

**LANCASTER COUNTY SAFETY ANALYSIS
148TH STREET
LANCASTER COUNTY, NE
TRAFFIC STUDY REPORT**

Prepared for:

Larry Legg, PE
Lancaster County
444 Cherrycreek Rd, Bldg. C
Lincoln, NE 68528

Prepared by:

Felsburg Holt & Ullevig
11422 Miracle Hills Drive, Suite 115
Omaha, NE 68154
402.445.4405

Project Manager: Adam Denney, PE
Project Team: Mark Meisinger, PE, PTOE
Rick Haden



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I. INTRODUCTION

A. *Project Description and Location*

The Lancaster County Engineer's Office has commissioned a traffic safety study to evaluate the existing and future traffic operations and safety for 148th Street between the intersections of Amberly Road and Old Cheney Road in Lancaster County, Nebraska. The location of the study corridor in relation to the surrounding roadway network is shown on **Figure 1**. This analysis utilizes information provided to Felsburg Holt & Ullevig (FHU) by Lancaster County, the Lincoln Metropolitan Planning Organization (MPO) and the Nebraska Department of Transportation (NDOT).

The purpose of this study is to identify improvements that should be implemented to improve safety and accommodate the future growth and travel within the study area. The study includes a speed study, auxiliary turn lane analysis, signal warrant analysis and a detailed crash analysis. The primary focus is on traffic operations at the following intersections:

- 148th Street with Amberly Road
- 148th Street with Adams Street
- 148th Street with O Street
- 148th Street with Old Cheney Road

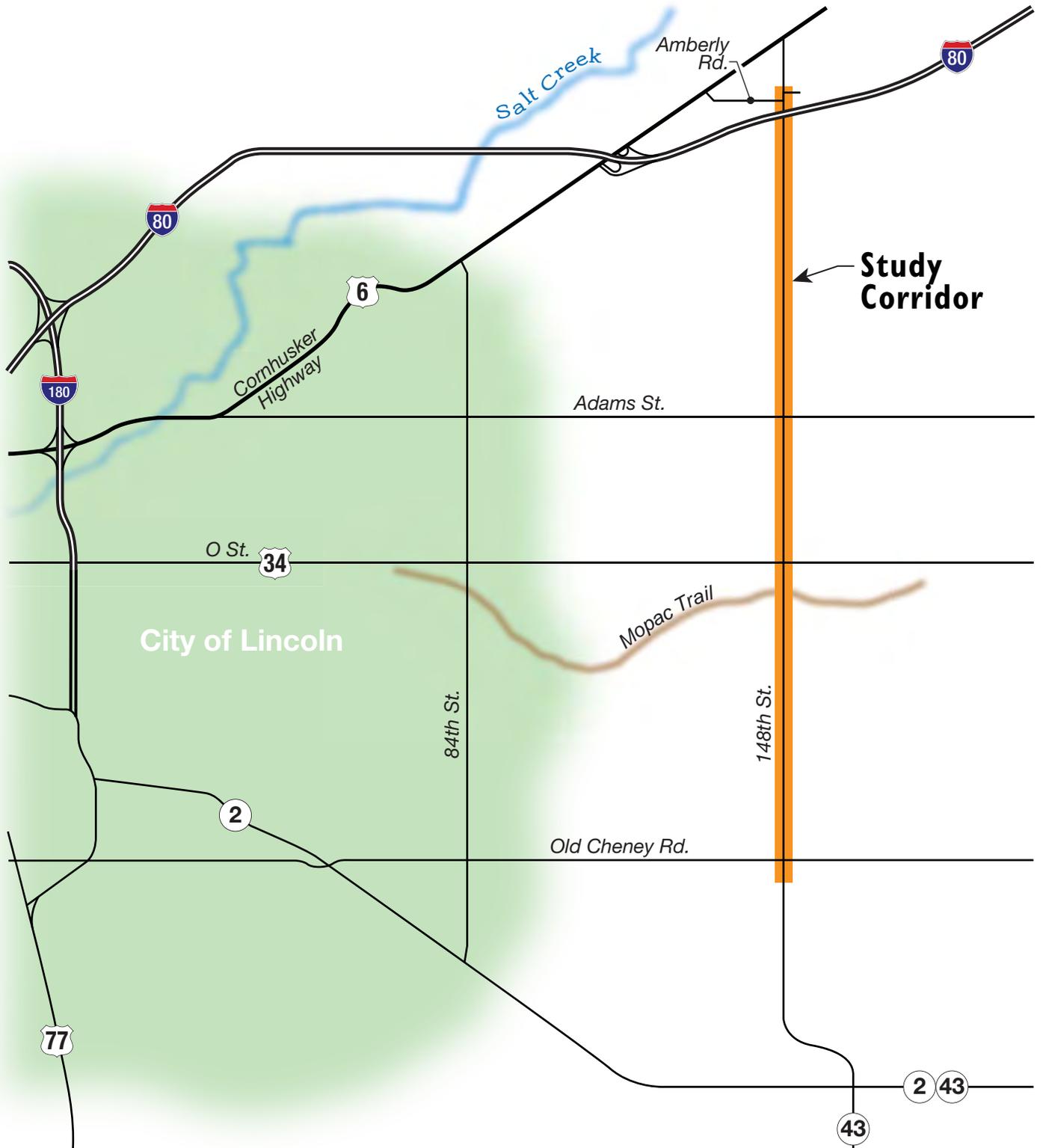
The study evaluates the following time periods:

- Existing (2018) weekday morning and evening peak hours
- Future (2040) weekday morning and evening peak hours

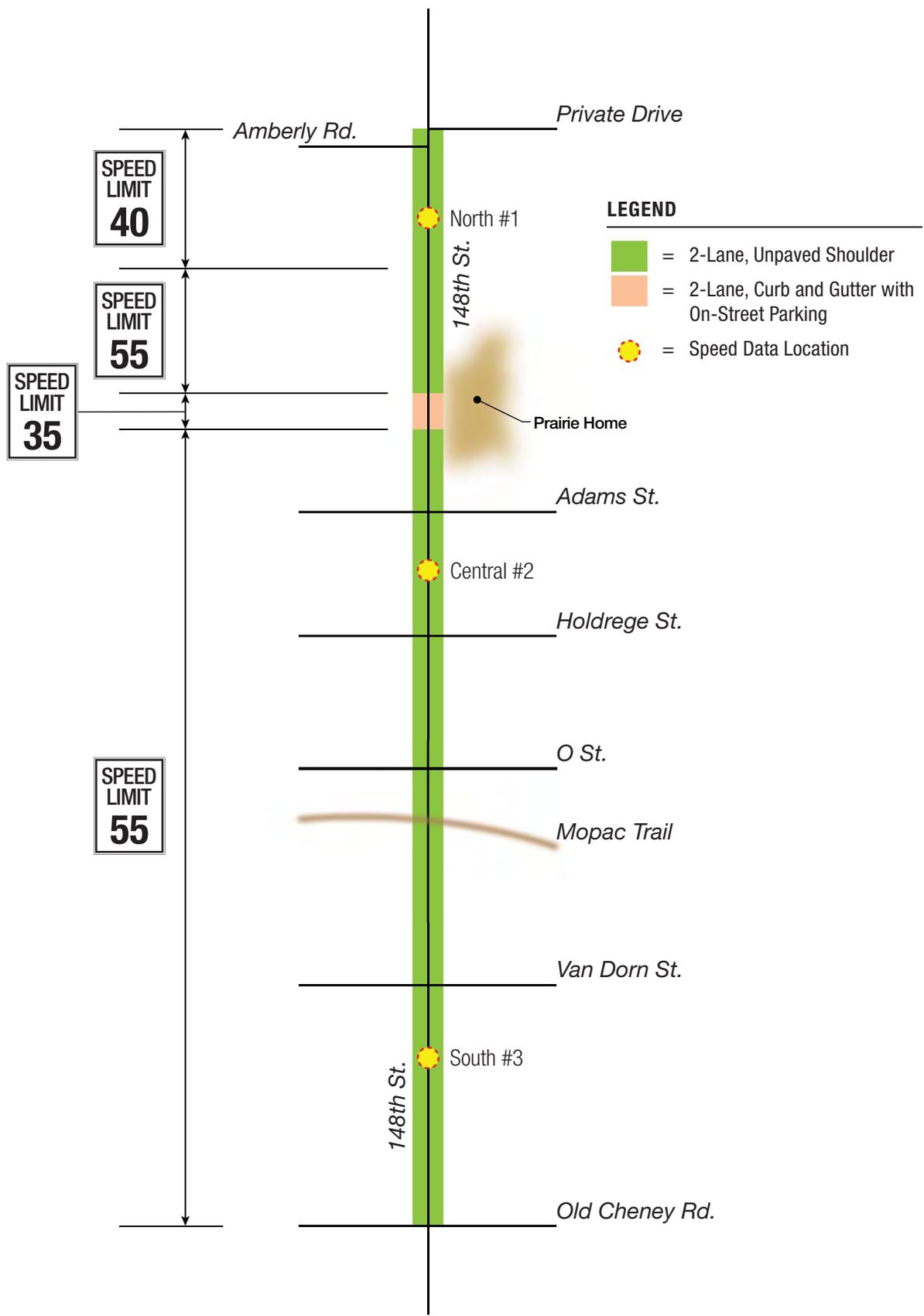
B. *Street Network*

The existing roadway system in the study area includes the following primary facilities:

- **148th Street** runs north-south from Mill Road in the north to Hooper Road in the south. In the study area, 148th Street is a two-lane undivided roadway with speed limits of 55, 40, and 35 miles per hour (mph). From Amberly Road to Old Cheney Road, 148th Street is a two-lane roadway with unpaved shoulders except for the segment that passes through Prairie Home. Within Prairie Home, 148th Street widens to allow for curb and gutter and on street parking. **Figure 2** shows the existing speed limits and roadway cross-sections within the study area. 148th Street provides access to the town of Waverly and the Prairie Home development.
- **Amberly Road** runs east-west and has a two-lane undivided cross section. The posted speed limit in this area is 40 mph or 25 mph when children are present and the school zone sign is flashing. At the intersection with 148th Street, Amberly Road is stop-controlled and a left-turn lane is provided on the northbound approach.
- **Adams St** runs east-west and is a two-lane undivided gravel road. The posted speed limit in this area of the study is 55 mph. Adams Street is stop-controlled at the intersection with 148th Street.
- **O St** runs east-west and has a two-lane undivided cross section. At the signalized intersection with 148th Street, left-turn lanes are provided on all approaches and right-turn lanes are provided on the eastbound and westbound approaches. The posted speed limit along O Street is 55 mph.
- **Old Cheney Road** runs east-west and has a two-lane undivided cross section with a posted speed limit of 55 mph. At the intersection with 148th Street, Old Cheney Road is stop-controlled.



Study Area | **FIGURE 1**



Existing Speed Limits and Roadway Cross-Sections

FIGURE 2

II. SPEED STUDY

FHU used data collection vendor MNRG to collect speed data at three locations, as shown on **Figure 2**, on 148th Street:

- 1,657 feet south of McKelvie Road,
- 2,356 feet north of Holdrege Street, and
- 2,625 feet south of Van Dorn Street.

Data was either collected for a 13-hour period from 6:00 AM – 7:00 PM or for a three-hour period in the morning, from 7:00 AM – 10:00 AM, and a five-hour period in the afternoon, from 2:00 PM – 7:00 PM. The studies were completed on either April 19th or May 22nd. This provided both off-peak and peak hour vehicle speeds to develop the 85th percentile speed for the corridor.

A. Methodology

To collect speed data at the three study locations, MNRG utilized Miovision Scout Connect. Data collection units were set up to track unique media access control (MAC) addresses from wi-fi connected devices (typically a cell phone) over a wi-fi network. A time stamp is created at each station for every MAC address detected. The time between stations and distance traveled are used to determine the space mean speed of the vehicle. The equation for space mean speed is as follows:

$$\text{Space mean speed: Distance / Median Travel Time in minutes} \times 60 \text{ minutes/hour}$$

B. 85th Percentile & Median Speed

Table I displays the results of the speed study. Additional data including graphs and charts for each location are included in the **Appendix**. Please note that these graphics display travel time and not speeds.

Table I. 85th Percentile & Median Speed

Roadway	Location	85 th Percentile Speed (mph)		Median Speed (mph)	
		NB	SB	NB	SB
148 th Street	North #1	70.82	57.39	55.48	53.69
148 th Street	Central #2	68.81	72.89	59.73	60.26
148 th Street	South #3	61.67	59.04	53.75	56.27
Directional Average		70.35	67.10	63.11	56.32
Overall Roadway Average		65.10		57.14	

The calculated 85th percentile speed over the analysis period ranged from just over the speed limit (57 mph) to segments with vehicles traveling at almost 18 mph over the posted speed limit. Overall, the average 85th percentile speed for the corridor was calculated to be 65.10 mph, approximately 10 mph over the posted speed limit. The median speed or 50th percentile speed was calculated to be 57.14 mph. The range of travel speeds on 148th Street varied widely depending on level of traffic.

C. Recommendation

Typically, a good indicator of what the posted speed limit should be set at is the 85th percentile speed, recognizing that 85% of drivers generally drive what is prudent. However, that is not the only factor that

should be considered when recommending the speed limit for a roadway. Other factors that should be evaluated are grades, cross-sections, median or 50th percentile speed, traffic volume, crash history, frequency of access points, sight distance, pedestrian activity, and engineering judgment.

As a tool to help assist in determining the appropriate posted speed limit for 148th Street, FHU utilized the Federal Highway Administration's (FHWA) USLIMIT2 tool. The tool completes a statistical analysis based on several roadway specific inputs including current speed limit, roadway features, ADT volumes, and crash statistics to develop a recommended posted speed limit. The results of the USLIMIT2 analysis are included in the **Appendix**. Please note, the recommended speed limits from the USLIMIT2 tool are higher than the 55-mph statutory speed limit for this type of road.

Based on speed study results, the roadway cross-section, crash history, engineering judgment, and FHWA guidance, it is recommended that the posted speed limits on 148th Street from Old Cheney Road to Amberly Road remain at 55 mph, outside of Prairie Home. With the higher speeds recorded along this corridor, it is recommended that strategic law enforcement be used to deter speeding. These efforts should be focused on the Central #2 (Adams Street to O Street) segment.

It is also recommended that additional Speed Limit signs be posted along 148th Street at the intersections with Alvo Road, Havelock Avenue, Adam Street, Holdridge Street, A Street, Van Dorn Street, Pioneers Boulevard, and Old Cheney Road. Signs should be placed north of the intersections on the east side of the roadway for northbound traffic and south of the intersections on west side of the roadway for southbound traffic.

III. EXISTING OPERATIONS

A. 2018 Existing Traffic Volumes

Traffic count vendor MNRG conducted peak hour turning movement counts at the intersection of 148th Street with Amberly Road, Adams Street, O Street, MoPac Trail and Old Cheney Road from Tuesday, April 17th, 2018 to Thursday, April 19th, 2018. The AM and PM Peak hours are summarized in **Table 2**. Trucks and buses were counted separately from passenger vehicles to develop heavy vehicle percentages for the study area. Existing traffic volumes are summarized on **Figure 3** and a more detailed report of the traffic count data is provided in the **Appendix**.

Table 2. AM & PM Peak Hours – 148th Street

Cross Section	Amberly Road	Adams Street	O Street	Mopac Trail	Old Cheney Road
Date of Count	4/17/2018	4/19/2018	4/18/2018	4/18/2018	4/18/2018
AM PEAK	7:45 AM - 8:45 AM	7:15 AM - 8:15 AM	7:15 AM - 8:15 AM	7:15 AM - 8:15 AM	7:00 AM - 8:00 AM
PM PEAK	5:00 PM - 6:00 PM	4:15 PM - 5:15 PM	4:45 PM - 5:45 PM	4:45 PM - 5:45 PM	4:45 PM - 5:45 PM

B. 2018 Existing Traffic Operations

Traffic operations were analyzed for the study intersections using procedures documented in the *Highway Capacity Manual (HCM) 6th Edition*, Transportation Research Board, 2016. From the analyses, a key measure or “level of service” rating of the traffic operational condition was obtained. In general, level of service (LOS) is a qualitative assessment of traffic operational conditions within a traffic stream in terms of the average stopped delay per vehicle at a controlled intersection. Levels of service are described by a letter designation of either A, B, C, D, E or F, with LOS A representing essentially uninterrupted flow, and LOS F representing a breakdown of traffic flow with noticeable congestion and delay. Unsignalized, or stop sign controlled, intersection capacity analyses produce LOS results for each movement which must yield to conflicting traffic at the intersection. **Table 3** summarizes LOS criteria for signalized and unsignalized (stop sign controlled) intersections.

Table 3. Level of Service (LOS) Criteria

Level of Service	Average Control Delay per Vehicle (sec/veh)	
	Signalized Intersections	Stop Sign Controlled Intersections
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

HCM 6th Edition, Exhibit 19-8 & Exhibit 20-2

The Synchro traffic analysis software program was utilized to analyze traffic operations at the study intersections. Traffic operations were analyzed for the AM and PM peak hours using 2018 traffic volumes with existing intersection configurations. **Figure 4** shows the lane geometry, traffic control, and levels of service for 2018 existing traffic conditions.

148th Street & Amberly Road

At the intersection of 148th Street with Amberly Road, the eastbound stop-controlled approach currently operates at LOS C for both peak hours. All other approaches operate at LOS A for both the AM and PM peak hours.

148th Street & Adams Street

At the intersection of 148th Street with Adams Street, the eastbound and westbound stop-controlled approaches currently operate at LOS C for both peak hours. The northbound and southbound approaches operate at LOS A for both the AM and PM peak hours.

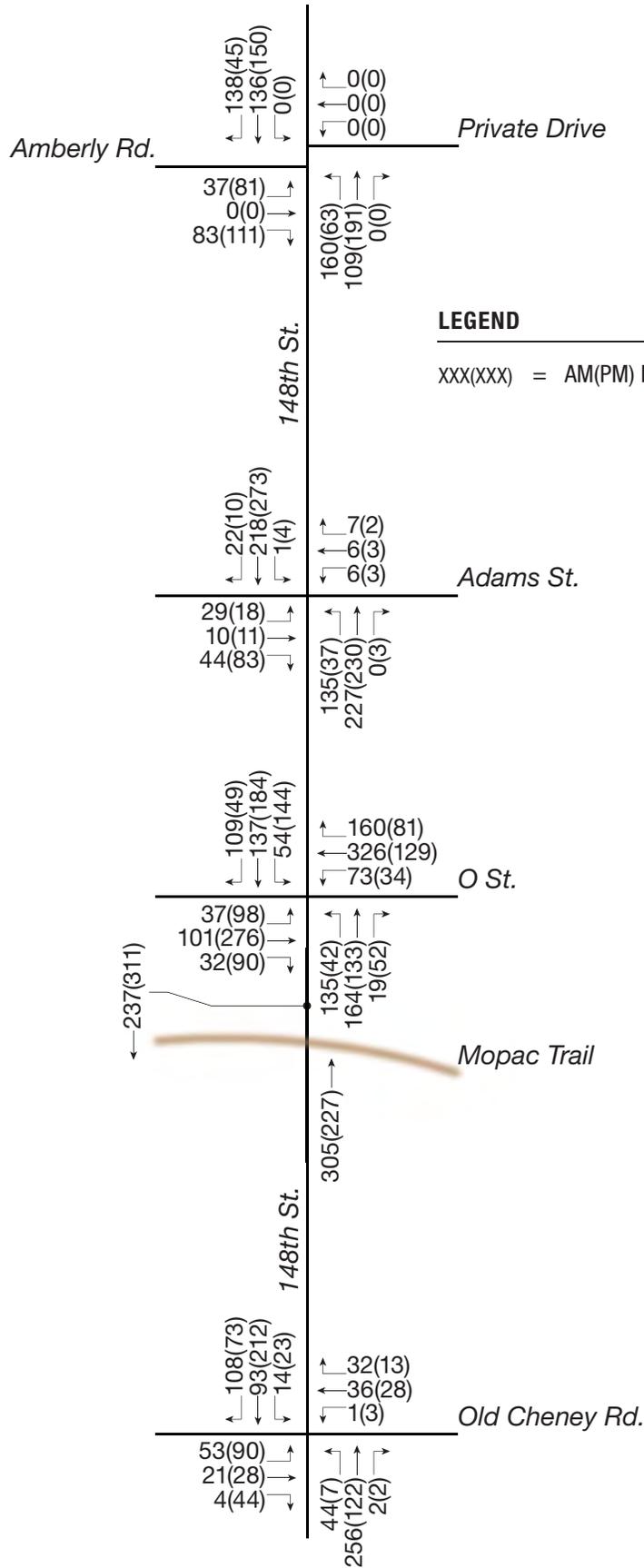
148th Street & O Street

The signalized intersection of 148th Street with O Street currently operates at a LOS B in both the AM and PM peak hour. During the AM peak hour, the northbound left-turn lane operates at LOS C and during the PM peak hour, the southbound left-turn lane operates at LOS C. All other movements operate at LOS B or better during both peak hours.

148th Street & Old Cheney Road

At the intersection of 148th Street with Old Cheney Road, the eastbound stop-controlled approach currently operates at LOS C for both peak hours. The westbound stop-controlled approach operates at LOS C in the AM peak hour and LOS B in the PM peak hour. The northbound and southbound approaches operate at LOS A during both peak hours.

Synchro capacity analysis worksheets for 2018 existing traffic conditions are included in the **Appendix**.



LEGEND

XXX(XXX) = AM(PM) Peak Hour Traffic Volumes



2018 Existing Traffic Volumes

FIGURE 3

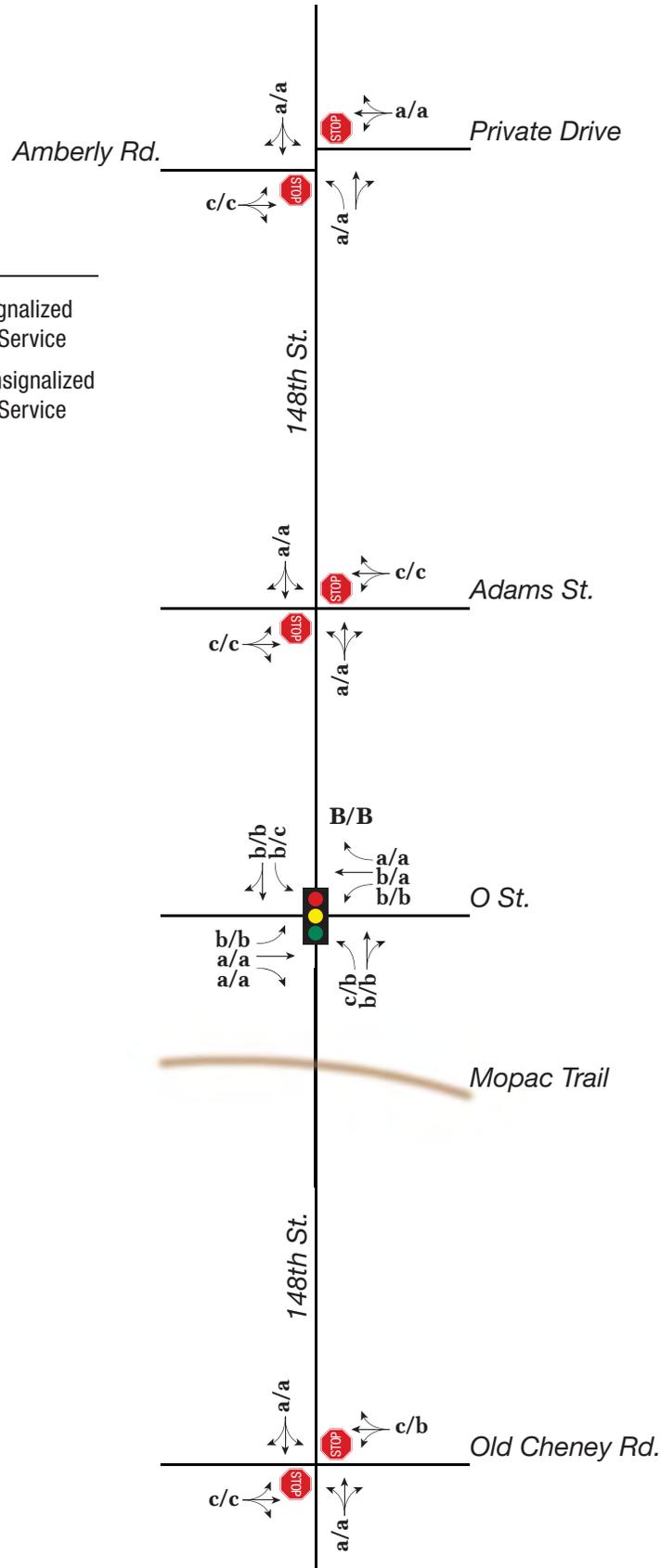
LEGEND

X/X = AM/PM Peak Hour Signalized Intersection Level of Service

x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

 = Stop Sign

 = Traffic Signal



2018 Existing Operations

FIGURE 4

IV. FUTURE OPERATIONS

A. 2040 Future Traffic Volumes

Future year traffic volumes were developed for analysis from trends in historic traffic counts provided by the Lancaster County Engineer’s office. Estimated 2040 peak hour turning movements for the study intersections were developed using a straight-line annual growth rate of 4.5% on 148th Street and O Street and 1% on the side streets. The 2040 traffic volumes are shown on **Figure 5**.

B. Roadway LOS Thresholds

For roadways, LOS is a qualitative assessment of traffic operational conditions within a traffic stream in terms of its volume to capacity ratio of the segment. To develop roadway segment LOS for the study area roadway network, LOS thresholds were utilized from the *Maximum Traffic Volumes at Level of Service C Versus Facility Type Table* developed by the Lincoln - Lancaster County Planning Department. **Table 4** displays the LOS C capacity threshold by facility type which were used for the analysis of the study area roadway network.

Table 4. Maximum Traffic Volumes at Level of Service C Versus Facility Type

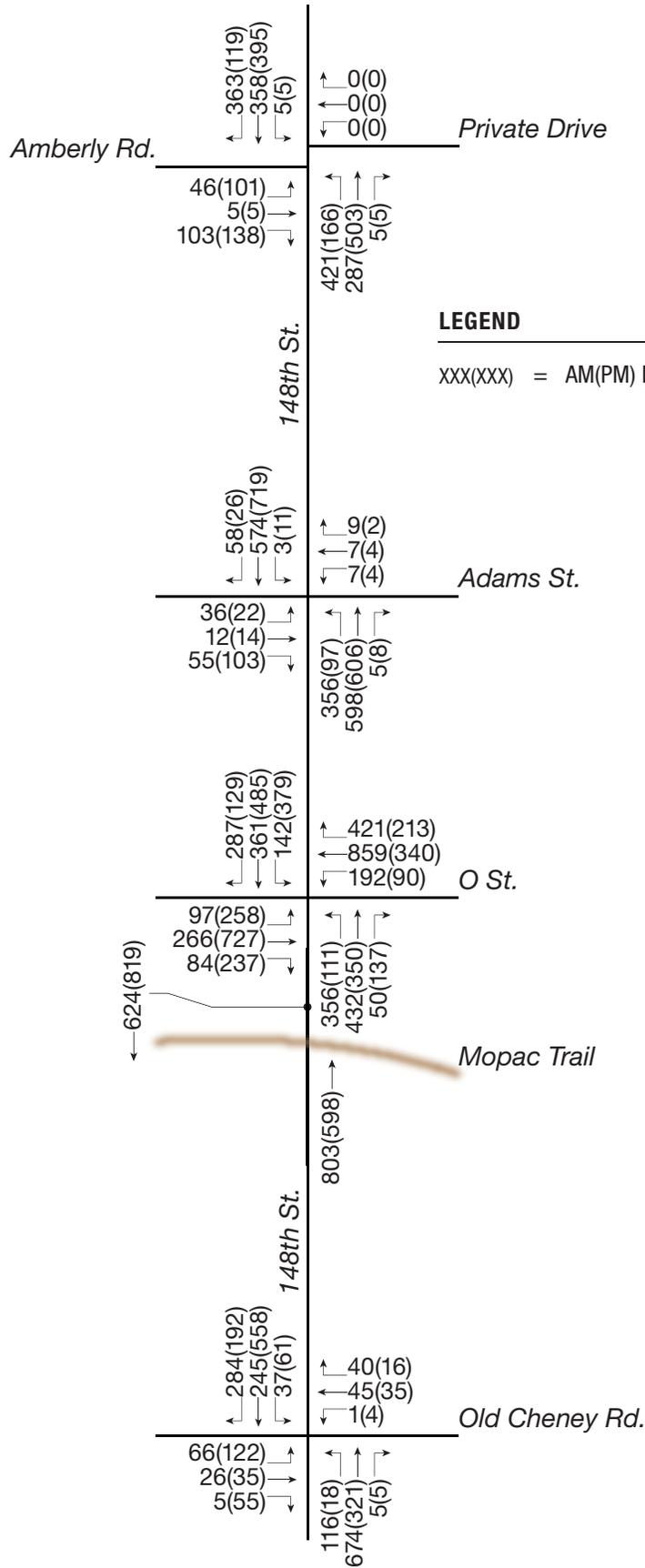
Type of Street and Number of Through Lanes (2-Way Traffic)	Maximum Capacity (LOS C) (Vehicles Per Day)
2-lane surfaced street, 7.9-9.8 m (26-32 ft) wide, without turn lanes	3,500 - 6,000
2-lane surfaced street, 7.9-9.8 m (26-32 ft) wide, with turn lanes	6,000 - 14,000
4-lane surfaced street, 13.4 m (44 ft) wide, without turn lanes	16,000
4-lane surfaced street, 13.4-18 m (44-60 ft) wide, with turn lanes	20,000 - 24,000
4-lane surfaced street with medians	28,000 - 30,000
4-lane divided roadway with partial access control	32,000
4-lane divided roadway with full access control	38,000
6-lane surfaced roadway with medians	40,000

Source: Lincoln - Lancaster County Planning Department

Table 5 shows the facility type and levels of service for the 2018 existing and 2040 future traffic scenarios. The segments which exceed the capacity thresholds are highlighted in the table. Assuming no improvements are made to 148th Street and it remains a two-lane surfaced street without turn lanes, all segments exceed the LOS C threshold of 6,000 ADT in future 2040 year. Given the high percentage of trucks (___%-___%) travelling on 148th Street the threshold ADT should be considered operating at a higher LOS (D).

Table 5. Roadway Capacity

Roadway Segment	Facility Type	Threshold ADT (LOS C)	2018 Existing ADT	2040 Future ADT
148 th Street	2-lane surfaced street, without turn lanes	6,000	5,850	15,410
	2-lane surfaced street, with turn lanes	14,000	5,850	15,410
	4-lane surfaced street, with turn lanes	24,000	5,850	15,410
	2-lane surfaced street, without turn lanes	6,000	4,960	13,065
	2-lane surfaced street, with turn lanes	14,000	4,960	13,065



LEGEND

XXX(XXX) = AM(PM) Peak Hour Traffic Volumes



2040 Traffic Volumes

FIGURE 5

With the addition of turn lanes along 148th Street the maximum capacity threshold is estimated at 14,000 ADT. The 2040 future ADT projections for the segment of 148th Street between O Street and Old Cheney Road would fall below this threshold but the segment between Amberly Road and O Street would exceed the LOS C threshold. If 148th Street were converted to a four-lane roadway with turn lanes, 2040 ADT projections for all the study area segments would fall below the maximum capacity threshold. As such, it is recommended that 148th Street be a four-lane surfaced street with turn lanes from Amberly Road to O Street and a four-lane surfaced street with turn lanes from O Street to Old Cheney Road. It is also recommended that O Street be widened to a four-lane cross-section.

C. Auxiliary Turn Lane Analysis

The National Cooperative Highway Research Program (NCHRP) has developed guidance to determine if an auxiliary turn lane is warranted on the major road of a two-way stop-controlled intersection. These guidelines are published in *NCHRP Report 457: Evaluating Intersection Improvements*. The methodologies are based on an evaluation of the operating and collision costs associated with the turning maneuver relative to the cost of constructing a turn lane. For left-turn lanes, *NCHRP Report 457* guidelines are based upon the following measures:

- Major road 85th percentile speed (posted speed can be used if data is unavailable)
- Percent of left-turns in advancing volume
- Major road peak hour advancing and opposing traffic volumes

For auxiliary right-turn lanes, *NCHRP Report 457* guidelines are based upon the following measures:

- Major road 85th percentile speed (posted speed can be used if data is unavailable)
- Major road peak hour approaching traffic volumes
- Right-turn traffic volumes

NCHRP Report 457 also provides guidance on when to provide an additional approach lane on the minor leg of a two-way stop-controlled intersection. It is based on the need to provide the side street with an acceptable level of service. To determine the approach geometry, *NCHRP Report 457* guidelines are based upon the following measures:

- Major road peak hour traffic volumes (total of both directions)
- Minor road peak hour approaching traffic volumes
- Right-turn traffic volumes
- Percentage of right-turns

The AM and PM peak hour volumes for 2018 existing and 2040 future scenarios were examined at the study intersections of 148th Street with Amberly Road, Adams Street, and Old Cheney Road to determine the geometric needs of the intersections. Results of the NCHRP 457 Geometric Improvement Evaluation are show in **Table 6**.

Table 6. Auxiliary Turn Lane Analysis Summary

Intersection	Warrant	2018 Existing		2040 Future	
		AM Peak	PM Peak	AM Peak	PM Peak
148th Street & Old Cheney Road	NB Left-Turn Lane	NO	NO	YES	YES
	NB Right-Turn Lane	NO	NO	NO	NO
	EB Approach	One Lane	One Lane	Two Lanes	Two Lanes
	SB Left-Turn Lane	NO	NO	YES	YES
	SB Right-Turn Lane	YES	YES	YES	YES
	WB Approach	One Lane	One Lane	One Lane	One Lane
148th Street & Adams St	NB Left-Turn Lane	YES	NO	YES	YES
	NB Right-Turn Lane	NO	NO	NO	NO
	EB Approach	One Lane	One Lane	One Lane	One Lane
	SB Left-Turn Lane	NO	NO	YES	YES
	SB Right-Turn Lane	YES	YES	YES	YES
	WB Approach	One Lane	One Lane	One Lane	One Lane
148th Street & Amberly Road / Private Drive	NB Left-Turn Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane
	NB Right-Turn Lane	NO	NO	NO	NO
	EB Approach	One Lane	One Lane	Two Lanes	Two Lanes
	SB Left-Turn Lane	NO	NO	NO	NO
	SB Right-Turn Lane	NO	NO	YES	YES
	WB Approach	NO	NO	NO	NO

In summary, under existing traffic conditions a southbound right-turn lane is warranted at the intersection of 148th Street with Old Cheney Road. A northbound left-turn lane and southbound right-turn lane are also warranted at the intersection of 148th Street with Adams Street. By 2040, left-turn lanes on 148th Street are expected to be warranted at the intersections with Old Cheney Road and Adams Street. An eastbound two-lane approach would also be recommended at the intersection of 148th Street with Old Cheney Road. At the intersection of 148th Street with Amberly Road, a southbound right-turn lane and a two-lane eastbound approach are expected to be warranted. A detailed summary of the results can be found in the **Appendix**.

D. Traffic Control Device Warrant Evaluation

A review of the study area intersections was performed to determine if the Manual on Uniform Traffic Control Devices (MUTCD) traffic signalization Warrant 1 (Eight-Hour Vehicular Volume) or Warrant 2 (Four-Hour Vehicular Volume) are satisfied under 2018 existing and 2040 future traffic volumes. All intersections along 148th Street were analyzed as rural, high speed intersections.

Table 7 displays a summary of MUTCD Warrants 1 and 2 for the study intersections. Neither MUTCD traffic signal Warrant 1 or Warrant 2 are satisfied at any of the study area intersections in 2018 under existing lane configurations. By 2040, MUTCD minimum signal warrants may be satisfied at all study area intersections. The 2040 warrant evaluation assumes the recommended turn lanes are constructed along

148th Street and two-lane approaches are provided on the recommended minor roads. At the intersection of 148th Street with Amberly Road, none of the eastbound right-turns were included in the analysis. MUTCD traffic signal warrants should be periodically re-evaluated at these locations as area development and traffic levels increase in the study area.

Table 7. Traffic Control Device Warrant Summary

Intersection	MUTCD Warrant	Is Warrant Met?	
		2018 Existing	2040 Future
148th & Amberly Road	Warrant 1	NO	NO (0% EB rights)
	Warrant 2	NO	YES (0% EB rights)
148th & Adams Street	Warrant 1	NO	YES
	Warrant 2	NO	YES
148th Street & Old Cheney Road	Warrant 1	NO	YES
	Warrant 2	NO	YES

In summary, the 2040 future traffic volumes are sufficient to meet the minimum warrants for the installation of a traffic signal at 148th Street with Amberly Road, Adams Street, and Old Cheney Road with the recommended auxiliary turn lanes included. The installation of roundabouts was also considered at the intersections of 148th Street with Adams Street and Old Cheney Road. A detailed summary of the results can be found in the **Appendix**.

E. 2040 Future Traffic Operations

The traffic analysis software program Synchro and the roundabout analysis program SIDRA were utilized to analyze traffic operations for the AM and PM peak hours using 2040 traffic volumes with the recommended intersection geometry and traffic control configurations. **Figure 6** shows the lane geometry, traffic control, and levels of service for 2040 future traffic conditions.

148th Street & Amberly Road

The intersection was analyzed as a signalized intersection with the addition of a southbound right-turn lane and eastbound left-turn lane. With these improvements the intersection is anticipated to operate at LOS C in the AM peak hour and LOS B in the PM peak hour. The northbound left-turn lane is anticipated to operate at LOS D in the AM peak hour and the eastbound shared through/right-turn lane is anticipated to operate at LOS D during the AM peak hour and LOS C during the PM peak hour. The eastbound left-turn lane is anticipated to operate at LOS C during both the AM and PM peak hours. All other movements are anticipated to operate at LOS B or better for both peak hours.

148th Street & Adams Street

The intersection was analyzed as a multi-lane roundabout. With this improvement the intersection is anticipated to operate at LOS B in the AM peak hour and LOS A in the PM peak hour. All movements are anticipated to operate at LOS B or better for both the AM and PM peak hours.

148th Street & O Street

The intersection was analyzed as a signalized intersection with O Street widened to a four-lane undivided roadway and the addition of a southbound right-turn lane. With these improvements the intersection is anticipated to operate at LOS C in the AM peak hour and LOS D in the PM peak hour. The northbound

shared through/right-turn lane and southbound right-turn lane are anticipated to operate at LOS E during the PM peak hour. All other movements are anticipated to operate at LOS D or better during both peak hours.

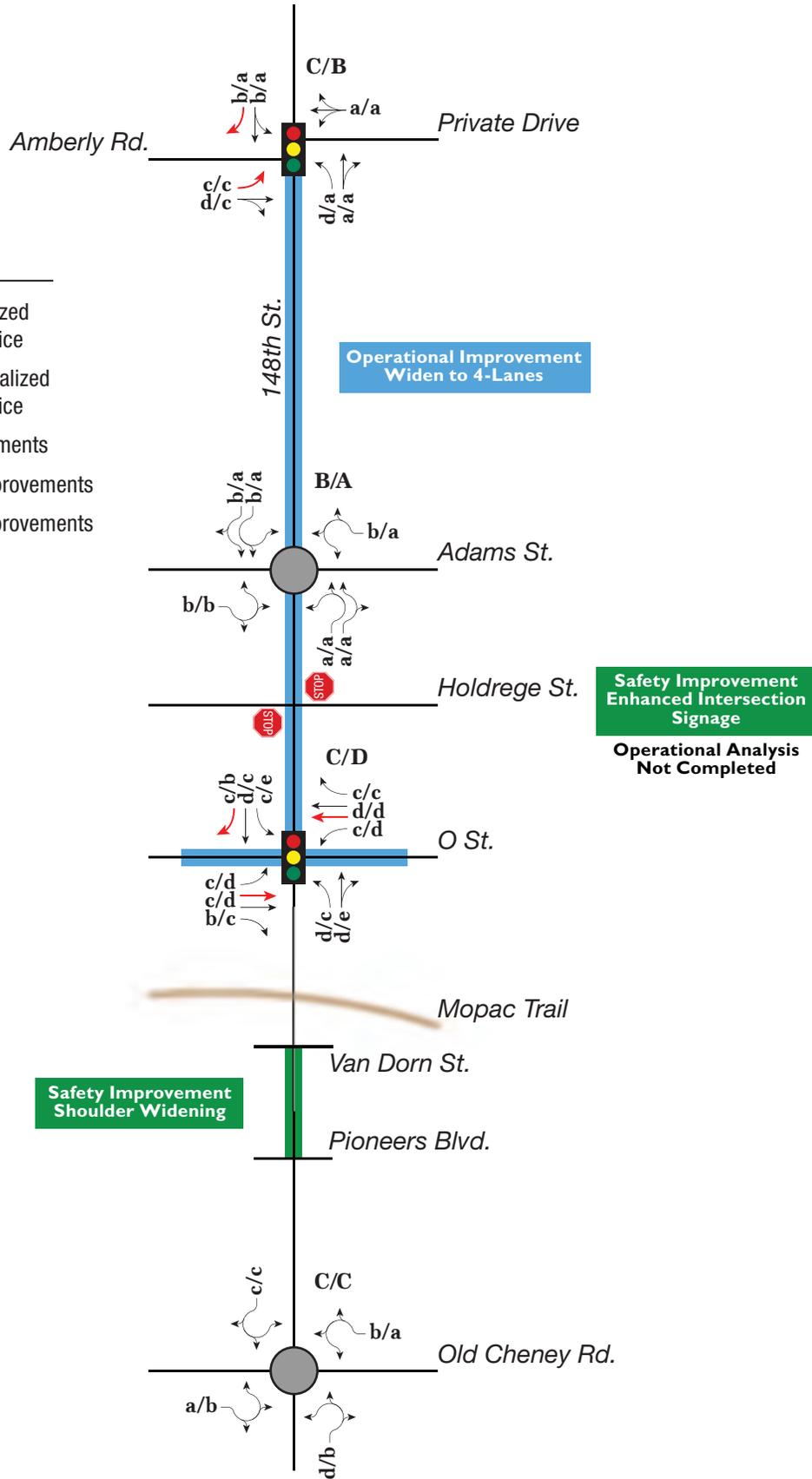
148th Street & Old Cheney Road

The intersection was analyzed as a single-lane roundabout. With this improvement the intersection is anticipated to operate at LOS C for both peak hours. The northbound approach is anticipated to operate at LOS D during the AM peak hour and the southbound approach is anticipated to operate at LOS C during both peak hours. All other movements are anticipated to operate at LOS B or better during both the AM and PM peak hours.

Synchro and SIDRA capacity analysis worksheets for 2040 future traffic conditions are included in the **Appendix**.

LEGEND

- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
- = Proposed Safety Improvements
- ↷ = Proposed Operational Improvements
- = Proposed Operational Improvements Widen to 4-Lanes
- ⊙ = Roundabout
- STOP = Stop Sign
- 🚦 = Traffic Signal



2040 Future Operations with Roundabout

FIGURE 6

V. SAFETY ANALYSIS

A. Crash History

The crash history on 148th Street for the period of 1/1/2013 to 2/28/2018 was examined between Old Cheney Road and Amberly Road (including intersections) to locate crash patterns and identify crash causality. The statewide average crash rate between 2012 and 2014 for a two-lane non-shouldered rural highway is 0.721 (0.638 for all two-lane combined) accidents per million vehicle miles (acc/mvm). Rural Nebraska intersection accident rates are 0.235 (acc/mv) for non-shouldered and 0.265 (acc/mv) overall, again from 2012 to 2014.

Over the 5-year 2-month analysis period 50 crashes occurred in segments along with another 35 at the intersections for a total of 85 accidents. There is one segment of 148th Street with a higher crash rate than the statewide average: the segment from Pioneers Boulevard to Van Dorn Street. There are also multiple intersections with higher crash rates than the statewide average, including the intersection of Holdrege Street with 148th Street with a crash rate just over three times the statewide average. The Accident Rate Analysis and the Collision Diagrams prepared by NDOT are attached to this memo. Crash reports from the City of Lincoln are also attached.

Table 8 summarizes the crash history by severity for each roadway segment between Old Cheney Road and Amberly Road over the 5-year 2-month study period. **Table 9** shows the segment crashes by type of collision. **Table 10** provides each study intersection by severity over the 5-year 2-month study period. **Table 11** summarizes the crash history for each intersection by type of collision.

Figures follow each table that give a graphical representation for the data. **Figure 7** displays segment crashes by severity and **Figure 8** provides a visual for segment crash by type. **Figure 9** shows intersection crashes by severity and is followed by **Figure 10** which displays the intersection crashes by type.

Table 8. 148th Street Segments Crash Summary by Severity

148 th Roadway Segment	Fatal	Injury			N-R	PDO	Totals
		INJ-A	INJ-B	INJ-C			
Old Cheney Rd to Pioneers Blvd	-	-	-	-	-	6	6
Pioneers Blvd to Van Dorn St	-	1	-	3	-	4	8
Van Dorn St to A St	-	-	-	2	1	3	6
A St to US 34 (O St)	-	-	-	1	-	-	1
US 34 (O St) to Plum Ridge Rd	-	1	1	2	2	-	6
Holdrege St to Adams St	-	1	-	3	-	2	6
Adams St to Havelock Ave	-	-	-	-	1	2	3
Havelock Ave to Fletcher Ave	-	-	-	2	-	2	4
Fletcher Ave to Alvo Rd	-	1	1	1	1	1	5
Alvo Rd to McKelvie Rd	1	-	-	-	-	2	3
McKelvie Rd to Amberly Rd	-	-	-	-	-	2	2
Totals	1	4	2	14	5	24	50

Table 9. I 48th Street Segments Crash Summary by Type

I 48th Roadway Segment	Rear End	Head On	Side Swipe (Same)	Side Swipe (Opp)	Right-Angle	Left Turn Leaving	Backing	Run Off Road	Animal	Totals
Old Cheney Rd to Pioneers Blvd	-	-	-	1	-	-	-	1	4	6
Pioneers Blvd to Van Dorn St	1	-	1	-	-	-	-	5	1	8
Van Dorn St to A St	-	-	-	1	1	-	-	1	3	6
A St to US 34 (O St)	-	-	-	-	1	-	-	-	-	1
US 34 (O St) to Holdrege St	1	-	-	-	-	-	-	4	1	6
Holdrege St to Adams St	2	-	1	-	-	-	-	3	-	6
Adams St to Havelock Ave	1	-	-	-	-	-	-	2	-	3
Havelock Ave to Fletcher Ave	-	-	-	1	-	-	-	3	-	4
Fletcher Ave to Alvo Rd	1	-	-	1	-	-	1	1	1	5
Alvo Rd to McKelvie Rd	-	1	-	-	-	1	-	1	-	3
McKelvie Rd to Amberly Rd	-	-	-	-	-	-	-	2	-	2
Totals	6	1	2	4	2	1	1	23	10	50

Figure 7. Segment Crashes – Severity

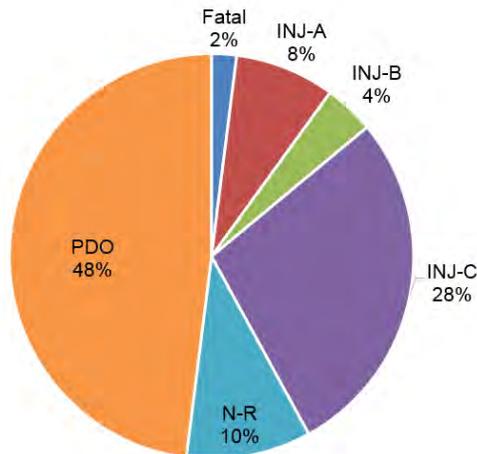


Figure 8. Segment Crashes - Type

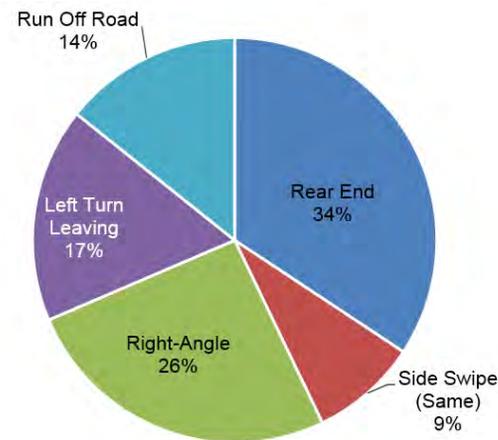


Table 10. 148th Street Intersections Crash Summary by Severity

Intersecting Roadway	Fatal	Injury			N-R	PDO	Totals
		INJ-A	INJ-B	INJ-C			
Old Cheney Rd	-	-	1	1	-	1	3
Pioneers Blvd	-	-	-	-	1	-	1
Van Dorn St	-	1	1	-	-	-	2
A St	-	-	-	-	-	-	0
US 34 (O St)	-	1	6	4	-	1	12
Holdrege St	-	1	1	1	2	4	9
Adams St	-	-	-	-	1	1	2
Havelock Ave	-	-	-	-	1	2	3
Fletcher Ave	-	-	-	-	-	1	1
Alvo Rd	-	-	-	-	-	1	1
McKelvie Rd	-	-	-	-	-	1	1
Totals	0	2	11	8	2	12	35

Table 11. 148th Street Intersections Crash Summary by Type

Intersecting Roadway	Rear End	Side Swipe (Same)	Right-Angle	Left Turn Leaving	Run Off Road	Totals
Old Cheney Rd	1	-	1	1	-	3
Pioneers Blvd	-	-	-	-	1	1
Van Dorn St	-	1	1	-	-	2
A St	-	-	-	-	-	0
US 34 (O St)	1	1	6	4	-	12
Holdrege St	4	1	1	1	2	9
Adams St	1	-	-	-	1	2
Havelock Ave	2	-	-	-	1	3
Fletcher Ave	1	-	-	-	-	1
Alvo Rd	1	-	-	-	-	1
McKelvie Rd	1	-	-	-	-	1
Totals	12	3	9	6	5	35

Figure 9. Intersection Crashes - Severity

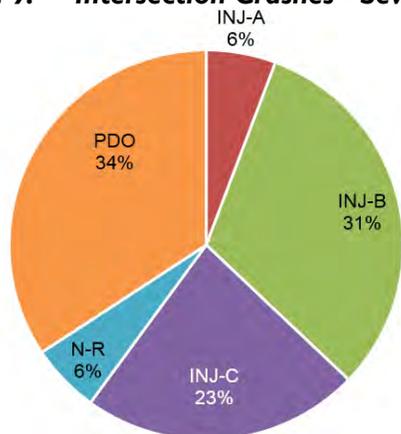


Figure 10. Intersection Crashes - Type

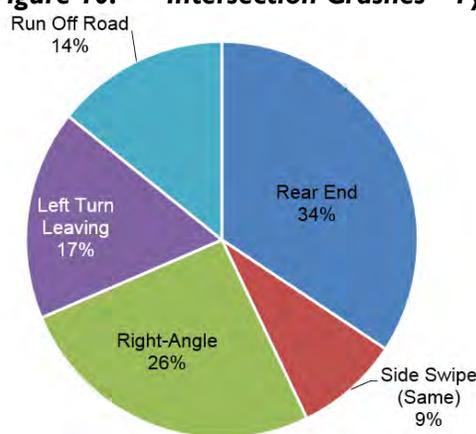


Figure 11 displays the breakdown of crash rates by segment from Old Cheney Road to Amberly Road. The figure illustrates three things: traffic volumes, segment crash rates, and statewide crash rates. The bar graph with axis on the left gives the number of million vehicle miles travelled in a 5-year 2-month period on the segment. The lines on the graph correspond to the axis on the right-hand side which shows crash rates for each of the segments as well as the Nebraska state average for comparable roadways. **Figure 12** shows the same information summarized for intersections.

Figure 11. 148th Street Segment Crash Rate Summary

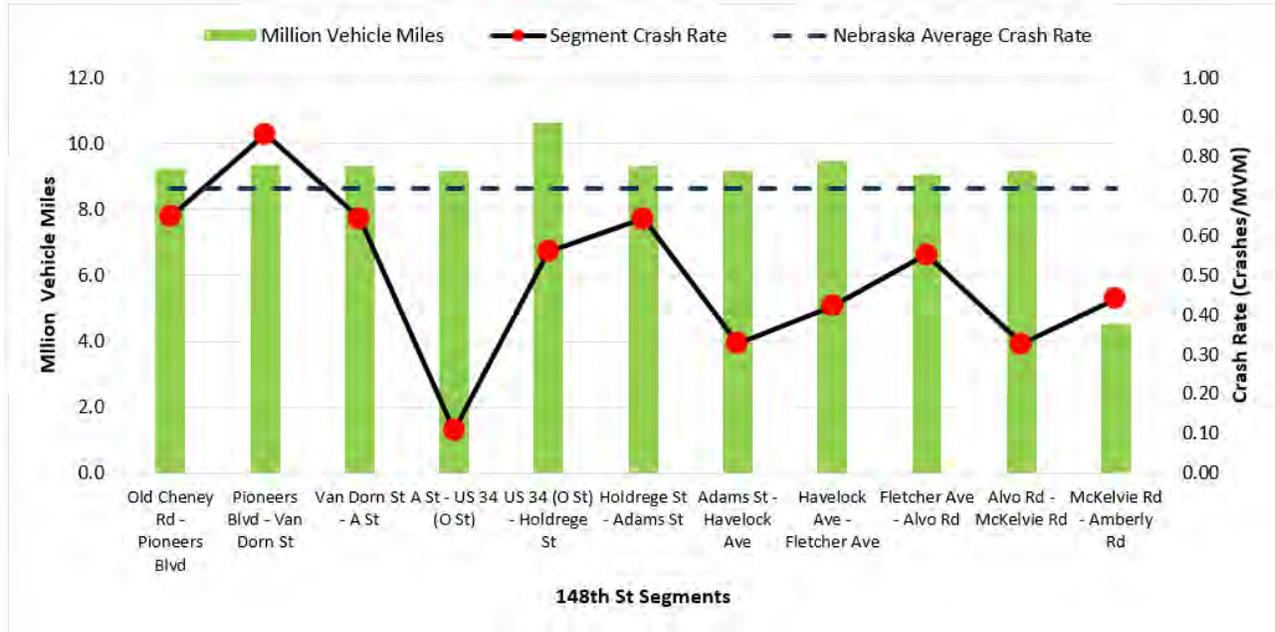


Figure 12. 148th Street Intersection Crash Rate Summary

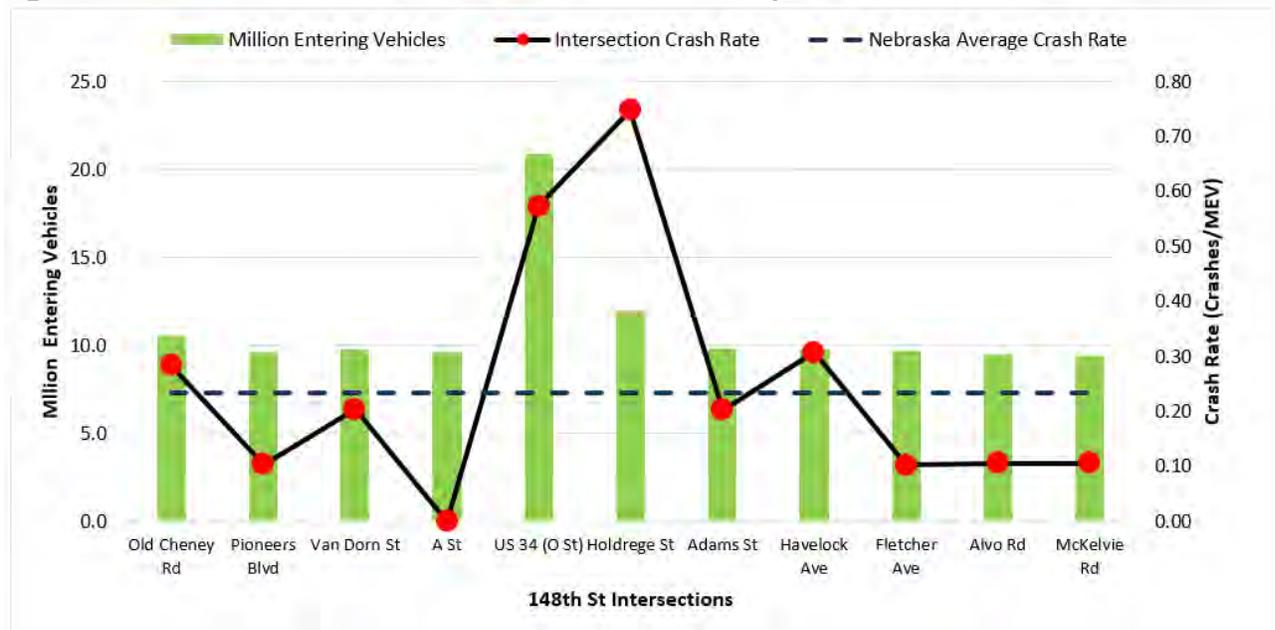
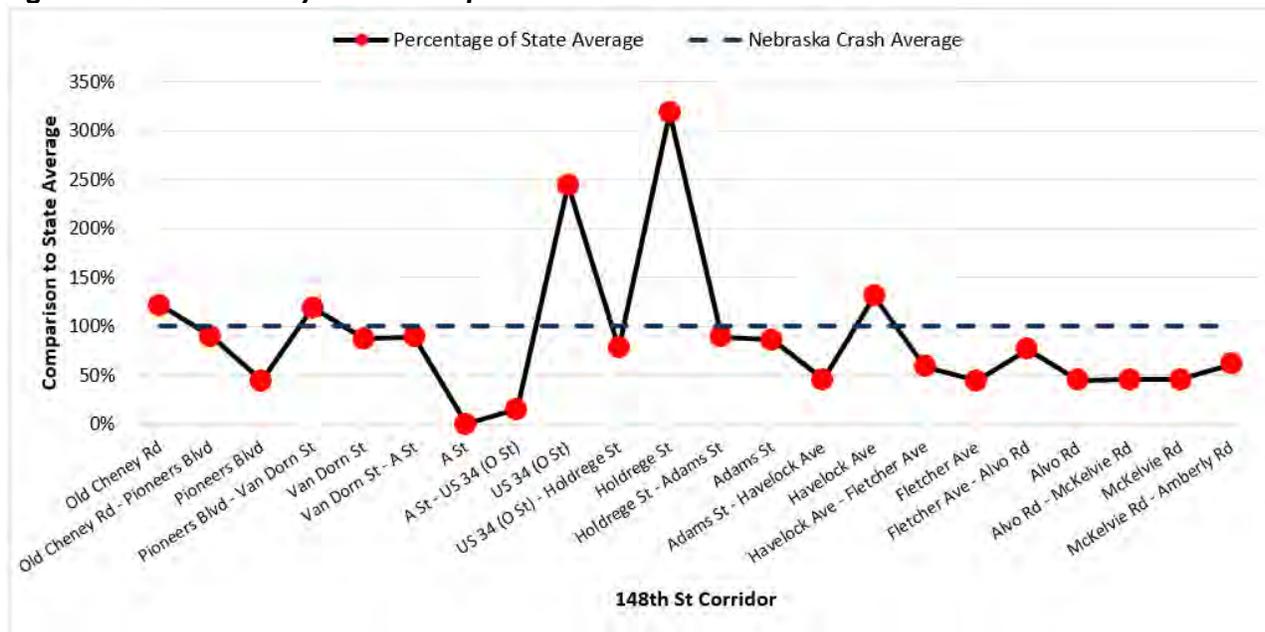


Figure 13 gives a visual representation for both facility types compared to their respective state averages. The graph shows two intersections that are of concern with much higher than average crash rates; the O Street intersection and the Holdrege Street intersection.

Figure 13. Roadway Crash Comparison



B. Proposed Safety Improvements

Based on the existing traffic operations and crash patterns, countermeasures were analyzed to improve safety along 148th Street.

Countermeasure 1: Pioneers Boulevard to Van Dorn Street (Construct 6' Paved Shoulders & Roadside Rumble Strips)

There is a high frequency of off-road crashes on 148th Street between Pioneers Boulevard and Van Dorn Street. The existing shoulders would be widened to 6' and paved with safety edges along the length of the study area.

Countermeasure 2: Enhanced Intersection Signage

There is a high frequency of crashes at the intersection of 148th Street with Holdrege Street. These crashes could be reduced with enhanced intersection signage. Additional signage that could be provided includes high visibility, solar powered LED Stop Signs, "Look Again" or "Cross Traffic Does Not Stop" supplemental signage below the Stop Sign, and also reflective tape on the sign post.

C. Project Costs

Based on a planning level cost estimate, the addition of shoulders and rumble strips between Pioneers Boulevard to Van Dorn Street is estimated to cost approximately **\$941,000**.

Countermeasure 2 is estimated at approximately **\$5,000**. More detailed cost estimates are provided in the **Chapter VI. Cost Estimates**.

D. Benefits of Project

The observed crash history along the roadway segments will be directly addressed with the countermeasures described above. The segment crashes have significant numbers of run off road type accidents, which can be greatly affected by roadside improvements.

E. Benefit Cost Analysis

A Benefit Cost Analysis (BCA) was completed for both countermeasures. A B/C tool developed by FHU that follows the example process given by NDOR was utilized. The BCA was completed on an annual basis, assuming an improvement life period, construction costs, and maintenance costs for the project. With this excel spreadsheet, intersections and segments can be analyzed together or separately if desired as long as each crash only has one assigned mitigation technique. This BCA evaluated crashes by type, instead of by severity, as per the preferred method by NDOR. In general, projects with a B/C ratio of 1.0 or greater have greater benefits than costs over the analysis time period. Only crashes directly affected by the proposed improvement were used in the benefit/cost calculations.

Societal cost of traffic crashes by severity and by type were gathered from the *Proposed 2016 428 NAC 2 Standards* provided by NDOR. For the BCA analysis, Crash Modification Factors (CMF) / Crash Reduction Factors (CRF) were obtained from the *Crash Modification Factors Clearinghouse* (<http://www.cmfclearinghouse.org>). If there is a case where more than one CMF applied to a specific crash, (i.e. installing rumble strips as well as paving the shoulder provide a reduction in run off road crashes) a composite CMF factor can be developed, however for the purpose of this BCA, only the more significant CMF for any one accident was used. The CMF's utilized in the BCA analysis are attached with this memo.

Countermeasure 1: Pioneers Boulevard to Van Dorn Street (Construct 6' Paved Shoulders & Roadside Rumble Strips)

The cost for Countermeasure 1 was estimated at \$1,223,530 in 2018 dollars with a projected life of 20 years. The annual maintenance was estimated at \$10,000 per year or \$200,000 for the life of the analysis. There were several CMF found for the application of rumble strips as well as introducing a 6' paved shoulder to a roadway. For the shouldering a 0.580 CMF (CMF ID 5409) was used for Run Off Road type crashes, and a CMF of 0.230 (CMF ID 5411) was applied to Sideswipe type collisions. A CMF of 0.340 (CMF ID 5312) was utilized for the shoulder rumble strips. **Table 12** summarizes the benefit-cost calculations for the Countermeasure 1, resulting in a B/C of **2.36**.

Table 12. Countermeasure 1: Benefit-Cost Calculation by Crash Type

Average Cost/Crash (1/2013 through 2/2018 average weighting crash type)	\$ 140,505
Value of Avoided Crashes, BENEFIT	\$ 3,360,140
Value of Associated Cost, COST	\$ 1,423,530
Crash Type Benefit/Cost Ratio	2.36

Improvements associated with the shoulder widening project are anticipated to provide a positive benefit/cost value from a crash type standpoint. This countermeasure is anticipated to mitigate over 20 crashes in its 20-year lifespan. The BCA worksheets which break down each crash type, cost associated, and mitigated values can be found in the **Appendix**.

Countermeasure 2: Holdrege Street Enhanced Intersection Signage

The cost for Countermeasure 2 was estimated at \$5,000 in 2018 dollars with a projected life of 10 years. The annual maintenance was estimated at \$500 per year or \$5,000 for the life of the analysis. There were several CMFs found for replacing a standard Stop Sign with a flashing LED Stop Sign. For the

improvement, a 0.415 CMF (CMF ID 6602) was applied to the angle type collisions. **Table 13** summarizes the benefit-cost calculations for the Countermeasure 2, resulting in a B/C of **54.06**.

Table 13. Countermeasure 2: Benefit-Cost Calculation by Crash Type

Average Cost/Crash (1/2013 through 2/2018 average weighting crash type)	\$ 238,400
Value of Avoided Crashes, BENEFIT	\$ 504,558
Value of Associated Cost, COST	\$ 10,000
Crash Type Benefit/Cost Ratio	54.06

Enhanced intersection signage is anticipated to provide a positive benefit/cost value from a crash type standpoint. This countermeasure is anticipated to mitigate two crashes in its 10-year lifespan. The BCA worksheets which break down each crash type, cost associated, and mitigated values are attached to this memo.

F. Systemic Countermeasures

According to the Federal Highway Administration (FHWA), systemic improvements focus on high-risk roadway features rather than specific locations. This leads to widespread implementation of projects to reduce the potential for severe crashes. Due to the significant number of run off the road crashes and high truck percentages, it is recommended that 148th Street in the study area be widened to a 28' top with earth shoulders should the road ever need to be repaved due to pavement conditions. It is also recommended that educational programs like Drive Smart Nebraska be implemented at area high schools. These types of programs are committed to eliminating injuries and deaths on Nebraska roads.

VI. COST ESTIMATES

A. Safety Improvements Cost Estimates

Cost estimates were prepared for the safety improvements identified in **Chapter V. Safety Analysis**. Summaries are provided below for each improvement with a more detailed estimate included in the **Appendix**. All cost estimates were completed using 2018 unit costs.

148th Street and Holdrege Street

The installation of enhanced intersection signage is anticipated to cost approximately \$5,000 in 2018 dollars. **Table 14** displays the estimated project cost

Table 14. 148th St and Holdrege St – Enhanced Intersection Signage

Category	2018 Cost
LED Stop Signs	\$ 3,000.00
Additional Signage and Markings	\$ 2,000.00
Total Project Costs	\$ 5,000.00
<i>No ROW is anticipated as part of this project.</i>	

148th Street – Van Dorn Street to Pioneers Boulevard

The installation of a paved shoulder and rumbles strips along 148th Street from Van Dorn Street to Pioneers Boulevard is anticipated to cost approximately \$1,223,530 in 2018 dollars. **Table 15** displays the estimated project cost.

Table 15. 148th St – Van Dorn Rd to Pioneers Blvd – Shoulders

Category	2018 Cost
General/Earthwork	\$ 125,000.00
Paving	\$ 349,600.00
Pavement Marking Items	\$ 3,300.00
Storm Drainage (20% of Construction)	\$ 105,580.00
ROW	\$ 100,000.00
Erosion Control	\$ 50,000.00
Miscellaneous Items	\$ 82,200.00
Construction SubTotal	\$ 815,680.00
Contingency (20%)	\$ 163,140.00
Survey (2%)	\$ 19,580.00
Utility Relocations (5%)	\$ 48,940.00
Engineering Services (10%)	\$ 97,882.00
Construction Services (8%)	\$ 78,310.00
Total Project Costs	\$ 1,223,530.00

B. Operational Improvements Cost Estimates

Cost estimates were prepared for the operational roadway improvements identified in **Chapter IV. Future Operations**. Summaries are provided below for each improvement with a more detailed estimate included in the **Appendix**. All cost estimates were completed using 2018 unit costs.

148th Street - O St. to Amberly Rd Widening to 4 Lanes

The widening of 148th Street to a four-lane divided cross-section from O Street to Amberly Road is anticipated to cost approximately \$28,939,380 in 2018 dollars. **Table 16** displays the estimated project cost.

Table 16. 148th St - O St. to Amberly Rd Widening to 4 Lanes

Category	2018 Cost
Grading	\$ 1,181,250.00
Pavement	\$ 13,970,000.00
Drainage	\$ 3,181,762.50
Right of Way*	\$ 100,000.00
Utilities	\$ 757,562.50
Construction SubTotal	\$ 19,190,580.00
Contingency (20%)	\$ 3,838,100.00
Survey (2%)	\$ 383,800.00
Engineering Services (10%)	\$ 2,302,900.00
Environmental Services (6%)	\$ 1,381,700.00
Construction Services (8%)	\$ 1,842,300.00
Total Project Costs	\$ 28,939,380.00

**Note: Detailed ROW impacts will be determined during Preliminary Engineering*

O Street – 98th St. to 148th St. Widening to 4 Lanes

The widening of O Street to a four-lane divided cross-section from 98th Street to 148th Street is anticipated to cost approximately \$14,619,390 in 2018 dollars. **Table 17** displays the estimated project cost. The 2040 LRTP update extends O Street to 98th Street.

Table 17. O St - 98th St to 148th St Widening to 4 Lanes

Category	2018 Cost
Grading	\$ 635,250.00
Pavement	\$ 6,979,500.00
Drainage	\$ 1,599,097.50
Right of Way*	\$ 100,000.00
Utilities	\$ 380,737.50
Construction SubTotal	\$ 9,694,590.00
Contingency (20%)	\$ 9,838,900.00
Survey (2%)	\$ 193,900.00
Engineering Services (10%)	\$ 1,163,300.00
Environmental Services (6%)	\$ 698,000.00
Construction Services (8%)	\$ 930,700.00
Total Project Costs	\$ 14,619,390.00

**Note: Detailed ROW impacts will be determined during Preliminary Engineering*

148th Street and Amberly Road

The installation of a southbound right-turn lane is anticipated to cost approximately \$126,070 in 2018 dollars. **Table 18** displays the estimated project cost. The addition of a two-lane eastbound approach is anticipated to cost approximately \$313,710 in 2018 dollars. **Table 19** displays the estimated project cost. The installation of a traffic signal is anticipated to cost approximately \$176,500 in 2018 dollars. **Table 20** displays the estimated project cost. The construction of a roundabout is anticipated to cost approximately \$791,350 in 2018 dollars. **Table 21** displays the estimated project cost.

Table 18. 148th St and Amberly Rd – SB Right Turn Lane

Category	2018 Cost
Grading	\$ 17,400.00
Pavement	\$ 27,360.00
Storm Sewer & Culverts	\$ 8,952.00
Signing and Striping	\$ 7,577.75
Mobilization	\$ 5,000.00
Traffic Control	\$ 5,000.00
Right of Way	\$ 12,000.00
Utilities	\$ 4,476.00
Construction SubTotal	\$ 87,770.00
Contingency (20%)	\$ 17,600.00
Survey (2%)	\$ 1,800.00
Engineering Services (10%)	\$ 10,500.00
Construction Services (8%)	\$ 8,400.00
Total Project Costs	\$ 126,070.00
<i>**No ROW is anticipated as part of this project.</i>	

Table 19. 148th St and Amberly Rd – Eastbound 2-Lane Approach

Category	2018 Cost
Grading	\$ 107,625.00
Pavement	\$ 68,750.00
Storm Sewer & Culverts	\$ 37,038.75
Utilities	\$ 5,000.00
Construction SubTotal	\$ 218,410.00
Contingency (20%)	\$ 43,700.00
Survey (2%)	\$ 4,400.00
Engineering Services (10%)	\$ 26,200.00
Construction Services (8%)	\$ 21,000.00
Total Project Costs	\$ 313,710.00
<i>**No ROW is anticipated as part of this project.</i>	

Table 20. 148th St and Amberly Rd – Traffic Signal

Category	2018 Cost
Traffic Signal	\$ 150,000.00
Utilities (5%)	\$ 7,500.00
Right of Way (ROW)**	\$ -
Construction SubTotal	\$ 157,500.00
Survey (2%)	\$ 3,200.00
Engineering Services (10%)	\$ 15,800.00
Total Project Costs	\$ 176,500.00

***No ROW is anticipated as part of this project.*

Table 21. 148th St and Amberly Rd – Roundabout

Category	2018 Cost
Grading	\$ 118,250.00
Pavement	\$ 212,400.00
Storm Sewer & Culverts	\$ 66,130.00
Signing and Striping	\$ 21,240.00
Mobilization	\$ 33,400.00
Traffic Control	\$ 20,900.00
Right of Way	\$ 45,760.00
Utilities	\$ 33,065.00
Construction SubTotal	\$ 551,150.00
Contingency (20%)	\$ 110,200.00
Survey (2%)	\$ 11,000.00
Engineering Services (10%)	\$ 66,100.00
Construction Services (8%)	\$ 52,900.00
Total Project Costs	\$ 791,350.00

148th Street and Adams Street

The construction of a roundabout is anticipated to cost approximately \$764,470 in 2018 dollars.

Table 22 displays the estimated project cost.

Table 22. 148th St and Adams St – Roundabout

Category	2018 Cost
Grading	\$ 116,162.00
Pavement	\$ 212,400.00
Storm Sewer & Culverts	\$ 65,712.40
Signing and Striping	\$ 21,240.00
Mobilization	\$ 33,200.00
Traffic Control	\$ 20,800.00
Right of Way	\$ 30,000.00
Utilities	\$ 32,856.20
Construction SubTotal	\$ 532,370.00
Contingency (20%)	\$ 106,500.00
Survey (2%)	\$ 10,600.00
Engineering Services (10%)	\$ 63,900.00
Construction Services (8%)	\$ 51,100.00
Total Project Costs	\$ 764,470.00

148th Street and O Street

The installation of a southbound right-turn lane is anticipated to cost approximately \$141,450 in 2018 dollars. **Table 23** displays the estimated project cost.

Table 23. 148th St and O St – SB Right Turn Lane

Category	2018 Cost
Grading	\$ 17,050.00
Pavement	\$ 36,000.00
Storm Sewer & Culverts	\$ 10,610.00
Signing and Striping	\$ 7,487.75
Mobilization	\$ 5,000.00
Traffic Control	\$ 5,000.00
Right of Way	\$ 12,000.00
Utilities	\$ 5,305.00
Construction SubTotal	\$ 98,450.00
Contingency (20%)	\$ 19,700.00
Survey (2%)	\$ 2,000.00
Engineering Services (10%)	\$ 11,800.00
Construction Services (8%)	\$ 9,500.00
Total Project Costs	\$ 141,450.00

148th Street and Old Cheney Road

The construction of a roundabout is anticipated to cost approximately \$825,490 in 2018 dollars.

Table 24 displays the estimated project cost.

Table 24. 148th St and Old Cheney Rd – Roundabout

Category	2018 Cost
Grading	\$ 124,100.00
Pavement	\$ 222,000.00
Storm Sewer & Culverts	\$ 69,220.00
Signing and Striping	\$ 22,200.00
Mobilization	\$ 35,000.00
Traffic Control	\$ 21,900.00
Right of Way	\$ 45,760.00
Utilities	\$ 34,610.00
Construction SubTotal	\$ 574,790.00
Contingency (20%)	\$ 115,000.00
Survey (2%)	\$ 11,500.00
Engineering Services (10%)	\$ 69,000.00
Construction Services (8%)	\$ 34,610.00
Total Project Costs	\$ 825,490.00

C. Systemic Improvements Cost Estimates

Cost estimates were prepared for the systemic roadway improvements identified in **Chapter V. Safety Analysis**. Summaries are provided below for each improvement with a more detailed estimate included in the **Appendix**. All cost estimates were completed using 2018 unit costs.

The widening of 148th Street the length of the project to include a 28' top with rumble strips along the edge of the road and 4' turf shoulders is anticipated to cost approximately \$9,545,200 in 2018 dollars.

Table 25 displays the estimated project cost.

Table 25. 148th St – Shoulders

Category	2018 Cost
General/Earthwork	\$ 1,052,040.00
Paving	\$ 3,610,000.00
Pavement Marking Items	\$ 33,600.00
*R.O.W	\$ 150,000.00
Storm Drainage (20% of Construction)	\$ 959,130.00
Erosion Control	\$ 100,000.00
Miscellaneous Items	\$ 458,700.00
Construction SubTotal	\$ 6,363,470.00
Contingency (20%)	\$ 1,272,690.00
Utilities (5%)	\$ 381,810.00
Survey (2%)	\$ 152,720.00
Engineering Services (10%)	\$ 763,620.00
Construction Services (8%)	\$ 610,890.00
Total Project Costs	\$ 9,545,200.00

*Note: Assumes ROW impacts will be determined during Preliminary Engineering

VII. SUMMARY AND RECOMMENDATIONS

Near Term Improvements

1. Based on speed study results, the roadway cross-section, crash history, engineering judgment, and FHWA guidance, it is recommended that the posted speed limits on 148th Street from Old Cheney Road to Amberly Road remain at 55 mph, outside of Prairie Home. With the higher speeds recorded along this corridor, it is recommended that additional law enforcement be used to deter speeding. These efforts should be focused on the Central #2 (Adams Street to O Street) segment.
2. It is recommended that additional Speed Limit signs be posted along 148th Street at the intersections with Alvo Road, Havelock Avenue, Adam Street, Holdridge Street, A Street, Van Dorn Street, Pioneers Boulevard, and Old Cheney Road.
3. Based on the existing traffic operations and crash patterns, additional intersections signage is recommended at the intersection of 148th Street with Holdrege Street.
4. Based on the existing traffic operations and crash patterns, it is recommended that the existing shoulders between Pioneers Boulevard and Van Dorn Street be widened to 6' and paved with safety edges along the length of the study area.
5. At the intersection of 148th Street with Amberly Road, it is recommended that a signal be installed, and a southbound right-turn lane and an eastbound left-turn lane be added, or as an alternate a roundabout be constructed.

Longer Term Improvements

1. Projected 2040 future traffic volumes along 148th Street are expected to exceed the capacity threshold for a two-lane roadway without turn lanes set by the Lincoln MPO. The segment of 148th Street between Amberly Road and O Street is also expected to exceed the LOS C threshold for a two-lane roadway with turn lanes. It is recommended that the cross-section of 148th Street be a two-lane surfaced street with turn lanes from Amberly Road to O Street and a four-lane surfaced street with turn lanes from O Street to Old Cheney Road. It is also recommended that O Street be widened to a four-lane cross section in the study area.
2. It is recommended that a multi-lane roundabout be installed at the intersection of 148th Street with Adams Street and a single-lane roundabout be installed at the intersection of 148th Street with Old Cheney Road.
3. It is recommended that O Street be widened to a four-lane cross section in the study area and a southbound right-turn lane be added.
4. Due to the number of run off the road crashes and high truck percentages, it is recommended that 148th street in the study area be widened to a 28' top with earth shoulders should the road ever need to be repaved due to pavement conditions.

APPENDIX

SPEED STUDY

TRAFFIC COUNT DATA

CAPACITY ANALYSIS WORKSHEETS

MUTCD SIGNAL WARRANTS

AUXILIARY TURN LANE WARRANTS

CRASH HISTORY

BCA WORKSHEETS

DETAILED COST ESTIMATES

SPEED STUDY



MEMORANDUM

TO: Pam Dingman, Pam Dingman, Lancaster County Engineer

FROM: Adam Denney, PE, Mark Meisinger, PE, PTOE & Rick Haden
Felsburg Holt & Ullevig

DATE: August 7, 2018

SUBJECT: I48th Street Speed Studies Memo

This memo summarizes the results of the speed study analysis completed by Felsburg Holt & Ullevig (FHU). The study identifies the 85th percentile speeds along I48th Street, from Old Cheney Road to Amberly Road and provides a comparison to the posted speed limits. The location of the project in relationship to the surrounding roadway network is identified on **Figure 1**. In the study area, I48th Street is a two-lane undivided roadway with posted speed limits of 55, 40, and 35 miles per hour (mph) as shown on **Figure 2**. From Amberly Road to Old Cheney Road, I48th Street is a two-lane roadway with an unpaved shoulder except for the segment that passes through Prairie Home. Within Prairie Home, I48th Street widens to allow for a curb and gutter and on street parking.

FHU used data collection vendor MNRG to collect speed data at three locations, as shown on **Figure 2**, on I48th Street:

- 1,657 feet south of McKelvie Road,
- 2,356 feet north of Holdrege Street, and
- 2,625 feet south of Van Dorn Street.

Data was either collected for a 13-hour period from 6:00 AM – 7:00 PM or for a three-hour period in the morning, from 7:00 AM – 10:00 AM, and a five-hour period in the afternoon, from 2:00 PM – 7:00 PM. The studies were completed on either April 19th or May 22nd. This provided both off-peak and peak hour vehicle speeds to develop the 85th percentile speed for the corridor.

Methodology

To collect speed data at the three study locations, MNRG utilized Miovision Scout Connect. Data collection units were set up to track unique media access control (MAC) addresses from wi-fi connected devices (typically a cell phone) over a wi-fi network. A time stamp is created at each station for every MAC address detected. The time between stations and distance traveled are used to determine the space mean speed of the vehicle. The equation for space mean speed is as follows:

Space mean speed: Distance / Median Travel Time in minutes x 60 minutes/hour

85th Percentile & Median Speed

The table below display the results of the speed study. Additional data including graphs and charts for each location are attached to this memo. Please note that these graphics display travel time and not speeds.

Roadway	Location	85th Percentile Speed (mph)		Median Speed (mph)	
		NB	SB	NB	SB
148 th Street	North #1	70.82	57.39	55.48	53.69
148 th Street	Central #2	68.81	72.89	59.73	60.26
148 th Street	South #3	61.67	59.04	53.75	56.27
Directional Average		70.35	67.10	63.11	56.32
Overall Roadway Average		65.10		57.14	

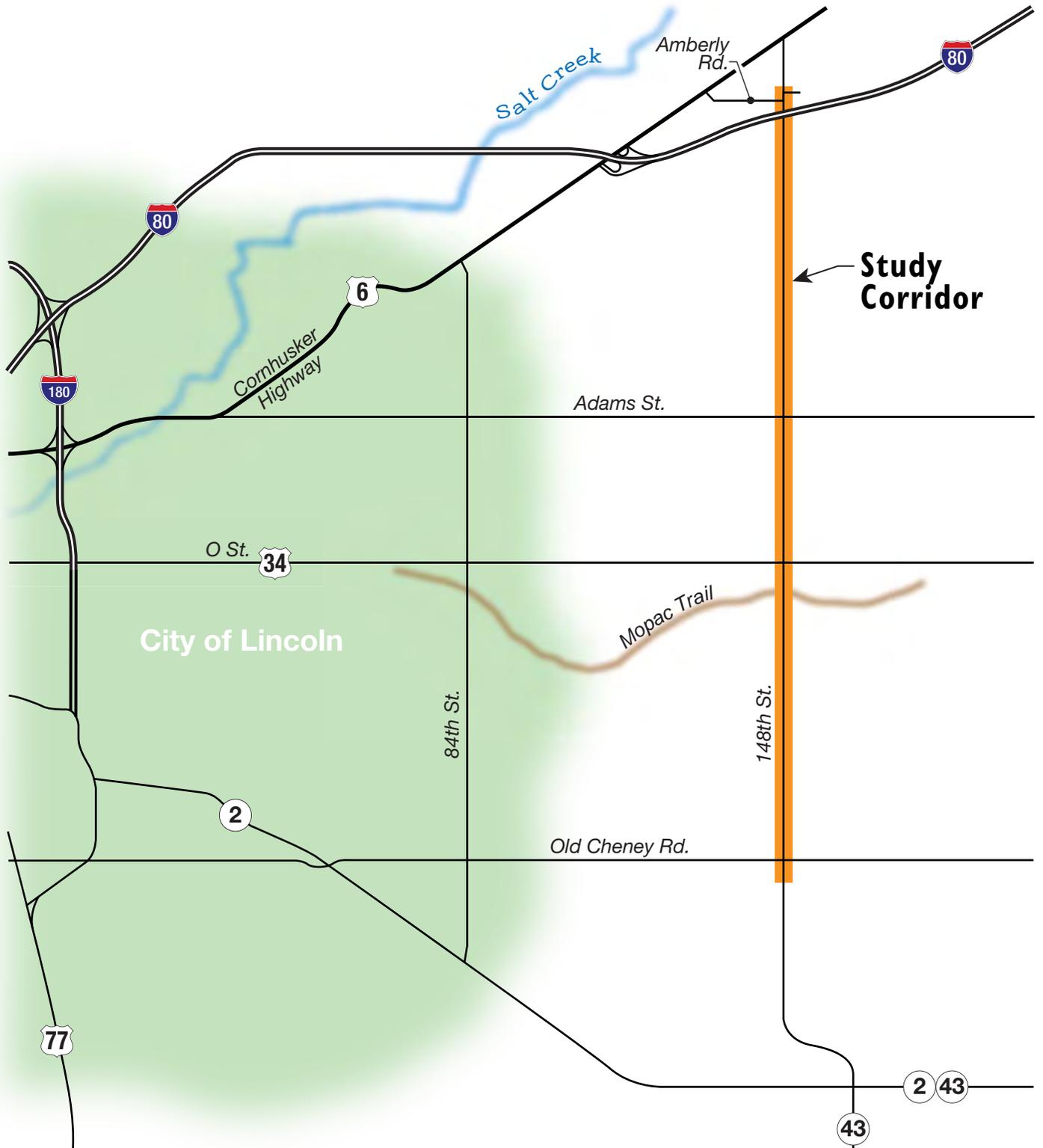
The calculated 85th percentile speed over the analysis period ranged from just over the speed limit (57 mph) to segments with vehicles traveling at almost 18 mph over the posted speed limit. Overall, the average 85th percentile speed for the corridor was calculated to be 65.10 mph, approximately 10 mph over the posted speed limit. The median speed or 50th percentile speed was calculated to be 57.14 mph. The range of travel speeds on 148th Street varied widely depending on level of traffic.

Recommendation

Typically, a good indicator of what the posted speed limit should be set at is the 85th percentile speed, recognizing that 85% of drivers generally drive what is prudent. However, that is not the only factor that should be considered when recommending the speed limit for a roadway. Other factors that should be evaluated are grades, cross-sections, median or 50th percentile speed, traffic volume, crash history, frequency of access points, sight distance, pedestrian activity, and engineering judgment.

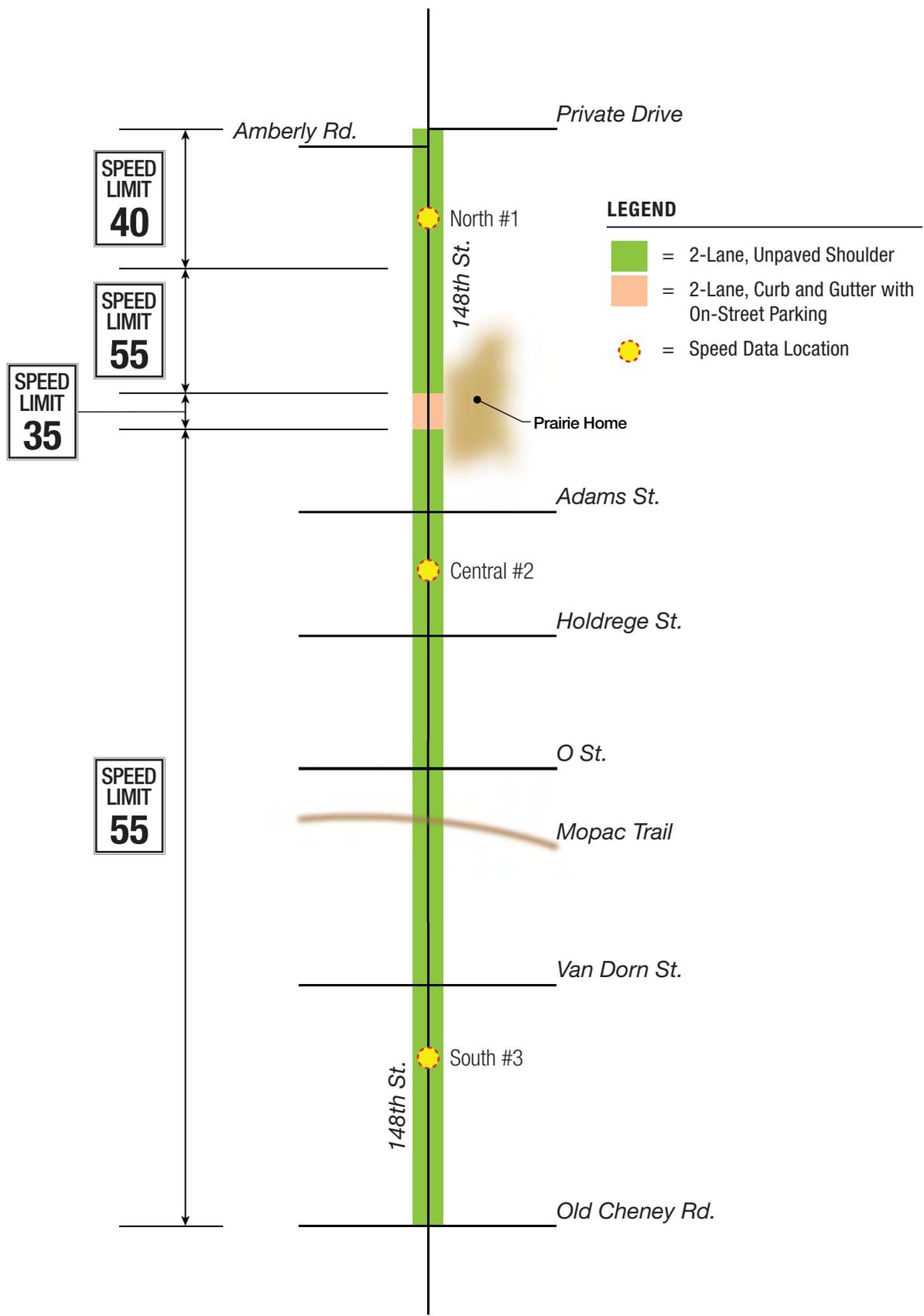
As a tool to help assist in determining the appropriate posted speed limit for 148th Street, FHU utilized the Federal Highway Administration's (FHWA) USLIMIT2 tool. The tool completes a statistical analysis based on several roadway specific inputs including current speed limit, roadway features, ADT volumes, and crash statistics to develop a recommended posted speed limit. The results of the USLIMIT2 analysis are attached to this memo. Please note, the recommended speed limits from the USLIMIT2 tool are higher than the 55-mph statutory speed limit for this type of road.

Based on speed study results, the roadway cross-section, crash history, engineering judgment, and FHWA guidance, it is recommended that the posted speed limits on 148th Street from Old Cheney Road to Amberly Road remain at 55 mph, outside of Prairie Home. With the higher speeds recorded along this corridor, it is recommended that addition law enforcement be used to deter speeding. These efforts should be focused on the Central #2 (Adams Street to O Street) segment.



Study Area

FIGURE 1



Existing Speed Limits and Roadway Cross-Sections
 Lancaster County Safety Study - 148th Street Corridor 18-122 8/8/18

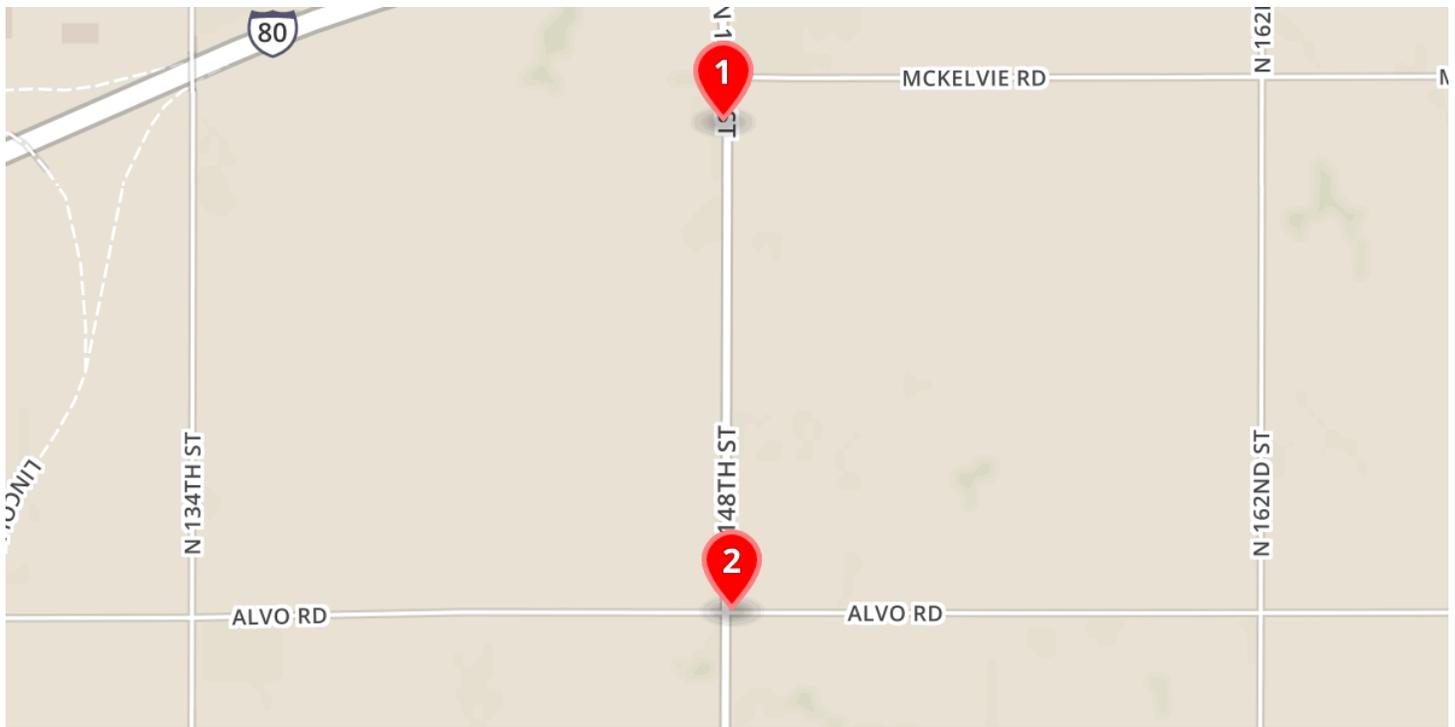
FIGURE 2

August 7, 2018
148th Street Speed Studies Memo
Attachments

North #1

Travel Time Summary

2 Locations | Lincoln, NE, Waverly, NE | Tue May 22, 2018 | 6:00AM - 7:00PM (13.0h)



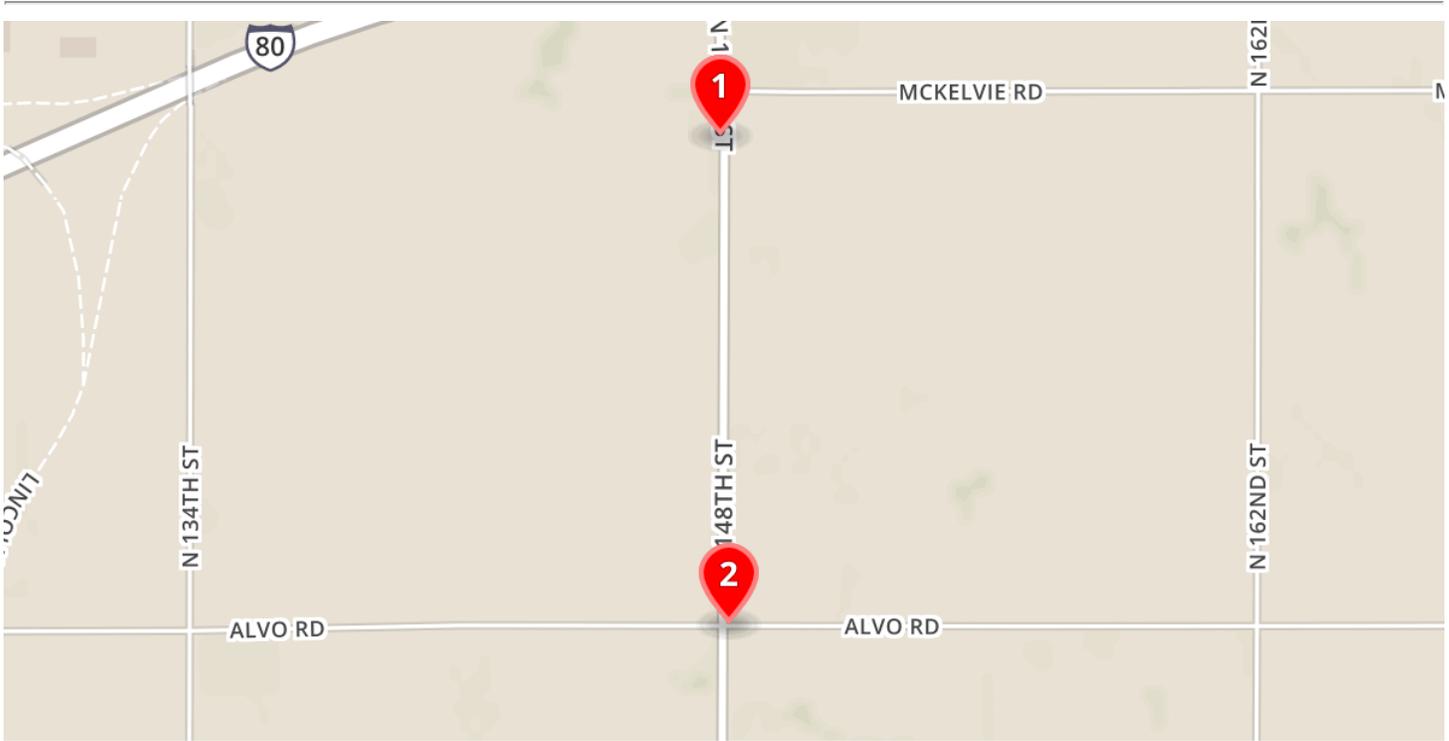
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) ¹	Speed (mph) ²					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 8529-8947 North 148th Street	2 15200 Alvo Road	110	1.03	1.23	1.32	1.06	0.73	1.65	0.9	53.69	57.39	71.89	53.29	33.62	75.65
2 15200 Alvo Road	1 8529-8947 North 148th Street	128	1.00	1.08	1.18	0.97	0.75	1.23	0.9	55.48	70.82	72.36	58.56	44.98	73.97

¹ Distance is the length of the Fastest Route between the locations in Google Maps. If Google Maps is unavailable or if Google Maps reports a distance longer than twice the aerial (as the bird flies) distance, the aerial distance is used and is denoted by an asterisk (*). See help.miovision.com/kb/distance for more information.

² Speed is the distance between the points divided by the travel time. This value is known as the space mean speed. This report was configured to include trips with calculated speeds between 1.0 mph and 90.0 mph. If you want a report that includes trips with a different range of speeds, or all trips, contact the person who generated the report.

Travel Time Reliability Summary

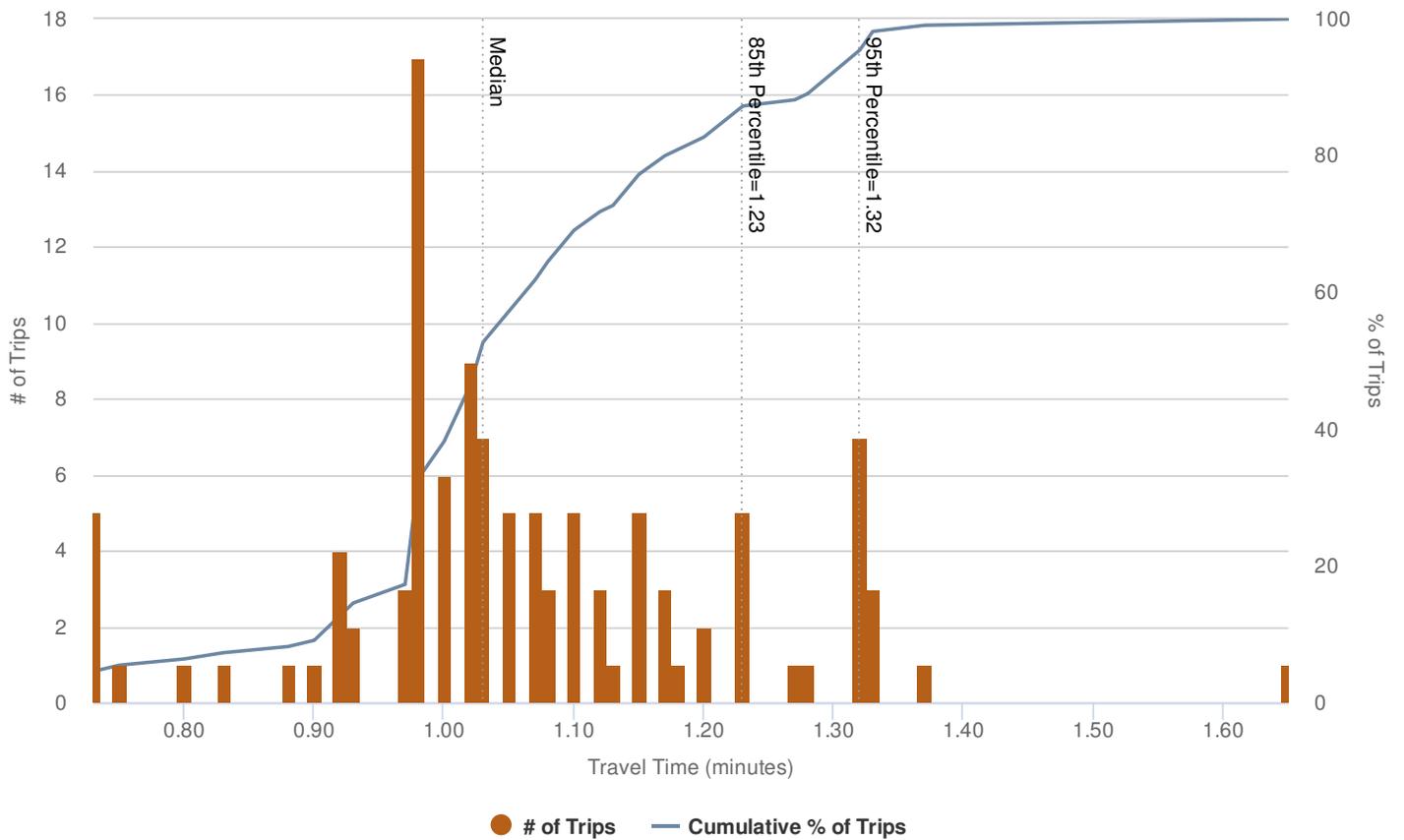
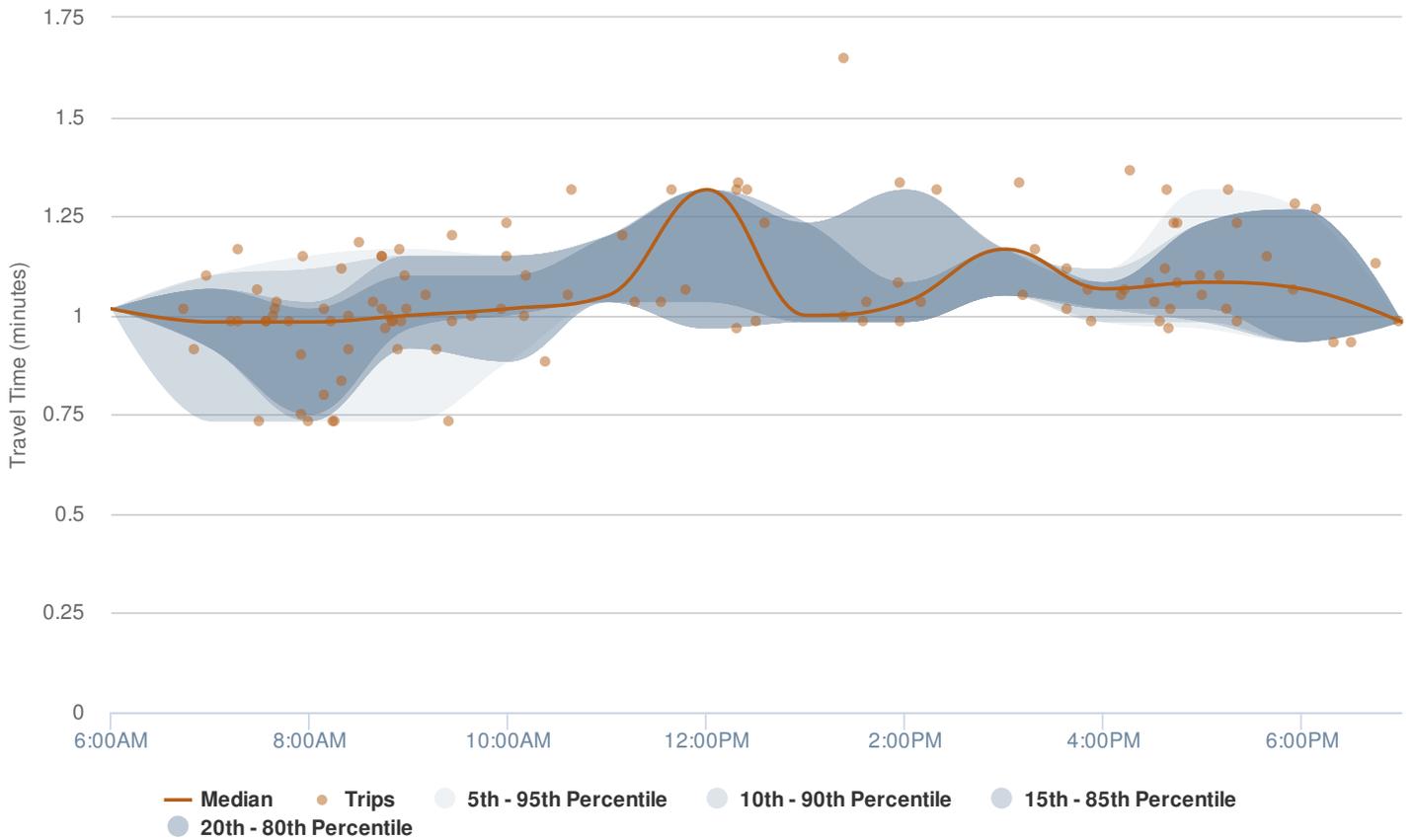
2 Locations | Lincoln, NE, Waverly, NE | Tue May 22, 2018 | 6:00AM - 7:00PM (13.0h)



Start Location	End Location	Planning Time Index AM (6am - 9am)	Planning Time Index PM (4pm - 7pm)	Travel Time Index AM (6am - 9am)	Travel Time Index PM (4pm - 7pm)	Buffer Time Index AM (6am - 9am)	Buffer Time Index PM (4pm - 7pm)
1 8529-8947 North 148th Street	2 15200 Alvo Road	1.14	1.30	0.99	1.12	0.16	0.16
2 15200 Alvo Road	1 8529-8947 North 148th Street	1.28	1.26	1.11	1.10	0.15	0.14

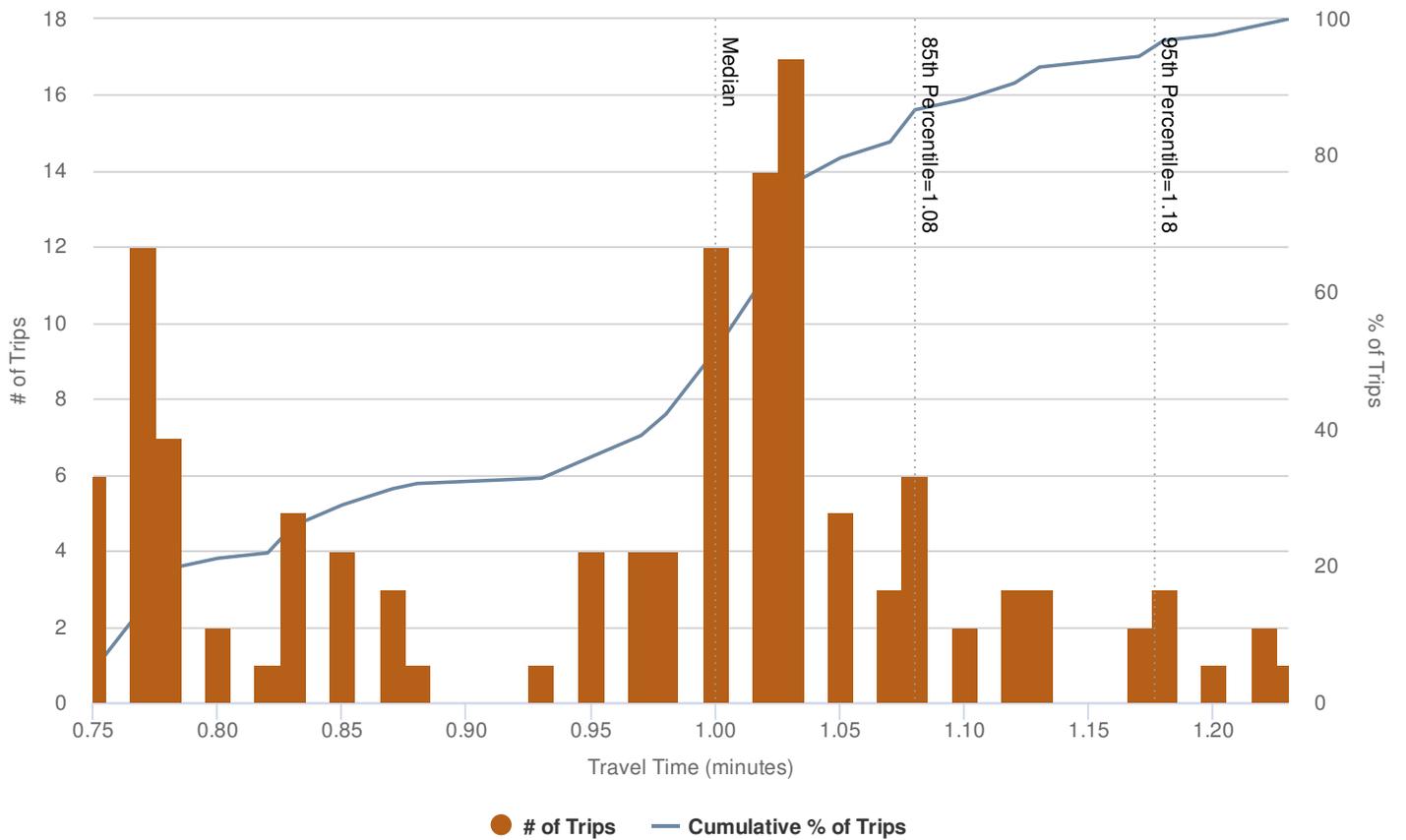
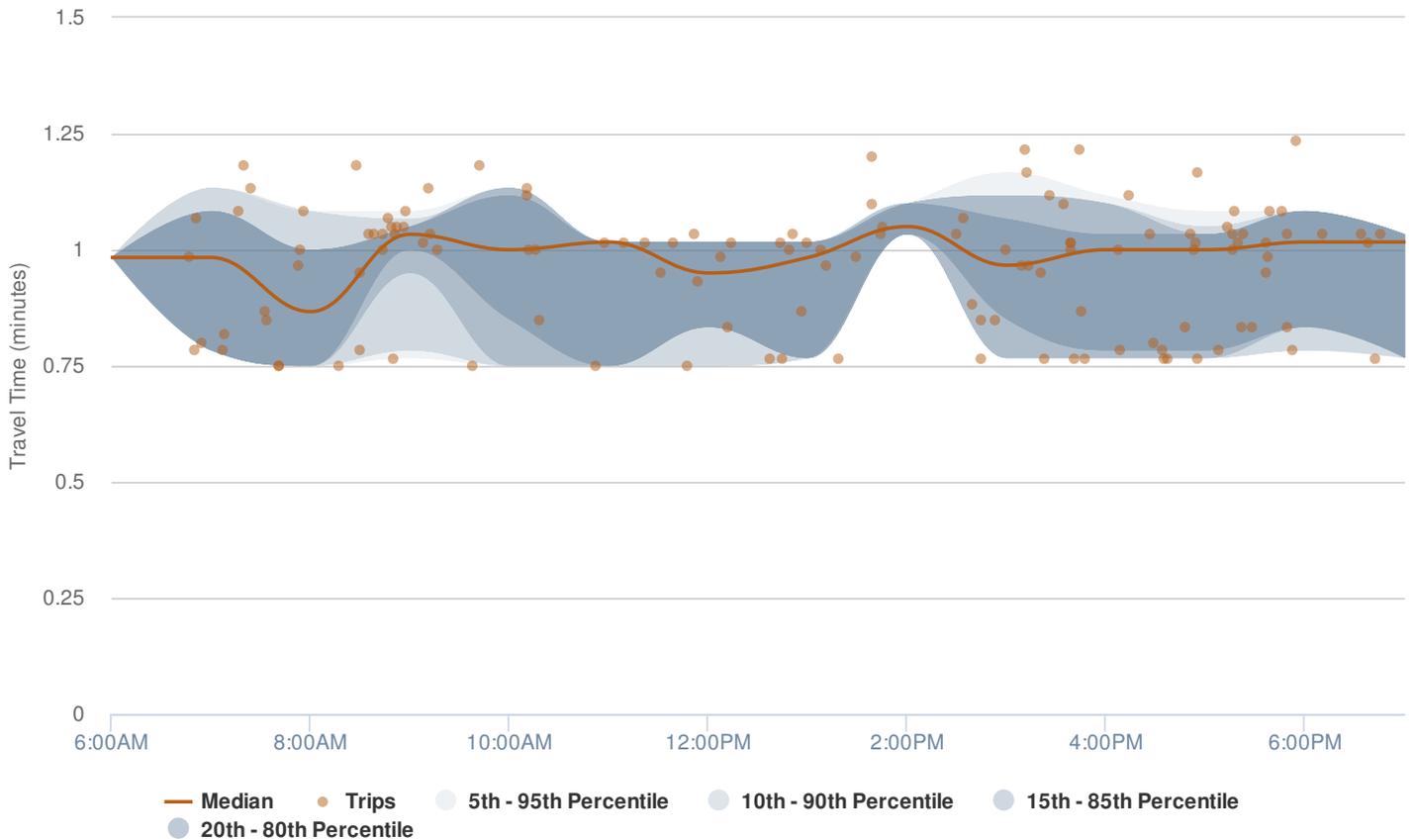
8529-8947 North 148th Street to 15200 Alvo Road

1 to 2 | (40.898609, -96.521072) to (40.885426, -96.520752)



15200 Alvo Road to 8529-8947 North 148th Street

2 to 1 | (40.885426, -96.520752) to (40.898609, -96.521072)

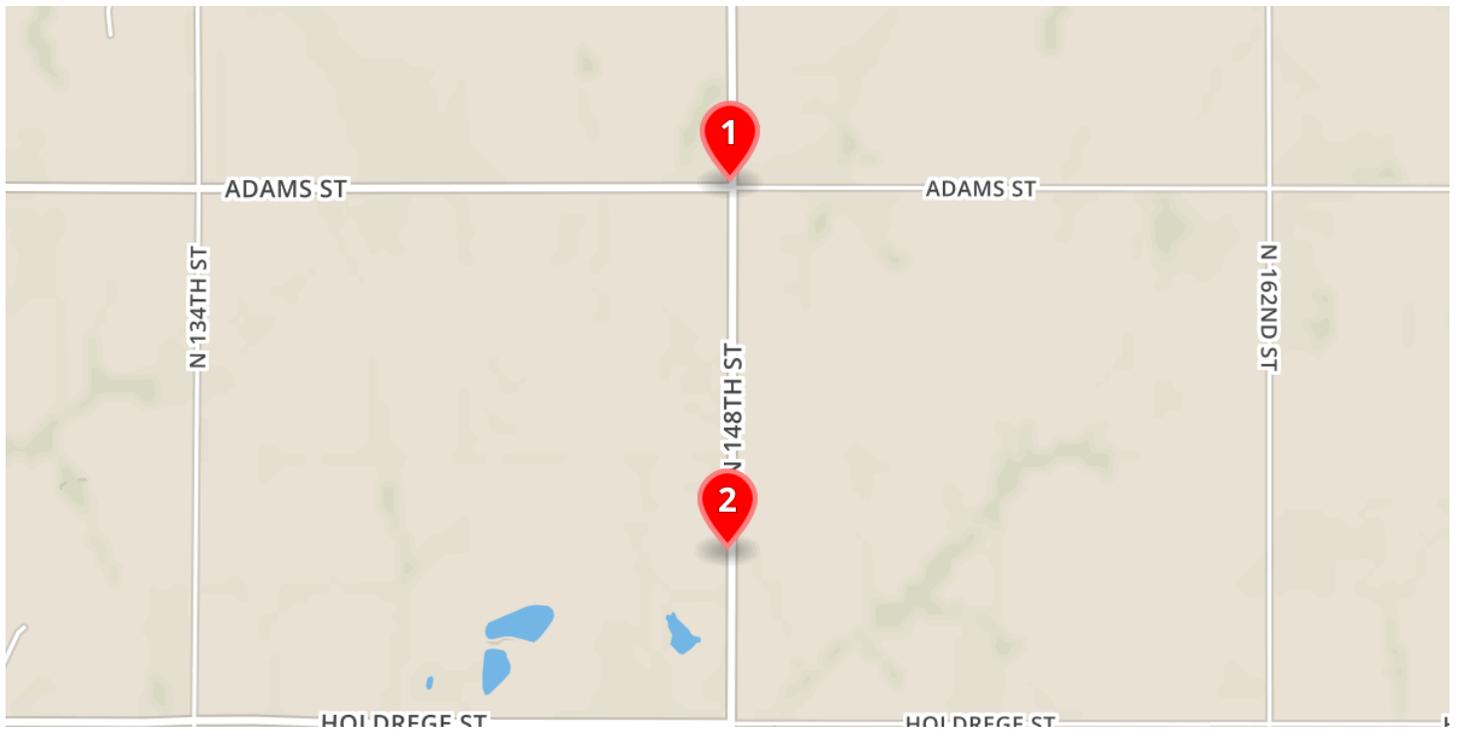


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Central #2

Travel Time Summary

2 Locations | Lincoln, NE | Thu Apr 19, 2018 | 6:00AM - 9:00AM (3.0h)



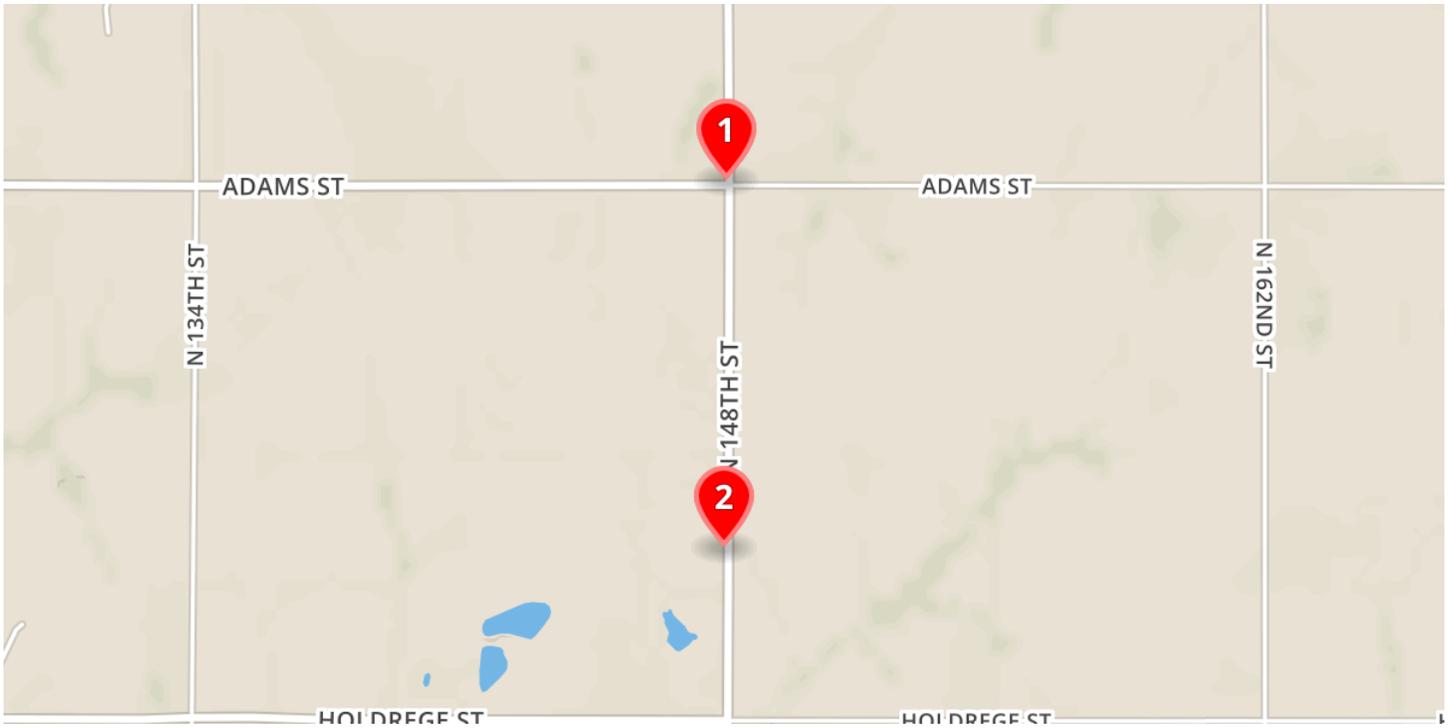
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) ¹	Speed (mph) ²							
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max		
1	148th St & Adams St	2	2025 North 148th Street	27	0.68	0.77	0.90	0.70	0.52	0.95	0.7	60.23	68.60	79.66	60.48	43.33	79.66
2	2025 North 148th Street	1	148th St & Adams St	25	0.73	0.85	0.96	0.74	0.52	0.98	0.7	56.13	64.99	77.08	57.34	41.86	79.66

¹ Distance is the length of the Shortest Route between the locations in Google Maps. If Google Maps is unavailable or if Google Maps reports a distance longer than twice the aerial (as the bird flies) distance, the aerial distance is used and is denoted by an asterisk (*). See help.miovision.com/kb/distance for more information.

² Speed is the distance between the points divided by the travel time. This value is known as the space mean speed. This report was configured to include trips with calculated speeds between 1.0 mph and 80.0 mph. If you want a report that includes trips with a different range of speeds, or all trips, contact the person who generated the report.

Travel Time Reliability Summary

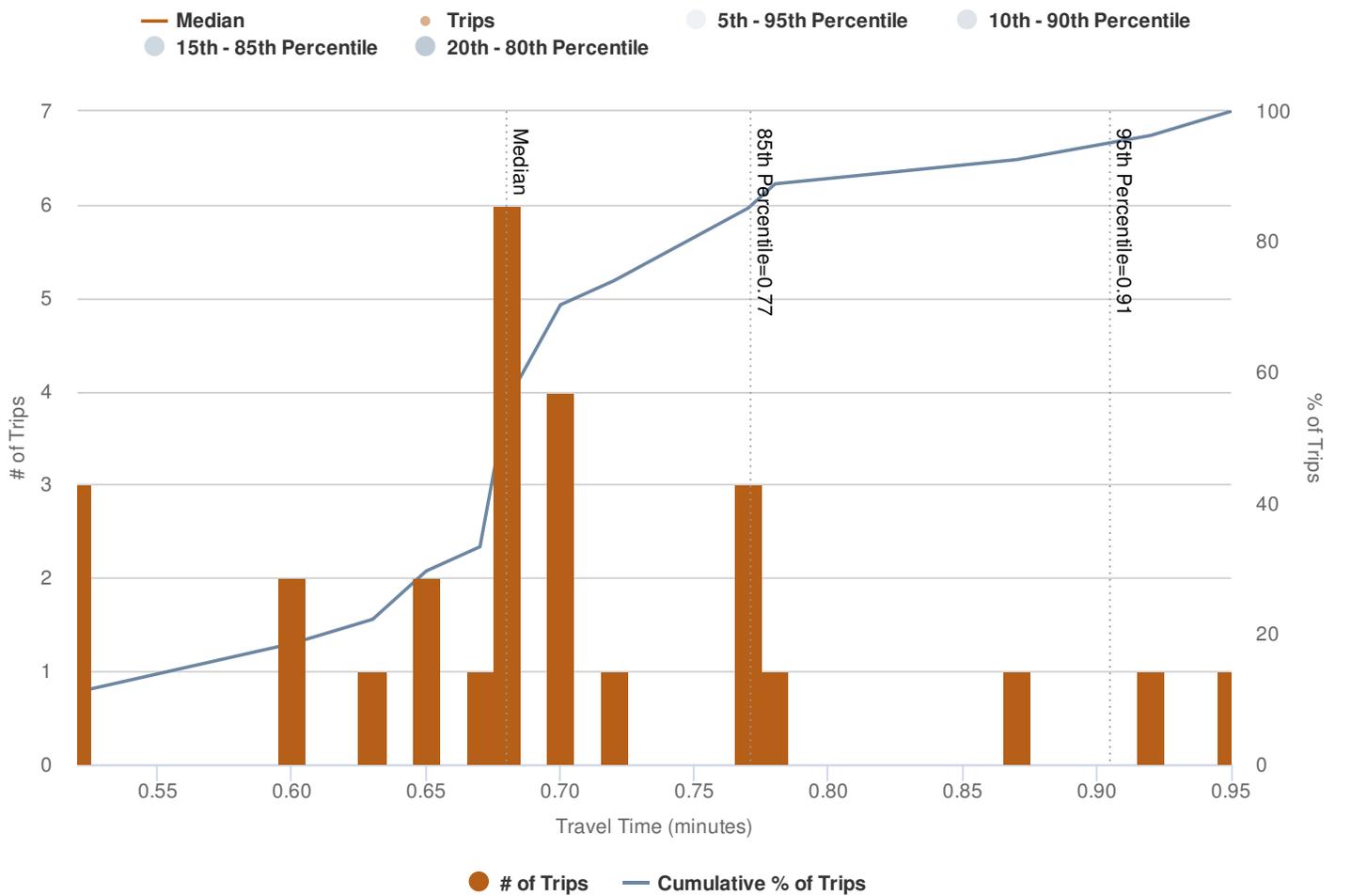
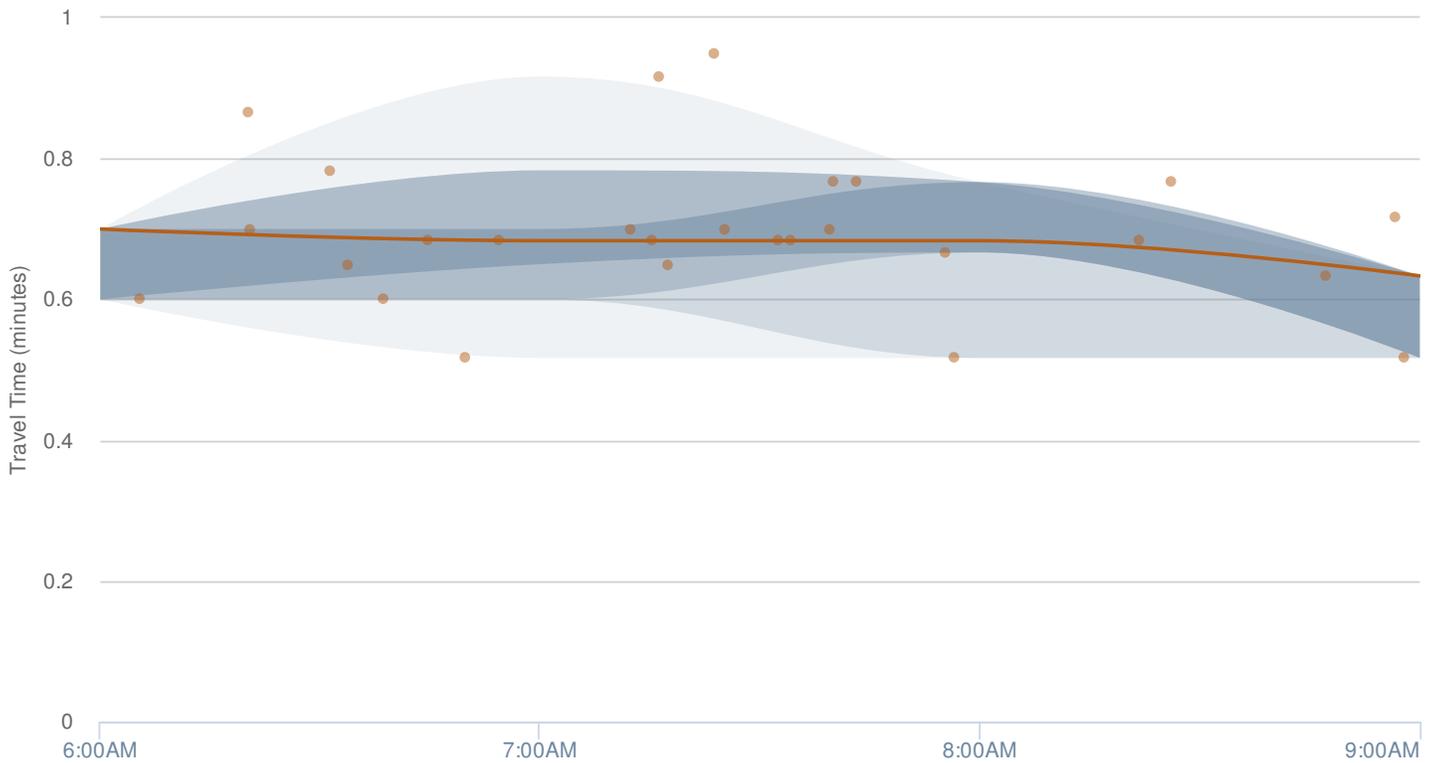
2 Locations | Lincoln, NE | Thu Apr 19, 2018 | 6:00AM - 9:00AM (3.0h)



Start Location		End Location		Buffer Time Index AM (6am - 9am)
1	148th St & Adams St	2	2025 North 148th Street	0.21
2	2025 North 148th Street	1	148th St & Adams St	0.21

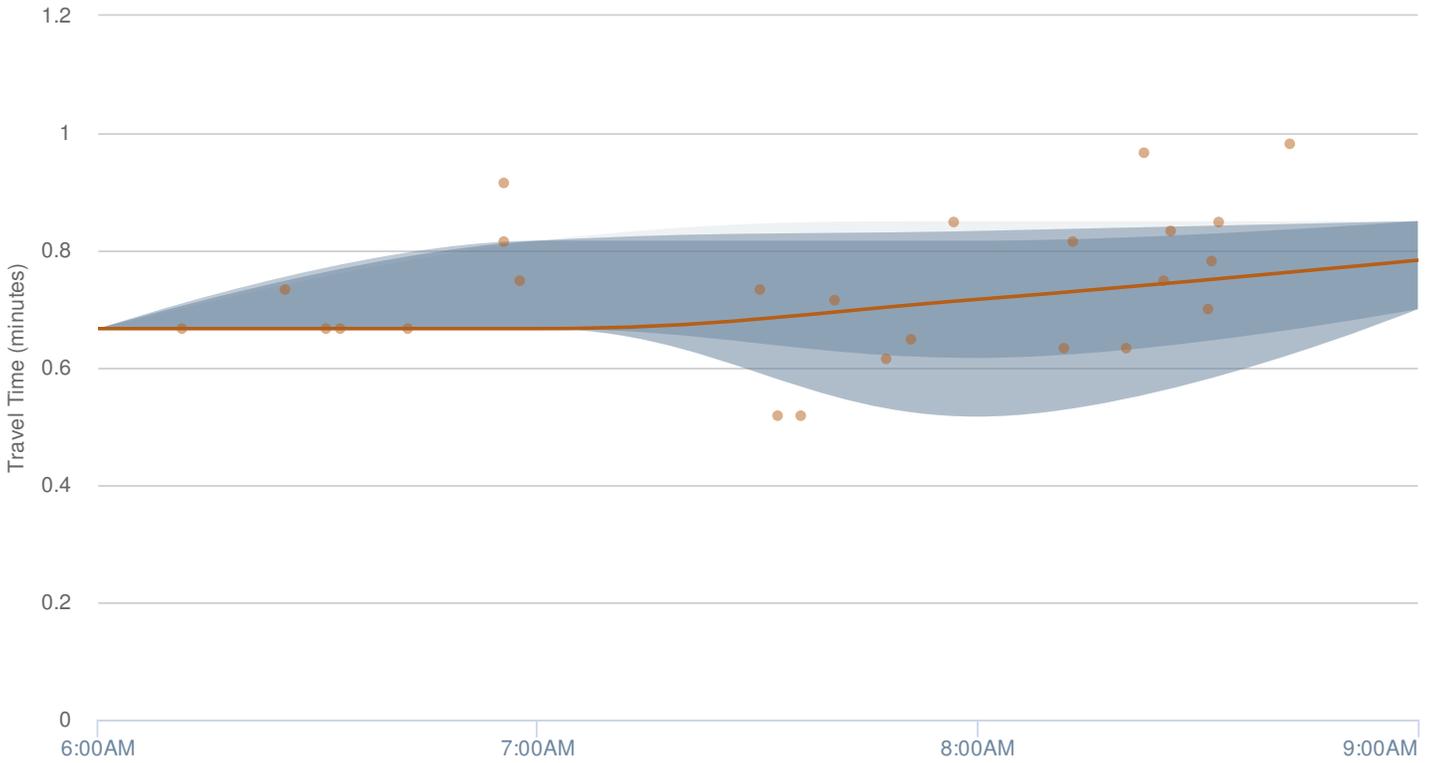
148th St & Adams St to 2025 North 148th Street

1 to 2 | (40.842131, -96.521066) to (40.832199, -96.521156)

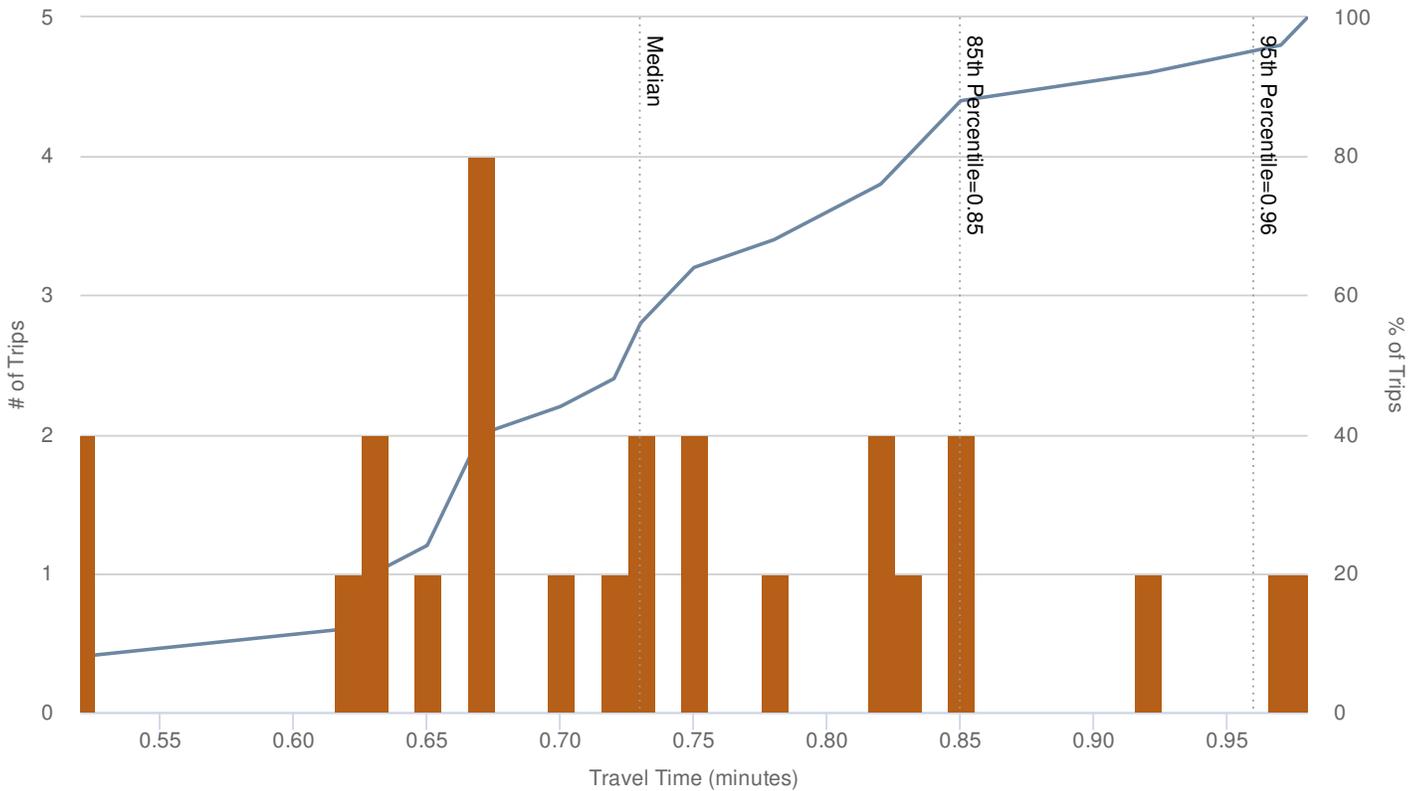


2025 North 148th Street to 148th St & Adams St

2 to 1 | (40.832199, -96.521156) to (40.842131, -96.521066)



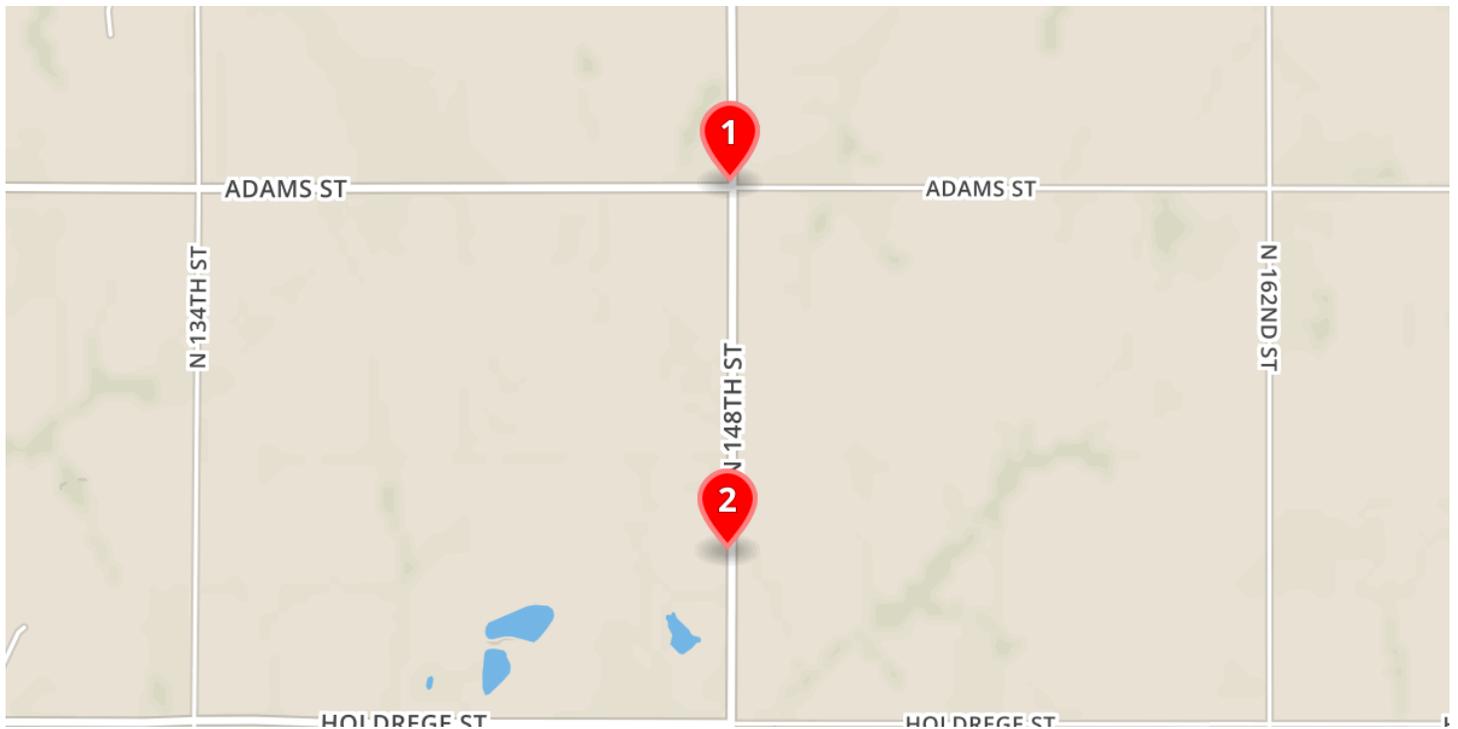
— Median
 ● Trips
 ● 5th - 95th Percentile
 ● 10th - 90th Percentile
● 15th - 85th Percentile
● 20th - 80th Percentile



● # of Trips
 — Cumulative % of Trips

Travel Time Summary

2 Locations | Lincoln, NE | Thu Apr 19, 2018 | 2:00PM - 7:00PM (5.0h)



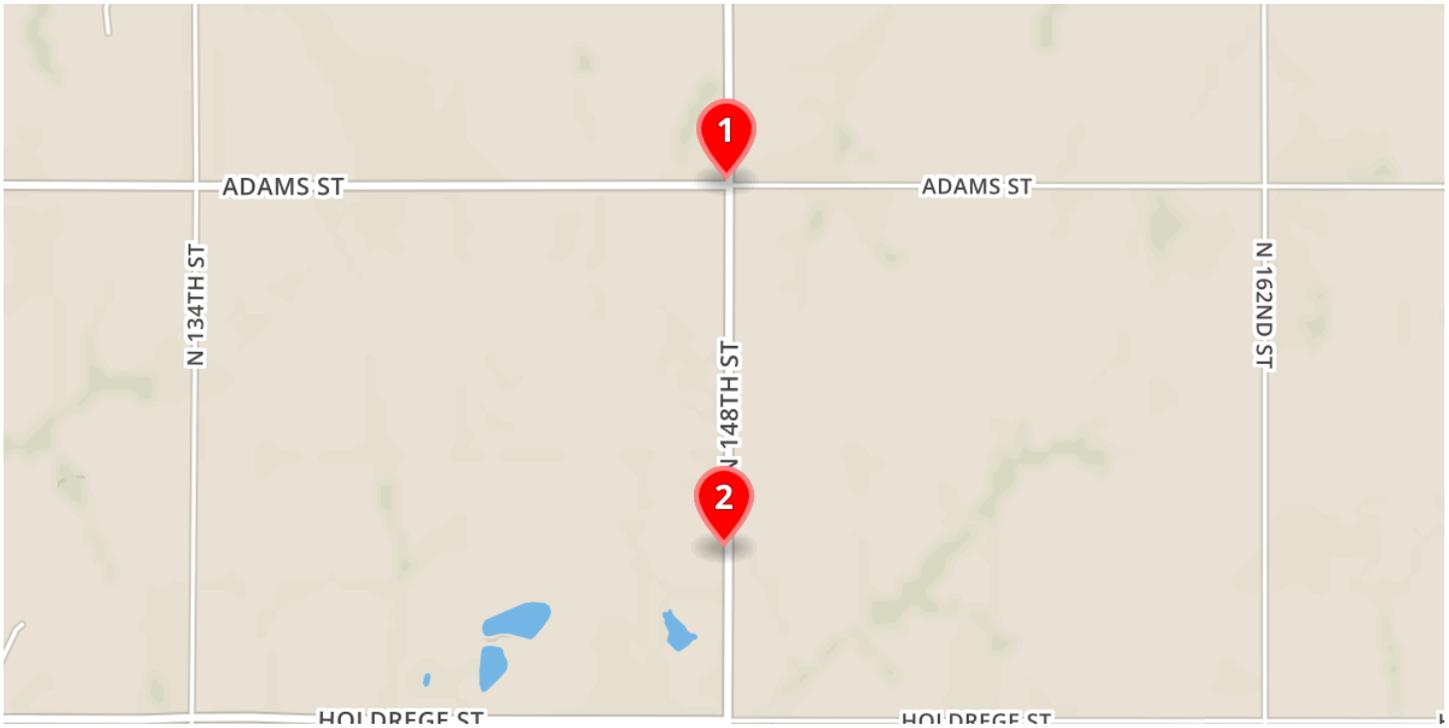
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) ¹	Speed (mph) ²							
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max		
1	148th St & Adams St	2	2025 North 148th Street	42	0.68	0.78	0.80	0.67	0.52	0.87	0.7	60.23	77.17	79.66	62.46	47.49	79.66
2	2025 North 148th Street	1	148th St & Adams St	26	0.65	0.77	0.97	0.68	0.53	0.98	0.7	63.32	72.63	77.17	62.33	41.86	77.17

¹ Distance is the length of the Shortest Route between the locations in Google Maps. If Google Maps is unavailable or if Google Maps reports a distance longer than twice the aerial (as the bird flies) distance, the aerial distance is used and is denoted by an asterisk (*). See help.miovision.com/kb/distance for more information.

² Speed is the distance between the points divided by the travel time. This value is known as the space mean speed. This report was configured to include trips with calculated speeds between 1.0 mph and 80.0 mph. If you want a report that includes trips with a different range of speeds, or all trips, contact the person who generated the report.

Travel Time Reliability Summary

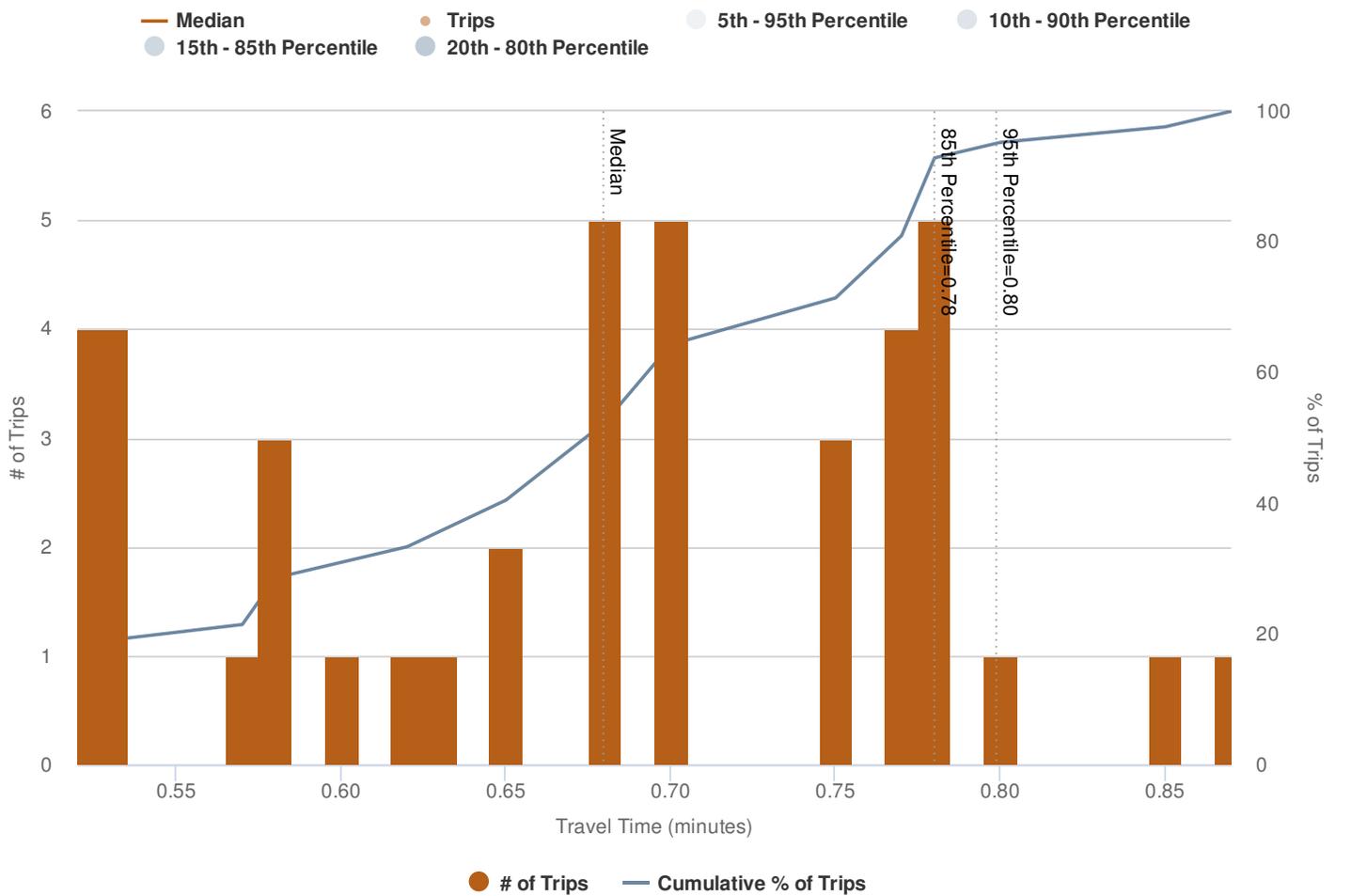
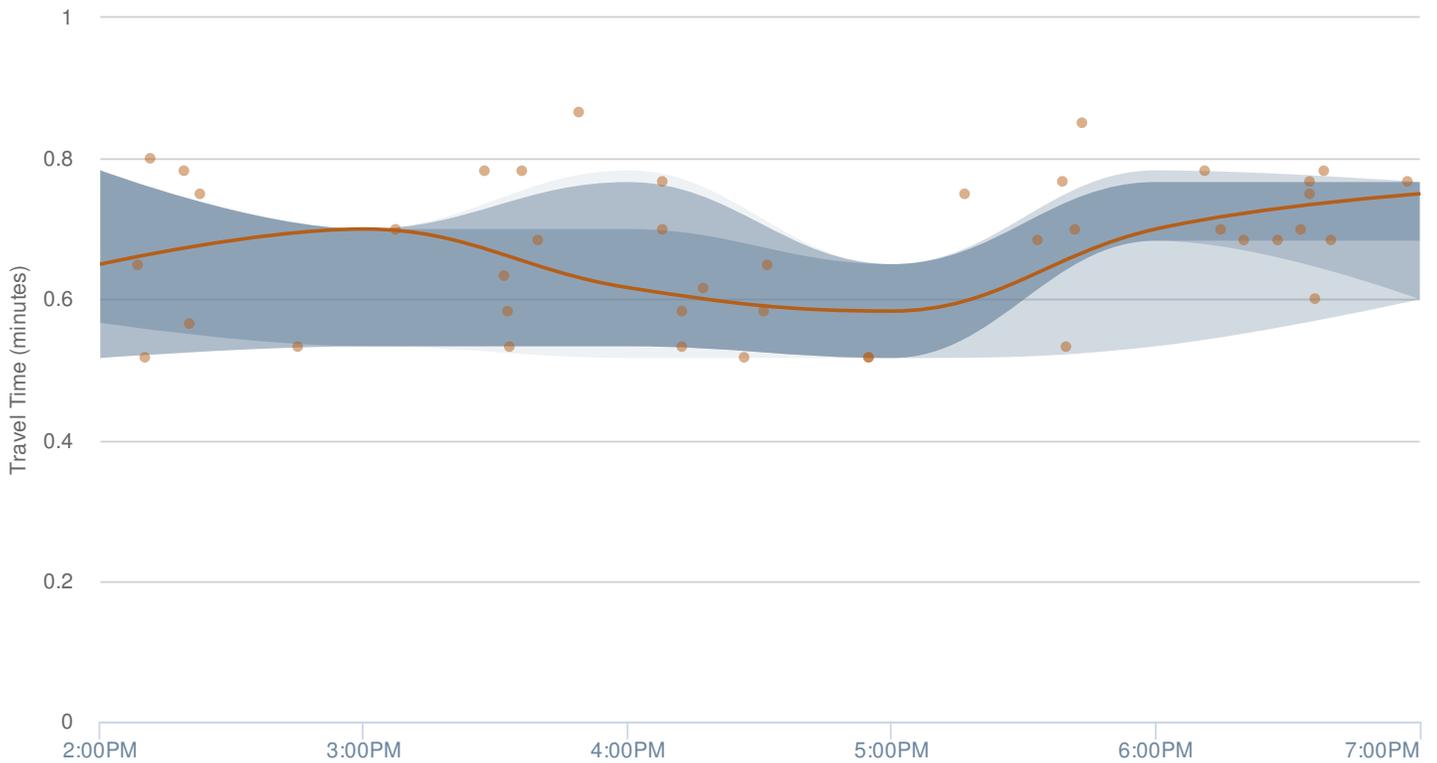
2 Locations | Lincoln, NE | Thu Apr 19, 2018 | 2:00PM - 7:00PM (5.0h)



Start Location	End Location	Planning Time Index PM (4pm - 7pm)	Travel Time Index PM (4pm - 7pm)	Buffer Time Index PM (4pm - 7pm)
1 148th St & Adams St	2 2025 North 148th Street	1.40	1.20	0.16
2 2025 North 148th Street	1 148th St & Adams St	1.35	1.10	0.22

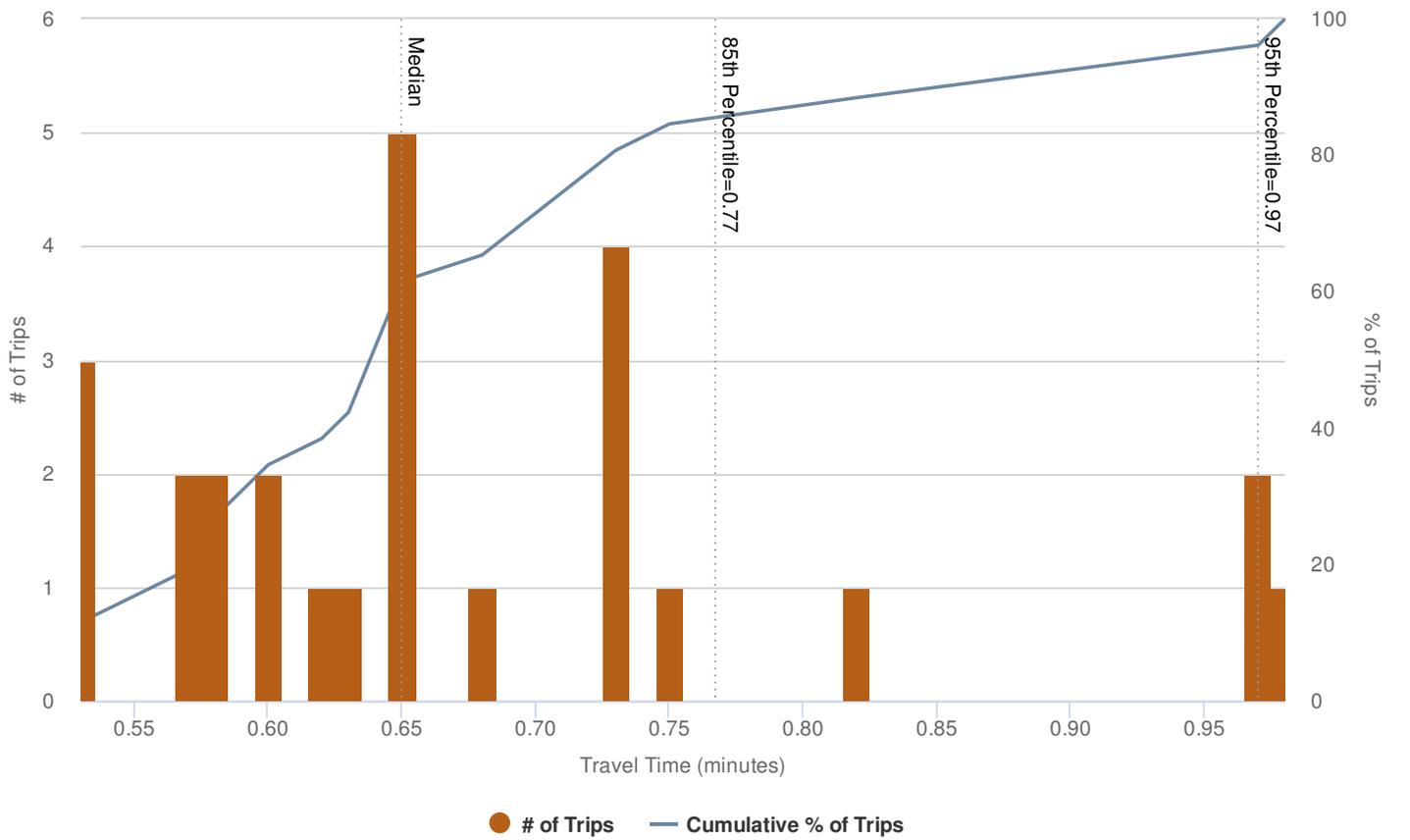
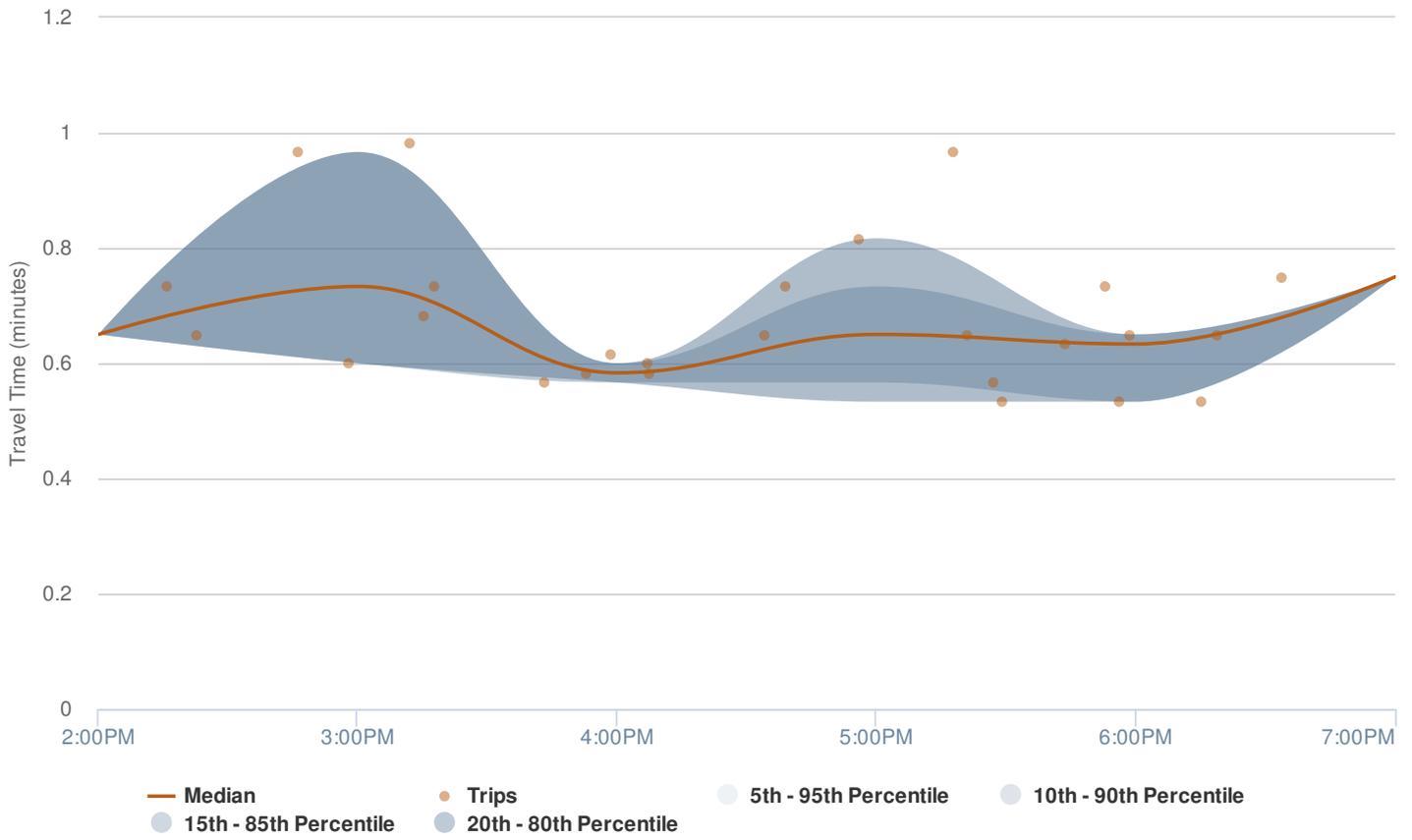
148th St & Adams St to 2025 North 148th Street

1 to 2 | (40.842131, -96.521066) to (40.832199, -96.521156)



2025 North 148th Street to 148th St & Adams St

2 to 1 | (40.832199, -96.521156) to (40.842131, -96.521066)

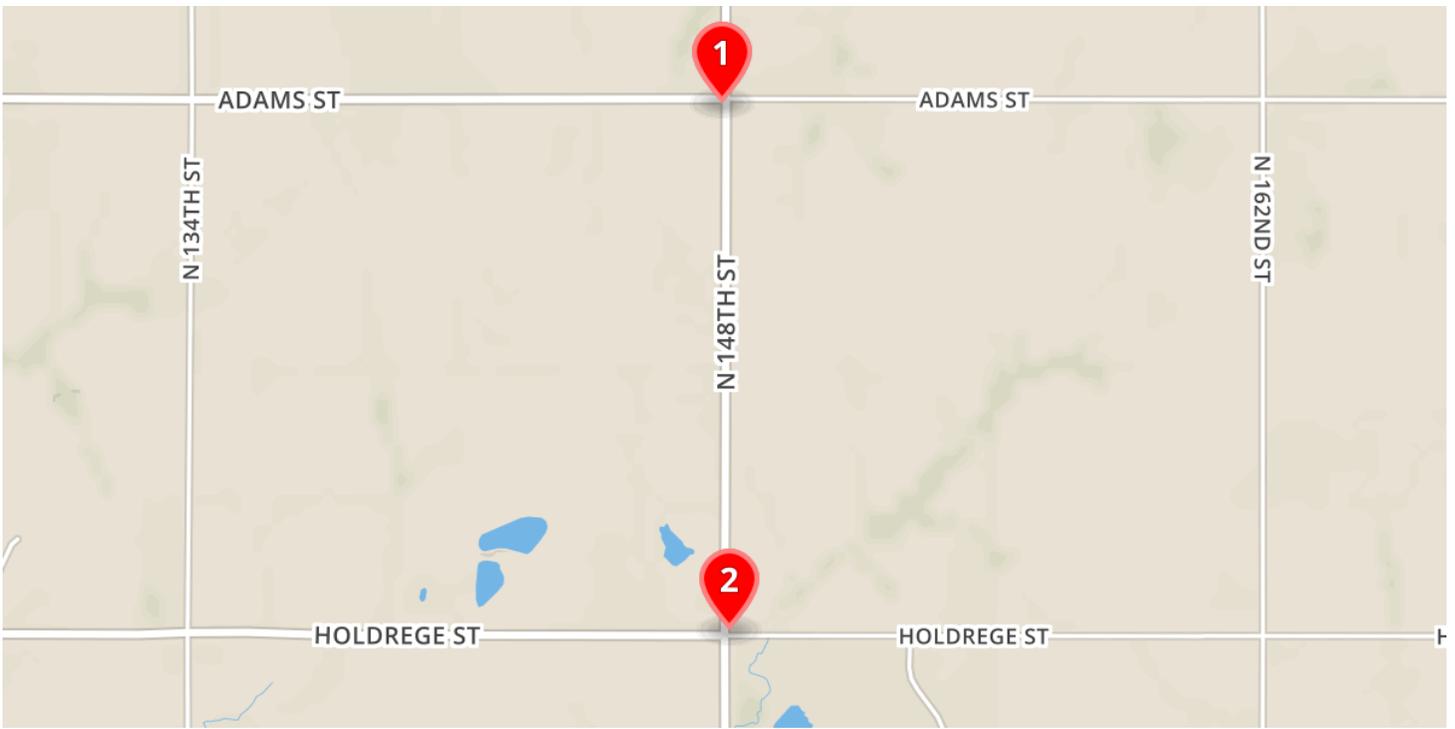


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South #3

Travel Time Summary

2 Locations | Lincoln, NE | Tue May 22, 2018 | 6:00AM - 7:00PM (13.0h)



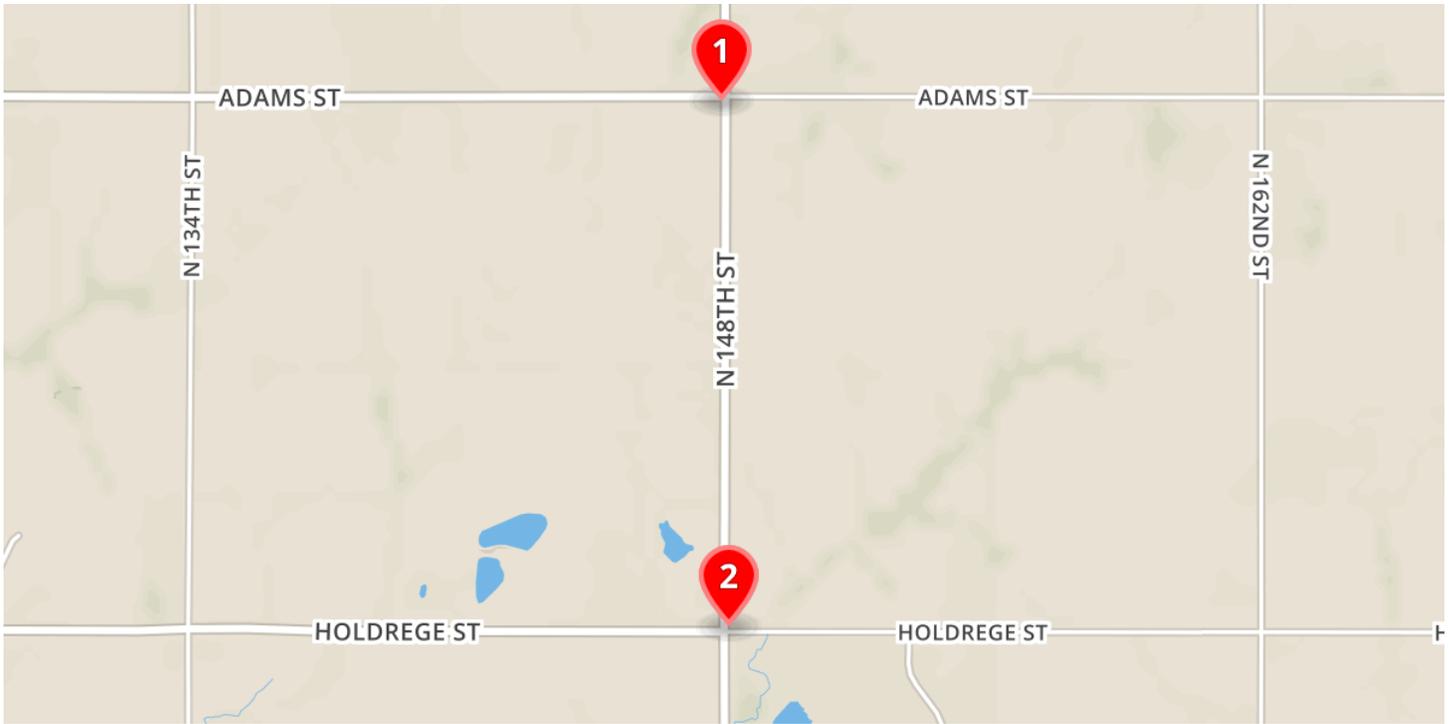
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) ¹	Speed (mph) ²							
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max		
1	13401-14799 Adams Street	2	1100-2998 North 148th Street	91	1.07	1.22	1.35	1.11	0.92	1.38	1.0	56.27	59.04	60.02	54.75	43.39	65.48
2	1100-2998 North 148th Street	1	13401-14799 Adams Street	97	1.12	1.30	1.34	1.12	0.93	1.48	1.0	53.75	61.67	63.18	54.33	40.47	64.31

¹ Distance is the length of the Fastest Route between the locations in Google Maps. If Google Maps is unavailable or if Google Maps reports a distance longer than twice the aerial (as the bird flies) distance, the aerial distance is used and is denoted by an asterisk (*). See help.miovision.com/kb/distance for more information.

² Speed is the distance between the points divided by the travel time. This value is known as the space mean speed. This report was configured to include trips with calculated speeds between 1.0 mph and 90.0 mph. If you want a report that includes trips with a different range of speeds, or all trips, contact the person who generated the report.

Travel Time Reliability Summary

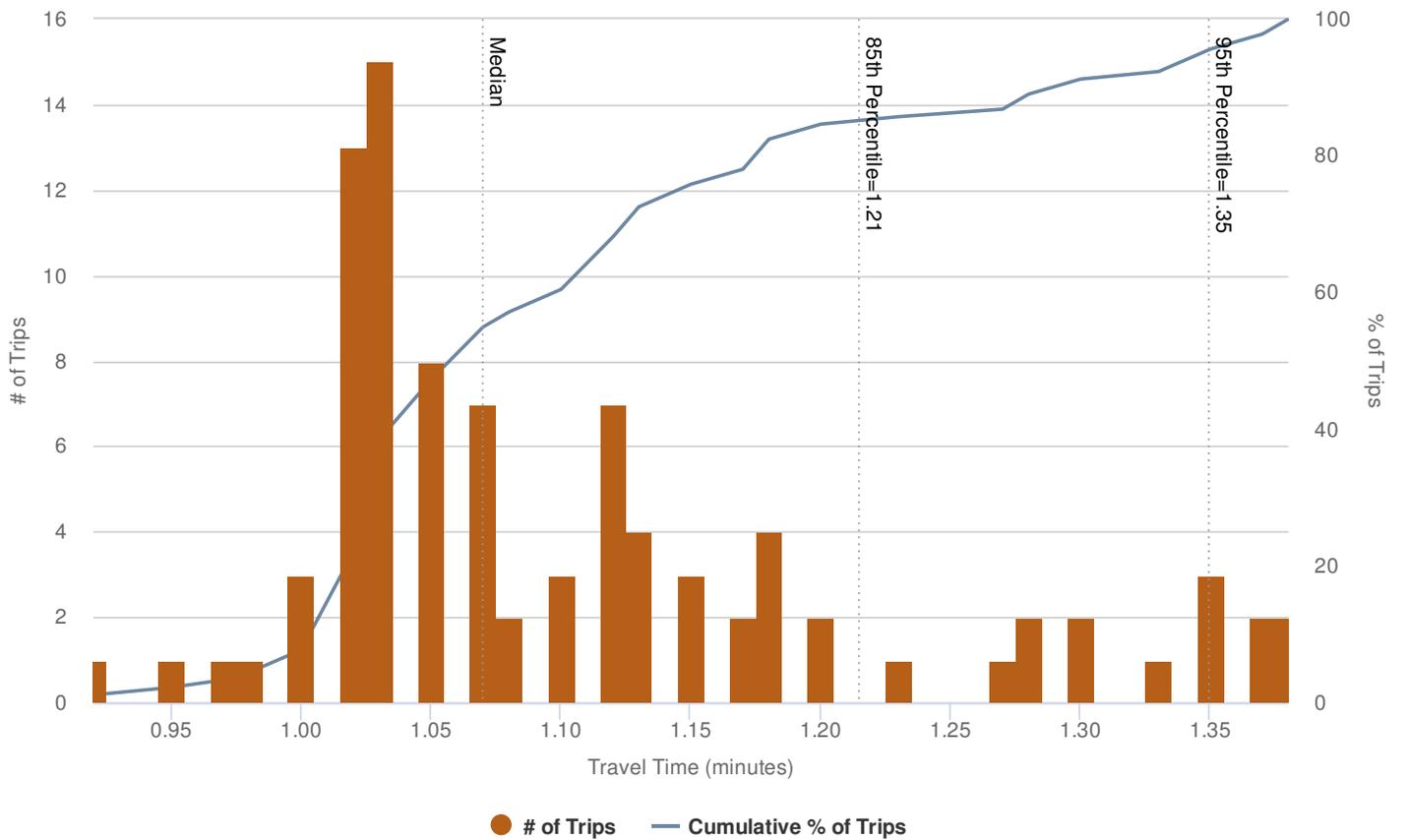
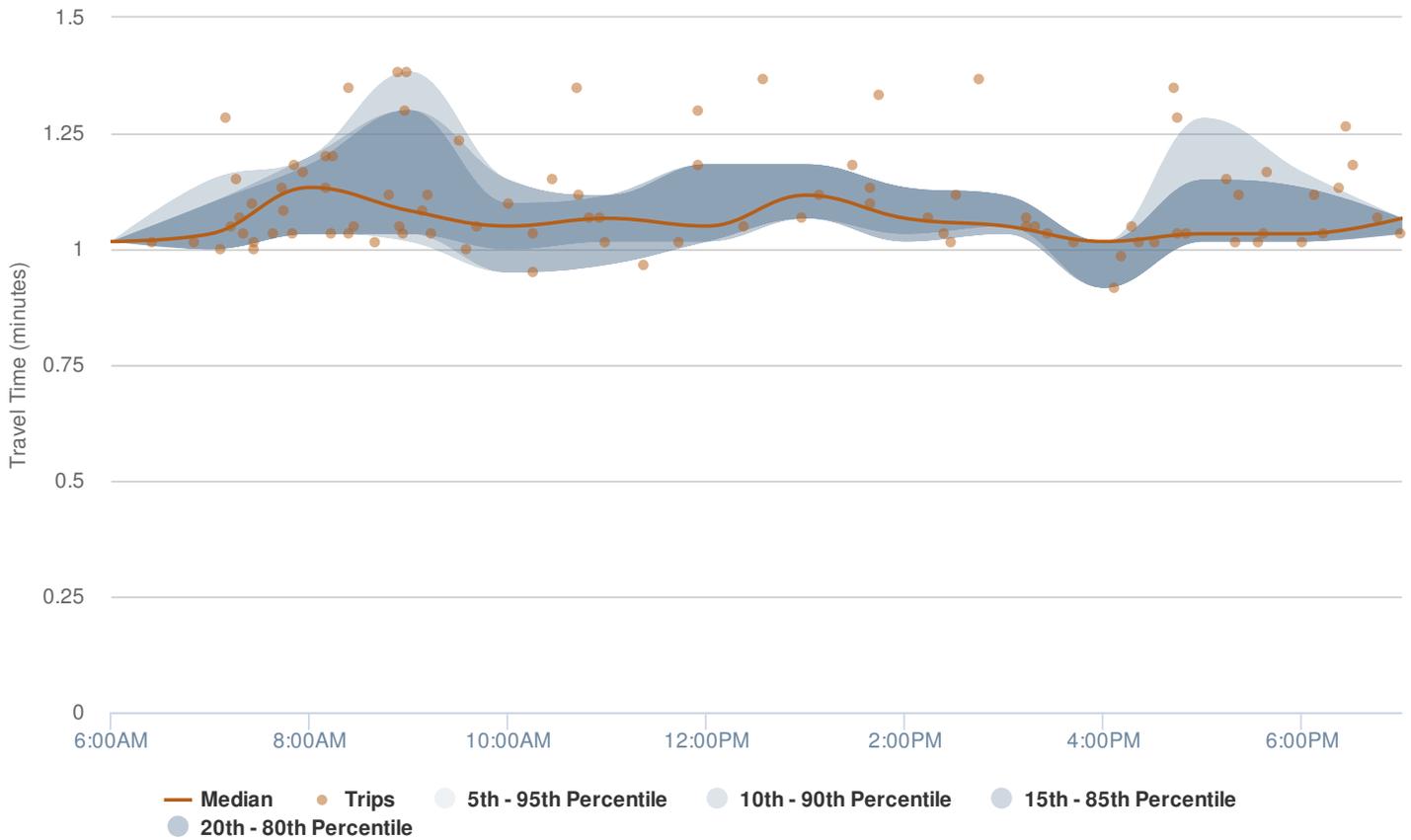
2 Locations | Lincoln, NE | Tue May 22, 2018 | 6:00AM - 7:00PM (13.0h)



Start Location	End Location	Planning Time Index AM (6am - 9am)	Planning Time Index PM (4pm - 7pm)	Travel Time Index AM (6am - 9am)	Travel Time Index PM (4pm - 7pm)	Buffer Time Index AM (6am - 9am)	Buffer Time Index PM (4pm - 7pm)
1 13401-14799 Adams Street	2 1100-2998 North 148th Street	1.16	1.20	1.08	1.05	0.08	0.14
2 1100-2998 North 148th Street	1 13401-14799 Adams Street	1.25	1.28	1.08	1.11	0.16	0.16

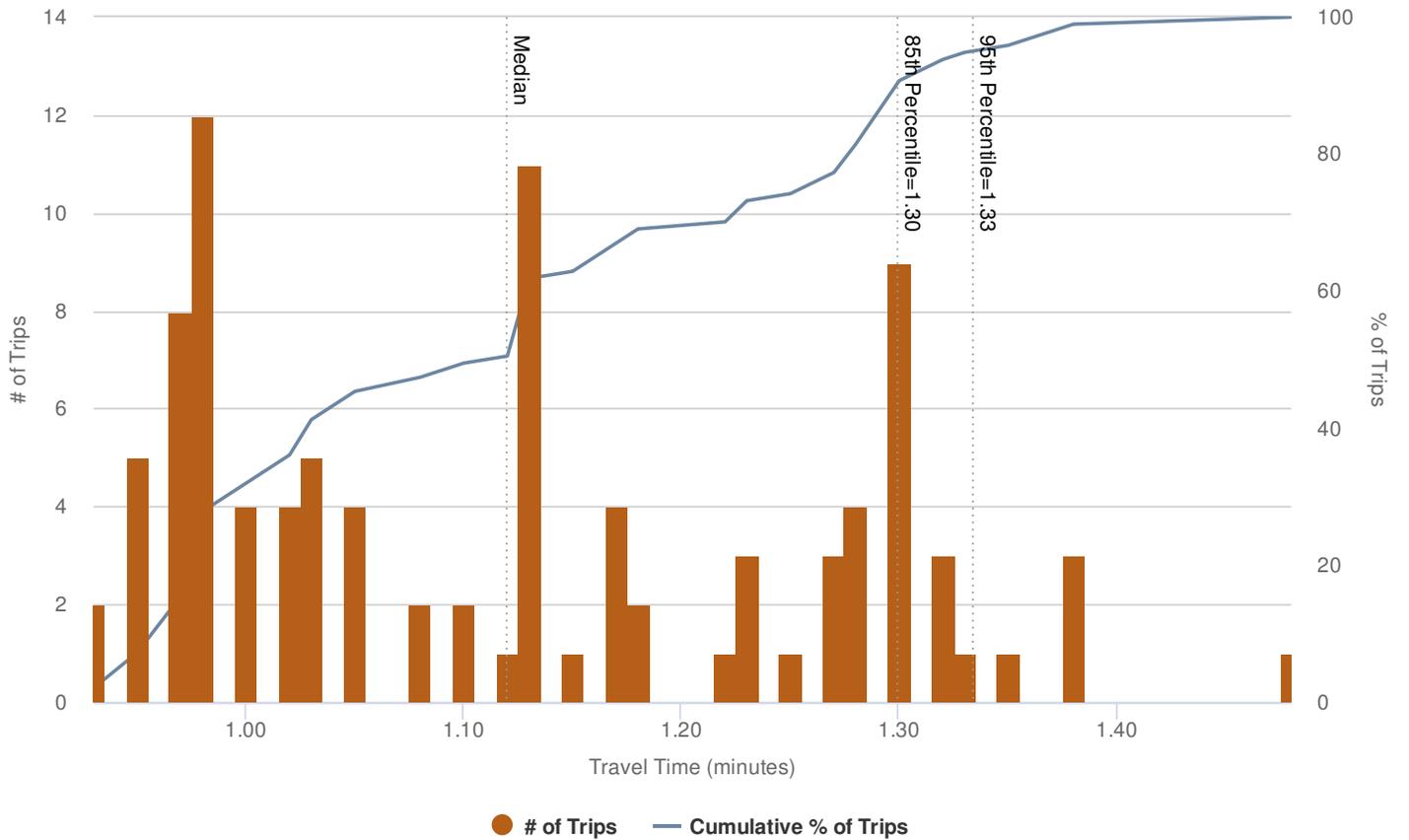
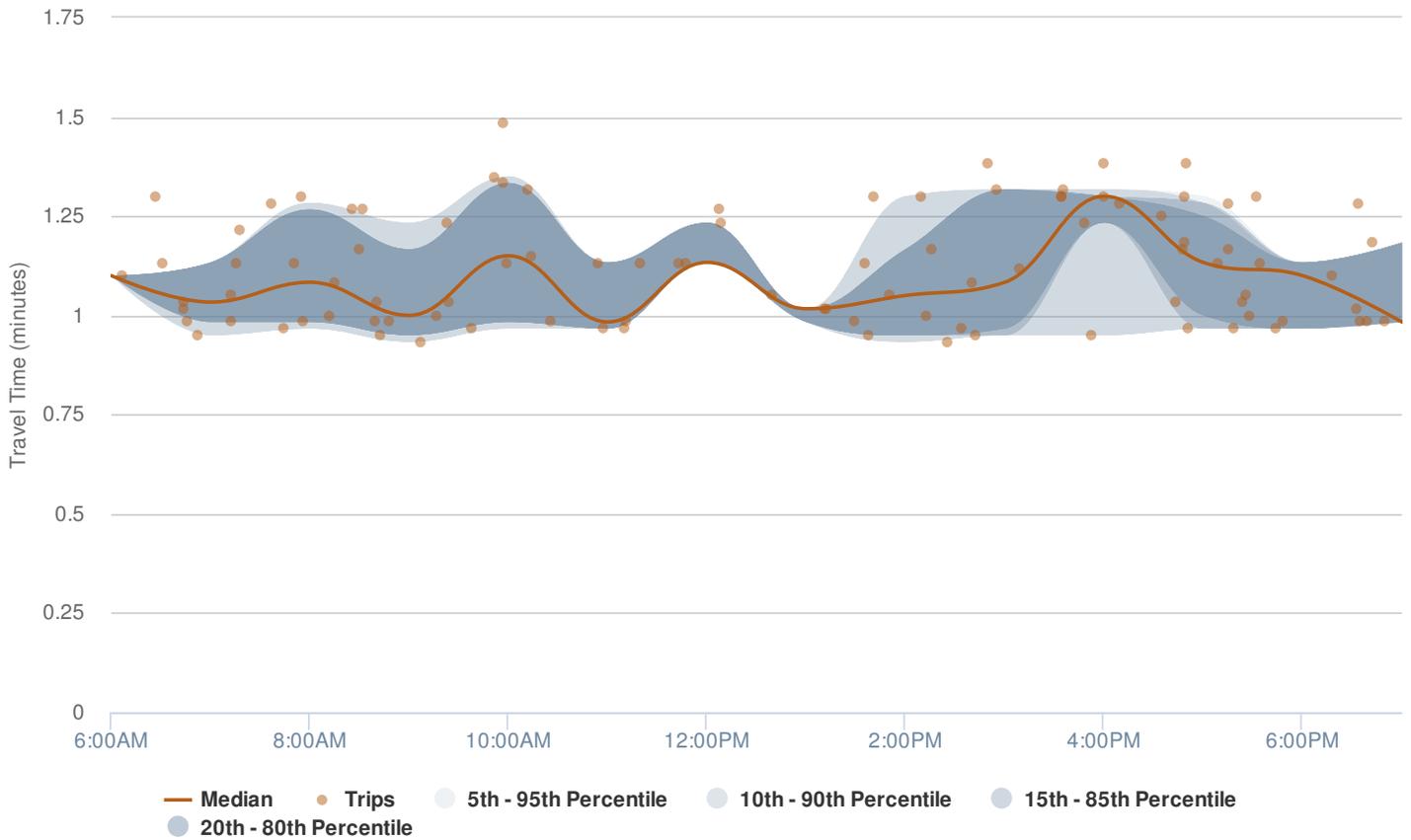
13401-14799 Adams Street to 1100-2998 North 148th Street

1 to 2 | (40.84185, -96.52111) to (40.827648, -96.520874)



1100-2998 North 148th Street to 13401-14799 Adams Street

2 to 1 | (40.827648, -96.520874) to (40.84185, -96.521111)



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148th Street Speed Studies Memo
Attachments

USLIMITS2 Report

USLIMITS2 Speed Zoning Report

Project Name: Lancaster 148th Street speed limit

Analyst: Peyton Weiss

Date: 08-03-2018

Basic Project Information

Route Name: 148th Street
From: S
To: N
State: Nebraska
County: Lancaster County
City: Hickman city
Route Type: Road Section in Undeveloped Area
Route Status: Existing

Crash Data Information

Crash Data Years: 5.17
Crash AADT: 5175 veh/day
Total Number of Crashes: 85
Total Number of Injury Crashes: 42
Section Crash Rate: 79 per 100 MVM
Section Injury Crash Rate: 39 per 100 MVM
Crash Rate Average for Similar Roads: 129
Injury Rate Average for Similar Roads: 43

Roadway Information

Section Length: 11 mile(s)
Statutory Speed Limit: 55 mph
Existing Speed Limit: 55 mph
Adverse Alignment: No
Divided/Undivided: Undivided
Number of Lanes: 2
Roadside Hazard Rating: 5
Transition Zone: No

Traffic Information

85th Percentile Speed: 66 mph
50th Percentile Speed: 58 mph
AADT: 5175 veh/day

Project Description: whole corridor

Recommended Speed Limit:



Note: The final recommended speed limit is higher than the 55 mph statutory speed limit for this type of road. An engineering study such as the one carried out with USLIMITS is usually required to set a speed limit above the statutory limit.

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Equations Used in Crash Data Calculations

Exposure (M)

$$M = (\text{Section AADT} * 365 * \text{Section Length} * \text{Duration of Crash Data}) / (100000000)$$
$$M = (5175 * 365 * 11 * 5.17) / (100000000)$$
$$M = 1.0735$$

Crash Rate (Rc)

$$Rc = (\text{Section Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Rc = (16.45 * 100000000) / (5175 * 365 * 11)$$
$$Rc = 79.18 \text{ crashes per 100 MVM}$$

Injury Rate (Ri)

$$Ri = (\text{Section Injury Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Ri = (8.13 * 100000000) / (5175 * 365 * 11)$$
$$Ri = 39.12 \text{ injuries per 100 MVM}$$

Critical Crash Rate (Cc)

$C_c = \text{Crash Average of Similar Sections} + 1.645 * (\text{Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$

$C_c = 128.57 + 1.645 * (128.57 / 1.0735)^{(1/2)} + (1 / (2 * 1.0735))$

$C_c = 147.04$ crashes per 100 MVM

Critical Injury Rate (Ic)

$I_c = \text{Injury Crash Average of Similar Sections} + 1.645 * (\text{Injury Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$

$I_c = 43.29 + 1.645 * (43.29 / 1.0735)^{(1/2)} + (1 / (2 * 1.0735))$

$I_c = 54.20$ injuries per 100 MVM

USLIMITS2 Speed Zoning Report

Project Name: Lancaster 148th Street speed limit

Analyst: Peyton Weiss

Date: 08-01-2018

Basic Project Information

Project Number: 1
Route Name: 148th Street
From: S
To: N
State: Nebraska
County: Lancaster County
City: Hickman city
Route Type: Road Section in Undeveloped Area
Route Status: Existing

Roadway Information

Section Length: 4 mile(s)
Statutory Speed Limit: 55 mph
Existing Speed Limit: 55 mph
Adverse Alignment: No
Divided/Undivided: Undivided
Number of Lanes: 2
Roadside Hazard Rating: 5
Transition Zone: No

Crash Data Information

Crash Data Years: 5.17
Crash AADT: 5175 veh/day
Total Number of Crashes: 13
Total Number of Injury Crashes: 4
Section Crash Rate: 33 per 100 MVM
Section Injury Crash Rate: 10 per 100 MVM
Crash Rate Average for Similar Roads: 129
Injury Rate Average for Similar Roads: 43

Traffic Information

85th Percentile Speed: 64 mph
50th Percentile Speed: 56 mph
AADT: 5175 veh/day

Project Description: North #1

Recommended Speed Limit:



Note: The final recommended speed limit is higher than the 55 mph statutory speed limit for this type of road. An engineering study such as the one carried out with USLIMITS is usually required to set a speed limit above the statutory limit.

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Equations Used in Crash Data Calculations

Exposure (M)

$$M = (\text{Section AADT} * 365 * \text{Section Length} * \text{Duration of Crash Data}) / (100000000)$$
$$M = (5175 * 365 * 4 * 5.17) / (100000000)$$
$$M = 0.3904$$

Crash Rate (Rc)

$$Rc = (\text{Section Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Rc = (2.52 * 100000000) / (5175 * 365 * 4)$$
$$Rc = 33.30 \text{ crashes per 100 MVM}$$

Injury Rate (Ri)

$$Ri = (\text{Section Injury Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Ri = (0.77 * 100000000) / (5175 * 365 * 4)$$
$$Ri = 10.25 \text{ injuries per 100 MVM}$$

Critical Crash Rate (Cc)

$Cc = \text{Crash Average of Similar Sections} + 1.645 * (\text{Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$

$Cc = 128.57 + 1.645 * (128.57 / 0.3904)^{(1/2)} + (1 / (2 * 0.3904))$

$Cc = 159.71$ crashes per 100 MVM

Critical Injury Rate (Ic)

$Ic = \text{Injury Crash Average of Similar Sections} + 1.645 * (\text{Injury Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$

$Ic = 43.29 + 1.645 * (43.29 / 0.3904)^{(1/2)} + (1 / (2 * 0.3904))$

$Ic = 61.90$ injuries per 100 MVM

USLIMITS2 Speed Zoning Report

Project Name: Lancaster 148th Street speed limit

Analyst: Peyton Weiss

Date: 08-01-2018

Basic Project Information

Project Number: 2
Route Name: 148th Street
From: S
To: N
State: Nebraska
County: Lancaster County
City: Hickman city
Route Type: Road Section in Undeveloped Area
Route Status: Existing

Roadway Information

Section Length: 4 mile(s)
Statutory Speed Limit: 55 mph
Existing Speed Limit: 55 mph
Adverse Alignment: No
Divided/Undivided: Undivided
Number of Lanes: 2
Roadside Hazard Rating: 5
Transition Zone: No

Crash Data Information

Crash Data Years: 5.17
Crash AADT: 5175 veh/day
Total Number of Crashes: 45
Total Number of Injury Crashes: 24
Section Crash Rate: 115 per 100 MVM
Section Injury Crash Rate: 61 per 100 MVM
Crash Rate Average for Similar Roads: 129
Injury Rate Average for Similar Roads: 43

Traffic Information

85th Percentile Speed: 71 mph
50th Percentile Speed: 60 mph
AADT: 5175 veh/day

Project Description: Central #2

Recommended Speed Limit:



Note: The final recommended speed limit is higher than the 55 mph statutory speed limit for this type of road. An engineering study such as the one carried out with USLIMITS is usually required to set a speed limit above the statutory limit.

Note: The injury crash rate for the section of 61 per 100 MVM is more than 30 percent above the average for similar roads (43) but below the critical rate (62). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Note: A speed zone of 4 miles is generally too short for the recommended speed limit. Consider lengthening the speed zone (if that is possible) or using the speed limits from adjacent sections (if they are appropriate for this section). If the speed and other data you provided are representative of conditions for this short section, then the speed limit noted above may be considered.

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Equations Used in Crash Data Calculations

Exposure (M)

$M = (\text{Section AADT} * 365 * \text{Section Length} * \text{Duration of Crash Data}) / (100000000)$

$M = (5175 * 365 * 4 * 5.17) / (100000000)$

$M = 0.3904$

Crash Rate (Rc)

$$R_c = (\text{Section Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$

$$R_c = (8.71 * 100000000) / (5175 * 365 * 4)$$

$$R_c = 115.28 \text{ crashes per 100 MVM}$$

Injury Rate (Ri)

$$R_i = (\text{Section Injury Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$

$$R_i = (4.65 * 100000000) / (5175 * 365 * 4)$$

$$R_i = 61.48 \text{ injuries per 100 MVM}$$

Critical Crash Rate (Cc)

$$C_c = \text{Crash Average of Similar Sections} + 1.645 * (\text{Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$$

$$C_c = 128.57 + 1.645 * (128.57 / 0.3904)^{(1/2)} + (1 / (2 * 0.3904))$$

$$C_c = 159.71 \text{ crashes per 100 MVM}$$

Critical Injury Rate (Ic)

$$I_c = \text{Injury Crash Average of Similar Sections} + 1.645 * (\text{Injury Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$$

$$I_c = 43.29 + 1.645 * (43.29 / 0.3904)^{(1/2)} + (1 / (2 * 0.3904))$$

$$I_c = 61.90 \text{ injuries per 100 MVM}$$

USLIMITS2 Speed Zoning Report

Project Name: Lancaster 148th Street speed limit

Analyst: Peyton Weiss

Date: 08-01-2018

Basic Project Information

Project Number: 3
Route Name: 148th Street
From: S
To: N
State: Nebraska
County: Lancaster County
City: Hickman city
Route Type: Road Section in Undeveloped Area
Route Status: Existing

Roadway Information

Section Length: 4 mile(s)
Statutory Speed Limit: 55 mph
Existing Speed Limit: 55 mph
Adverse Alignment: No
Divided/Undivided: Undivided
Number of Lanes: 2
Roadside Hazard Rating: 5
Transition Zone: No

Crash Data Information

Crash Data Years: 5.17
Crash AADT: 4935 veh/day
Total Number of Crashes: 27
Total Number of Injury Crashes: 11
Section Crash Rate: 73 per 100 MVM
Section Injury Crash Rate: 30 per 100 MVM
Crash Rate Average for Similar Roads: 134
Injury Rate Average for Similar Roads: 44

Traffic Information

85th Percentile Speed: 60 mph
50th Percentile Speed: 55 mph
AADT: 4935 veh/day

Project Description: South #3

Recommended Speed Limit:



Note: The final recommended speed limit is higher than the 55 mph statutory speed limit for this type of road. An engineering study such as the one carried out with USLIMITS is usually required to set a speed limit above the statutory limit.

Disclaimer: The U.S. Government assumes no liability for the use of the information contained in this report. This report does not constitute a standard, specification, or regulation.

Equations Used in Crash Data Calculations

Exposure (M)

$$M = (\text{Section AADT} * 365 * \text{Section Length} * \text{Duration of Crash Data}) / (100000000)$$
$$M = (4935 * 365 * 4 * 5.17) / (100000000)$$
$$M = 0.3723$$

Crash Rate (Rc)

$$Rc = (\text{Section Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Rc = (5.23 * 100000000) / (4935 * 365 * 4)$$
$$Rc = 72.53 \text{ crashes per 100 MVM}$$

Injury Rate (Ri)

$$Ri = (\text{Section Injury Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Ri = (2.13 * 100000000) / (4935 * 365 * 4)$$
$$Ri = 29.55 \text{ injuries per 100 MVM}$$

Critical Crash Rate (Cc)

$Cc = \text{Crash Average of Similar Sections} + 1.645 * (\text{Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$

$Cc = 133.96 + 1.645 * (133.96 / 0.3723)^{(1/2)} + (1 / (2 * 0.3723))$

$Cc = 166.51$ crashes per 100 MVM

Critical Injury Rate (Ic)

$Ic = \text{Injury Crash Average of Similar Sections} + 1.645 * (\text{Injury Crash Average of Similar Sections} / \text{Exposure})^{(1/2)} + (1 / (2 * \text{Exposure}))$

$Ic = 43.89 + 1.645 * (43.89 / 0.3723)^{(1/2)} + (1 / (2 * 0.3723))$

$Ic = 63.10$ injuries per 100 MVM

TRAFFIC COUNT DATA



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Adams St
Site Code: 1484
Start Date: 04/19/2018
Page No: 1

Turning Movement Data

Start Time	148th St Southbound				Adams St Westbound				148th St Northbound				Adams St Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
6:00 AM	0	14	0	14	0	2	0	2	15	23	0	38	3	0	6	9	63
6:15 AM	1	17	0	18	1	5	0	6	28	23	0	51	3	0	4	7	82
6:30 AM	0	32	0	32	1	1	1	3	39	38	0	77	0	0	5	5	117
6:45 AM	0	35	1	36	0	0	0	0	34	50	0	84	2	1	7	10	130
Hourly Total	1	98	1	100	2	8	1	11	116	134	0	250	8	1	22	31	392
7:00 AM	0	41	5	46	2	2	1	5	23	35	0	58	6	1	5	12	121
7:15 AM	1	53	4	58	2	2	0	4	33	52	0	85	4	1	14	19	166
7:30 AM	0	71	5	76	1	1	2	4	47	52	0	99	8	3	15	26	205
7:45 AM	0	49	5	54	2	0	1	3	30	53	0	83	10	3	7	20	160
Hourly Total	1	214	19	234	7	5	4	16	133	192	0	325	28	8	41	77	652
8:00 AM	0	45	8	53	1	3	4	8	25	70	0	95	7	3	8	18	174
8:15 AM	1	48	5	54	1	1	5	7	19	62	0	81	4	3	6	13	155
8:30 AM	1	45	2	48	0	3	1	4	19	29	0	48	3	0	12	15	115
8:45 AM	0	30	4	34	0	3	1	4	6	26	0	32	2	0	3	5	75
Hourly Total	2	168	19	189	2	10	11	23	69	187	0	256	16	6	29	51	519
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:00 PM	0	19	3	22	0	0	0	0	3	24	0	27	3	0	7	10	59
2:15 PM	0	28	0	28	0	0	0	0	9	28	0	37	4	1	6	11	76
2:30 PM	3	32	2	37	0	1	0	1	11	31	0	42	4	0	5	9	89
2:45 PM	0	34	1	35	0	0	3	3	6	36	0	42	1	3	4	8	88
Hourly Total	3	113	6	122	0	1	3	4	29	119	0	148	12	4	22	38	312
3:00 PM	0	44	4	48	0	1	0	1	5	37	1	43	1	3	5	9	101
3:15 PM	0	31	1	32	0	2	1	3	9	49	0	58	3	1	15	19	112
3:30 PM	1	64	3	68	1	2	1	4	13	46	1	60	0	1	23	24	156
3:45 PM	2	60	3	65	0	0	0	0	13	53	2	68	7	1	19	27	160
Hourly Total	3	199	11	213	1	5	2	8	40	185	4	229	11	6	62	79	529
4:00 PM	2	61	5	68	0	2	0	2	2	50	3	55	0	2	22	24	149
4:15 PM	2	59	2	63	1	1	1	3	6	64	2	72	7	4	22	33	171
4:30 PM	1	59	5	65	0	0	1	1	12	58	1	71	1	2	19	22	159
4:45 PM	1	68	1	70	0	1	0	1	13	52	0	65	7	4	25	36	172
Hourly Total	6	247	13	266	1	4	2	7	33	224	6	263	15	12	88	115	651
5:00 PM	0	87	2	89	2	1	0	3	6	56	0	62	3	1	17	21	175
5:15 PM	1	58	0	59	0	1	2	3	7	71	0	78	6	0	24	30	170
5:30 PM	3	60	3	66	0	2	1	3	9	53	0	62	5	2	13	20	151
5:45 PM	0	45	1	46	1	3	0	4	11	65	0	76	2	4	19	25	151
Hourly Total	4	250	6	260	3	7	3	13	33	245	0	278	16	7	73	96	647
6:00 PM	1	39	2	42	1	2	0	3	8	59	0	67	4	2	14	20	132
6:15 PM	0	33	3	36	1	2	2	5	8	59	4	71	6	6	12	24	136

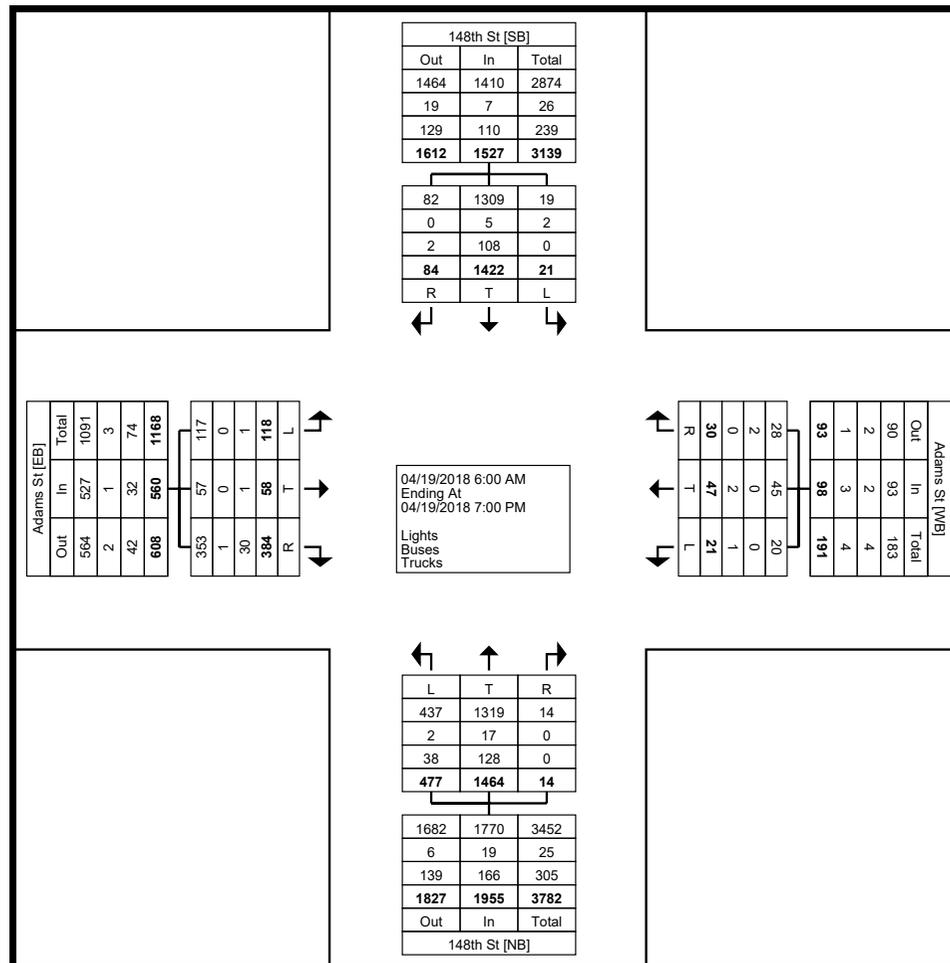
6:30 PM	0	28	2	30	2	1	0	3	4	29	0	33	0	1	11	12	78
6:45 PM	0	33	2	35	1	2	2	5	4	31	0	35	2	5	10	17	92
Hourly Total	1	133	9	143	5	7	4	16	24	178	4	206	12	14	47	73	438
Grand Total	21	1422	84	1527	21	47	30	98	477	1464	14	1955	118	58	384	560	4140
Approach %	1.4	93.1	5.5	-	21.4	48.0	30.6	-	24.4	74.9	0.7	-	21.1	10.4	68.6	-	-
Total %	0.5	34.3	2.0	36.9	0.5	1.1	0.7	2.4	11.5	35.4	0.3	47.2	2.9	1.4	9.3	13.5	-
Lights	19	1309	82	1410	20	45	28	93	437	1319	14	1770	117	57	353	527	3800
% Lights	90.5	92.1	97.6	92.3	95.2	95.7	93.3	94.9	91.6	90.1	100.0	90.5	99.2	98.3	91.9	94.1	91.8
Buses	2	5	0	7	0	0	2	2	2	17	0	19	0	0	1	1	29
% Buses	9.5	0.4	0.0	0.5	0.0	0.0	6.7	2.0	0.4	1.2	0.0	1.0	0.0	0.0	0.3	0.2	0.7
Trucks	0	108	2	110	1	2	0	3	38	128	0	166	1	1	30	32	311
% Trucks	0.0	7.6	2.4	7.2	4.8	4.3	0.0	3.1	8.0	8.7	0.0	8.5	0.8	1.7	7.8	5.7	7.5



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Adams St
Site Code: 1484
Start Date: 04/19/2018
Page No: 3



Turning Movement Data Plot



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Adams St
Site Code: 1484
Start Date: 04/19/2018
Page No: 4

Turning Movement Peak Hour Data (7:15 AM)

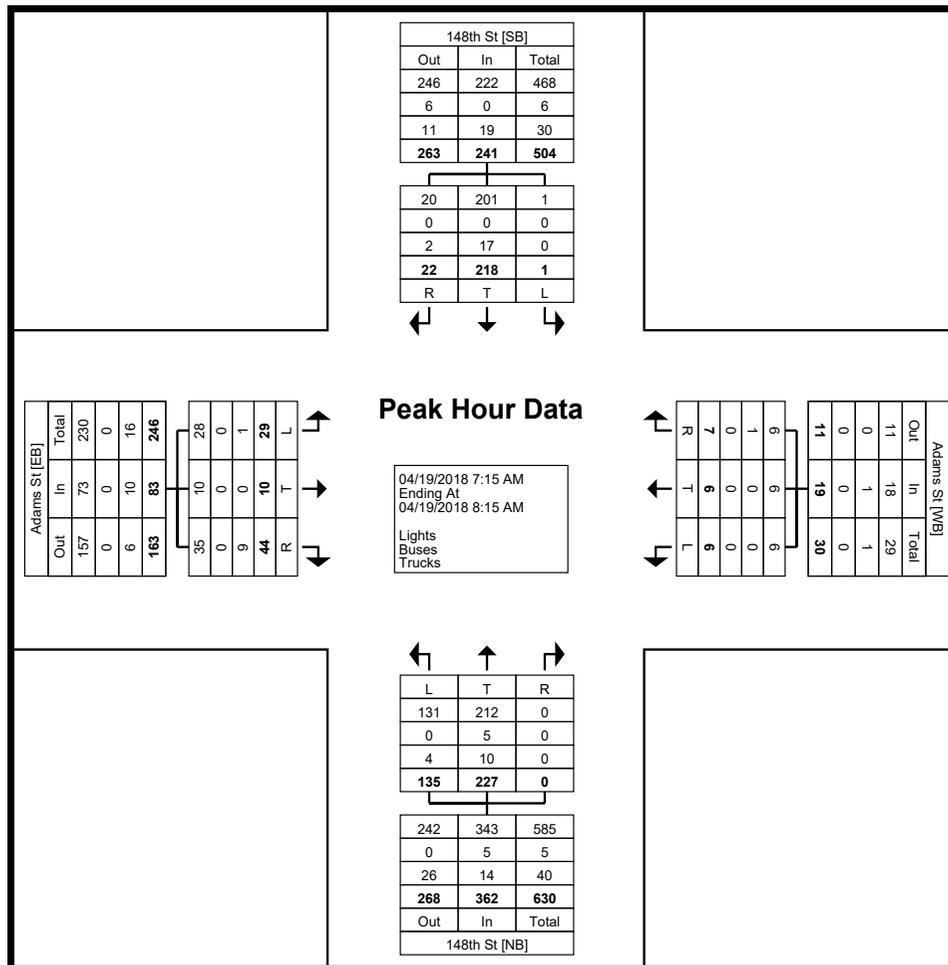
Start Time	148th St Southbound				Adams St Westbound				148th St Northbound				Adams St Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:15 AM	1	53	4	58	2	2	0	4	33	52	0	85	4	1	14	19	166
7:30 AM	0	71	5	76	1	1	2	4	47	52	0	99	8	3	15	26	205
7:45 AM	0	49	5	54	2	0	1	3	30	53	0	83	10	3	7	20	160
8:00 AM	0	45	8	53	1	3	4	8	25	70	0	95	7	3	8	18	174
Total	1	218	22	241	6	6	7	19	135	227	0	362	29	10	44	83	705
Approach %	0.4	90.5	9.1	-	31.6	31.6	36.8	-	37.3	62.7	0.0	-	34.9	12.0	53.0	-	-
Total %	0.1	30.9	3.1	34.2	0.9	0.9	1.0	2.7	19.1	32.2	0.0	51.3	4.1	1.4	6.2	11.8	-
PHF	0.250	0.768	0.688	0.793	0.750	0.500	0.438	0.594	0.718	0.811	0.000	0.914	0.725	0.833	0.733	0.798	0.860
Lights	1	201	20	222	6	6	6	18	131	212	0	343	28	10	35	73	656
% Lights	100.0	92.2	90.9	92.1	100.0	100.0	85.7	94.7	97.0	93.4	-	94.8	96.6	100.0	79.5	88.0	93.0
Buses	0	0	0	0	0	0	1	1	0	5	0	5	0	0	0	0	6
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	14.3	5.3	0.0	2.2	-	1.4	0.0	0.0	0.0	0.0	0.9
Trucks	0	17	2	19	0	0	0	0	4	10	0	14	1	0	9	10	43
% Trucks	0.0	7.8	9.1	7.9	0.0	0.0	0.0	0.0	3.0	4.4	-	3.9	3.4	0.0	20.5	12.0	6.1



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Adams St
Site Code: 1484
Start Date: 04/19/2018
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Turning Movement Peak Hour Data Plot (7:15 AM)



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Adams St
Site Code: 1484
Start Date: 04/19/2018
Page No: 6

Turning Movement Peak Hour Data (4:15 PM)

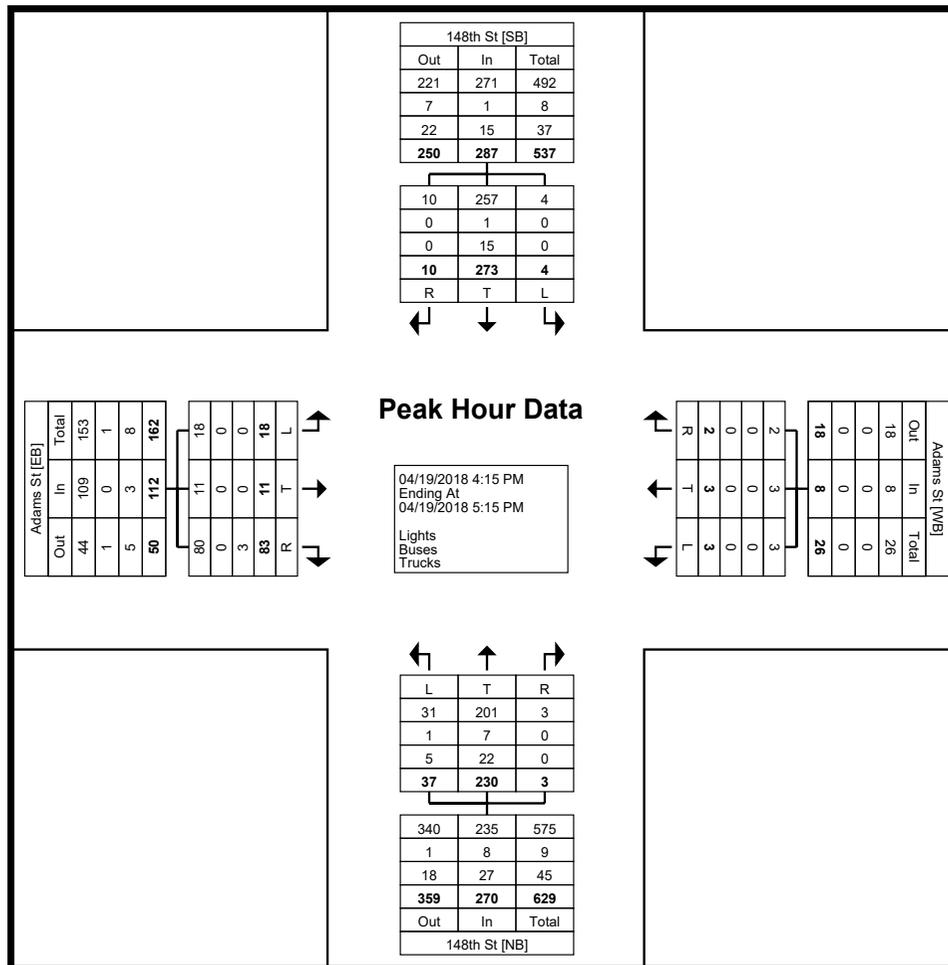
Start Time	148th St Southbound				Adams St Westbound				148th St Northbound				Adams St Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:15 PM	2	59	2	63	1	1	1	3	6	64	2	72	7	4	22	33	171
4:30 PM	1	59	5	65	0	0	1	1	12	58	1	71	1	2	19	22	159
4:45 PM	1	68	1	70	0	1	0	1	13	52	0	65	7	4	25	36	172
5:00 PM	0	87	2	89	2	1	0	3	6	56	0	62	3	1	17	21	175
Total	4	273	10	287	3	3	2	8	37	230	3	270	18	11	83	112	677
Approach %	1.4	95.1	3.5	-	37.5	37.5	25.0	-	13.7	85.2	1.1	-	16.1	9.8	74.1	-	-
Total %	0.6	40.3	1.5	42.4	0.4	0.4	0.3	1.2	5.5	34.0	0.4	39.9	2.7	1.6	12.3	16.5	-
PHF	0.500	0.784	0.500	0.806	0.375	0.750	0.500	0.667	0.712	0.898	0.375	0.938	0.643	0.688	0.830	0.778	0.967
Lights	4	257	10	271	3	3	2	8	31	201	3	235	18	11	80	109	623
% Lights	100.0	94.1	100.0	94.4	100.0	100.0	100.0	100.0	83.8	87.4	100.0	87.0	100.0	100.0	96.4	97.3	92.0
Buses	0	1	0	1	0	0	0	0	1	7	0	8	0	0	0	0	9
% Buses	0.0	0.4	0.0	0.3	0.0	0.0	0.0	0.0	2.7	3.0	0.0	3.0	0.0	0.0	0.0	0.0	1.3
Trucks	0	15	0	15	0	0	0	0	5	22	0	27	0	0	3	3	45
% Trucks	0.0	5.5	0.0	5.2	0.0	0.0	0.0	0.0	13.5	9.6	0.0	10.0	0.0	0.0	3.6	2.7	6.6



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Adams St
Site Code: 1484
Start Date: 04/19/2018
Page No: 7



Turning Movement Peak Hour Data Plot (4:15 PM)



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Amberly Rd
Site Code: 1481
Start Date: 04/17/2018
Page No: 1

Turning Movement Data

Start Time	148th St Southbound			148th St Northbound			Amberly Rd Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
12:00 AM	3	0	3	1	0	1	0	0	0	4
12:15 AM	0	0	0	1	1	2	0	0	0	2
12:30 AM	1	0	1	0	0	0	0	0	0	1
12:45 AM	0	0	0	0	1	1	1	0	1	2
Hourly Total	4	0	4	2	2	4	1	0	1	9
1:00 AM	0	0	0	1	0	1	0	1	1	2
1:15 AM	0	0	0	0	0	0	0	0	0	0
1:30 AM	1	0	1	0	0	0	0	0	0	1
1:45 AM	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	0	1	1	0	1	0	1	1	3
2:00 AM	1	0	1	0	0	0	0	0	0	1
2:15 AM	0	0	0	0	0	0	0	0	0	0
2:30 AM	2	0	2	0	0	0	0	0	0	2
2:45 AM	1	0	1	0	0	0	0	0	0	1
Hourly Total	4	0	4	0	0	0	0	0	0	4
3:00 AM	0	0	0	0	0	0	0	1	1	1
3:15 AM	0	0	0	0	0	0	0	0	0	0
3:30 AM	0	0	0	1	1	2	0	0	0	2
3:45 AM	1	0	1	0	0	0	1	0	1	2
Hourly Total	1	0	1	1	1	2	1	1	2	5
4:00 AM	0	0	0	0	0	0	0	0	0	0
4:15 AM	1	0	1	0	0	0	0	0	0	1
4:30 AM	0	2	2	0	3	3	0	2	2	7
4:45 AM	1	1	2	3	0	3	1	1	2	7
Hourly Total	2	3	5	3	3	6	1	3	4	15
5:00 AM	4	3	7	2	5	7	0	1	1	15
5:15 AM	5	0	5	4	5	9	1	1	2	16
5:30 AM	3	3	6	5	3	8	0	1	1	15
5:45 AM	7	3	10	1	9	10	0	4	4	24
Hourly Total	19	9	28	12	22	34	1	7	8	70
6:00 AM	11	4	15	11	20	31	0	2	2	48
6:15 AM	12	7	19	15	11	26	3	4	7	52
6:30 AM	17	13	30	20	12	32	4	15	19	81
6:45 AM	20	21	41	24	17	41	7	11	18	100
Hourly Total	60	45	105	70	60	130	14	32	46	281
7:00 AM	36	8	44	11	17	28	1	17	18	90
7:15 AM	41	15	56	25	25	50	6	21	27	133
7:30 AM	33	4	37	31	24	55	3	19	22	114

7:45 AM	42	27	69	30	33	63	4	17	21	153
Hourly Total	152	54	206	97	99	196	14	74	88	490
8:00 AM	42	48	90	55	32	87	15	17	32	209
8:15 AM	34	36	70	50	21	71	13	26	39	180
8:30 AM	18	27	45	25	23	48	5	23	28	121
8:45 AM	31	1	32	5	19	24	2	12	14	70
Hourly Total	125	112	237	135	95	230	35	78	113	580
9:00 AM	10	5	15	11	18	29	3	7	10	54
9:15 AM	12	1	13	9	10	19	5	11	16	48
9:30 AM	19	3	22	13	18	31	9	11	20	73
9:45 AM	16	3	19	7	14	21	2	9	11	51
Hourly Total	57	12	69	40	60	100	19	38	57	226
10:00 AM	8	8	16	9	12	21	3	10	13	50
10:15 AM	20	1	21	5	8	13	5	11	16	50
10:30 AM	8	1	9	11	14	25	3	12	15	49
10:45 AM	9	4	13	13	13	26	2	2	4	43
Hourly Total	45	14	59	38	47	85	13	35	48	192
11:00 AM	12	2	14	11	11	22	3	7	10	46
11:15 AM	12	5	17	8	20	28	2	9	11	56
11:30 AM	14	3	17	6	14	20	5	9	14	51
11:45 AM	12	6	18	10	10	20	6	3	9	47
Hourly Total	50	16	66	35	55	90	16	28	44	200
12:00 PM	20	2	22	8	15	23	7	15	22	67
12:15 PM	12	4	16	6	23	29	1	15	16	61
12:30 PM	15	7	22	9	16	25	0	12	12	59
12:45 PM	12	7	19	13	15	28	2	11	13	60
Hourly Total	59	20	79	36	69	105	10	53	63	247
1:00 PM	7	4	11	13	15	28	5	8	13	52
1:15 PM	16	5	21	12	15	27	2	10	12	60
1:30 PM	6	0	6	11	19	30	4	6	10	46
1:45 PM	16	4	20	9	10	19	3	6	9	48
Hourly Total	45	13	58	45	59	104	14	30	44	206
2:00 PM	16	2	18	9	14	23	7	12	19	60
2:15 PM	12	1	13	10	19	29	5	5	10	52
2:30 PM	17	5	22	7	21	28	6	12	18	68
2:45 PM	17	3	20	10	15	25	6	8	14	59
Hourly Total	62	11	73	36	69	105	24	37	61	239
3:00 PM	13	5	18	13	30	43	4	8	12	73
3:15 PM	24	13	37	25	22	47	6	15	21	105
3:30 PM	32	15	47	16	29	45	13	35	48	140
3:45 PM	40	4	44	20	22	42	30	39	69	155
Hourly Total	109	37	146	74	103	177	53	97	150	473
4:00 PM	45	1	46	15	16	31	17	22	39	116
4:15 PM	35	6	41	23	29	52	15	29	44	137
4:30 PM	19	11	30	27	32	59	10	25	35	124
4:45 PM	27	10	37	19	52	71	16	24	40	148
Hourly Total	126	28	154	84	129	213	58	100	158	525
5:00 PM	49	10	59	13	49	62	14	34	48	169
5:15 PM	38	5	43	21	42	63	16	28	44	150
5:30 PM	32	16	48	20	61	81	15	24	39	168
5:45 PM	31	14	45	9	39	48	36	25	61	154
Hourly Total	150	45	195	63	191	254	81	111	192	641

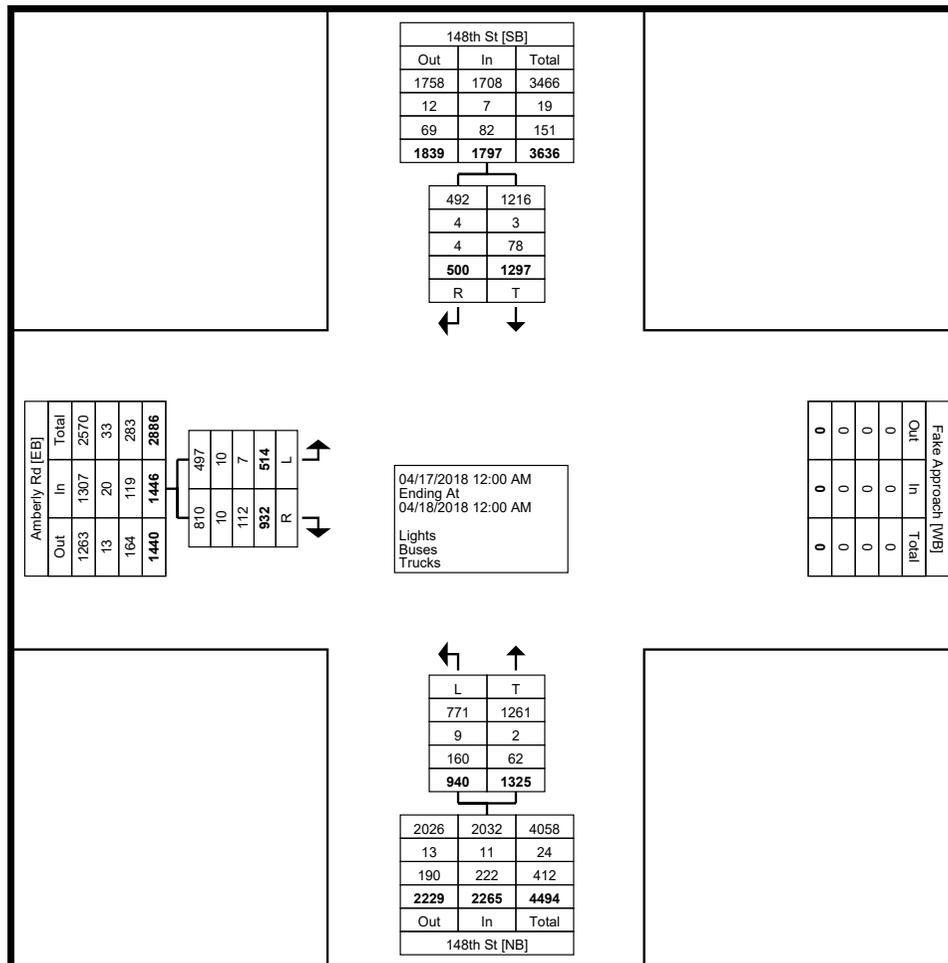
6:00 PM	25	3	28	22	36	58	12	21	33	119
6:15 PM	17	5	22	15	28	43	9	18	27	92
6:30 PM	15	8	23	16	16	32	11	9	20	75
6:45 PM	18	6	24	7	24	31	7	15	22	77
Hourly Total	75	22	97	60	104	164	39	63	102	363
7:00 PM	11	4	15	6	20	26	7	10	17	58
7:15 PM	8	3	11	9	24	33	14	6	20	64
7:30 PM	11	6	17	10	11	21	6	7	13	51
7:45 PM	16	5	21	12	18	30	14	18	32	83
Hourly Total	46	18	64	37	73	110	41	41	82	256
8:00 PM	10	7	17	11	18	29	4	6	10	56
8:15 PM	16	13	29	15	8	23	18	18	36	88
8:30 PM	17	13	30	10	11	21	8	15	23	74
8:45 PM	17	1	18	6	10	16	16	13	29	63
Hourly Total	60	34	94	42	47	89	46	52	98	281
9:00 PM	10	1	11	4	7	11	7	9	16	38
9:15 PM	7	0	7	4	11	15	5	2	7	29
9:30 PM	11	2	13	2	9	11	5	7	12	36
9:45 PM	1	0	1	2	5	7	0	2	2	10
Hourly Total	29	3	32	12	32	44	17	20	37	113
10:00 PM	7	0	7	4	1	5	1	2	3	15
10:15 PM	5	2	7	4	0	4	4	6	10	21
10:30 PM	1	0	1	2	0	2	6	5	11	14
10:45 PM	0	1	1	2	2	4	1	3	4	9
Hourly Total	13	3	16	12	3	15	12	16	28	59
11:00 PM	1	0	1	0	1	1	0	7	7	9
11:15 PM	1	0	1	3	1	4	2	2	4	9
11:30 PM	1	0	1	1	0	1	0	3	3	5
11:45 PM	0	1	1	1	0	1	2	3	5	7
Hourly Total	3	1	4	5	2	7	4	15	19	30
Grand Total	1297	500	1797	940	1325	2265	514	932	1446	5508
Approach %	72.2	27.8	-	41.5	58.5	-	35.5	64.5	-	-
Total %	23.5	9.1	32.6	17.1	24.1	41.1	9.3	16.9	26.3	-
Lights	1216	492	1708	771	1261	2032	497	810	1307	5047
% Lights	93.8	98.4	95.0	82.0	95.2	89.7	96.7	86.9	90.4	91.6
Buses	3	4	7	9	2	11	10	10	20	38
% Buses	0.2	0.8	0.4	1.0	0.2	0.5	1.9	1.1	1.4	0.7
Trucks	78	4	82	160	62	222	7	112	119	423
% Trucks	6.0	0.8	4.6	17.0	4.7	9.8	1.4	12.0	8.2	7.7



MNRG - Omaha
1753 S. 107th St

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Count Name: 148th St & Amberly Rd
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Turning Movement Data Plot



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
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Count Name: 148th St & Amberly Rd
Site Code: 1481
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Turning Movement Peak Hour Data (7:45 AM)

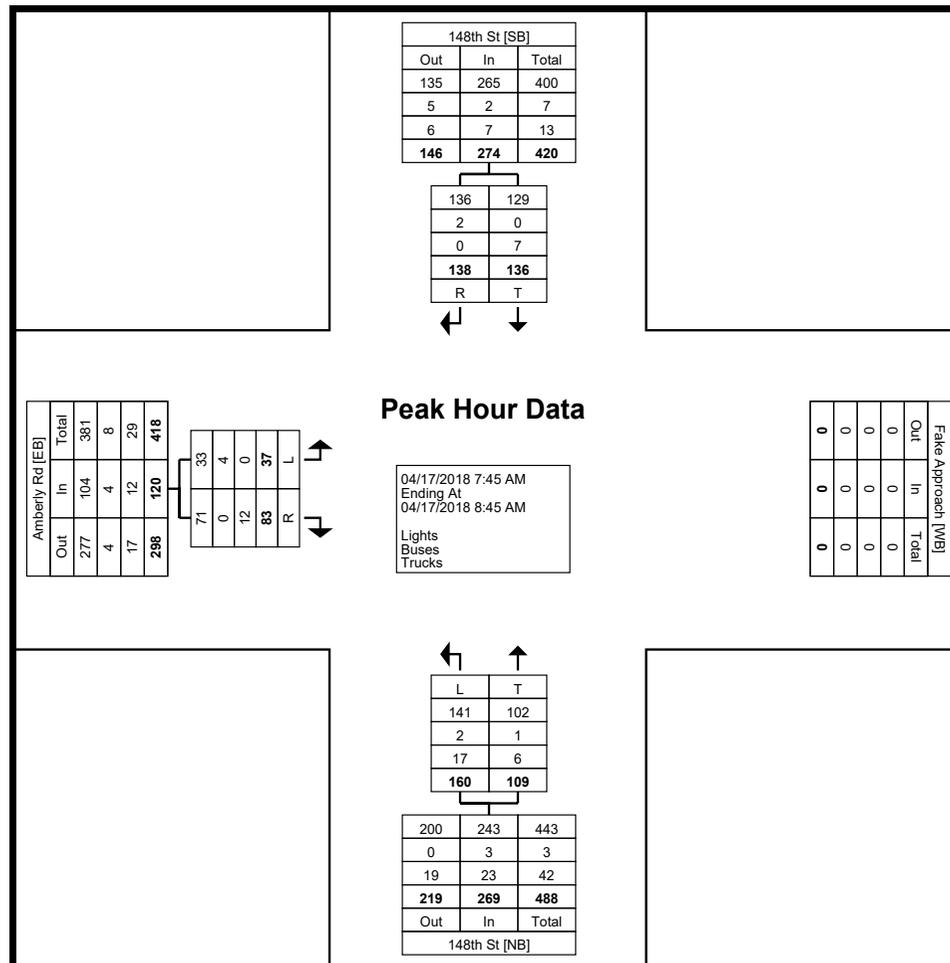
Start Time	148th St Southbound			148th St Northbound			Amberly Rd Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
7:45 AM	42	27	69	30	33	63	4	17	21	153
8:00 AM	42	48	90	55	32	87	15	17	32	209
8:15 AM	34	36	70	50	21	71	13	26	39	180
8:30 AM	18	27	45	25	23	48	5	23	28	121
Total	136	138	274	160	109	269	37	83	120	663
Approach %	49.6	50.4	-	59.5	40.5	-	30.8	69.2	-	-
Total %	20.5	20.8	41.3	24.1	16.4	40.6	5.6	12.5	18.1	-
PHF	0.810	0.719	0.761	0.727	0.826	0.773	0.617	0.798	0.769	0.793
Lights	129	136	265	141	102	243	33	71	104	612
% Lights	94.9	98.6	96.7	88.1	93.6	90.3	89.2	85.5	86.7	92.3
Buses	0	2	2	2	1	3	4	0	4	9
% Buses	0.0	1.4	0.7	1.3	0.9	1.1	10.8	0.0	3.3	1.4
Trucks	7	0	7	17	6	23	0	12	12	42
% Trucks	5.1	0.0	2.6	10.6	5.5	8.6	0.0	14.5	10.0	6.3



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Count Name: 148th St & Amberly Rd
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Turning Movement Peak Hour Data Plot (7:45 AM)



MNRG - Omaha
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Count Name: 148th St & Amberly Rd
Site Code: 1481
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Turning Movement Peak Hour Data (5:00 PM)

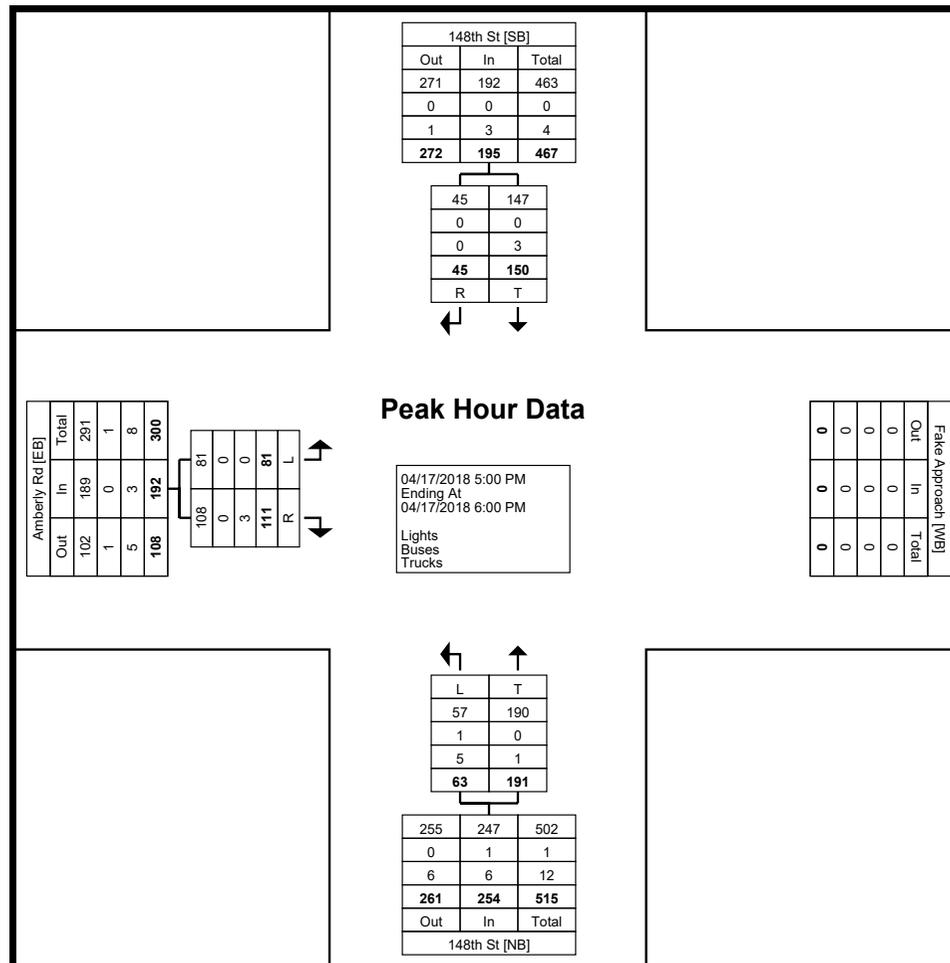
Start Time	148th St Southbound			148th St Northbound			Amberly Rd Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
5:00 PM	49	10	59	13	49	62	14	34	48	169
5:15 PM	38	5	43	21	42	63	16	28	44	150
5:30 PM	32	16	48	20	61	81	15	24	39	168
5:45 PM	31	14	45	9	39	48	36	25	61	154
Total	150	45	195	63	191	254	81	111	192	641
Approach %	76.9	23.1	-	24.8	75.2	-	42.2	57.8	-	-
Total %	23.4	7.0	30.4	9.8	29.8	39.6	12.6	17.3	30.0	-
PHF	0.765	0.703	0.826	0.750	0.783	0.784	0.563	0.816	0.787	0.948
Lights	147	45	192	57	190	247	81	108	189	628
% Lights	98.0	100.0	98.5	90.5	99.5	97.2	100.0	97.3	98.4	98.0
Buses	0	0	0	1	0	1	0	0	0	1
% Buses	0.0	0.0	0.0	1.6	0.0	0.4	0.0	0.0	0.0	0.2
Trucks	3	0	3	5	1	6	0	3	3	12
% Trucks	2.0	0.0	1.5	7.9	0.5	2.4	0.0	2.7	1.6	1.9



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Count Name: 148th St & Amberly Rd
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Turning Movement Peak Hour Data Plot (5:00 PM)



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & MoPac Trail
Site Code: 1488
Start Date: 04/18/2018
Page No: 1

Turning Movement Data

Start Time	148th St Southbound			148th St Northbound		Int. Total
	Thru	Peds	App. Total	Thru	App. Total	
6:00 AM	17	0	17	31	31	48
6:15 AM	25	0	25	52	52	77
6:30 AM	20	0	20	57	57	77
6:45 AM	34	0	34	56	56	90
Hourly Total	96	0	96	196	196	292
7:00 AM	45	0	45	45	45	90
7:15 AM	59	0	59	87	87	146
7:30 AM	64	0	64	84	84	148
7:45 AM	60	0	60	88	88	148
Hourly Total	228	0	228	304	304	532
8:00 AM	54	0	54	46	46	100
8:15 AM	41	0	41	52	52	93
8:30 AM	31	0	31	48	48	79
8:45 AM	30	0	30	35	35	65
Hourly Total	156	0	156	181	181	337
*** BREAK ***	-	-	-	-	-	-
2:00 PM	47	0	47	32	32	79
2:15 PM	30	0	30	32	32	62
2:30 PM	43	0	43	36	36	79
2:45 PM	30	0	30	35	35	65
Hourly Total	150	0	150	135	135	285
3:00 PM	50	0	50	40	40	90
3:15 PM	44	0	44	40	40	84
3:30 PM	59	0	59	34	34	93
3:45 PM	58	0	58	59	59	117
Hourly Total	211	0	211	173	173	384
4:00 PM	68	0	68	45	45	113
4:15 PM	62	0	62	51	51	113
4:30 PM	65	0	65	45	45	110
4:45 PM	63	0	63	50	50	113
Hourly Total	258	0	258	191	191	449
5:00 PM	79	0	79	55	55	134
5:15 PM	93	0	93	59	59	152
5:30 PM	76	0	76	63	63	139
5:45 PM	57	0	57	50	50	107
Hourly Total	305	0	305	227	227	532
6:00 PM	45	0	45	39	39	84
6:15 PM	36	0	36	31	31	67

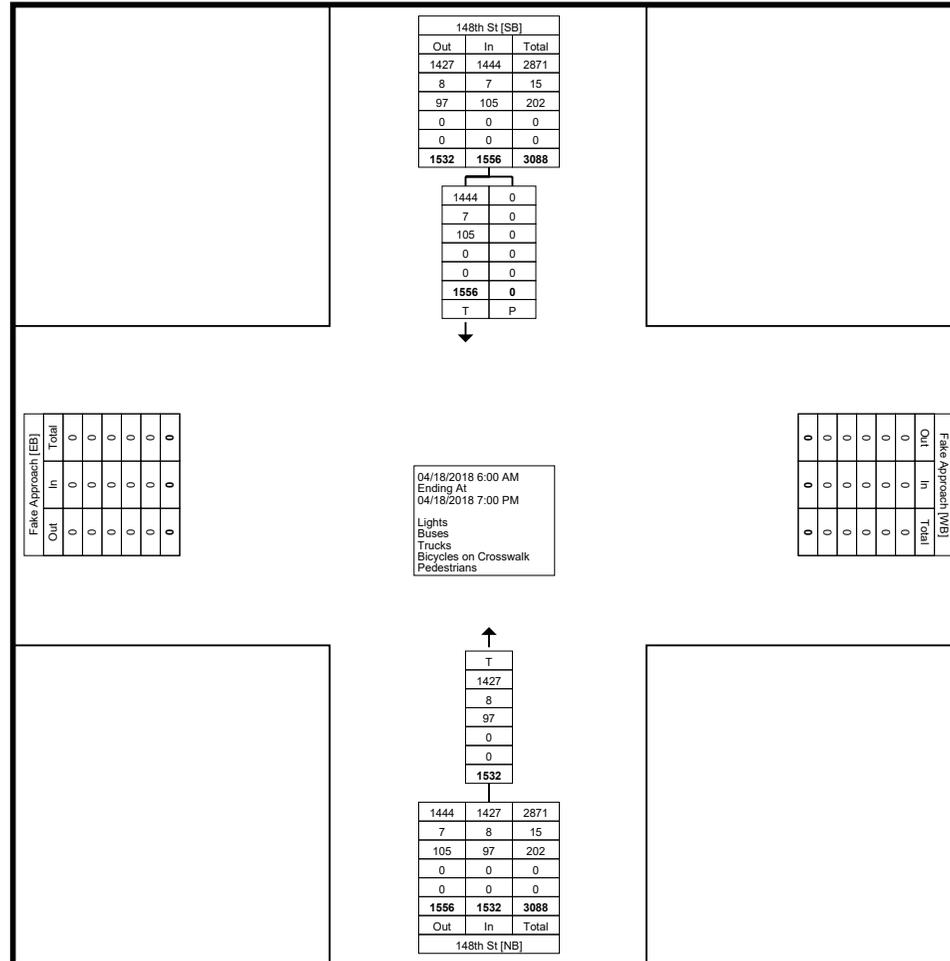
6:30 PM	37	0	37	32	32	69
6:45 PM	34	0	34	23	23	57
Hourly Total	152	0	152	125	125	277
Grand Total	1556	0	1556	1532	1532	3088
Approach %	100.0	-	-	100.0	-	-
Total %	50.4	-	50.4	49.6	49.6	-
Lights	1444	-	1444	1427	1427	2871
% Lights	92.8	-	92.8	93.1	93.1	93.0
Buses	7	-	7	8	8	15
% Buses	0.4	-	0.4	0.5	0.5	0.5
Trucks	105	-	105	97	97	202
% Trucks	6.7	-	6.7	6.3	6.3	6.5
Bicycles on Crosswalk	-	0	-	-	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-
Pedestrians	-	0	-	-	-	-
% Pedestrians	-	-	-	-	-	-



MNRG - Omaha
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Count Name: 148th St & MoPac Trail
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Count Name: 148th St & MoPac Trail
Site Code: 1488
Start Date: 04/18/2018
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Turning Movement Peak Hour Data (7:15 AM)

Start Time	148th St Southbound			148th St Northbound		Int. Total
	Thru	Peds	App. Total	Thru	App. Total	
7:15 AM	59	0	59	87	87	146
7:30 AM	64	0	64	84	84	148
7:45 AM	60	0	60	88	88	148
8:00 AM	54	0	54	46	46	100
Total	237	0	237	305	305	542
Approach %	100.0	-	-	100.0	-	-
Total %	43.7	-	43.7	56.3	56.3	-
PHF	0.926	-	0.926	0.866	0.866	0.916
Lights	220	-	220	289	289	509
% Lights	92.8	-	92.8	94.8	94.8	93.9
Buses	0	-	0	1	1	1
% Buses	0.0	-	0.0	0.3	0.3	0.2
Trucks	17	-	17	15	15	32
% Trucks	7.2	-	7.2	4.9	4.9	5.9
Bicycles on Crosswalk	-	0	-	-	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-
Pedestrians	-	0	-	-	-	-
% Pedestrians	-	-	-	-	-	-



MNRG - Omaha
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Count Name: 148th St & MoPac Trail
Site Code: 1488
Start Date: 04/18/2018
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Turning Movement Peak Hour Data (4:45 PM)

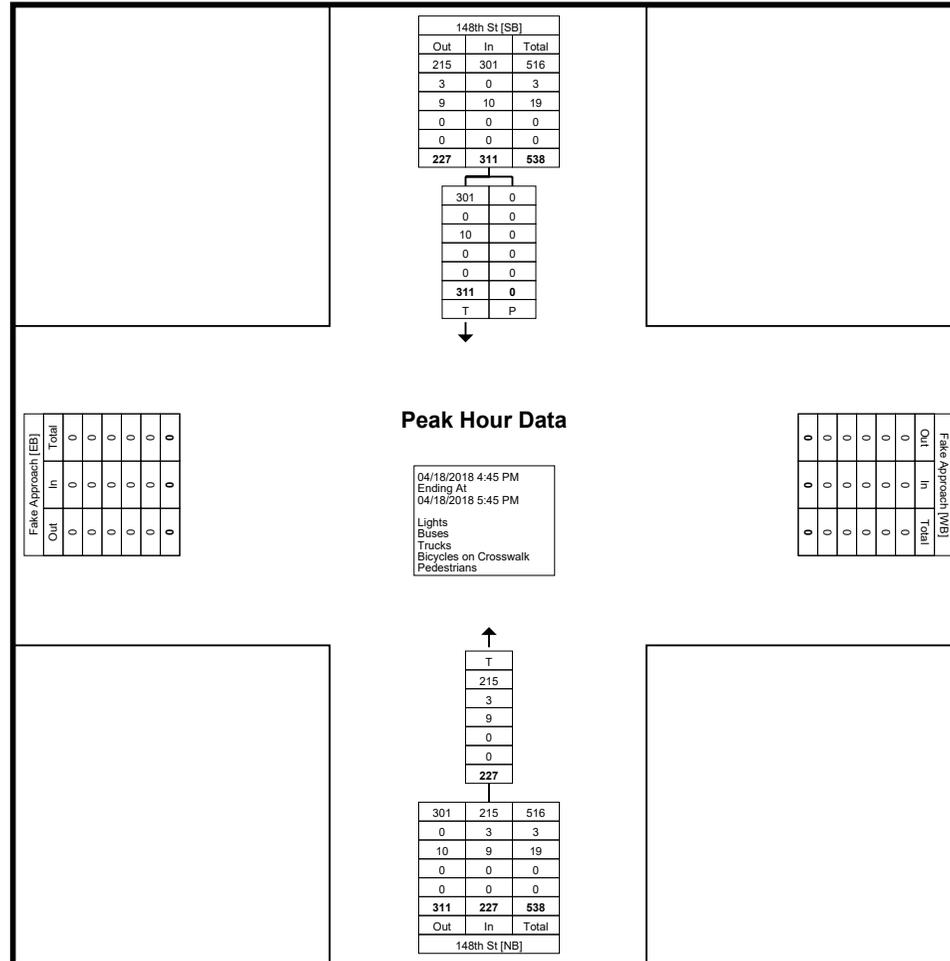
Start Time	148th St Southbound			148th St Northbound		Int. Total
	Thru	Peds	App. Total	Thru	App. Total	
4:45 PM	63	0	63	50	50	113
5:00 PM	79	0	79	55	55	134
5:15 PM	93	0	93	59	59	152
5:30 PM	76	0	76	63	63	139
Total	311	0	311	227	227	538
Approach %	100.0	-	-	100.0	-	-
Total %	57.8	-	57.8	42.2	42.2	-
PHF	0.836	-	0.836	0.901	0.901	0.885
Lights	301	-	301	215	215	516
% Lights	96.8	-	96.8	94.7	94.7	95.9
Buses	0	-	0	3	3	3
% Buses	0.0	-	0.0	1.3	1.3	0.6
Trucks	10	-	10	9	9	19
% Trucks	3.2	-	3.2	4.0	4.0	3.5
Bicycles on Crosswalk	-	0	-	-	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-
Pedestrians	-	0	-	-	-	-
% Pedestrians	-	-	-	-	-	-



MNRG - Omaha
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Count Name: 148th St & MoPac Trail
Site Code: 1488
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Turning Movement Peak Hour Data Plot (4:45 PM)



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1753 S. 107th St

Omaha, Nebraska, United States 68124
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Count Name: 148th St & O St
Site Code: 1486
Start Date: 04/18/2018
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Turning Movement Data

Start Time	148th St Southbound				O St Westbound				148th St Northbound				O St Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
12:00 AM	1	4	0	5	0	0	1	1	0	1	1	2	0	3	0	3	11
12:15 AM	0	2	2	4	0	4	0	4	0	2	0	2	0	2	1	3	13
12:30 AM	0	2	0	2	0	6	2	8	0	0	1	1	1	2	1	4	15
12:45 AM	0	2	0	2	0	2	0	2	0	0	0	0	0	3	0	3	7
Hourly Total	1	10	2	13	0	12	3	15	0	3	2	5	1	10	2	13	46
1:00 AM	1	0	0	1	0	2	0	2	0	1	0	1	0	3	1	4	8
1:15 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	3	0	3	4
1:30 AM	0	0	0	0	0	0	0	0	1	1	0	2	0	3	0	3	5
1:45 AM	0	1	0	1	0	1	1	2	0	1	0	1	0	3	0	3	7
Hourly Total	1	1	0	2	0	3	2	5	1	3	0	4	0	12	1	13	24
2:00 AM	0	2	0	2	0	2	0	2	0	2	0	2	0	0	0	0	6
2:15 AM	0	2	0	2	0	0	0	0	0	0	0	0	1	4	0	5	7
2:30 AM	0	0	0	0	0	1	1	2	0	0	0	0	0	1	0	1	3
2:45 AM	1	2	0	3	0	3	0	3	0	0	0	0	0	1	0	1	7
Hourly Total	1	6	0	7	0	6	1	7	0	2	0	2	1	6	0	7	23
3:00 AM	0	1	0	1	0	2	0	2	0	0	0	0	0	1	0	1	4
3:15 AM	1	0	0	1	0	8	0	8	0	0	0	0	0	0	1	1	10
3:30 AM	0	0	0	0	0	2	1	3	1	3	0	4	0	1	0	1	8
3:45 AM	0	0	0	0	1	2	0	3	4	1	0	5	0	4	0	4	12
Hourly Total	1	1	0	2	1	14	1	16	5	4	0	9	0	6	1	7	34
4:00 AM	1	2	0	3	0	3	2	5	0	1	0	1	0	1	0	1	10
4:15 AM	0	1	2	3	2	4	1	7	0	2	0	2	0	1	0	1	13
4:30 AM	0	3	1	4	1	1	1	3	1	3	2	6	0	1	1	2	15
4:45 AM	0	2	1	3	0	7	9	16	2	4	0	6	1	2	2	5	30
Hourly Total	1	8	4	13	3	15	13	31	3	10	2	15	1	5	3	9	68
5:00 AM	3	6	0	9	1	9	2	12	3	8	2	13	0	3	2	5	39
5:15 AM	2	4	1	7	3	16	7	26	1	8	0	9	1	6	2	9	51
5:30 AM	3	5	0	8	4	10	11	25	6	10	0	16	1	2	0	3	52
5:45 AM	1	10	3	14	4	20	18	42	7	18	0	25	1	4	3	8	89
Hourly Total	9	25	4	38	12	55	38	105	17	44	2	63	3	15	7	25	231
6:00 AM	1	10	4	15	2	31	25	58	3	25	1	29	1	7	3	11	113
6:15 AM	3	17	6	26	6	46	34	86	8	42	2	52	1	10	2	13	177
6:30 AM	4	12	14	30	10	54	29	93	11	40	6	57	3	9	1	13	193
6:45 AM	10	16	15	41	14	62	33	109	21	33	2	56	2	11	2	15	221
Hourly Total	18	55	39	112	32	193	121	346	43	140	11	194	7	37	8	52	704
7:00 AM	8	35	12	55	10	73	34	117	15	34	3	52	7	17	5	29	253
7:15 AM	9	36	23	68	10	92	34	136	40	38	7	85	8	29	12	49	338
7:30 AM	18	30	36	84	28	100	33	161	36	44	2	82	6	29	4	39	366

7:45 AM	14	34	29	77	21	85	40	146	36	58	8	102	10	27	8	45	370
Hourly Total	49	135	100	284	69	350	141	560	127	174	20	321	31	102	29	162	1327
8:00 AM	13	37	21	71	14	49	53	116	23	24	2	49	13	16	8	37	273
8:15 AM	7	22	19	48	8	54	41	103	15	29	7	51	12	13	5	30	232
8:30 AM	10	13	12	35	8	29	16	53	9	19	1	29	2	8	3	13	130
8:45 AM	6	7	4	17	4	25	4	33	11	10	2	23	6	10	5	21	94
Hourly Total	36	79	56	171	34	157	114	305	58	82	12	152	33	47	21	101	729
9:00 AM	8	31	7	46	8	31	9	48	9	18	4	31	2	14	5	21	146
9:15 AM	13	21	9	43	8	29	15	52	8	9	7	24	2	22	3	27	146
9:30 AM	8	15	8	31	3	28	8	39	17	13	4	34	2	25	7	34	138
9:45 AM	8	20	5	33	4	30	13	47	11	18	3	32	4	22	5	31	143
Hourly Total	37	87	29	153	23	118	45	186	45	58	18	121	10	83	20	113	573
10:00 AM	6	10	7	23	4	23	12	39	4	12	1	17	3	17	11	31	110
10:15 AM	10	11	4	25	2	24	12	38	8	17	2	27	6	17	4	27	117
10:30 AM	9	21	11	41	7	21	11	39	14	17	7	38	4	11	5	20	138
10:45 AM	8	11	3	22	3	22	13	38	9	11	3	23	6	17	4	27	110
Hourly Total	33	53	25	111	16	90	48	154	35	57	13	105	19	62	24	105	475
11:00 AM	9	14	5	28	9	23	9	41	12	21	1	34	6	22	18	46	149
11:15 AM	11	16	9	36	4	30	10	44	10	8	6	24	2	24	2	28	132
11:30 AM	10	15	2	27	6	23	8	37	9	16	2	27	11	22	6	39	130
11:45 AM	16	19	6	41	7	21	12	40	4	7	10	21	6	20	8	34	136
Hourly Total	46	64	22	132	26	97	39	162	35	52	19	106	25	88	34	147	547
12:00 PM	12	11	2	25	4	31	18	53	7	11	0	18	9	23	6	38	134
12:15 PM	11	17	7	35	4	25	7	36	7	11	5	23	7	35	9	51	145
12:30 PM	8	13	9	30	5	25	10	40	11	16	1	28	2	26	9	37	135
12:45 PM	9	7	7	23	2	22	10	34	12	16	8	36	13	25	6	44	137
Hourly Total	40	48	25	113	15	103	45	163	37	54	14	105	31	109	30	170	551
1:00 PM	16	20	6	42	13	19	9	41	4	15	2	21	7	25	3	35	139
1:15 PM	9	16	1	26	4	31	6	41	8	21	7	36	8	24	6	38	141
1:30 PM	10	13	5	28	6	26	11	43	10	10	5	25	9	14	12	35	131
1:45 PM	12	14	9	35	5	31	15	51	10	19	4	33	3	28	5	36	155
Hourly Total	47	63	21	131	28	107	41	176	32	65	18	115	27	91	26	144	566
2:00 PM	16	21	4	41	6	26	13	45	5	20	6	31	7	19	20	46	163
2:15 PM	15	15	6	36	7	15	19	41	10	16	7	33	8	27	9	44	154
2:30 PM	14	21	4	39	5	23	11	39	9	19	5	33	10	28	15	53	164
2:45 PM	12	15	4	31	7	22	18	47	11	12	15	38	6	38	10	54	170
Hourly Total	57	72	18	147	25	86	61	172	35	67	33	135	31	112	54	197	651
3:00 PM	16	26	4	46	7	19	13	39	10	21	7	38	10	41	16	67	190
3:15 PM	18	21	6	45	7	23	19	49	11	18	10	39	18	58	16	92	225
3:30 PM	31	34	7	72	9	20	16	45	8	23	7	38	10	38	17	65	220
3:45 PM	28	39	1	68	4	22	17	43	9	35	8	52	13	37	15	65	228
Hourly Total	93	120	18	231	27	84	65	176	38	97	32	167	51	174	64	289	863
4:00 PM	48	42	11	101	10	27	12	49	8	21	18	47	16	53	17	86	283
4:15 PM	28	44	19	91	7	19	13	39	6	33	14	53	20	53	13	86	269
4:30 PM	31	40	15	86	6	30	23	59	13	25	6	44	18	61	17	96	285
4:45 PM	32	40	12	84	6	30	28	64	8	31	10	49	31	76	20	127	324
Hourly Total	139	166	57	362	29	106	76	211	35	110	48	193	85	243	67	395	1161
5:00 PM	41	47	13	101	10	25	17	52	10	32	12	54	17	60	19	96	303
5:15 PM	44	51	11	106	10	34	20	64	14	40	9	63	31	75	32	138	371
5:30 PM	27	46	13	86	8	40	16	64	10	30	21	61	19	65	19	103	314
5:45 PM	29	36	8	73	7	34	10	51	7	24	18	49	22	55	13	90	263
Hourly Total	141	180	45	366	35	133	63	231	41	126	60	227	89	255	83	427	1251

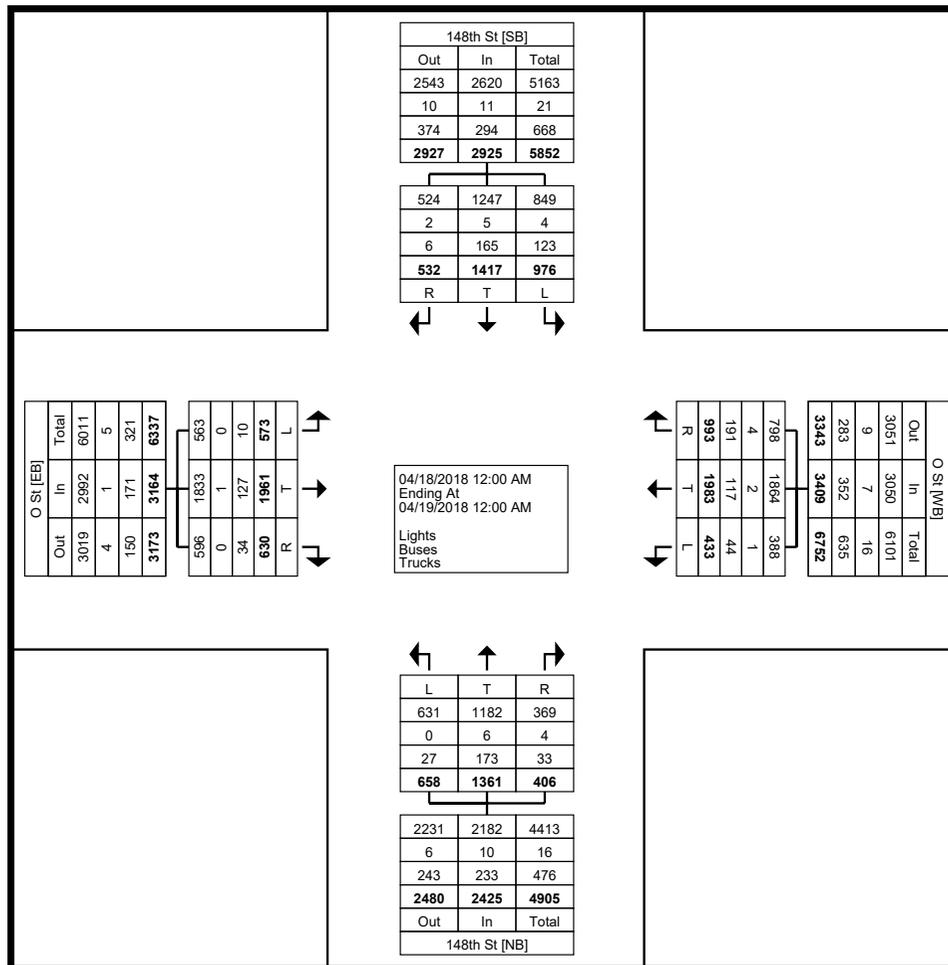
6:00 PM	26	28	12	66	8	24	6	38	4	23	10	37	16	42	10	68	209
6:15 PM	20	21	8	49	6	37	9	52	9	14	9	32	11	44	9	64	197
6:30 PM	22	18	3	43	6	21	9	36	7	14	12	33	7	34	9	50	162
6:45 PM	13	17	5	35	4	22	1	27	4	15	5	24	9	32	13	54	140
Hourly Total	81	84	28	193	24	104	25	153	24	66	36	126	43	152	41	236	708
7:00 PM	15	16	6	37	3	15	7	25	7	13	7	27	7	26	17	50	139
7:15 PM	12	9	7	28	2	18	3	23	1	11	4	16	8	27	8	43	110
7:30 PM	8	16	5	29	3	13	7	23	7	14	5	26	9	27	8	44	122
7:45 PM	15	20	3	38	3	5	4	12	4	6	5	15	4	32	8	44	109
Hourly Total	50	61	21	132	11	51	21	83	19	44	21	84	28	112	41	181	480
8:00 PM	10	11	6	27	1	14	3	18	0	11	9	20	10	28	9	47	112
8:15 PM	14	9	1	24	3	7	6	16	1	10	8	19	11	31	9	51	110
8:30 PM	13	15	2	30	1	7	2	10	4	13	6	23	5	24	17	46	109
8:45 PM	9	11	3	23	1	7	1	9	4	9	2	15	8	24	8	40	87
Hourly Total	46	46	12	104	6	35	12	53	9	43	25	77	34	107	43	184	418
9:00 PM	7	7	1	15	2	8	1	11	1	8	3	12	3	19	6	28	66
9:15 PM	7	8	3	18	3	8	2	13	1	8	2	11	5	20	2	27	69
9:30 PM	8	9	0	17	4	12	2	18	1	9	0	10	6	23	6	35	80
9:45 PM	3	5	0	8	3	8	4	15	3	15	3	21	4	15	3	22	66
Hourly Total	25	29	4	58	12	36	9	57	6	40	8	54	18	77	17	112	281
10:00 PM	3	4	0	7	1	5	2	8	2	2	2	6	1	10	5	16	37
10:15 PM	2	3	0	5	1	9	2	12	7	10	4	21	1	8	2	11	49
10:30 PM	4	3	0	7	1	8	1	10	0	1	0	1	1	7	1	9	27
10:45 PM	2	1	0	3	0	0	1	1	0	2	1	3	0	6	0	6	13
Hourly Total	11	11	0	22	3	22	6	31	9	15	7	31	3	31	8	42	126
11:00 PM	5	4	1	10	0	3	1	4	2	2	0	4	1	6	1	8	26
11:15 PM	4	3	1	8	0	2	1	3	1	1	1	3	1	8	1	10	24
11:30 PM	3	4	0	7	1	0	0	1	1	2	1	4	0	8	3	11	23
11:45 PM	1	2	0	3	1	1	1	3	0	0	3	3	0	3	1	4	13
Hourly Total	13	13	2	28	2	6	3	11	4	5	5	14	2	25	6	33	86
Grand Total	976	1417	532	2925	433	1983	993	3409	658	1361	406	2425	573	1961	630	3164	11923
Approach %	33.4	48.4	18.2	-	12.7	58.2	29.1	-	27.1	56.1	16.7	-	18.1	62.0	19.9	-	-
Total %	8.2	11.9	4.5	24.5	3.6	16.6	8.3	28.6	5.5	11.4	3.4	20.3	4.8	16.4	5.3	26.5	-
Lights	849	1247	524	2620	388	1864	798	3050	631	1182	369	2182	563	1833	596	2992	10844
% Lights	87.0	88.0	98.5	89.6	89.6	94.0	80.4	89.5	95.9	86.8	90.9	90.0	98.3	93.5	94.6	94.6	91.0
Buses	4	5	2	11	1	2	4	7	0	6	4	10	0	1	0	1	29
% Buses	0.4	0.4	0.4	0.4	0.2	0.1	0.4	0.2	0.0	0.4	1.0	0.4	0.0	0.1	0.0	0.0	0.2
Trucks	123	165	6	294	44	117	191	352	27	173	33	233	10	127	34	171	1050
% Trucks	12.6	11.6	1.1	10.1	10.2	5.9	19.2	10.3	4.1	12.7	8.1	9.6	1.7	6.5	5.4	5.4	8.8



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Count Name: 148th St & O St
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Turning Movement Data Plot



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1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & O St
Site Code: 1486
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Turning Movement Peak Hour Data (7:15 AM)

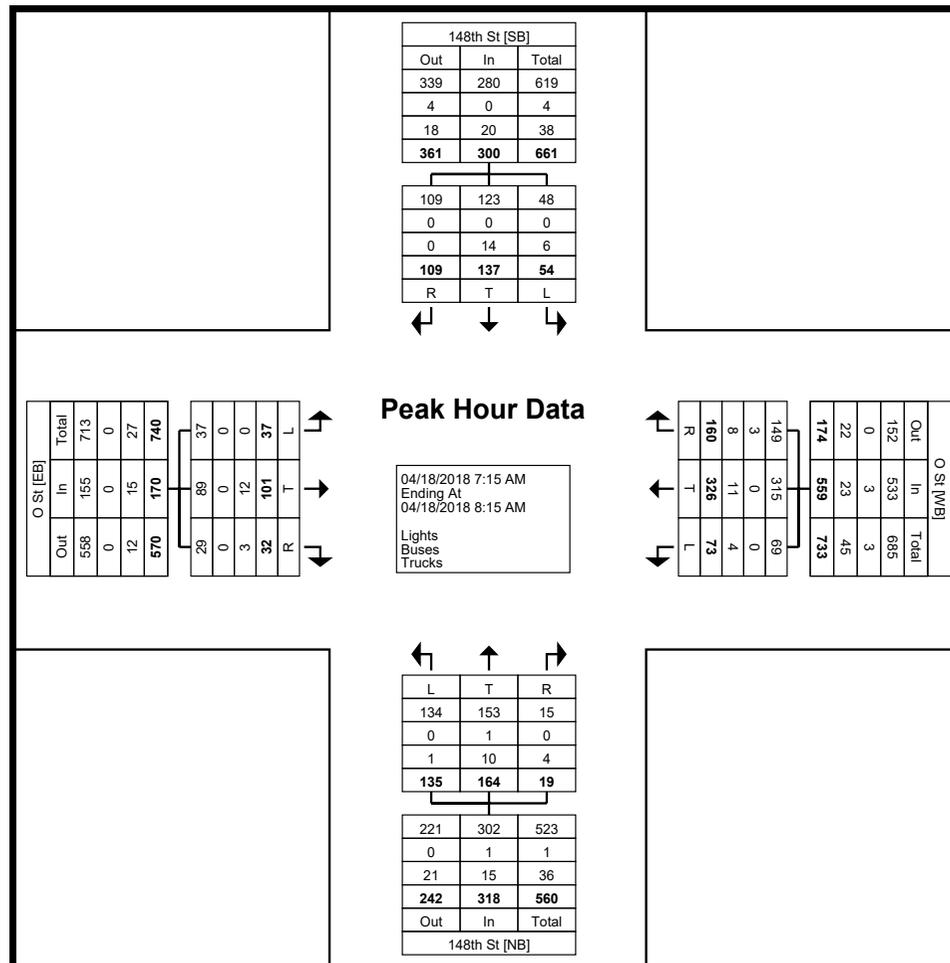
Start Time	148th St Southbound				O St Westbound				148th St Northbound				O St Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:15 AM	9	36	23	68	10	92	34	136	40	38	7	85	8	29	12	49	338
7:30 AM	18	30	36	84	28	100	33	161	36	44	2	82	6	29	4	39	366
7:45 AM	14	34	29	77	21	85	40	146	36	58	8	102	10	27	8	45	370
8:00 AM	13	37	21	71	14	49	53	116	23	24	2	49	13	16	8	37	273
Total	54	137	109	300	73	326	160	559	135	164	19	318	37	101	32	170	1347
Approach %	18.0	45.7	36.3	-	13.1	58.3	28.6	-	42.5	51.6	6.0	-	21.8	59.4	18.8	-	-
Total %	4.0	10.2	8.1	22.3	5.4	24.2	11.9	41.5	10.0	12.2	1.4	23.6	2.7	7.5	2.4	12.6	-
PHF	0.750	0.926	0.757	0.893	0.652	0.815	0.755	0.868	0.844	0.707	0.594	0.779	0.712	0.871	0.667	0.867	0.910
Lights	48	123	109	280	69	315	149	533	134	153	15	302	37	89	29	155	1270
% Lights	88.9	89.8	100.0	93.3	94.5	96.6	93.1	95.3	99.3	93.3	78.9	95.0	100.0	88.1	90.6	91.2	94.3
Buses	0	0	0	0	0	0	3	3	0	1	0	1	0	0	0	0	4
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.5	0.0	0.6	0.0	0.3	0.0	0.0	0.0	0.0	0.3
Trucks	6	14	0	20	4	11	8	23	1	10	4	15	0	12	3	15	73
% Trucks	11.1	10.2	0.0	6.7	5.5	3.4	5.0	4.1	0.7	6.1	21.1	4.7	0.0	11.9	9.4	8.8	5.4



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Turning Movement Peak Hour Data Plot (7:15 AM)



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Omaha, Nebraska, United States 68124
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Count Name: 148th St & O St
Site Code: 1486
Start Date: 04/18/2018
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Turning Movement Peak Hour Data (9:00 AM)

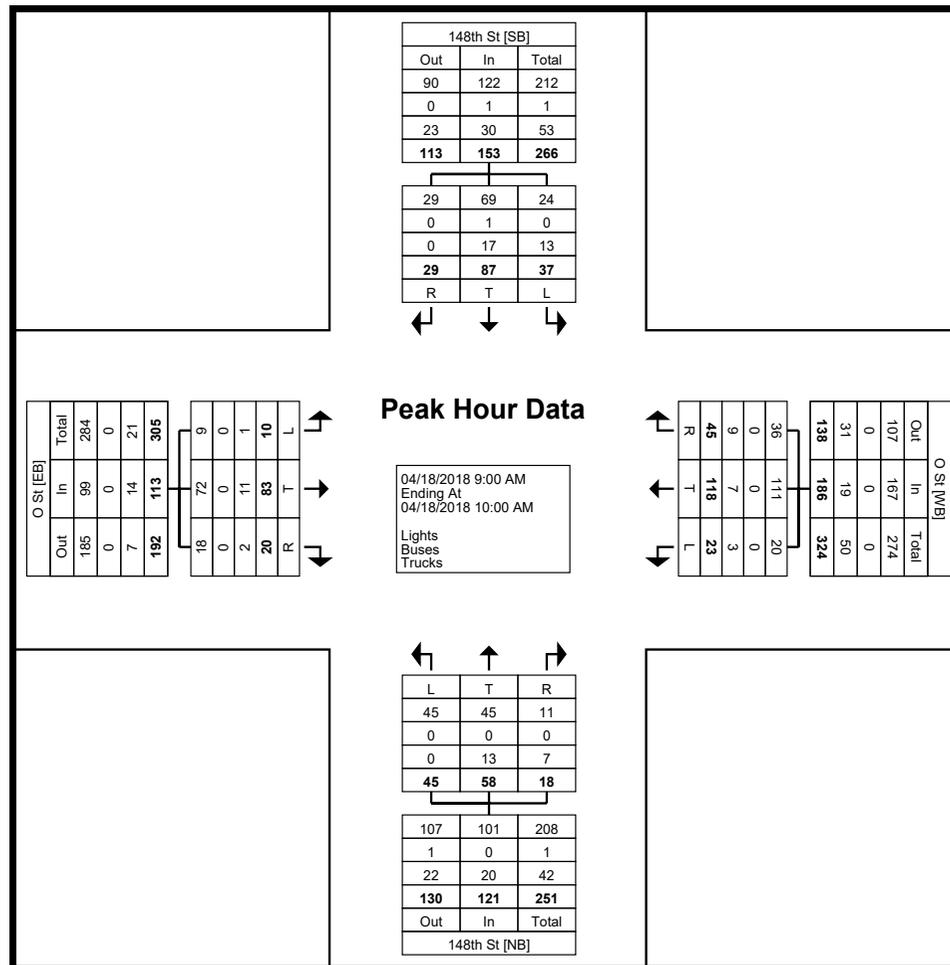
Start Time	148th St Southbound				O St Westbound				148th St Northbound				O St Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
9:00 AM	8	31	7	46	8	31	9	48	9	18	4	31	2	14	5	21	146
9:15 AM	13	21	9	43	8	29	15	52	8	9	7	24	2	22	3	27	146
9:30 AM	8	15	8	31	3	28	8	39	17	13	4	34	2	25	7	34	138
9:45 AM	8	20	5	33	4	30	13	47	11	18	3	32	4	22	5	31	143
Total	37	87	29	153	23	118	45	186	45	58	18	121	10	83	20	113	573
Approach %	24.2	56.9	19.0	-	12.4	63.4	24.2	-	37.2	47.9	14.9	-	8.8	73.5	17.7	-	-
Total %	6.5	15.2	5.1	26.7	4.0	20.6	7.9	32.5	7.9	10.1	3.1	21.1	1.7	14.5	3.5	19.7	-
PHF	0.712	0.702	0.806	0.832	0.719	0.952	0.750	0.894	0.662	0.806	0.643	0.890	0.625	0.830	0.714	0.831	0.981
Lights	24	69	29	122	20	111	36	167	45	45	11	101	9	72	18	99	489
% Lights	64.9	79.3	100.0	79.7	87.0	94.1	80.0	89.8	100.0	77.6	61.1	83.5	90.0	86.7	90.0	87.6	85.3
Buses	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Buses	0.0	1.1	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Trucks	13	17	0	30	3	7	9	19	0	13	7	20	1	11	2	14	83
% Trucks	35.1	19.5	0.0	19.6	13.0	5.9	20.0	10.2	0.0	22.4	38.9	16.5	10.0	13.3	10.0	12.4	14.5



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Turning Movement Peak Hour Data Plot (9:00 AM)



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Omaha, Nebraska, United States 68124
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Count Name: 148th St & O St
Site Code: 1486
Start Date: 04/18/2018
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Turning Movement Peak Hour Data (4:45 PM)

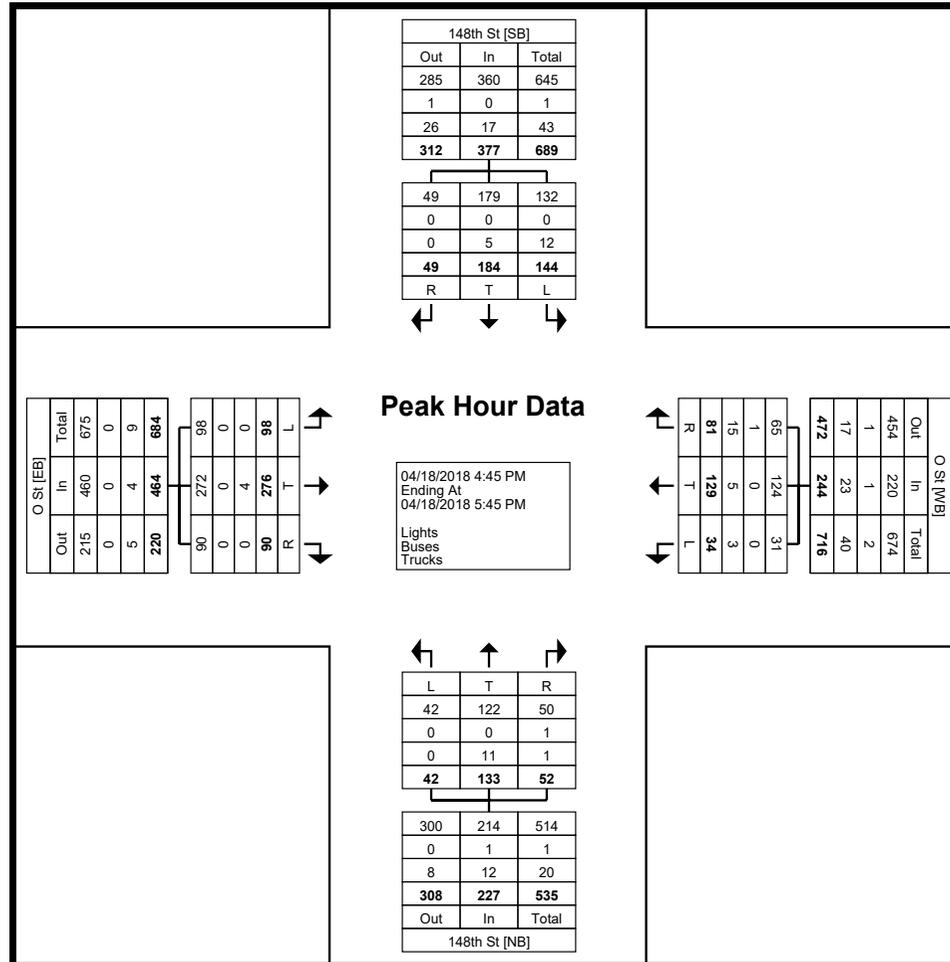
Start Time	148th St Southbound				O St Westbound				148th St Northbound				O St Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:45 PM	32	40	12	84	6	30	28	64	8	31	10	49	31	76	20	127	324
5:00 PM	41	47	13	101	10	25	17	52	10	32	12	54	17	60	19	96	303
5:15 PM	44	51	11	106	10	34	20	64	14	40	9	63	31	75	32	138	371
5:30 PM	27	46	13	86	8	40	16	64	10	30	21	61	19	65	19	103	314
Total	144	184	49	377	34	129	81	244	42	133	52	227	98	276	90	464	1312
Approach %	38.2	48.8	13.0	-	13.9	52.9	33.2	-	18.5	58.6	22.9	-	21.1	59.5	19.4	-	-
Total %	11.0	14.0	3.7	28.7	2.6	9.8	6.2	18.6	3.2	10.1	4.0	17.3	7.5	21.0	6.9	35.4	-
PHF	0.818	0.902	0.942	0.889	0.850	0.806	0.723	0.953	0.750	0.831	0.619	0.901	0.790	0.908	0.703	0.841	0.884
Lights	132	179	49	360	31	124	65	220	42	122	50	214	98	272	90	460	1254
% Lights	91.7	97.3	100.0	95.5	91.2	96.1	80.2	90.2	100.0	91.7	96.2	94.3	100.0	98.6	100.0	99.1	95.6
Buses	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	2
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.4	0.0	0.0	1.9	0.4	0.0	0.0	0.0	0.0	0.2
Trucks	12	5	0	17	3	5	15	23	0	11	1	12	0	4	0	4	56
% Trucks	8.3	2.7	0.0	4.5	8.8	3.9	18.5	9.4	0.0	8.3	1.9	5.3	0.0	1.4	0.0	0.9	4.3



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Count Name: 148th St & O St
Site Code: 1486
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Turning Movement Peak Hour Data Plot (4:45 PM)



MNRG - Omaha
1753 S. 107th St

Omaha, Nebraska, United States 68124
402-708-9175

Count Name: 148th St & Old Cheney Rd
Site Code: 1480
Start Date: 04/18/2018
Page No: 1

Turning Movement Data

Start Time	148th St Southbound				Old Cheney Rd Westbound				148th St Northbound				Old Cheney Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
12:00 AM	1	3	0	4	0	0	0	0	0	1	0	1	0	0	0	0	5
12:15 AM	0	1	0	1	1	0	0	1	0	2	0	2	1	0	0	1	5
12:30 AM	1	3	1	5	0	0	0	0	0	0	1	1	0	0	0	1	7
12:45 AM	1	0	0	1	1	0	0	1	0	0	0	0	0	1	0	1	3
Hourly Total	3	7	1	11	2	0	0	2	0	3	1	4	2	1	0	3	20
1:00 AM	0	1	1	2	0	0	1	1	1	0	0	1	0	0	0	0	4
1:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 AM	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	2	3
1:45 AM	0	0	1	1	0	0	0	0	0	1	0	1	1	0	0	1	3
Hourly Total	0	1	2	3	0	0	1	1	1	2	0	3	2	1	0	3	10
2:00 AM	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
2:15 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2:30 AM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2:45 AM	0	2	0	2	0	1	0	1	0	0	0	0	0	0	0	0	3
Hourly Total	0	4	1	5	0	1	0	1	0	1	0	1	0	0	0	0	7
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 AM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
3:30 AM	0	1	0	1	0	0	0	0	0	4	0	4	2	0	0	2	7
3:45 AM	0	1	0	1	0	0	1	1	0	2	0	2	0	0	0	0	4
Hourly Total	0	2	1	3	0	0	1	1	0	6	0	6	2	0	0	2	12
4:00 AM	0	2	0	2	0	0	0	0	0	1	0	1	0	0	0	0	3
4:15 AM	0	1	1	2	0	0	0	0	0	2	0	2	0	0	0	0	4
4:30 AM	0	2	2	4	0	0	0	0	0	6	0	6	1	0	0	1	11
4:45 AM	0	2	0	2	0	2	1	3	0	7	0	7	0	0	1	1	13
Hourly Total	0	7	3	10	0	2	1	3	0	16	0	16	1	0	1	2	31
5:00 AM	0	6	3	9	0	3	1	4	0	8	0	8	2	0	1	3	24
5:15 AM	0	5	2	7	0	2	0	2	0	7	0	7	0	0	0	0	16
5:30 AM	0	6	5	11	0	0	1	1	1	19	0	20	0	2	1	3	35
5:45 AM	1	6	5	12	1	1	0	2	0	23	0	23	1	0	0	1	38
Hourly Total	1	23	15	39	1	6	2	9	1	57	0	58	3	2	2	7	113
6:00 AM	0	11	5	16	0	1	1	2	1	28	0	29	5	0	0	5	52
6:15 AM	0	12	11	23	0	4	3	7	5	43	0	48	3	2	0	5	83
6:30 AM	1	10	11	22	0	2	4	6	7	52	1	60	7	0	0	7	95
6:45 AM	0	11	19	30	2	2	0	4	9	46	0	55	6	3	0	9	98
Hourly Total	1	44	46	91	2	9	8	19	22	169	1	192	21	5	0	26	328
7:00 AM	5	14	17	36	1	10	8	19	8	53	0	61	9	6	0	15	131
7:15 AM	2	32	25	59	0	8	7	15	13	64	0	77	13	0	0	13	164
7:30 AM	3	29	36	68	0	12	11	23	7	77	0	84	14	5	2	21	196

7:45 AM	4	18	30	52	0	6	6	12	16	62	2	80	17	10	2	29	173
Hourly Total	14	93	108	215	1	36	32	69	44	256	2	302	53	21	4	78	664
8:00 AM	4	30	24	58	0	5	7	12	6	33	1	40	11	5	2	18	128
8:15 AM	1	19	24	44	0	7	2	9	3	46	0	49	9	10	2	21	123
8:30 AM	2	15	18	35	1	7	3	11	3	35	2	40	5	5	1	11	97
8:45 AM	1	14	12	27	0	3	6	9	2	28	0	30	7	4	2	13	79
Hourly Total	8	78	78	164	1	22	18	41	14	142	3	159	32	24	7	63	427
9:00 AM	4	22	21	47	1	3	2	6	5	20	0	25	5	1	1	7	85
9:15 AM	1	18	13	32	1	4	3	8	2	21	1	24	8	2	2	12	76
9:30 AM	0	11	8	19	0	3	0	3	7	26	0	33	3	3	3	9	64
9:45 AM	1	12	13	26	1	3	2	6	0	22	0	22	6	1	0	7	61
Hourly Total	6	63	55	124	3	13	7	23	14	89	1	104	22	7	6	35	286
10:00 AM	0	19	7	26	0	4	1	5	1	13	0	14	3	1	1	5	50
10:15 AM	3	12	7	22	1	4	1	6	1	23	0	24	8	4	3	15	67
10:30 AM	0	21	7	28	0	4	1	5	1	28	0	29	8	3	1	12	74
10:45 AM	0	12	8	20	0	0	1	1	1	22	0	23	5	4	0	9	53
Hourly Total	3	64	29	96	1	12	4	17	4	86	0	90	24	12	5	41	244
11:00 AM	3	27	6	36	1	4	2	7	3	18	1	22	5	3	4	12	77
11:15 AM	0	18	12	30	0	4	1	5	4	17	3	24	7	3	4	14	73
11:30 AM	0	12	8	20	0	2	1	3	4	18	0	22	6	1	0	7	52
11:45 AM	0	28	7	35	0	8	0	8	1	12	0	13	4	2	4	10	66
Hourly Total	3	85	33	121	1	18	4	23	12	65	4	81	22	9	12	43	268
12:00 PM	0	18	8	26	0	5	1	6	2	15	1	18	4	3	1	8	58
12:15 PM	0	18	3	21	0	3	3	6	7	16	0	23	4	3	4	11	61
12:30 PM	2	17	7	26	0	4	1	5	0	24	0	24	6	1	3	10	65
12:45 PM	0	16	10	26	1	1	1	3	3	15	0	18	8	7	2	17	64
Hourly Total	2	69	28	99	1	13	6	20	12	70	1	83	22	14	10	46	248
1:00 PM	1	19	13	33	1	2	6	9	2	16	1	19	10	5	2	17	78
1:15 PM	2	26	9	37	0	5	1	6	1	26	0	27	12	5	2	19	89
1:30 PM	3	19	3	25	0	4	3	7	2	20	0	22	5	2	2	9	63
1:45 PM	0	18	7	25	0	3	3	6	2	21	0	23	14	2	1	17	71
Hourly Total	6	82	32	120	1	14	13	28	7	83	1	91	41	14	7	62	301
2:00 PM	5	23	9	37	0	6	2	8	1	23	0	24	10	2	0	12	81
2:15 PM	2	25	14	41	0	2	1	3	6	15	0	21	16	0	3	19	84
2:30 PM	1	24	9	34	0	5	3	8	2	22	0	24	10	3	5	18	84
2:45 PM	2	32	5	39	1	3	0	4	5	20	0	25	14	9	1	24	92
Hourly Total	10	104	37	151	1	16	6	23	14	80	0	94	50	14	9	73	341
3:00 PM	2	35	6	43	0	4	2	6	1	25	0	26	10	2	7	19	94
3:15 PM	1	33	10	44	0	4	2	6	2	26	1	29	14	6	6	26	105
3:30 PM	5	30	13	48	1	0	3	4	5	19	0	24	13	2	6	21	97
3:45 PM	4	52	11	67	0	4	3	7	3	34	0	37	22	4	2	28	139
Hourly Total	12	150	40	202	1	12	10	23	11	104	1	116	59	14	21	94	435
4:00 PM	9	40	13	62	0	1	1	2	2	31	0	33	23	6	12	41	138
4:15 PM	4	47	11	62	0	6	0	6	2	24	0	26	22	6	6	34	128
4:30 PM	2	41	22	65	2	5	4	11	3	24	1	28	20	9	10	39	143
4:45 PM	9	44	15	68	1	6	3	10	1	28	0	29	14	10	8	32	139
Hourly Total	24	172	61	257	3	18	8	29	8	107	1	116	79	31	36	146	548
5:00 PM	5	48	23	76	2	11	5	18	2	37	1	40	24	6	8	38	172
5:15 PM	7	72	16	95	0	7	3	10	3	32	1	36	30	4	13	47	188
5:30 PM	2	48	19	69	0	4	2	6	1	25	0	26	22	8	15	45	146
5:45 PM	5	45	15	65	0	5	1	6	2	18	0	20	23	3	8	34	125
Hourly Total	19	213	73	305	2	27	11	40	8	112	2	122	99	21	44	164	631

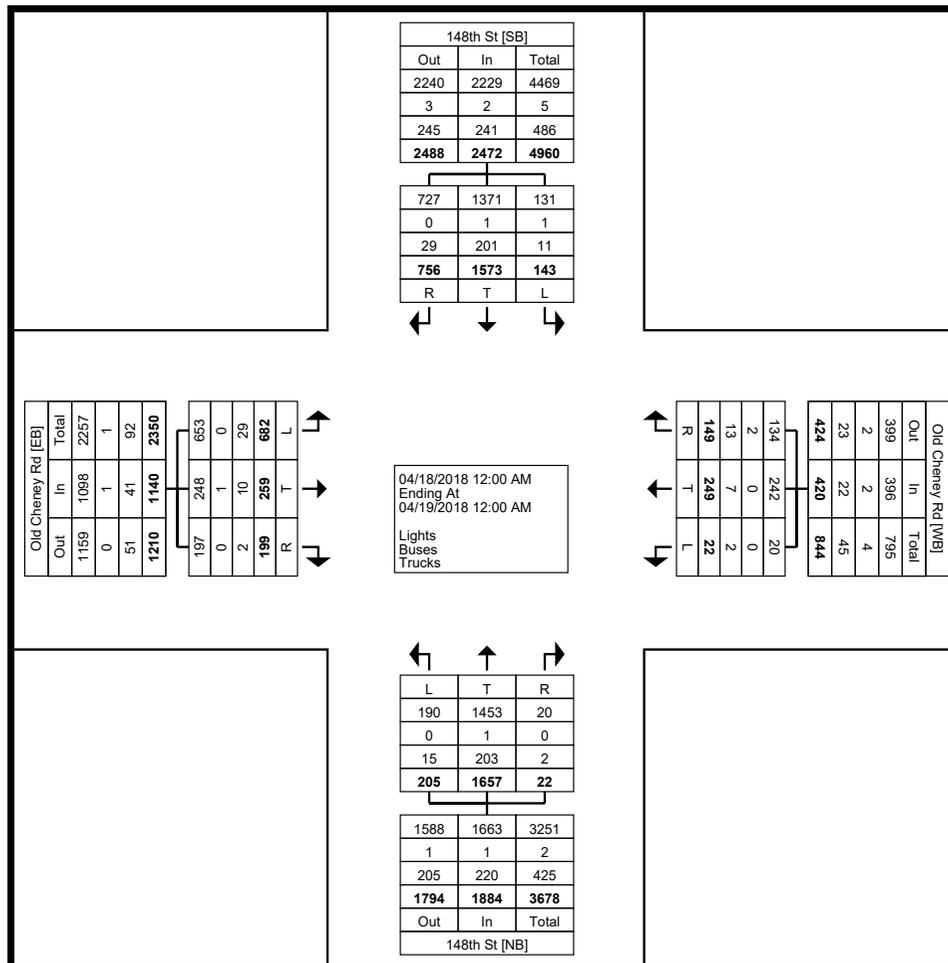
6:00 PM	4	28	16	48	0	5	4	9	3	24	0	27	13	9	4	26	110
6:15 PM	1	24	10	35	1	5	0	6	2	15	1	18	11	5	3	19	78
6:30 PM	2	17	15	34	0	2	4	6	4	19	0	23	10	3	3	16	79
6:45 PM	0	22	8	30	0	3	0	3	1	16	0	17	10	5	3	18	68
Hourly Total	7	91	49	147	1	15	8	24	10	74	1	85	44	22	13	79	335
7:00 PM	2	29	5	36	0	2	1	3	0	11	0	11	12	2	0	14	64
7:15 PM	1	22	1	24	0	2	0	2	0	12	1	13	10	6	2	18	57
7:30 PM	2	16	7	25	0	1	1	2	2	12	0	14	7	2	2	11	52
7:45 PM	3	16	9	28	0	2	1	3	0	9	0	9	9	7	1	17	57
Hourly Total	8	83	22	113	0	7	3	10	2	44	1	47	38	17	5	60	230
8:00 PM	4	18	4	26	0	3	1	4	1	6	1	8	9	3	6	18	56
8:15 PM	1	9	2	12	0	1	1	2	0	10	0	10	15	6	3	24	48
8:30 PM	2	22	5	29	0	0	2	2	0	8	0	8	13	5	0	18	57
8:45 PM	3	15	7	25	0	0	0	0	2	7	0	9	5	3	1	9	43
Hourly Total	10	64	18	92	0	4	4	8	3	31	1	35	42	17	10	69	204
9:00 PM	0	13	1	14	0	1	1	2	1	9	0	10	4	3	0	7	33
9:15 PM	1	10	3	14	0	1	0	1	1	6	0	7	3	2	3	8	30
9:30 PM	0	9	8	17	0	0	0	0	0	8	0	8	0	0	1	1	26
9:45 PM	0	9	2	11	0	1	0	1	2	8	0	10	5	1	0	6	28
Hourly Total	1	41	14	56	0	3	1	4	4	31	0	35	12	6	4	22	117
10:00 PM	1	9	4	14	0	0	1	1	4	7	0	11	1	0	1	2	28
10:15 PM	2	4	2	8	0	0	0	0	10	13	0	23	4	4	1	9	40
10:30 PM	0	3	0	3	0	0	0	0	0	0	1	1	2	0	0	2	6
10:45 PM	0	4	1	5	0	0	0	0	0	3	0	3	1	2	0	3	11
Hourly Total	3	20	7	30	0	0	1	1	14	23	1	38	8	6	2	16	85
11:00 PM	0	2	0	2	0	1	0	1	0	2	0	2	0	1	1	2	7
11:15 PM	0	4	1	5	0	0	0	0	0	3	0	3	1	0	0	1	9
11:30 PM	1	6	1	8	0	0	0	0	0	1	0	1	1	0	0	1	10
11:45 PM	1	1	1	3	0	0	0	0	0	0	0	0	2	0	0	2	5
Hourly Total	2	13	3	18	0	1	0	1	0	6	0	6	4	1	1	6	31
Grand Total	143	1573	756	2472	22	249	149	420	205	1657	22	1884	682	259	199	1140	5916
Approach %	5.8	63.6	30.6	-	5.2	59.3	35.5	-	10.9	88.0	1.2	-	59.8	22.7	17.5	-	-
Total %	2.4	26.6	12.8	41.8	0.4	4.2	2.5	7.1	3.5	28.0	0.4	31.8	11.5	4.4	3.4	19.3	-
Lights	131	1371	727	2229	20	242	134	396	190	1453	20	1663	653	248	197	1098	5386
% Lights	91.6	87.2	96.2	90.2	90.9	97.2	89.9	94.3	92.7	87.7	90.9	88.3	95.7	95.8	99.0	96.3	91.0
Buses	1	1	0	2	0	0	2	2	0	1	0	1	0	1	0	1	6
% Buses	0.7	0.1	0.0	0.1	0.0	0.0	1.3	0.5	0.0	0.1	0.0	0.1	0.0	0.4	0.0	0.1	0.1
Trucks	11	201	29	241	2	7	13	22	15	203	2	220	29	10	2	41	524
% Trucks	7.7	12.8	3.8	9.7	9.1	2.8	8.7	5.2	7.3	12.3	9.1	11.7	4.3	3.9	1.0	3.6	8.9



MNRG - Omaha
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Count Name: 148th St & Old Cheney Rd
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Turning Movement Data Plot



MNRG - Omaha
1753 S. 107th St

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402-708-9175

Count Name: 148th St & Old Cheney Rd
Site Code: 1480
Start Date: 04/18/2018
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Turning Movement Peak Hour Data (7:00 AM)

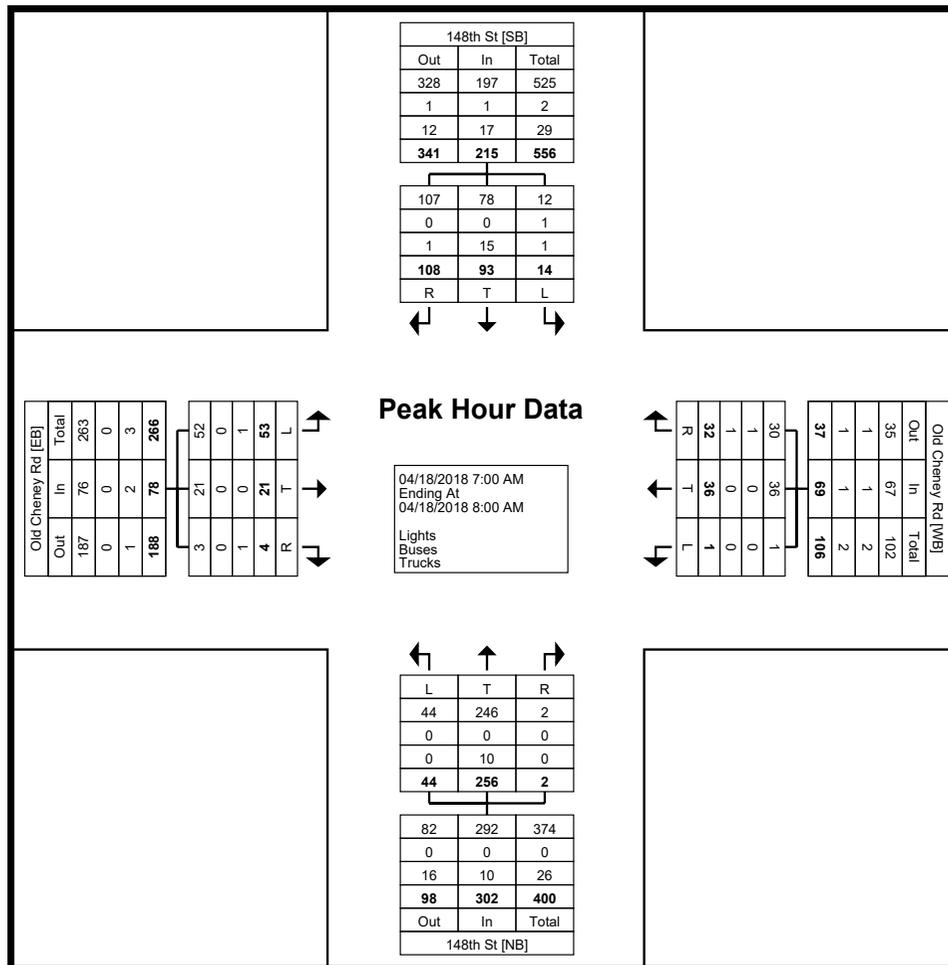
Start Time	148th St Southbound				Old Cheney Rd Westbound				148th St Northbound				Old Cheney Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:00 AM	5	14	17	36	1	10	8	19	8	53	0	61	9	6	0	15	131
7:15 AM	2	32	25	59	0	8	7	15	13	64	0	77	13	0	0	13	164
7:30 AM	3	29	36	68	0	12	11	23	7	77	0	84	14	5	2	21	196
7:45 AM	4	18	30	52	0	6	6	12	16	62	2	80	17	10	2	29	173
Total	14	93	108	215	1	36	32	69	44	256	2	302	53	21	4	78	664
Approach %	6.5	43.3	50.2	-	1.4	52.2	46.4	-	14.6	84.8	0.7	-	67.9	26.9	5.1	-	-
Total %	2.1	14.0	16.3	32.4	0.2	5.4	4.8	10.4	6.6	38.6	0.3	45.5	8.0	3.2	0.6	11.7	-
PHF	0.700	0.727	0.750	0.790	0.250	0.750	0.727	0.750	0.688	0.831	0.250	0.899	0.779	0.525	0.500	0.672	0.847
Lights	12	78	107	197	1	36	30	67	44	246	2	292	52	21	3	76	632
% Lights	85.7	83.9	99.1	91.6	100.0	100.0	93.8	97.1	100.0	96.1	100.0	96.7	98.1	100.0	75.0	97.4	95.2
Buses	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	2
% Buses	7.1	0.0	0.0	0.5	0.0	0.0	3.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Trucks	1	15	1	17	0	0	1	1	0	10	0	10	1	0	1	2	30
% Trucks	7.1	16.1	0.9	7.9	0.0	0.0	3.1	1.4	0.0	3.9	0.0	3.3	1.9	0.0	25.0	2.6	4.5



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Turning Movement Peak Hour Data Plot (7:00 AM)



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Count Name: 148th St & Old Cheney Rd
Site Code: 1480
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Turning Movement Peak Hour Data (4:45 PM)

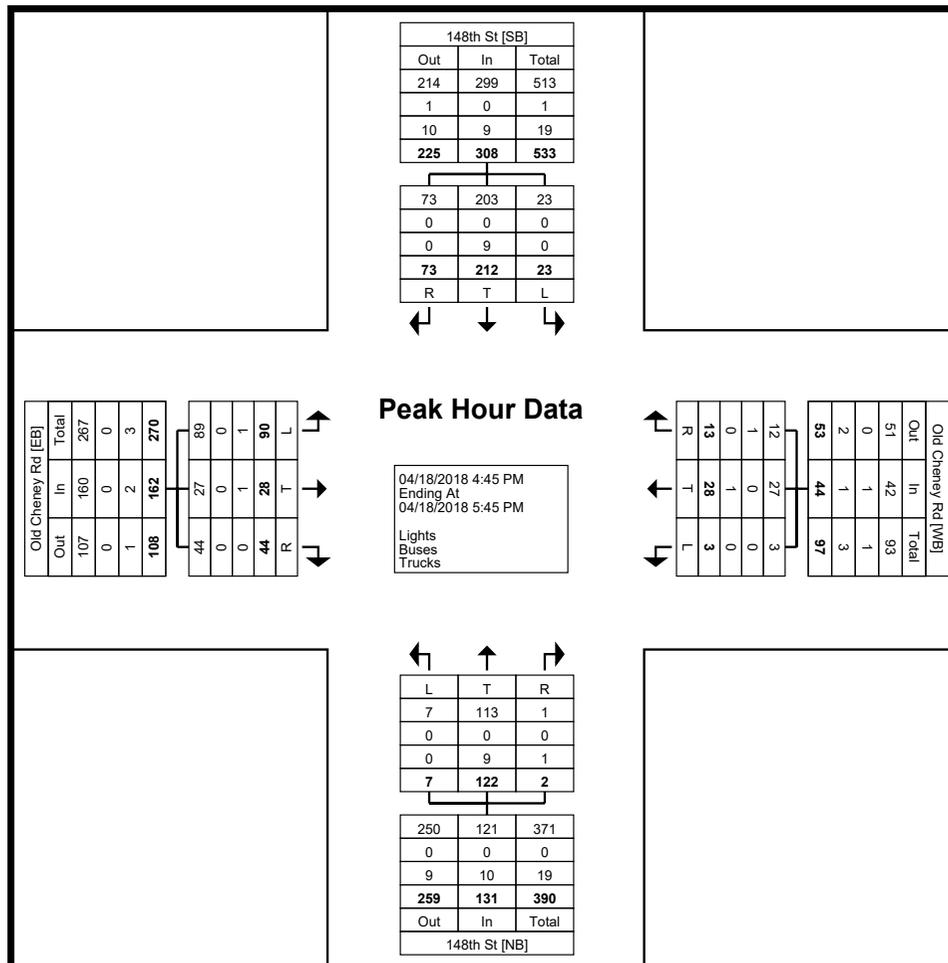
Start Time	148th St Southbound				Old Cheney Rd Westbound				148th St Northbound				Old Cheney Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:45 PM	9	44	15	68	1	6	3	10	1	28	0	29	14	10	8	32	139
5:00 PM	5	48	23	76	2	11	5	18	2	37	1	40	24	6	8	38	172
5:15 PM	7	72	16	95	0	7	3	10	3	32	1	36	30	4	13	47	188
5:30 PM	2	48	19	69	0	4	2	6	1	25	0	26	22	8	15	45	146
Total	23	212	73	308	3	28	13	44	7	122	2	131	90	28	44	162	645
Approach %	7.5	68.8	23.7	-	6.8	63.6	29.5	-	5.3	93.1	1.5	-	55.6	17.3	27.2	-	-
Total %	3.6	32.9	11.3	47.8	0.5	4.3	2.0	6.8	1.1	18.9	0.3	20.3	14.0	4.3	6.8	25.1	-
PHF	0.639	0.736	0.793	0.811	0.375	0.636	0.650	0.611	0.583	0.824	0.500	0.819	0.750	0.700	0.733	0.862	0.858
Lights	23	203	73	299	3	27	12	42	7	113	1	121	89	27	44	160	622
% Lights	100.0	95.8	100.0	97.1	100.0	96.4	92.3	95.5	100.0	92.6	50.0	92.4	98.9	96.4	100.0	98.8	96.4
Buses	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	7.7	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Trucks	0	9	0	9	0	1	0	1	0	9	1	10	1	1	0	2	22
% Trucks	0.0	4.2	0.0	2.9	0.0	3.6	0.0	2.3	0.0	7.4	50.0	7.6	1.1	3.6	0.0	1.2	3.4



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Turning Movement Peak Hour Data Plot (4:45 PM)

CAPACITY ANALYSIS WORKSHEETS

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	37	0	83	0	0	0	160	109	0	0	136	138
Future Vol, veh/h	37	0	83	0	0	0	160	109	0	0	136	138
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	150	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	100	80	100	100	100	73	83	100	100	81	72
Heavy Vehicles, %	11	0	14	0	0	0	12	6	0	0	5	1
Mvmt Flow	60	0	104	0	0	0	219	131	0	0	168	192

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	833	833	264	885	929	131	360	0	0	131	0	0
Stage 1	264	264	-	569	569	-	-	-	-	-	-	-
Stage 2	569	569	-	316	360	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.5	6.34	7.1	6.5	6.2	4.22	-	-	4.1	-	-
Critical Hdwy Stg 1	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4	3.426	3.5	4	3.3	2.308	-	-	2.2	-	-
Pot Cap-1 Maneuver	278	307	746	268	270	924	1145	-	-	1467	-	-
Stage 1	722	694	-	511	509	-	-	-	-	-	-	-
Stage 2	492	509	-	699	630	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	237	248	746	197	218	924	1145	-	-	1467	-	-
Mov Cap-2 Maneuver	237	248	-	197	218	-	-	-	-	-	-	-
Stage 1	584	694	-	413	412	-	-	-	-	-	-	-
Stage 2	398	412	-	602	630	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19	0	5.6	0
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1145	-	-	418	-	1467	-	-
HCM Lane V/C Ratio	0.191	-	-	0.391	-	-	-	-
HCM Control Delay (s)	8.9	-	-	19	0	0	-	-
HCM Lane LOS	A	-	-	C	A	A	-	-
HCM 95th %tile Q(veh)	0.7	-	-	1.8	-	0	-	-

Intersection												
Int Delay, s/veh	5.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	29	10	44	6	6	7	135	227	0	1	218	22
Future Vol, veh/h	29	10	44	6	6	7	135	227	0	1	218	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	73	83	73	75	50	44	72	81	100	25	77	69
Heavy Vehicles, %	3	0	20	0	0	14	3	7	0	0	8	9
Mvmt Flow	40	12	60	8	12	16	188	280	0	4	283	32

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	977	963	299	999	979	280	315	0	0	280	0	0
Stage 1	307	307	-	656	656	-	-	-	-	-	-	-
Stage 2	670	656	-	343	323	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.4	7.1	6.5	6.34	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.48	3.5	4	3.426	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	229	258	700	224	252	731	1240	-	-	1294	-	-
Stage 1	701	665	-	458	465	-	-	-	-	-	-	-
Stage 2	445	465	-	676	654	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	184	211	700	168	206	731	1240	-	-	1294	-	-
Mov Cap-2 Maneuver	184	211	-	168	206	-	-	-	-	-	-	-
Stage 1	575	662	-	376	381	-	-	-	-	-	-	-
Stage 2	346	381	-	604	651	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	22.9		19.7		3.4		0.1	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1240	-	-	312	281	1294	-	-
HCM Lane V/C Ratio	0.151	-	-	0.359	0.128	0.003	-	-
HCM Control Delay (s)	8.4	0	-	22.9	19.7	7.8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	1.6	0.4	0	-	-

HCM 6th Signalized Intersection Summary
1483: S 148th St & O St

68th St and 148th St Safety Analysis
08/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	101	32	73	326	160	135	164	19	54	137	109
Future Volume (veh/h)	37	101	32	73	326	160	135	164	19	54	137	109
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1722	1767	1826	1856	1796	1885	1796	1796	1737	1752	1752
Adj Flow Rate, veh/h	52	116	48	112	398	213	161	231	32	72	147	143
Peak Hour Factor	0.71	0.87	0.67	0.65	0.82	0.75	0.84	0.71	0.59	0.75	0.93	0.76
Percent Heavy Veh, %	0	12	9	5	3	7	1	7	7	11	10	10
Cap, veh/h	388	790	687	633	851	699	345	524	73	363	277	269
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	823	1722	1497	1193	1856	1522	1098	1544	214	1037	816	793
Grp Volume(v), veh/h	52	116	48	112	398	213	161	0	263	72	0	290
Grp Sat Flow(s),veh/h/ln	823	1722	1497	1193	1856	1522	1098	0	1758	1037	0	1609
Q Serve(g_s), s	2.5	2.1	1.0	3.3	8.0	4.8	7.5	0.0	6.3	3.2	0.0	7.9
Cycle Q Clear(g_c), s	10.6	2.1	1.0	5.4	8.0	4.8	15.5	0.0	6.3	9.5	0.0	7.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.12	1.00		0.49
Lane Grp Cap(c), veh/h	388	790	687	633	851	699	345	0	596	363	0	546
V/C Ratio(X)	0.13	0.15	0.07	0.18	0.47	0.30	0.47	0.00	0.44	0.20	0.00	0.53
Avail Cap(c_a), veh/h	426	869	756	688	937	768	406	0	694	421	0	635
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.8	8.6	8.2	10.1	10.2	9.3	20.7	0.0	14.0	17.7	0.0	14.5
Incr Delay (d2), s/veh	0.2	0.1	0.1	0.2	0.6	0.3	1.4	0.0	0.7	0.4	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.5	0.2	0.6	2.2	1.1	1.7	0.0	2.0	0.6	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.0	8.7	8.3	10.3	10.7	9.6	22.1	0.0	14.7	18.1	0.0	15.7
LnGrp LOS	B	A	A	B	B	A	C	A	B	B	A	B
Approach Vol, veh/h		216			723			424				362
Approach Delay, s/veh		9.9			10.3			17.5				16.1
Approach LOS		A			B			B				B
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		30.5		24.0		30.5		24.0				
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5				
Max Green Setting (Gmax), s		27.5		21.5		27.5		21.5				
Max Q Clear Time (g_c+I1), s		12.6		11.5		10.0		17.5				
Green Ext Time (p_c), s		1.1		1.8		4.4		1.0				
Intersection Summary												
HCM 6th Ctrl Delay				13.3								
HCM 6th LOS				B								

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	53	21	4	1	36	32	44	256	2	14	93	108
Future Vol, veh/h	53	21	4	1	36	32	44	256	2	14	93	108
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	53	50	25	75	73	69	83	25	70	73	75
Heavy Vehicles, %	2	0	25	0	0	6	0	4	0	14	16	1
Mvmt Flow	68	40	8	4	48	44	64	308	8	20	127	144

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	725	683	199	703	751	312	271	0	0	316	0	0
Stage 1	239	239	-	440	440	-	-	-	-	-	-	-
Stage 2	486	444	-	263	311	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.5	6.45	7.1	6.5	6.26	4.1	-	-	4.24	-	-
Critical Hdwy Stg 1	6.12	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4	3.525	3.5	4	3.354	2.2	-	-	2.326	-	-
Pot Cap-1 Maneuver	340	374	787	355	342	719	1304	-	-	1179	-	-
Stage 1	764	711	-	600	581	-	-	-	-	-	-	-
Stage 2	563	579	-	747	662	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	266	344	787	301	315	719	1304	-	-	1179	-	-
Mov Cap-2 Maneuver	266	344	-	301	315	-	-	-	-	-	-	-
Stage 1	718	697	-	564	546	-	-	-	-	-	-	-
Stage 2	453	544	-	683	649	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	23.9		16		1.3		0.6	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1304	-	-	304	423	1179	-	-
HCM Lane V/C Ratio	0.049	-	-	0.38	0.227	0.017	-	-
HCM Control Delay (s)	7.9	0	-	23.9	16	8.1	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.2	-	-	1.7	0.9	0.1	-	-

Intersection												
Int Delay, s/veh	7.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	81	0	111	0	0	0	63	191	0	0	150	45
Future Vol, veh/h	81	0	111	0	0	0	63	191	0	0	150	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	150	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	56	100	82	100	100	100	75	78	100	100	77	70
Heavy Vehicles, %	0	0	3	0	0	0	10	1	0	0	2	0
Mvmt Flow	145	0	135	0	0	0	84	245	0	0	195	64

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	640	640	227	708	672	245	259	0	0	245	0	0
Stage 1	227	227	-	413	413	-	-	-	-	-	-	-
Stage 2	413	413	-	295	259	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.23	7.1	6.5	6.2	4.2	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.327	3.5	4	3.3	2.29	-	-	2.2	-	-
Pot Cap-1 Maneuver	391	396	810	352	380	799	1260	-	-	1333	-	-
Stage 1	780	720	-	620	597	-	-	-	-	-	-	-
Stage 2	620	597	-	718	697	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	371	369	810	278	355	799	1260	-	-	1333	-	-
Mov Cap-2 Maneuver	371	369	-	278	355	-	-	-	-	-	-	-
Stage 1	728	720	-	578	557	-	-	-	-	-	-	-
Stage 2	579	557	-	598	697	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	20.8		0		2.1		0	
HCM LOS	C		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1260	-	-	503	-	1333	-	-
HCM Lane V/C Ratio	0.067	-	-	0.557	-	-	-	-
HCM Control Delay (s)	8.1	-	-	20.8	0	0	-	-
HCM Lane LOS	A	-	-	C	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	3.4	-	0	-	-

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	11	83	3	3	2	37	230	3	4	273	10
Future Vol, veh/h	18	11	83	3	3	2	37	230	3	4	273	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	64	69	83	38	75	50	71	90	38	50	78	50
Heavy Vehicles, %	0	0	4	0	0	0	16	13	0	0	6	0
Mvmt Flow	28	16	100	8	4	4	52	256	8	8	350	20

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	744	744	360	798	750	260	370	0	0	264	0	0
Stage 1	376	376	-	364	364	-	-	-	-	-	-	-
Stage 2	368	368	-	434	386	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.24	7.1	6.5	6.2	4.26	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.336	3.5	4	3.3	2.344	-	-	2.2	-	-
Pot Cap-1 Maneuver	333	345	680	306	342	784	1115	-	-	1312	-	-
Stage 1	649	620	-	659	627	-	-	-	-	-	-	-
Stage 2	656	625	-	604	614	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	312	323	680	239	320	784	1115	-	-	1312	-	-
Mov Cap-2 Maneuver	312	323	-	239	320	-	-	-	-	-	-	-
Stage 1	613	615	-	623	593	-	-	-	-	-	-	-
Stage 2	613	591	-	498	609	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	15		17.1		1.4		0.2	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1115	-	-	503	314	1312	-	-
HCM Lane V/C Ratio	0.047	-	-	0.286	0.051	0.006	-	-
HCM Control Delay (s)	8.4	0	-	15	17.1	7.8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.2	0.2	0	-	-

HCM 6th Signalized Intersection Summary
1483: S 148th St & O St

68th St and 148th St Safety Analysis
08/16/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	98	276	90	34	129	81	42	133	52	144	184	49
Future Volume (veh/h)	98	276	90	34	129	81	42	133	52	144	184	49
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1885	1900	1767	1841	1604	1900	1781	1781	1781	1856	1856
Adj Flow Rate, veh/h	124	303	129	40	159	112	56	160	84	176	204	52
Peak Hour Factor	0.79	0.91	0.70	0.85	0.81	0.72	0.75	0.83	0.62	0.82	0.90	0.94
Percent Heavy Veh, %	0	1	0	9	4	20	0	8	8	8	3	3
Cap, veh/h	605	883	754	466	862	636	378	358	188	363	465	118
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1126	1885	1610	903	1841	1359	1141	1100	577	1082	1426	364
Grp Volume(v), veh/h	124	303	129	40	159	112	56	0	244	176	0	256
Grp Sat Flow(s),veh/h/ln	1126	1885	1610	903	1841	1359	1141	0	1677	1082	0	1790
Q Serve(g_s), s	3.8	5.4	2.5	1.6	2.7	2.5	2.2	0.0	6.1	8.2	0.0	6.0
Cycle Q Clear(g_c), s	6.5	5.4	2.5	7.0	2.7	2.5	8.2	0.0	6.1	14.3	0.0	6.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.34	1.00		0.20
Lane Grp Cap(c), veh/h	605	883	754	466	862	636	378	0	546	363	0	583
V/C Ratio(X)	0.20	0.34	0.17	0.09	0.18	0.18	0.15	0.00	0.45	0.48	0.00	0.44
Avail Cap(c_a), veh/h	679	1006	860	525	983	725	445	0	644	426	0	687
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.2	9.0	8.2	11.2	8.3	8.2	17.4	0.0	14.2	19.9	0.0	14.2
Incr Delay (d2), s/veh	0.2	0.3	0.2	0.1	0.1	0.2	0.3	0.0	0.8	1.4	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.5	0.6	0.2	0.7	0.5	0.5	0.0	1.8	1.8	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.4	9.3	8.4	11.3	8.4	8.4	17.6	0.0	15.0	21.3	0.0	14.9
LnGrp LOS	B	A	A	B	A	A	B	A	B	C	A	B
Approach Vol, veh/h		556			311			300				432
Approach Delay, s/veh		9.3			8.8			15.5				17.5
Approach LOS		A			A			B				B
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		30.5		22.9		30.5		22.9				
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5				
Max Green Setting (Gmax), s		28.5		20.5		28.5		20.5				
Max Q Clear Time (g_c+I1), s		8.5		16.3		9.0		10.2				
Green Ext Time (p_c), s		3.5		1.1		1.8		1.4				
Intersection Summary												
HCM 6th Ctrl Delay				12.6								
HCM 6th LOS				B								

Intersection												
Int Delay, s/veh	7.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	90	28	44	3	28	13	7	122	2	23	212	73
Future Vol, veh/h	90	28	44	3	28	13	7	122	2	23	212	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	70	73	38	64	65	58	82	50	64	74	79
Heavy Vehicles, %	1	4	0	0	4	8	0	7	50	0	4	0
Mvmt Flow	120	40	60	8	44	20	12	149	4	36	286	92

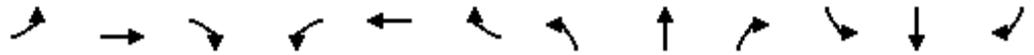
Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	611	581	332	629	625	151	378	0	0	153	0	0
Stage 1	404	404	-	175	175	-	-	-	-	-	-	-
Stage 2	207	177	-	454	450	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.54	6.2	7.1	6.54	6.28	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.54	-	6.1	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.54	-	6.1	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.036	3.3	3.5	4.036	3.372	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	407	422	714	398	399	880	1192	-	-	1440	-	-
Stage 1	625	596	-	832	750	-	-	-	-	-	-	-
Stage 2	797	749	-	589	568	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	351	404	714	326	382	880	1192	-	-	1440	-	-
Mov Cap-2 Maneuver	351	404	-	326	382	-	-	-	-	-	-	-
Stage 1	618	577	-	823	742	-	-	-	-	-	-	-
Stage 2	725	741	-	486	550	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	22.7		14.7		0.6		0.7	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1192	-	-	419	444	1440	-	-
HCM Lane V/C Ratio	0.01	-	-	0.526	0.161	0.025	-	-
HCM Control Delay (s)	8.1	0	-	22.7	14.7	7.6	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3	0.6	0.1	-	-

HCM 6th Signalized Intersection Summary
 1481: S 148th St & Amberly Rd/Private Drive

2040 Future Conditions
 Timing Plan: AM PEAK



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	5	103	0	0	0	421	287	5	5	358	363
Future Volume (veh/h)	46	5	103	0	0	0	421	287	5	5	358	363
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1737	1900	1900	1900	1900	1900	1722	1811	1811	1826	1826	1885
Adj Flow Rate, veh/h	48	5	108	0	0	0	443	302	5	5	377	382
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	11	0	0	0	0	0	12	6	6	5	5	1
Cap, veh/h	176	7	154	0	3	0	492	1370	23	55	738	719
Arrive On Green	0.04	0.10	0.10	0.00	0.00	0.00	0.30	0.77	0.77	0.41	0.41	0.41
Sat Flow, veh/h	1654	72	1549	0	-12050	0	1640	1776	29	5	1817	1598
Grp Volume(v), veh/h	48	0	113	0	0	0	443	0	307	382	0	382
Grp Sat Flow(s),veh/h/ln	1654	0	1621	0	1900	0	1640	0	1806	1822	0	1598
Q Serve(g_s), s	1.9	0.0	4.7	0.0	0.0	0.0	18.0	0.0	3.3	0.0	0.0	12.0
Cycle Q Clear(g_c), s	1.9	0.0	4.7	0.0	0.0	0.0	18.0	0.0	3.3	10.9	0.0	12.0
Prop In Lane	1.00		0.96	0.00		0.00	1.00		0.02	0.01		1.00
Lane Grp Cap(c), veh/h	176	0	161	0	3	0	492	0	1392	793	0	719
V/C Ratio(X)	0.27	0.00	0.70	0.00	0.00	0.00	0.90	0.00	0.22	0.48	0.00	0.53
Avail Cap(c_a), veh/h	223	0	643	0	493	0	626	0	1392	793	0	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.4	0.0	30.3	0.0	0.0	0.0	23.3	0.0	2.2	15.5	0.0	13.8
Incr Delay (d2), s/veh	0.8	0.0	5.5	0.0	0.0	0.0	13.8	0.0	0.4	2.1	0.0	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	1.9	0.0	0.0	0.0	8.0	0.0	0.5	4.4	0.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.2	0.0	35.7	0.0	0.0	0.0	37.1	0.0	2.6	17.5	0.0	16.6
LnGrp LOS	C	A	D	A	A	A	D	A	A	B	A	B
Approach Vol, veh/h		161			0			750			764	
Approach Delay, s/veh		34.7			0.0			22.9			17.1	
Approach LOS		C						C			B	
Timer - Assigned Phs		2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s		58.0		11.4	25.3	32.7	7.5	3.9				
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s		53.5		27.5	26.5	22.5	5.0	18.0				
Max Q Clear Time (g_c+I1), s		5.3		6.7	20.0	14.0	3.9	0.0				
Green Ext Time (p_c), s		1.8		0.5	0.8	2.4	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			21.4									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary
 1483: S 148th St & O St

2040 Future Conditions
 Timing Plan: AM PEAK



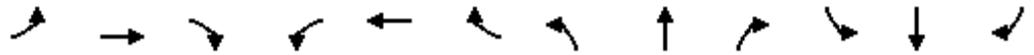
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	266	84	192	859	421	356	432	50	142	361	287
Future Volume (veh/h)	97	266	84	192	859	421	356	432	50	142	361	287
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No										
Adj Sat Flow, veh/h/ln	1900	1722	1767	1826	1856	1796	1885	1796	1796	1737	1752	1900
Adj Flow Rate, veh/h	102	280	88	202	904	443	375	455	53	149	380	302
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	12	9	5	3	7	1	7	7	11	10	0
Cap, veh/h	209	898	664	452	1122	613	413	537	63	272	446	501
Arrive On Green	0.06	0.27	0.27	0.10	0.32	0.32	0.17	0.34	0.34	0.08	0.25	0.25
Sat Flow, veh/h	1810	3272	1497	1739	3526	1522	1795	1579	184	1654	1752	1610
Grp Volume(v), veh/h	102	280	88	202	904	443	375	0	508	149	380	302
Grp Sat Flow(s),veh/h/ln	1810	1636	1497	1739	1763	1522	1795	0	1763	1654	1752	1610
Q Serve(g_s), s	4.0	6.8	3.5	7.9	23.4	24.4	14.6	0.0	26.6	6.5	20.5	15.8
Cycle Q Clear(g_c), s	4.0	6.8	3.5	7.9	23.4	24.4	14.6	0.0	26.6	6.5	20.5	15.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	209	898	664	452	1122	613	413	0	599	272	446	501
V/C Ratio(X)	0.49	0.31	0.13	0.45	0.81	0.72	0.91	0.00	0.85	0.55	0.85	0.60
Avail Cap(c_a), veh/h	221	938	683	488	1216	653	443	0	725	274	544	591
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.0	28.6	16.3	21.1	31.1	25.0	22.9	0.0	30.4	25.9	35.3	29.0
Incr Delay (d2), s/veh	1.8	0.3	0.1	0.7	4.1	4.1	21.4	0.0	8.7	2.3	11.5	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	2.5	1.1	3.0	9.6	8.5	7.8	0.0	11.6	2.5	9.5	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.8	28.9	16.5	21.8	35.2	29.2	44.3	0.0	39.1	28.2	46.8	30.8
LnGrp LOS	C	C	B	C	D	C	D	A	D	C	D	C
Approach Vol, veh/h		470			1549			883			831	
Approach Delay, s/veh		26.3			31.7			41.3			37.6	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	4.5	32.8	21.3	30.8	10.1	37.2	12.9	39.3				
Change Period (Y+Rc), s	4.5	5.5	4.5	5.5	4.5	5.5	4.5	5.5				
Max Green Setting (Gmax), s	4.5	28.5	18.5	30.9	6.3	34.3	8.5	40.9				
Max Q Clear Time (g_c+19), s	4.5	8.8	16.6	22.5	6.0	26.4	8.5	28.6				
Green Ext Time (p_c), s	0.1	2.4	0.2	2.8	0.0	5.3	0.0	3.1				

Intersection Summary

HCM 6th Ctrl Delay	34.6
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary
 1481: S 148th St & Amberly Rd/Private Drive

2040 Future Conditions
 Timing Plan: PM PEAK



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	5	138	0	0	0	166	503	5	5	395	119
Future Volume (veh/h)	101	5	138	0	0	0	166	503	5	5	395	119
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1752	1885	1885	1870	1870	1900
Adj Flow Rate, veh/h	106	5	145	0	0	0	175	529	5	5	416	125
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	10	1	1	2	2	0
Cap, veh/h	236	7	198	0	3	0	622	1392	13	54	1144	1109
Arrive On Green	0.07	0.13	0.13	0.00	0.00	0.00	0.07	0.75	0.75	0.61	0.61	0.61
Sat Flow, veh/h	1810	54	1564	0	-14463	0	1668	1864	18	4	1861	1610
Grp Volume(v), veh/h	106	0	150	0	0	0	175	0	534	421	0	125
Grp Sat Flow(s),veh/h/ln	1810	0	1618	0	1900	0	1668	0	1882	1865	0	1610
Q Serve(g_s), s	4.0	0.0	6.3	0.0	0.0	0.0	2.4	0.0	7.1	0.0	0.0	1.9
Cycle Q Clear(g_c), s	4.0	0.0	6.3	0.0	0.0	0.0	2.4	0.0	7.1	7.9	0.0	1.9
Prop In Lane	1.00		0.97	0.00		0.00	1.00		0.01	0.01		1.00
Lane Grp Cap(c), veh/h	236	0	205	0	3	0	622	0	1405	1198	0	1109
V/C Ratio(X)	0.45	0.00	0.73	0.00	0.00	0.00	0.28	0.00	0.38	0.35	0.00	0.11
Avail Cap(c_a), veh/h	242	0	638	0	482	0	755	0	1405	1198	0	1109
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.1	0.0	29.8	0.0	0.0	0.0	4.2	0.0	3.2	6.8	0.0	3.7
Incr Delay (d2), s/veh	1.3	0.0	4.9	0.0	0.0	0.0	0.2	0.0	0.8	0.8	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	2.6	0.0	0.0	0.0	0.5	0.0	1.6	2.6	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.5	0.0	34.8	0.0	0.0	0.0	4.4	0.0	4.0	7.6	0.0	3.9
LnGrp LOS	C	A	C	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		256			0			709			546	
Approach Delay, s/veh		33.8			0.0			4.1			6.8	
Approach LOS		C						A			A	
Timer - Assigned Phs		2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s		57.5		13.5	9.3	48.2	9.8	3.7				
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s		53.0		28.0	10.5	38.0	5.5	18.0				
Max Q Clear Time (g_c+I1), s		9.1		8.3	4.4	9.9	6.0	0.0				
Green Ext Time (p_c), s		3.6		0.7	0.2	3.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				10.1								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary
1483: S 148th St & O St

2040 Future Conditions
Timing Plan: PM PEAK



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	258	727	237	90	340	213	111	350	137	379	485	129
Future Volume (veh/h)	258	727	237	90	340	213	111	350	137	379	485	129
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No										
Adj Sat Flow, veh/h/ln	1900	1885	1900	1767	1841	1604	1900	1781	1781	1781	1856	1900
Adj Flow Rate, veh/h	272	765	249	95	358	224	117	368	144	399	511	136
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	1	0	9	4	20	0	8	8	8	3	0
Cap, veh/h	328	918	509	173	768	575	374	385	151	426	854	878
Arrive On Green	0.09	0.26	0.26	0.05	0.22	0.22	0.06	0.32	0.32	0.20	0.46	0.46
Sat Flow, veh/h	1810	3582	1610	1682	3497	1359	1810	1219	477	1697	1856	1610
Grp Volume(v), veh/h	272	765	249	95	358	224	117	0	512	399	511	136
Grp Sat Flow(s),veh/h/ln	1810	1791	1610	1682	1749	1359	1810	0	1696	1697	1856	1610
Q Serve(g_s), s	9.7	23.0	14.3	5.0	10.1	13.0	4.9	0.0	33.7	20.8	23.4	4.8
Cycle Q Clear(g_c), s	9.7	23.0	14.3	5.0	10.1	13.0	4.9	0.0	33.7	20.8	23.4	4.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.28	1.00		1.00
Lane Grp Cap(c), veh/h	328	918	509	173	768	575	374	0	536	426	854	878
V/C Ratio(X)	0.83	0.83	0.49	0.55	0.47	0.39	0.31	0.00	0.95	0.94	0.60	0.15
Avail Cap(c_a), veh/h	328	1022	556	173	869	614	414	0	543	460	859	882
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.1	40.0	31.5	34.3	38.6	22.7	24.0	0.0	38.1	31.6	22.9	12.9
Incr Delay (d2), s/veh	16.2	5.9	1.0	3.6	0.6	0.6	0.5	0.0	27.7	26.0	1.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	10.2	5.3	2.1	4.2	3.9	2.0	0.0	17.1	13.3	9.6	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.3	46.0	32.6	37.9	39.3	23.3	24.4	0.0	65.8	57.6	24.3	13.0
LnGrp LOS	D	D	C	D	D	C	C	A	E	E	C	B
Approach Vol, veh/h		1286			677			629			1046	
Approach Delay, s/veh		44.7			33.8			58.1			35.5	
Approach LOS		D			C			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.0	34.7	11.3	57.9	14.2	30.5	27.7	41.5				
Change Period (Y+Rc), s	4.5	5.5	4.5	5.5	4.5	5.5	4.5	5.5				
Max Green Setting (Gmax), s	5.5	32.5	9.3	52.7	9.7	28.3	25.5	36.5				
Max Q Clear Time (g_c+11), s	5.5	25.0	6.9	25.4	11.7	15.0	22.8	35.7				
Green Ext Time (p_c), s	0.0	4.1	0.1	5.1	0.0	3.3	0.4	0.3				
Intersection Summary												
HCM 6th Ctrl Delay			42.4									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary
 1481: S 148th St & Amberly Rd/Private Drive

68th St and 148th St Safety Analysis
 08/16/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	5	103	0	0	0	421	287	5	5	358	363
Future Volume (veh/h)	46	5	103	0	0	0	421	287	5	5	358	363
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1737	1900	1900	1900	1900	1900	1722	1811	1811	1826	1826	1885
Adj Flow Rate, veh/h	74	5	129	0	0	0	577	346	5	5	442	504
Peak Hour Factor	0.62	1.00	0.80	1.00	1.00	1.00	0.73	0.83	1.00	1.00	0.81	0.72
Percent Heavy Veh, %	11	0	0	0	0	0	12	6	6	5	5	1
Cap, veh/h	458	8	215	0	262	0	469	1024	15	119	1045	918
Arrive On Green	0.14	0.14	0.14	0.00	0.00	0.00	0.57	0.57	0.57	0.57	0.57	0.57
Sat Flow, veh/h	1654	60	1559	0	1900	0	546	1781	26	4	1819	1598
Grp Volume(v), veh/h	74	0	134	0	0	0	577	0	351	447	0	504
Grp Sat Flow(s),veh/h/ln	1654	0	1619	0	1900	0	546	0	1806	1823	0	1598
Q Serve(g_s), s	1.3	0.0	2.4	0.0	0.0	0.0	13.7	0.0	3.2	0.0	0.0	6.1
Cycle Q Clear(g_c), s	1.3	0.0	2.4	0.0	0.0	0.0	18.0	0.0	3.2	4.3	0.0	6.1
Prop In Lane	1.00		0.96	0.00		0.00	1.00		0.01	0.01		1.00
Lane Grp Cap(c), veh/h	458	0	223	0	262	0	469	0	1039	1164	0	918
V/C Ratio(X)	0.16	0.00	0.60	0.00	0.00	0.00	1.23	0.00	0.34	0.38	0.00	0.55
Avail Cap(c_a), veh/h	1181	0	931	0	1092	0	469	0	1039	1164	0	918
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.2	0.0	12.7	0.0	0.0	0.0	12.2	0.0	3.5	3.7	0.0	4.1
Incr Delay (d2), s/veh	0.2	0.0	2.6	0.0	0.0	0.0	121.7	0.0	0.9	1.0	0.0	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.8	0.0	0.0	0.0	18.3	0.0	0.4	0.5	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.4	0.0	15.3	0.0	0.0	0.0	133.9	0.0	4.4	4.7	0.0	6.5
LnGrp LOS	B	A	B	A	A	A	F	A	A	A	A	A
Approach Vol, veh/h		208			0			928				951
Approach Delay, s/veh		14.2			0.0			84.9				5.7
Approach LOS		B						F				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		8.8		22.5		8.8				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		20.0		4.4		8.1		0.0				
Green Ext Time (p_c), s		0.0		0.7		3.3		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				41.7								
HCM 6th LOS				D								

HCM 6th Signalized Intersection Summary
1482: S 148th St & Adams St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖		↗	↖	↗
Traffic Volume (veh/h)	36	12	55	7	7	9	356	598	5	3	574	58
Future Volume (veh/h)	36	12	55	7	7	9	356	598	5	3	574	58
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1856	1796	1796	1900	1781	1767
Adj Flow Rate, veh/h	49	14	75	9	14	20	494	738	5	12	745	84
Peak Hour Factor	0.73	0.83	0.73	0.75	0.50	0.44	0.72	0.81	1.00	0.25	0.77	0.69
Percent Heavy Veh, %	0	0	0	0	0	0	3	7	7	0	8	9
Cap, veh/h	222	28	110	172	88	103	417	1037	7	441	1036	871
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.58	0.58	0.58	0.58	0.58	0.58
Sat Flow, veh/h	503	223	865	242	691	811	656	1782	12	728	1781	1497
Grp Volume(v), veh/h	138	0	0	43	0	0	494	0	743	12	745	84
Grp Sat Flow(s),veh/h/ln	1591	0	0	1744	0	0	656	0	1794	728	1781	1497
Q Serve(g_s), s	1.8	0.0	0.0	0.0	0.0	0.0	8.7	0.0	9.2	0.4	9.3	0.8
Cycle Q Clear(g_c), s	2.5	0.0	0.0	0.7	0.0	0.0	18.0	0.0	9.2	9.5	9.3	0.8
Prop In Lane	0.36		0.54	0.21		0.47	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	360	0	0	363	0	0	417	0	1044	441	1036	871
V/C Ratio(X)	0.38	0.00	0.00	0.12	0.00	0.00	1.18	0.00	0.71	0.03	0.72	0.10
Avail Cap(c_a), veh/h	1064	0	0	1098	0	0	417	0	1044	441	1036	871
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.8	0.0	0.0	12.1	0.0	0.0	13.6	0.0	4.6	8.0	4.7	2.9
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.1	0.0	0.0	104.9	0.0	4.1	0.1	4.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.0	0.2	0.0	0.0	14.1	0.0	1.2	0.0	1.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.5	0.0	0.0	12.2	0.0	0.0	118.5	0.0	8.8	8.1	9.0	3.1
LnGrp LOS	B	A	A	B	A	A	F	A	A	A	A	A
Approach Vol, veh/h		138			43			1237			841	
Approach Delay, s/veh		13.5			12.2			52.6			8.4	
Approach LOS		B			B			D			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		8.4		22.5		8.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		20.0		4.5		11.5		2.7				
Green Ext Time (p_c), s		0.0		0.5		2.6		0.1				
Intersection Summary												
HCM 6th Ctrl Delay				33.0								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary
1483: S 148th St & O St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	266	84	192	859	421	356	432	50	142	361	287
Future Volume (veh/h)	97	266	84	192	859	421	356	432	50	142	361	287
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1722	1767	1826	1856	1796	1885	1796	1796	1737	1752	1752
Adj Flow Rate, veh/h	137	306	125	295	1048	561	424	608	85	189	388	378
Peak Hour Factor	0.71	0.87	0.67	0.65	0.82	0.75	0.84	0.71	0.59	0.75	0.93	0.76
Percent Heavy Veh, %	0	12	9	5	3	7	1	7	7	11	10	10
Cap, veh/h	120	789	686	439	850	698	120	553	77	120	292	284
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	320	1722	1497	934	1856	1522	707	1542	216	697	815	794
Grp Volume(v), veh/h	137	306	125	295	1048	561	424	0	693	189	0	766
Grp Sat Flow(s),veh/h/ln	320	1722	1497	934	1856	1522	707	0	1757	697	0	1609
Q Serve(g_s), s	0.0	7.0	3.0	18.2	27.5	19.0	0.0	0.0	21.5	0.0	0.0	21.5
Cycle Q Clear(g_c), s	27.5	7.0	3.0	25.3	27.5	19.0	21.5	0.0	21.5	21.5	0.0	21.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.12	1.00		0.49
Lane Grp Cap(c), veh/h	120	789	686	439	850	698	120	0	630	120	0	577
V/C Ratio(X)	1.14	0.39	0.18	0.67	1.23	0.80	3.53	0.00	1.10	1.57	0.00	1.33
Avail Cap(c_a), veh/h	120	789	686	439	850	698	120	0	630	120	0	577
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.0	10.7	9.6	19.0	16.2	13.9	30.0	0.0	19.3	30.0	0.0	19.3
Incr Delay (d2), s/veh	125.3	0.4	0.2	4.5	114.8	7.1	1160.5	0.0	66.5	294.8	0.0	159.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/lr	5.7	2.0	0.7	3.6	35.0	5.8	40.2	0.0	18.2	11.3	0.0	31.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	155.3	11.1	9.8	23.5	131.0	21.1	1190.5	0.0	85.7	324.8	0.0	178.8
LnGrp LOS	F	B	A	C	F	C	F	A	F	F	A	F
Approach Vol, veh/h	568			1904			1117			955		
Approach Delay, s/veh	45.6			82.0			505.1			207.7		
Approach LOS	D			F			F			F		
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	33.0		27.0		33.0		27.0					
Change Period (Y+Rc), s	5.5		5.5		5.5		5.5					
Max Green Setting (Gmax), s	27.5		21.5		27.5		21.5					
Max Q Clear Time (g_c+I1), s	29.5		23.5		29.5		23.5					
Green Ext Time (p_c), s	0.0		0.0		0.0		0.0					
Intersection Summary												
HCM 6th Ctrl Delay	207.9											
HCM 6th LOS	F											

HCM 6th Signalized Intersection Summary
 1485: S 148th St & Old Cheney Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	26	5	1	45	40	116	674	5	37	245	284
Future Volume (veh/h)	66	26	5	1	45	40	116	674	5	37	245	284
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1900	1900	1900	1900	1900	1900	1841	1841	1693	1663	1885
Adj Flow Rate, veh/h	85	49	10	4	60	55	168	812	20	53	336	379
Peak Hour Factor	0.78	0.53	0.50	0.25	0.75	0.73	0.69	0.83	0.25	0.70	0.73	0.75
Percent Heavy Veh, %	2	0	0	0	0	0	0	4	4	14	16	1
Cap, veh/h	442	219	45	123	129	115	575	1022	25	357	950	913
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.57	0.57	0.57	0.57	0.57	0.57
Sat Flow, veh/h	1277	1531	313	32	906	805	747	1789	44	597	1663	1598
Grp Volume(v), veh/h	85	0	59	119	0	0	168	0	832	53	336	379
Grp Sat Flow(s),veh/h/ln	1277	0	1844	1743	0	0	747	0	1833	597	1663	1598
Q Serve(g_s), s	0.0	0.0	0.9	0.0	0.0	0.0	4.9	0.0	11.2	2.4	3.4	4.2
Cycle Q Clear(g_c), s	1.4	0.0	0.9	2.0	0.0	0.0	8.3	0.0	11.2	13.6	3.4	4.2
Prop In Lane	1.00		0.17	0.03		0.46	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	442	0	263	367	0	0	575	0	1047	357	950	913
V/C Ratio(X)	0.19	0.00	0.22	0.32	0.00	0.00	0.29	0.00	0.79	0.15	0.35	0.42
Avail Cap(c_a), veh/h	990	0	1054	1110	0	0	575	0	1047	357	950	913
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.2	0.0	12.0	12.4	0.0	0.0	5.9	0.0	5.3	10.6	3.6	3.8
Incr Delay (d2), s/veh	0.2	0.0	0.4	0.5	0.0	0.0	1.3	0.0	6.2	0.9	1.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/lr	0.3	0.0	0.2	0.5	0.0	0.0	0.4	0.0	1.8	0.3	0.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.4	0.0	12.4	12.9	0.0	0.0	7.1	0.0	11.5	11.5	4.7	5.2
LnGrp LOS	B	A	B	B	A	A	A	A	B	B	A	A
Approach Vol, veh/h		144			119			1000			768	
Approach Delay, s/veh		12.4			12.9			10.8			5.4	
Approach LOS		B			B			B			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		9.0		22.5		9.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		13.2		3.4		15.6		4.0				
Green Ext Time (p_c), s		2.6		0.4		0.9		0.4				
Intersection Summary												
HCM 6th Ctrl Delay				9.0								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary
 1481: S 148th St & Amberly Rd/Private Drive

68th St and 148th St Safety Analysis
 08/16/2018



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	5	138	0	0	0	166	503	5	5	395	119
Future Volume (veh/h)	101	5	138	0	0	0	166	503	5	5	395	119
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1752	1885	1885	1870	1870	1900
Adj Flow Rate, veh/h	180	5	168	0	0	0	221	645	5	5	513	170
Peak Hour Factor	0.56	1.00	0.82	1.00	1.00	1.00	0.75	0.78	1.00	1.00	0.77	0.70
Percent Heavy Veh, %	0	0	0	0	0	0	10	1	1	2	2	0
Cap, veh/h	554	9	292	0	353	0	478	1014	8	112	1010	874
Arrive On Green	0.19	0.19	0.19	0.00	0.00	0.00	0.54	0.54	0.54	0.54	0.54	0.54
Sat Flow, veh/h	1810	47	1571	0	1900	0	710	1868	14	4	1862	1610
Grp Volume(v), veh/h	180	0	173	0	0	0	221	0	650	518	0	170
Grp Sat Flow(s),veh/h/ln	1810	0	1617	0	1900	0	710	0	1883	1865	0	1610
Q Serve(g_s), s	3.0	0.0	3.2	0.0	0.0	0.0	9.5	0.0	8.0	0.0	0.0	1.8
Cycle Q Clear(g_c), s	3.0	0.0	3.2	0.0	0.0	0.0	15.3	0.0	8.0	5.8	0.0	1.8
Prop In Lane	1.00		0.97	0.00		0.00	1.00		0.01	0.01		1.00
Lane Grp Cap(c), veh/h	554	0	301	0	353	0	478	0	1022	1122	0	874
V/C Ratio(X)	0.33	0.00	0.58	0.00	0.00	0.00	0.46	0.00	0.64	0.46	0.00	0.19
Avail Cap(c_a), veh/h	1199	0	878	0	1031	0	478	0	1022	1122	0	874
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.2	0.0	12.3	0.0	0.0	0.0	9.6	0.0	5.3	4.8	0.0	3.9
Incr Delay (d2), s/veh	0.3	0.0	1.7	0.0	0.0	0.0	3.2	0.0	3.0	1.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.0	0.0	0.0	0.0	1.2	0.0	1.7	1.1	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.5	0.0	14.0	0.0	0.0	0.0	12.8	0.0	8.3	6.2	0.0	4.4
LnGrp LOS	B	A	B	A	A	A	B	A	A	A	A	A
Approach Vol, veh/h		353			0			871			688	
Approach Delay, s/veh		13.3			0.0			9.5			5.7	
Approach LOS		B						A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		10.7		22.5		10.7				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		17.3		5.2		7.8		0.0				
Green Ext Time (p_c), s		0.4		1.2		2.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									

HCM 6th Signalized Intersection Summary
1482: S 148th St & Adams St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↖	↗		↖	↗	↖
Traffic Volume (veh/h)	22	14	103	4	4	2	97	606	8	11	719	26
Future Volume (veh/h)	22	14	103	4	4	2	97	606	8	11	719	26
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1663	1707	1707	1900	1811	1900
Adj Flow Rate, veh/h	34	20	124	11	5	4	137	673	21	22	922	52
Peak Hour Factor	0.64	0.69	0.83	0.38	0.75	0.50	0.71	0.90	0.38	0.50	0.78	0.50
Percent Heavy Veh, %	0	0	0	0	0	0	16	13	13	0	6	0
Cap, veh/h	169	41	174	275	110	53	283	929	29	426	1022	908
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.56	0.56	0.56	0.56	0.56	0.56
Sat Flow, veh/h	226	266	1130	653	717	343	513	1647	51	762	1811	1610
Grp Volume(v), veh/h	178	0	0	20	0	0	137	0	694	22	922	52
Grp Sat Flow(s),veh/h/ln	1622	0	0	1713	0	0	513	0	1698	762	1811	1610
Q Serve(g_s), s	2.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	9.6	0.7	14.4	0.5
Cycle Q Clear(g_c), s	3.3	0.0	0.0	0.3	0.0	0.0	18.0	0.0	9.6	10.3	14.4	0.5
Prop In Lane	0.19		0.70	0.55		0.20	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	384	0	0	439	0	0	283	0	958	426	1022	908
V/C Ratio(X)	0.46	0.00	0.00	0.05	0.00	0.00	0.48	0.00	0.72	0.05	0.90	0.06
Avail Cap(c_a), veh/h	1040	0	0	1032	0	0	283	0	958	426	1022	908
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.8	0.0	0.0	11.5	0.0	0.0	15.2	0.0	5.1	8.9	6.2	3.1
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.0	0.0	0.0	5.8	0.0	4.8	0.2	12.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.0	0.1	0.0	0.0	1.1	0.0	1.3	0.1	3.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.7	0.0	0.0	11.6	0.0	0.0	21.0	0.0	9.9	9.2	18.8	3.3
LnGrp LOS	B	A	A	B	A	A	C	A	A	A	B	A
Approach Vol, veh/h		178			20			831			996	
Approach Delay, s/veh		13.7			11.6			11.7			17.8	
Approach LOS		B			B			B			B	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		9.4		22.5		9.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		20.0		5.3		16.4		2.3				
Green Ext Time (p_c), s		0.0		0.6		1.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				14.9								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary
1483: S 148th St & O St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	258	727	237	90	340	213	111	350	137	379	485	129
Future Volume (veh/h)	258	727	237	90	340	213	111	350	137	379	485	129
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1885	1900	1767	1841	1604	1900	1781	1781	1781	1856	1856
Adj Flow Rate, veh/h	327	799	339	106	420	296	148	422	221	462	539	137
Peak Hour Factor	0.79	0.91	0.70	0.85	0.81	0.72	0.75	0.83	0.62	0.82	0.90	0.94
Percent Heavy Veh, %	0	1	0	9	4	20	0	8	8	8	3	3
Cap, veh/h	343	864	738	148	844	623	120	395	207	120	511	130
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.36	0.36	0.36	0.36	0.36	0.36
Sat Flow, veh/h	747	1885	1610	467	1841	1359	775	1101	577	749	1427	363
Grp Volume(v), veh/h	327	799	339	106	420	296	148	0	643	462	0	676
Grp Sat Flow(s),veh/h/ln	747	1885	1610	467	1841	1359	775	0	1678	749	0	1790
Q Serve(g_s), s	17.9	23.9	8.7	3.6	9.6	9.1	0.0	0.0	21.5	0.0	0.0	21.5
Cycle Q Clear(g_c), s	27.5	23.9	8.7	27.5	9.6	9.1	21.5	0.0	21.5	21.5	0.0	21.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.34	1.00		0.20
Lane Grp Cap(c), veh/h	343	864	738	148	844	623	120	0	601	120	0	642
V/C Ratio(X)	0.95	0.92	0.46	0.72	0.50	0.48	1.23	0.00	1.07	3.85	0.00	1.05
Avail Cap(c_a), veh/h	343	864	738	148	844	623	120	0	601	120	0	642
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.9	15.3	11.1	29.5	11.4	11.3	30.0	0.0	19.3	30.0	0.0	19.3
Incr Delay (d2), s/veh	36.8	15.7	0.6	16.5	0.6	0.8	157.8	0.0	56.7	1302.5	0.0	50.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	10.7	2.3	2.0	2.9	2.0	6.8	0.0	15.7	44.9	0.0	15.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.7	31.0	11.8	46.1	12.1	12.1	187.8	0.0	76.0	1332.5	0.0	69.8
LnGrp LOS	E	C	B	D	B	B	F	A	F	F	A	F
Approach Vol, veh/h		1465			822			791			1138	
Approach Delay, s/veh		33.2			16.4			96.9			582.4	
Approach LOS		C			B			F			F	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.0		27.0		33.0		27.0				
Change Period (Y+Rc), s		5.5		5.5		5.5		5.5				
Max Green Setting (Gmax), s		27.5		21.5		27.5		21.5				
Max Q Clear Time (g_c+I1), s		29.5		23.5		29.5		23.5				
Green Ext Time (p_c), s		0.0		0.0		0.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay											190.1	
HCM 6th LOS											F	

HCM 6th Signalized Intersection Summary
 1485: S 148th St & Old Cheney Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	35	55	4	35	16	18	321	5	61	558	192
Future Volume (veh/h)	122	35	55	4	35	16	18	321	5	61	558	192
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1841	1841	1841	1841	1841	1900	1796	1796	1900	1841	1900
Adj Flow Rate, veh/h	163	50	75	11	55	25	31	391	10	95	754	243
Peak Hour Factor	0.75	0.70	0.73	0.38	0.64	0.65	0.58	0.82	0.50	0.64	0.74	0.79
Percent Heavy Veh, %	1	4	4	4	4	4	0	7	7	0	4	0
Cap, veh/h	477	118	177	142	201	83	354	956	24	636	1009	883
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.55	0.55	0.55	0.55	0.55	0.55
Sat Flow, veh/h	1329	665	997	106	1132	469	574	1744	45	999	1841	1610
Grp Volume(v), veh/h	163	0	125	91	0	0	31	0	401	95	754	243
Grp Sat Flow(s),veh/h/ln	1329	0	1661	1706	0	0	574	0	1788	999	1841	1610
Q Serve(g_s), s	1.7	0.0	2.2	0.0	0.0	0.0	1.4	0.0	4.3	2.0	10.3	2.6
Cycle Q Clear(g_c), s	3.2	0.0	2.2	1.5	0.0	0.0	11.7	0.0	4.3	6.3	10.3	2.6
Prop In Lane	1.00		0.60	0.12		0.27	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	477	0	295	426	0	0	354	0	980	636	1009	883
V/C Ratio(X)	0.34	0.00	0.42	0.21	0.00	0.00	0.09	0.00	0.41	0.15	0.75	0.28
Avail Cap(c_a), veh/h	969	0	911	1042	0	0	354	0	980	636	1009	883
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.3	0.0	12.0	11.7	0.0	0.0	10.2	0.0	4.3	6.2	5.7	3.9
Incr Delay (d2), s/veh	0.4	0.0	1.0	0.2	0.0	0.0	0.5	0.0	1.3	0.5	5.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/lr	0.7	0.0	0.5	0.4	0.0	0.0	0.1	0.0	0.4	0.2	1.6	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.7	0.0	13.0	12.0	0.0	0.0	10.7	0.0	5.6	6.7	10.7	4.7
LnGrp LOS	B	A	B	B	A	A	B	A	A	A	B	A
Approach Vol, veh/h		288			91			432			1092	
Approach Delay, s/veh		12.8			12.0			6.0			9.0	
Approach LOS		B			B			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		10.3		22.5		10.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		18.0		18.0		18.0		18.0				
Max Q Clear Time (g_c+I1), s		13.7		5.2		12.3		3.5				
Green Ext Time (p_c), s		0.9		0.8		2.8		0.3				
Intersection Summary												
HCM 6th Ctrl Delay				9.1								
HCM 6th LOS				A								

LANE LEVEL OF SERVICE

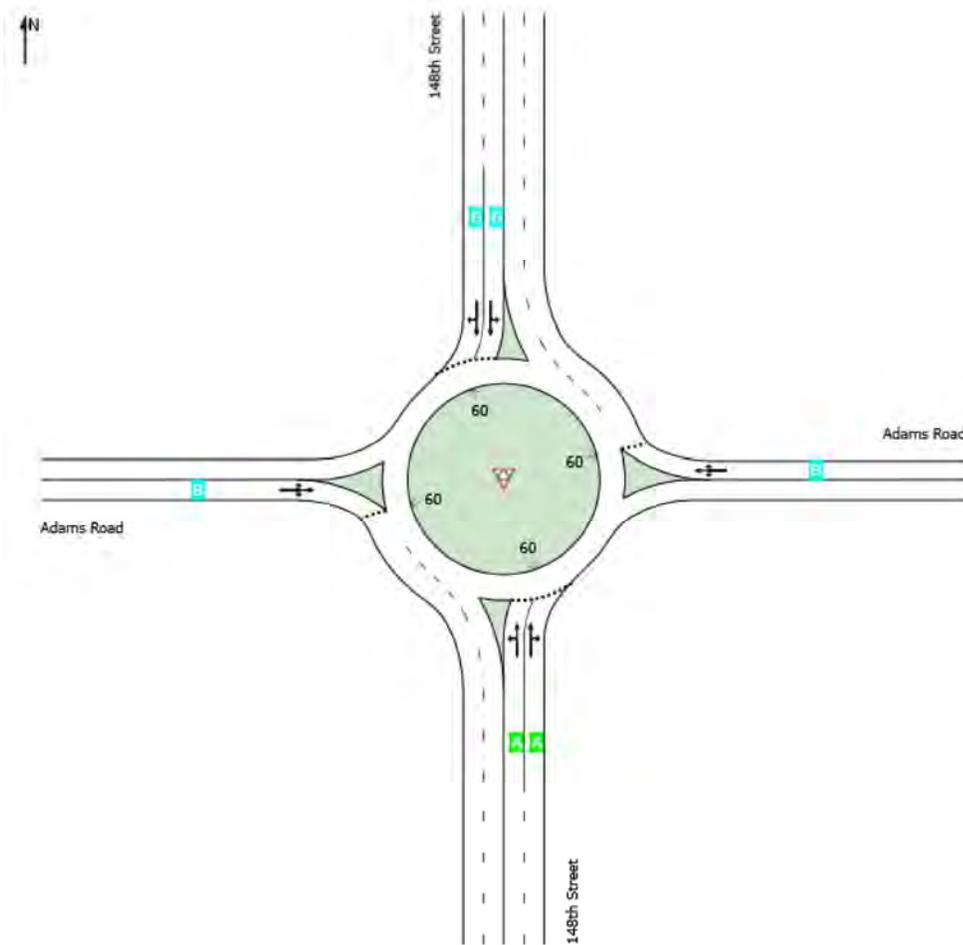
Lane Level of Service

 **Site: 4 [2040 AM Peak]**

Lancaster Safety Study - 148th

Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	B	B	B	B



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by vehicle movement (feet)

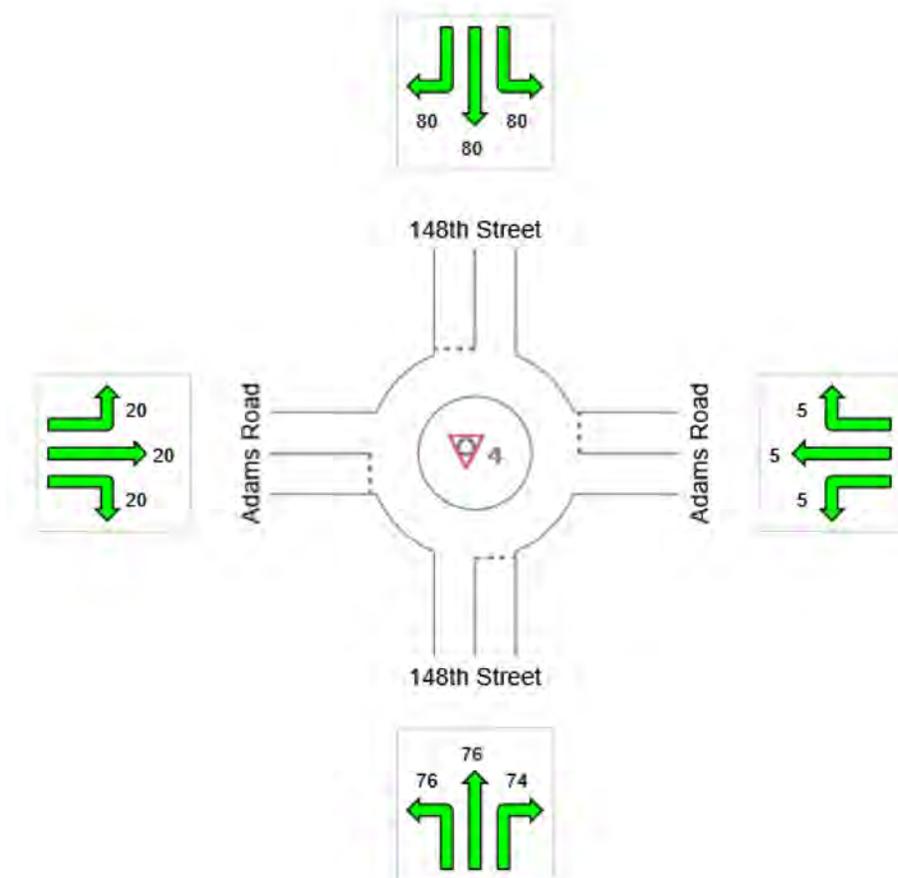
 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 148th

Site Category: (None)
Roundabout

All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	76	5	80	20	80



Colour code based on Queue Storage Ratio



LANE LEVEL OF SERVICE

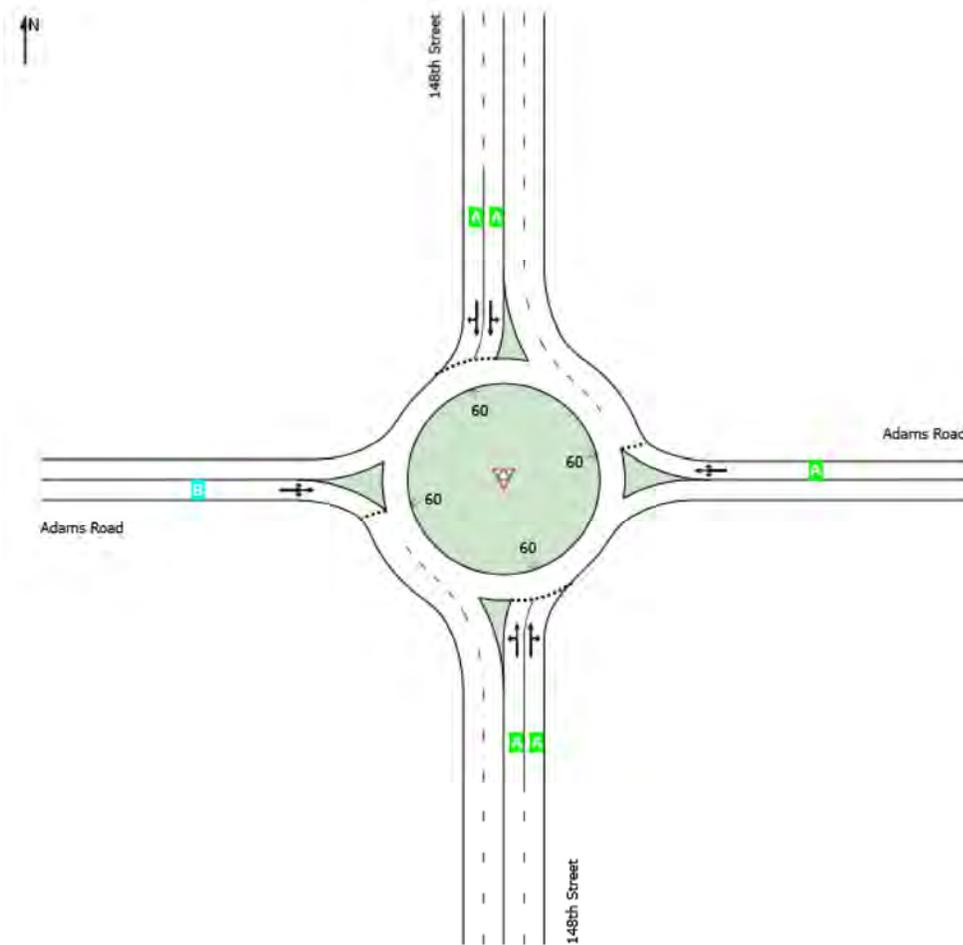
Lane Level of Service

 **Site: 4 [2040 PM Peak]**

Lancaster Safety Study - 148th

Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	A	B	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by vehicle movement (feet)

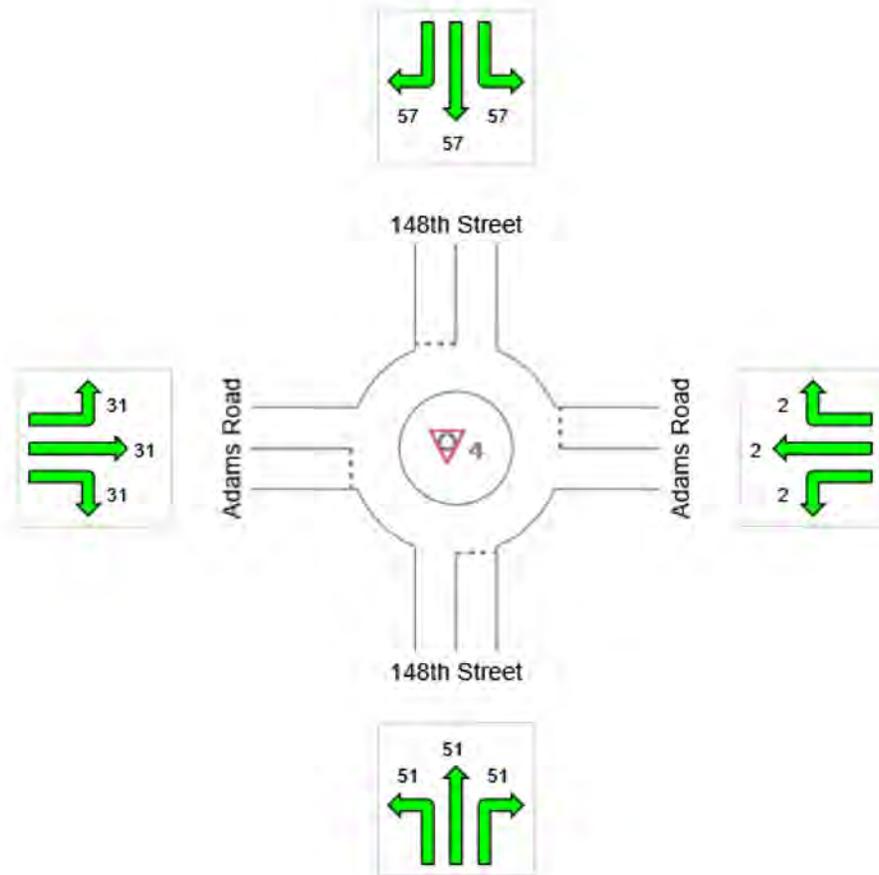
 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 148th

Site Category: (None)
Roundabout

All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	51	2	57	31	57



Colour code based on Queue Storage Ratio



LANE LEVEL OF SERVICE

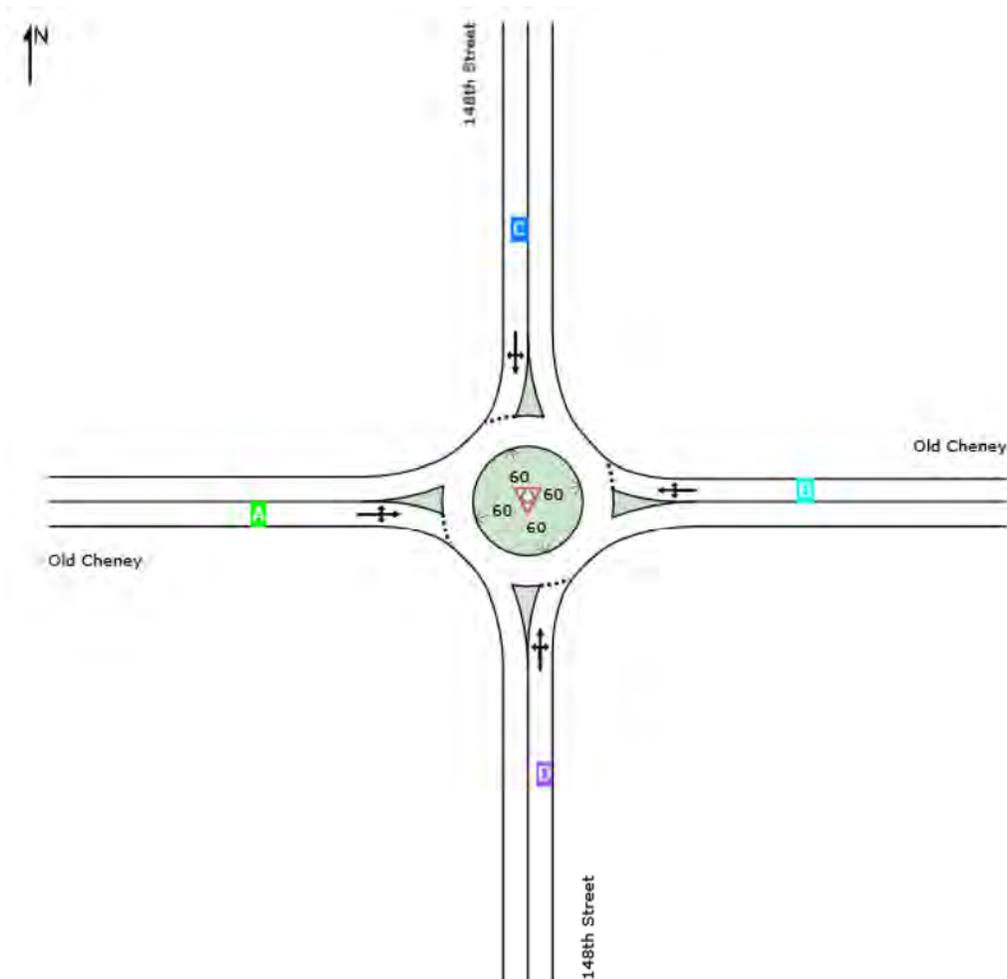
Lane Level of Service

 **Site: 4 [2040 AM Peak]**

Lancaster Safety Study - 148th

Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	D	B	C	A	C



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by vehicle movement (feet)

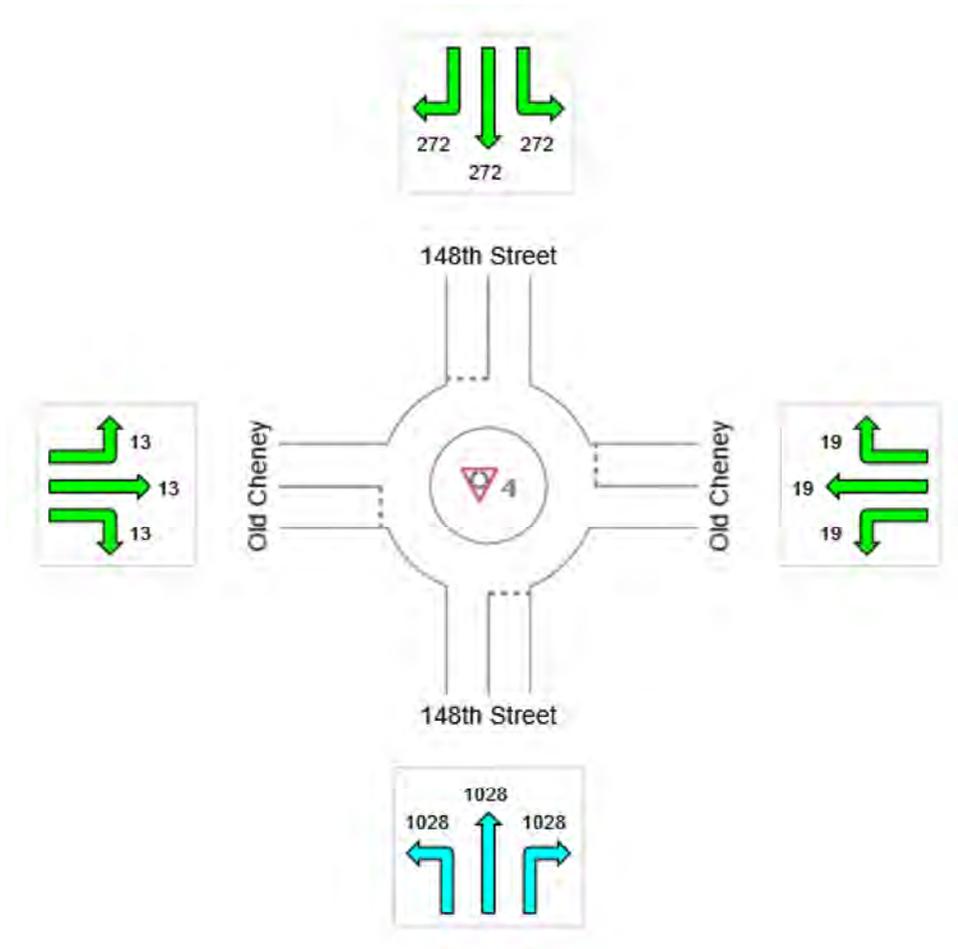
 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 148th

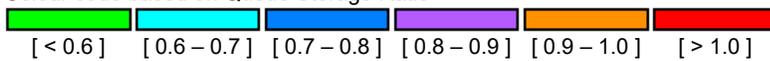
Site Category: (None)
Roundabout

All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	1028	19	272	13	1028



Colour code based on Queue Storage Ratio



LANE LEVEL OF SERVICE

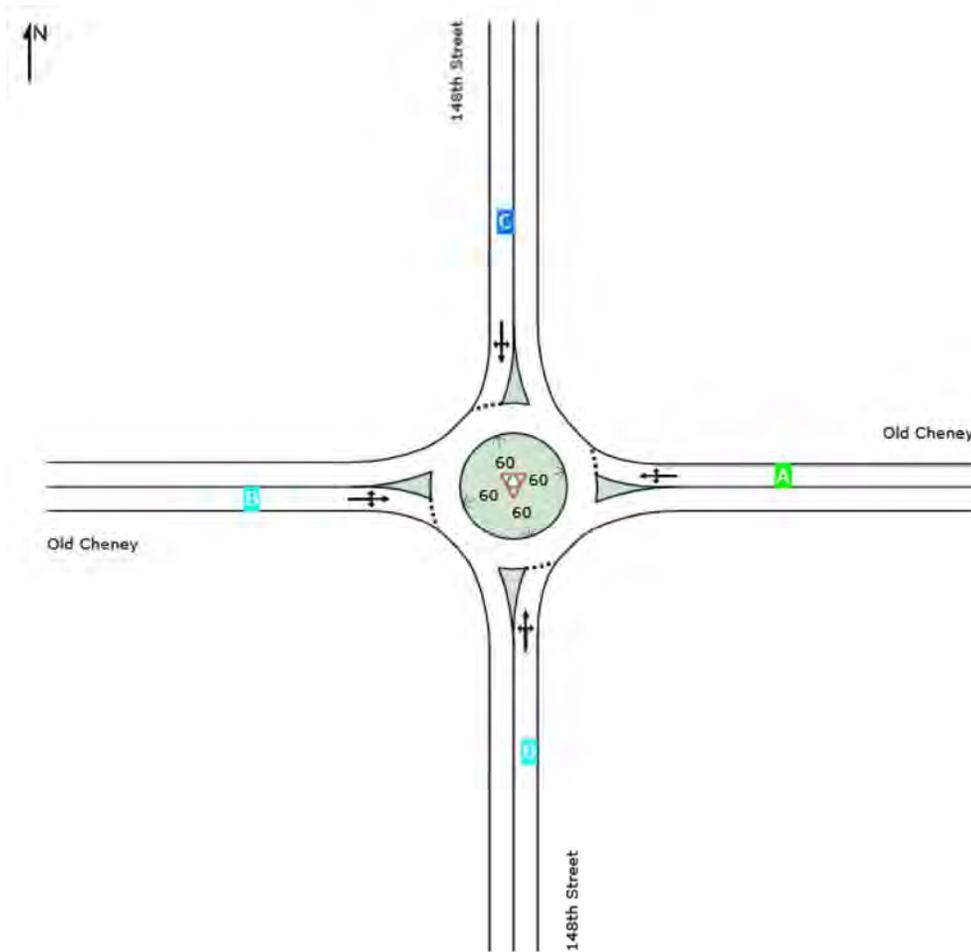
Lane Level of Service

 **Site: 4 [2040 PM Peak]**

Lancaster Safety Study - 148th

Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	B	A	C	B	C



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if $v/c > 1$ irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

QUEUE DISTANCE (%ILE)

Largest 95% Back of Queue Distance for any lane used by vehicle movement (feet)

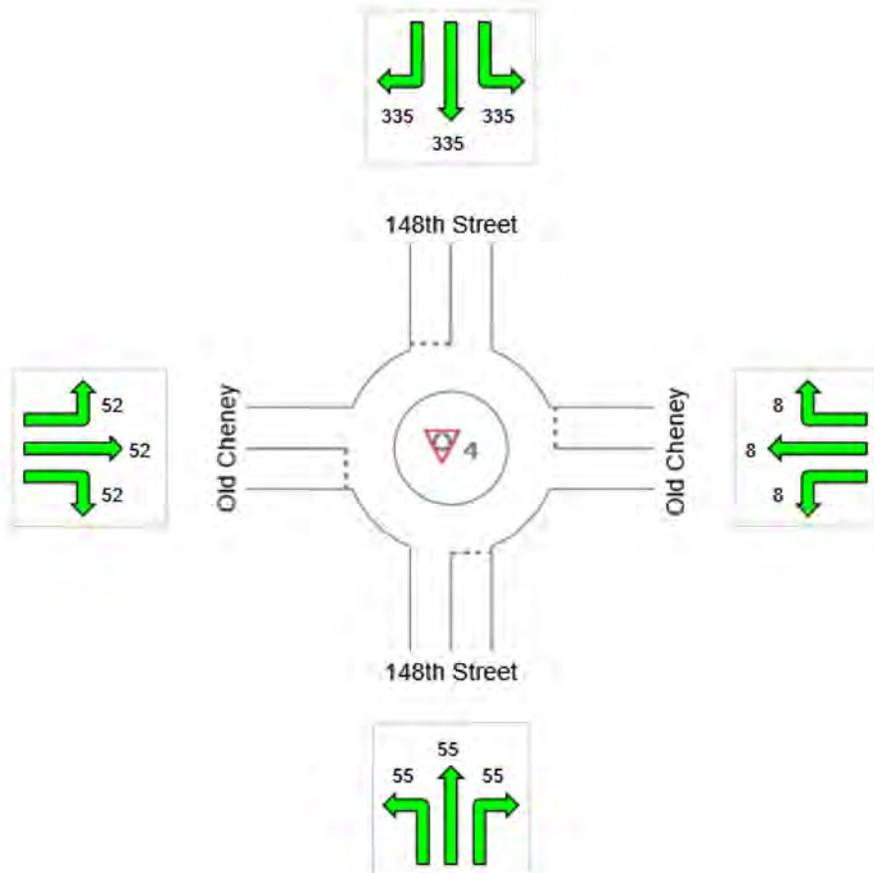
 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 148th

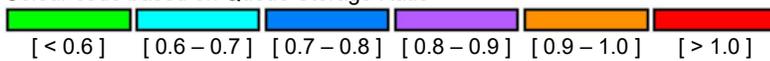
Site Category: (None)
Roundabout

All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	55	8	335	52	335



Colour code based on Queue Storage Ratio



MUTCD SIGNAL WARRANTS

**MUTCD Volume-based Warrant Evaluation - 2018 Existing
Adams Street and 148th Street**

Major Street: 148th Street
 Minor Street: Adams Street
 Major Street Approach Speed: 55 MPH
 Option: High speed, rural community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	1	350 (280)	603	566	529	492	455	418	381	344
Highest Apprch. Minor Street	1	105 (84)	112	105	98	91	85	78	71	64

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	1	525 (420)	603	566	529	492	455	418	381	344
Highest Apprch. Minor Street	1	53 (42)	112	105	98	91	85	78	71	64

WARRANT 1, Condition A and Condition B

56% Satisfied No

WARRANT 2, Four Hour Volume

70% Satisfied No

	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	1	603	566	529	492
Highest Apprch. Minor Street	1	112	105	98	91

**MUTCD Volume-based Warrant Evaluation - 2018 Existing
Amberly Road / Private Drive and 148th Street**

Major Street: 148th Street
 Minor Street: Amberly Road / Private Drive
 Major Street Approach Speed: 40 MPH
 Option: Rural Community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	1	350 (280)	543	510	476	443	410	377	343	310
Highest Apprch. Minor Street	1	105 (84)	192	180	168	157	145	133	121	110

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	1	525 (420)	543	510	476	443	410	377	343	310
Highest Apprch. Minor Street	1	53 (42)	192	180	168	157	145	133	121	110

WARRANT 1, Condition A and Condition B

56% Satisfied No

WARRANT 2, Four Hour Volume

70% Satisfied No

	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	1	543	510	476	443
Highest Apprch. Minor Street	1	192	180	168	157

**MUTCD Volume-based Warrant Evaluation - 2040 Future (0% EB rights)
Amberly Road / Private Drive and 148th Street**

Major Street: 148th Street
 Minor Street: Amberly Road / Private Drive
 Major Street Approach Speed: 40 MPH
 Option: Rural Community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied | No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	420 (336)	1439	1351	1263	1174	1086	998	910	822
Highest Apprch. Minor Street	2 or more	140 (112)	106	100	93	87	80	74	67	61

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied | No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	630 (504)	1439	1351	1263	1174	1086	998	910	822
Highest Apprch. Minor Street	2 or more	70 (56)	106	100	93	87	80	74	67	61

WARRANT 1, Condition A and Condition B

56% Satisfied | No

WARRANT 2, Four Hour Volume

70% Satisfied | Yes

	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	1439	1351	1263	1174
Highest Apprch. Minor Street	2 or more	106	100	93	87

**MUTCD Volume-based Warrant Evaluation - 2018 Existing
Old Cheney Road and 148th Street**

Major Street: 148th Street
 Minor Street: Old Cheney Road
 Major Street Approach Speed: 55 MPH
 Option: High speed, rural community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	1	350 (280)	517	485	454	422	390	359	327	295
Highest Apprch. Minor Street	1	105 (84)	162	152	142	132	122	112	102	93

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied No

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	1	525 (420)	517	485	454	422	390	359	327	295
Highest Apprch. Minor Street	1	53 (42)	162	152	142	132	122	112	102	93

WARRANT 1, Condition A and Condition B

56% Satisfied No

WARRANT 2, Four Hour Volume

70% Satisfied No

	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	1	517	485	454	422
Highest Apprch. Minor Street	1	162	152	142	132

**MUTCD Volume-based Warrant Evaluation - 2040 Future
Old Cheney Road and 148th Street**

Major Street: 148th Street
 Minor Street: Old Cheney Road
 Major Street Approach Speed: 55 MPH
 Option: High speed, rural community



WARRANT 1, Condition A - Minimum Vehicular Volume

70% Satisfied Yes

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	420 (336)	1361	1278	1194	1111	1027	944	861	777
Highest Apprch. Minor Street	1	105 (84)	212	199	186	173	160	147	134	121

WARRANT 1, Condition B - Interruption of Continuous Traffic

70% Satisfied Yes

	Number of lanes moving traffic	Vehicles per hour 70% (56%)	Peak Hour	2nd Highest	3rd Highest	4th Highest	5th Highest	6th Highest	7th Highest	8th Highest
Both Apprchs. Major Street	2 or more	630 (504)	1361	1278	1194	1111	1027	944	861	777
Highest Apprch. Minor Street	1	53 (42)	212	199	186	173	160	147	134	121

WARRANT 1, Condition A and Condition B

56% Satisfied Yes

WARRANT 2, Four Hour Volume

70% Satisfied Yes

	Number of lanes moving traffic	Peak Hour	2nd Highest	3rd Highest	4th Highest
Both Apprchs. Major Street	2 or more	1361	1278	1194	1111
Highest Apprch. Minor Street	1	212	199	186	173

AUXILIARY TURN LANE WARRANTS

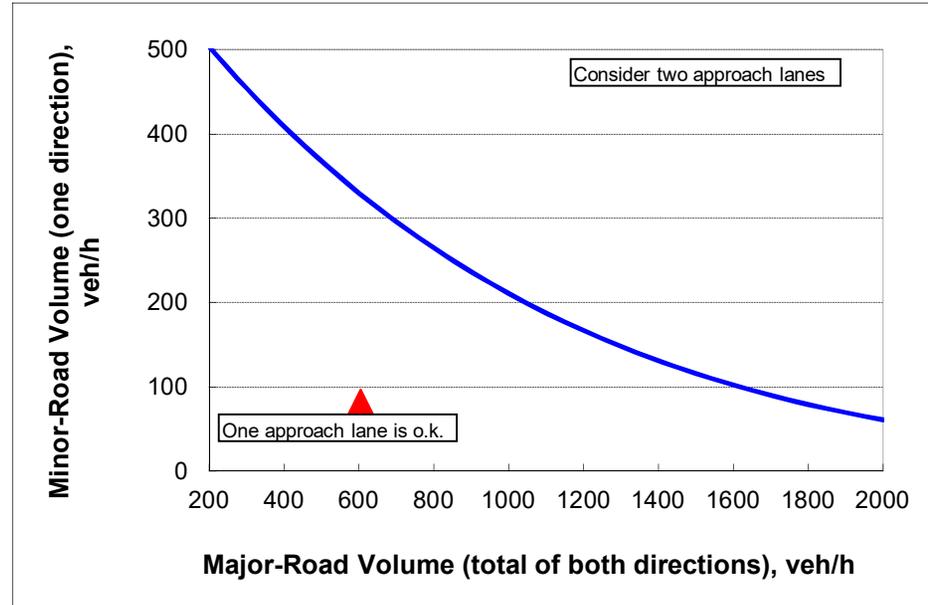
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	603
Percentage of right-turns on minor road, %:	53%
Minor-road volume (one direction), veh/h:	83

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	329
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Adams Street
Approach: Eastbound
Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	557
Percentage of right-turns on minor road, %:	74%
Minor-road volume (one direction), veh/h:	112

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	411
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Adams Street
Approach: Eastbound
Peak Period: PM Peak Hour

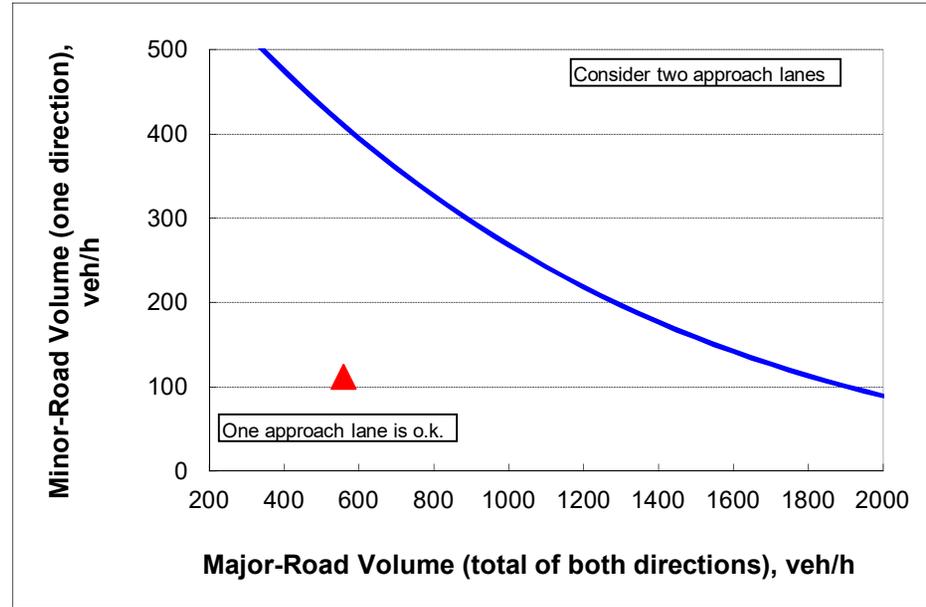


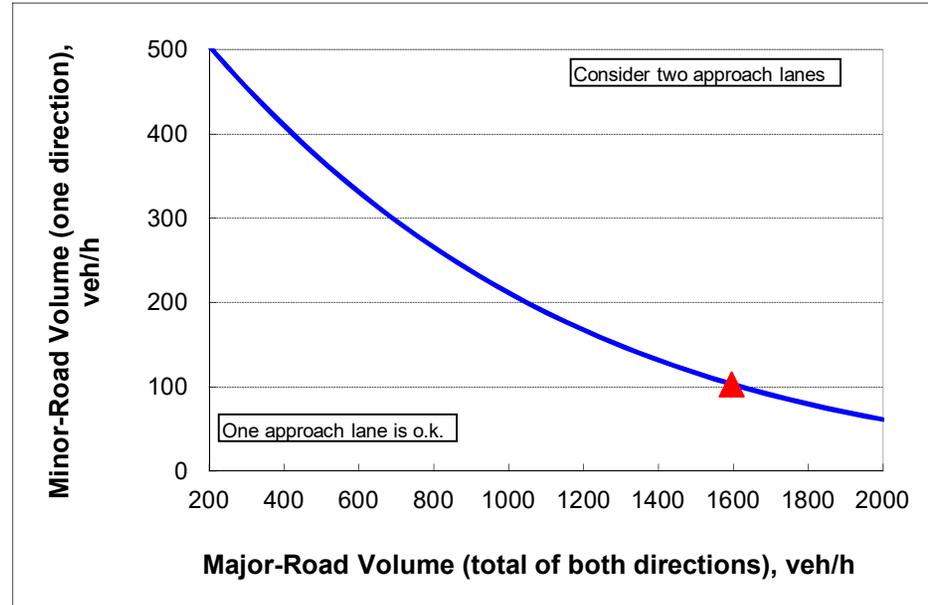
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1594
Percentage of right-turns on minor road, %:	53%
Minor-road volume (one direction), veh/h:	103

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	104
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Adams Street
Approach: Eastbound
Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1467
Percentage of right-turns on minor road, %:	74%
Minor-road volume (one direction), veh/h:	139

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	164
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Adams Street
Approach: Eastbound
Peak Period: PM Peak Hour

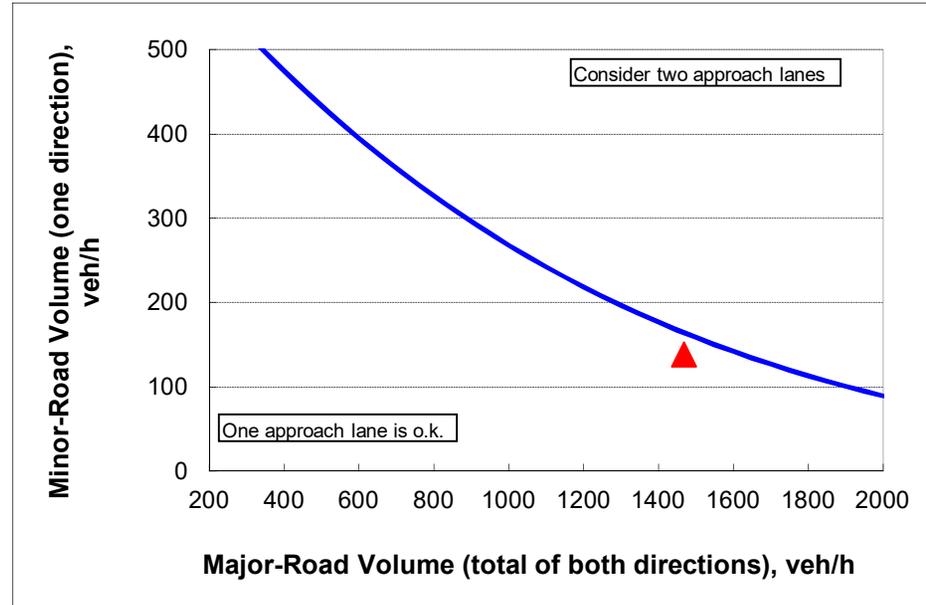


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

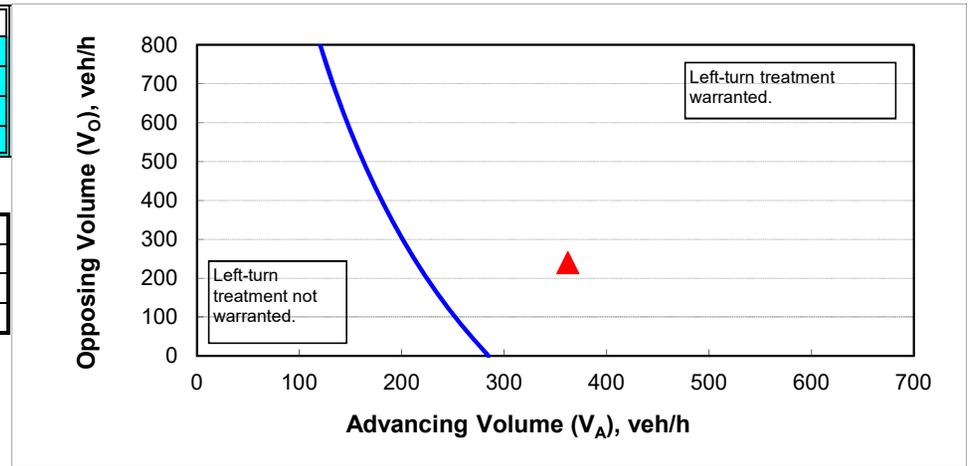
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	37%
Advancing volume (V_A), veh/h:	362
Opposing volume (V_O), veh/h:	240

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	215
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

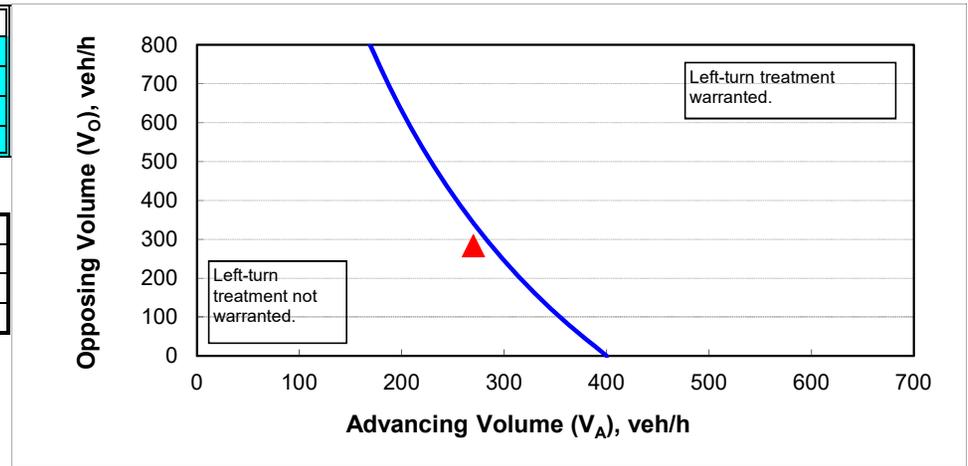
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	14%
Advancing volume (V_A), veh/h:	270
Opposing volume (V_O), veh/h:	283

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	288
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: PM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

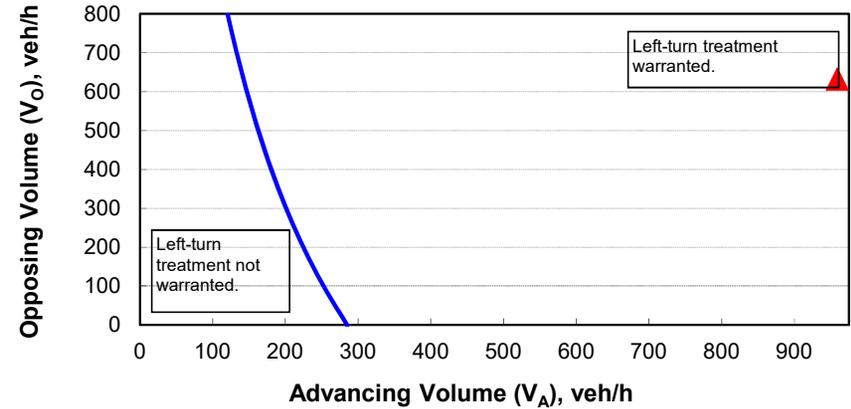
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	37%
Advancing volume (V_A), veh/h:	959
Opposing volume (V_O), veh/h:	632

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	142
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

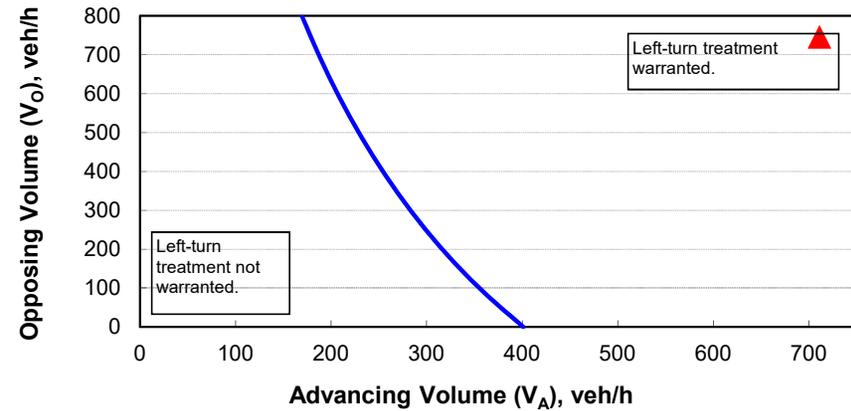
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	14%
Advancing volume (V_A), veh/h:	711
Opposing volume (V_O), veh/h:	745

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	179
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: PM Peak Hour

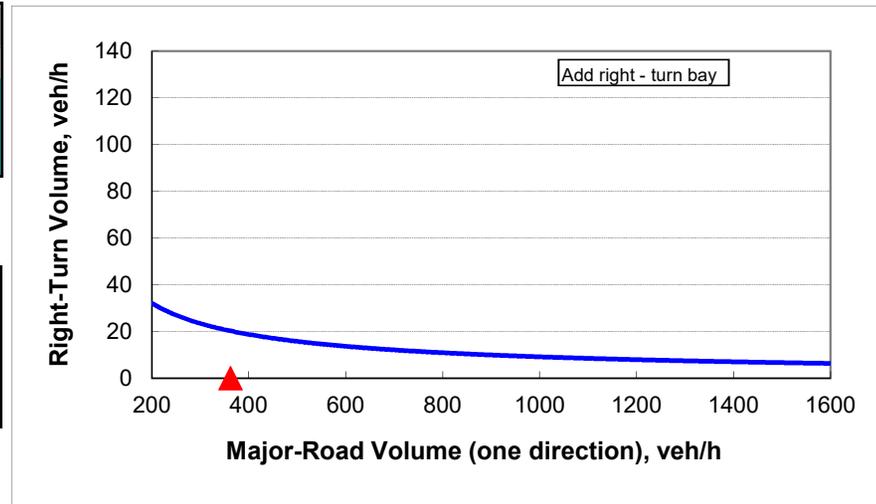
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		362
Right-turn volume, veh/h:		0

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		20
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:		
Do NOT add right-turn bay.		



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: AM Peak Hour

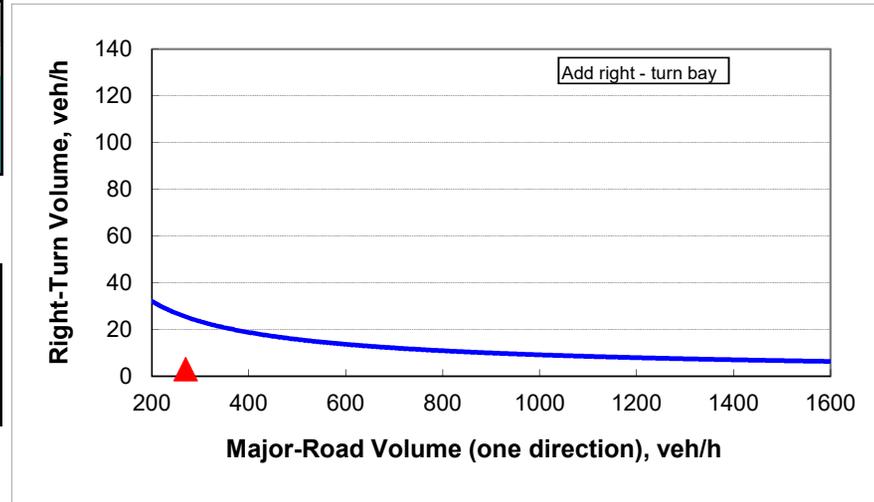
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
Variable	Value	
Major-road speed, mph:	55	
Major-road volume (one direction), veh/h:	270	
Right-turn volume, veh/h:	3	

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	25
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: PM Peak Hour

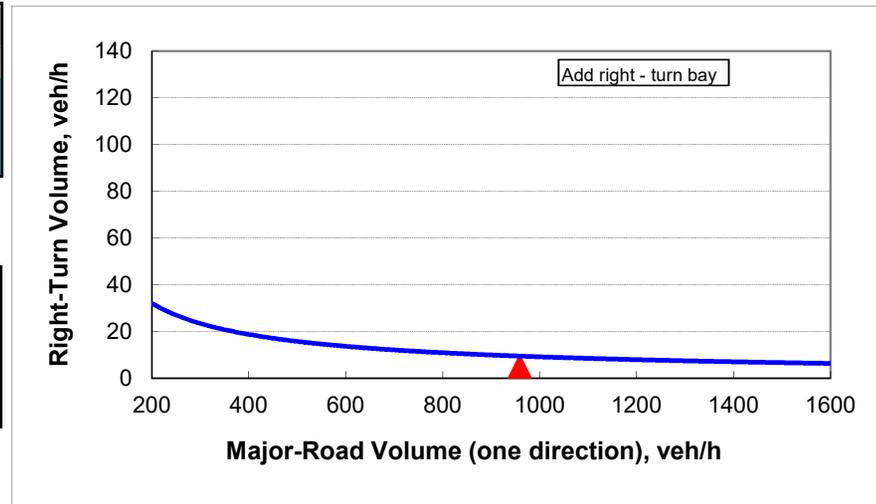
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	959
Right-turn volume, veh/h:	5

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	9
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: AM Peak Hour

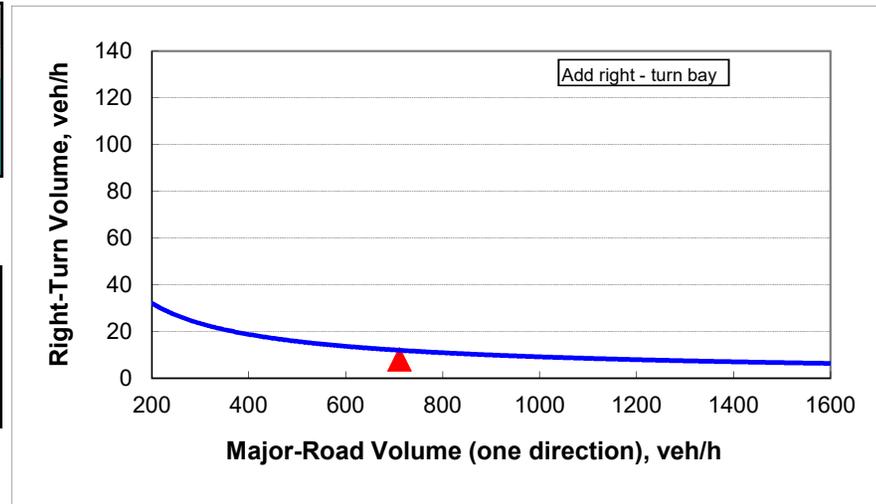
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		711
Right-turn volume, veh/h:		8

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		12
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:		
Do NOT add right-turn bay.		



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Northbound

Peak Period: PM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

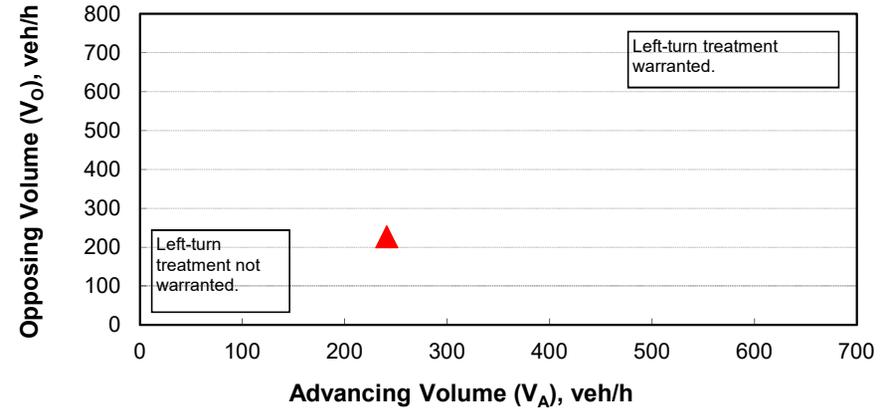
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	0%
Advancing volume (V_A), veh/h:	241
Opposing volume (V_O), veh/h:	227

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1638
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

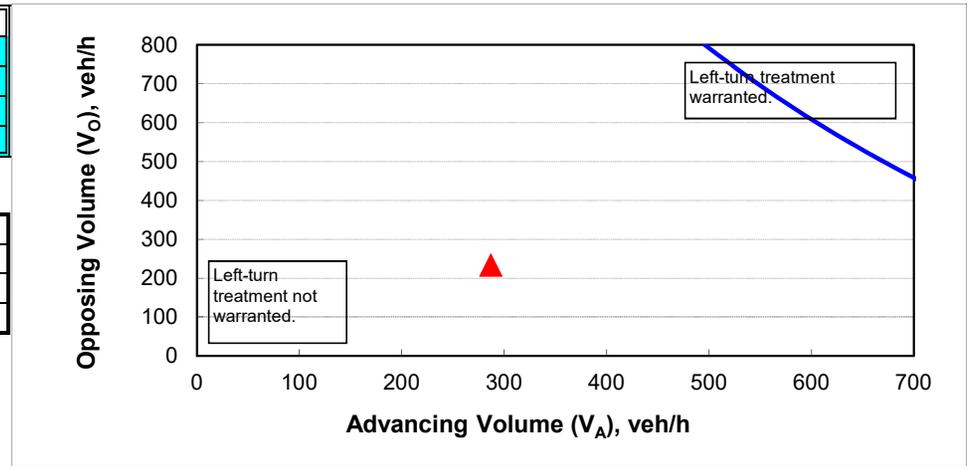
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	287
Opposing volume (V_O), veh/h:	233

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	892
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: PM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

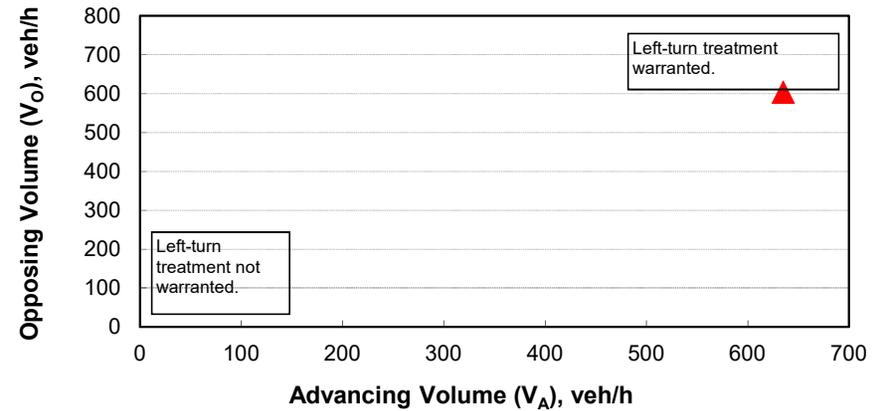
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	0%
Advancing volume (V_A), veh/h:	635
Opposing volume (V_O), veh/h:	603

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1031
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

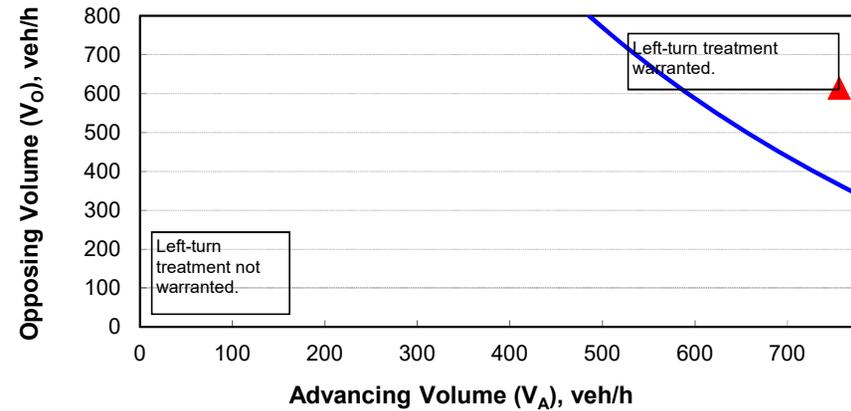
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	756
Opposing volume (V_O), veh/h:	614

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	584
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: PM Peak Hour

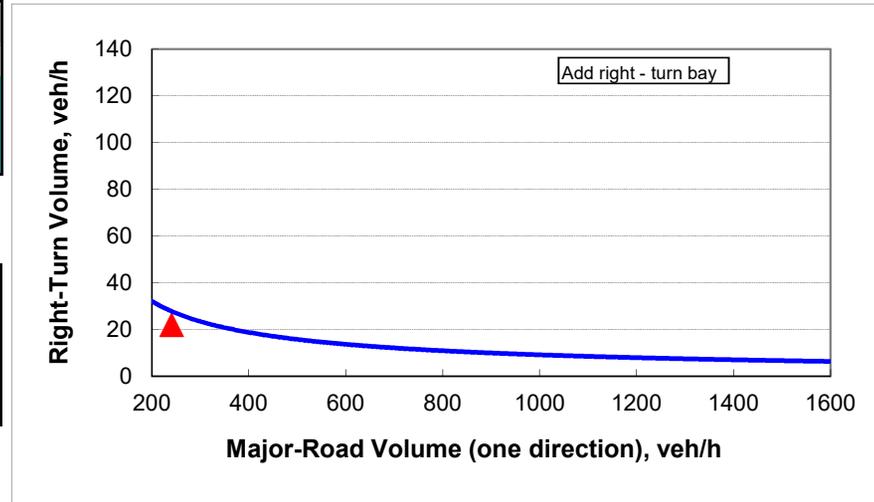
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		241
Right-turn volume, veh/h:		22

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		28
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:		
Do NOT add right-turn bay.		



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: AM Peak Hour

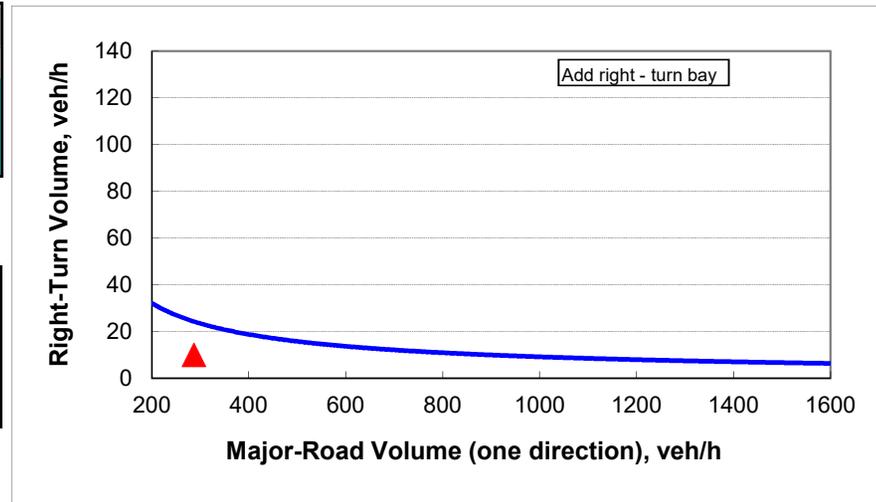
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		287
Right-turn volume, veh/h:		10

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		24
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:		
Do NOT add right-turn bay.		



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: PM Peak Hour

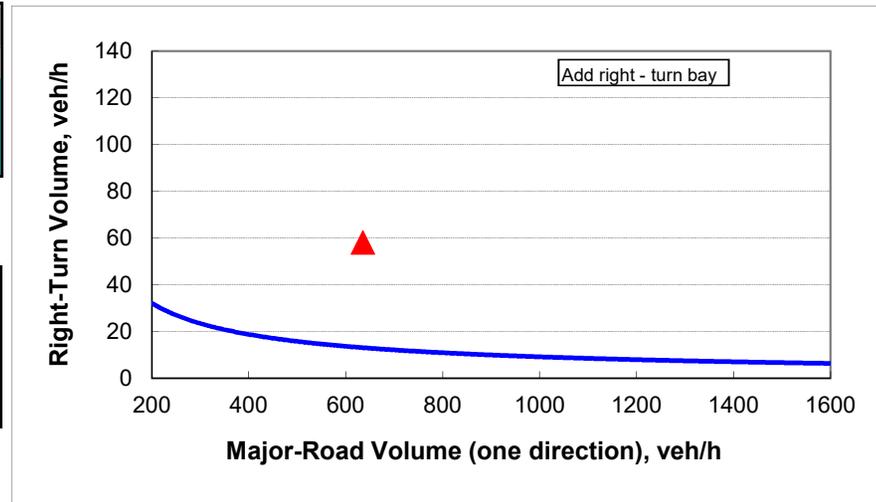
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		635
Right-turn volume, veh/h:		58

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		13
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:		
Add right-turn bay.		



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: AM Peak Hour

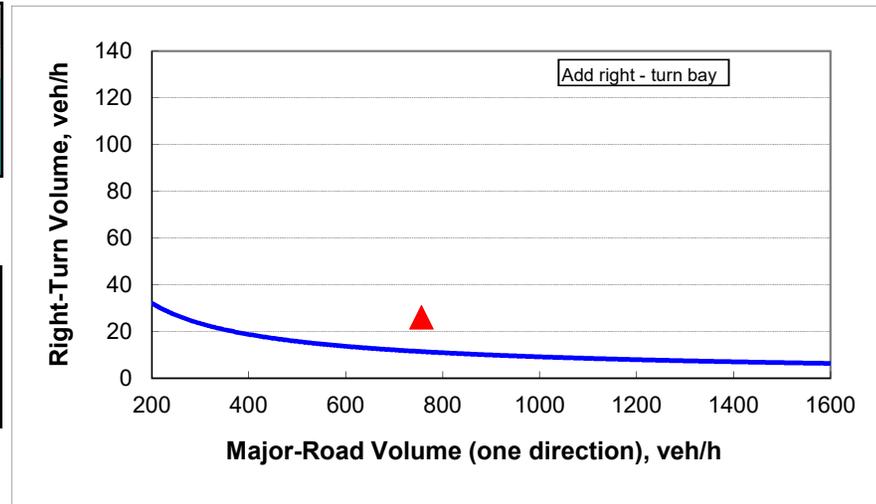
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		756
Right-turn volume, veh/h:		26

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		11
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:		
Add right-turn bay.		



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Adams Street

Approach: Southbound

Peak Period: PM Peak Hour

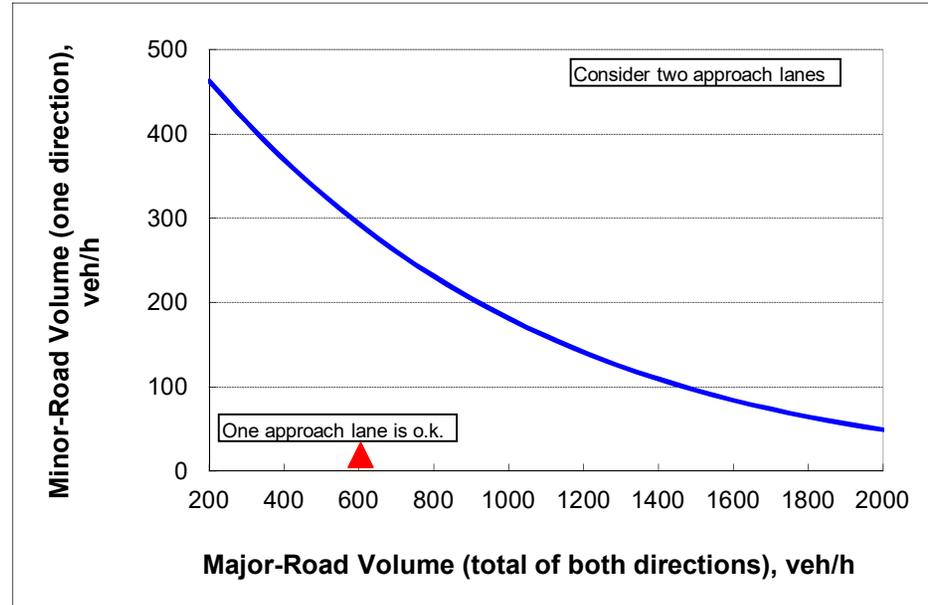
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	603
Percentage of right-turns on minor road, %:	37%
Minor-road volume (one direction), veh/h:	19

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	292
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Westbound
Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	557
Percentage of right-turns on minor road, %:	25%
Minor-road volume (one direction), veh/h:	8

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	286
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Westbound
Peak Period: PM Peak Hour

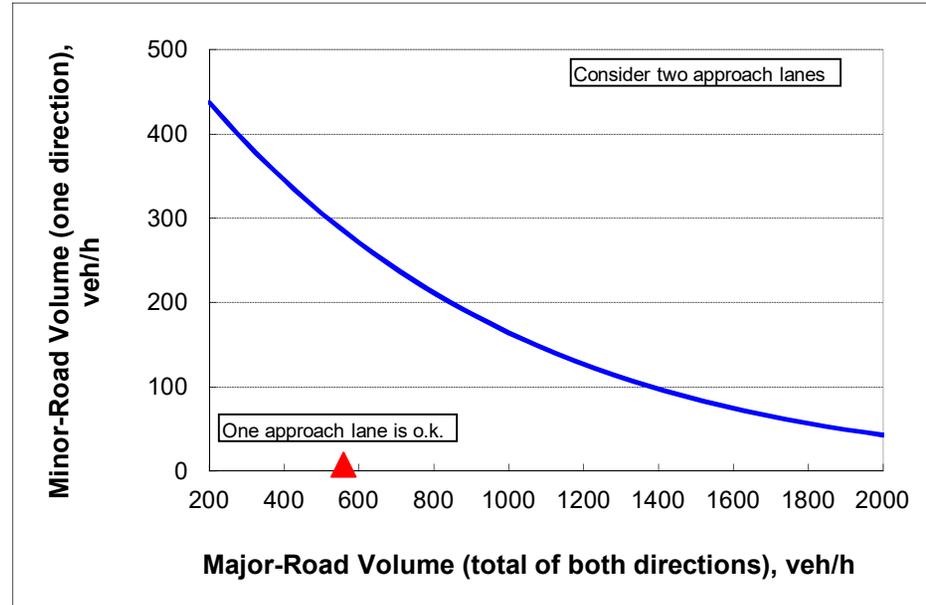


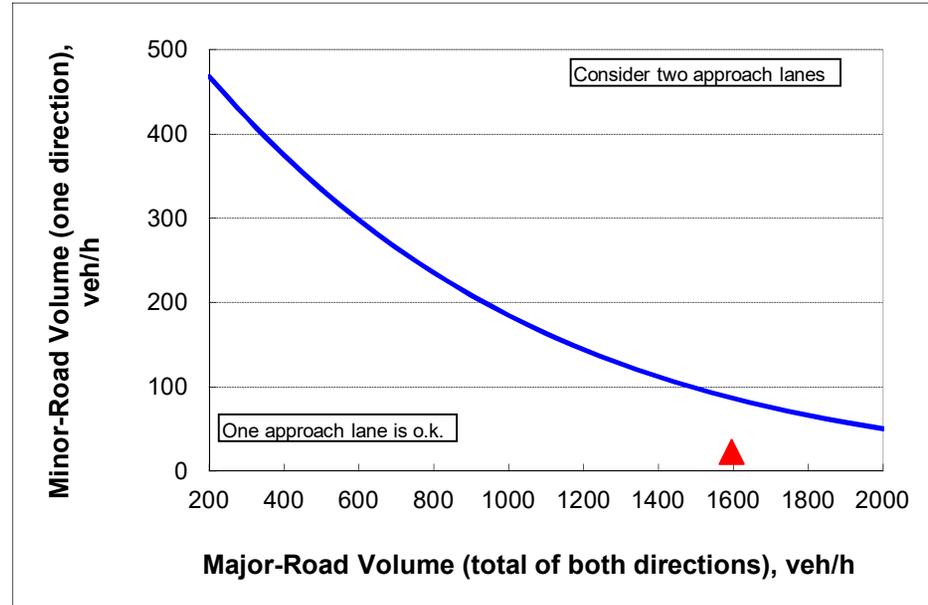
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1594
Percentage of right-turns on minor road, %:	39%
Minor-road volume (one direction), veh/h:	23

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	87
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Westbound
Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1467
Percentage of right-turns on minor road, %:	20%
Minor-road volume (one direction), veh/h:	10

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	85
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Westbound
Peak Period: PM Peak Hour

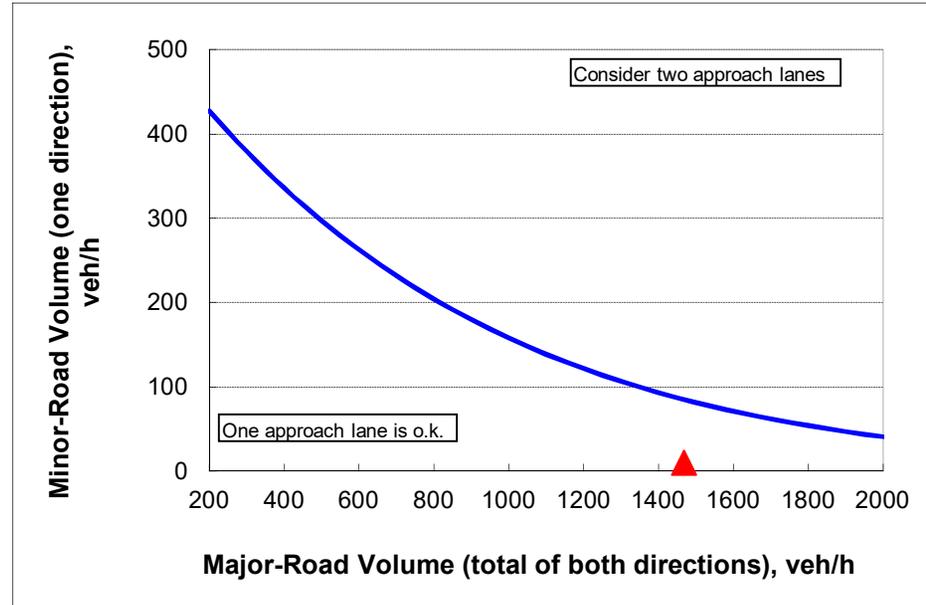


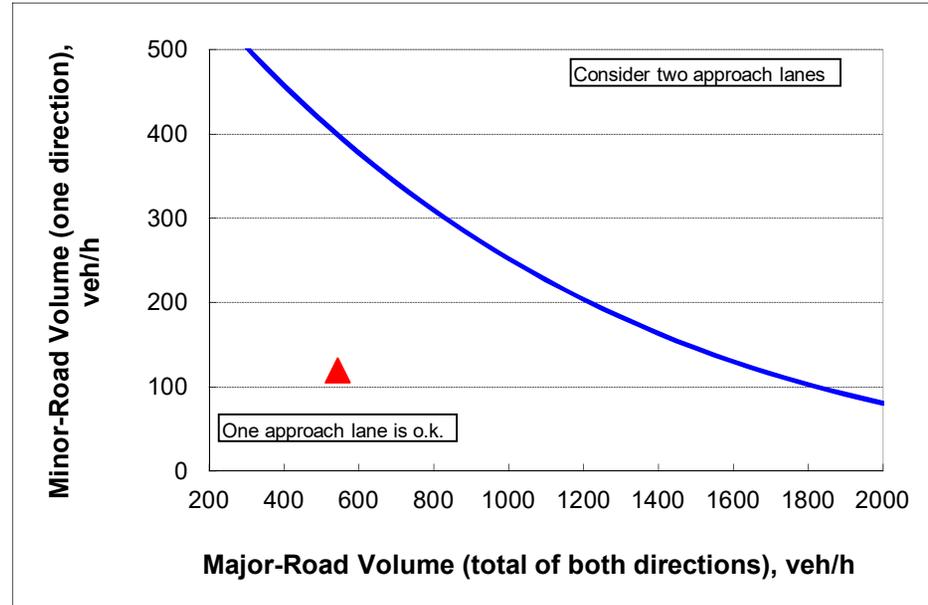
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	543
Percentage of right-turns on minor road, %:	69%
Minor-road volume (one direction), veh/h:	120

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	399
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Amberly Rd / Private Drive

Approach: Eastbound

Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	449
Percentage of right-turns on minor road, %:	58%
Minor-road volume (one direction), veh/h:	192

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	402
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Amberly Rd / Private Drive
Approach: Eastbound
Peak Period: PM Peak Hour

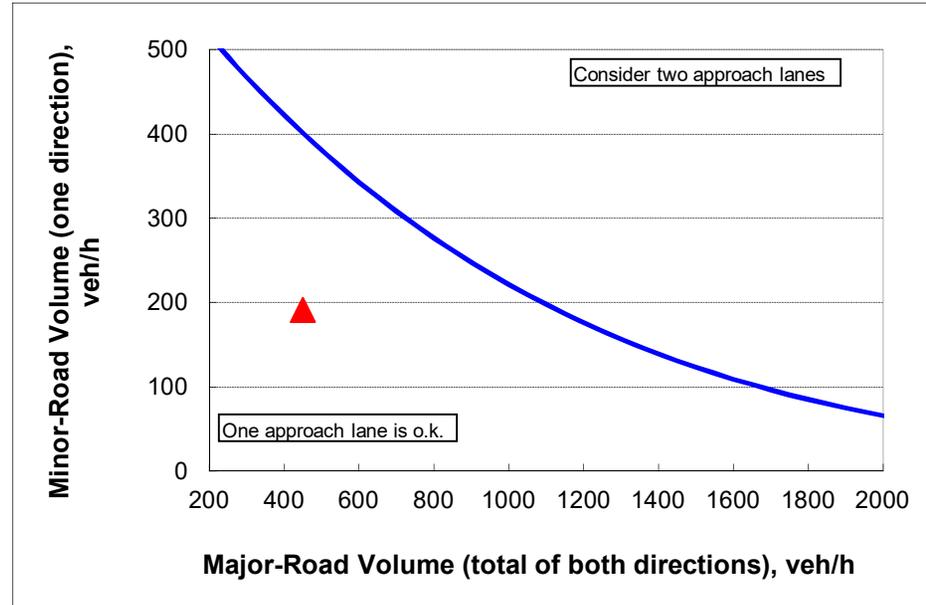


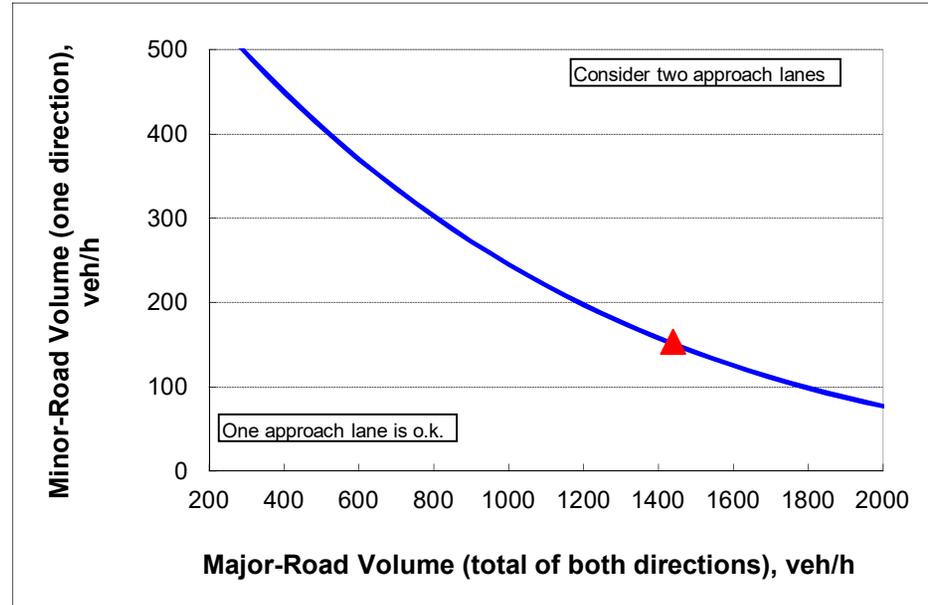
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1439
Percentage of right-turns on minor road, %:	67%
Minor-road volume (one direction), veh/h:	154

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	151
Guidance for determining minor-road approach geometry:	
Consider TWO approach lanes	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Amberly Rd / Private Drive

Approach: Eastbound

Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1193
Percentage of right-turns on minor road, %:	57%
Minor-road volume (one direction), veh/h:	244

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	175
Guidance for determining minor-road approach geometry:	
Consider TWO approach lanes	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Amberly Rd / Private Drive
Approach: Eastbound
Peak Period: PM Peak Hour

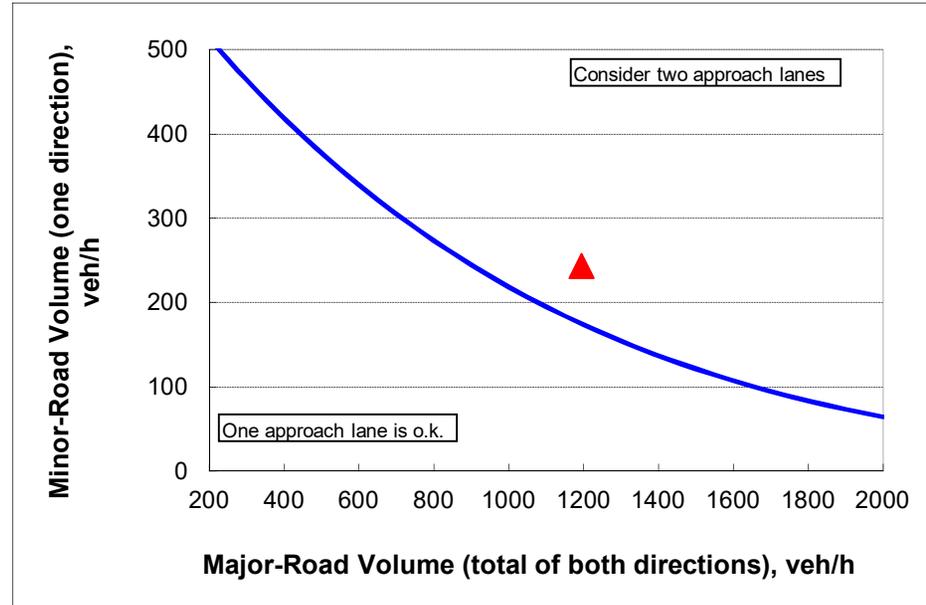


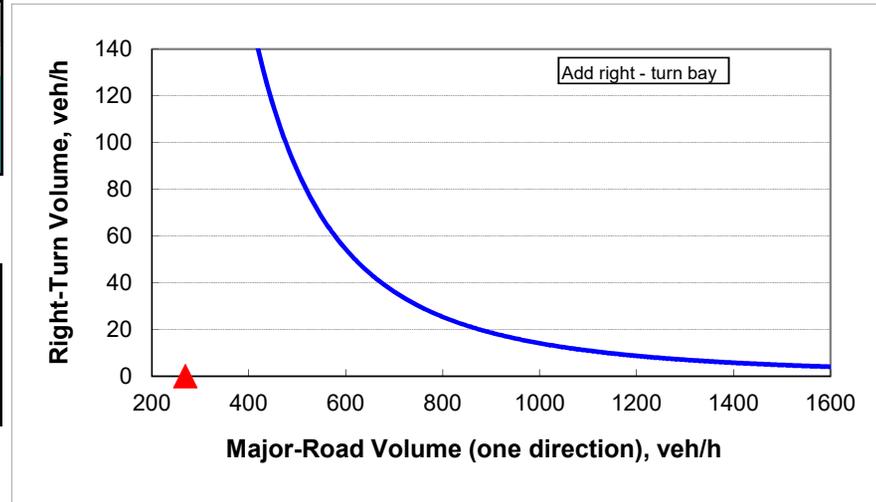
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:		2-lane roadway
Variable	Value	
Major-road speed, mph:	40	
Major-road volume (one direction), veh/h:	269	
Right-turn volume, veh/h:	0	

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	452
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Amberly Road / Private Drive

Approach: Northbound

Peak Period: AM Peak Hour

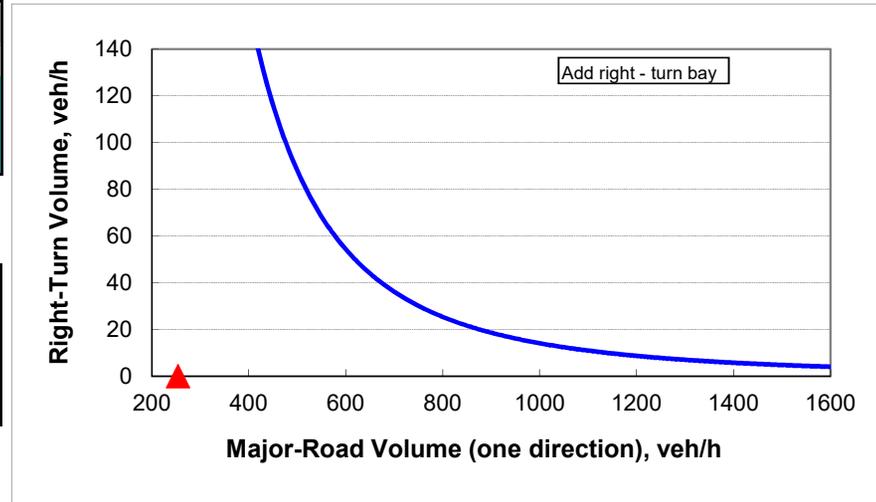
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
Variable	Value	
Major-road speed, mph:	40	
Major-road volume (one direction), veh/h:	254	
Right-turn volume, veh/h:	0	

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	526
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Amberly Road / Private Drive

Approach: Northbound

Peak Period: PM Peak Hour

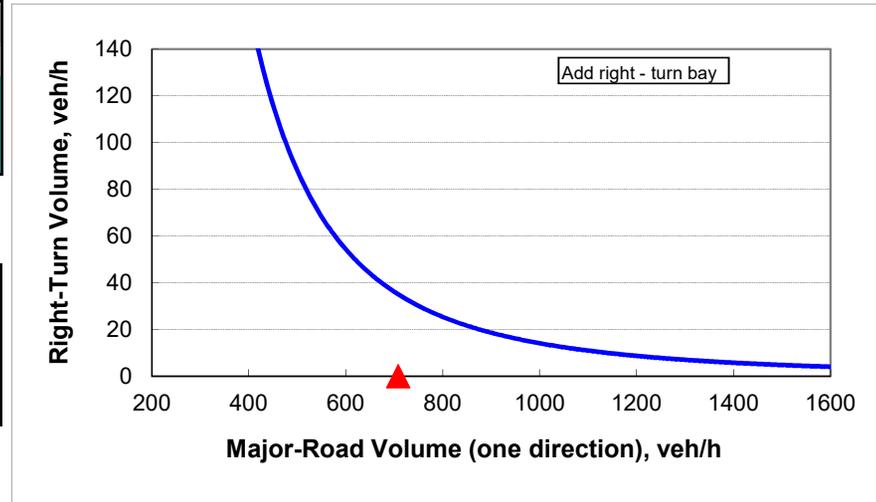
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	708
Right-turn volume, veh/h:	0

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	35
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Amberly Road / Private Drive

Approach: Northbound

Peak Period: AM Peak Hour

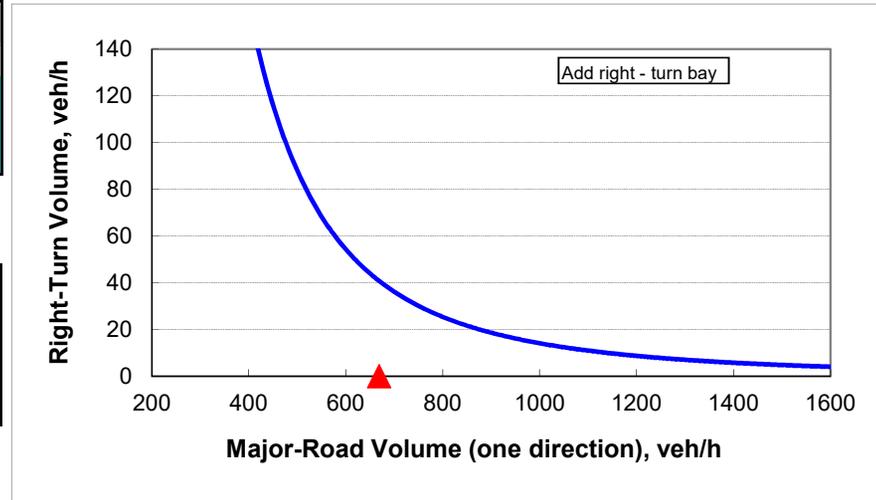
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		40
Major-road volume (one direction), veh/h:		669
Right-turn volume, veh/h:		0

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		41
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:		
Do NOT add right-turn bay.		



Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Amberly Road / Private Drive
Approach: Northbound
Peak Period: PM Peak Hour

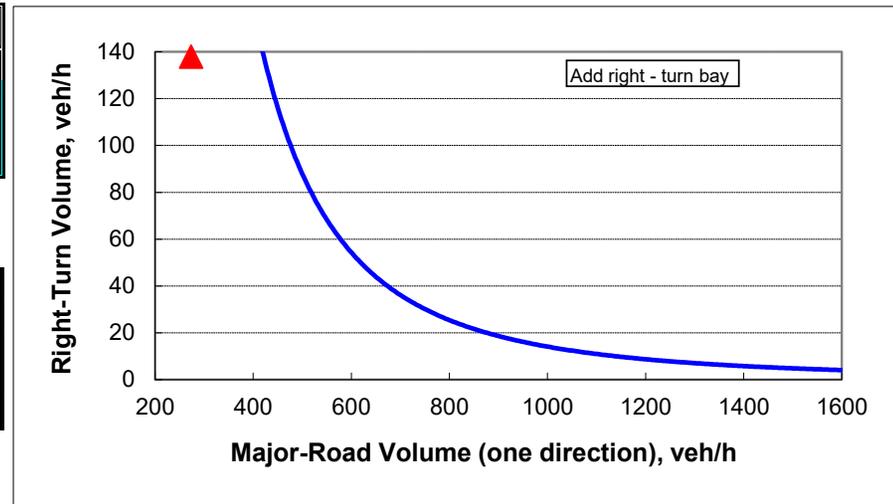
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	274
Right-turn volume, veh/h:	138

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	430
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Amberly Road / Private Drive

Approach: Southbound

Peak Period: AM Peak Hour

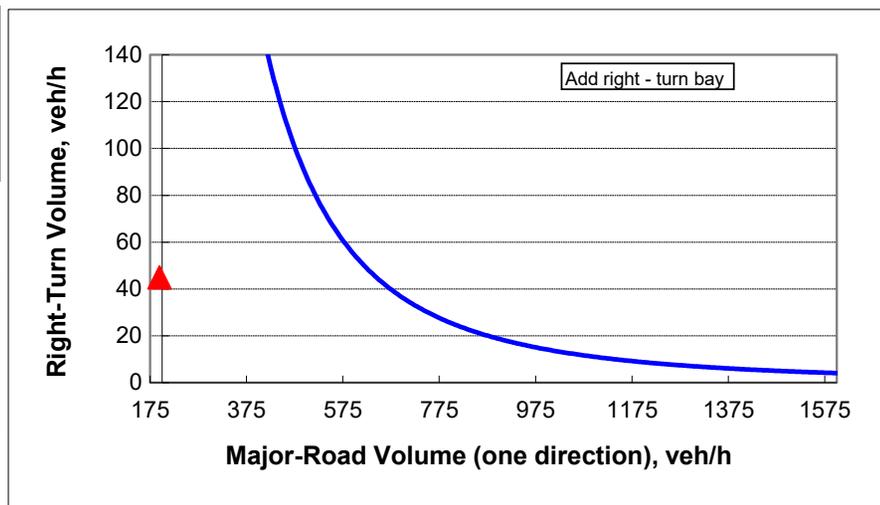
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	195
Right-turn volume, veh/h:	45

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	1057
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Amberly Road / Private Drive

Approach: Southbound

Peak Period: PM Peak Hour

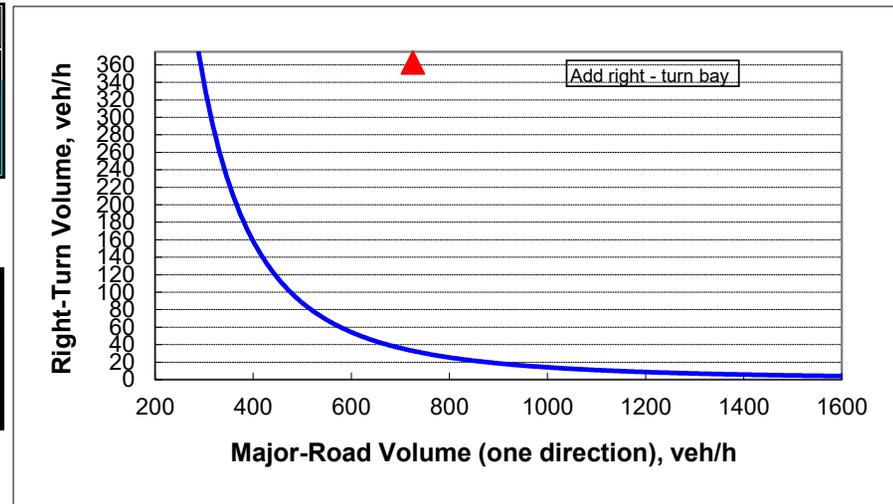
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	726
Right-turn volume, veh/h:	363

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	33
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Amberly Road / Private Drive

Approach: Southbound

Peak Period: AM Peak Hour

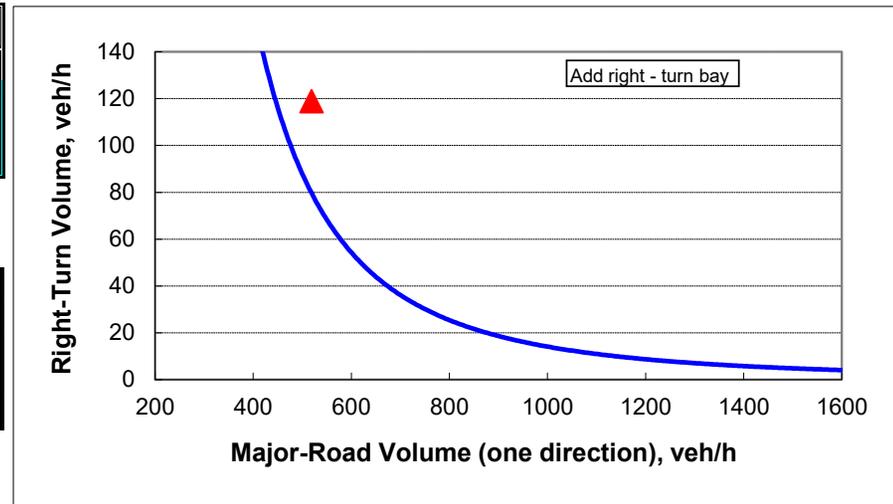
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	40
Major-road volume (one direction), veh/h:	519
Right-turn volume, veh/h:	119

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	80
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Amberly Road / Private Drive

Approach: Southbound

Peak Period: PM Peak Hour

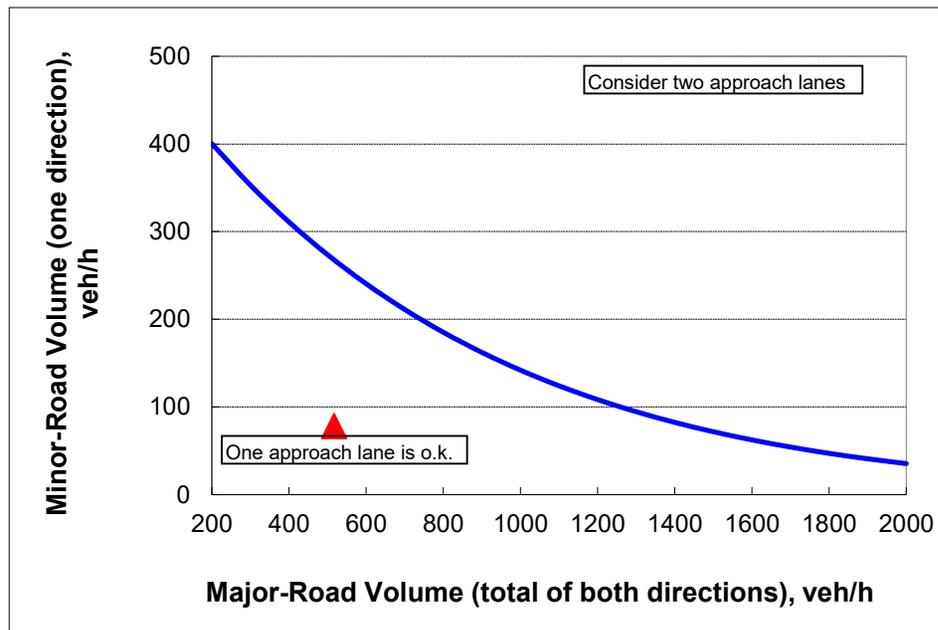
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	517
Percentage of right-turns on minor road, %:	5%
Minor-road volume (one direction), veh/h:	78

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	268
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Eastbound

Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	439
Percentage of right-turns on minor road, %:	27%
Minor-road volume (one direction), veh/h:	162

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	334
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Eastbound
Peak Period: PM Peak Hour

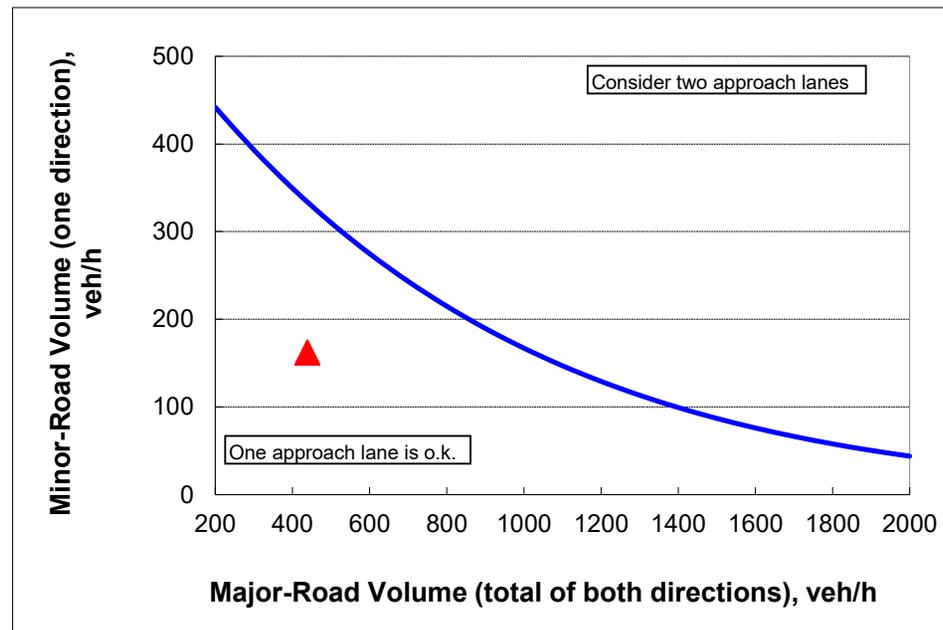


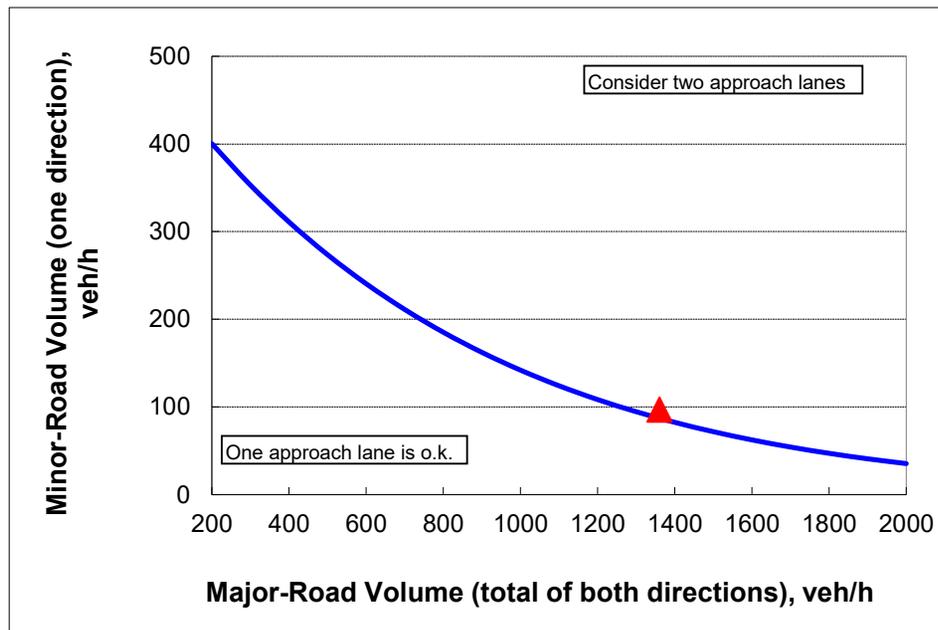
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1361
Percentage of right-turns on minor road, %:	5%
Minor-road volume (one direction), veh/h:	97

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	87
Guidance for determining minor-road approach geometry:	
Consider TWO approach lanes	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Eastbound
Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1155
Percentage of right-turns on minor road, %:	26%
Minor-road volume (one direction), veh/h:	212

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	136
Guidance for determining minor-road approach geometry:	
Consider TWO approach lanes	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Eastbound
Peak Period: PM Peak Hour

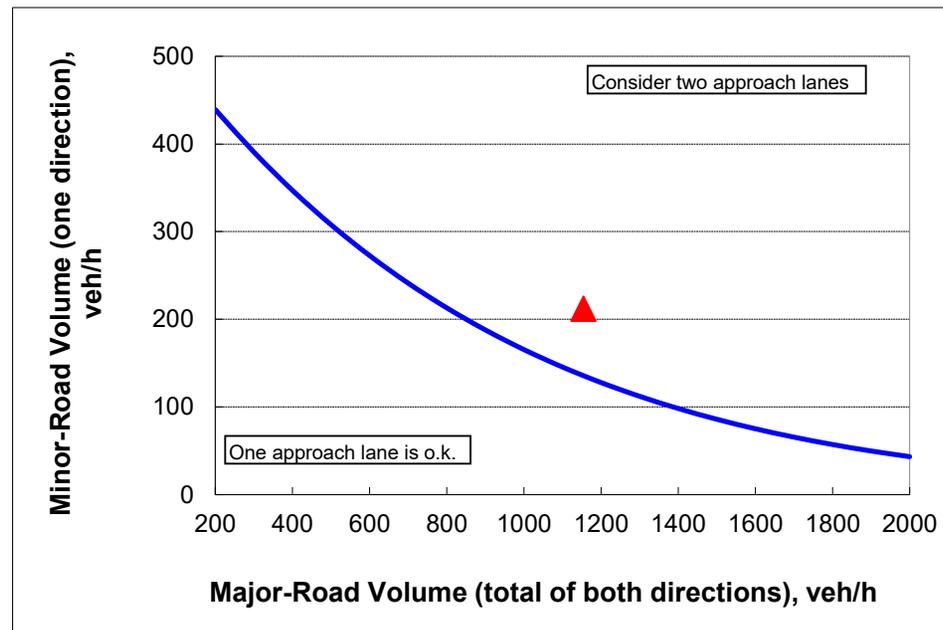


Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

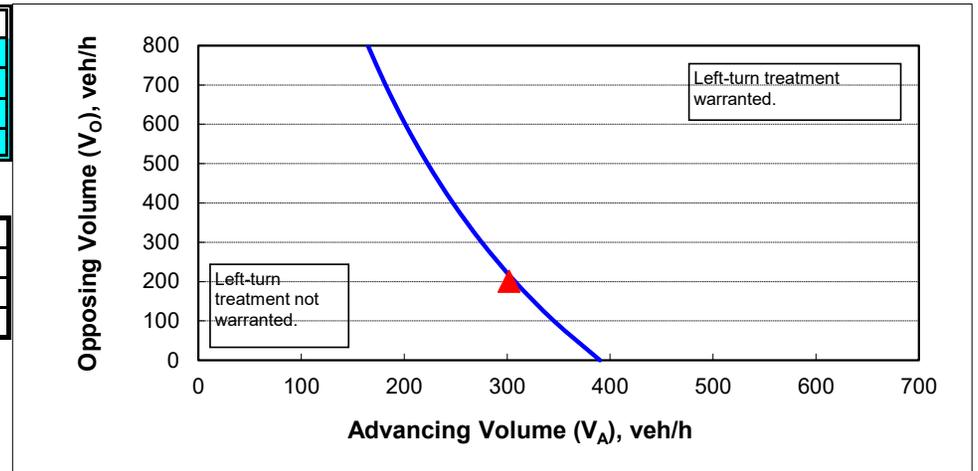
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	15%
Advancing volume (V_A), veh/h:	302
Opposing volume (V_O), veh/h:	201

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	307
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Rd

Approach: Northbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

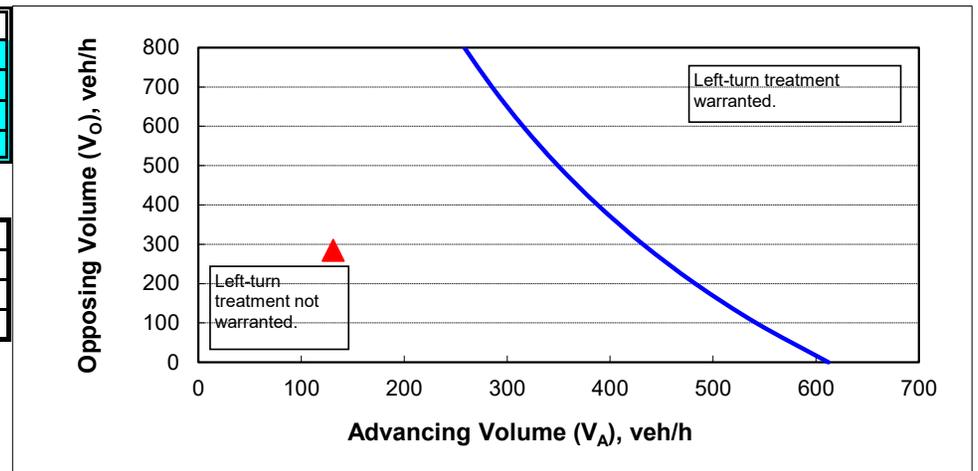
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	5%
Advancing volume (V_A), veh/h:	131
Opposing volume (V_O), veh/h:	285

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	439
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Rd

Approach: Northbound

Peak Period: PM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

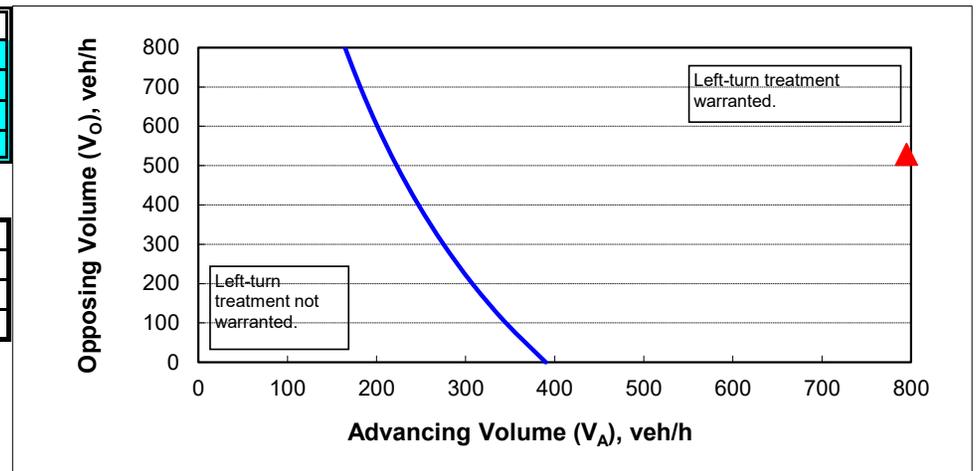
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	15%
Advancing volume (V_A), veh/h:	795
Opposing volume (V_O), veh/h:	529

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	216
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Rd

Approach: Northbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

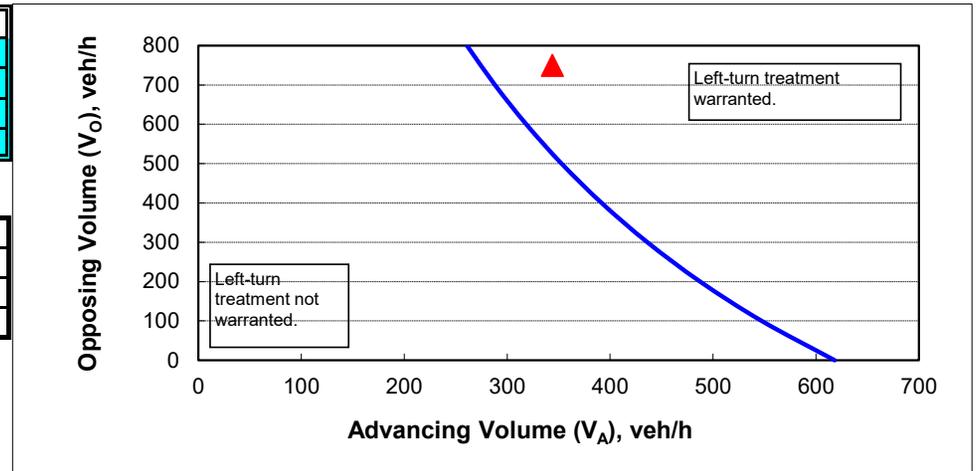
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	5%
Advancing volume (V_A), veh/h:	344
Opposing volume (V_O), veh/h:	750

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	274
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Rd

Approach: Northbound

Peak Period: PM Peak Hour

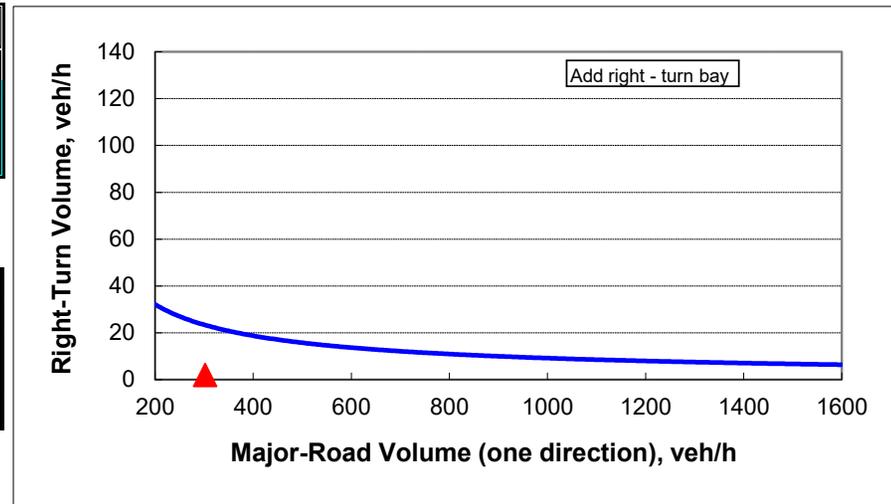
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	302
Right-turn volume, veh/h:	2

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	23
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Northbound

Peak Period: AM Peak Hour

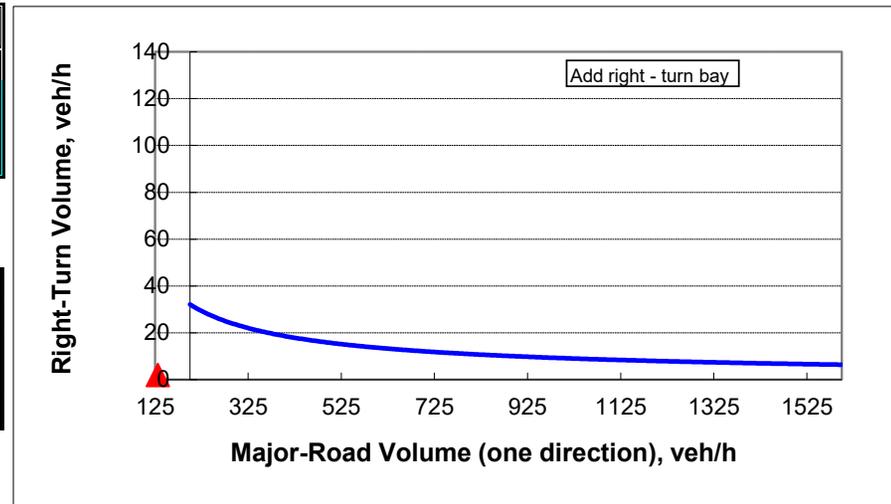
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	131
Right-turn volume, veh/h:	2

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	45
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Northbound

Peak Period: PM Peak Hour

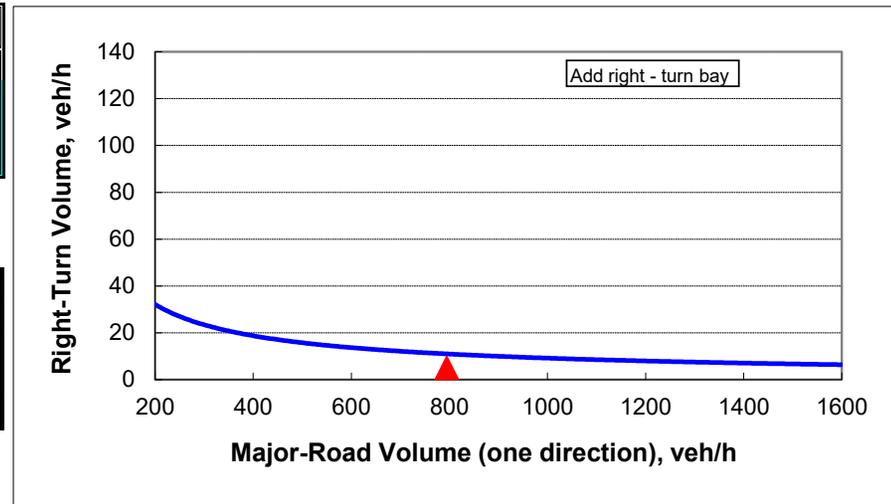
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	795
Right-turn volume, veh/h:	5

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	11
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Northbound

Peak Period: AM Peak Hour

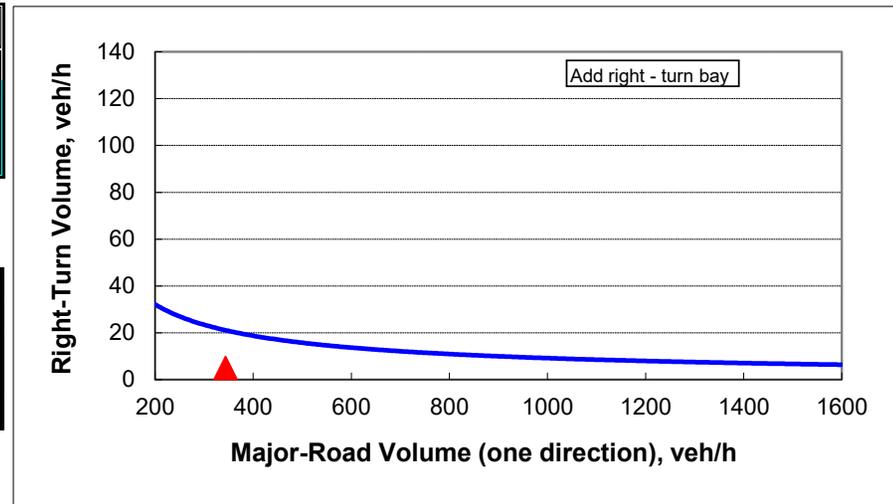
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	344
Right-turn volume, veh/h:	5

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	21
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Northbound

Peak Period: PM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

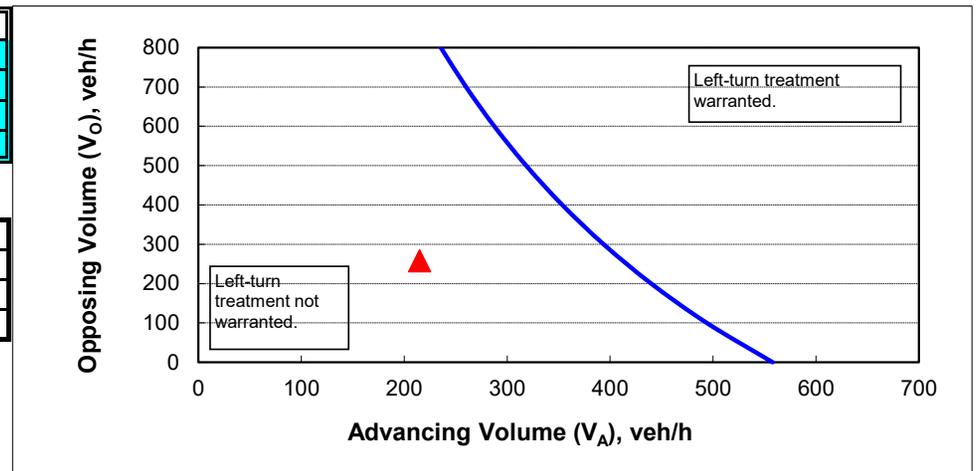
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	7%
Advancing volume (V_A), veh/h:	215
Opposing volume (V_O), veh/h:	258

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	412
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Rd

Approach: Southbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

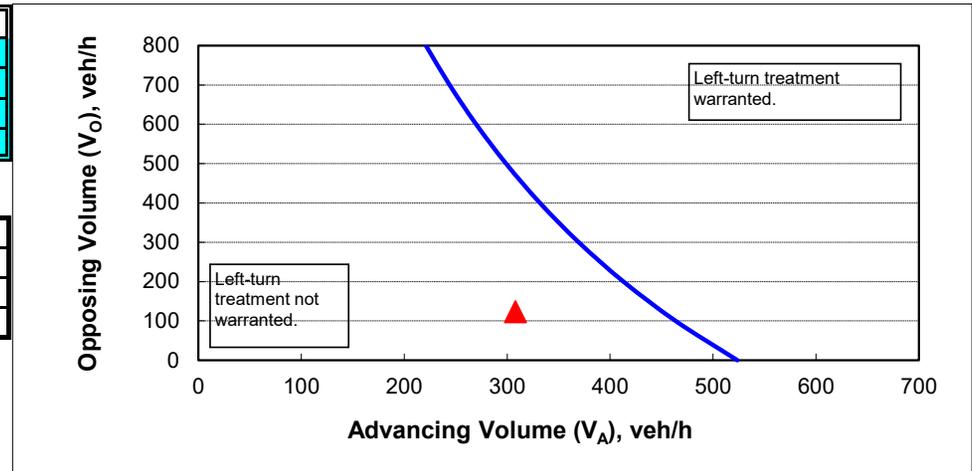
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	7%
Advancing volume (V_A), veh/h:	308
Opposing volume (V_O), veh/h:	124

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	451
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Old Cheney Rd
Approach: Southbound
Peak Period: PM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

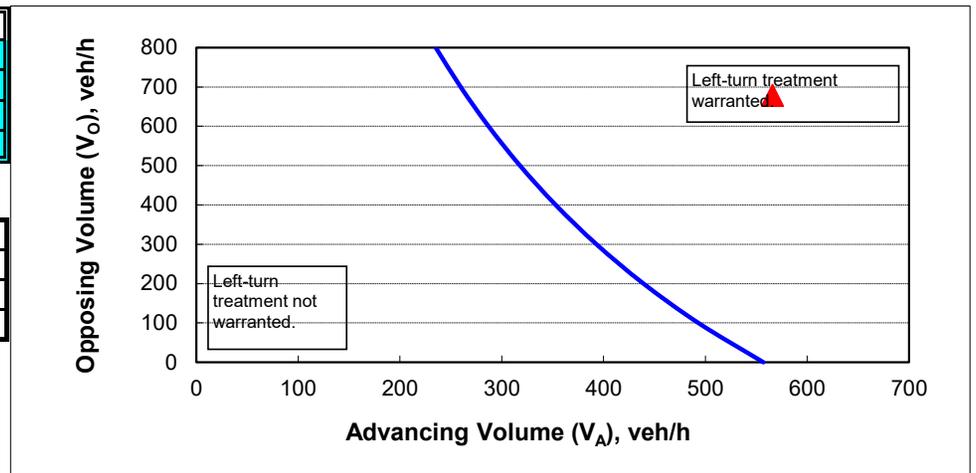
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	7%
Advancing volume (V_A), veh/h:	566
Opposing volume (V_O), veh/h:	679

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	265
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Rd

Approach: Southbound

Peak Period: AM Peak Hour

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

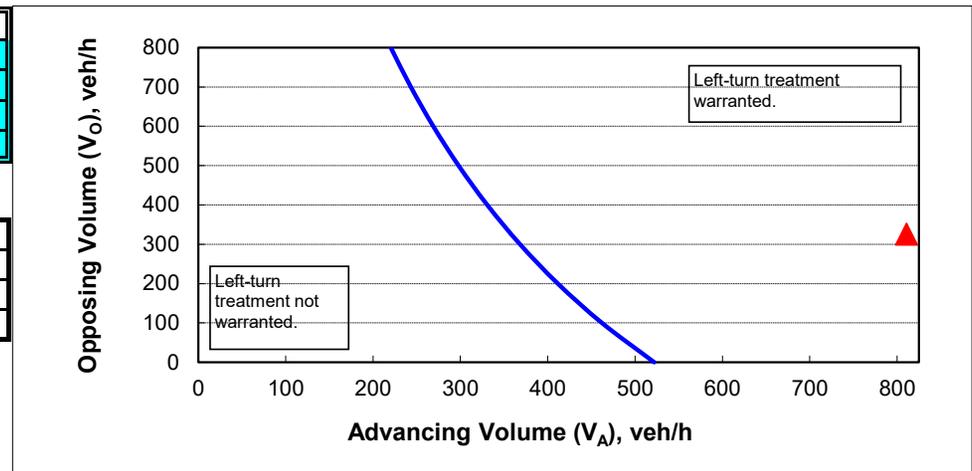
2-lane roadway (English)

INPUT

Variable	Value
85 th percentile speed, mph:	55
Percent of left-turns in advancing volume (V_A), %:	8%
Advancing volume (V_A), veh/h:	811
Opposing volume (V_O), veh/h:	326

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	358
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Rd

Approach: Southbound

Peak Period: PM Peak Hour

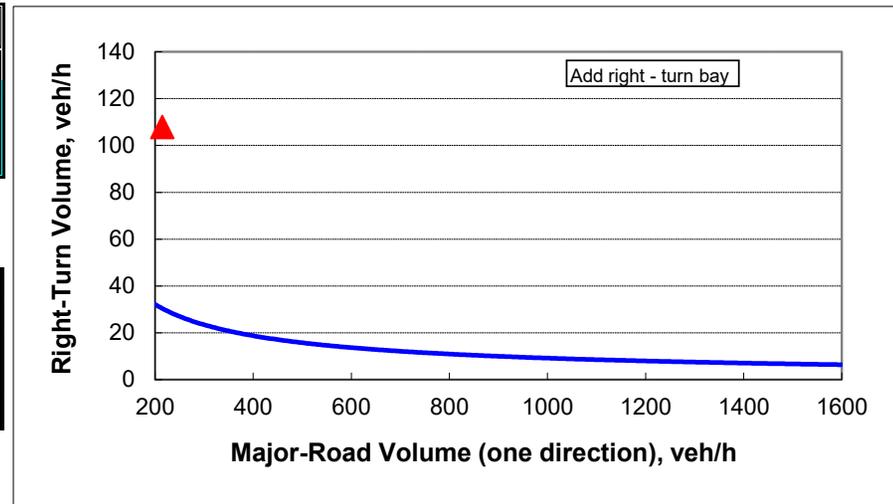
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	215
Right-turn volume, veh/h:	108

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	30
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Southbound

Peak Period: AM Peak Hour

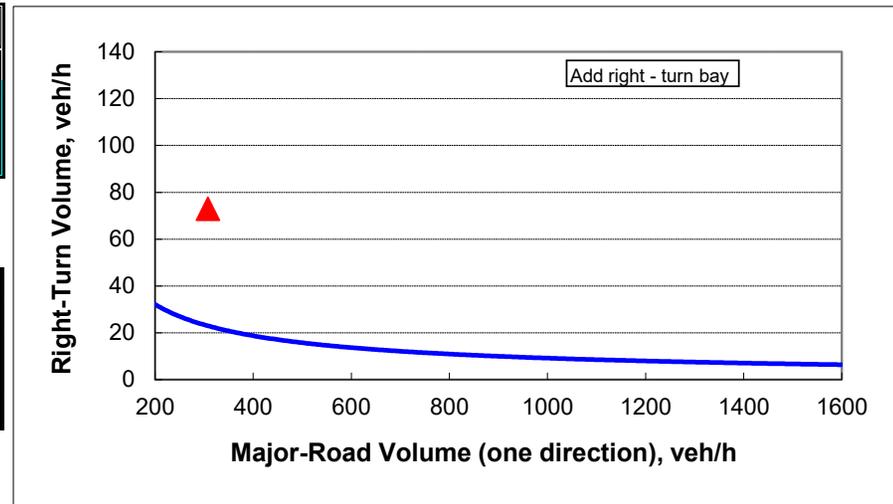
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	308
Right-turn volume, veh/h:	73

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	23
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Southbound

Peak Period: PM Peak Hour

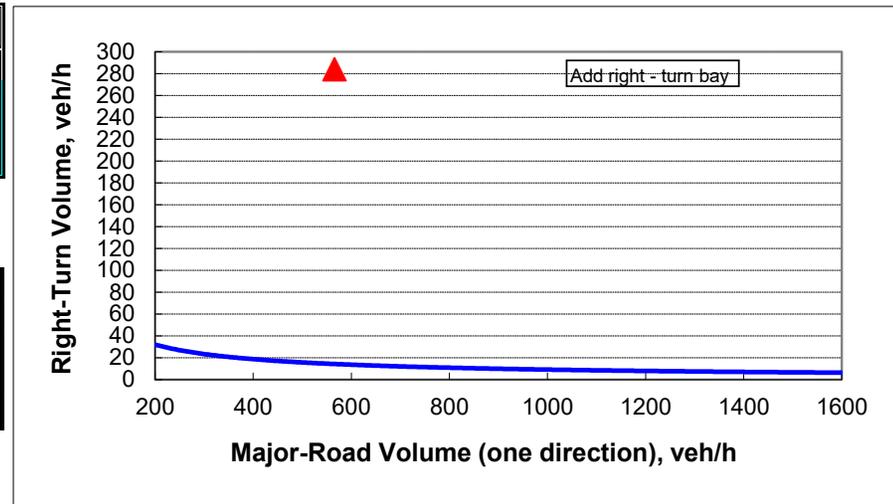
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	566
Right-turn volume, veh/h:	284

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	14
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Southbound

Peak Period: AM Peak Hour

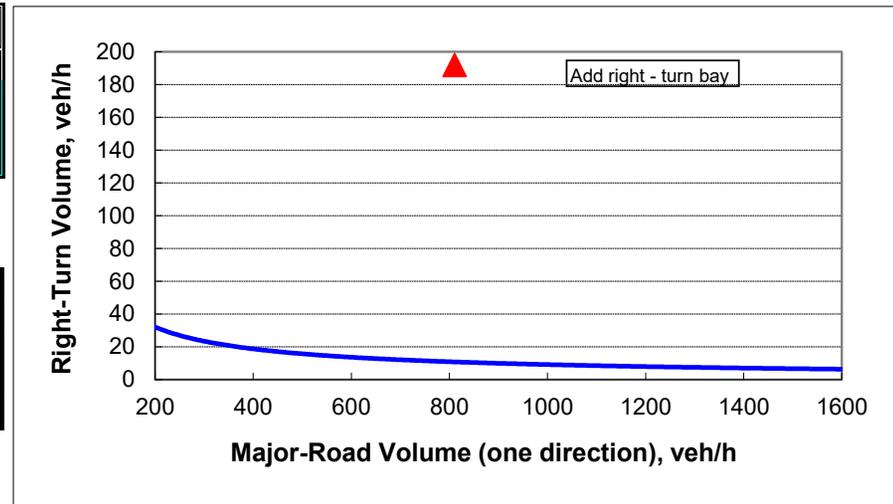
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	811
Right-turn volume, veh/h:	192

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	11
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Add right-turn bay.	



Analyst: Felsburg Holt & Ullevig

Scenario: 2040 Future

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Southbound

Peak Period: PM Peak Hour

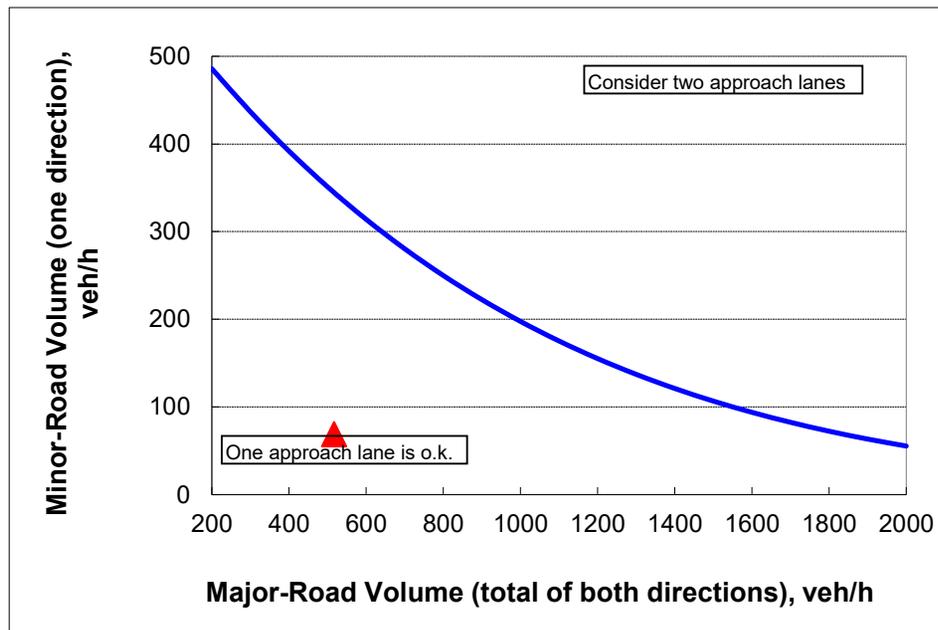
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	517
Percentage of right-turns on minor road, %:	46%
Minor-road volume (one direction), veh/h:	69

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	345
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig

Scenario: 2018 Existing

Major Roadway: 148th Street

Minor Roadway: Old Cheney Road

Approach: Westbound

Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	439
Percentage of right-turns on minor road, %:	30%
Minor-road volume (one direction), veh/h:	44

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	338
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2018 Existing
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Westbound
Peak Period: PM Peak Hour

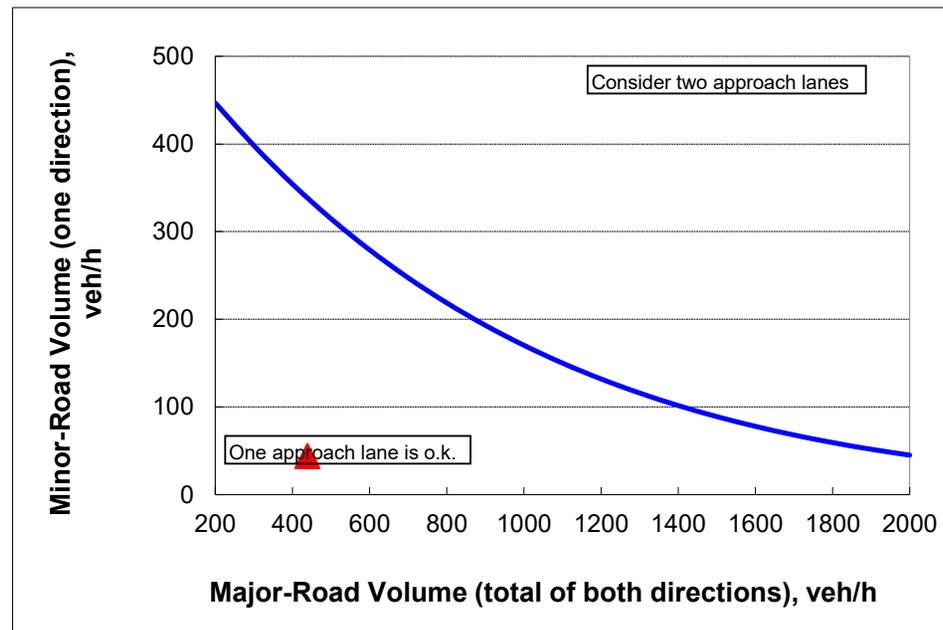


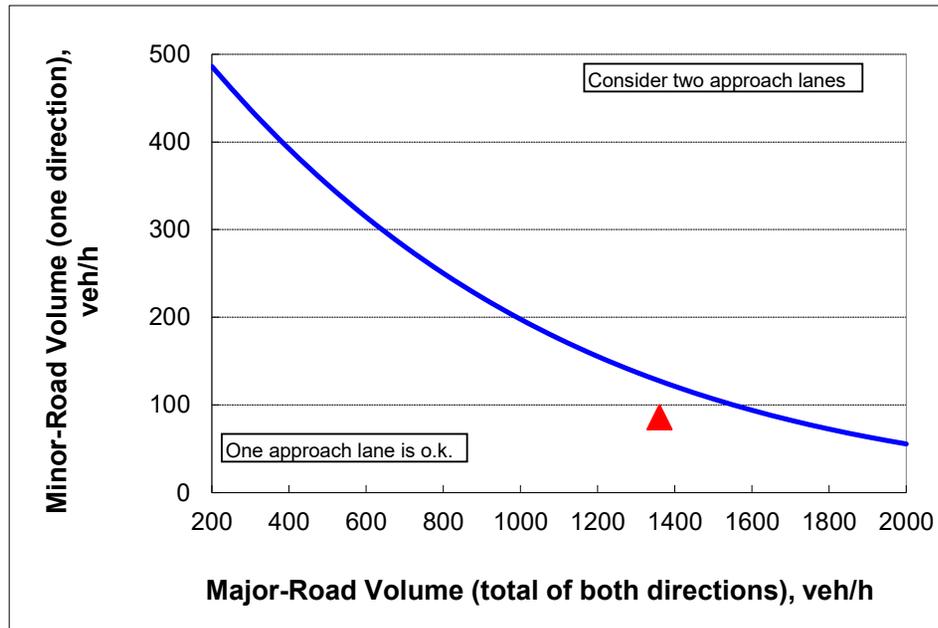
Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1361
Percentage of right-turns on minor road, %:	47%
Minor-road volume (one direction), veh/h:	86

OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	127
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	



CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Westbound
Peak Period: AM Peak Hour

Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

INPUT

Variable	Value
Major-road volume (total of both directions), veh/h:	1156
Percentage of right-turns on minor road, %:	29%
Minor-road volume (one direction), veh/h:	55

OUTPUT

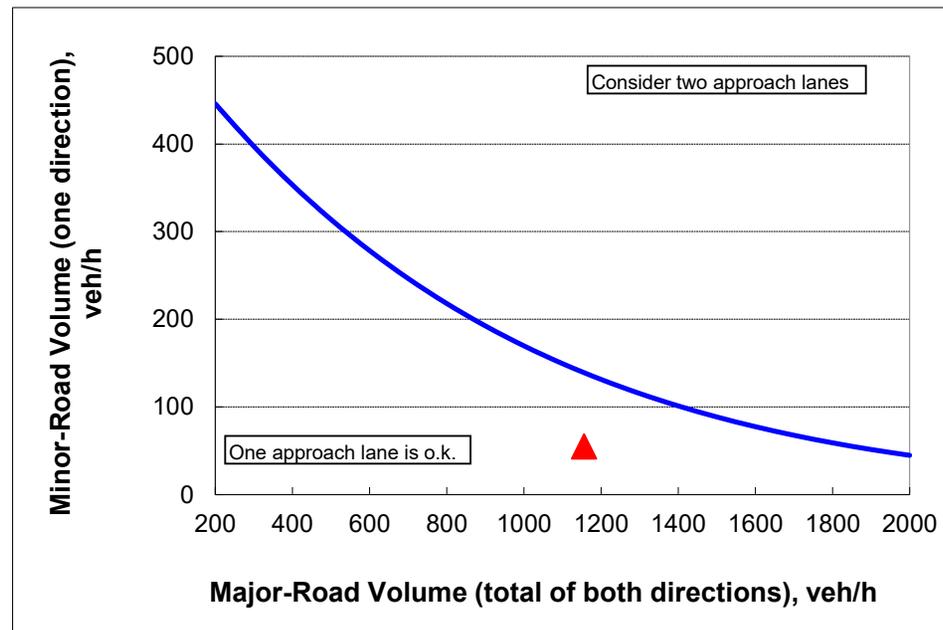
Variable	Value
Limiting minor-road volume (one direction), veh/h:	139
Guidance for determining minor-road approach geometry:	
ONE approach lane is o.k.	

CALIBRATION CONSTANTS

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

* according to Table 17 - 5 of the HCM

Analyst: Felsburg Holt & Ullevig
Scenario: 2040 Future
Major Roadway: 148th Street
Minor Roadway: Old Cheney Road
Approach: Westbound
Peak Period: PM Peak Hour



CRASH HISTORY

ACCIDENT QUERY LIST
 District 1
 Lancaster County
 Intsx. of US-34 ('O' St.), RP 334+49 & 148th St.
 Lancaster County Safety Studies
 Non-fatal Accidents: 1-1-2013 thru 2-28-2018
 Fatal Accidents: 1-1-2013 thru 2-28-2018

ACCIDENTS LISTED IN DATE ORDER

NDOR Accident Key	Accident Date	Week day	Mil. Time	Ref. Post Num	Accident Location Description	Acc Sev	Num. Injured	Num. Fatal	Weather	Light Cond	Multi Vehicle Accident Type	First Harmful Event	Road Surf Cond	Alco Rel?
<u>Intsx. of 148th St. & Old Cheney Rd.</u>														
216040272	9/27/2016	TUE	2025		S 148TH ST & OLD CHENEY RD-E OF LINCOLN	INJ-A	3	0	Clear	Dark	LT Leavng	MV transprt	Dry	N
217021214	5/27/2017	SAT	1652		S 148TH ST & OLD CHENEY RD-E OF LINCOLN	INJ-B	2	0	Clear	Light	Angle	MV transprt	Dry	N
217045564	11/1/2017	WED	0743		OLD CHENEY RD AT S 148TH ST-E OF LINCOLN	INJ-C	1	0	Cloudy	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
3							6	0						
<u>148th St. between Old Cheney Rd. & Pioneers Blvd. - excluding intsx</u>														
215046244	11/9/2015	MON	2332		S 148TH ST S OF PIONEERS BLVD-E OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
216036194	8/27/2016	SAT	1422		S 148TH ST N OF OLD CHENEY RD-E OF LINCOLN	PDO	0	0	Clear	Light	N/A	Tree	Dry	N
216042513	10/13/2016	THU	0630		S 148TH ST N OF OLD CHENEY RD-E OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
216042512	10/13/2016	THU	0637		S 148TH ST N OF OLD CHENEY RD-E OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
216046779	10/27/2016	THU	0630		S 148TH ST S OF PIONEERS BLVD-E OF LINCOLN	PDO	0	0	Cloudy	Dark	N/A	Animal	Dry	N
216049511	11/23/2016	WED	1730		S 148TH ST S OF PIONEERS BLVD-E OF LINCOLN	PDO	0	0	Cloudy	Dark	SS (opp.)	MV transprt	Dry	N
=====							===	===						
6							0	0						
<u>Intsx. of 148th St. & Pioneers Blvd.</u>														
217048364	11/18/2017	SAT	2499		PIONEERS BLVD AT S 148TH ST-E OF LINCOLN	N-R	0	0	Clear	Light	N/A	Sign post	Dry	N
=====							===	===						
1							0	0						
<u>148th St. between Pioneers Blvd. & Van Dorn St. - excluding intsx</u>														
213006785	3/6/2013	WED	2000		S 148TH ST N OF PIONEERS BLVD-E OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
214015338	4/20/2014	SUN	1735		S 148TH ST S OF VAN DORN ST-E OF LINCOLN	INJ-C	1	0	Rain	Light	N/A	Tree	Wet	N
214024598	6/24/2014	TUE	0515		S 148TH ST S OF VAN DORN ST-E OF LINCOLN	INJ-A	1	0	Clear	Dark	N/A	Tree	Dry	N
214045537	11/15/2014	SAT	1600		S 148TH ST N OF PIONEERS BLVD-E OF LINCOLN	PDO	0	0	Snow	Light	N/A	Tree	Sno	N
217002895	1/18/2017	WED	0840		S 148TH ST N OF PIONEERS BLVD-E OF LINCOLN	INJ-C	1	0	Clear	Light	SS (same)	MV transprt	Dry	N
217003973	1/25/2017	WED	0746		S 148TH ST S OF VAN DORN ST-E OF LINCOLN	PDO	0	0	Blowing sand	Light	Rear-end	MV transprt	Ice	N
217036836	9/5/2017	TUE	0700		S 148TH ST S OF VAN DORN ST-E OF LINCOLN	INJ-C	1	0	Clear	Light	N/A	Fire/Explsn	Dry	N
218004615	1/26/2018	FRI	2499		S 148TH ST S OF VAN DORN ST-E OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Overturn	Dry	Y
=====							===	===						
8							4	0						

ACCIDENT QUERY LIST
District 1
Lancaster County
Intsx. of US-34 ('O' St.), RP 334+49 & 148th St.
Lancaster County Safety Studies
Non-fatal Accidents: 1-1-2013 thru 2-28-2018
Fatal Accidents: 1-1-2013 thru 2-28-2018

ACCIDENTS LISTED IN DATE ORDER

NDOR Accident Key	Accident Date	Week day	Mil. Time	Ref. Post Num	Accident Location Description	Acc Sev	Num. Injured	Num. Fatal	Weather	Light Cond	Multi Vehicle Accident Type	First Harmful Event	Road Surf Cond	Alco Rel?
<u>Intsx. of 148th St. & Van Dorn St.</u>														
214025680	6/28/2014	SAT	1820		S 148TH ST & VAN DORN ST-E OF LINCOLN	INJ-A	6	0	Clear	Light	Angle	MV transprt	Dry	N
215006499	1/31/2015	SAT	0855		S 148TH ST & VAN DORN ST-E OF LINCOLN	PDO	0	0	Clear	Light	SS (same)	MV transprt	Wet	N
=====							===	===						
2							6	0						
<u>148th St. between Van Dorn St. & 'A' St. - excluding intsx</u>														
213005443	2/16/2013	SAT	0845		S 148TH ST NR VAN DORN ST-E OF LINCOLN	PDO	0	0	Clear	Light	N/A	Animal	Wet	N
213049520	12/28/2013	SAT	0630		S 148TH ST N OF VAN DORN ST-E OF LINCOLN	INJ-C	1	0	Clear	Dawn	N/A	Tree	Dry	N
217032727	8/13/2017	SUN	2040		S 148TH ST N OF VAN DORN ST-E OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
217045887	11/2/2017	THU	2035		S 148TH ST N OF VAN DORN ST-E OF LINCOLN	N-R	0	0	Clear	Dark	N/A	Animal	Dry	N
217049143	11/20/2017	MON	1207		S 148TH ST N OF VAN DORN ST-E OF LINCOLN	INJ-C	2	0	Clear	Light	Angle	MV transprt	Dry	N
216029950	7/11/2016	MON	1650		S 148TH ST S OF "A" ST-E OF LINCOLN	PDO	0	0	Clear	Light	SS (opp.)	MV transprt	Dry	N
=====							===	===						
6							3	0						
<u>Intsx. of 148th St. & 'A' St.</u>														
During the above stated time period, there were no accidents referenced to this location.														
<u>148th St. between 'A' St. & US-34 ('O' St.) - excluding intsx</u>														
213000462	1/22/2013	TUE	1725		S 148TH ST S OF US34-E OF LINCOLN	INJ-C	1	0	Clear	Dusk	Angle	MV transprt	Dry	N
=====							===	===						
1							1	0						
<u>Intsx. of 148th St. & US-34 ('O' St.)</u>														
213007105	3/8/2013	FRI	0844	334.490	US34 & 148TH ST-E OF LINCOLN	INJ-B	2	0	Clear	Light	LT Leavng	MV transprt	Dry	N
213009369	3/25/2013	MON	0905	334.490	US34 & 148TH ST-E OF LINCOLN	INJ-B	2	0	Cloudy	Light	Angle	MV transprt	Wet	N
215012144	3/24/2015	TUE	1330	334.490	US34 & 148TH ST-E OF LINCOLN	PDO	0	0	Rain	Light	Angle	MV transprt	Wet	N
215024343	6/18/2015	THU	1903	334.490	US34 AT 148TH ST-E OF LINCOLN	INJ-C	1	0	Clear	Other	Rear-end	MV transprt	Dry	N
215051895	12/10/2015	THU	1757	334.490	US34 & 148TH ST-E OF LINCOLN	INJ-B	2	0	Clear	Dark	LT Leavng	MV transprt	Dry	N
216040688	9/23/2016	FRI	1710	334.490	US34 & 148TH ST-E OF LINCOLN	PDO	0	0	Clear	Light	LT Leavng	MV transprt	Dry	N
217001255	1/4/2017	WED	2030	334.490	US34 & 148TH ST-E OF LINCOLN	INJ-B	3	0	Snow	Dark	Angle	MV transprt	Sno	N
217013870	4/3/2017	MON	1152	334.490	US34 & 148TH ST-E OF LINCOLN	INJ-C	1	0	Clear	Light	Angle	MV transprt	Dry	N
217028084	7/8/2017	SAT	1025	334.490	US34 & 148TH ST-E OF LINCOLN	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
218005042	1/30/2018	TUE	1130	334.490	US34 & 148TH ST-E OF LINCOLN	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N

ACCIDENT QUERY LIST
 District 1
 Lancaster County
 Intsx. of US-34 ('O' St.), RP 334+49 & 148th St.
 Lancaster County Safety Studies
 Non-fatal Accidents: 1-1-2013 thru 2-28-2018
 Fatal Accidents: 1-1-2013 thru 2-28-2018

ACCIDENTS LISTED IN DATE ORDER

NDOR Accident Key	Accident Date	Week day	Mil. Time	Ref. Post Num	Accident Location Description	Acc Sev	Num. Injured	Num. Fatal	Weather	Light Cond	Multi Vehicle Accident Type	First Harmful Event	Road Surf Cond	Alco Rel?
<u>Intsx. of 148th St. & US-34 ('O' St.) - cont.</u>														
218007745	2/8/2018	THU	0830	334.490	US34 & 148TH ST-E OF LINCOLN	PDO	0	0	Clear	Light	SS (same)	MV transprt	Dry	N
218007636	2/10/2018	SAT	1700	334.490	US34 & 148TH ST-E OF LINCOLN	INJ-B	1	0	Cloudy	Light	LT Leavng	MV transprt	Sno	N
=====							===	===						
12							12	0						
<u>148th St. between US-34 ('O' St.) & Plum Ridge Rd. - excluding intsx</u>														
212057725	1/3/2013	THU	2140		N 148TH ST S OF PLUM RIDGE RD-E OF LINCOLN	N-R	0	0	Clear	Dark	N/A	Mail box	Dry	N
216028059	7/7/2016	THU	1142		N 148TH ST N OF US34-E OF LINCOLN	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
2							1	0						
<u>Intsx. of 148th St. & Plum Ridge Rd.</u>														
During the above stated time period, there were no accidents referenced to this location.														
<u>148th St. between Plum Ridge Rd. & Holdrege St. - excluding intsx</u>														
216029263	7/11/2016	MON	0809		N 148TH ST N OF PLUM RIDGE RD-E OF LINCOLN	INJ-A	1	0	Clear	Light	N/A	Overturn	Dry	N
213037299	10/7/2013	MON	0705		N 148TH ST S OF HOLDREGE ST-E OF LINCOLN	N-R	0	0	Clear	Dawn	N/A	Animal	Dry	N
216023388	6/6/2016	MON	0647		N 148TH ST S OF HOLDREGE ST-E OF LINCOLN	INJ-C	1	0	Clear	Light	N/A	Utility pol	Dry	N
217054423	12/26/2017	TUE	0700		N 148TH ST S OF HOLDREGE ST-E OF LINCOLN	INJ-B	1	0	Cloudy	Dark	N/A	Tree	Wet	N
=====							===	===						
4							3	0						
<u>Intsx. of 148th St. & Holdrege St.</u>														
212058546	1/9/2013	WED	0740		N 148TH ST & HOLDREGE ST-E OF LINCOLN	INJ-B	2	0	Clear	Dawn	Angle	MV transprt	Dry	N
212058547	1/9/2013	WED	0741		N 148TH ST & HOLDREGE ST-E OF LINCOLN	INJ-B	1	0	Clear	Dawn	Rear-end	MV transprt	Dry	N
214016501	4/27/2014	SUN	1835		N 148TH ST & HOLDREGE ST-E OF LINCOLN	INJ-C	1	0	Clear	Light	N/A	Ditch	Dry	N
214019989	5/15/2014	THU	2220		N 148TH ST & HOLDREGE ST-E OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Fence	Dry	N
215018628	5/8/2015	FRI	1640		N 148TH ST AT HOLDREGE ST-E OF LINCOLN	N-R	0	0	Cloudy	Light	SS (same)	MV transprt	Dry	N
216002387	1/13/2016	WED	1740		HOLDREGE ST AT N 148TH ST-E OF LINCOLN	INJ-C	1	0	Clear	Dark	Rear-end	MV transprt	Dry	N
216013549	4/3/2016	SUN	1553		N 148TH ST & HOLDREGE ST-E OF LINCOLN	INJ-B	3	0	Clear	Light	LT Leavng	MV transprt	Dry	N
216025416	6/17/2016	FRI	1750		N 148TH ST AT HOLDREGE ST-E OF LINCOLN	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
217001243	1/3/2017	TUE	1708		N 148TH ST AT HOLDREGE ST-E OF LINCOLN	PDO	0	0	Clear	Dusk	Rear-end	MV transprt	Dry	N
=====							===	===						
9							8	0						

ACCIDENT QUERY LIST
 District 1
 Lancaster County
 Intsx. of US-34 ('O' St.), RP 334+49 & 148th St.
 Lancaster County Safety Studies
 Non-fatal Accidents: 1-1-2013 thru 2-28-2018
 Fatal Accidents: 1-1-2013 thru 2-28-2018

ACCIDENTS LISTED IN DATE ORDER

NDOR Accident Key	Accident Date	Week day	Mil. Time	Ref. Post Num	Accident Location Description	Acc Sev	Num. Injured	Num. Fatal	Weather	Light Cond	Multi Vehicle Accident Type	First Harmful Event	Road Surf Cond	Alco Rel?
<u>148th St. between Holdrege St. & Adams St. - excluding intsx</u>														
213014394	4/24/2013	WED	1415		N 148TH ST N OF HOLDREGE ST-E OF LINCOLN	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
213045671	12/4/2013	WED	0520		N 148TH ST N OF HOLDREGE ST-E OF LINCOLN	PDO	0	0	Sleet, hail, fr	Dark	N/A	Overturn	Ice	N
214040261	10/11/2014	SAT	2105		N 148TH ST N OF HOLDREGE ST-E OF LINCOLN	PDO	0	0	Clear	Dark	SS (same)	MV transprt	Dry	N
215009344	2/25/2015	WED	2499		N 148TH ST S OF ADAMS ST-E OF LINCOLN	INJ-C	1	0	Clear	Dark	N/A	Ditch	Dry	N
216017285	4/27/2016	WED	1117		N 148TH ST N OF HOLDREGE ST-E OF LINCOLN	INJ-A	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
217011824	3/24/2017	FRI	1416		N 148TH ST N OF HOLDREGE ST-E OF LINCOLN	INJ-C	1	0	Cloudy	Light	N/A	Overturn	Dry	N
=====							===	===						
6							4	0						
<u>Intsx. of 148th St. & Adams St.</u>														
213038301	10/8/2013	TUE	1800		N 148TH ST & ADAMS ST-E OF LINCOLN	PDO	0	0	Clear	Light	N/A	Fence	Dry	N
216014303	4/8/2016	FRI	1900		N 148TH ST AT ADAMS ST-E OF LINCOLN	INJ-C	2	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
2							2	0						
<u>148th St. between Adams St. & Havelock Ave. - excluding intsx</u>														
215025047	6/20/2015	SAT	1222		N 148TH ST N OF ADAMS ST-E OF LINCOLN	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
216054892	12/24/2016	SAT	0002		N 148TH ST S OF HAVELOCK AVE-E OF LINCOLN	N-R	0	0	Unknown	Dark	N/A	Utility pol	Unk	N
217008200	2/25/2017	SAT	0115		N 148TH ST N OF ADAMS ST-S OF WAVERLY	PDO	0	0	Clear	Dark	N/A	Utility pol	Ice	N
=====							===	===						
3							0	0						
<u>Intsx. of 148th St. & Havelock Ave.</u>														
213035012	9/19/2013	THU	1757		N 148TH ST & HAVELOCK AVE-E OF LINCOLN	INJ-C	2	0	Clear	Light	Rear-end	MV transprt	Dry	N
216003918	1/25/2016	MON	0918		N 148TH ST & HAVELOCK AVE-E OF LINCOLN	INJ-B	1	0	Sleet, hail, fr	Light	N/A	Overturn	Ice	N
216049181	11/22/2016	TUE	1850		N 148TH ST & HAVELOCK AVE-E OF LINCOLN	INJ-B	3	0	Rain	Dark	Rear-end	MV transprt	Wet	N
=====							===	===						
3							6	0						
<u>148th St. between Havelock Ave. & Garland Ave. - excluding intsx</u>														
215013002	4/2/2015	THU	1025		N 148TH ST N OF HAVELOCK AVE-E OF LINCOLN	INJ-C	1	0	Clear	Light	N/A	Sign post	Dry	N
218010692	2/26/2018	MON	1515		N 148TH ST N OF HAVELOCK AVE-E OF LINCOLN	PDO	0	0	Clear	Light	SS (opp.)	MV transprt	Dry	N
=====							===	===						
2							1	0						

ACCIDENT QUERY LIST
 District 1
 Lancaster County
 Intsx. of US-34 ('O' St.), RP 334+49 & 148th St.
 Lancaster County Safety Studies
 Non-fatal Accidents: 1-1-2013 thru 2-28-2018
 Fatal Accidents: 1-1-2013 thru 2-28-2018

ACCIDENTS LISTED IN DATE ORDER

NDOR Accident Key	Accident Date	Week day	Mil. Time	Ref. Post Num	Accident Location Description	Acc Sev	Num. Injured	Num. Fatal	Weather	Light Cond	Multi Vehicle Accident Type	First Harmful Event	Road Surf Cond	Alco Rel?
<u>Intsx. of 148th St. & Garland Ave.</u>														
During the above stated time period, there were no accidents referenced to this location.														
<u>148th St. between Garland Ave. & Wait Ave. - excluding intsx</u>														
During the above stated time period, there were no accidents referenced to this location.														
<u>Intsx. of 148th St. & Wait Ave.</u>														
During the above stated time period, there were no accidents referenced to this location.														
<u>148th St. between Wait Ave. & Chicago Ave. - excluding intsx</u>														
During the above stated time period, there were no accidents referenced to this location.														
<u>Intsx. of 148th St. & Chicago Ave.</u>														
During the above stated time period, there were no accidents referenced to this location.														
<u>148th St. between Chicago Ave. & Fletcher Ave. - excluding intsx</u>														
217008068	2/23/2017	THU	2053		N 148TH ST N OF CHICAGO AVE-E OF LINCOLN	PDO	0	0	Snow	Dark	N/A	Tree	Sno	N
217049703	11/22/2017	WED	0210		N 148TH ST N OF CHICAGO AVE-E OF LINCOLN	INJ-C	1	0	Clear	Dark	N/A	Overturn	Dry	N
=====							===	===						
2							1	0						
<u>Intsx. of 148th St. & Fletcher Ave.</u>														
215002270	1/15/2015	THU	1545		N 148TH ST & FLETCHER AVE-SE OF WAVERLY	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
1							1	0						
<u>148th St. between Fletcher Ave. & Alvo Rd. - excluding intsx</u>														
213024106	7/2/2013	TUE	1458		N 148TH ST S OF ALVO RD-S OF WAVERLY	INJ-A	2	0	Clear	Light	SS (opp.)	MV transprt	Dry	N
214053209	12/27/2014	SAT	0907		N 148TH ST S OF ALVO RD-SE OF WAVERLY	INJ-B	1	0	Snow	Light	N/A	Overturn	Sls	N
216015986	4/16/2016	SAT	2050		N 148TH ST S OF ALVO RD-SE OF WAVERLY	N-R	0	0	Clear	Dark	Rear-end	MV transprt	Dry	N
216020690	5/21/2016	SAT	1950		N 148TH ST S OF ALVO RD-SE OF WAVERLY	INJ-C	1	0	Clear	Light	Backing	MV transprt	Dry	N
217037982	9/15/2017	FRI	1710		N 148TH ST N OF FLETCHER AVE-SE OF WAVERLY	PDO	0	0	Clear	Light	N/A	Animal	Dry	N
=====							===	===						
5							4	0						

ACCIDENT QUERY LIST
 District 1
 Lancaster County
 Intsx. of US-34 ('O' St.), RP 334+49 & 148th St.
 Lancaster County Safety Studies
 Non-fatal Accidents: 1-1-2013 thru 2-28-2018
 Fatal Accidents: 1-1-2013 thru 2-28-2018

ACCIDENTS LISTED IN DATE ORDER

NDOR Accident Key	Accident Date	Week day	Mil. Time	Ref. Post Num	Accident Location Description	Acc Sev	Num. Injured	Num. Fatal	Weather	Light Cond	Multi Vehicle Accident Type	First Harmful Event	Road Surf Cond	Alco Rel?
<u>Intsx. of 148th St. & Alvo Rd.</u>														
216044172	10/24/2016	MON	0820		N 148TH ST AT ALVO RD-SE OF WAVERLY	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
1							0	0						
<u>148th St. between Alvo Rd. & McKelvie Rd. - excluding intsx</u>														
215054016	12/24/2015	THU	1130		N 148TH ST N OF ALVO RD-SE OF WAVERLY	PDO	0	0	Snow	Light	N/A	Utility pol	Sno	N
216048274	11/6/2016	SUN	1732		N 148TH ST S OF MCKELVIE RD-SE OF WAVERLY	FATAL	3	2	Clear	Dusk	Head-on	MV transprt	Dry	N
217013871	4/5/2017	WED	0905		N 148TH ST N OF ALVO RD-S OF WAVERLY	PDO	0	0	Cloudy	Light	LT Leavng	MV transprt	Dry	N
=====							===	===						
3							3	2						
<u>Intsx. of 148th St. & McKelvie Rd.</u>														
216019463	5/12/2016	THU	0818		N 148TH ST AT MCKELVIE RD-E OF WAVERLY	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
1							0	0						
<u>148th St. between McKelvie Rd. & I-80 (Waverly S. Corp. Limits)</u>														
216007058	2/13/2016	SAT	0120		N 148TH ST BRDG OVER I80-E OF WAVERLY	PDO	0	0	Clear	Dark	N/A	Bridge rail	Dry	N
=====							===	===						
1							0	0						
<u>148th St. between I-80 & Amberly Rd. - excluding intsx</u>														
217041460	10/7/2017	SAT	0015		N 148TH ST S OF AMBERLY RD	PDO	0	0	Rain	Dark	N/A	Sign post	Wet	Y
=====							===	===						
1							0	0						

Intsx. of 148th St. & Amberly Rd.

During the above stated time period, there were no accidents referenced to this location.

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ACCIDENT RATE ANALYSIS

District 1
Lancaster County
148th St. from Old Cheney Rd. to Amberly Rd.
Lancaster County Safety Studies
Non-fatal Accidents: 1-1-2013 thru 2-28-2018
Fatal Accidents: 1-1-2013 thru 2-28-2018

5 Year, 2 Month Study

During the above stated time period, this section of 148th St. experienced a total of eighty-five accidents. Of these, one was a fatal injury accident resulting in two deaths and injury to three people. Forty-one were non-fatal injury accidents resulting in injury to sixty-six people. Thirty-six were reportable property damage only accidents and seven were non-reportable property damage only accidents.

148th St. from Old Cheney Rd. (Begin 148th St. Study) to I-80 (Waverly S. Corp. Limits)

During the above stated time period, this section of 148th St. experienced a total of eighty-four accidents. Of these, one was a fatal injury accident resulting in two deaths and injury to three people. Forty-one were non-fatal injury accidents resulting in injury to sixty-six people. Thirty-five were reportable property damage only accidents and seven were non-reportable property damage only accidents. The accident rate is 0.787 acc/mvm (accidents/million vehicle miles).

148th St. from I-80 to Amberly Rd. – End 148th St. Study

During the above stated time period, this section of 148th St. experienced one reportable property damage only accident. The accident rate is 0.935 acc/mvm.

Note: During the above stated time period, ten accidents (12%) on 148th St. were animal related.

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Years	2013	2014	2015	2016	2107	2018	Total	%
TOTAL ACCIDENTS	15	8	11	25	21	5	85	100%
Fatal Accident	0	0	0	1	0	0	1	1%
Nonfatal Injury Accident	9	5	5	11	10	1	41	48%
Property Damage (Reportable)	4	3	5	11	9	4	36	42%
Property Damage (Non-Reportable)	2	0	1	2	2	0	7	8%
CASUALTIES								
Killed	0	0	0	2	0	0	2	3%
Injured	14	10	6	21	14	1	66	97%
MULTI-VEHICLE ACCIDENT TYPE								
Angle	3	2	1	0	5	1	12	14%
Left Turn Leaving	1	0	1	3	1	1	7	8%
Rear-end	3	0	3	9	3	0	18	21%
Head-on	0	0	0	1	0	0	1	1%
Sideswipe (Same Direction)	0	0	2	0	1	1	4	5%
Sideswipe (Opposite Direction)	1	0	0	2	0	1	4	5%
Backing	0	0	0	1	0	0	1	1%
Unknown	0	0	0	0	0	0	0	0%
Not Applicable	7	6	4	9	11	1	38	45%
FIRST HARMFUL EVENT								
Overturn	1	1	0	2	2	1	7	8%
Other Non-Collision	0	0	0	0	1	0	1	1%
Pedestrian	0	0	0	0	0	0	0	0%
Pedalcycle	0	0	0	0	0	0	0	0%
Train	0	0	0	0	0	0	0	0%
Animal	3	0	1	3	3	0	10	12%
Motor Vehicle	8	2	7	16	10	4	47	55%
Parked Vehicle	0	0	0	0	0	0	0	0%
Fixed Object	3	5	3	4	5	0	20	24%
Other Object	0	0	0	0	0	0	0	0%
Unknown	0	0	0	0	0	0	0	0%
LIGHT CONDITION								
Daylight	7	5	7	14	12	4	49	58%
Dawn/Dusk	5	0	0	1	1	0	7	8%
Dark (Street Lighting)	1	1	1	1	2	0	6	7%
Dark	2	2	2	9	6	1	22	26%
Unknown	0	0	1	0	0	0	1	1%
ROAD SURFACE CONDITION								
Dry	12	5	8	22	15	4	66	78%
Wet	2	1	2	1	2	0	8	9%
Snowy/Icy	1	1	1	1	4	1	9	11%
Unknown	0	1	0	1	0	0	2	2%
ROAD CHARACTER								
Straight and Level	6	2	6	13	12	1	40	47%
Straight and on Slope	6	6	5	10	8	4	39	46%
Straight and on Hilltop	2	0	0	2	1	0	5	6%
Curved and Level	0	0	0	0	0	0	0	0%
Curved and on Slope	1	0	0	0	0	0	1	1%
Curved and on Hilltop	0	0	0	0	0	0	0	0%
Unknown	0	0	0	0	0	0	0	0%
Contributing Circumstances, Road								
Rut, holes and bumps	0	0	0	0	0	0	0	0%
Work Zone (const/maint/utility)	0	0	0	0	0	0	0	0%
Worn, travel-polished surface	0	0	0	0	0	0	0	0%
Obstruction in roadway	0	0	0	0	0	0	0	0%
Traffic control device inoperative, etc	0	0	0	0	0	0	0	0%
Shoulders (none, low, soft and high)	0	0	0	1	0	0	1	1%
Other	1	2	2	2	2	0	9	11%
Unknown	0	0	0	1	0	0	1	1%
None	14	6	9	21	19	5	74	87%

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SUMMARY:								
Total Accidents:	85							
Fatal Accidents:	1							
Injury Accidents:	41							
Property Damage (Reportable):	36							
Property Damage (Non-Reportable):	7							
Years	2013	2014	2015	2016	2017	2018	Total	%
WEATHER CONDITION								
Rain	0	1	1	1	1	0	4	5%
Sleet/hail/freezing rain	1	0	0	1	0	0	2	2%
Snow	0	2	1	0	2	0	5	6%
Fog	0	0	0	0	0	0	0	0%
High winds	0	0	0	0	0	0	0	0%
Other	0	0	0	0	1	0	1	1%
No adverse conditions	14	5	9	22	17	5	72	85%
Unknown	0	0	0	1	0	0	1	1%
Contributing Circumstances, Drivers								
No improper driving	11	4	8	20	18	6	67	72%
Failed to yield right of way	2	0	0	4	2	1	9	10%
Disregarded traffic signs, etc	0	1	1	0	2	1	5	5%
Exceeded speed limit	0	0	0	0	0	0	0	0%
Too fast for condition	1	2	0	1	1	0	5	5%
Made an improper turn	0	0	1	0	0	0	1	1%
Wrong side or wrong way	0	0	0	1	0	0	1	1%
Followed too closely	4	0	4	1	0	0	9	10%
Failure to keep in lane, ROR	2	0	1	1	2	1	7	8%
Erratic, reckless, etc.	2	0	3	4	2	0	11	12%
Swerving or avoiding	0	1	1	1	1	0	4	4%
Overcorrect/oversteering	0	0	0	2	0	0	2	2%
Visibility obstructed	0	0	0	0	0	0	0	0%
Inattention	0	1	0	4	1	0	6	6%
Mobile phone distraction	0	0	0	0	0	0	0	0%
Distracted - other	1	0	0	1	1	0	3	3%
Fatigued/asleep	0	1	0	1	1	0	3	3%
Operating defective equipment	0	0	0	0	0	0	0	0%
Other improper action	0	0	0	0	0	0	0	0%
Unknown	0	0	0	0	0	0	0	0%
Not Stated	0	0	0	0	0	0	0	0%
Totals	23	10	19	41	0	0	93	143%
ALCOHOL INVOLVEMENT								
Apparent alcohol involvement	0	0	0	0	1	1	2	2%
No alcohol involvement	15	8	11	25	20	4	83	98%
DRIVER'S RESIDENCE								
Within 25 Miles	15	7	12	26	0	0	60	45%
Over 25 Miles	5	3	5	8	0	0	21	16%
Outside Nebraska	1	0	2	0	0	0	3	2%
Unknown	2	0	0	7	31	9	49	37%
DRIVER'S AGE GROUP								
14 & Under	0	0	0	0	0	0	0	0%
15 - 19	4	1	2	14	7	1	29	22%
20 - 24	3	4	2	2	4	0	15	11%
25 - 34	6	1	5	1	6	1	20	15%
35 - 44	4	4	3	9	2	5	27	20%
45 - 54	1	0	3	6	3	0	13	10%
55 - 64	2	0	3	8	5	1	19	14%
65 - 74	1	0	1	0	3	1	6	5%
75 & Up	2	0	0	1	1	0	4	3%
Unknown	0	0	0	0	0	0	0	0%

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COLLISION DIAGRAM

District 1
 Lancaster County
 Intsx. of 148th St. & Holdrege St.
 Lancaster County Safety Studies
 Non-fatal Accidents: 1-1-2013 thru 2-28-2018
 Fatal Accidents: 1-1-2013 thru 2-28-2018

5 Year, 2 Month Study

NOT DRAWN TO SCALE

FTY - Failed to Yield
 IM - Improper Movement
 S&S - Vehicle Started Forward then Stopped

Holdrege St.
 ADT = 1,758
 (2011)

148th St.
 ADT = 5,000
 (2016)

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INJURY ACCIDENT SEVERITY

Inj-A: "Disabling" Injury Accident
 Inj-B: "Visible" Injury Accident
 Inj-C: "Non-Visible" Injury Accident

Lancaster County ADT Counts

ditch

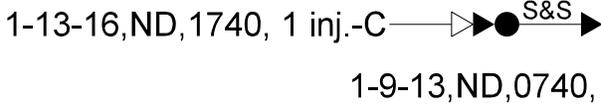
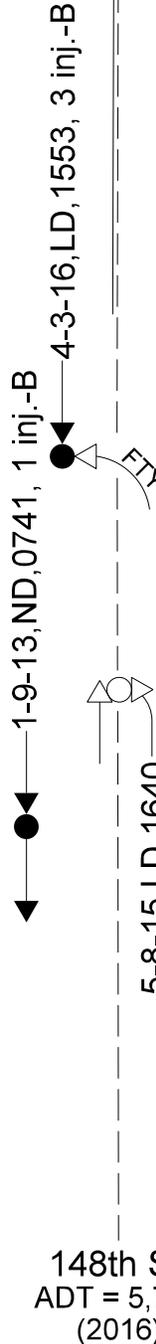


4-27-14, LD, 1835, 1 inj.-C
 NB veh swerved to avoid
 EB veh & went into ditch

Holdrege St.
 ADT = 250
 (2016)

5-15-14, ND, 2220
 EB veh had brake
 failure; hit fence

fence



LEGEND

- ★ Fatal Accident
- Non-Fatal Injury Accident
- Property Damage Only Accident (Reportable)*
- Property Damage Only Accident (Non-Reportable)*
- Driver Residence Less Than 25 Miles
- Driver Residence More Than 25 Miles
- Driver Residence, Unknown
- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- I Icy Road Surface
- S Snowy Road Surface
- * As defined by the law applicable at the time of the accident
- Vehicle Moving Ahead
- ←←←← Vehicle Backing
- Right Angle
- Left Turn
- Passing Turning Vehicle
- Vehicle Over-Turned
- Jackknife

- Head-On
- Out of Control
- Evasive Action
- Sideswipe (Opposite Direction)
- Sideswipe (Same Direction)
- Rear-End
- Multiple Vehicle Rear-End
- Waiting to Turn-Rear-End
- Rear-End Behind Turning Vehicle
- Collision With Animal
- Collision With Other Object
- Collision With Fixed Object
- Collision With Parked Vehicle
- Collision With Stalled Vehicle
- Pedestrian
- Pedalcyclist
- Train
- Stop Sign
- Bouncing Ball Flashing Beacon
- ∞ Traffic Signal

District 1

Lancaster County

148th St. from Old Cheney Rd. to Amberly Rd.

Lancaster County Safety Studies

Non-fatal Accidents: 1-1-2013 thru 2-28-2018

Fatal Accidents: 1-1-2013 thru 2-28-2018

5 Year, 2 Month Study

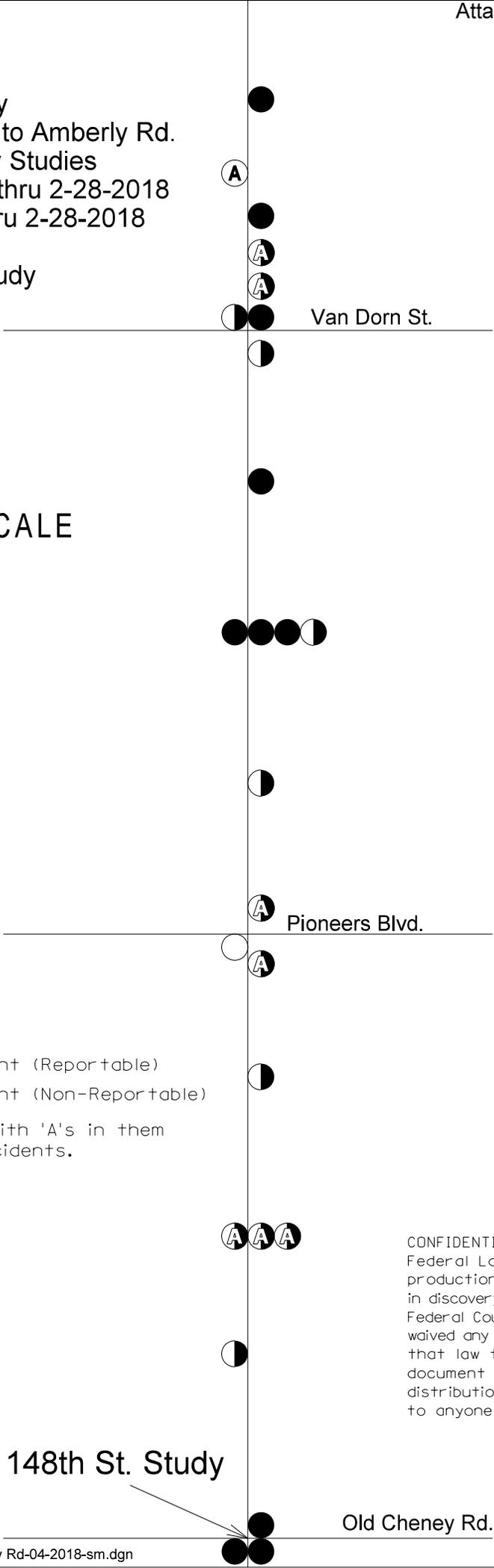


NOT DRAWN TO SCALE

LEGEND

- ★ Fatal Accident
- Non-Fatal Injury Accident
- ◐ Property Damage Only Accident (Reportable)
- Property Damage Only Accident (Non-Reportable)

Accident Spot Map symbols with 'A's in them represent animal related accidents.



Begin 148th St. Study

Old Cheney Rd.

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SPOT MAP

District 1
Lancaster County

148th St. from Old Cheney Rd. to Amberly Rd.

Lancaster County Safety Studies

Non-fatal Accidents: 1-1-2013 thru 2-28-2018

Fatal Accidents: 1-1-2013 thru 2-28-2018

5 Year, 2 Month Study

Holdrege St.

Plum Ridge Rd.

US-34 ('O' St.)

MoPac Trail East

'A' St.



NOT DRAWN TO SCALE

LEGEND

- ★ Fatal Accident
- Non-Fatal Injury Accident
- ◐ Property Damage Only Accident (Reportable)
- Property Damage Only Accident (Non-Reportable)

Accident Spot Map symbols with 'A's in them represent animal related accidents.

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District 1
Lancaster County
148th St. from Old Cheney Rd. to Amberly Rd.
Lancaster County Safety Studies
Non-fatal Accidents: 1-1-2013 thru 2-28-2018
Fatal Accidents: 1-1-2013 thru 2-28-2018

5 Year, 2 Month Study

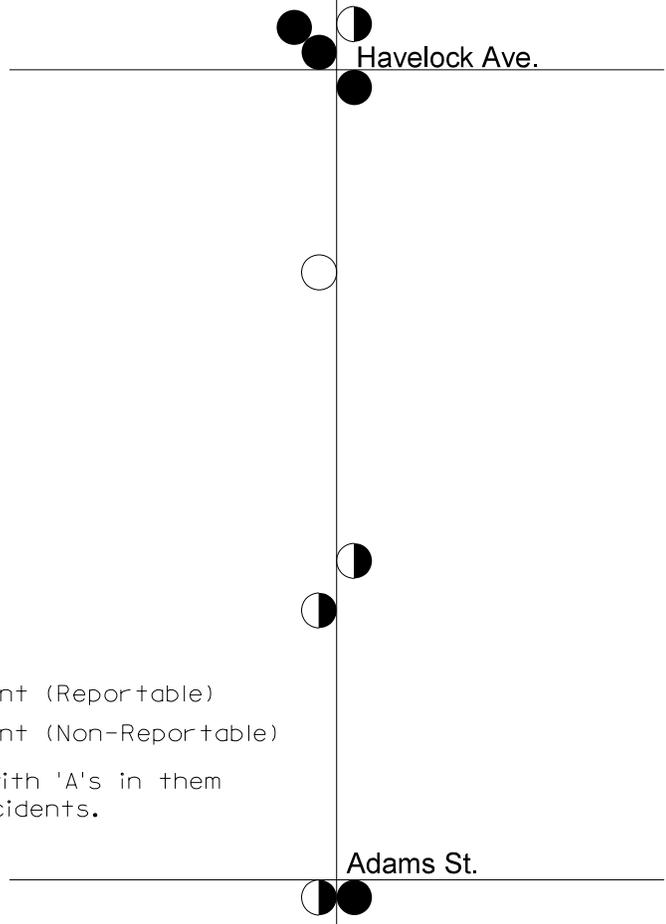
NOT DRAWN TO SCALE



LEGEND

- ★ Fatal Accident
- Non-Fatal Injury Accident
- ◐ Property Damage Only Accident (Reportable)
- Property Damage Only Accident (Non-Reportable)

Accident Spot Map symbols with 'A's in them represent animal related accidents.



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SPOT MAP

End 148th St. Study

District 1
Lancaster County

Amberly Rd.

Waverly S. Corp. Limits

148th St. from Old Cheney Rd. to Amberly Rd.

Lancaster County Safety Studies

Non-fatal Accidents: 1-1-2013 thru 2-28-2018

Fatal Accidents: 1-1-2013 thru 2-28-2018

Brdg over I-80

5 Year, 2 Month Study



McKelvie Rd.

NOT DRAWN TO SCALE

★ 11-6-16

Alvo Rd.

Fletcher Ave.

LEGEND

- ★ Fatal Accident
- Non-Fatal Injury Accident
- ◐ Property Damage Only Accident (Reportable)
- Property Damage Only Accident (Non-Reportable)

Accident Spot Map symbols with 'A's in them represent animal related accidents.

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BCA WORKSHEETS

DETAILED COST ESTIMATES



148th Street- Pioneer to Van Dorn Shoulder Widening
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018

General/Earthwork				
	Units	Qty	2018 Estimate	
			Unit Price	Total
General Clearing and Grubbing	L.S.	1	\$ 15,000.00	\$ 15,000.00
Earthwork	C.Y.	11,000	\$ 10.00	\$ 110,000.00
Group Total				\$ 125,000.00

Paving				
	Units	Qty	2018 Estimate	
			Unit Price	Total
P.C.C. 6' Shoulder	S.Y.	7250	\$ 48.00	\$ 348,000.00
Driveway Gravel Surfacing (10 Ton/ Drive)	TON	40	\$ 40.00	\$ 1,600.00
Group Total				\$ 349,600.00

Safety Edge				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Safety Edge	STA	110	\$ 30.00	\$ 3,300.00
Group Total				\$ 3,300.00

Erosion Control				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Erosion Control	L.S.	1	\$ 50,000.00	\$ 50,000.00
Group Total				\$ 50,000.00

Miscellaneous Items				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Mobilization	L.S.	1	\$ 42,200.00	\$ 42,200.00
Traffic Control for Construction	L.S.	1	\$ 25,000.00	\$ 25,000.00
Construction Staking	L.S.	1	\$ 15,000.00	\$ 15,000.00
Group Total				\$ 82,200.00

Construction Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
General/Earthwork	L.S.	1	\$ 125,000.00	\$ 125,000.00
Paving	L.S.	1	\$ 349,600.00	\$ 349,600.00
Safety Edge	L.S.	1	\$ 3,300.00	\$ 3,300.00
Storm Drainage (20% of Construction)	L.S.	1	\$ 105,580.00	\$ 105,580.00
*R.O.W	L.S.	1	\$ 100,000.00	\$ 100,000.00
Erosion Control	L.S.	1	\$ 50,000.00	\$ 50,000.00
Miscellaneous Items	L.S.	1	\$ 82,200.00	\$ 82,200.00
Project SubTotal				\$ 815,680.00
Construction Contingency - 20%				\$ 163,140.00
Construction Total				\$ 978,820.00

Project Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Engineering Services (10%)	L.S.	1	\$ 97,882.00	\$ 97,880.00
Utility Relocations (5% of Constrn)	L.S.	1	\$ 48,941.00	\$ 48,940.00
Survey (2% of Constrn)	L.S.	1	\$ 19,576.40	\$ 19,580.00
Construction Engineering (8% of Constrn)	L.S.	1	\$ 78,305.60	\$ 78,310.00
Construction	L.S.	1	\$ 978,820.00	\$ 978,820.00
Project Total \$				1,223,530.00

*Note: Assumes ROW impacts will be determined during Preliminary Engineering



148th Street & Holdrege Rd Enhanced Intersection Signage
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Thursday, October 11, 2018

Project Related Items				
	Units	Qty	2018 Estimate	
			Unit Price	Total
LED Stop Signs	LS	1	\$ 3,000.00	\$ 3,000.00
Additional Signage and Markings	LS	1	\$ 2,000.00	\$ 2,000.00
Group Total				\$ 5,000.00

Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Project Related Items	LS	1	\$ 5,000.00	\$ 5,000.00
Project SubTotal				\$ 5,000.00
Survey				0% \$ -
Engineering Services				0% \$ -
Project Total				\$ 5,000.00

Assumptions:

148th Street- O St. & Amberly Rd 4 Lane Approach

FHU Project No. 18-122

Engineer's Opinion of Probable Cost

Saturday, August 25, 2018



Grading					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$ 56,250.00	\$	56,250.00
General Clearing and Grubbing	LS	1	\$ 25,000.00	\$	25,000.00
Earthwork	CY	110,000	\$ 10.00	\$	1,100,000.00
Group Total					\$ 1,181,250.00

Surfacing					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$ 605,000.00	\$	605,000.00
Removal of Pavement	SY	115,000	\$ 11.00	\$	1,265,000.00
P.C.C. Pavement, 9 in.	SY	275,000	\$ 44.00	\$	12,100,000.00
Group Total					\$ 13,970,000.00

Drainage					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$ 151,512.50	\$	151,512.50
Roadway Storm Sewer and Inlets (20%)	LS	1	\$ 3,030,250.00	\$	3,030,250.00
Group Total					\$ 3,181,762.50

Project Related Items					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Utilities (5%)	LS	1.000	\$ 757,562.50	\$	757,562.50
Group Total					\$ 757,562.50

Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Grading	LS	1	\$ 1,181,250.00	\$ 1,181,250.00
Surfacing	LS	1	\$ 13,970,000.00	\$ 13,970,000.00
Drainage	LS	1	\$ 3,181,762.50	\$ 3,181,762.50
R.O.W	LS	1	\$ 100,000.00	\$ 100,000.00
Project Related Items	LS	1	\$ 757,562.50	\$ 757,562.50
Project SubTotal				\$ 19,190,580.00
Contingency 20%				\$ 3,838,100.00
Survey 2%				\$ 383,800.00
Engineering Services 10%				\$ 2,302,900.00
Environmental Services 6%				\$ 1,381,700.00
Construction Services 8%				\$ 1,842,300.00
Project Total				\$ 28,939,380.00

Assumptions:

- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 5% of Pavement and Grading
- Contingency of 20% used
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Environmental Services are estimated at 6% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



**O Street 4 Lane Widening
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018**

Grading					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$ 30,250.00	\$	30,250.00
General Clearing and Grubbing	LS	1	\$ 5,000.00	\$	5,000.00
Earthwork	CY	60,000	\$ 10.00	\$	600,000.00
Group Total					\$ 635,250.00

Surfacing					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$ 297,000.00	\$	297,000.00
Removal of Pavement	SY	67,500	\$ 11.00	\$	742,500.00
P.C.C. Pavement, 9 in.	SY	135,000	\$ 44.00	\$	5,940,000.00
Group Total					\$ 6,979,500.00

Drainage					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$ 76,147.50	\$	76,147.50
Roadway Storm Sewer and Inlets (20%)	LS	1	\$ 1,522,950.00	\$	1,522,950.00
Group Total					\$ 1,599,097.50

Project Related Items					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Utilities (5%)	LS	1.000	\$ 380,737.50	\$	380,737.50
Group Total					\$ 380,737.50

Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Grading	LS	1	\$ 635,250.00	\$ 635,250.00
Surfacing	LS	1	\$ 6,979,500.00	\$ 6,979,500.00
R.O.W	LS	1	\$ 100,000.00	\$ 100,000.00
Drainage	LS	1	\$ 1,599,097.50	\$ 1,599,097.50
Project Related Items	LS	1	\$ 380,737.50	\$ 380,737.50
Project SubTotal				\$ 9,694,590.00
Contingency 20%				\$ 1,938,900.00
Survey 2%				\$ 193,900.00
Engineering Services 10%				\$ 1,163,300.00
Environmental Services 6%				\$ 698,000.00
Construction Services 8%				\$ 930,700.00
Project Total				\$ 14,619,390.00

Assumptions:

- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 5% of Pavement and Grading
- Contingency of 20% used
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Environmental Services are estimated at 6% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



148th Street & Amberly Rd Signal
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018

Project Related Items				
	Units	Qty	2018 Estimate	
			Unit Price	Total
148th Street & Amberly Rd Signals	SF	1	\$ 150,000.00	\$ 150,000.00
Utilities (5%)	LS	1	\$ 7,500.00	\$ 7,500.00
Group Total				\$ 157,500.00

Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Project Related Items	LS	1	\$ 157,500.00	\$ 157,500.00
Project SubTotal				\$ 157,500.00
Survey				2% \$ 3,200.00
Engineering Services				10% \$ 15,800.00
Project Total				\$ 176,500.00

Assumptions:
- Utility Cost is estimated at 5% of Signal Cost
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost



148th Street & Amberly Rd Roundabout
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018

Grading Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00
Earthwork	CY	10,000.00	\$ 10.00	\$ 100,000.00
Remove Pavement	SY	1,750.00	\$ 9.00	\$ 15,750.00
Group Total				\$ 118,250.00

Pavement Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	3,800	\$ 48.00	\$ 182,400.00
11" Concrete Pavement - Truck Apron	SY	500	\$ 60.00	\$ 30,000.00
Group Total				\$ 212,400.00

Storm Sewer & Culverts				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%		\$ 66,130.00
Group Total				\$ 66,130.00

Signing & Striping				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Signing	%	5%		\$ 10,620.00
Striping	%	5%		\$ 10,620.00
Group Total				\$ 21,240.00

Project Related Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Mobilization	LS	1.00	\$ 33,400.00	\$ 33,400.00
Traffic Control	LS	1.00	\$ 20,900.00	\$ 20,900.00
Right of Way	SF	7,440	\$ 4.00	\$ 29,760.00
Right of Way Design (Title Searches and Acquisition)	EA	4	\$ 4,000.00	\$ 16,000.00
Utilities	%	5%		\$ 16,532.50
Group Total				\$ 116,592.50

Project Totals

	Category	Total
	Grading	\$ 118,250.00
	Pavemnet	\$ 212,400.00
	Storm Sewer & Culverts	\$ 66,130.00
	Signing and Striping	\$ 21,240.00
	Mobilization	\$ 33,400.00
	Traffic Control	\$ 20,900.00
	Right of Way	\$ 45,760.00
	Utilities	\$ 33,065.00
	Construction Subtotal	\$ 551,150.00
	Contingency 20%	\$ 110,200.00
	Survey 2%	\$ 11,000.00
	Engineering Services 10%	\$ 66,100.00
	Construction Services 8%	\$ 52,900.00
	Project Total	\$ 791,350.00

Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 10% of Pavement and Grading
- Contingency of 20% used
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



148th Street & Amberly Rd Turn Lane
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018

Grading Items					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
General Clearing and Grubbing	LS	1.00	\$ 1,000.00	\$	1,000.00
Earthwork	CY	1,500.00	\$ 10.00	\$	15,000.00
Remove Pavement	SY	200.00	\$ 7.00	\$	1,400.00
Group Total					\$ 17,400.00

Pavement Items					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
9" Concrete Pavement	SY	570.00	\$ 48.00	\$	27,360.00
Group Total					\$ 27,360.00

Storm Sewer & Culverts					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Drainage	%	20%		\$	8,952.00
Group Total					\$ 8,952.00

Signing & Striping					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
5" White Preformed Pavement Marking, Type 4 Grooved	LF	1137.00	\$ 3.25	\$	3,695.25
5" Yellow Preformed Pavement Marking, Type 4 Grooved	LF	630.00	\$ 3.25	\$	2,047.50
Right Arrow, Preformed Pavement Markings, Type 4 Grooved	EA	3.00	\$ 365.00	\$	1,095.00
Pavement Marking Removal, Lines	LF	1360.00	\$ 0.25	\$	340.00
Signs And Poles	LS	1.00	\$ 400.00	\$	400.00
Group Total					\$ 7,577.75

Project Related Items					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Mobilization	LS	1.00	\$ 5,000.00	\$	5,000.00
Traffic Control	LS	1.00	\$ 5,000.00	\$	5,000.00
Right Of Way	SF	1,000	\$ 4.00	\$	4,000.00
Right Of Way Design(Title Searches & Acquisition)	EA	2	\$ 4,000.00	\$	8,000.00
Utilities	%	10%		\$	4,476.00
Group Total					\$ 26,476.00

Project Totals

	Category	Total
	Grading	\$ 17,400.00
	Pavemnet	\$ 27,360.00
	Storm Sewer & Culverts	\$ 8,952.00
	Signing and Striping	\$ 7,577.75
	Mobilization	\$ 5,000.00
	Traffic Control	\$ 5,000.00
	Right of Way	\$ 12,000.00
	Utilities	\$ 4,476.00
	Construction Subtotal	\$ 87,770.00
	Contingency 20%	\$ 17,600.00
	Survey 2.0%	\$ 1,800.00
	Engineering Services 10%	\$ 10,500.00
	Construction Services 8%	\$ 8,400.00
	Project Total	\$ 126,070.00

Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 10% of Pavement and Grading
- Contingency of 20% used
- Survey is not estimated and understood to be provided by Sarpy County Public Works Department
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



148th Street & Amberly 2 Lane Approach
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018

Grading					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$	5,125.00	\$ 5,125.00
General Clearing and Grubbing	LS	1	\$	2,500.00	\$ 2,500.00
Earthwork	CY	10,000	\$	10.00	\$ 100,000.00
Group Total					\$ 107,625.00

Surfacing					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$	2,750.00	\$ 2,750.00
Removal of Pavement	SY	1,000	\$	11.00	\$ 11,000.00
P.C.C. Pavement, 9 in.	SY	1,250	\$	44.00	\$ 55,000.00
Group Total					\$ 68,750.00

Drainage					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$	1,763.75	\$ 1,763.75
Roadway Storm Sewer and Inlets (20%)	LS	1	\$	35,275.00	\$ 35,275.00
Group Total					\$ 37,038.75

Project Related Items					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Utilities (5%)	LS	1,000	\$	5,000.00	\$ 5,000.00
Group Total					\$ 5,000.00

Totals					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Grading	LS	1	\$	107,625.00	\$ 107,625.00
Surfacing	LS	1	\$	68,750.00	\$ 68,750.00
Drainage	LS	1	\$	37,038.75	\$ 37,038.75
Project Related Items	LS	1	\$	5,000.00	\$ 5,000.00
Project SubTotal					\$ 218,410.00
Contingency 20%					\$ 43,700.00
Survey 2%					\$ 4,400.00
Engineering Services 10%					\$ 26,200.00
Construction Services 8%					\$ 21,000.00
Project Total					\$ 313,710.00

Assumptions:

- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 5% of Pavement and Grading
- Contingency of 20% used
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Environmental Services are estimated at 6% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



**148th Street & Adams St Roundabout
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018**

Grading Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00
Earthwork	CY	10,000.00	\$ 10.00	\$ 100,000.00
Remove Pavement	SY	1,518.00	\$ 9.00	\$ 13,662.00
Group Total				\$ 116,162.00

Pavement Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	3,800	\$ 48.00	\$ 182,400.00
11" Concrete Pavement - Truck Apron	SY	500	\$ 60.00	\$ 30,000.00
Group Total				\$ 212,400.00

Storm Sewer & Culverts				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%		\$ 65,712.40
Group Total				\$ 65,712.40

Signing & Striping				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Signing	%	5%		\$ 10,620.00
Striping	%	5%		\$ 10,620.00
Group Total				\$ 21,240.00

Project Related Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Mobilization	LS	1.00	\$ 33,200.00	\$ 33,200.00
Traffic Control	LS	1.00	\$ 20,800.00	\$ 20,800.00
Right of Way	SF	3,500	\$ 4.00	\$ 14,000.00
Right of Way Design (Title Searches and Acquisition)	EA	4	\$ 4,000.00	\$ 16,000.00
Utilities	%	5%		\$ 16,428.10
Group Total				\$ 100,428.10

Project Totals

	Category	Total
	Grading	\$ 116,162.00
	Pavemnet	\$ 212,400.00
	Storm Sewer & Culverts	\$ 65,712.40
	Signing and Striping	\$ 21,240.00
	Mobilization	\$ 33,200.00
	Traffic Control	\$ 20,800.00
	Right of Way	\$ 30,000.00
	Utilities	\$ 32,856.20
	Construction Subtotal	\$ 532,370.00
	Contingency 20%	\$ 106,500.00
	Survey 2%	\$ 10,600.00
	Engineering Services 10%	\$ 63,900.00
	Construction Services 8%	\$ 51,100.00
	Project Total	\$ 764,470.00

Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 10% of Pavement and Grading
- Contingency of 20% used
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



148th Street & O Street Turn Lane
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Friday, August 17, 2018

Grading Items					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
General Clearing and Grubbing	LS	1.00	\$ 1,000.00	\$	1,000.00
Earthwork	CY	1,500.00	\$ 10.00	\$	15,000.00
Remove Pavement	SY	150.00	\$ 7.00	\$	1,050.00
Group Total					\$ 17,050.00

Pavement Items					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
9" Concrete Pavement	SY	750.00	\$ 48.00	\$	36,000.00
Group Total					\$ 36,000.00

Storm Sewer & Culverts					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Drainage	%	20%		\$	10,610.00
Group Total					\$ 10,610.00

Signing & Striping					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
5" White Preformed Pavement Marking, Type 4 Grooved	LF	1137.00	\$ 3.25	\$	3,695.25
5" Yellow Preformed Pavement Marking, Type 4 Grooved	LF	630.00	\$ 3.25	\$	2,047.50
Right Arrow, Preformed Pavement Markings, Type 4 Grooved	EA	3.00	\$ 365.00	\$	1,095.00
Pavement Marking Removal, Lines	LF	1000.00	\$ 0.25	\$	250.00
Signs And Poles	LS	1.00	\$ 400.00	\$	400.00
Group Total					\$ 7,487.75

Project Related Items					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Mobilization	LS	1.00	\$ 5,000.00	\$	5,000.00
Traffic Control	LS	1.00	\$ 5,000.00	\$	5,000.00
Right Of Way	SF	1,000	\$ 4.00	\$	4,000.00
Right Of Way Design(Title Searches & Acquisition)	EA	2	\$ 4,000.00	\$	8,000.00
Utilities	%	10%		\$	5,305.00
Group Total					\$ 27,305.00

Project Totals

	Category	Total
	Grading	\$ 17,050.00
	Pavemnet	\$ 36,000.00
	Storm Sewer & Culverts	\$ 10,610.00
	Signing and Striping	\$ 7,487.75
	Mobilization	\$ 5,000.00
	Traffic Control	\$ 5,000.00
	Right of Way	\$ 12,000.00
	Utilities	\$ 5,305.00
	Construction Subtotal	\$ 98,450.00
	Contingency 20%	\$ 19,700.00
	Survey 2.0%	\$ 2,000.00
	Engineering Services 10%	\$ 11,800.00
	Construction Services 8%	\$ 9,500.00
	Project Total	\$ 141,450.00

Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 10% of Pavement and Grading
- Contingency of 20% used
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



148th Street & Old Cheney Road Roundabout
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Friday, August 17, 2018

Grading Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00
Earthwork	CY	10,000.00	\$ 10.00	\$ 100,000.00
Remove Pavement	SY	2,400.00	\$ 9.00	\$ 21,600.00
Group Total				\$ 124,100.00

Pavement Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	4,000	\$ 48.00	\$ 192,000.00
11" Concrete Pavement - Truck Apron	SY	500	\$ 60.00	\$ 30,000.00
Group Total				\$ 222,000.00

Storm Sewer & Culverts				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%		\$ 69,220.00
Group Total				\$ 69,220.00

Signing & Striping				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Signing	%	5%		\$ 11,100.00
Striping	%	5%		\$ 11,100.00
Group Total				\$ 22,200.00

Project Related Items				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Mobilization	LS	1.00	\$ 35,000.00	\$ 35,000.00
Traffic Control	LS	1.00	\$ 21,900.00	\$ 21,900.00
Right of Way	SF	7,440	\$ 4.00	\$ 29,760.00
Right of Way Design (Title Searches and Acquisition)	EA	4	\$ 4,000.00	\$ 16,000.00
Utilities	%	5%		\$ 17,305.00
Group Total				\$ 119,965.00

Project Totals

	Category	Total
	GRADING	\$ 124,100.00
	PAVEMENT	\$ 222,000.00
	STORM SEWER & CULVERTS	\$ 69,220.00
	SIGNING & STRIPING	\$ 22,200.00
	MOBILIZATION	\$ 35,000.00
	Traffic Control	\$ 21,900.00
	RIGHT OF WAY	\$ 45,760.00
	UTILITIES	\$ 34,610.00
	Construction Subtotal	\$ 574,790.00
	Contingency 20%	\$ 115,000.00
	Survey 2%	\$ 11,500.00
	Engineering Services 10%	\$ 69,000.00
	Construction Services 8%	\$ 55,200.00
	Project Total	\$ 825,490.00

Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage Cost is estimated at 20% of Pavement and Grading
- Utility Cost is estimated at 10% of Pavement and Grading
- Contingency of 20% used
- Survey is estimated at 2% of Construction Cost
- Engineering Services are estimated at 10% of Construction Cost and Contingency
- Construction Services are estimated at 8% of Construction Cost and Contingency



**148th Street Shoulder Widening
FHU Project No. 18-122
Engineer's Opinion of Probable Cost
Saturday, August 25, 2018**

General/Earthwork				
	Units	Qty	2018 Estimate	
			Unit Price	Total
General Clearing and Grubbing	L.S.	1	\$ 15,000.00	\$ 15,000.00
Earthwork	C.Y.	103,704	\$ 10.00	\$ 1,037,040.00
Group Total				\$ 1,052,040.00

Paving				
	Units	Qty	2018 Estimate	
			Unit Price	Total
P.C.C. 6' Shoulder	S.Y.	74667	\$ 48.00	\$ 3,584,000.00
Driveway Gravel Surfacing (10 Ton/ Drive)	TON	650	\$ 40.00	\$ 26,000.00
Group Total				\$ 3,610,000.00

Safety Edge				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Safety Edge	STA	1120	\$ 30.00	\$ 33,600.00
Group Total				\$ 33,600.00

Erosion Control				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Erosion Control	L.S.	1	\$ 100,000.00	\$ 100,000.00
Group Total				\$ 100,000.00

Miscellaneous Items				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Mobilization	L.S.	1	\$ 383,700.00	\$ 383,700.00
Traffic Control for Construction	L.S.	1	\$ 50,000.00	\$ 50,000.00
Construction Staking	L.S.	1	\$ 25,000.00	\$ 25,000.00
Group Total				\$ 458,700.00

Construction Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
General/Earthwork	L.S.	1	\$ 1,052,040.00	\$ 1,052,040.00
Paving	L.S.	1	\$ 3,610,000.00	\$ 3,610,000.00
Pavement Marking Items	L.S.	1	\$ 33,600.00	\$ 33,600.00
*R.O.W	L.S.	1	\$ 150,000.00	\$ 150,000.00
Storm Drainage (20% of Construction)	L.S.	1	\$ 959,130.00	\$ 959,130.00
Erosion Control	L.S.	1	\$ 100,000.00	\$ 100,000.00
Miscellaneous Items	L.S.	1	\$ 458,700.00	\$ 458,700.00
Project SubTotal				\$ 6,363,470.00
Construction Contingency - 20%				\$ 1,272,690.00
Construction Total				\$ 7,636,160.00

Project Totals				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Engineering Services (10%)	L.S.	1	\$ 763,616.00	\$ 763,620.00
Utility Relocations (5% of Constrn)	L.S.	1	\$ 381,808.00	\$ 381,810.00
Survey (2% of Constrn)	L.S.	1	\$ 152,723.20	\$ 152,720.00
Construction Engineering (8% of Constrn)	L.S.	1	\$ 610,892.80	\$ 610,890.00
Construction	L.S.	1	\$ 7,636,160.00	\$ 7,636,160.00
Project Total			\$	9,545,200.00

*Note: Assumes ROW impacts will be determined during Preliminary Engineering