

**LANCASTER COUNTY SAFETY ANALYSIS  
S. 68<sup>TH</sup> STREET  
LANCASTER COUNTY, NE  
TRAFFIC STUDY REPORT**

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## I. INTRODUCTION

### A. *Project Description and Location*

Lancaster County has commissioned a traffic safety study to evaluate existing and future traffic operations and safety for S. 68<sup>th</sup> Street between the intersections of Saltillo Road and Firth 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, a detailed crash analysis, an auxiliary turn lane analysis, and a signal warrant analysis. A primary focus is on traffic operations at the following intersections:

- S. 68<sup>th</sup> Street with Saltillo Road
- S. 68<sup>th</sup> Street with Roca Road
- S. 68<sup>th</sup> Street with Panama Road
- S. 68<sup>th</sup> Street with Princeton Road
- S. 68<sup>th</sup> Street with Norris High School
- S. 68<sup>th</sup> Street with Firth Road

The operations study evaluates the following time periods:

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

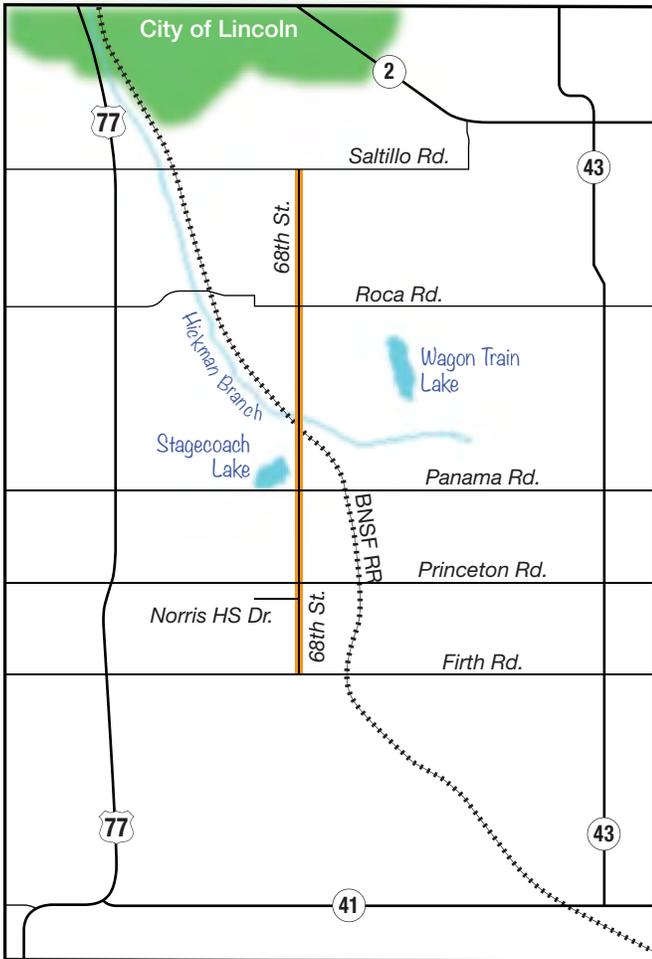
### B. *Street Network*

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

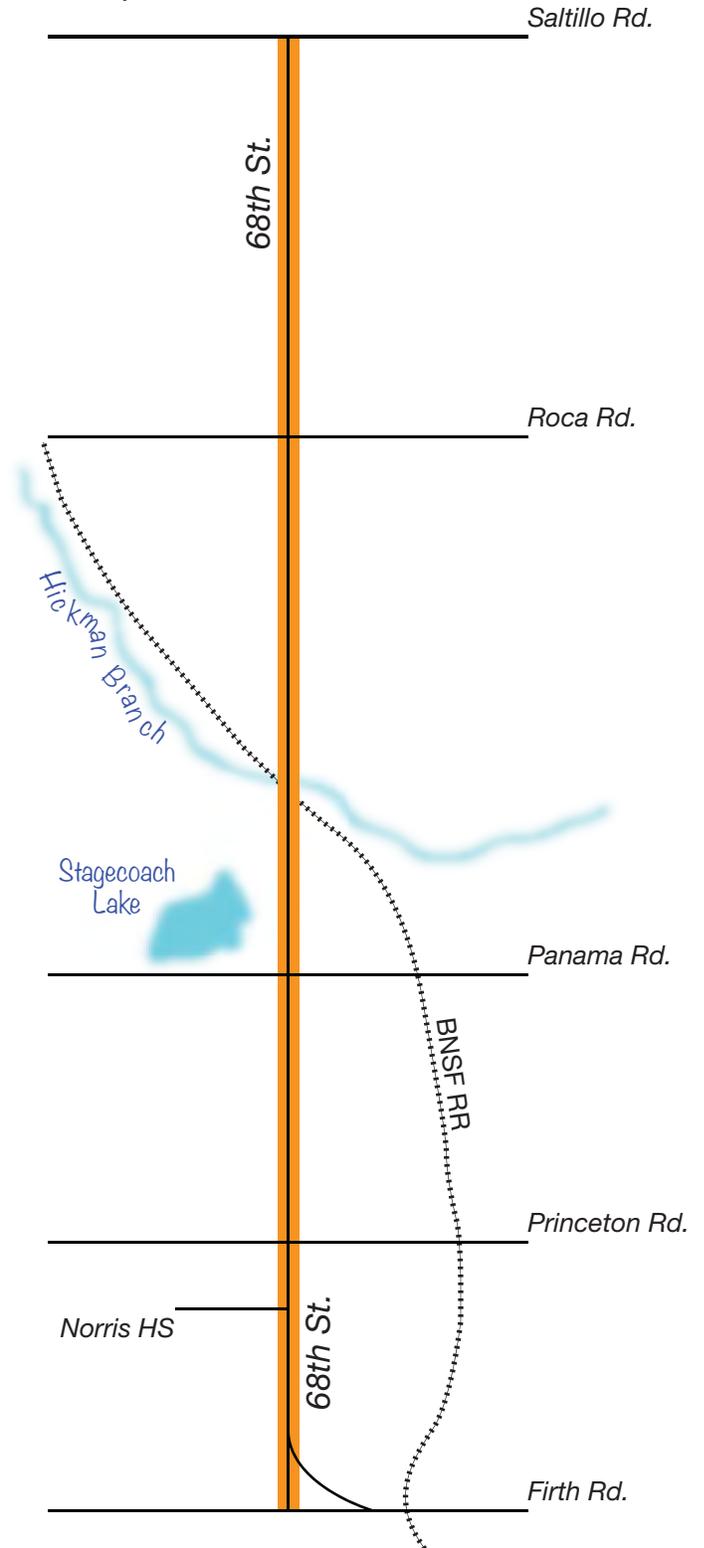
- **S. 68<sup>th</sup> Street** runs north-south from Firth Road on the south to Saltillo Road on the north. In the study area, S. 68<sup>th</sup> Street is a two-lane undivided roadway with posted speed limits of 55, 45 and 35 miles per hour (mph). There is a 35 mph School Speed Zone (When Flashing) during school hours adjacent to Norris School. There are varying roadway designs along S. 68<sup>th</sup> Street. From Firth Road to 580 feet south of Stagecoach Road, S. 68<sup>th</sup> Street is a two-lane road with unpaved shoulders. From 580 feet south of Stagecoach Road to 500 feet north of Wagon Train Road over the BNSF Railway tracks, S. 68<sup>th</sup> is a two-lane road with a curb and gutter. Through Hickman, S. 68<sup>th</sup> Street is classified as a two-lane urban road with an unpaved shoulder. Approximately 300 ft north of Woodland Blvd to just south of Roca Road, S. 68<sup>th</sup> Street converts to a two-lane road with an earth shoulder. From just south of Roca Road to Saltillo Road, S. 68<sup>th</sup> Street is a two-lane road with paved shoulder. **Figure 2** shows the existing speed limits and roadway cross-sections within the study area. S. 68<sup>th</sup> Street provides access to the town of Hickman as well as Norris Elementary, Middle, and High School.
- **Saltillo Road** runs east-west with a posted speed limit of 50 mph and has a two-lane undivided cross-section. At the unsignalized intersection with S. 68<sup>th</sup> Street, a left-turn lane is provided on the westbound approach and a right-turn lane is provided on the eastbound approach. The northbound approach includes a left-turn lane and a right-turn lane. Stop control is provided on S. 68<sup>th</sup> Street.

- **Roca Road** runs east-west and has a two-lane undivided cross section. At the intersection with S. 68<sup>th</sup> Street, Roca Road is stop controlled and left-turn lanes are provided on all approaches. The posted speed limit along Roca Road in the study area is 55 mph.
- **Panama Road** runs east-west and has a two-lane undivided cross section with a speed limit of 45 mph in the study area. At the intersection with S. 68<sup>th</sup> Street, Panama Road is stop controlled and left-turn lanes are provided on all approaches.
- **Princeton Road** runs east-west and has a two-lane undivided cross section. To the east, Princeton Road is a gravel road with a speed limit of 50 mph. To the west, Princeton Road is a paved road with a speed limit of 55 mph. Princeton Road is stop controlled at the intersection with S. 68<sup>th</sup> Street.
- **Norris High School Drive** runs east-west and provides access to Norris Elementary, Middle, and High School. Norris High School Drive is stop controlled at the intersection with S. 68<sup>th</sup> Street. A left-turn lane is provided on the northbound approach and a right-turn lane is provided on the southbound approach.
- **Firth Road** runs east-west with a posted speed limit of 55 mph and a two-lane undivided cross section. The intersection with S. 68<sup>th</sup> Street is stop controlled on S. 68<sup>th</sup> St and a yield sign is located approximately 200 feet north of the intersection for northbound 68<sup>th</sup> Street traffic merging with westbound to northbound Firth traffic.

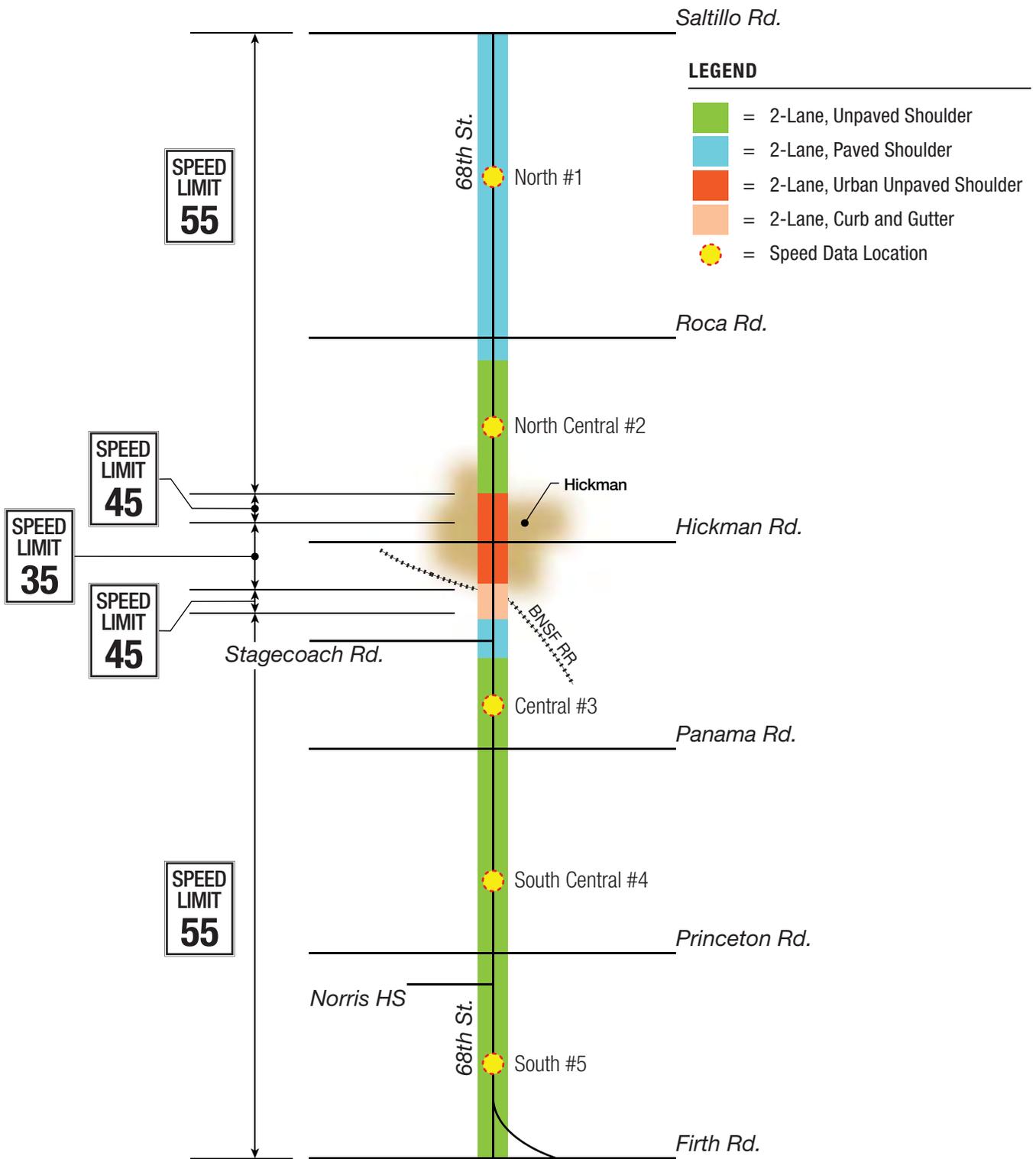
### Vicinity Map



### Study Corridor



Study Area | **FIGURE 1**



## II. SPEED STUDY

FHU used data collection vendor MNRG to collect speed data at five locations, as shown on **Figure 2**, on S. 68<sup>th</sup> Street:

- 887 feet south of Bennet Road (North #1),
- 559 feet south of Leisure Lane (North Central #2),
- 1,346 feet south of Stagecoach Road (Central #3),
- 1,825 feet south of Olive Creek Road (South Central #4), and
- 1,837 feet south of Pella Road (South #5).

Data was collected for a three-hour period from 7:00 AM – 10:00 AM and five-hour periods from 2:00 PM – 7:00 PM. The studies were completed on either April 24<sup>th</sup>, April 25<sup>th</sup>, May 1<sup>st</sup>, or May 17<sup>th</sup>.

### A. Methodology

To collect speed data at the five 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. 85<sup>th</sup> 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. 85<sup>th</sup> Percentile & Median Speed**

Roadway	Location	85th Percentile Speed (mph)		Median Speed (mph)	
		NB	SB	NB	SB
S. 68 <sup>th</sup> Street	North #1	66.95	65.39	58.39	48.93
S. 68 <sup>th</sup> Street	North Central #2	59.09	59.50	53.91	56.00
S. 68 <sup>th</sup> Street	Central #3	54.60	66.90	52.00	54.58
S. 68 <sup>th</sup> Street	South Central #4	69.72	66.16	55.18	48.68
S. 68 <sup>th</sup> Street	South #5	62.01	61.60	59.37	54.14
Directional Average		62.47	63.91	55.77	52.07
Overall Roadway Average		63.19		53.92	

### C. Recommendation

Typically, a good indicator of what the posted speed limit should be set at is the 85<sup>th</sup> 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 50<sup>th</sup> percentile speed, traffic volume, crash history, frequency of access points, sight distance, and pedestrian activity.

As a tool to help assist in determining the appropriate posted speed limit for S. 68<sup>th</sup> 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 posted speed limit on S. 68<sup>th</sup> Street, outside of the City of Hickman, from Saltillo Road to Firth Road remain at 55 mph. 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 North #1 (Saltillo Road to Wittstruck Road) and South Central #4 segments (Panama Road to Princeton Road).**

**It is also recommended that additional Speed Limit signs be posted along S. 68<sup>th</sup> Street at the intersections with Bennet Road, Wittstruck Road, Panama Road, Olive Creek Road, Pella Road, and Firth 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 S. 68<sup>th</sup> Street with Saltillo Road, Roca Road, Panama Road, Princeton Road, Norris High School and Firth Road from Monday, April 23, 2018 to Tuesday, May 1<sup>st</sup>, 2018. The counts were completed while Norris Elementary, Middle, and High School were in session. The AM and PM Peak hours are summarized on **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 – S. 68<sup>th</sup> Street**

Cross Section	Saltillo Road	Roca Road	Panama Road	Princeton Road	Norris High School	Firth Road
Date of Count	4/26/2018	4/23/2018	4/24/2018	4/26/2018	4/25/2018	5/01/2018
AM PEAK	7:15 AM - 8:15 AM	7:15 AM - 8:15 AM	7:30 AM - 8:30 PM	7:45 AM - 8:45 AM	7:45 AM - 8:45 AM	7:30 AM - 8:30 AM
PM PEAK	4:45 PM - 5:45 PM	4:30 PM - 5:30 PM	3:15 PM - 4:15 PM	3:30 PM - 4:30 PM	3:30 PM - 4:30 PM	4:15 PM - 5:15 PM

#### B. 2018 Existing Traffic Operations

Traffic operations were analyzed for the study intersections using procedures documented in the *Highway Capacity Manual (HCM) 6<sup>th</sup> 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 6<sup>th</sup> 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.

*S. 68<sup>th</sup> Street & Saltillo Road*

At the intersection of S. 68<sup>th</sup> Street with Saltillo Road, the northbound left-turn lane currently operates at LOS F during both peak hours. All other movements operate at LOS B or better during both peak hours.

*S. 68<sup>th</sup> Street & Roca Road*

At the intersection of S. 68<sup>th</sup> Street with Roca Road, the eastbound left-turn lane and westbound left-turn lane currently operate at LOS C in the AM peak hour and LOS D in the PM peak hour. The eastbound shared through/right-turn lane operates at LOS B in the AM peak hour and C in the PM peak hour. The westbound shared through/right-turn lane operates at LOS C in both peak hours. The northbound and southbound approaches operate at LOS A during both peak hours.

*S. 68<sup>th</sup> Street & Panama Road*

At the intersection of S. 68<sup>th</sup> Street with Panama Road, the eastbound left-turn lane currently operates at LOS D in both the AM and PM peak hour. The westbound left-turn lane operates at LOS E in both the AM and PM peak hours. The eastbound and westbound shared through/right-turn lanes operate at LOS B in the AM peak hour and LOS C in the PM peak hour. The northbound and southbound approaches operate at LOS A during both peak hours.

*S. 68<sup>th</sup> Street & Princeton Road*

At the intersection of S. 68<sup>th</sup> Street with Princeton Road, the eastbound approach currently operates at LOS F during both peak hours. The westbound stop-controlled approach operates at LOS D in the AM peak hour and LOS C in the PM peak hour. The northbound and southbound approaches operate at LOS A or LOS B during both peak hours.

*S. 68<sup>th</sup> Street & Norris High School Drive*

At the intersection of S. 68<sup>th</sup> Street with Norris High School Drive, the eastbound approach currently operates at LOS C in the AM peak hour and LOS D in the PM peak hour. The northbound left-turn lane operates at LOS A.

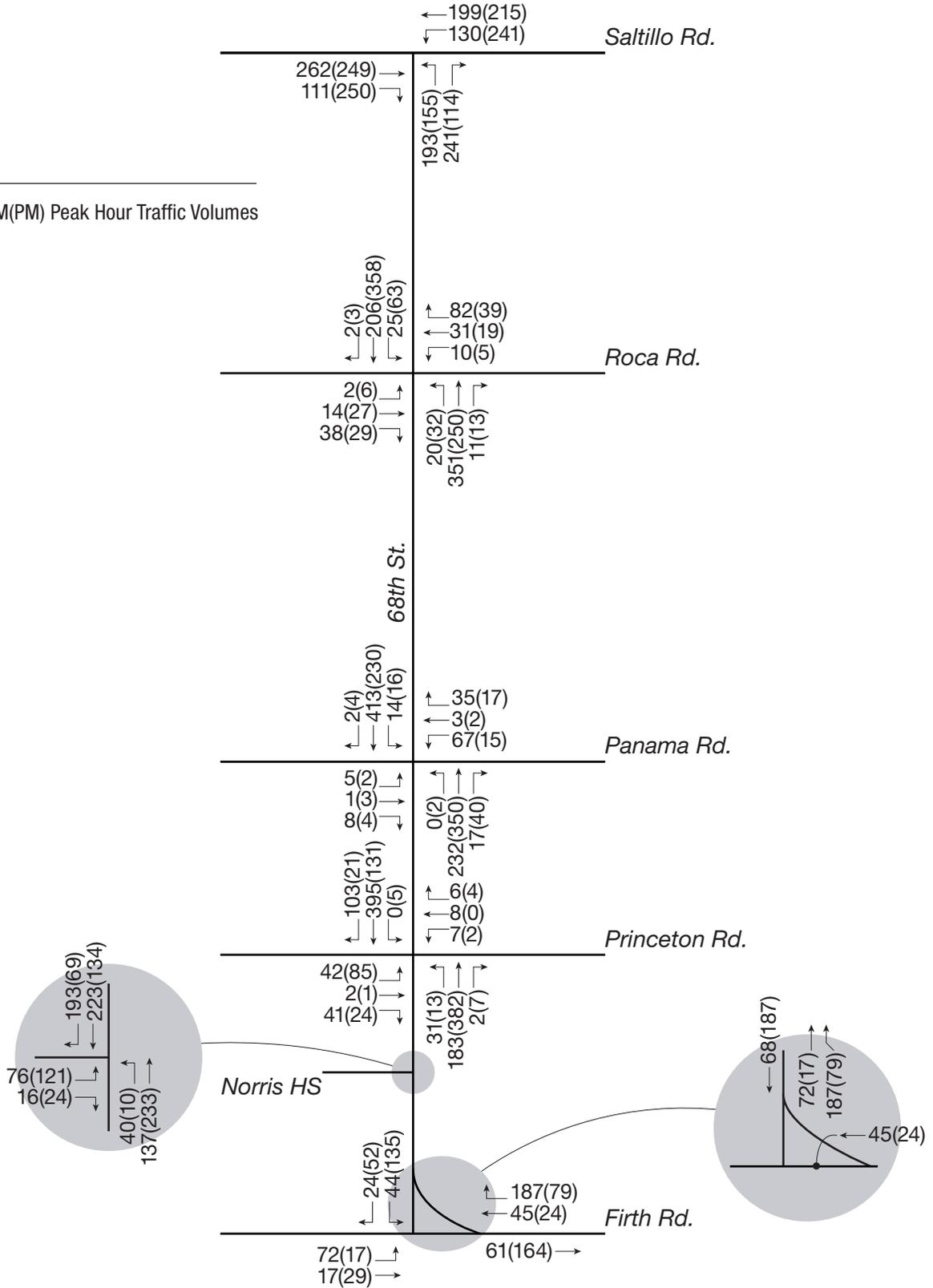
*S. 68<sup>th</sup> Street & Firth Road*

At the intersection of S. 68<sup>th</sup> Street with Firth Road, all approaches currently operate at LOS B or better during both the AM and PM peak periods.

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

**LEGEND**

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

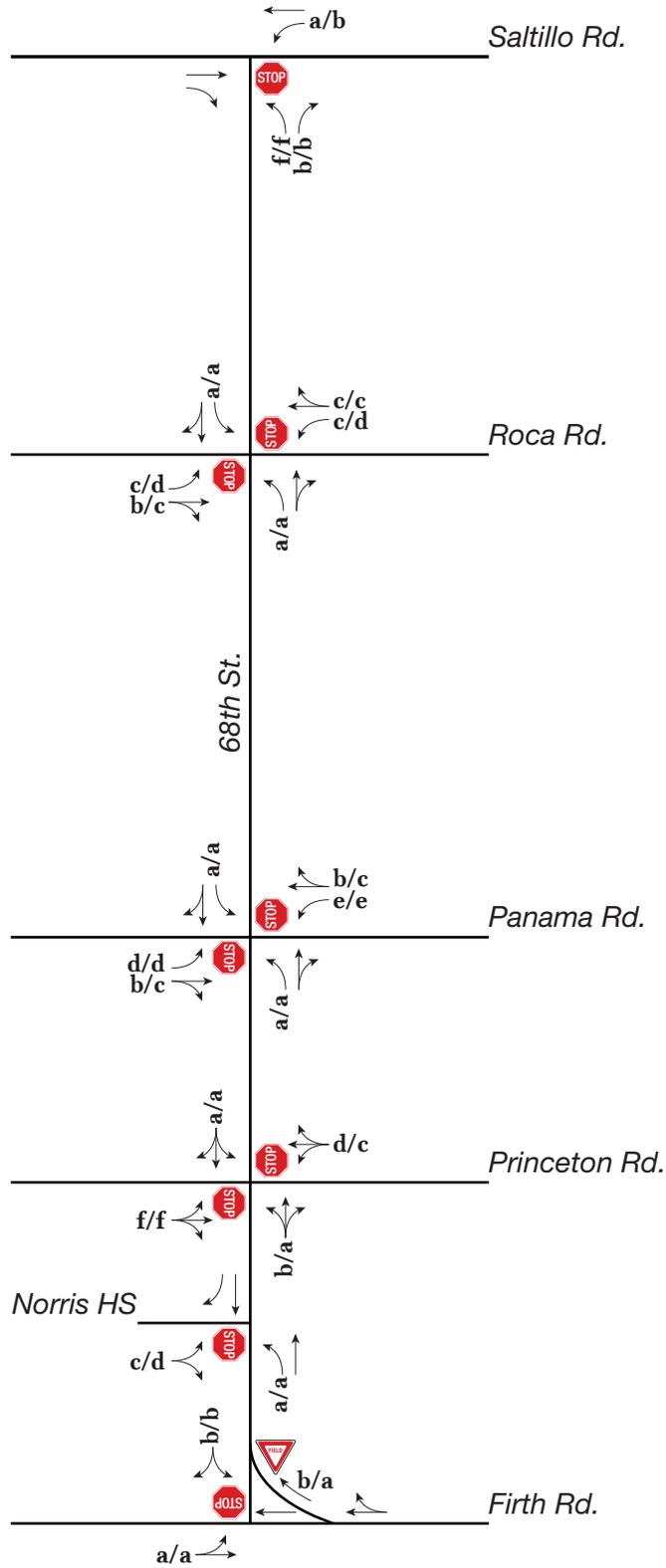


**LEGEND**

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

 = Stop Sign

 = Yield Sign



## IV. FUTURE OPERATIONS

### A. 2040 Future Traffic Volumes

Future year (2040) traffic volume projections 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 2.5% on S. 68<sup>th</sup> Street, Saltillo Road, Norris High School Drive, and Firth Road 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*

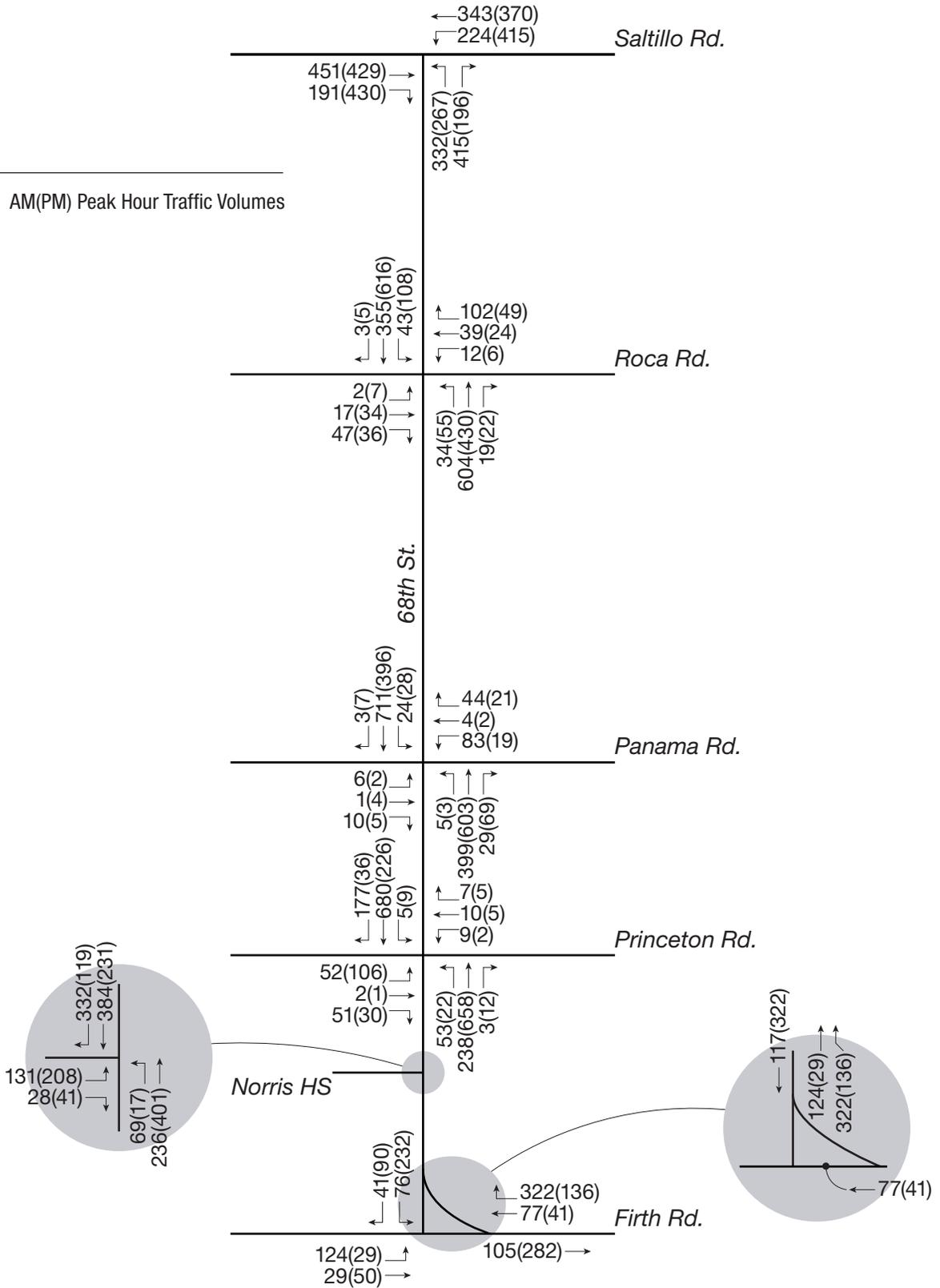
**Table 5** shows the facility type and levels of service for the 2018 existing and 2040 future traffic scenarios. The segments which exceed the capacity thresholds are highlighted in the table. Assuming no improvements are made to S. 68<sup>th</sup> Street and it remains a two-lane surfaced street without turn lanes, all segments exceed the LOS C threshold of 6,000 ADT in both the existing 2018 and future 2040 years.

**Table 5. Roadway Capacity**

Roadway Segment		Facility Type	Threshold ADT (LOS C)	2018 Existing ADT	2040 Future ADT
S. 68 <sup>th</sup> Street	Saltillo Road – Roca Road	2-lane surfaced street, without turn lanes	6,000	6,600	11,360
		2-lane surfaced street, with turn lanes	14,000	6,600	11,360
	Roca Road – Firth Road	2-lane surfaced street, without turn lanes	6,000	6,175	10,630
		2-lane surfaced street, with turn lanes	14,000	6,175	10,630

**LEGEND**

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



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**With the addition of turn lanes along S. 68<sup>th</sup> Street the maximum capacity threshold is estimated at 14,000 ADT. The 2040 future ADT projections for all segments of S. 68<sup>th</sup> Street in the study area would fall below this threshold. As such, a two-lane surfaced roadway with turns lanes is recommended on S. 68<sup>th</sup> Street.**

### **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 85<sup>th</sup> 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 85<sup>th</sup> 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 S. 68<sup>th</sup> Street with Saltillo Road, Roca Road, Panama Road, Princeton Road, Norris High School Drive and Firth 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
Saltillo Road & S. 68 <sup>th</sup> Street	EB Right-Turn Lane	Existing RT Lane	Existing RT Lane	Existing RT Lane	Existing RT Lane
	NB Approach	Existing Two Lane	Existing Two Lane	Existing Two Lane	Existing Two Lane
	WB Left-Turn Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane
S. 68 <sup>th</sup> Street & Roca Road	NB Left-Turn Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane
	NB Right-Turn Lane	NO	NO	YES	YES
	EB Approach	Existing Two Lane	Existing Two Lane	Existing Two Lane	Existing Two Lane
	SB Left-Turn Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane
	SB Right-Turn Lane	NO	NO	NO	NO
	WB Approach	Existing Two Lane	Existing Two Lane	Existing Two Lane	Existing Two Lane
S. 68 <sup>th</sup> Street & Panama Road	NB Left-Turn Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane
	NB Right-Turn Lane	NO	YES	YES	YES
	EB Approach	Existing Two Lane	Existing Two Lane	Existing Two Lane	Existing Two Lane
	SB Left-Turn Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane
	SB Right-Turn Lane	NO	NO	NO	NO
	WB Approach	Existing Two Lane	Existing Two Lane	Existing Two Lane	Existing Two Lane
S. 68 <sup>th</sup> Street & Princeton Road	NB Left-Turn Lane	NO	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	NO	NO
	SB Right-Turn Lane	YES	NO	YES	YES
	WB Approach	One Lane	One Lane	One Lane	One Lane
S. 68 <sup>th</sup> Street & Norris High School	NB Left-Turn Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane	Existing LT Lane
	EB Approach	One Lane	One Lane	Two Lanes	Two Lanes
	SB Right-Turn Lane	Existing RT Lane	Existing RT Lane	Existing RT Lane	Existing RT Lane
S. 68 <sup>th</sup> Street & Firth Road	EB Left-Turn Lane	NO	NO	NO	NO
	WB Right-Turn Lane	Existing RT Lane	Existing RT Lane	Existing RT Lane	Existing RT Lane
	SB Approach	One Lane	One Lane	One Lane	One Lane

In summary, under existing traffic conditions a northbound right-turn lane is warranted at the intersection of S. 68<sup>th</sup> Street with Panama Road. A southbound right-turn lane is also warranted at the intersection of S. 68<sup>th</sup> Street with Princeton Road. By 2040, a northbound right-turn lane would be recommended at the intersection of S. 68<sup>th</sup> Street with Roca Road. A northbound left-turn lane at the intersection of S. 68<sup>th</sup> Street with Princeton Road and an eastbound two-lane approach at the intersection of S. 68<sup>th</sup> Street with Norris High School Drive would also be recommended. 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 S. 68<sup>th</sup> Street were analyzed as rural, high speed intersections.

**Table 7** displays a summary of MUTCD Warrants 1 and 2 for the study intersections. At the intersection of S. 68<sup>th</sup> Street with Saltillo Road, both MUTCD traffic signal Warrant 1 and Warrant 2 are satisfied in 2018 under existing lane configurations. By 2040, MUTCD signal warrants may be satisfied at the intersections of S. 68<sup>th</sup> Street with Roca Road, Princeton Road, and Norris High School Dive. The 2040 warrant evaluation assumes the recommended turn lanes are constructed along S. 68<sup>th</sup> Street and two-lane approaches are provided on the recommended minor roads. At the intersection of S. 68<sup>th</sup> Street with Panama Road and Firth Road, none of the westbound 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
S. 68th & Saltillo Road	Warrant 1	YES	YES
	Warrant 2	YES	YES
S. 68th Street & Roca Road	Warrant 1	NO	YES
	Warrant 2	NO	YES
S. 68th Street & Panama Road	Warrant 1	NO	NO (0% WB rights)
	Warrant 2	NO	NO (0% WB rights)
S. 68th Street & Princeton Road	Warrant 1	NO	YES
	Warrant 2	NO	YES
S. 68th Street & Norris High School	Warrant 1	NO	YES
	Warrant 2	NO	YES
S. 68th Street & Firth Road	Warrant 1	NO (0% WB rights)	NO (0% WB rights)
	Warrant 2	NO (0% WB rights)	NO (0% WB rights)

In summary, the 2018 traffic volumes are sufficient to meet minimum warrants for the installation of a traffic signal under existing lane arrangement at S. 68<sup>th</sup> Street with Saltillo Road. By 2040, traffic signals may be warranted at the intersections of S. 68<sup>th</sup> Street with Roca Road, Princeton Road, and Norris High School. The installation of roundabouts was also considered at the intersections of 68<sup>th</sup> Street with Saltillo Road, Roca Road, and Panama 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.

#### *S. 68<sup>th</sup> Street & Saltillo Road*

Analysis was completed for two scenarios at this intersection. The first scenario includes the installation of a signal. Under 2040 traffic volumes, a signal is anticipated to operate at LOS C for both the AM and PM peak hours. The westbound left-turn lane is anticipated to operate at LOS D during both peak hours. The eastbound shared through/right-turn lane is anticipated to operate at LOS D in the AM peak hour and LOS C in the PM peak hour. The northbound left-turn lane is anticipated to operate at LOS C in the AM peak hour. All other movements are anticipated to operate at LOS B or better for both peak hours.

The second scenario includes the installation of a multi-lane roundabout. With this improvement the intersection is anticipated to operate at LOS B in both the AM and PM peak hours. The northbound approach is anticipated to operate at LOS C during the AM peak hour. All other movements are anticipated to operate at LOS B or better for both peak hours. It is recommended that a multi-lane roundabout be installed instead of a signal.

#### *S. 68<sup>th</sup> Street & Roca Road*

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

#### *S. 68<sup>th</sup> Street & Panama Road*

Analysis was completed for two scenarios at this intersection. The first scenario analyzes Panama Road as a stop-controlled intersection with the addition of a northbound right-turn lane. With this improvement the westbound left-turn lane is anticipated to operate at LOS F in the AM peak hour and LOS D in the PM peak hour. The eastbound left-turn lane is anticipated to operate at LOS D during both peak hours and the eastbound shared through/right-turn lane is anticipated to operate at LOS C during both peak hours. All other movements are anticipated to operate at LOS B or better for both the AM and PM peak hours.

The second scenario includes the installation of a single-lane roundabout. With this improvement the intersection is anticipated to operate at LOS C in the AM peak hour and LOS B in the PM peak hour. The northbound movement is anticipated to operate at LOS C during the PM peak hour and the southbound movement is anticipated to operate at LOS C during the AM peak hour. All other approaches are anticipated to operate at LOS B or better for both peak hours. It is recommended that a single-lane roundabout be installed instead of maintaining the intersection as stop-controlled.

*S. 68<sup>th</sup> Street & Princeton Road*

The intersection was analyzed as a signalized intersection with the addition of a northbound left-turn lane and southbound right-turn lane. With these improvements the intersection is anticipated to operate at LOS B in the AM peak hour and LOS A in the PM peak hour. The eastbound movement 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 during both peak hours.

*S. 68<sup>th</sup> Street & Norris High School Drive*

The intersection was analyzed as a signalized intersection with the addition of a two-lane approach on Norris High School Drive. With these improvements the intersection is anticipated to operate at LOS A in both the AM and PM peak hours. The northbound left-turn lane is anticipated to operate at LOS C in the PM peak hour and the eastbound left-turn lane is anticipated to operate at LOS C in the AM peak hour. All other movements are anticipated to operate at LOS B or better during both peak hours.

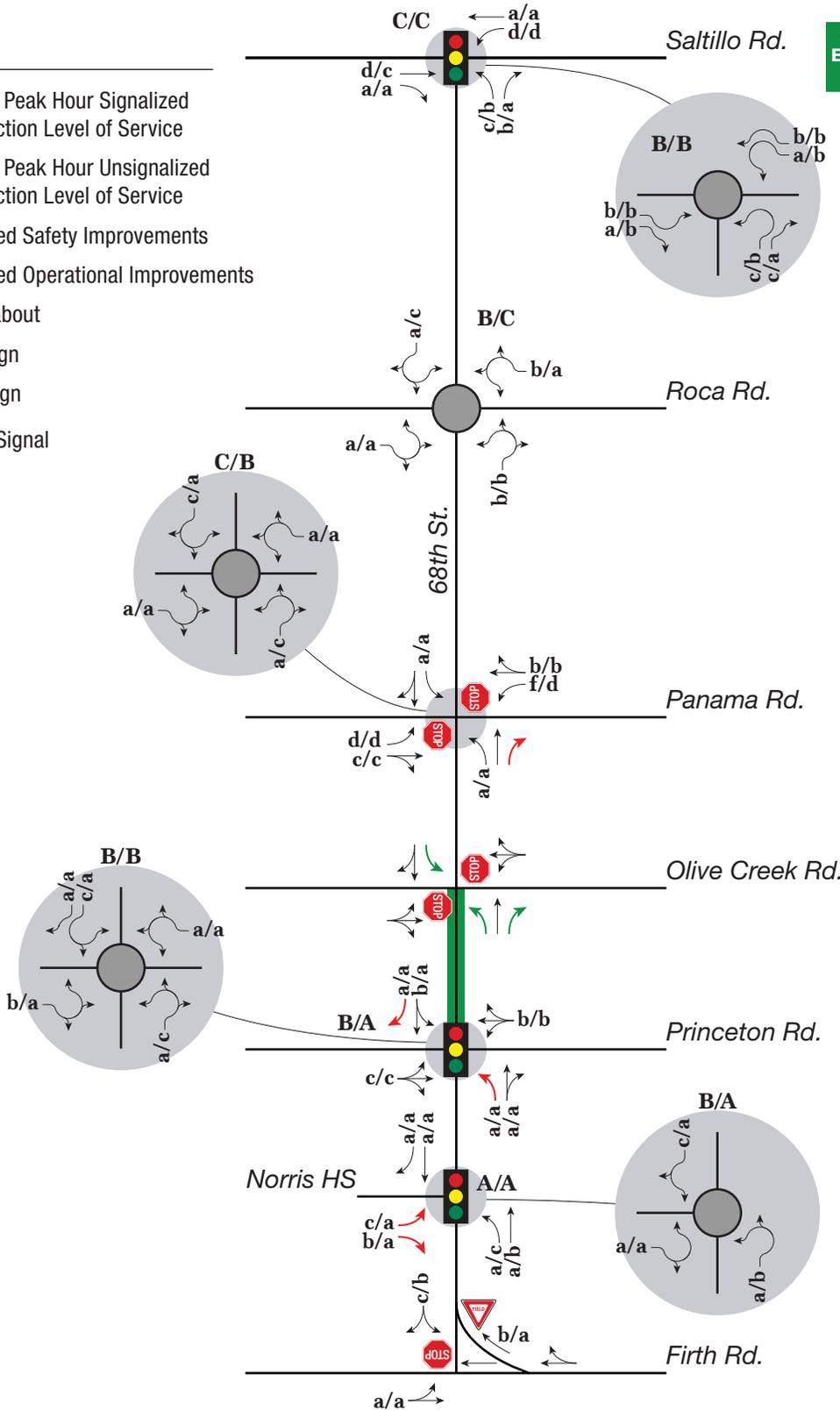
*S. 68<sup>th</sup> Street & Firth Road*

The intersection was analyzed as an unsignalized intersection. The southbound approach is anticipated to operate at LOS C during the AM peak hour. All other approaches are anticipated to operate at LOS B or better during both 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
-  = Roundabout
-  = Stop Sign
-  = Yield Sign
-  = Traffic Signal



**Safety Improvement  
Enhanced Intersection  
Signage**

**Safety Improvement  
Shoulder Widening  
and Turn Lanes**  
**Operational Analysis  
Not Completed**



## V. SAFETY ANALYSIS

### A. Crash History

The crash history on S. 68<sup>th</sup> Street for the period of 1/1/2013 to 2/28/2018 was examined between Firth Road and Saltillo Road (including intersections) to identify crash patterns and 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 61 crashes occurred in segments along with another 50 at the intersections for a total of 111 accidents. There is a higher crash rate than the statewide average on the roadway segments between Firth Road and Olive Creek Road. There are also multiple intersections with higher crash rates than the statewide average, including the intersections of Pella Road and Saltillo Road with S. 68<sup>th</sup> Street, having crash rates more than double the statewide average. In reviewing the crash reports, it was noted that many of the rear end crashes located in the segment between Princeton Road and Olive Creek Road were related to stopped or slowing vehicles at the adjacent intersections. The Accident Rate Analysis and the Collision Diagrams prepared by NDOR are included in the **Appendix**. Crash reports from the City of Lincoln are also included.

**Table 8** summarizes the crash history by severity for each roadway segment between Firth Road and Saltillo 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.

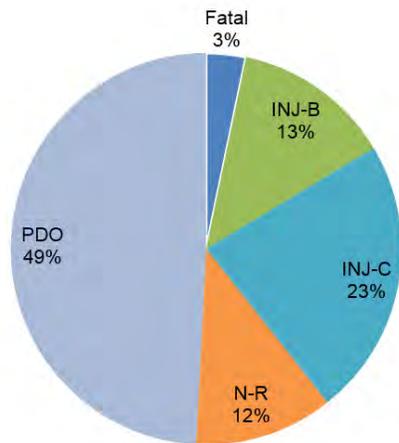
**Table 8. S. 68th Street Segments Crash Summary by Severity**

S. 68th Roadway Segment	Fatal	Injury			N-R	PDO	Totals
		INJ-A	INJ-B	INJ-C			
Firth Rd - Pella Rd	-	-	-	1	-	2	3
Pella Rd - Princeton Rd	-	-	-	-	1	5	6
Princeton Rd - Olive Creek Rd	1	-	3	2	2	3	11
Olive Creek Rd - Panama Rd	-	-	-	-	-	1	1
Panama Rd - Stagecoach Rd	-	-	-	-	-	1	1
Stagecoach Rd - Hickman Rd/7th St	-	-	-	2	1	2	5
Hickman Rd/7th St - Martell Rd	-	-	5	2	-	1	8
Martell Rd - Roca Rd	-	-	-	4	-	5	9
Roca Rd - Wittstruck Rd	1	-	-	-	2	3	6
Wittstruck Rd - Bennet Rd	-	-	-	2	1	4	7
Bennet Rd - Saltillo Rd	-	-	-	1	-	3	4
<b>Totals</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>14</b>	<b>7</b>	<b>30</b>	<b>61</b>

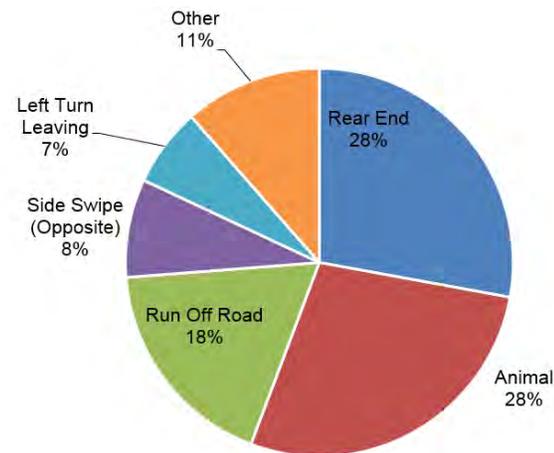
**Table 9. S. 68th Street Segments Crash Summary by Type**

S. 68th Roadway Segment	Rear End	Side Swipe (Same)	Side Swipe (Opp)	Right-Angle	Left Turn Leaving	Backing	Run Off Road	Animal	Totals
Firth Rd - Pella Rd	1	-	-	-	-	-	1	1	3
Pella Rd - Princeton Rd	1	-	-	2	1	-	-	2	6
Princeton Rd - Olive Creek Rd	7	-	-	-	-	-	2	2	11
Olive Creek Rd - Panama Rd	-	-	1	-	-	-	-	-	1
Panama Rd - Stagecoach Rd	-	-	-	-	-	-	-	1	1
Stagecoach Rd - Hickman Rd/7th St	4	-	-	-	-	1	-	-	5
Hickman Rd/7th St - Martell Rd	2	-	2	-	3	-	1	-	8
Martell Rd - Roca Rd	1	1	2	1	-	-	4	-	9
Roca Rd - Wittstruck Rd	-	-	-	-	-	-	1	5	6
Wittstruck Rd - Bennet Rd	1	-	-	-	-	-	2	4	7
Bennet Rd - Saltillo Rd	-	2	-	-	-	-	-	2	4
<b>Totals</b>	<b>17</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>11</b>	<b>17</b>	<b>61</b>

**Figure 7. Segment Crashes - Severity**



**Figure 8. Segment Crashes - Type**



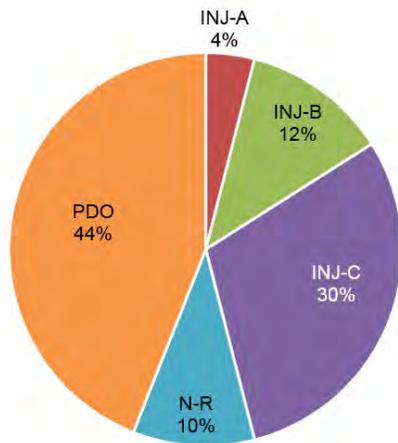
**Table 10. S. 68<sup>th</sup> Street Intersections Crash Summary by Severity**

Intersecting Roadway	Fatal	Injury			N-R	PDO	Totals
		INJ-A	INJ-B	INJ-C			
Firth Rd				1			1
Pella Rd			1	1			2
Princeton Rd				1			1
Olive Creek Rd			1	2		2	5
Panama Rd							0
Stagecoach Rd							0
Wagon Train Rd				1		1	2
1st St						1	1
2nd St				1			1
Hickman Rd/7th St			2	3	1	8	14
Woodland Blvd						1	1
Martell Rd				1		1	2
Roca Rd		1		1		1	3
Wittstruck Rd							0
Bennet Rd							0
Saltillo Rd		1	2	3	4	7	17
<b>Totals</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>15</b>	<b>5</b>	<b>22</b>	<b>50</b>

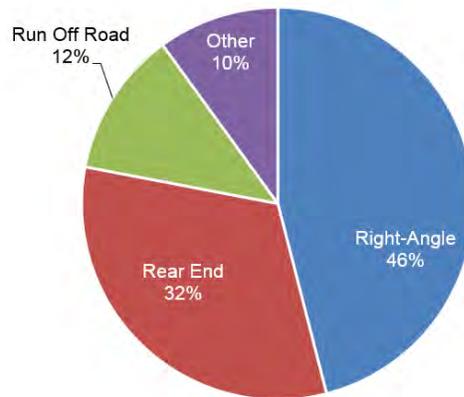
**Table 11. S. 68<sup>th</sup> Street Intersections Crash Summary by Type**

Intersecting Roadway	Rear End	Side Swipe (Same)	Side Swipe (Opposite)	Right-Angle	Left Turn Leaving	Run Off Road	Totals
Firth Rd					1		1
Pella Rd	2						2
Princeton Rd	1						1
Olive Creek Rd	3		1			1	5
Panama Rd							0
Stagecoach Rd							0
Wagon Train Rd						2	2
1st St						1	1
2nd St	1						1
Hickman Rd/7th St	1			11	1	1	14
Woodland Blvd	1						1
Martell Rd		1		1			2
Roca Rd		1		2			3
Wittstruck Rd							0
Bennet Rd							0
Saltillo Rd	7			9		1	17
<b>Totals</b>	<b>16</b>	<b>2</b>	<b>1</b>	<b>23</b>	<b>2</b>	<b>6</b>	<b>50</b>

**Figure 9. Intersection Crashes - Severity**

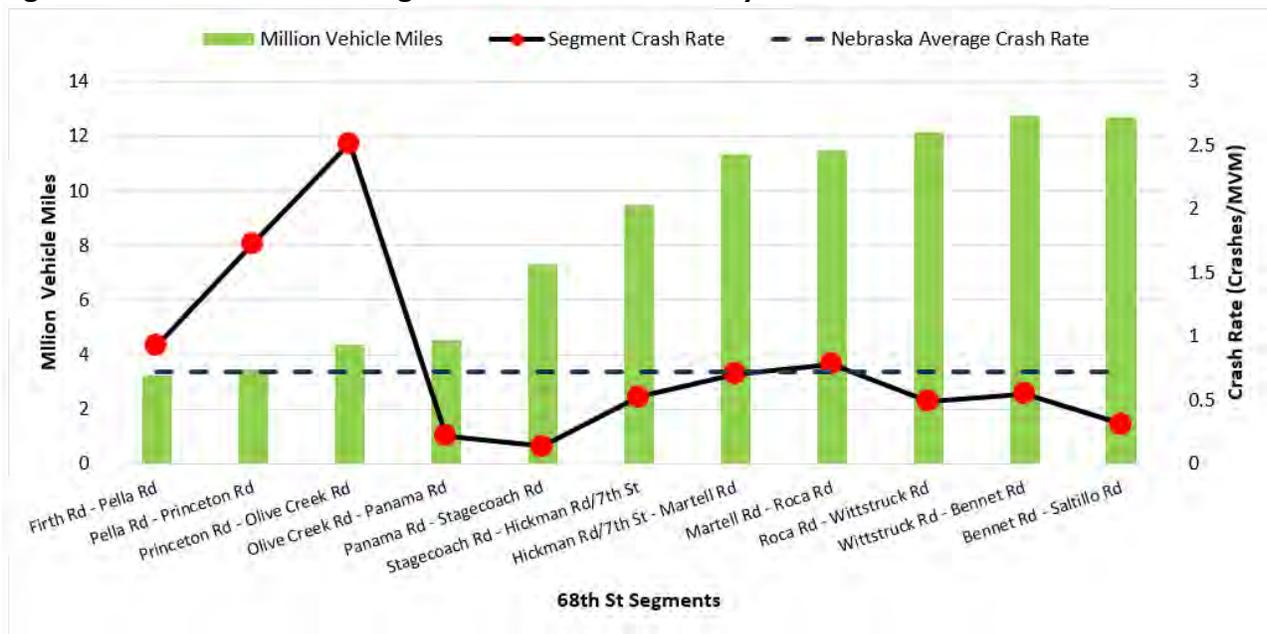


**Figure 10. Intersection Crashes - Type**



**Figure 11** displays the breakdown of crash rates by segment from Firth Road to Saltillo 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. S. 68<sup>th</sup> Street Segment Crash Rate Summary**



**Figure 12. S. 68<sup>th</sup> Street Intersection Crash Rate Summary**

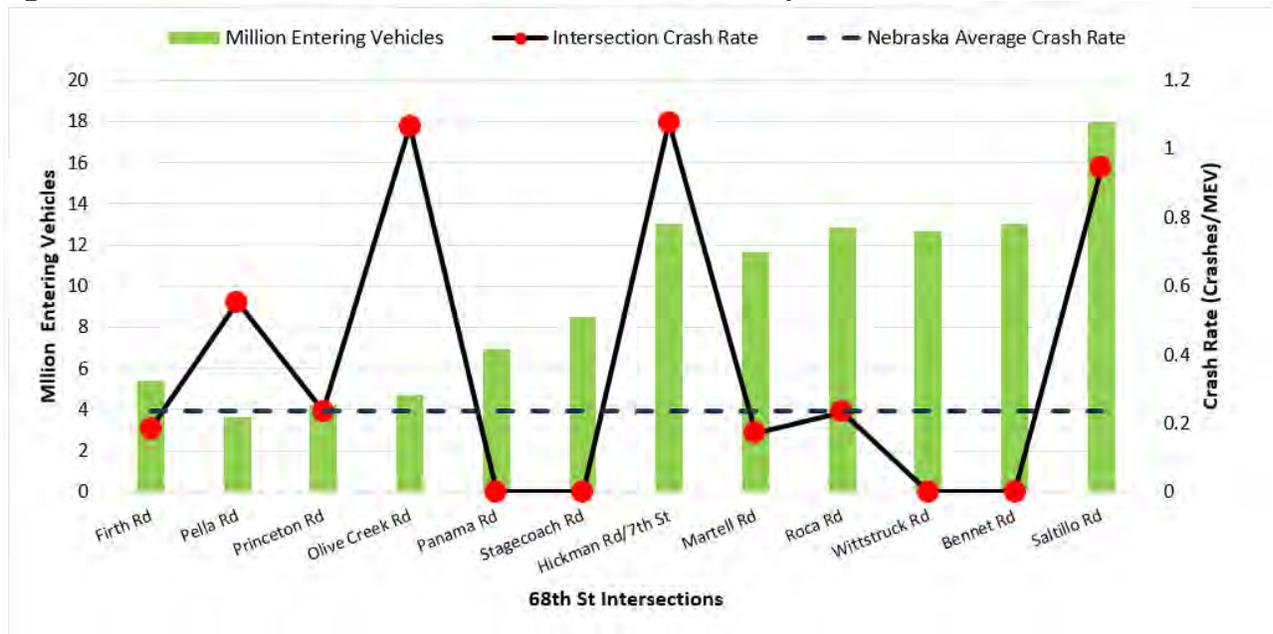
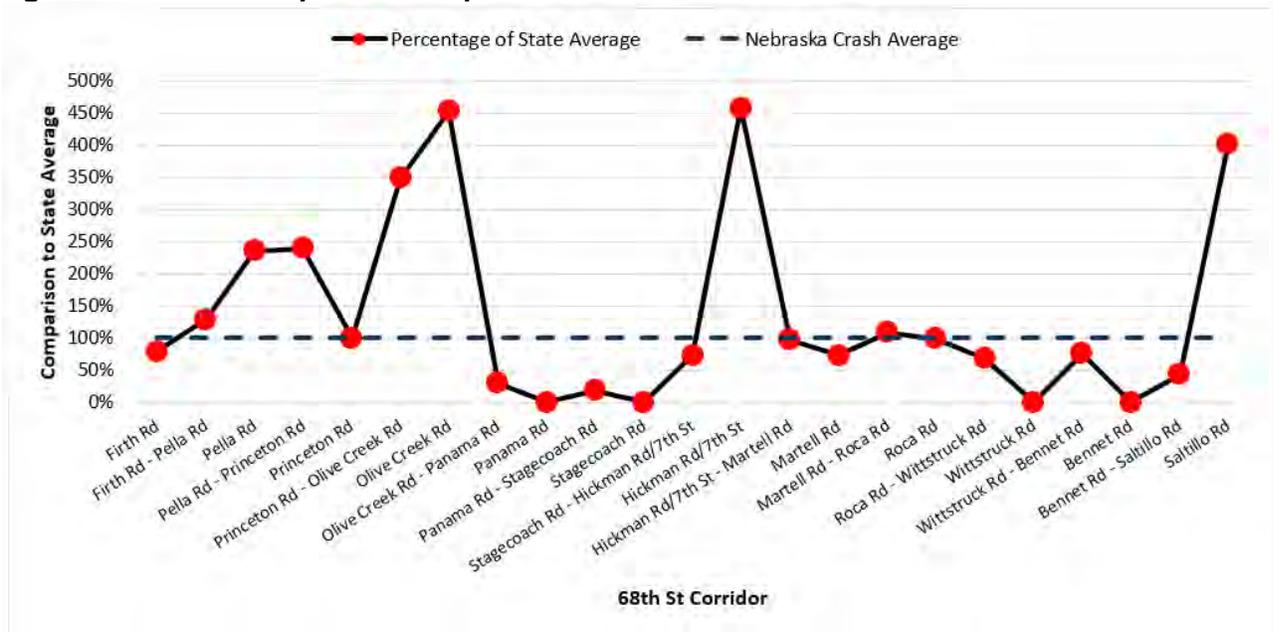


Figure 13 gives a visual representation for both facility types compared to their respective state averages. The graph shows three intersections that are of concern with much higher than average crash rates; the Olive Creek Road intersection, the Hickman Road, and the Saltillo Road intersection. Additionally, the southern segments between Pella Road and Olive Creek Road are higher than the state average.

**Figure 13. Roadway Crash Comparison**



## **B. Proposed Improvements**

Based on the existing traffic operations and crash patterns, countermeasures were analyzed to improve safety along S. 68<sup>th</sup> Street between Firth Road and Saltillo Road.

### Countermeasure 1: Saltillo Road Enhanced Intersection Signage

There is a high frequency of angle crashes at the intersection of S. 68<sup>th</sup> Street with Saltillo Road. 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. This would be an interim measure until the realignment of S. 68<sup>th</sup> Street and construction of a roundabout begins as part of the South Beltway project.

### Countermeasure 2: Construct Shoulder Princeton Road – Olive Creek Road, Turn Lanes on Both Approaches at Olive Creek Road

There is a high frequency of crashes at the intersection of S. 68<sup>th</sup> Street with Olive Creek Road as well as between Princeton Road and Olive Creek Road. Many of these crashes are due to the vehicle curve (hill crest) and downgrade on the northbound approach to Olive Creek Road. Northbound left and right-turning lanes should be constructed on the northbound approach to Olive Creek Road. In addition, a southbound left-turning lane should be constructed as well. These recommendations are included on **Figure 6**. To implement left and right-turning lanes the roadway would need to be widened by 24 feet at the intersections of S. 68<sup>th</sup> Street and Olive Creek Road. Standard storage and taper lengths were utilized. Additionally, the shoulders on both sides of the corridor between Princeton Road and Olive Creek Road should be widened to 6’ and paved with safety edges and rumble strips.

## **C. Project Costs**

Based on a planning level cost estimate for the proposed improvements, the overall cost for Countermeasure 1 is estimated at approximately **\$5,000**.

The addition of a southbound left-turn lane and northbound left and right-turn lanes on S. 68<sup>th</sup> Street at Olive Creek Road and shoulder widening between Princeton Road and Olive Creek Road is estimated to cost **\$1,450,000**. 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. Installing additional intersection signage and markings at the intersection of S. 68<sup>th</sup> Street and Saltillo Road will help to reduce the angle crashes occurring at this location.

Constructing turn lanes for the northbound approach to Olive Creek Road will help to reduce rear-end crashes occurring at this intersection. This will in turn reduce additional rear-ends occurring south of the intersection as the crash history shows that a single incident at this location can lead to multiple other incidents, resulting in multi-car collisions. The 6’ shoulders will help to reduce the run-off-the-road crashes occurring along this segment. Additionally, the shoulders may help to reduce crashes caused by vehicles turning into private driveways along the segment. Although not a full turn lane, it does give right-turning vehicles an opportunity to pull slightly out of traffic while slowing to turn.

## **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: Saltillo Road Enhanced Intersection Signage

The cost for Countermeasure 1 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 12** summarizes the benefit-cost calculations for the Countermeasure 1, resulting in a B/C of **216.22**.

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

Average Cost/Crash (1/2013 through 2/2018 average weighting crash type)	\$ 238,400
Value of Avoided Crashes, <b>BENEFIT</b>	\$ 2,162,233
Value of Associated Cost, <b>COST</b>	\$ 10,000
<b>Crash Type Benefit/Cost Ratio</b>	<b>216.22</b>

Enhanced intersection signage is anticipated to provide a positive benefit/cost value from a crash type standpoint. This countermeasure is anticipated to mitigate nine 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.

#### Countermeasure 2: Construct Shoulder Princeton Road – Olive Creek Road, Turn Lanes on the Northbound Approach at Olive Creek Road

The cost for Countermeasure 2 was estimated at \$1,164,390 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 installation of right and left-turn lanes. For installing left-turn lanes on the major approach a 0.520 CMF (CMF ID 268) was applied to all crash types that would be mitigated by this treatment. For installing right-turn lanes on the major approach a 0.740 CMF (CMF ID 289) was applied to all crash types that would be mitigated by this treatment.

For the shoulder widening a 0.580 CMF (CMF ID 5409) was used for Run Off Road type crashes. A CMF of 0.340 (CMF ID 5312) was utilized for the shoulder rumble strips. **Table 13** summarizes the benefit-cost calculations for the Countermeasure 2, resulting in a B/C of **1.40**.

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

Average Cost/Crash (1/2013 through 2/2018 average weighting crash type)	\$ 97,986
Value of Avoided Crashes, <b>BENEFIT</b>	\$ 1,914,140
Value of Associated Cost, <b>COST</b>	\$ 1,364,390
<b>Crash Type Benefit/Cost Ratio</b>	<b>1.40</b>

Improvements associated with the shoulder widening and turn lanes are anticipated to provide a positive benefit/cost value from a crash type standpoint. This countermeasure is anticipated to mitigate over 19 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**.

#### **F. Systemic Countermeasures**

According to the Federal Highway Administration (FHWA), “systemic” improvements focus on high-risk most serious crash types on the entire road system, not just at specific high-spot locations. This leads to widespread implementation of projects to reduce the potential for severe crashes. Due to the number of run off the road crashes, it is recommended that S. 68<sup>th</sup> Street in the study area be widened to a 28’ top with rumble strips along the edge of the road and 4’ turf shoulders should the road ever need to be repaved due to pavement conditions. It is further recommended that separate left turn lanes be included in S. 68<sup>th</sup> Street paving at all county road intersections where none exist today. In addition to Olive Creek Road, this would include the intersections of Martell Road, Princeton Road, and Pella Road.

Due the number of crashes involving student drivers on S. 68<sup>th</sup> Street, 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.

#### S. 68<sup>th</sup> Street and Saltillo Road

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. S. 68th St and Saltillo Rd – Enhanced Intersection Signage**

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

#### S. 68<sup>th</sup> Street and Olive Creek Road

The installation of a northbound left-turn and right-turn is anticipated to cost approximately \$235,980 in 2018 dollars. **Table 15** displays the estimated project cost. The installation of a southbound left-turn and right-turn is anticipated to cost approximately \$133,760 in 2018 dollars. **Table 16** displays the estimated project cost.

**Table 15. S. 68th St and Olive Creek Rd – NB Left and Right Turn Lanes**

Category	2018 Cost
Grading	\$ 17,750.00
Pavement	\$ 76,800.00
Storm Sewer & Culverts	\$ 18,910.00
Signing and Striping	\$ 9,360.00
Mobilization	\$ 5,000.00
Traffic Control	\$ 5,000.00
Right of Way	\$ 22,000.00
Utilities	\$ 9,455.00
Construction SubTotal	\$ 164,280.00
Contingency (20%)	\$ 32,900.00
Survey (2%)	\$ 3,300.00
Engineering Services (10%)	\$ 19,700.00
Construction Services (8%)	\$ 15,800.00
<b>Total Project Costs</b>	<b>\$ 235,980.00</b>

**Table 16. S. 68th St and Olive Creek Rd – SB Left Turn Lane**

Category	2018 Cost
Grading	\$ 12,050.00
Pavement	\$ 38,400.00
Storm Sewer & Culverts	\$ 10,090.00
Signing and Striping	\$ 7,577.75
Mobilization	\$ 5,000.00
Traffic Control	\$ 5,000.00
Right of Way	\$ 10,000.00
Utilities	\$ 5,045.00
Construction SubTotal	\$ 133,760.00
Contingency (20%)	\$ 18,600.00
Survey (2%)	\$ 1,900.00
Engineering Services (10%)	\$ 11,200.00
Construction Services (8%)	\$ 8,900.00
<b>Total Project Costs</b>	<b>\$ 133,760.00</b>

*S. 68<sup>th</sup> Street - Olive Creek Road to Princeton Road*

The installation of a paved shoulder and rumbles strips along S. 68<sup>th</sup> Street from Olive Creek Road to Princeton Road is anticipated to cost approximately \$1,164,390 in 2018 dollars. **Table 17** displays the estimated project cost.

**Table 17. S. 68th St - Olive Creek Rd to Princeton Rd – Shoulders**

Category	2018 Cost
General/Earthwork	\$ 180,000.00
Paving	\$ 341,920.00
Pavement Marking Items	\$ 3,300.00
Storm Drainage (20% of Construction)	\$ 115,040.00
Erosion Control	\$ 50,000.00
Miscellaneous Items	\$ 86,000.00
Construction SubTotal	\$ 776,260.00
Contingency (20%)	\$ 155,250.00
Utilities (5%)	\$ 46,575.00
Survey (2%)	\$ 18,630.00
Engineering Services (10%)	\$ 93,151.00
Construction Services (8%)	\$ 74,520.00
<b>Total Project Costs</b>	<b>\$ 1,164,390.00</b>
<i>*Note: Assumes ROW impacts will be determined during Preliminary Engineering</i>	

**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.

*S. 68<sup>th</sup> Street and Saltillo Road*

The installation of a traffic signal is anticipated to cost approximately \$176,500 in 2018 dollars.

**Table 18** displays the estimated project cost. The construction of a roundabout is anticipated to cost approximately \$965,130 in 2018 dollars. **Table 19** displays the estimated project cost.

**Table 18. S. 68th St and Saltillo 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
<b>Total Project Costs</b>	<b>\$ 176,500.00</b>

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

**Table 19. S. 68th St and Saltillo Rd – Roundabout**

Category	2018 Cost
Grading	\$ 73,790.00
Pavement	\$ 342,000.00
Storm Sewer & Culverts	\$ 83,158.00
Signing and Striping	\$ 34,200.00
Mobilization	\$ 42,700.00
Traffic Control	\$ 26,700.00
Right of Way	\$ 28,000.00
Utilities	\$ 41,579.00
Construction SubTotal	\$ 672,130.00
Contingency (20%)	\$ 134,400.00
Survey (2%)	\$ 13,400.00
Engineering Services (10%)	\$ 80,700.00
Construction Services (8%)	\$ 64,500.00
<b>Total Project Costs</b>	<b>\$ 965,130.00</b>

*S. 68<sup>th</sup> Street and Roca Road*

The construction of a roundabout is anticipated to cost approximately \$788,970 in 2018 dollars.

**Table 20** displays the estimated project cost.

**Table 20. S. 68th St and Roca Rd – Roundabout**

Category	2018 Cost
Grading	\$ 64,700.00
Pavement	\$ 261,000.00
Storm Sewer & Culverts	\$ 65,140.00
Signing and Striping	\$ 26,100.00
Mobilization	\$ 33,400.00
Traffic Control	\$ 20,800.00
Right of Way	\$ 45,760.00
Utilities	\$ 32,570.00
Construction SubTotal	\$ 549,470.00
Contingency (20%)	\$ 109,900.00
Survey (2%)	\$ 11,000.00
Engineering Services (10%)	\$ 65,900.00
Construction Services (8%)	\$ 52,700.00
<b>Total Project Costs</b>	<b>\$ 788,970.00</b>

*S. 68<sup>th</sup> Street and Panama Road*

The installation of a northbound right-turn lane is anticipated to cost approximately \$130,210 in 2018 dollars. **Table 21** displays the estimated project cost. The construction of a roundabout is anticipated to cost approximately \$719,940.00 in 2018 dollars. **Table 22** displays the estimated project cost.

**Table 21. S. 68th St and Panama Rd – NB Right Turn Lane**

Category	2018 Cost
Grading	\$ 11,700.00
Pavement	\$ 38,400.00
Storm Sewer & Culverts	\$ 10,020.00
Signing and Striping	\$ 7,577.75
Mobilization	\$ 5,000.00
Traffic Control	\$ 5,000.00
Right of Way	\$ 8,000.00
Utilities	\$ 5,010.00
Construction SubTotal	\$ 90,710.00
Contingency (20%)	\$ 18,100.00
Survey (2%)	\$ 1,800.00
Engineering Services (10%)	\$ 10,900.00
Construction Services (8%)	\$ 8,700.00
<b>Total Project Costs</b>	<b>\$ 130,210.00</b>

**Table 22. S. 68th St and Panama Rd – Roundabout**

Category	2018 Cost
Grading	\$ 54,215.00
Pavement	\$ 240,000.00
Storm Sewer & Culverts	\$ 58,843.00
Signing and Striping	\$ 24,000.00
Mobilization	\$ 30,200.00
Traffic Control	\$ 18,900.00
Right of Way	\$ 45,760.00
Utilities	\$ 29,421.50
Construction SubTotal	\$ 719,940.00
Contingency (20%)	\$ 100,300.00
Survey (2%)	\$ 10,000.00
Engineering Services (10%)	\$ 60,200.00
Construction Services (8%)	\$ 48,100.00
<b>Total Project Costs</b>	<b>\$ 719,940.00</b>

*S. 68<sup>th</sup> Street and Princeton Road*

The addition of a northbound left-turn lane and southbound right-turn is anticipated to cost approximately \$217,520 in 2018 dollars. **Table 23** displays the estimated project cost. The installation of a traffic signal is anticipated to cost approximately \$176,500 in 2018 dollars. **Table 24** displays the estimated project cost. The construction of a roundabout is anticipated to cost approximately \$595,880 in 2018 dollars. **Table 25** displays the estimated project cost.

**Table 23. S. 68th St and Princeton Rd – Turn Lanes**

Category	2018 Cost
Grading	\$ 17,550.00
Pavement	\$ 76,800.00
Storm Sewer & Culverts	\$ 18,870.00
Signing and Striping	\$ 14,465.00
Mobilization	\$ 5,000.00
Traffic Control	\$ 5,000.00
Right of Way	\$ 4,400.00
Utilities	\$ 9,435.00
Construction SubTotal	\$ 151,520.00
Contingency (20%)	\$ 30,300.00
Survey (2%)	\$ 3,000.00
Engineering Services (10%)	\$ 18,200.00
Construction Services (8%)	\$ 9,435.00
<b>Total Project Costs</b>	<b>\$ 217,520.00</b>

**Table 24. S. 68th St and Princeton 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
<b>Total Project Costs</b>	<b>\$ 176,500.00</b>

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

**Table 25. S. 68th St and Princeton Rd – Roundabout**

Category	2018 Cost
Grading	\$ 31,400.00
Pavement	\$ 212,400.00
Storm Sewer & Culverts	\$ 48,760.00
Signing and Striping	\$ 21,240.00
Mobilization	\$ 25,100.00
Traffic Control	\$ 15,700.00
Right of Way	\$ 36,000.00
Utilities	\$ 24,380.00
Construction SubTotal	\$ 414,980.00
Contingency (20%)	\$ 83,000.00
Survey (2%)	\$ 8,300.00
Engineering Services (10%)	\$ 49,800.00
Construction Services (8%)	\$ 39,800.00
<b>Total Project Costs</b>	<b>\$ 595,880.00</b>

*S. 68<sup>th</sup> Street and Norris HS Drive*

The addition of a two-lane eastbound approach is anticipated to cost approximately \$111,040 in 2018 dollars. **Table 26** displays the estimated project cost. The installation of a traffic signal is anticipated to cost approximately \$176,500 in 2018 dollars. **Table 27** displays the estimated project cost. The construction of a roundabout is anticipated to cost approximately \$615,370 in 2018 dollars. **Table 28** displays the estimated project cost.

**Table 26. S. 68th St and Norris HS Dr – Eastbound 2-Lane Approach**

Category	2018 Cost
Grading	\$ 11,550.00
Pavement	\$ 49,830.00
Storm Sewer & Culverts	\$ 12,889.80
Utilities	\$ 3,069.00
Construction SubTotal	\$ 77,340.00
Contingency (20%)	\$ 15,500.00
Survey (2%)	\$ 1,500.00
Engineering Services (10%)	\$ 9,300.00
Construction Services (8%)	\$ 7,400.00
<b>Total Project Costs</b>	<b>\$ 111,040.00</b>
<i>**No ROW is anticipated as part of this project.</i>	

**Table 27. S. 68th St and Norris HS Dr – 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
<b>Total Project Costs</b>	<b>\$ 176,500.00</b>

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

**Table 28. S. 68th St and Norris HS Dr – Roundabout**

Category	2018 Cost
Grading	\$ 39,500.00
Pavement	\$ 212,400.00
Storm Sewer & Culverts	\$ 50,380.40
Signing and Striping	\$ 21,240.00
Mobilization	\$ 25,900.00
Traffic Control	\$ 16,200.00
Right of Way	\$ 37,760.00
Utilities	\$ 25,190.00
Construction SubTotal	\$ 428,570.00
Contingency (20%)	\$ 85,700.00
Survey (2%)	\$ 8,600.00
Engineering Services (10%)	\$ 51,400.00
Construction Services (8%)	\$ 25,190.00
<b>Total Project Costs</b>	<b>\$ 615,370.00</b>

### 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 S. 68<sup>th</sup> 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 \$9,803,640 in 2018 dollars. **Table 29** displays the estimated project cost.

**Table 29. S. 68th St – Shoulders**

Category	2018 Cost
General/Earthwork	\$ 1,225,000.00
Paving	\$ 3,740,000.00
Pavement Marking Items	\$ 34,800.00
Storm Drainage (20% of Construction)	\$ 1,014,960.00
Erosion Control	\$ 75,000.00
Miscellaneous Items	\$ 446,000.00
Construction SubTotal	\$ 6,535,760.00
Contingency (20%)	\$ 1,307,150.00
Utilities (5%)	\$ 392,150.00
Survey (2%)	\$ 156,860.00
Engineering Services (10%)	\$ 784,290.00
Construction Services (8%)	\$ 627,430.00
<b>Total Project Costs</b>	<b>\$ 9,803,640.00</b>
<i>*Note: Assumes ROW impacts will be determined during Preliminary Engineering</i>	

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## 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 posted speed limit on S. 68<sup>th</sup> Street, outside of the City of Hickman, from Saltillo Road to Firth Road remain at 55 mph. With the excessive vehicular speeds recorded along this corridor, it is recommended that strategic law enforcement be used during the primary crash periods to deter speeding. These efforts should be focused on the North #1 (Saltillo Road to Wittstruck Road) and South Central #4 segments (Panama Road to Princeton Road).
2. It is also recommended that additional Speed Limit signs be posted along S. 68<sup>th</sup> Street at the intersections with Bennet Road, Wittstruck Road, Panama Road, Olive Creek Road, Pella Road, and Firth Road.
3. Based on the existing traffic operations and crash patterns, it is recommended that northbound left and right-turning lanes should be constructed on the northbound approach to Olive Creek Road. In addition, a southbound left-turning lane should be constructed as well. To implement left and right-turning lanes the roadway would need to be widened by 24 feet at the intersections of S. 68<sup>th</sup> Street and Olive Creek Road. Standard storage and taper lengths were utilized. Additionally, the shoulders on both sides of the corridor between Princeton Road and Olive Creek Road should be widened to 6' and paved with safety edges and rumble strips.
4. Based on the existing traffic operations and crash patterns, additional intersections signage such as solar LED Stop Sign, is recommended at the intersection of S. 68<sup>th</sup> Street and Saltillo Road. This would operate until S. 68<sup>th</sup> Street is realigned and a multi-lane roundabout is installed at S. 70<sup>th</sup> Street as part of the South Beltway project.
5. Current and projected future traffic volumes along S. 68<sup>th</sup> Street exceed the capacity threshold for a two-lane roadway without turn lanes set by the Lincoln MPO. It is recommended that a project be programmed to add turn lanes at major intersections and future access location along S. 68<sup>th</sup> Street from Saltillo Road to Firth Road.
6. Due to the number of run off the road crashes, it is recommended that S. 68<sup>th</sup> street in the study area be widened to a 28' top with rumble strips along the edge of the road and 4' turf shoulders should the road ever need to be repaved due to pavement conditions.

### Longer Term Improvements

1. It is recommended that the intersection of S. 68<sup>th</sup> St with Princeton Road be monitored for a traffic signal. This would need to include a northbound left-turn lane and southbound right-turn lane.
2. At the intersections of S. 68<sup>th</sup> Street with Roca Road and Panama Road, it is recommended that a single-lane roundabout be installed.
3. It is recommended that the intersection of S. 68<sup>th</sup> with Norris High School Drive be monitored for a traffic signal. This would need to include a two-lane approach on the west leg.

**APPENDIX**

SPEED STUDY

TRAFFIC COUNT DATA

CAPACITY ANALYSIS WORKSHEETS

MUTCD SIGNAL WARRANTS

AUXILIARY TURN LANE WARRANTS

CRASH HISTORY

BCA WORKSHEETS

DETAILED COST ESTIMATES

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**SPEED STUDY**



## MEMORANDUM

**TO:** Pam Dingman, Lancaster County Engineer

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

**DATE:** August 7, 2018

**SUBJECT:** S. 68<sup>th</sup> Street Speed Studies Memo

This memo summarizes the results of the speed study analysis completed by Felsburg Holt & Ullevig (FHU). The study identified the 85<sup>th</sup> percentile speeds along S. 68<sup>th</sup> Street and compared them to the posted speed limit. The location of the project in relationship to the surrounding roadway network is identified on **Figure 1**. In the study area, S. 68<sup>th</sup> Street is a two-lane undivided roadway with a posted speed limits of 55, 45, and 35 miles per hour (mph) as shown on **Figure 2**. There are varying roadway designs along S. 68<sup>th</sup> Street:

- Two-lane road with unpaved shoulders from Firth Road to 580 feet south of Stagecoach Road,
- Two-lane road with a curb and gutter from 580 feet south of Stagecoach Road to 500 feet north of Wagon Train Road over the BNSF Railway tracks,
- Two-lane urban road with an unpaved shoulder through Hickman,
- Two-lane road with an earth shoulder approximately 300 feet north of Woodland Boulevard to just south of Roca Road, and
- Paved shoulders are provided from just south of Roca Road to Saltillo Road.

FHU used data collection vendor MNRG to collect speed data at five locations, as shown on **Figure 2**, on S. 68<sup>th</sup> Street:

- 887 feet south of Bennet Road (North #1),
- 559 feet south of Leisure Lane (North Central #2),
- 1,346 feet south of Stagecoach Road (Central #3),
- 1,825 feet south of Olive Creek Road (South Central #4), and
- 1,837 feet south of Pella Road (South #5).

Data was collected for a three-hour period from 7:00 AM – 10:00 AM and five-hour periods from 2:00 PM – 7:00 PM. The studies were completed on either April 24<sup>th</sup>, April 25<sup>th</sup>, May 1<sup>st</sup>, or May 17<sup>th</sup>.

## Methodology

To collect speed data at the five 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*

## 85<sup>th</sup> 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
S. 68 <sup>th</sup> Street	North #1	66.95	65.39	58.39	48.93
S. 68 <sup>th</sup> Street	North Central #2	59.09	59.50	53.91	56.00
S. 68 <sup>th</sup> Street	Central #3	54.60	66.90	52.00	54.58
S. 68 <sup>th</sup> Street	South Central #4	69.72	66.16	55.18	48.68
S. 68 <sup>th</sup> Street	South #5	62.01	61.60	59.37	54.14
Directional Average		62.47	63.91	55.77	52.07
Overall Roadway Average		63.19		53.92	

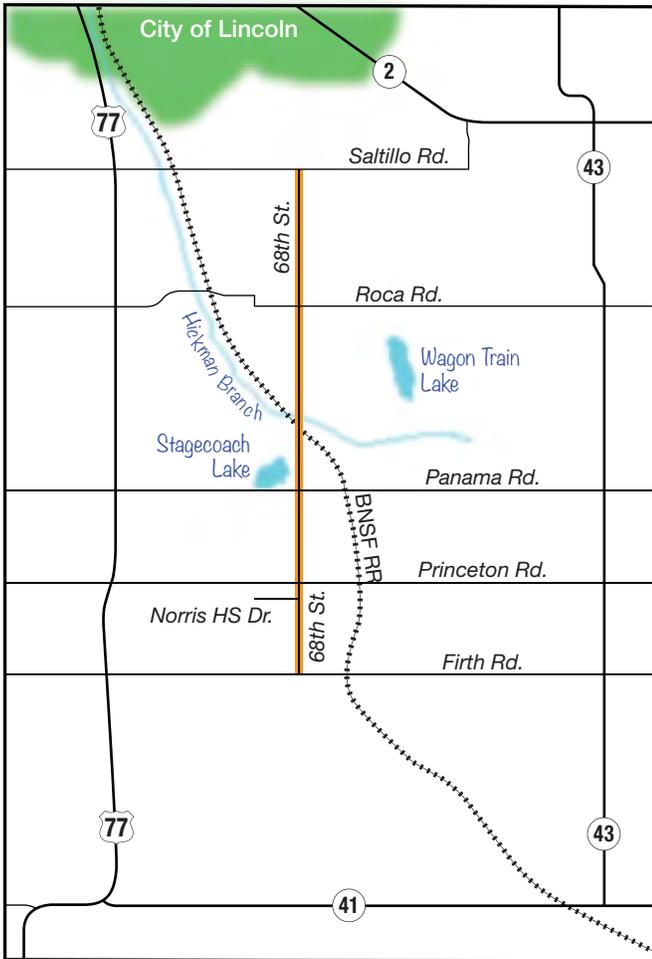
## Recommendation

Typically, a good indicator of what the posted speed limit should be set at is the 85<sup>th</sup> 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 50<sup>th</sup> percentile speed, traffic volume, crash history, frequency of access points, sight distance, and pedestrian activity.

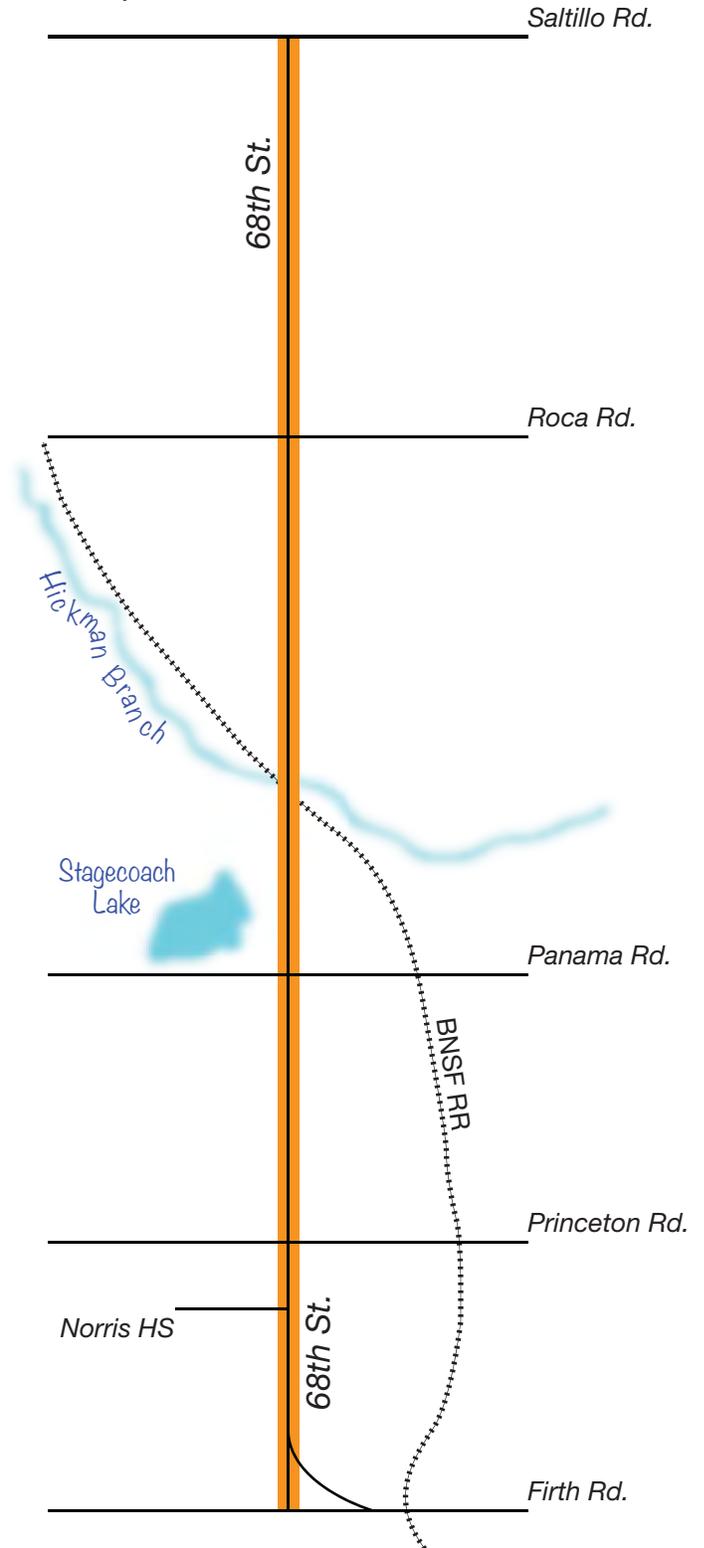
As a tool to help assist in determining the appropriate posted speed limit for S. 68<sup>th</sup> Street, FHU utilized the Federal Highway Administration's (FHWA) USLIMIT2 tool. The tool completes a statistical analysis based on several roadway specific inputs including current speed limit, roadway features, 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 posted speed limit on S. 68<sup>th</sup> Street, outside of the City of Hickman, from Saltillo Road to Firth Road remain at 55 mph. 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 North #1 (Saltillo Road to Wittstruck Road) and South Central #4 segments (Panama Road to Princeton Road).**

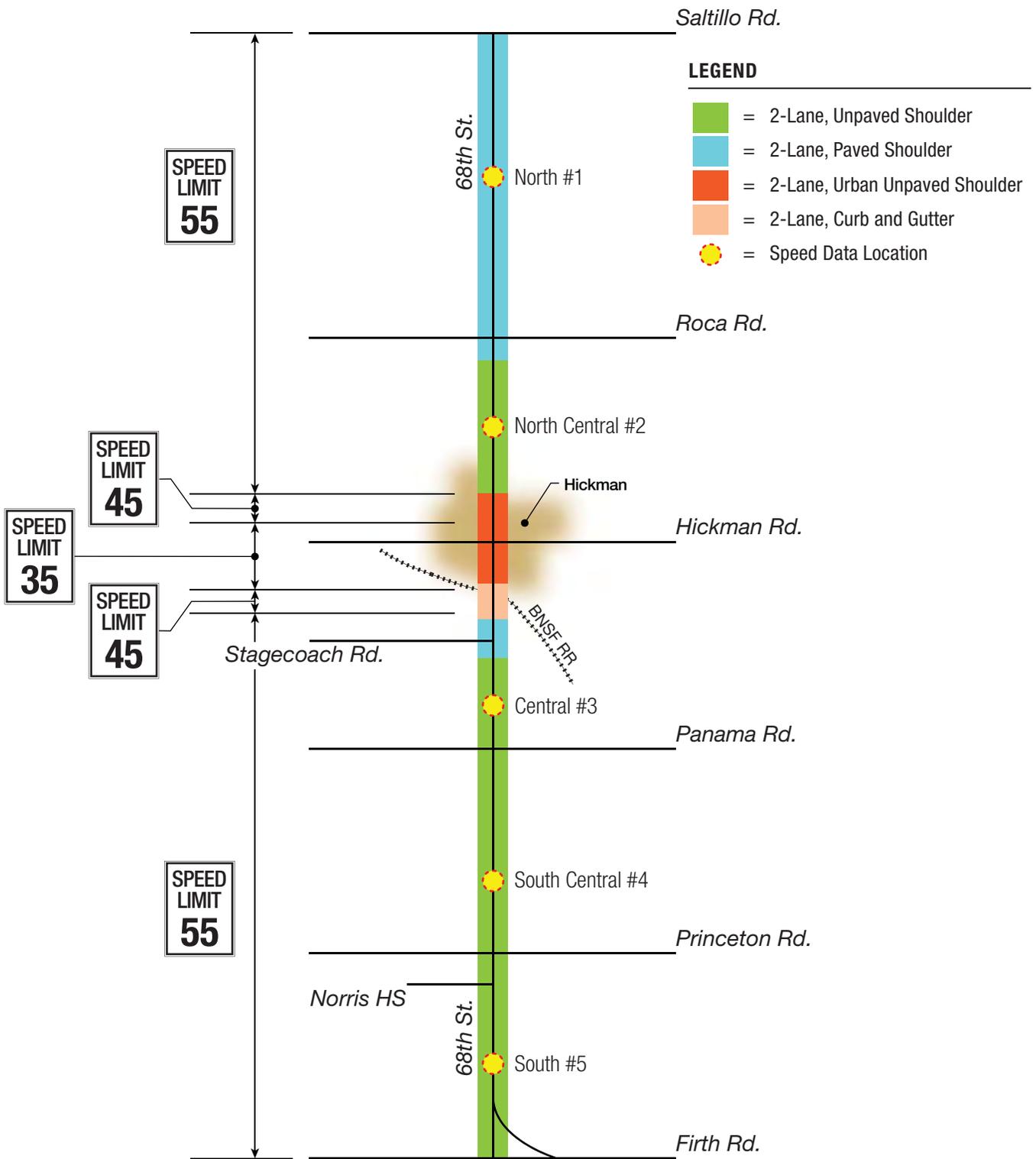
### Vicinity Map



### Study Corridor



Study Area | **FIGURE 1**

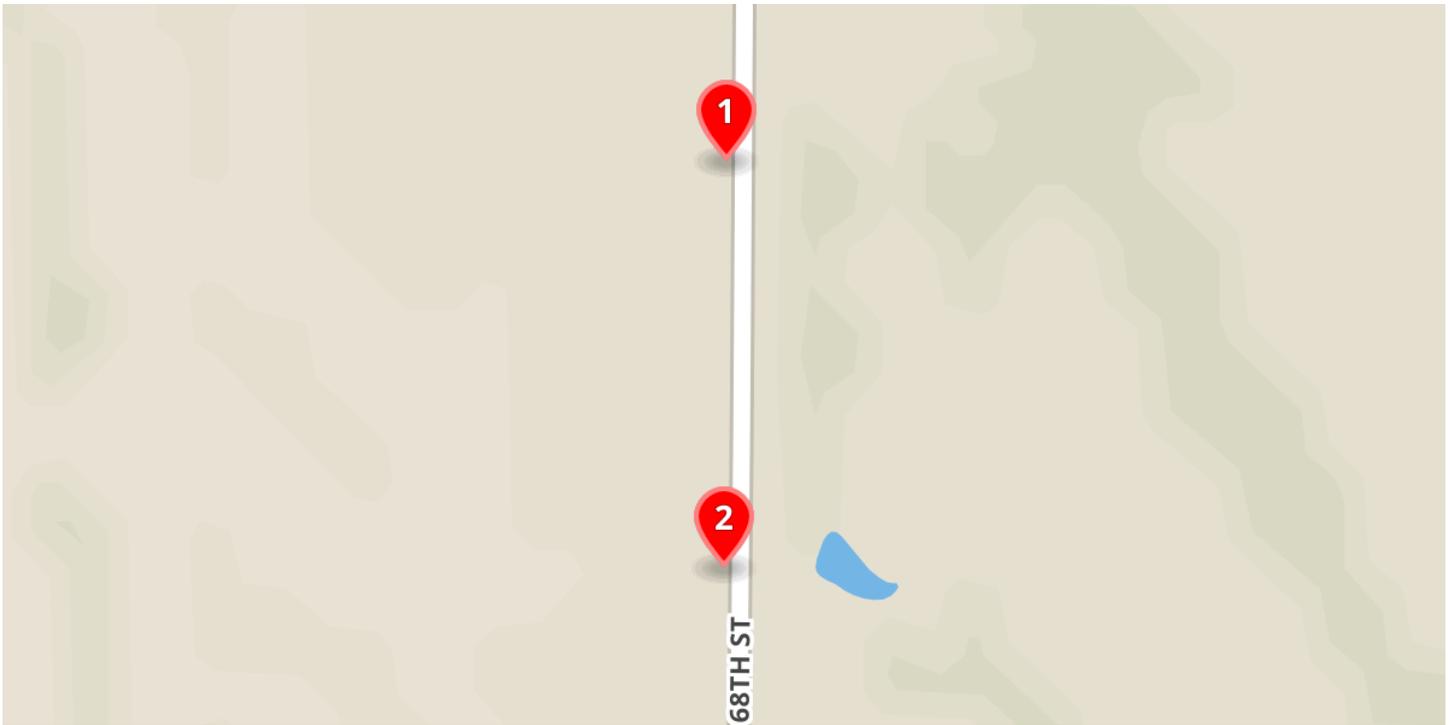


August 3, 2018  
S. 68<sup>th</sup> Street Speed Studies Memo  
Attachments

## **North #1**

# Travel Time Summary

2 Locations | Roca, NE | Wed Apr 25, 2018 | 7:00AM - 10:00AM (3.0h)



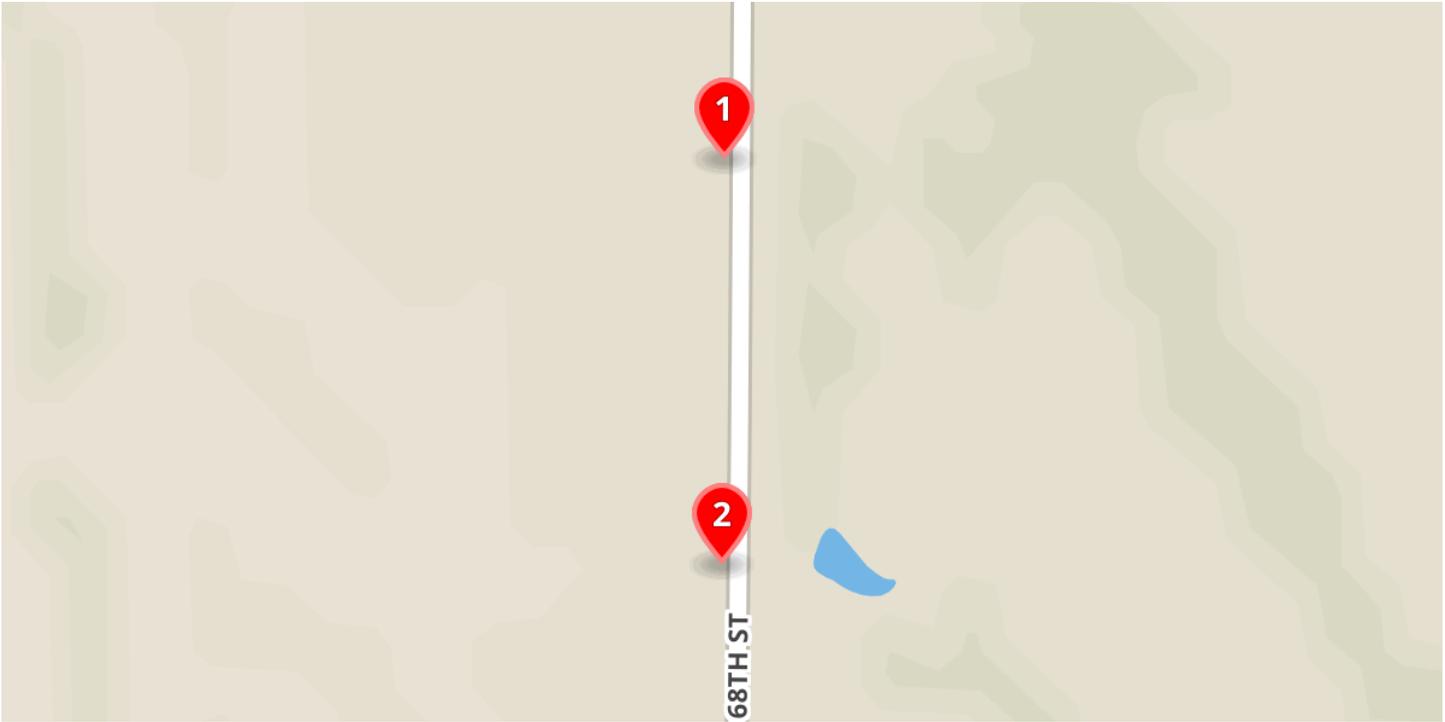
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 13327-14769 South 68th Street	2 13327-14769 South 68th Street	15	0.23	0.33	0.38	0.25	0.17	0.38	0.2*	48.93	62.28	68.50	48.71	29.78	68.50
2 13327-14769 South 68th Street	1 13327-14769 South 68th Street	28	0.19	0.33	0.37	0.23	0.17	0.53	0.2*	59.68	68.50	68.50	53.81	21.41	68.50

<sup>1</sup> 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](http://help.miovision.com/kb/distance) for more information.

<sup>2</sup> 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

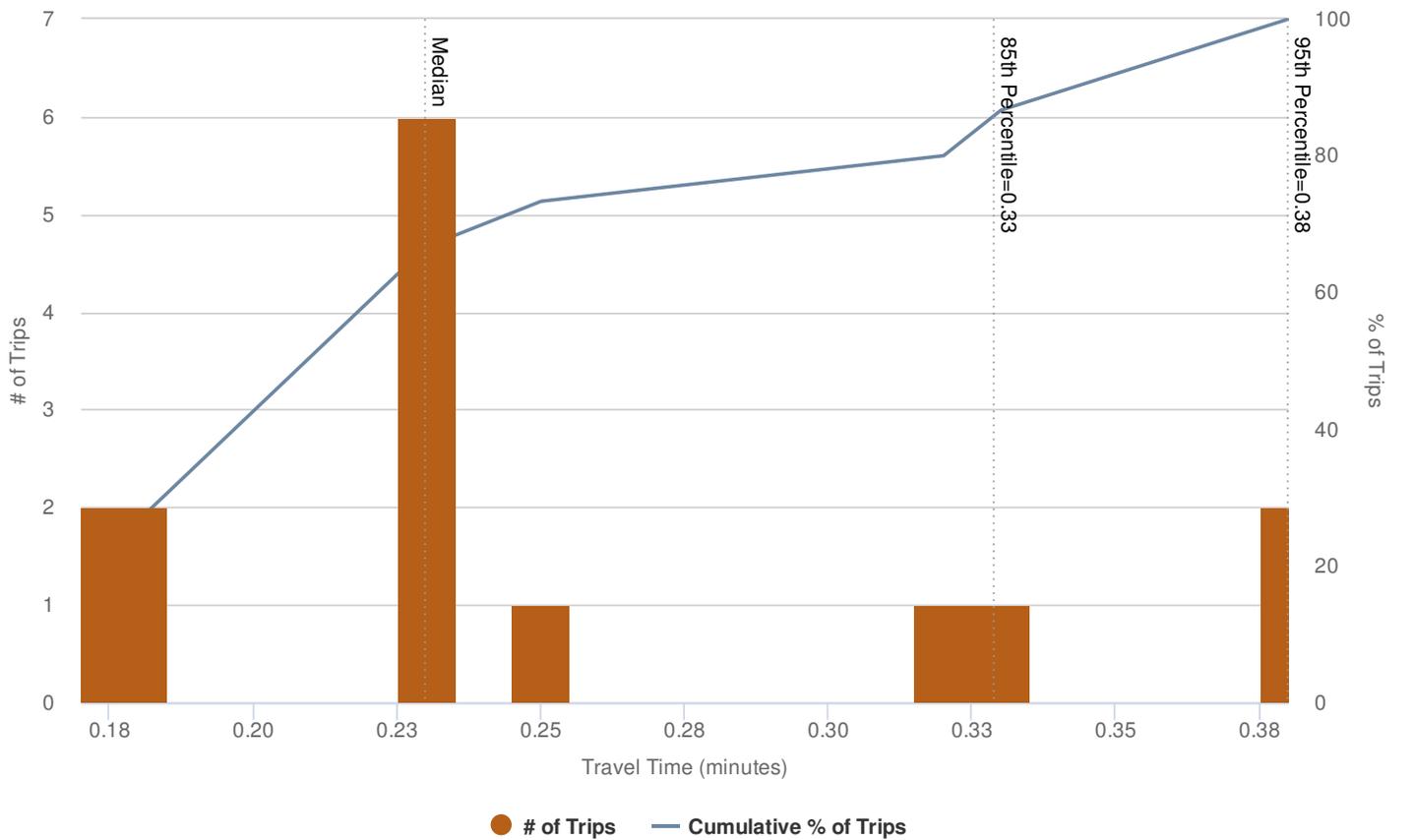
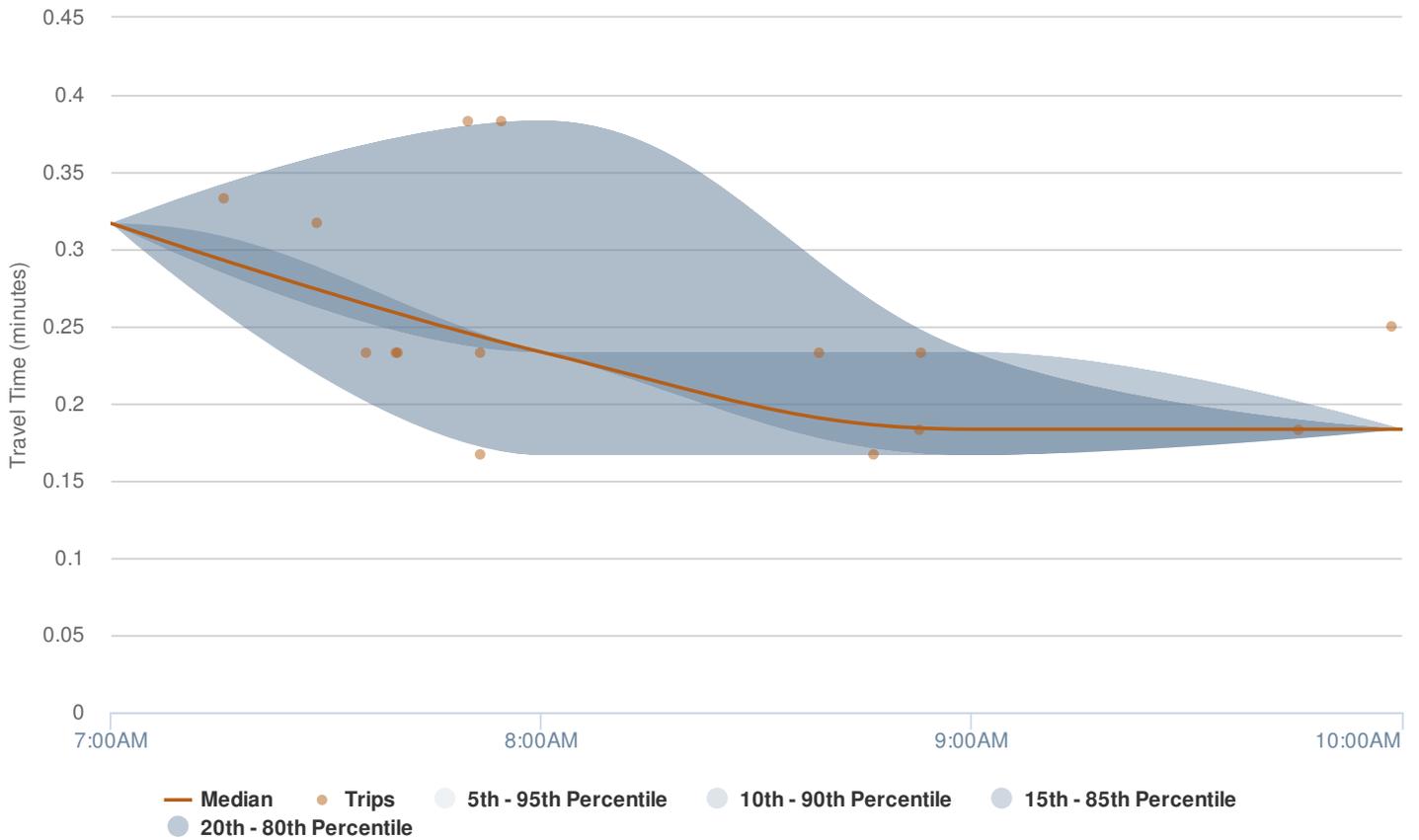
2 Locations | Roca, NE | Wed Apr 25, 2018 | 7:00AM - 10:00AM (3.0h)



Start Location		End Location		Planning Time Index AM (6am - 9am)	Travel Time Index AM (6am - 9am)	Buffer Time Index AM (6am - 9am)
1	13327-14769 South 68th Street	2	13327-14769 South 68th Street	1.59	1.33	0.20
2	13327-14769 South 68th Street	1	13327-14769 South 68th Street	2.53	1.45	0.75

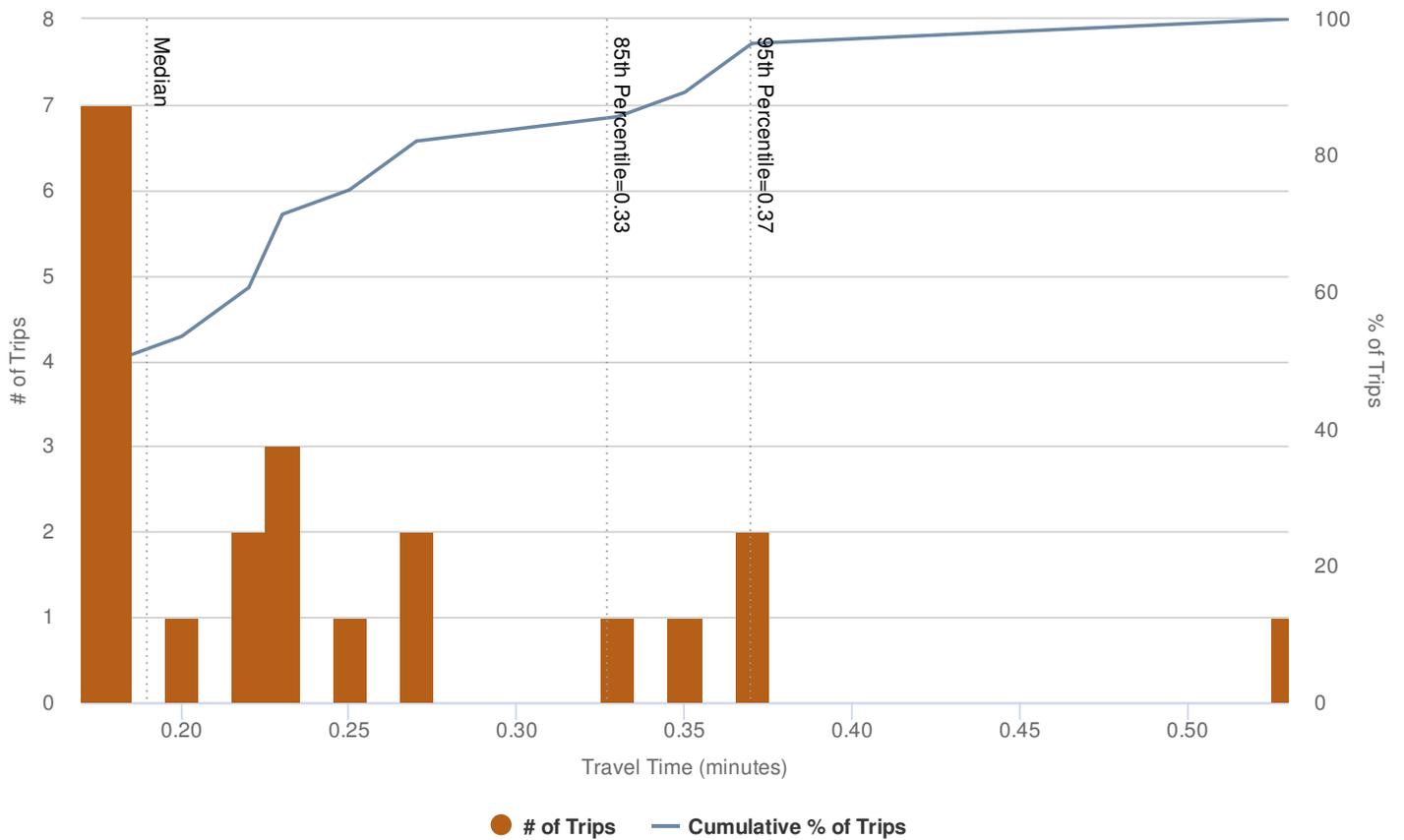
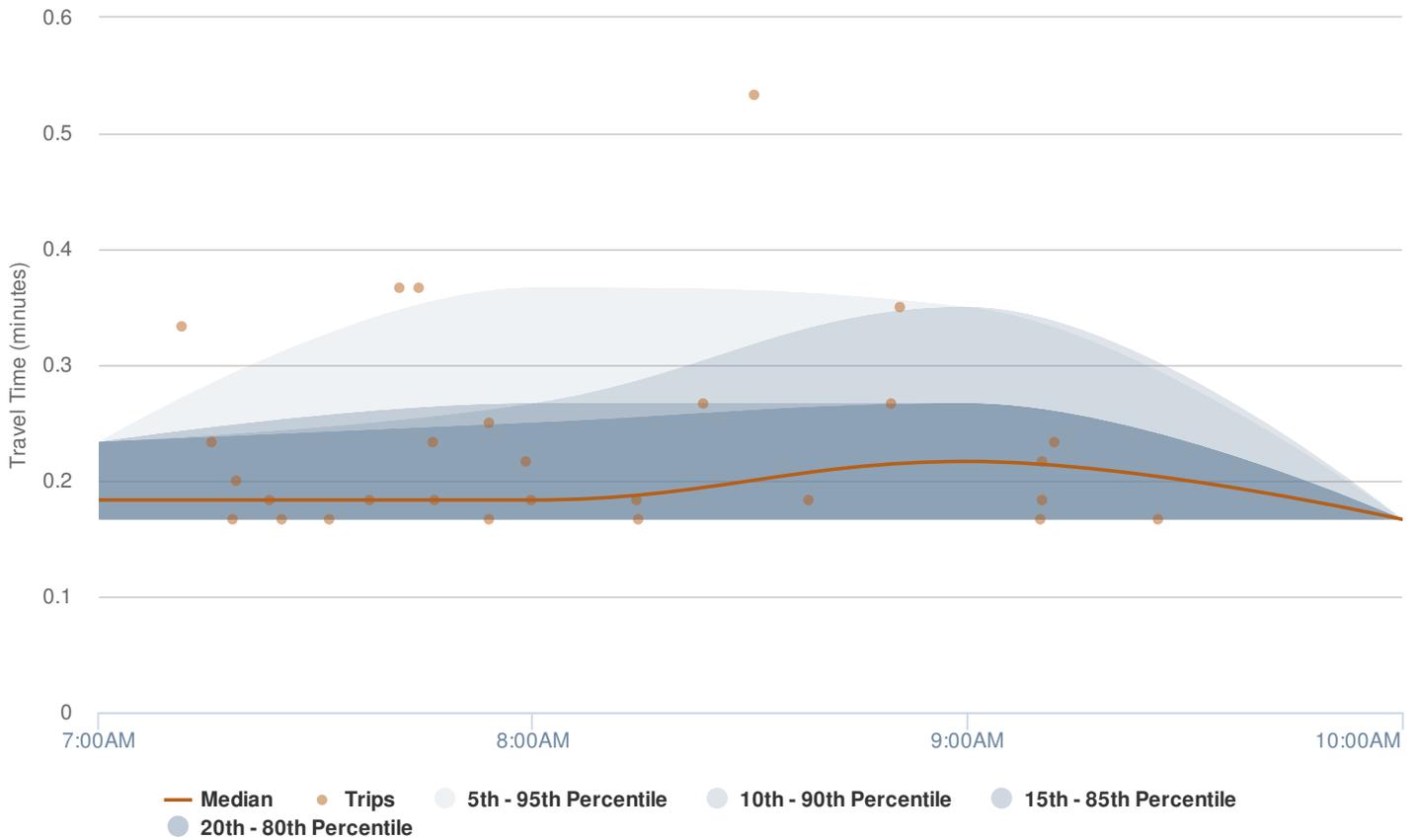
# 13327-14769 South 68th Street to 13327-14769 South 68th Street

1 to 2 | (40.674091, -96.629555) to (40.671337, -96.629578)



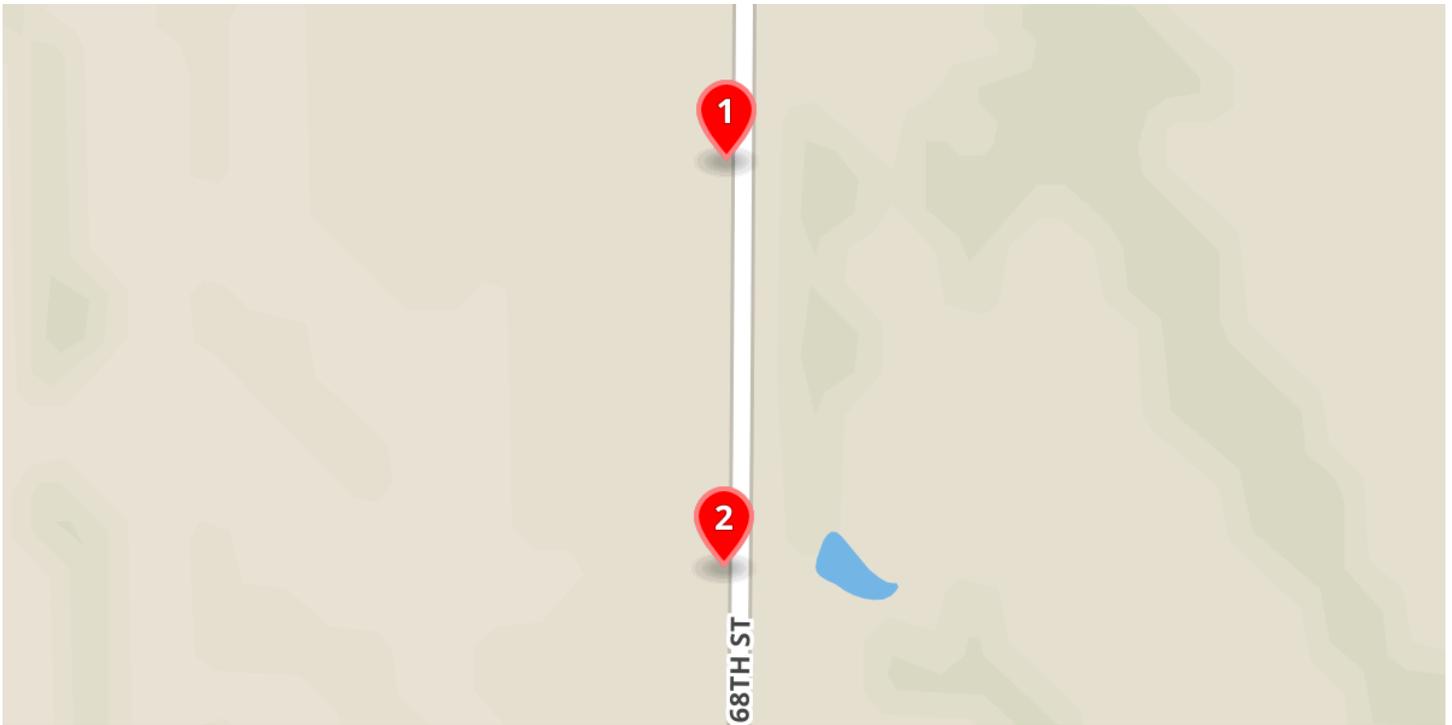
# 13327-14769 South 68th Street to 13327-14769 South 68th Street

2 to 1 | (40.671337, -96.629578) to (40.674091, -96.629555)



# Travel Time Summary

2 Locations | Roca, NE | Wed Apr 25, 2018 | 2:00PM - 7:00PM (5.0h)



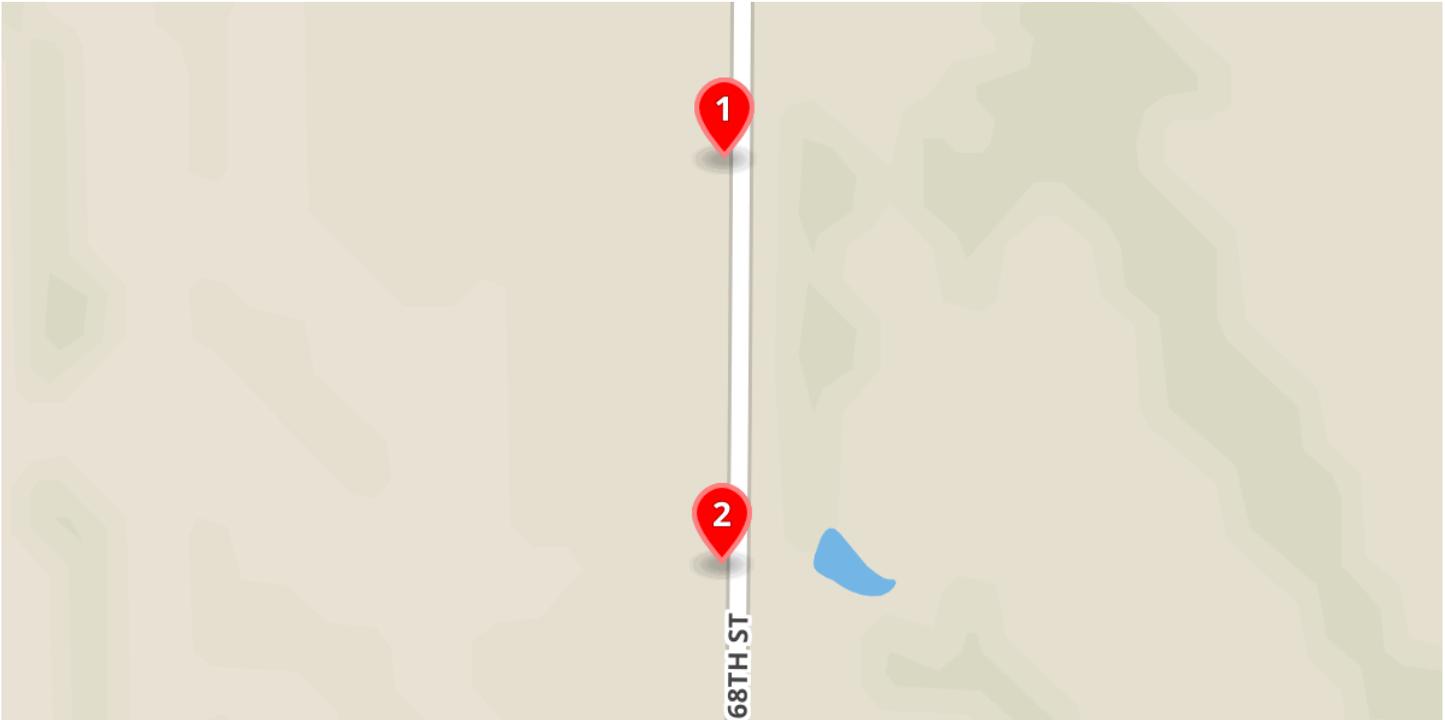
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 13327-14769 South 68th Street	2 13327-14769 South 68th Street	39	0.23	0.30	0.44	0.25	0.17	0.60	0.2*	48.93	68.50	68.50	51.09	19.03	68.50
2 13327-14769 South 68th Street	1 13327-14769 South 68th Street	31	0.20	0.35	0.42	0.25	0.17	0.53	0.2*	57.09	65.39	68.50	50.75	21.41	68.50

<sup>1</sup> 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](http://help.miovision.com/kb/distance) for more information.

<sup>2</sup> 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

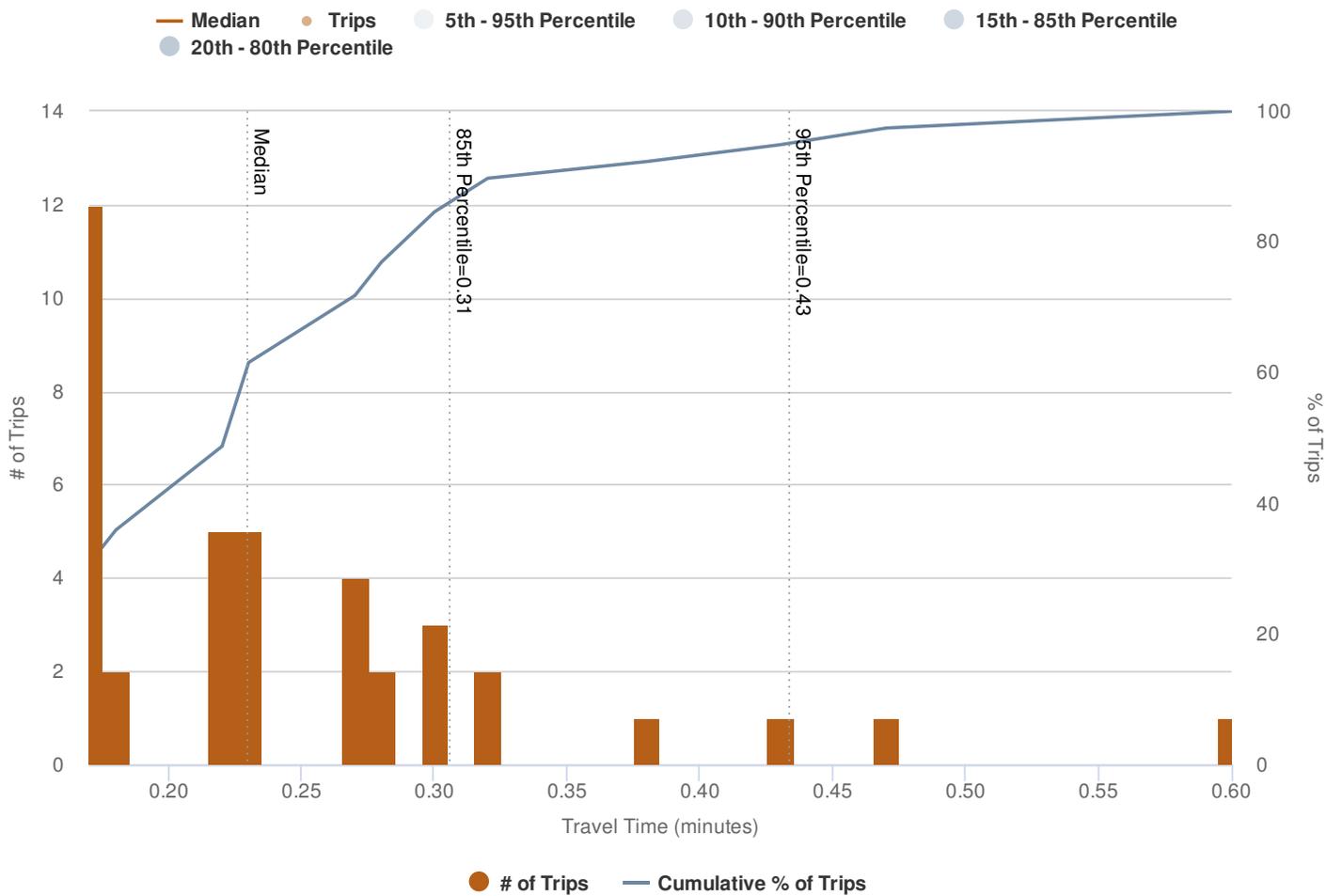
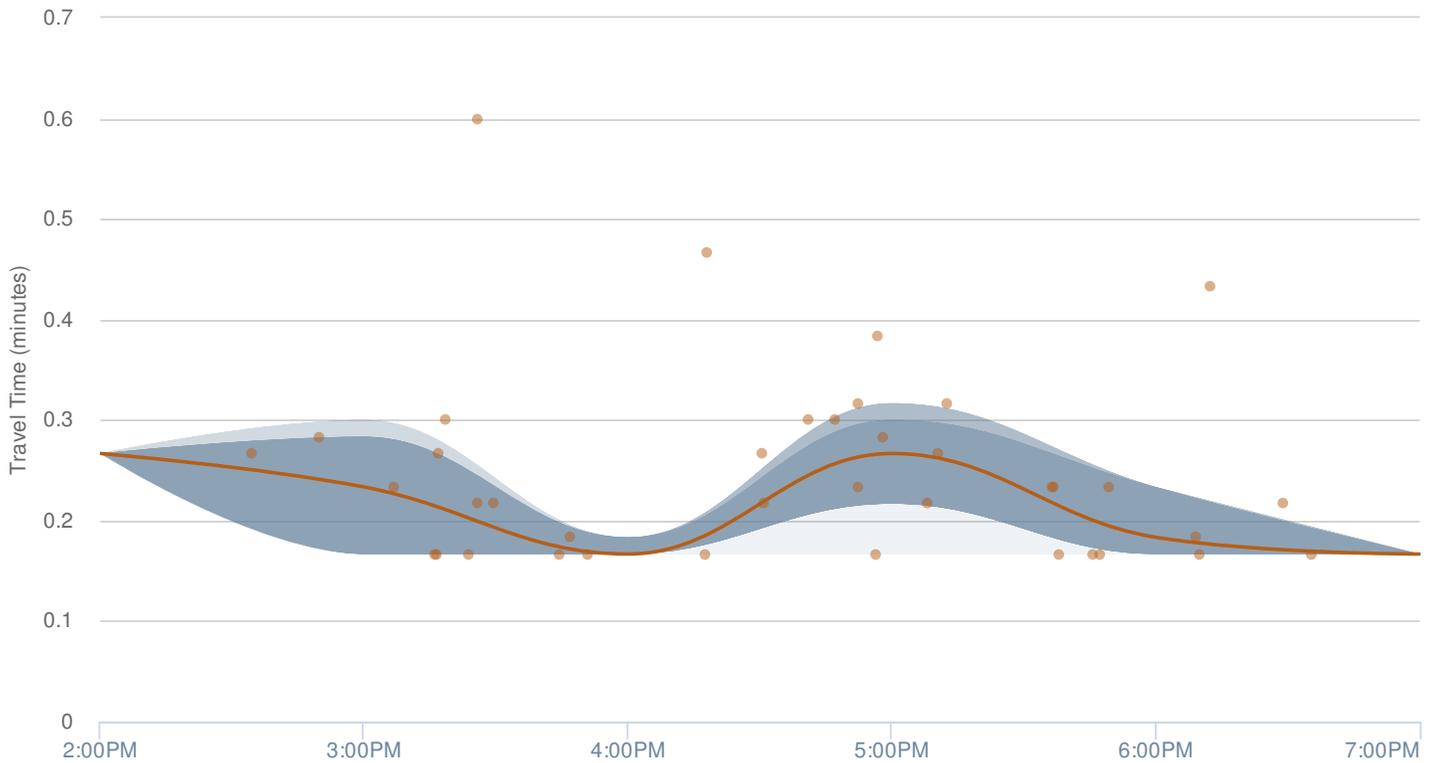
2 Locations | Roca, NE | Wed Apr 25, 2018 | 2:00PM - 7:00PM (5.0h)



Start Location		End Location		Planning Time Index PM (4pm - 7pm)	Travel Time Index PM (4pm - 7pm)	Buffer Time Index PM (4pm - 7pm)
1	13327-14769 South 68th Street	2	13327-14769 South 68th Street	1.70	1.15	0.48
2	13327-14769 South 68th Street	1	13327-14769 South 68th Street	2.20	1.47	0.50

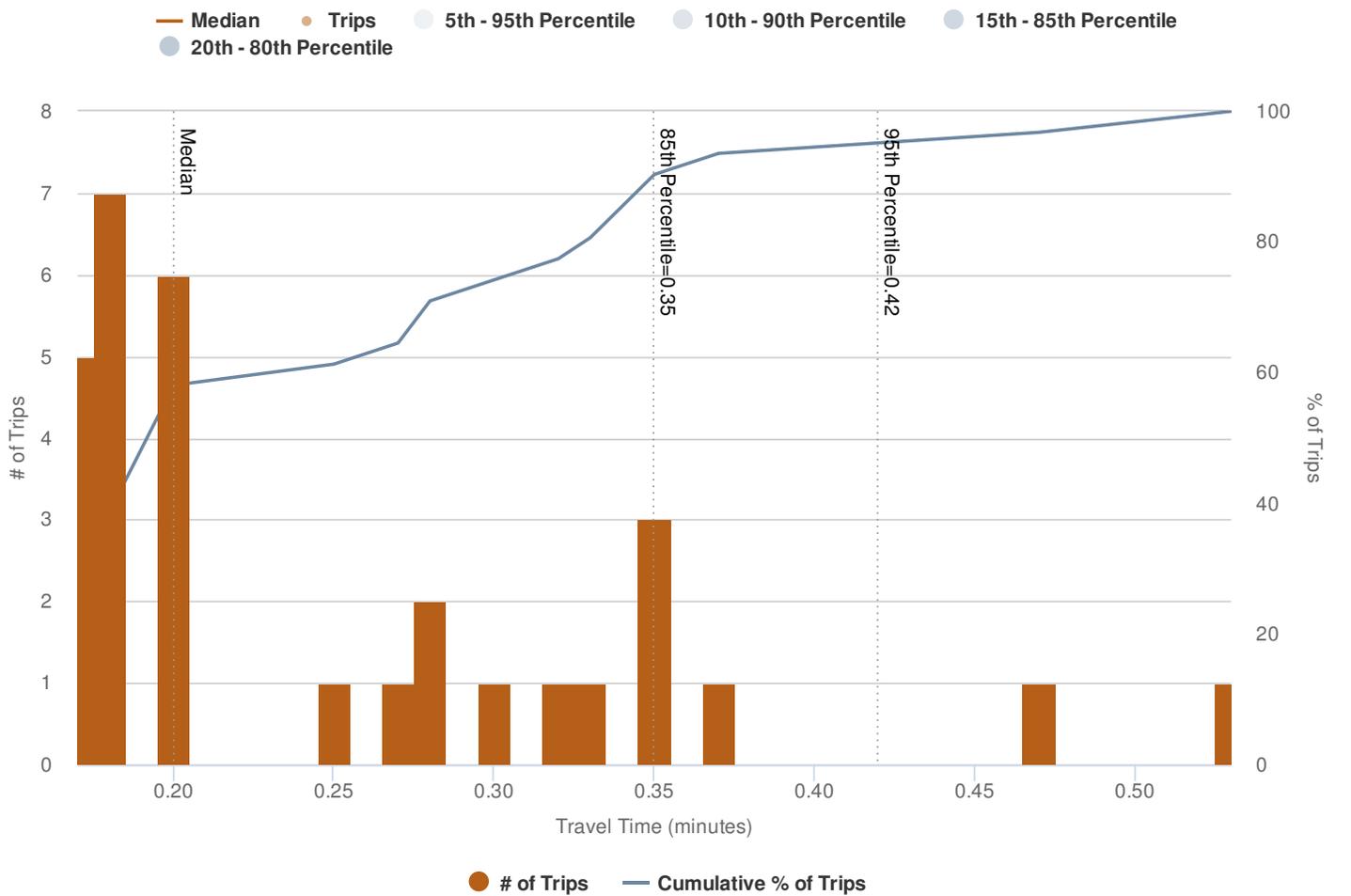
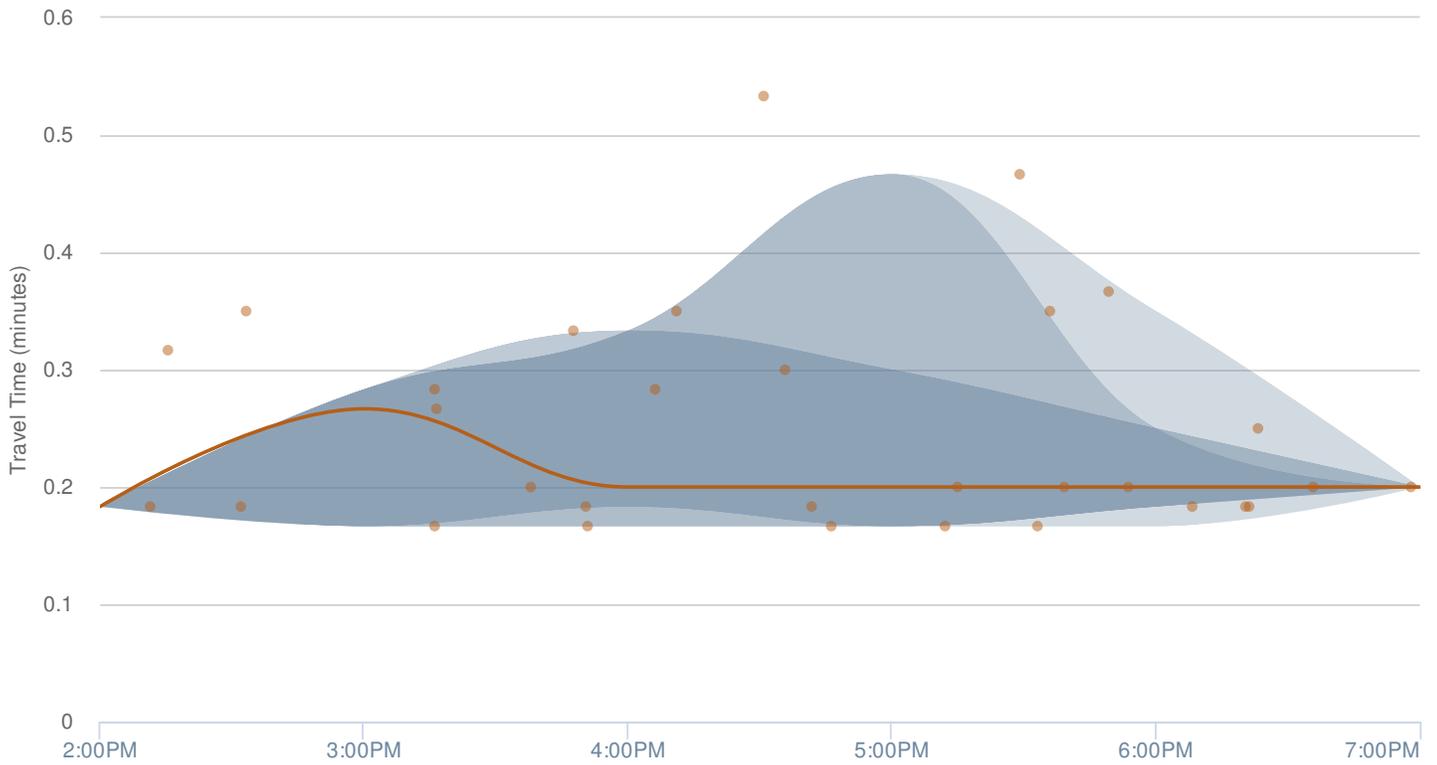
# 13327-14769 South 68th Street to 13327-14769 South 68th Street

1 to 2 | (40.674091, -96.629555) to (40.671337, -96.629578)



# 13327-14769 South 68th Street to 13327-14769 South 68th Street

2 to 1 | (40.671337, -96.629578) to (40.674091, -96.629555)

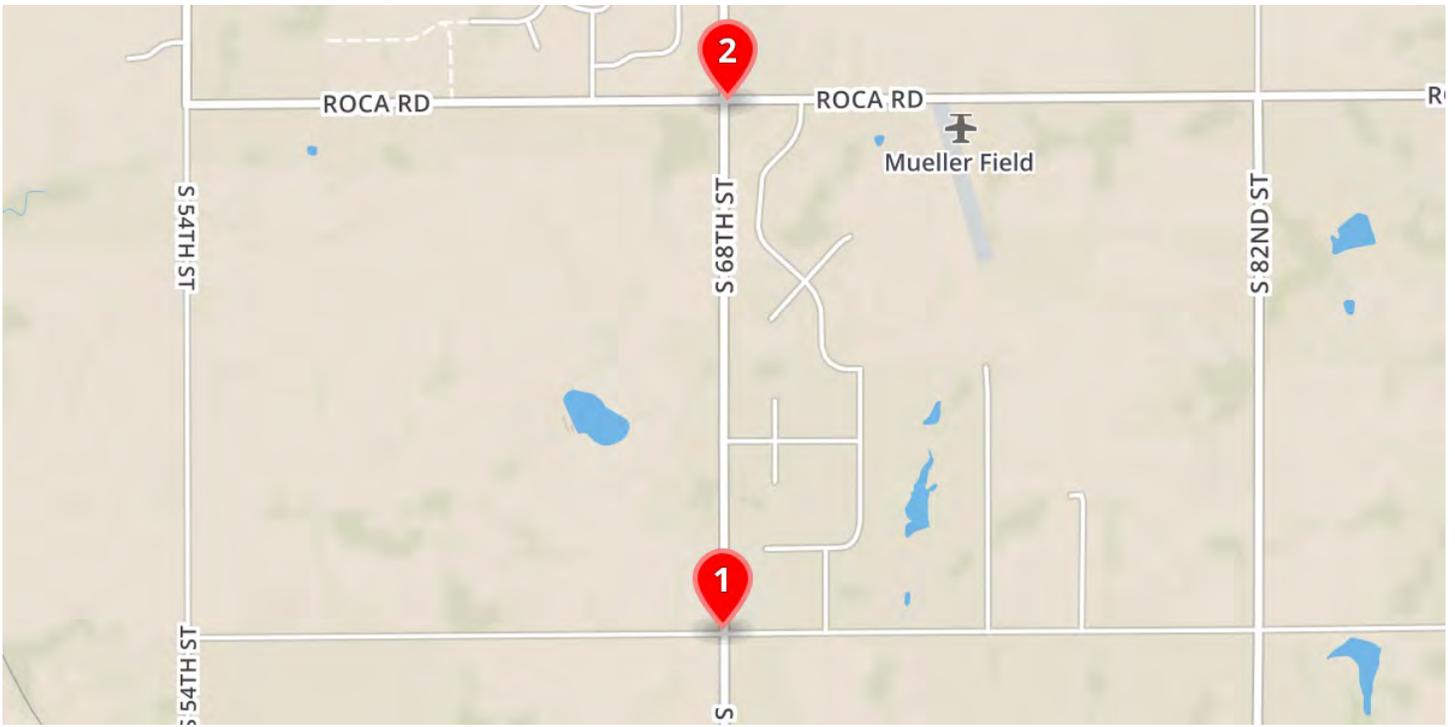


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Attachments

## **North Central #2**

# Travel Time Summary

2 Locations | Hickman, NE, Roca, NE | Tue Apr 24, 2018 | 7:00AM - 10:00AM (3.0h)



Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1, 3</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 17405 South 68th Street	2 68th St & Roca Rd	37	1.05	1.17	1.32	1.09	0.98	1.37	1.0	56.74	59.58	60.59	55.05	43.59	60.59
2 68th St & Roca Rd	1 17405 South 68th Street	16	1.06	1.20	1.24	1.07	0.83	1.25	1.0*	56.22	59.50	64.01	56.12	47.60	71.40

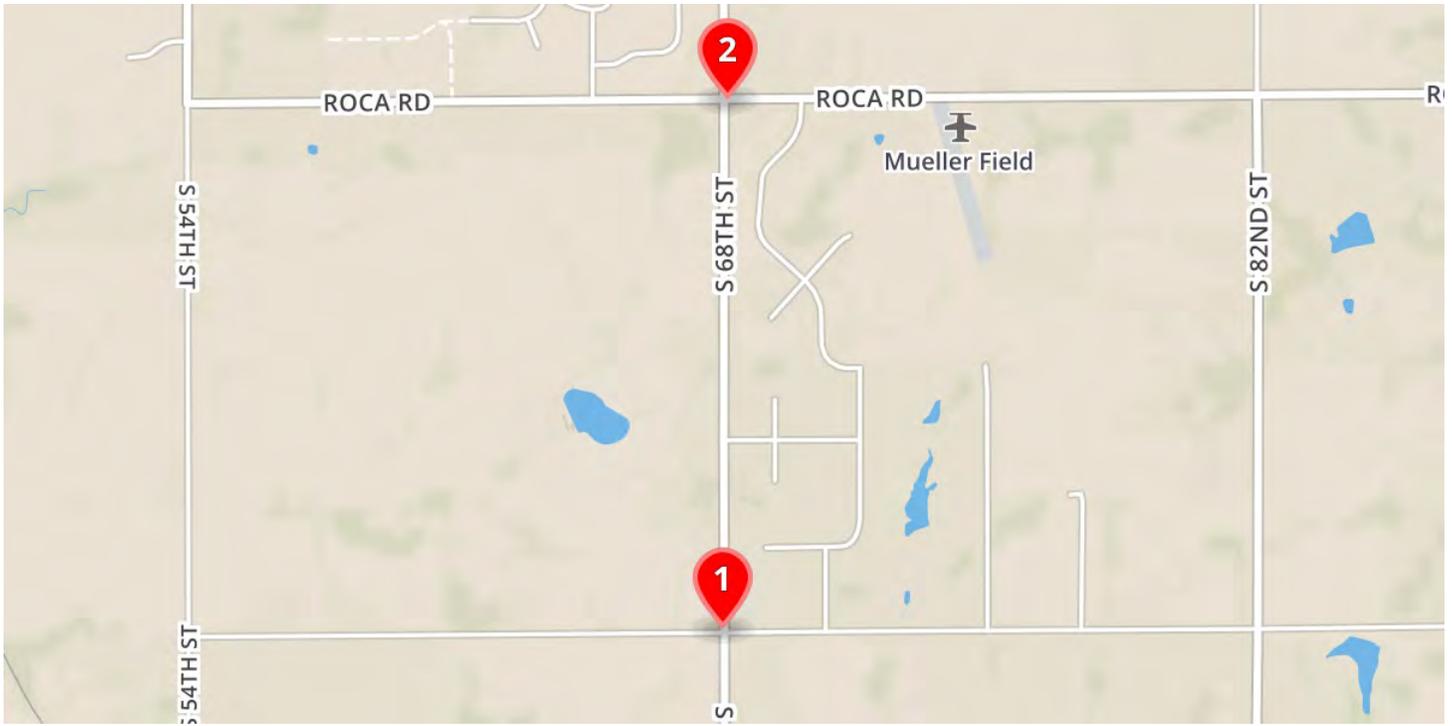
<sup>1</sup> Distance is the length of the Shortest Route between the locations in Google Maps. If Google Maps is unavailable or if Google Maps reports a distance longer than twice the aerial (as the bird flies) distance, the aerial distance is used and is denoted by an asterisk (\*). See [help.miovision.com/kb/distance](http://help.miovision.com/kb/distance)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

<sup>2</sup> 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.

<sup>3</sup> Custom distances are used in the calculations of this report.

# Travel Time Reliability Summary

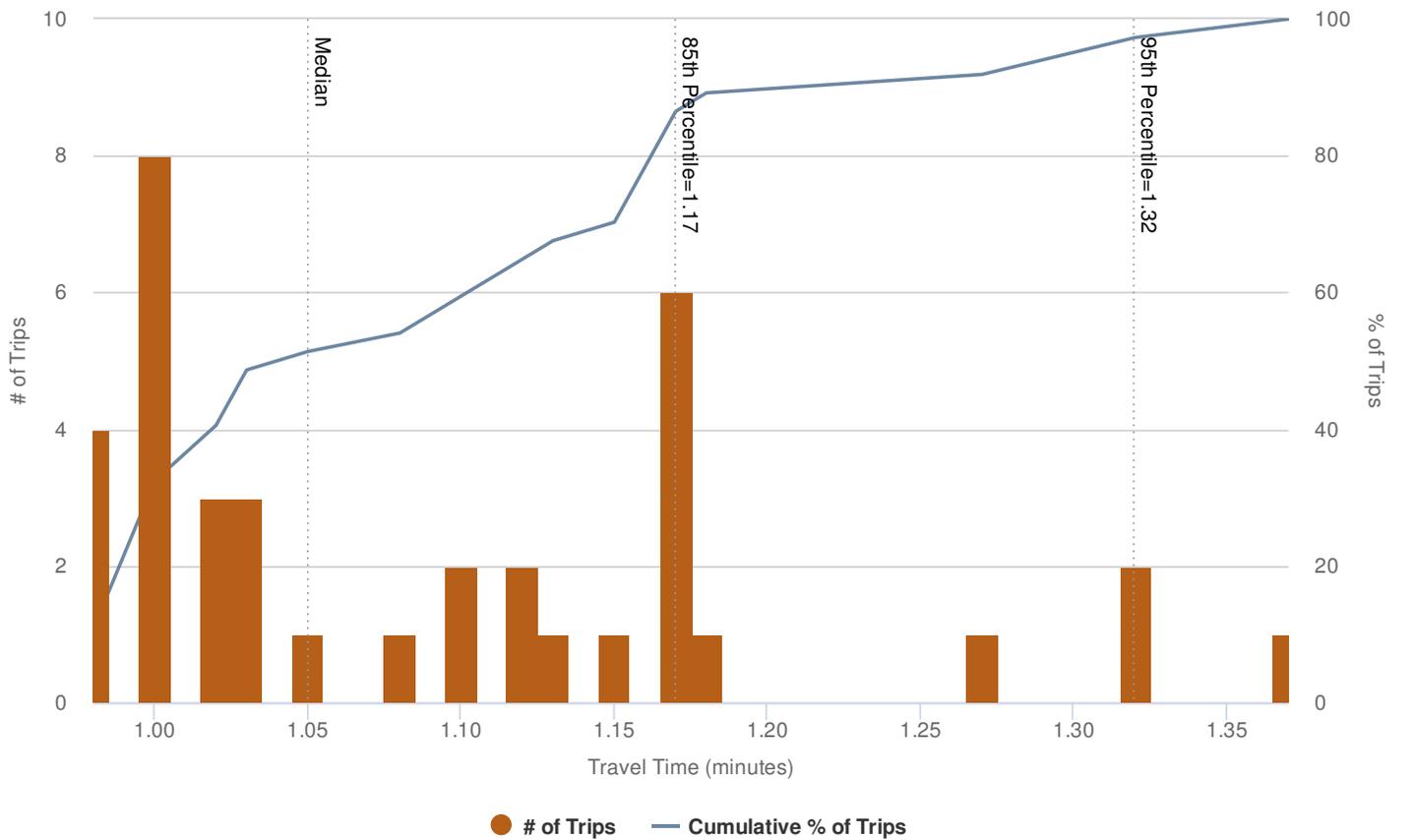
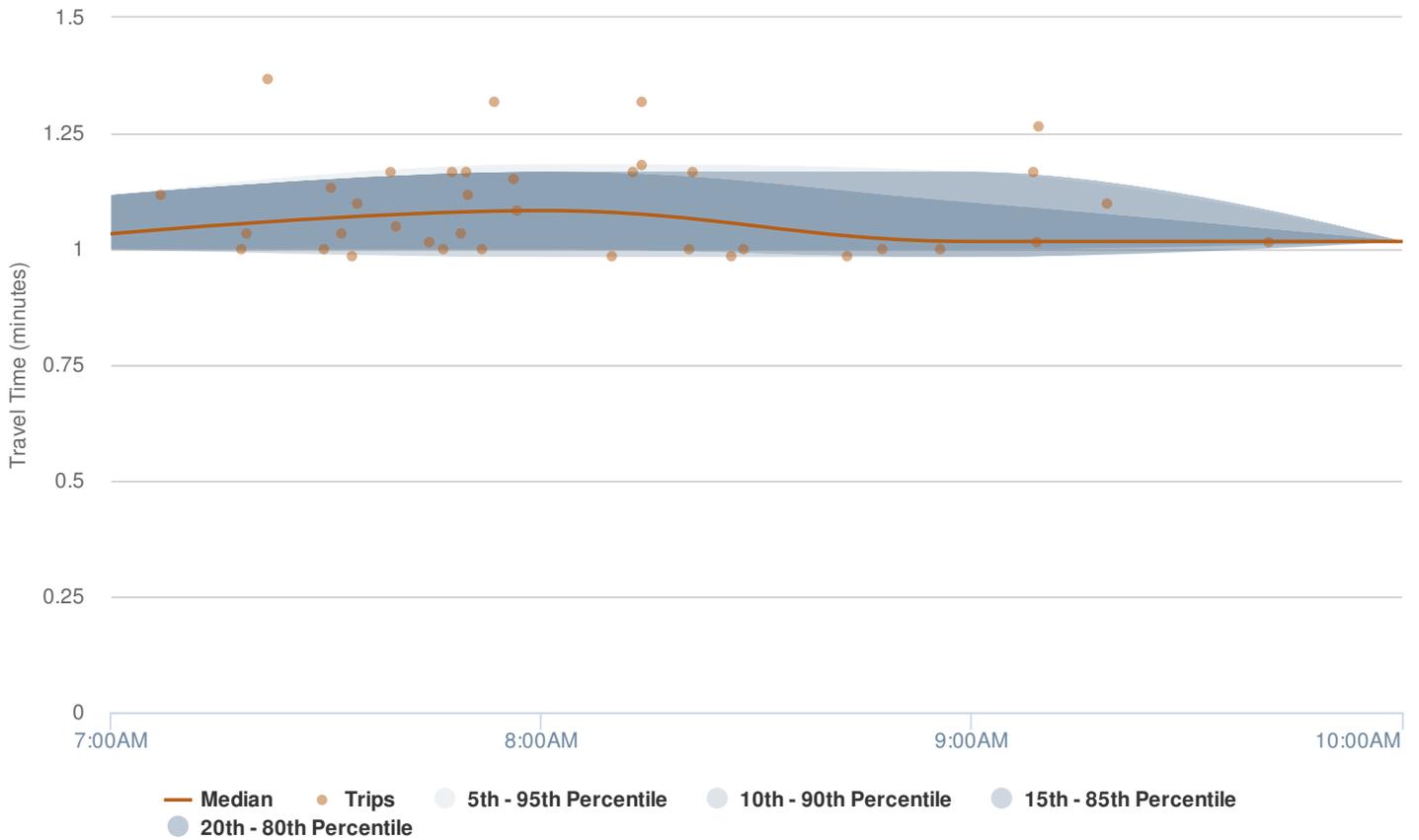
2 Locations | Hickman, NE, Roca, NE | Tue Apr 24, 2018 | 7:00AM - 10:00AM (3.0h)



Start Location	End Location	Planning Time Index AM (6am - 9am)	Travel Time Index AM (6am - 9am)	Buffer Time Index AM (6am - 9am)
1   17405 South 68th Street	2   68th St & Roca Rd	1.26	1.07	0.18
2   68th St & Roca Rd	1   17405 South 68th Street	1.34	1.20	0.11

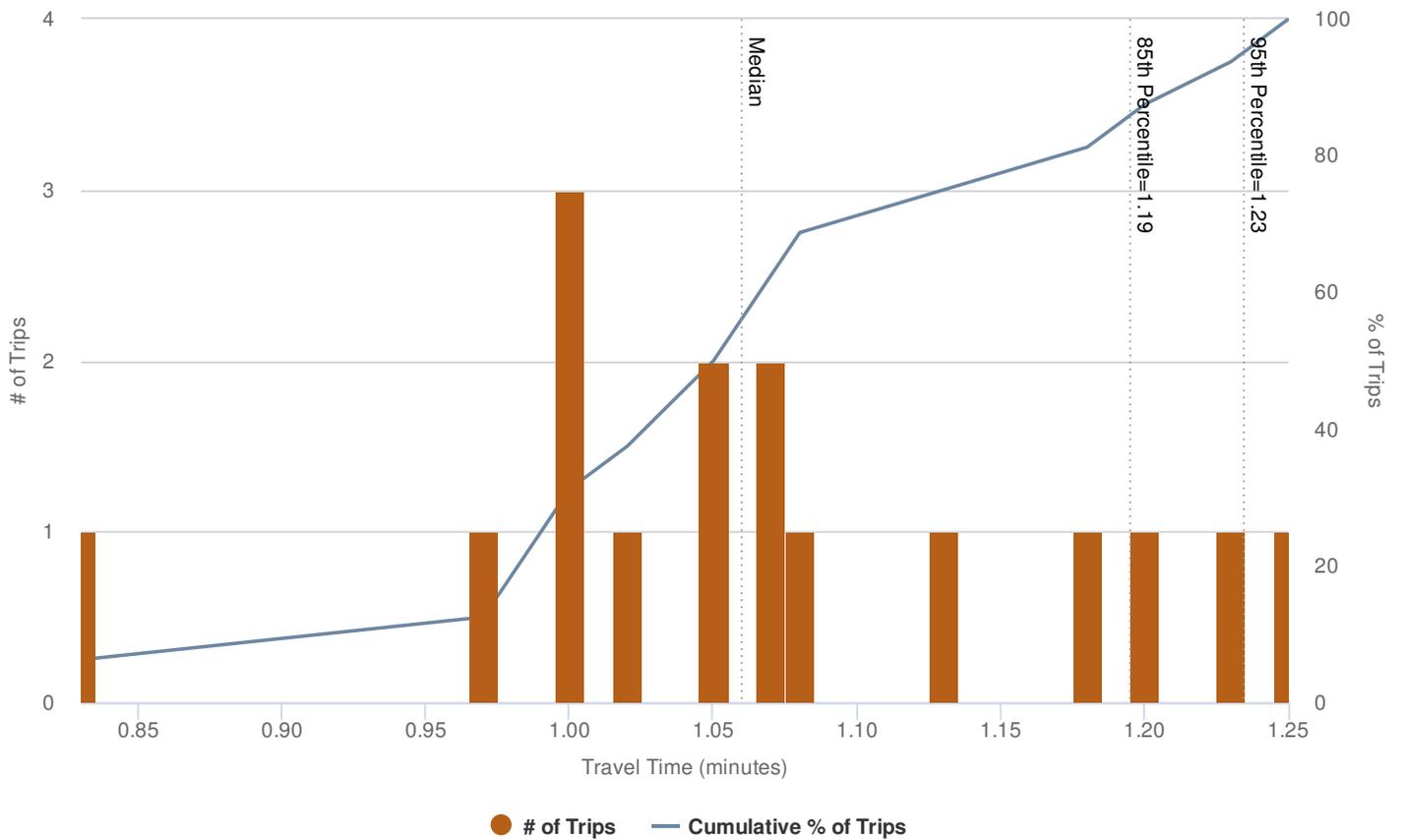
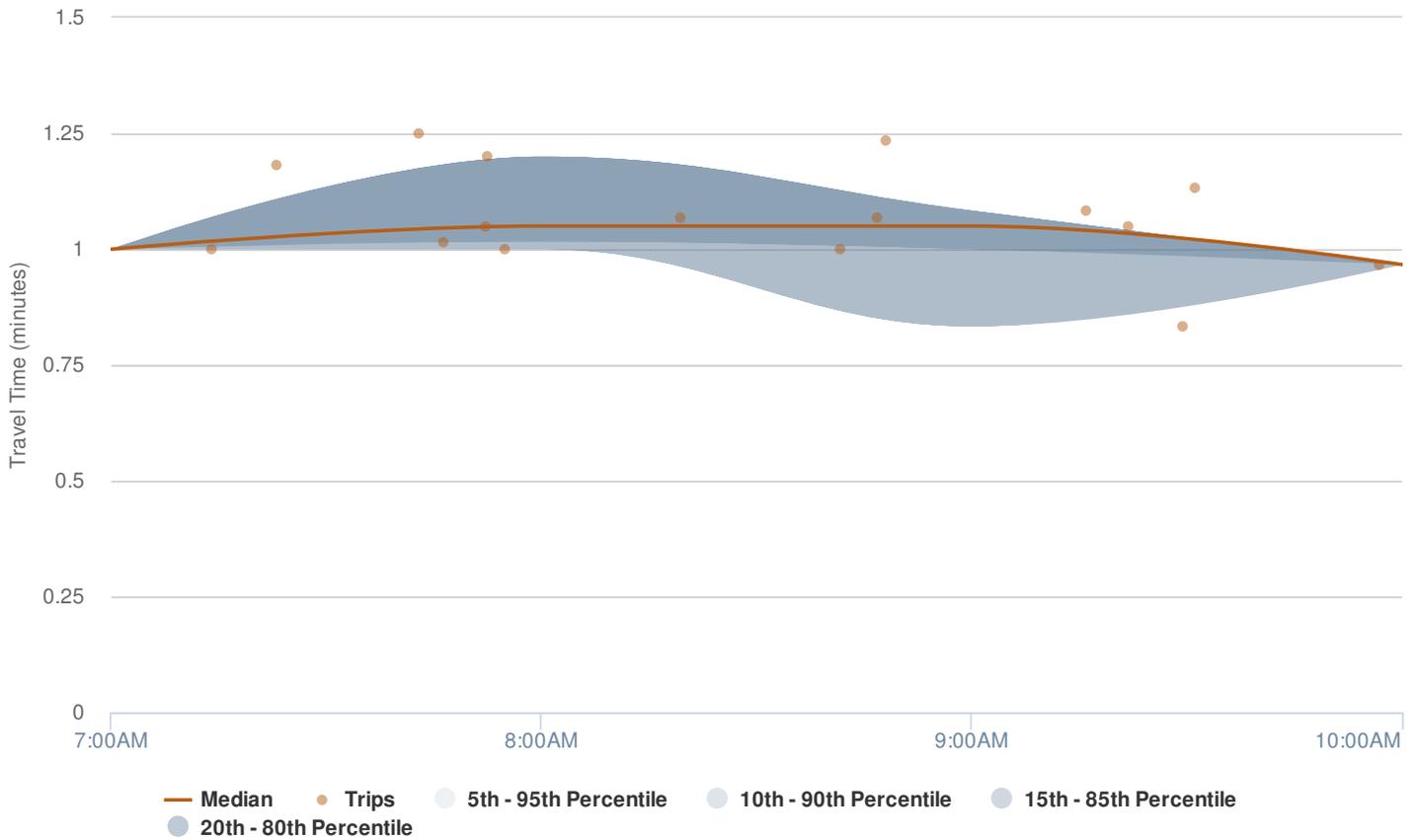
# 17405 South 68th Street to 68th St & Roca Rd

1 to 2 | (40.639755, -96.629539) to (40.654106, -96.629342)



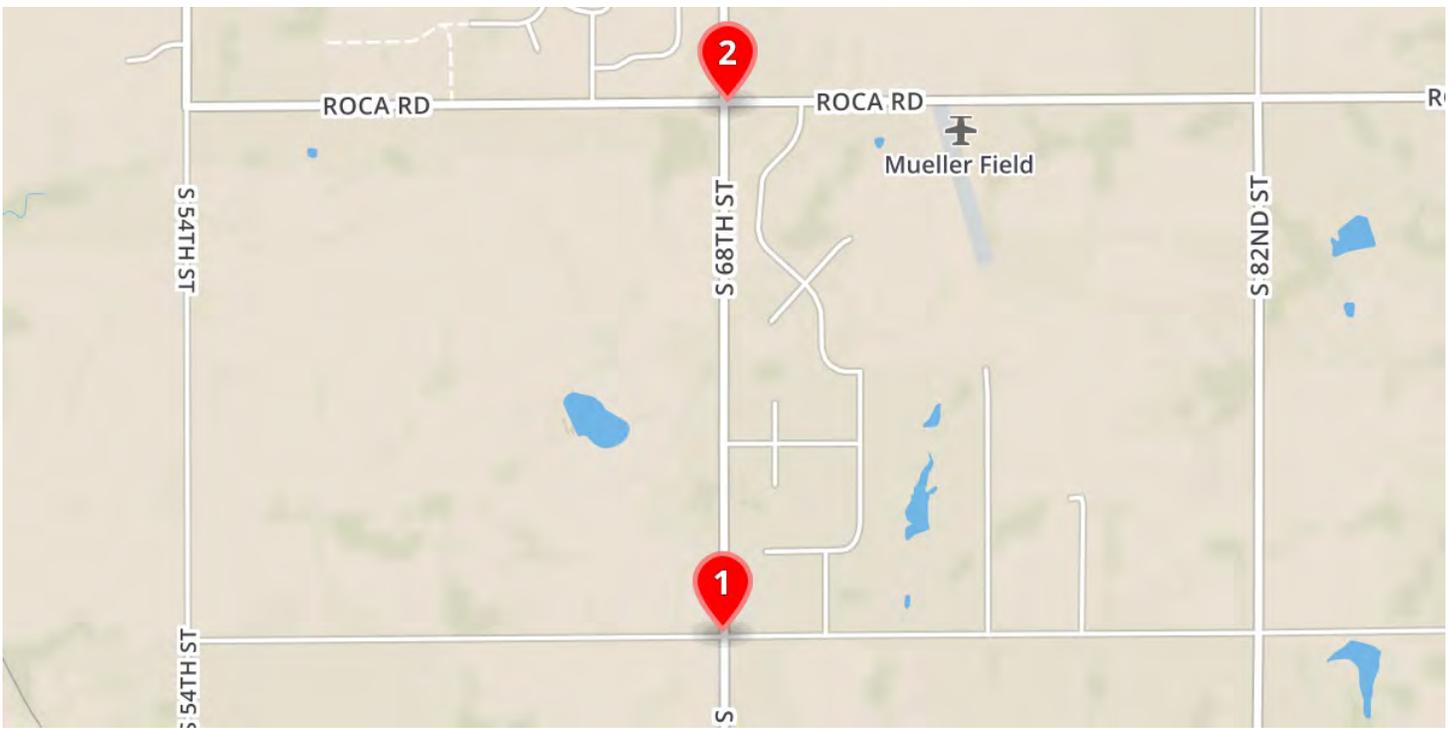
# 68th St & Roca Rd to 17405 South 68th Street

2 to 1 | (40.654106, -96.629342) to (40.639755, -96.629539)



# Travel Time Summary

2 Locations | Hickman, NE, Roca, NE | Tue Apr 24, 2018 | 2:00PM - 7:00PM (5.0h)



Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1, 3</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 17405 South 68th Street	2 68th St & Roca Rd	22	1.17	1.31	1.33	1.16	1.00	1.35	1.0	51.07	58.60	59.58	51.90	44.13	59.58
2 68th St & Roca Rd	1 17405 South 68th Street	43	1.07	1.19	1.33	1.10	0.98	1.38	1.0*	55.78	59.50	59.50	54.66	43.01	60.51

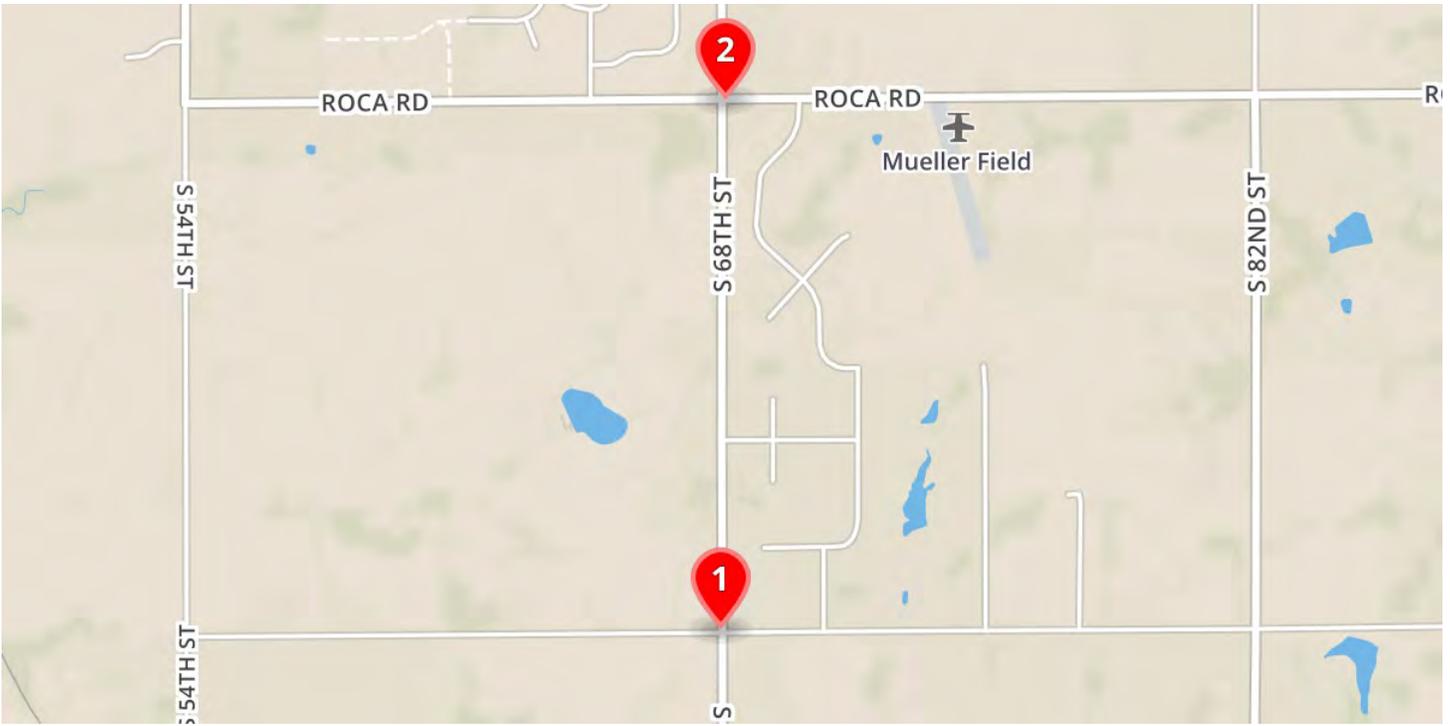
<sup>1</sup> Distance is the length of the Shortest Route between the locations in Google Maps. If Google Maps is unavailable or if Google Maps reports a distance longer than twice the aerial (as the bird flies) distance, the aerial distance is used and is denoted by an asterisk (\*). See [help.miovision.com/kb/distance](http://help.miovision.com/kb/distance)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

<sup>2</sup> 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.

<sup>3</sup> Custom distances are used in the calculations of this report.

# Travel Time Reliability Summary

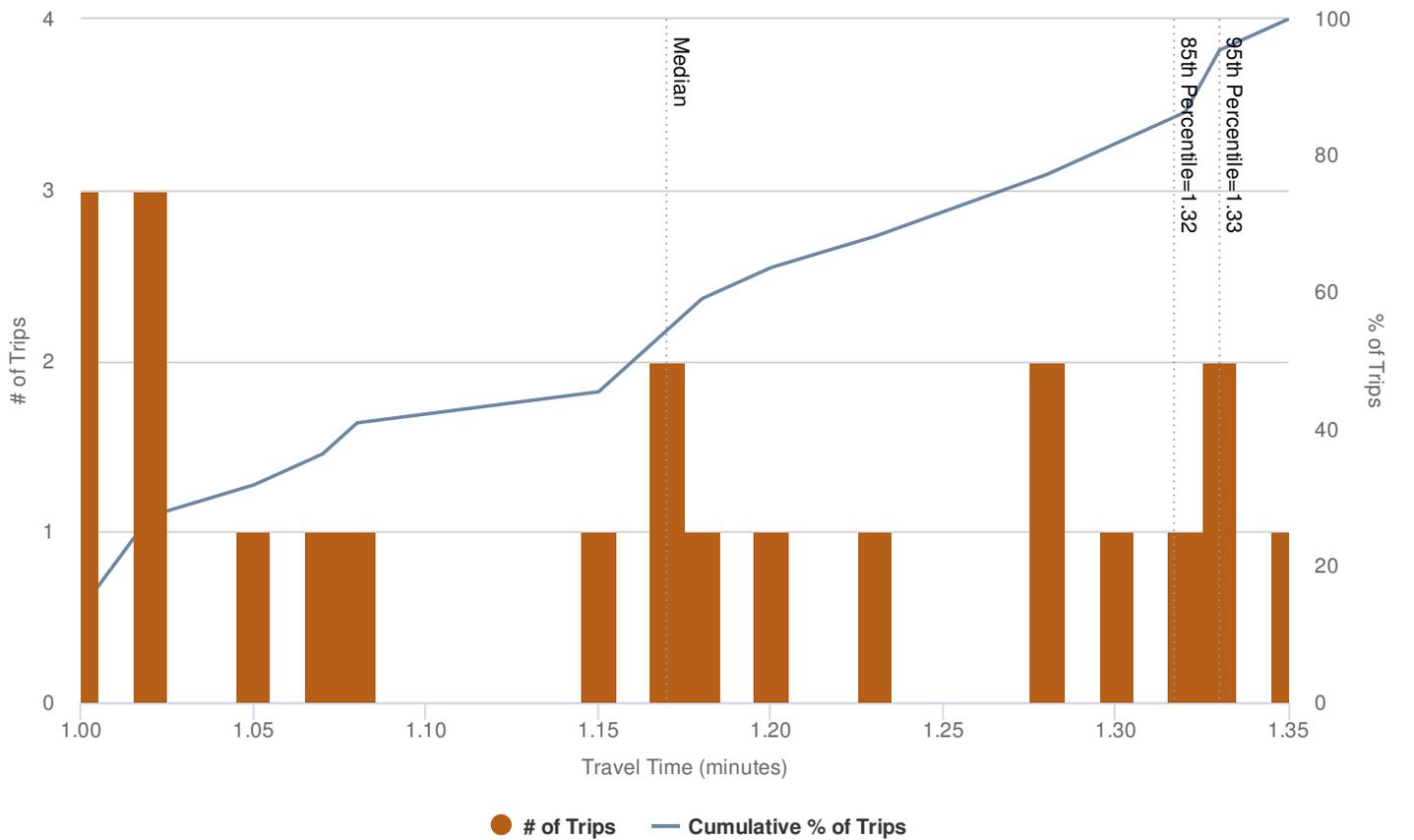
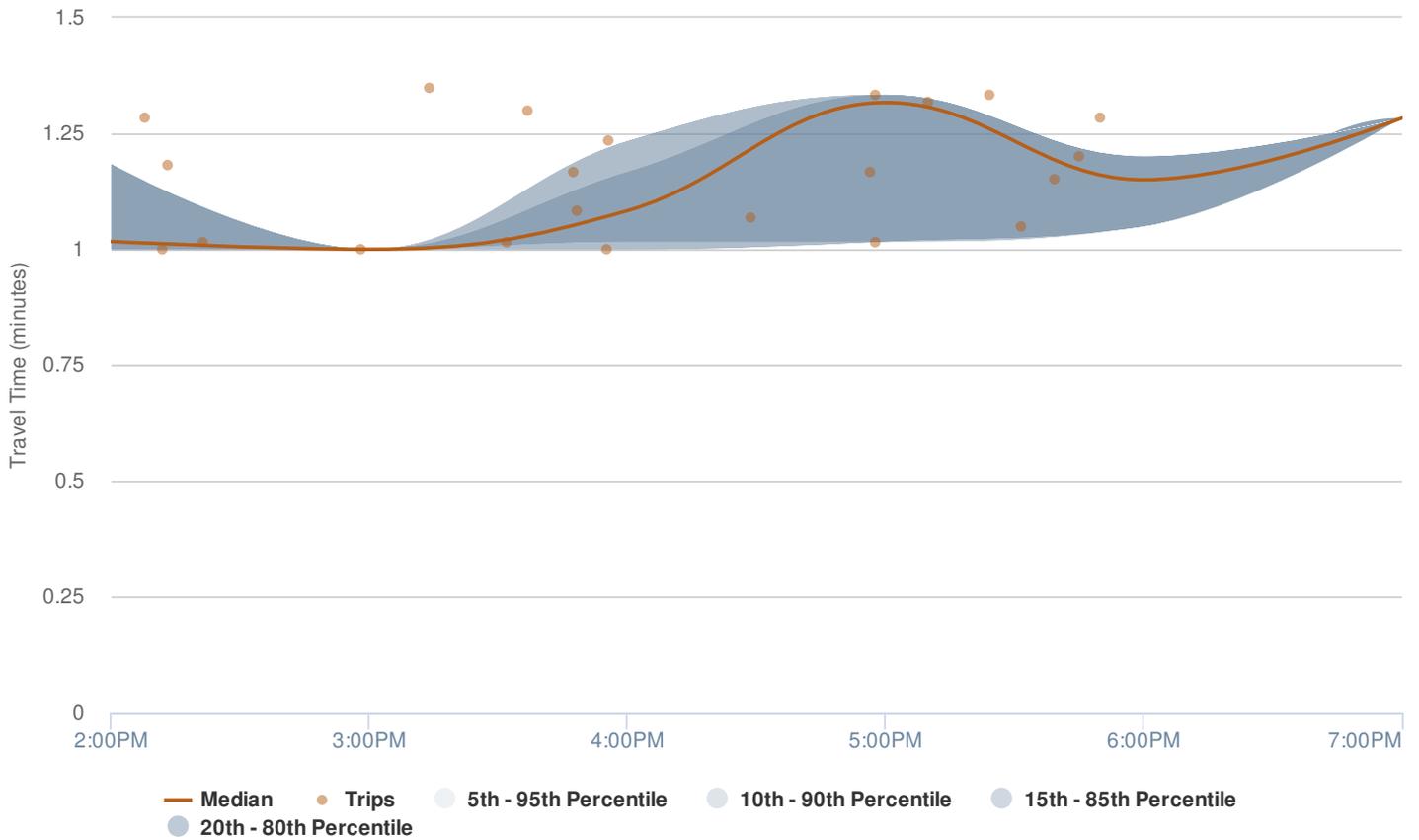
2 Locations | Hickman, NE, Roca, NE | Tue Apr 24, 2018 | 2:00PM - 7:00PM (5.0h)



Start Location	End Location	Planning Time Index PM (4pm - 7pm)	Travel Time Index PM (4pm - 7pm)	Buffer Time Index PM (4pm - 7pm)
1   17405 South 68th Street	2   68th St & Roca Rd	1.31	1.18	0.11
2   68th St & Roca Rd	1   17405 South 68th Street	1.23	1.08	0.14

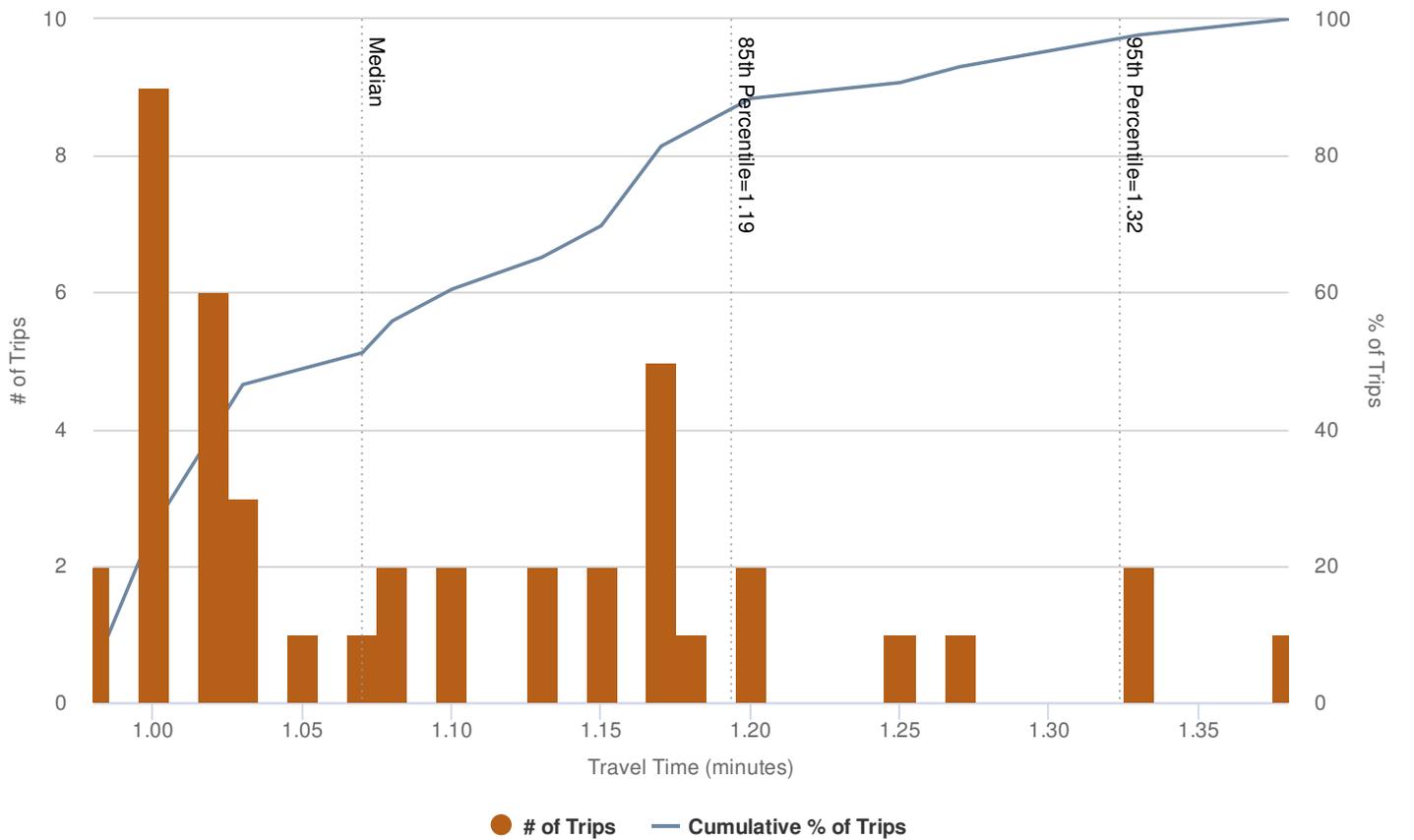
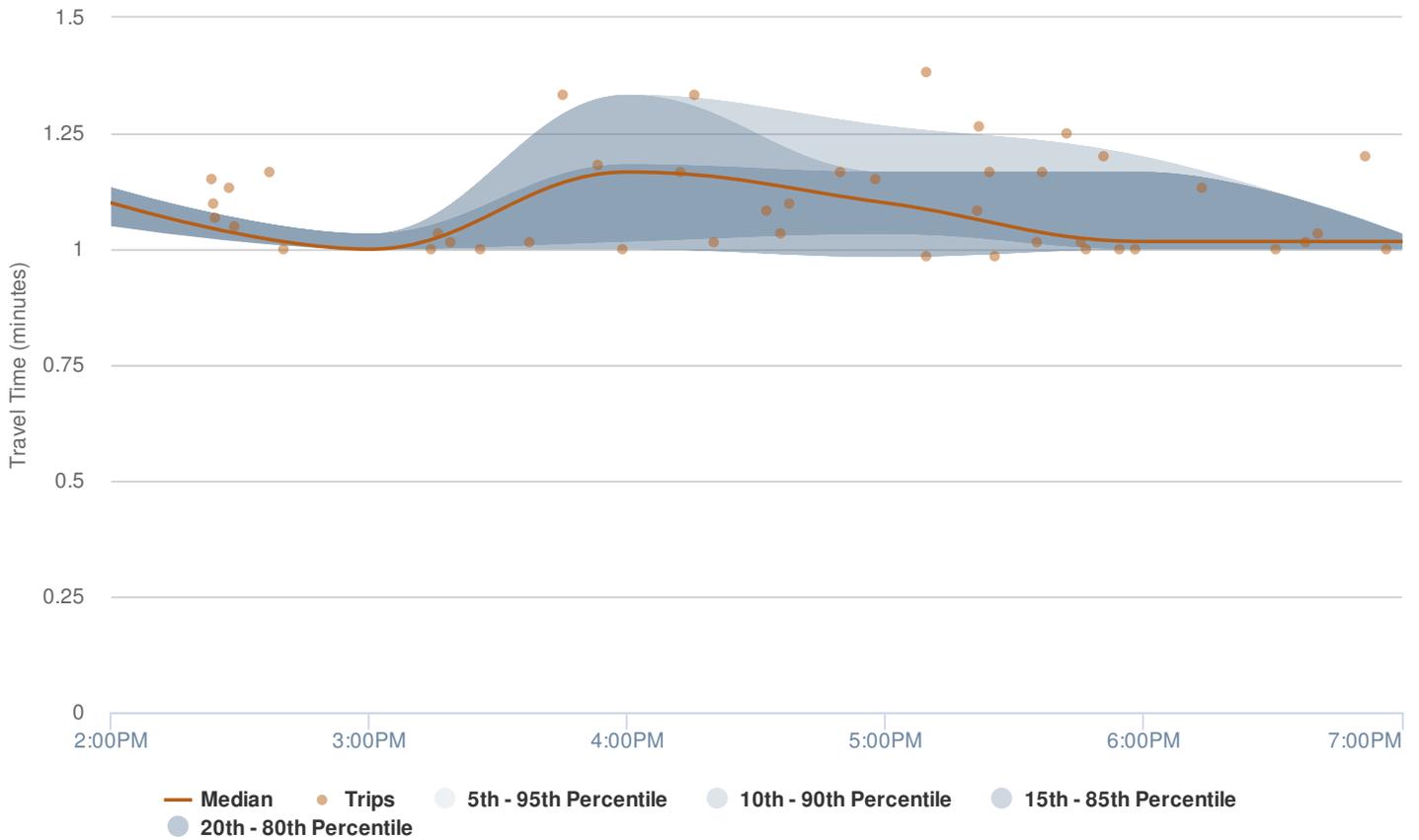
# 17405 South 68th Street to 68th St & Roca Rd

1 to 2 | (40.639755, -96.629539) to (40.654106, -96.629342)



# 68th St & Roca Rd to 17405 South 68th Street

2 to 1 | (40.654106, -96.629342) to (40.639755, -96.629539)

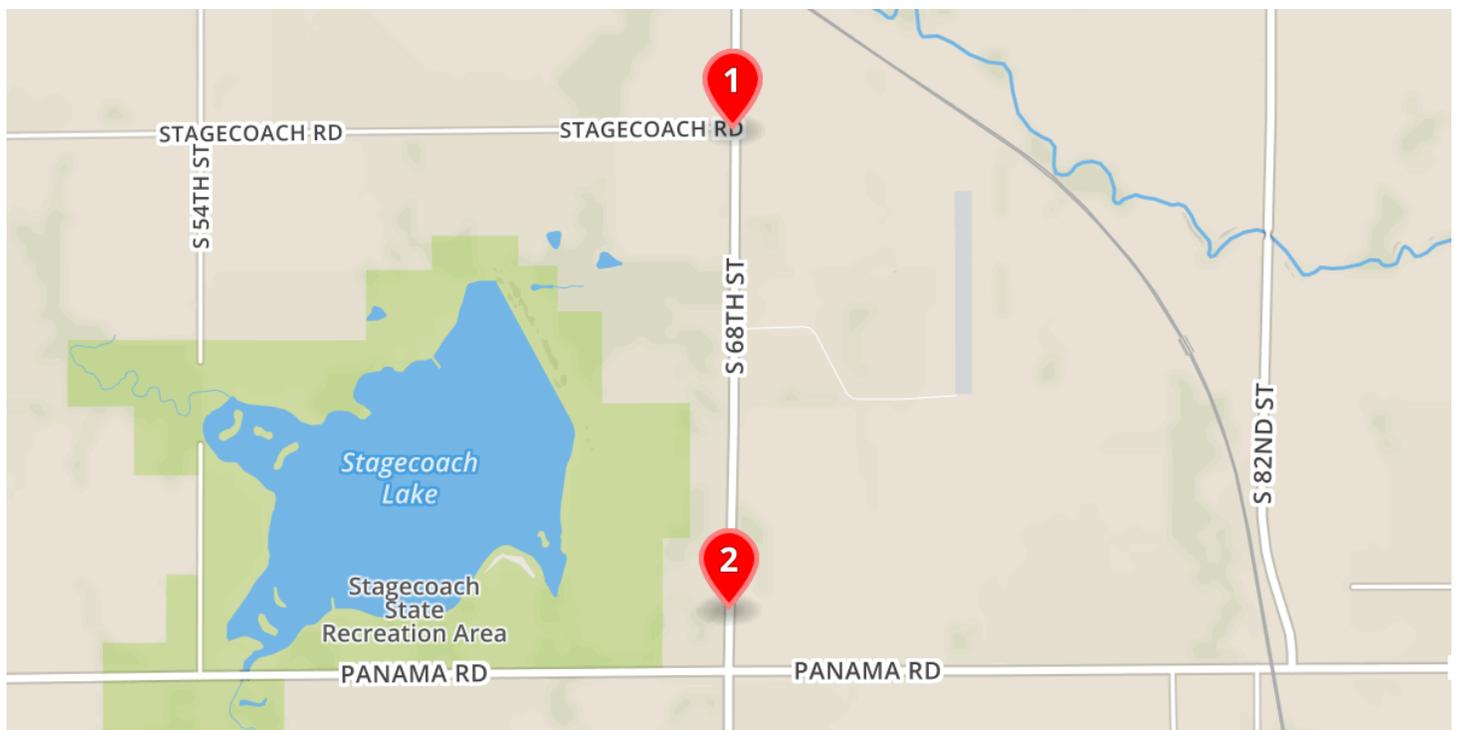


August 3, 2018  
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## **Central #3**

# Travel Time Summary

2 Locations | Hickman, NE | Thu May 17, 2018 | 6:00AM - 7:00PM (13.0h)



Start Location	End Location	# of Trips	Travel Time (minutes)							Distance (mis) <sup>1, 3</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max	Median		85th Percentile	95th Percentile	Mean	Min	Max	
1 5801-6105 Stagecoach Road	2 21919-21963 South 68th Street	74	1.00	1.05	1.15	0.96	0.73	1.22	0.9	54.58	66.90	72.78	57.55	44.86	74.43	
2 21919-21963 South 68th Street	1 5801-6105 Stagecoach Road	74	1.05	1.20	1.28	1.09	0.90	1.35	0.9	52.00	54.60	57.47	50.37	40.44	60.67	

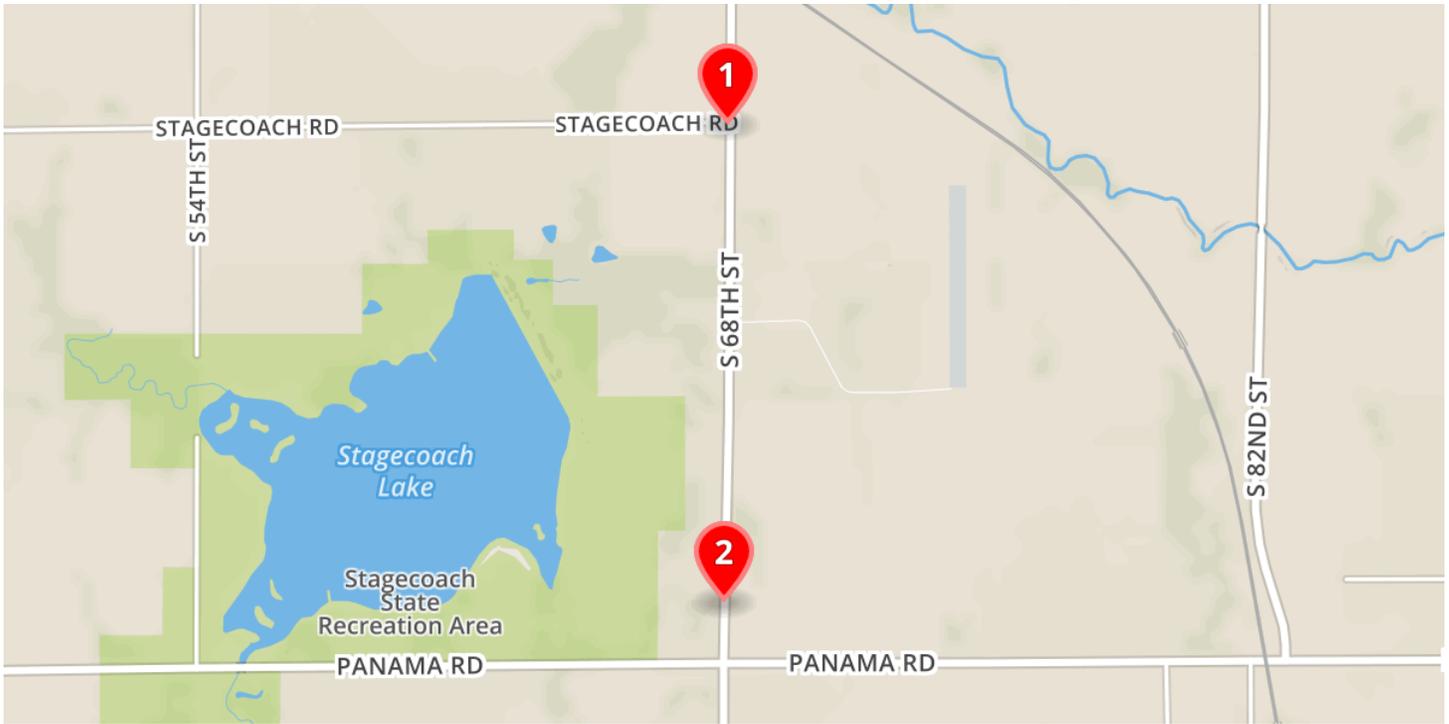
<sup>1</sup> Distance is the length of the Shortest Route between the locations in Google Maps. If Google Maps is unavailable or if Google Maps reports a distance longer than twice the aerial (as the bird flies) distance, the aerial distance is used and is denoted by an asterisk (\*). See [help.miovision.com/kb/distance](http://help.miovision.com/kb/distance)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

<sup>2</sup> 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.

<sup>3</sup> Custom distances are used in the calculations of this report.

# Travel Time Reliability Summary

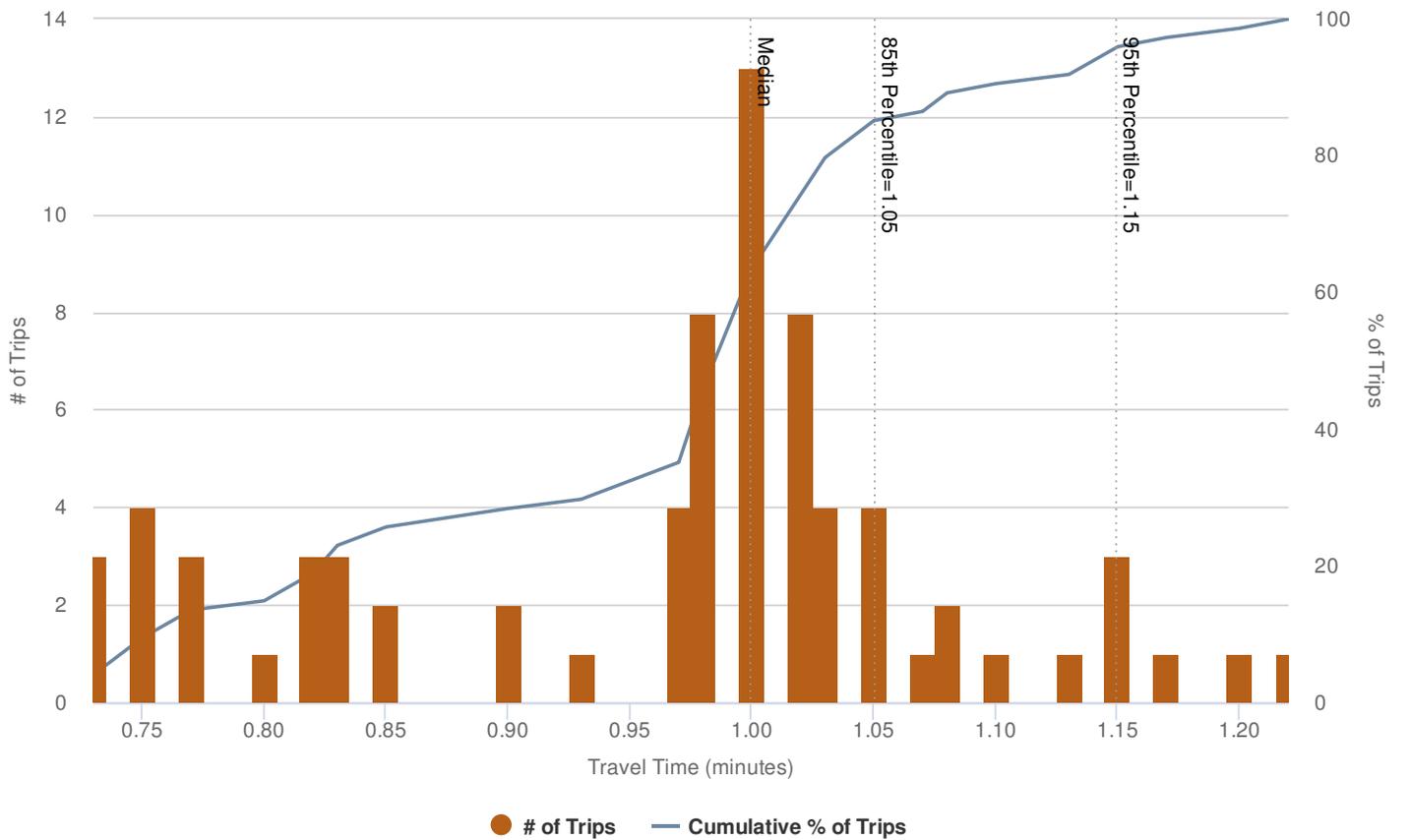
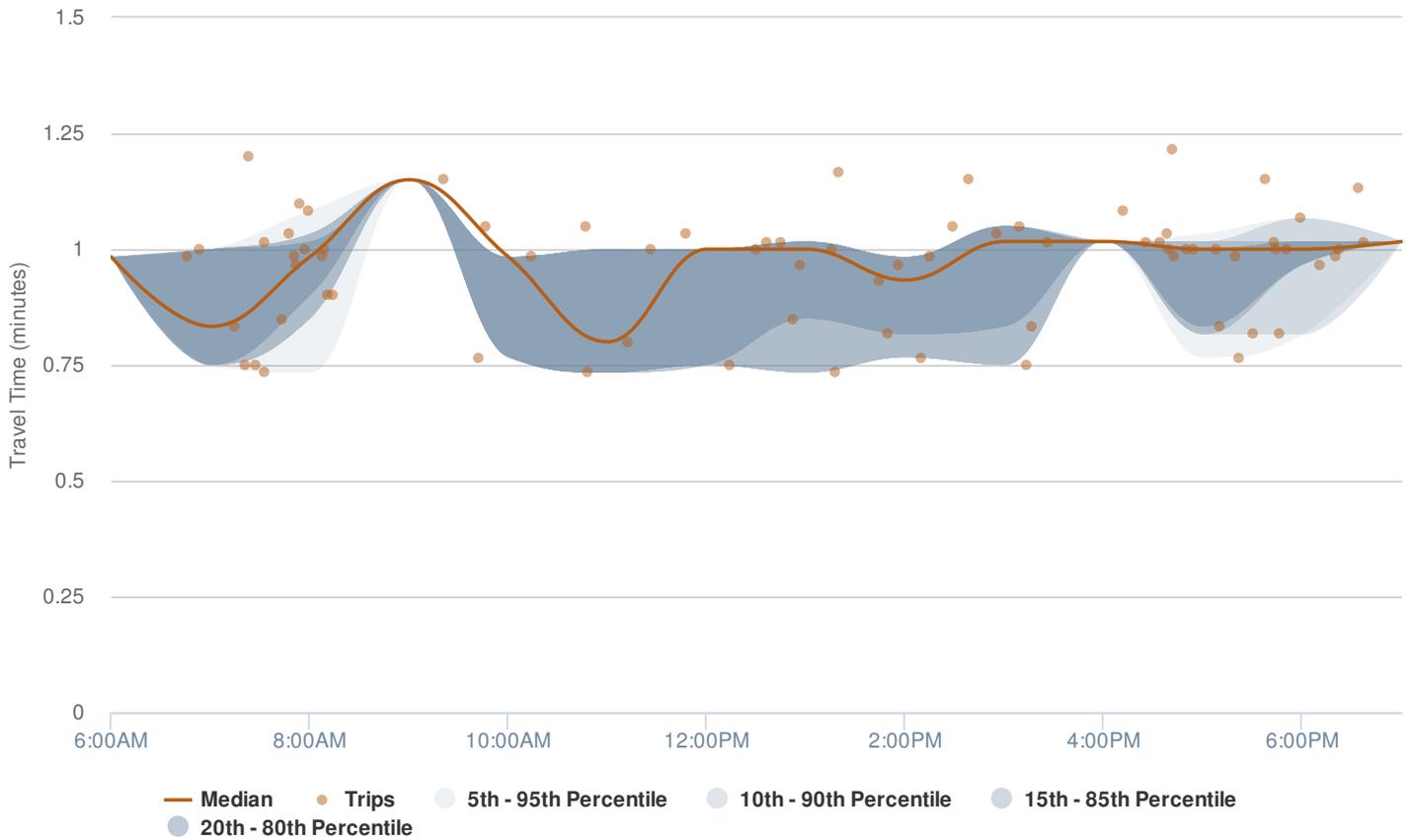
2 Locations | Hickman, NE | Thu May 17, 2018 | 6:00AM - 7:00PM (13.0h)



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 5801-6105 Stagecoach Road	2 21919-21963 South 68th Street	1.26	1.35	1.14	1.20	0.10	0.13
2 21919-21963 South 68th Street	1 5801-6105 Stagecoach Road	1.17	1.08	1.05	1.03	0.11	0.05

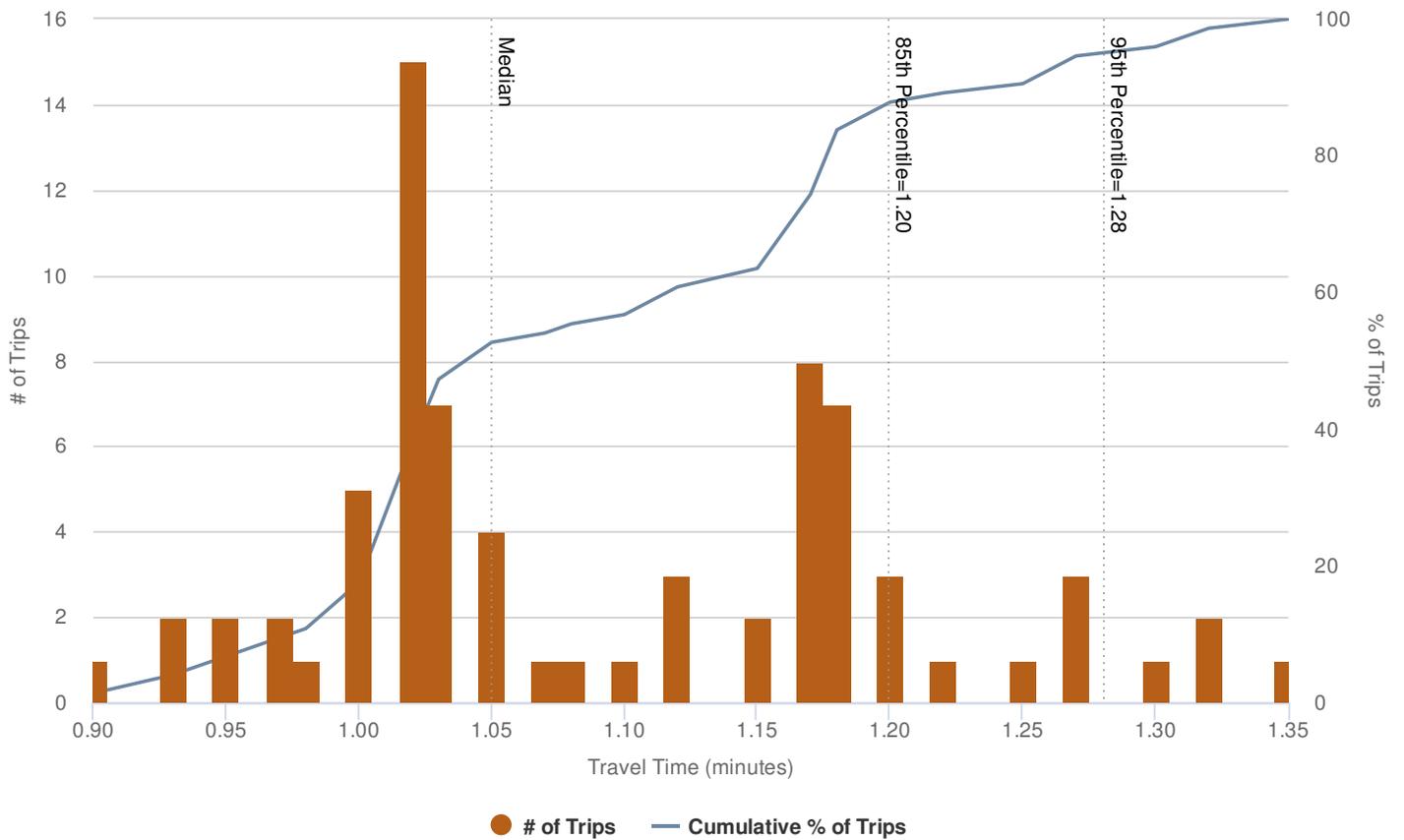
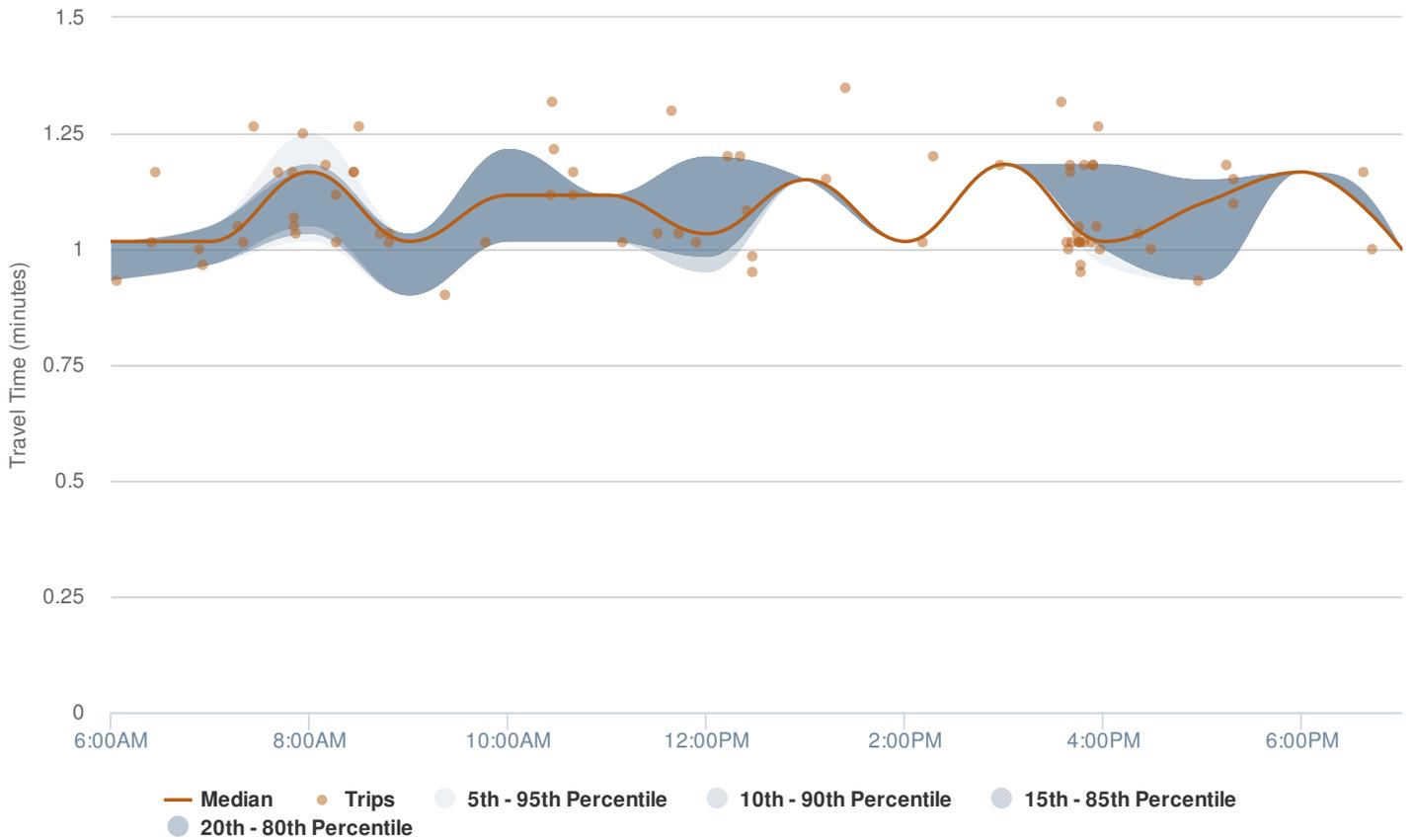
# 5801-6105 Stagecoach Road to 21919-21963 South 68th Street

1 to 2 | (40.610622, -96.629593) to (40.597656, -96.629753)



# 21919-21963 South 68th Street to 5801-6105 Stagecoach Road

2 to 1 | (40.597656, -96.629753) to (40.610622, -96.629593)

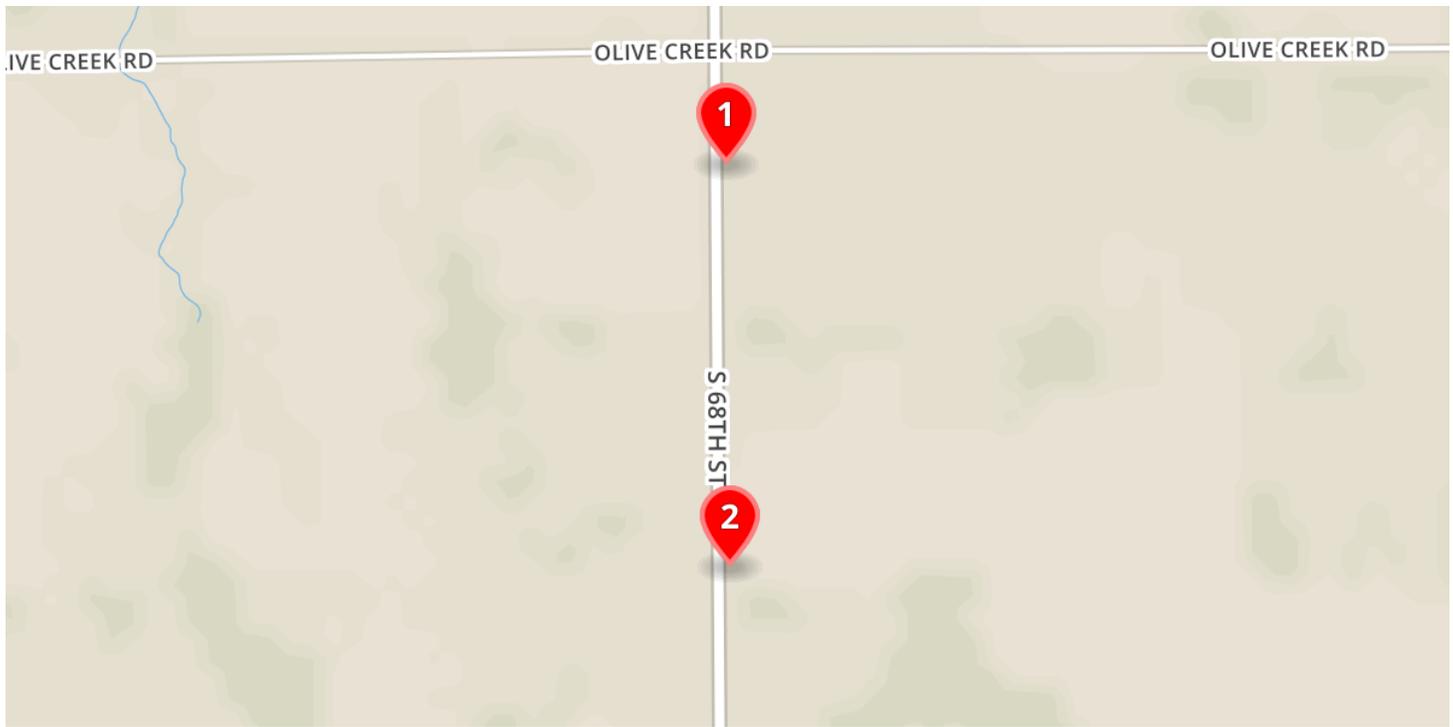


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## **South Central #4**

# Travel Time Summary

2 Locations | Firth, NE | Wed Apr 25, 2018 | 7:00AM - 10:00AM (3.0h)



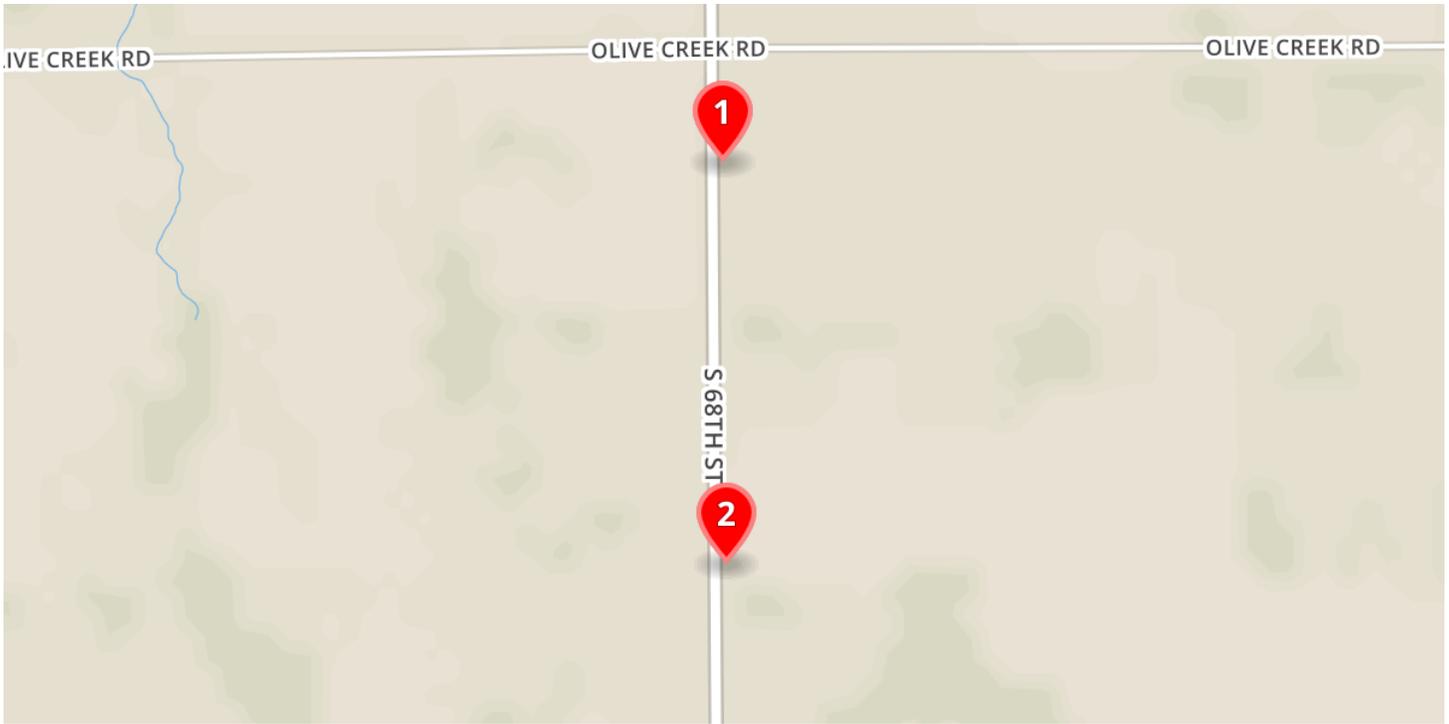
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 23500-24684 South 68th Street	2 23500-24684 South 68th Street	14	0.49	0.65	0.70	0.48	0.30	0.75	0.4*	46.07	64.86	70.58	49.98	30.19	75.48
2 23500-24684 South 68th Street	1 23500-24684 South 68th Street	12	0.44	0.66	0.67	0.47	0.32	0.67	0.4*	51.29	67.93	69.54	51.74	33.97	71.51

<sup>1</sup> 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](http://help.miovision.com/kb/distance) for more information.

<sup>2</sup> 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

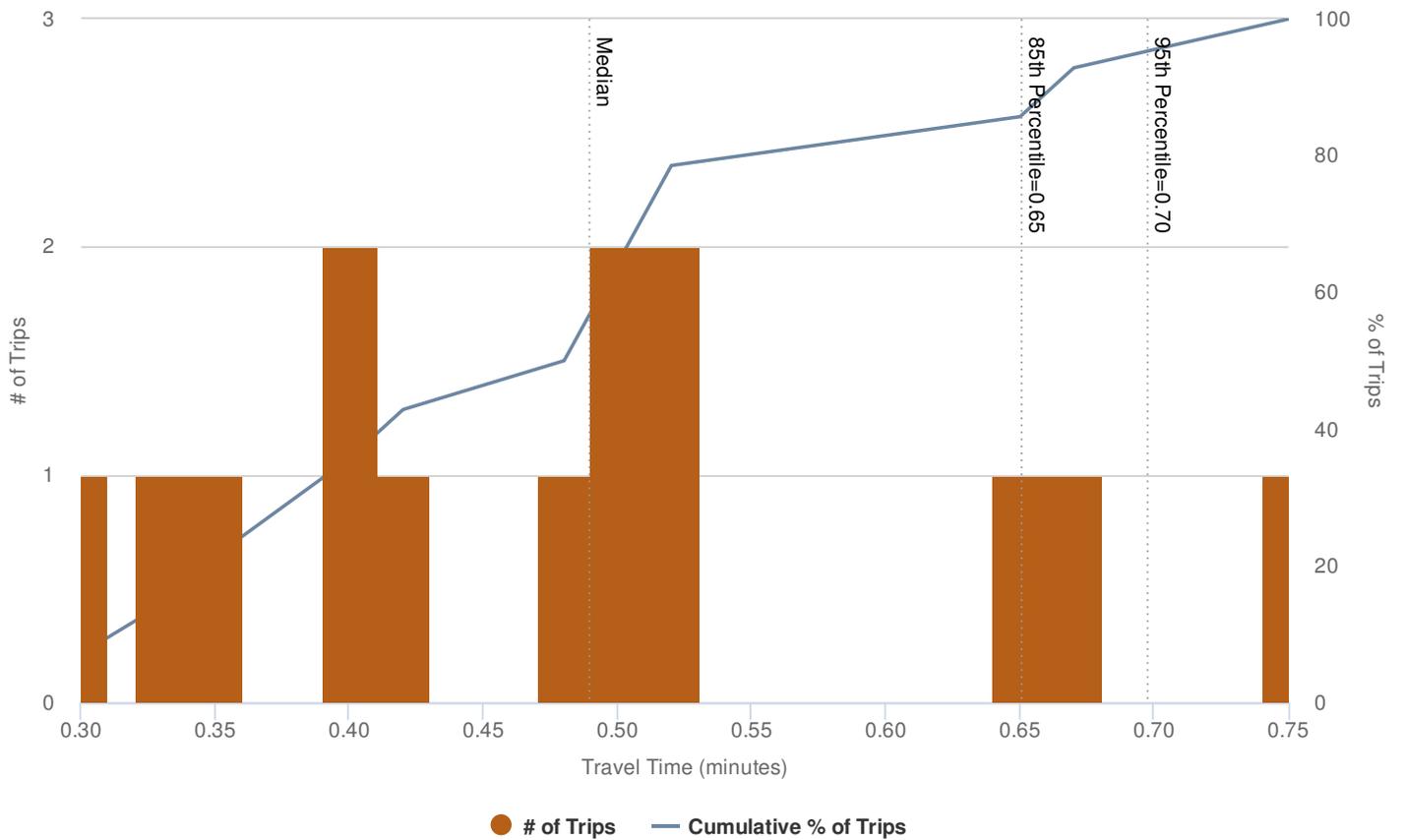
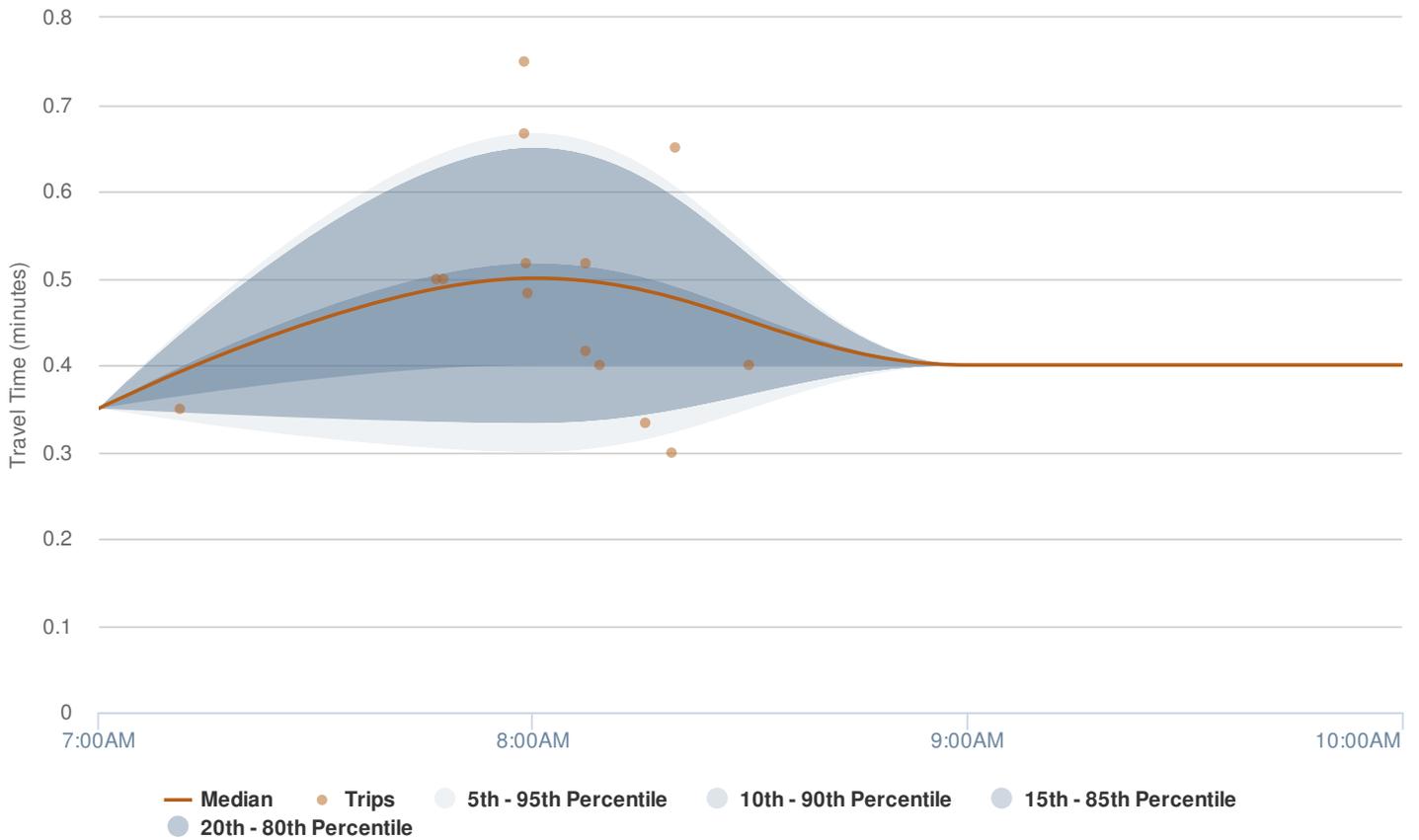
2 Locations | Firth, NE | Wed Apr 25, 2018 | 7:00AM - 10:00AM (3.0h)



Start Location		End Location		Buffer Time Index AM (6am - 9am)	Planning Time Index AM (6am - 9am)	Travel Time Index AM (6am - 9am)
1	23500-24684 South 68th Street	2	23500-24684 South 68th Street	0.38		
2	23500-24684 South 68th Street	1	23500-24684 South 68th Street	0.37	1.44	1.05

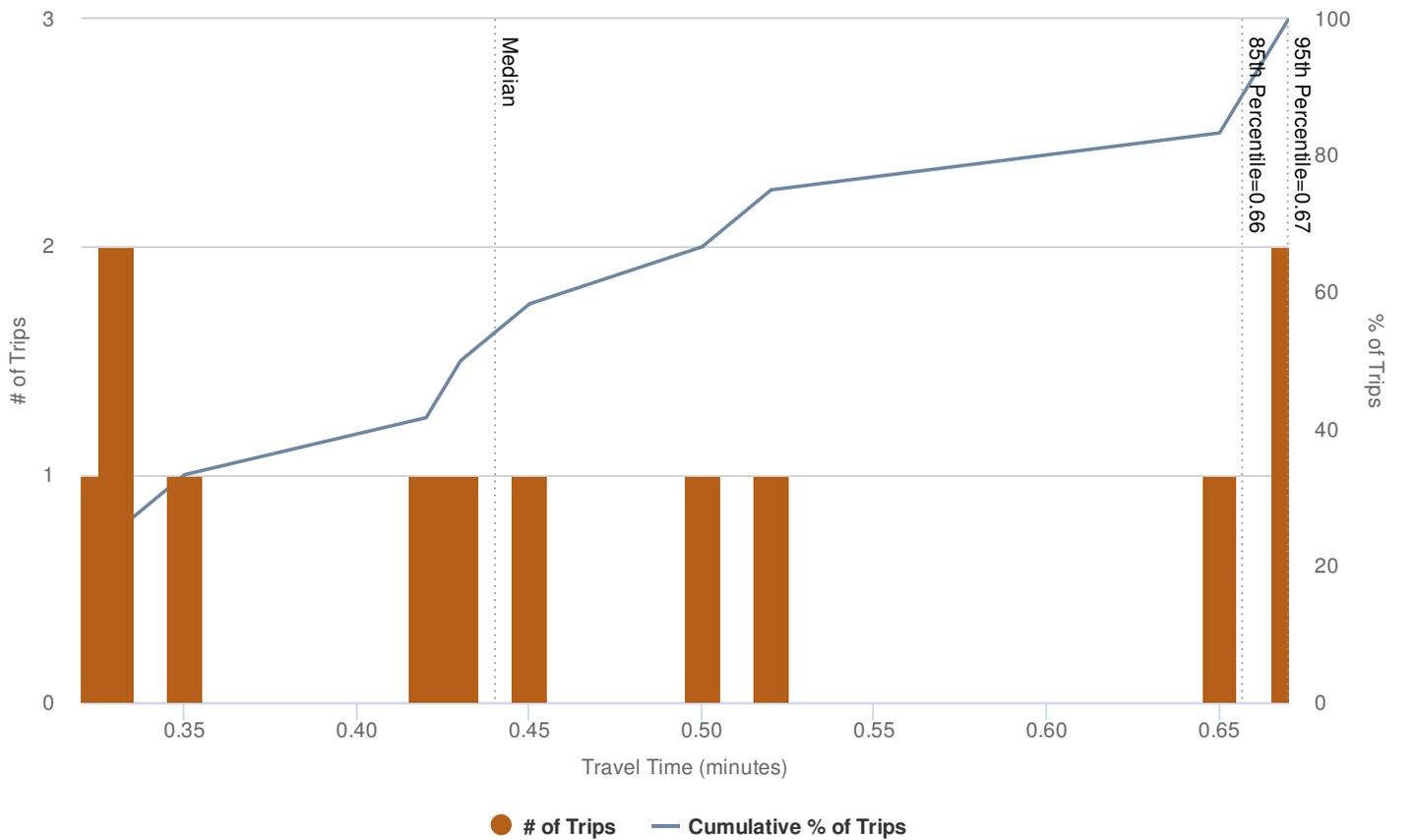
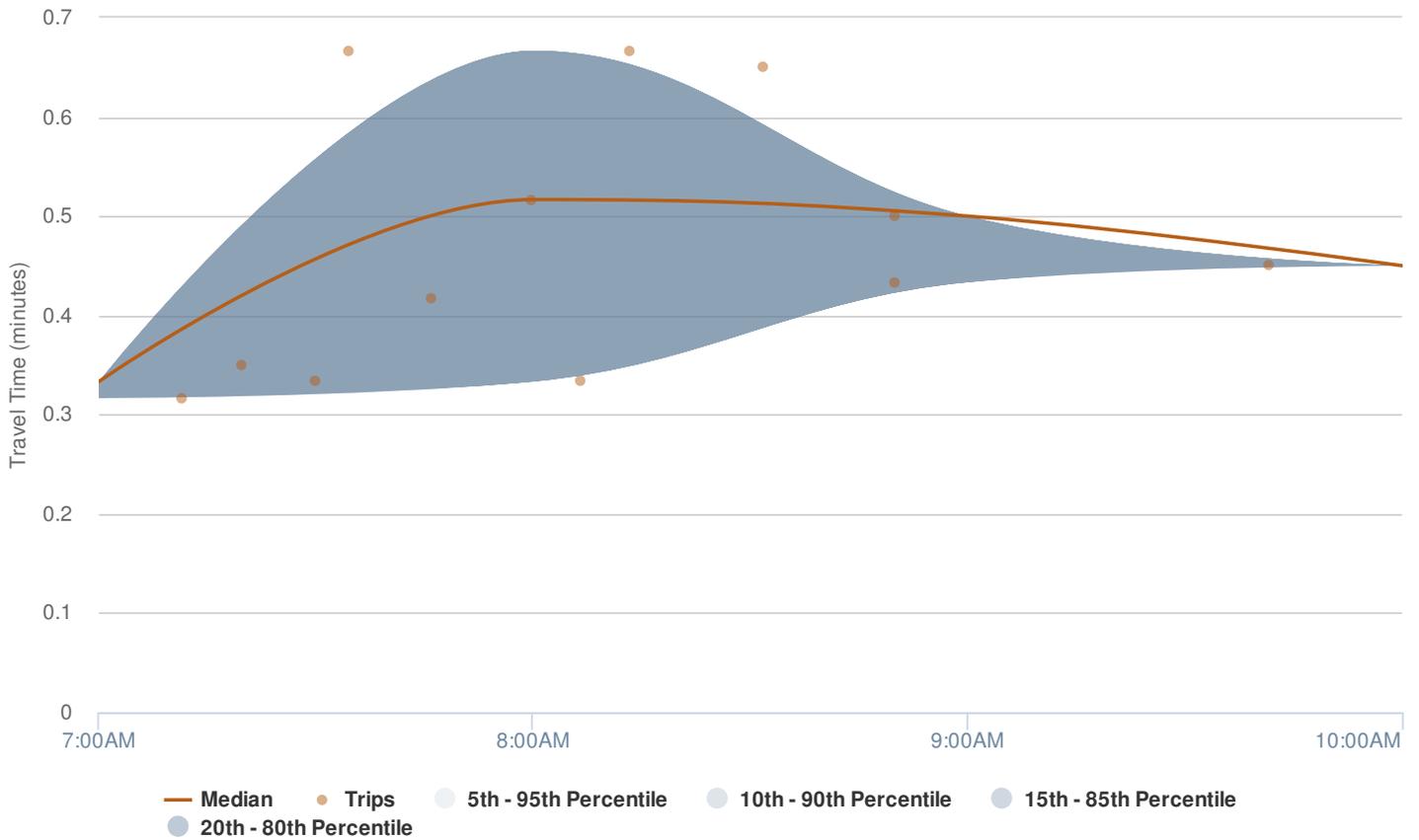
# 23500-24684 South 68th Street to 23500-24684 South 68th Street

1 to 2 | (40.579994, -96.629478) to (40.574532, -96.629402)



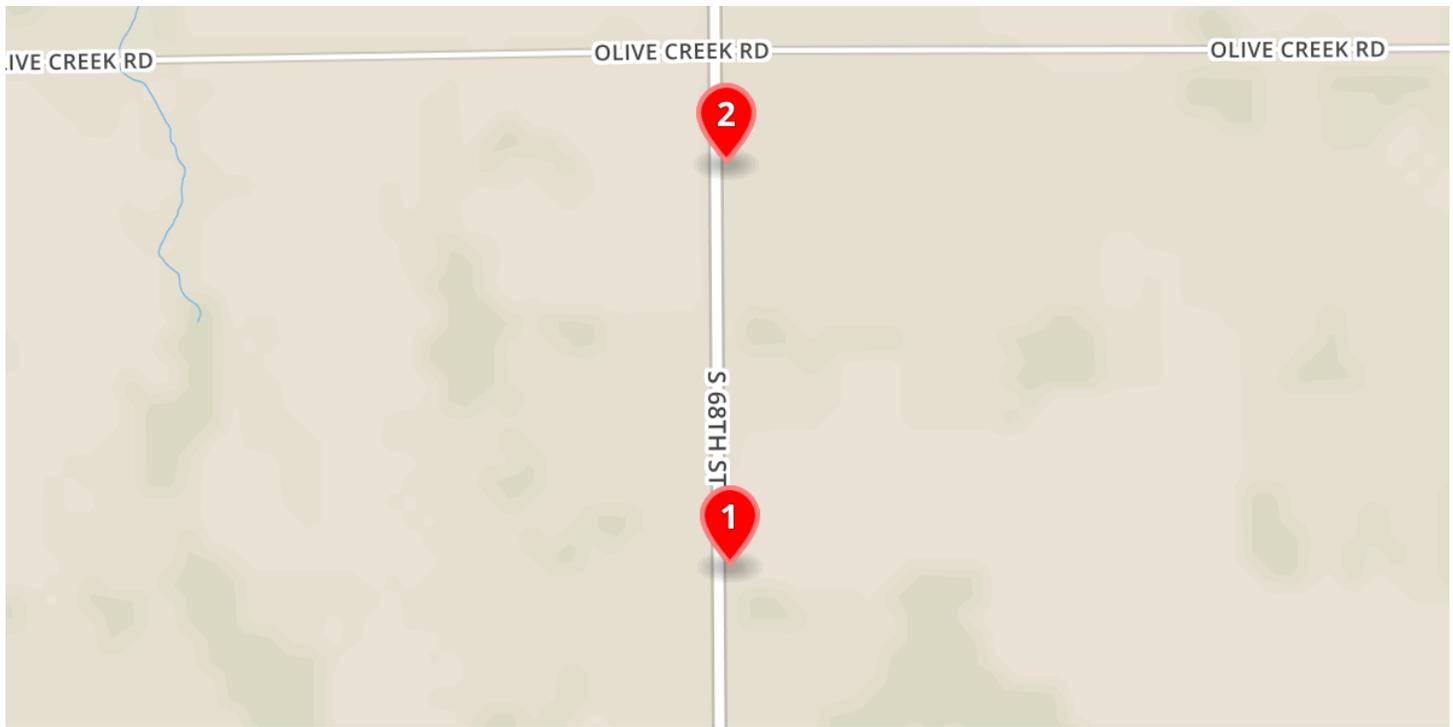
# 23500-24684 South 68th Street to 23500-24684 South 68th Street

2 to 1 | (40.574532, -96.629402) to (40.579994, -96.629478)



# Travel Time Summary

2 Locations | Firth, NE | Wed Apr 25, 2018 | 2:00PM - 7:00PM (5.0h)



Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 23500-24684 South 68th Street	2 23500-24684 South 68th Street	56	0.38	0.50	0.50	0.40	0.27	0.67	0.4*	59.07	71.51	76.59	58.60	33.97	84.92
2 23500-24684 South 68th Street	1 23500-24684 South 68th Street	22	0.44	0.51	0.52	0.44	0.28	0.73	0.4*	51.29	67.45	71.33	53.91	30.88	79.92

<sup>1</sup> 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](http://help.miovision.com/kb/distance) for more information.

<sup>2</sup> 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

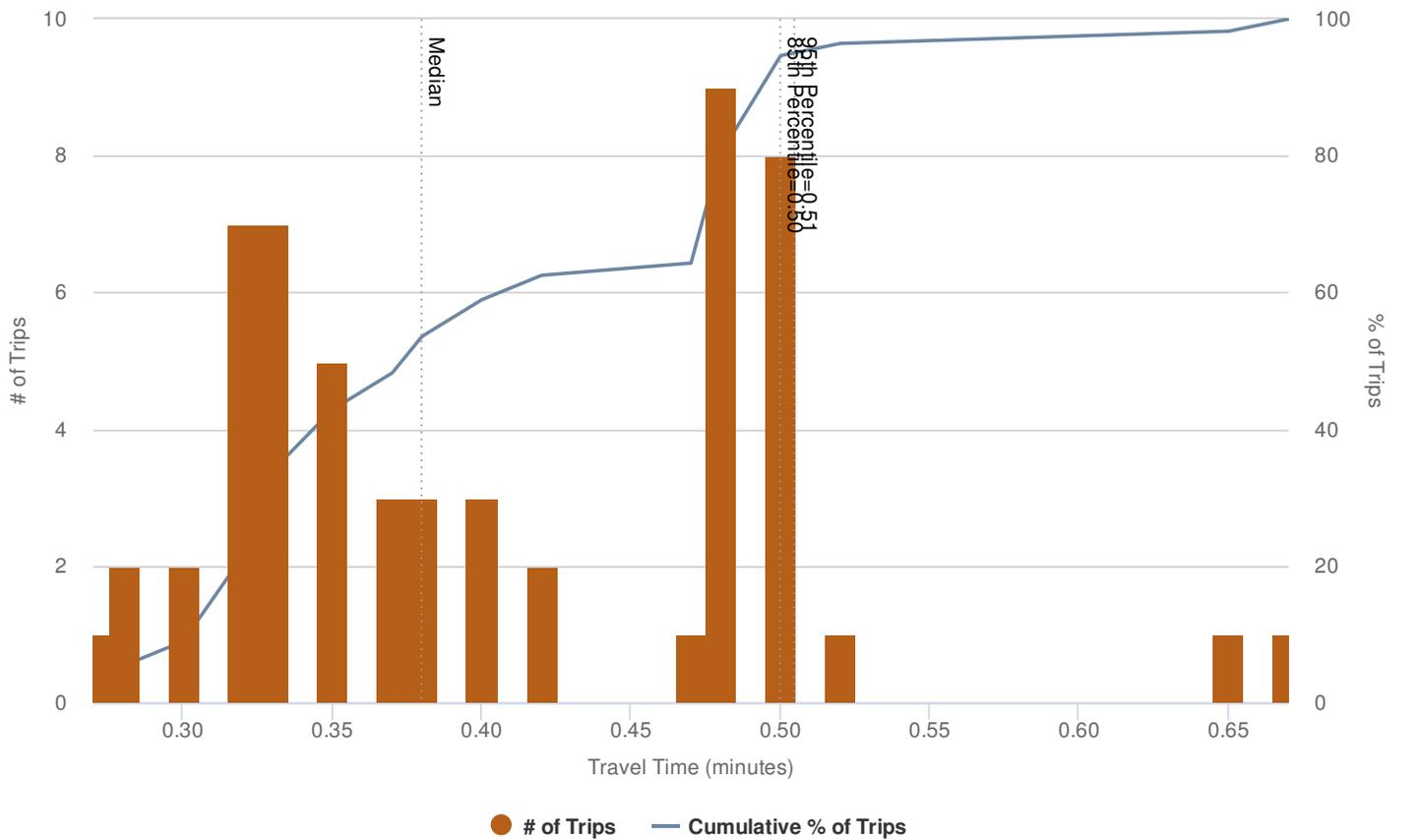
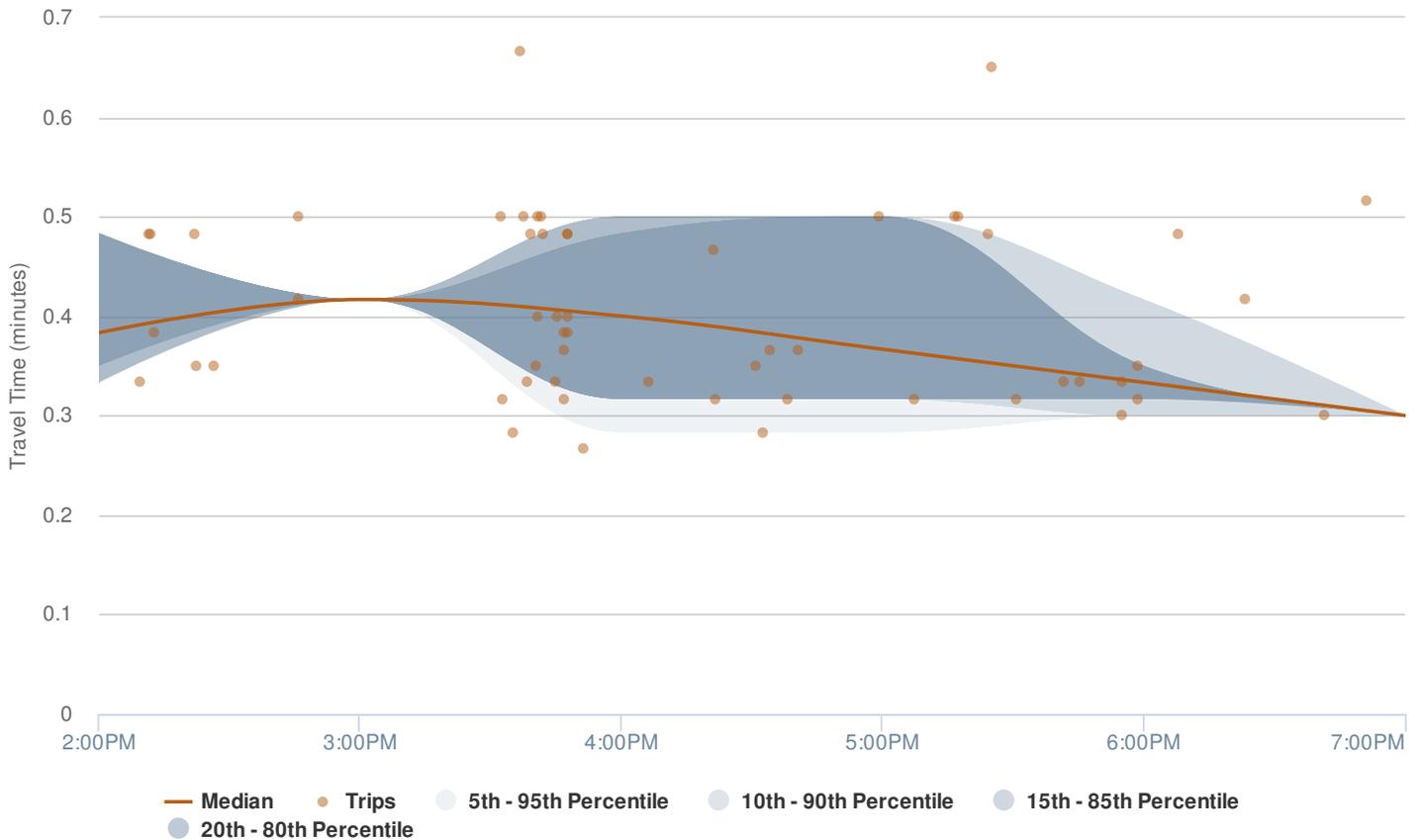
2 Locations | Firth, NE | Wed Apr 25, 2018 | 2:00PM - 7:00PM (5.0h)



Start Location		End Location		Planning Time Index PM (4pm - 7pm)	Travel Time Index PM (4pm - 7pm)	Buffer Time Index PM (4pm - 7pm)
1	23500-24684 South 68th Street	2	23500-24684 South 68th Street	1.56	1.17	0.34
2	23500-24684 South 68th Street	1	23500-24684 South 68th Street	1.61	1.29	0.25

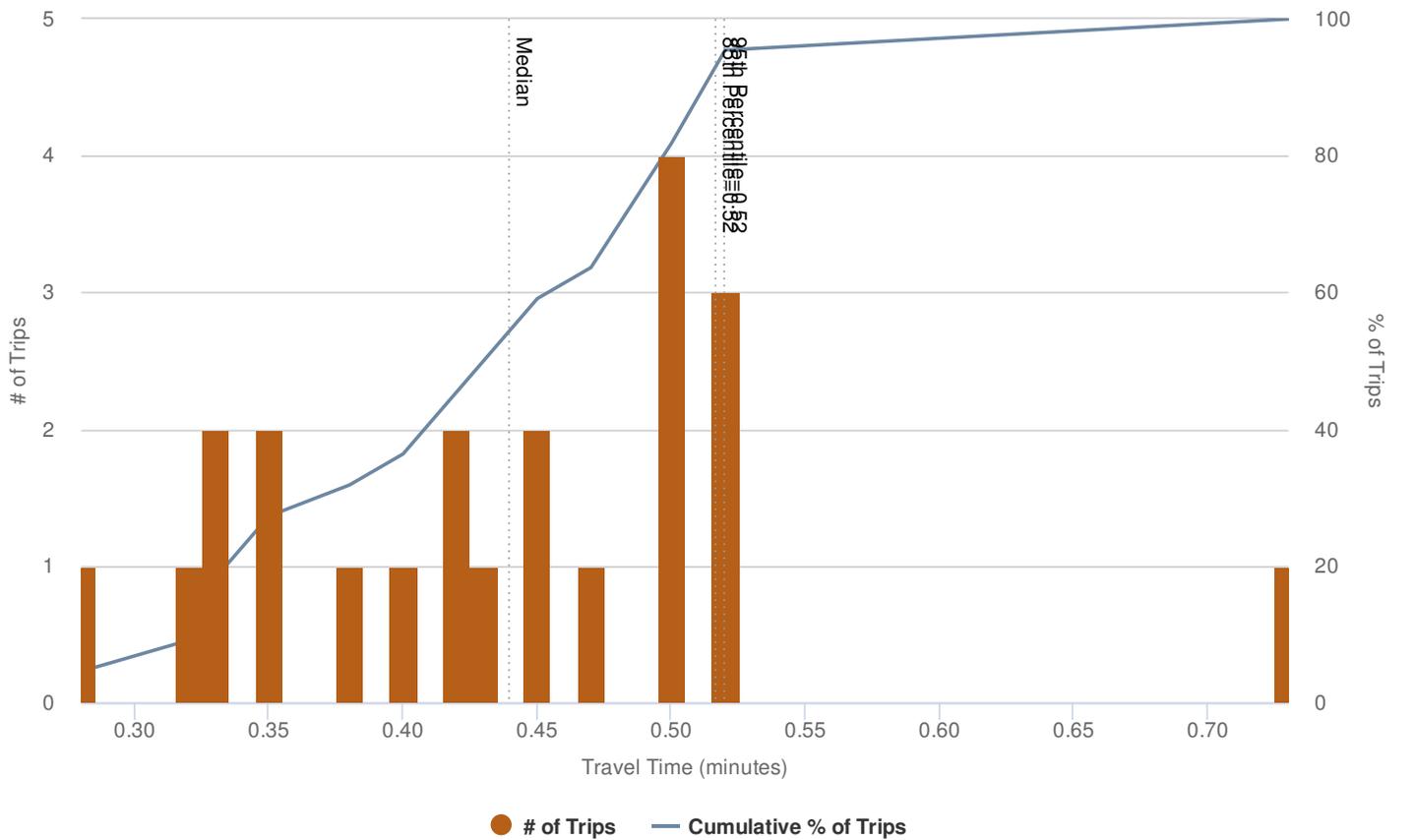
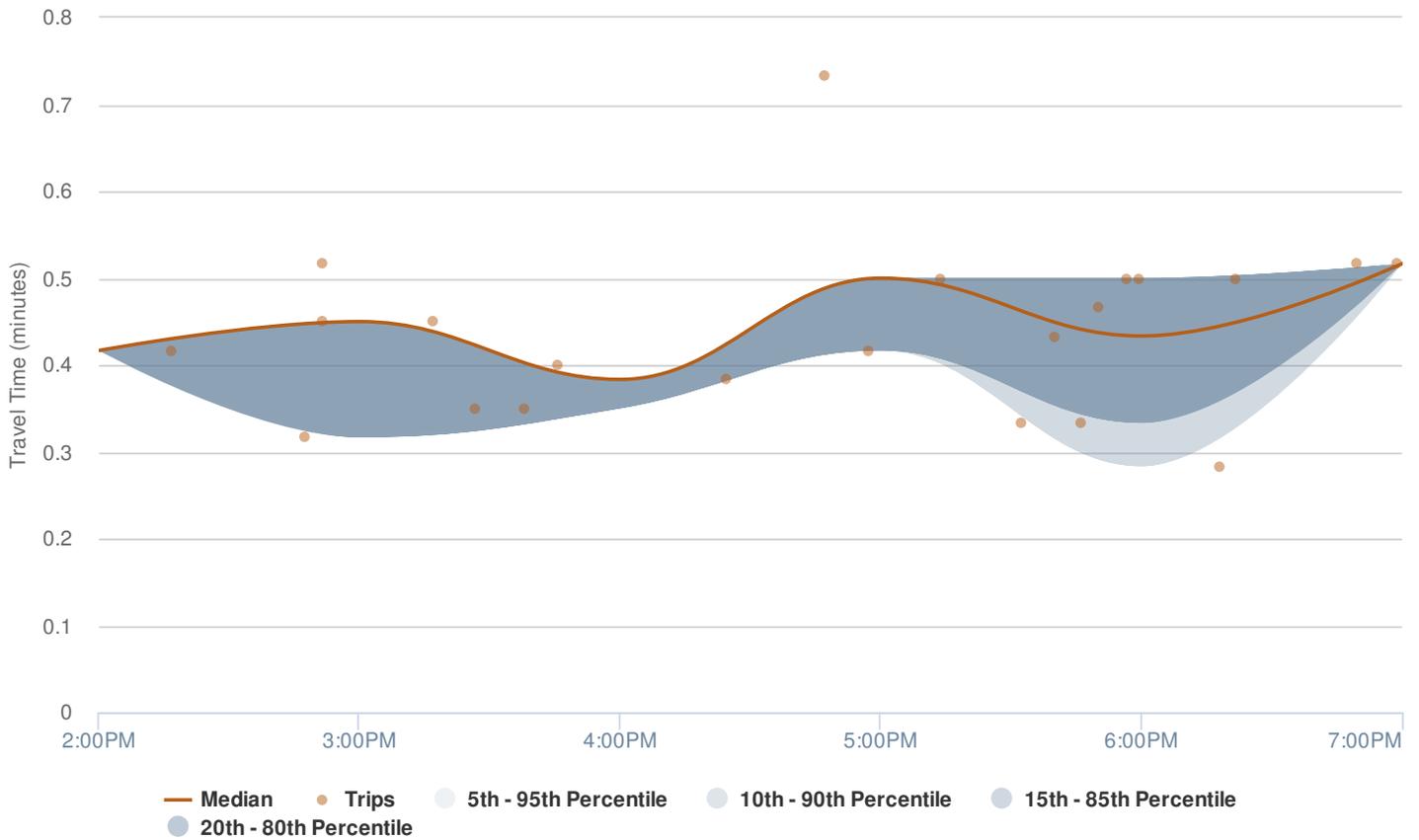
# 23500-24684 South 68th Street to 23500-24684 South 68th Street

1 to 2 | (40.574532, -96.629402) to (40.579994, -96.629478)



# 23500-24684 South 68th Street to 23500-24684 South 68th Street

2 to 1 | (40.579994, -96.629478) to (40.574532, -96.629402)

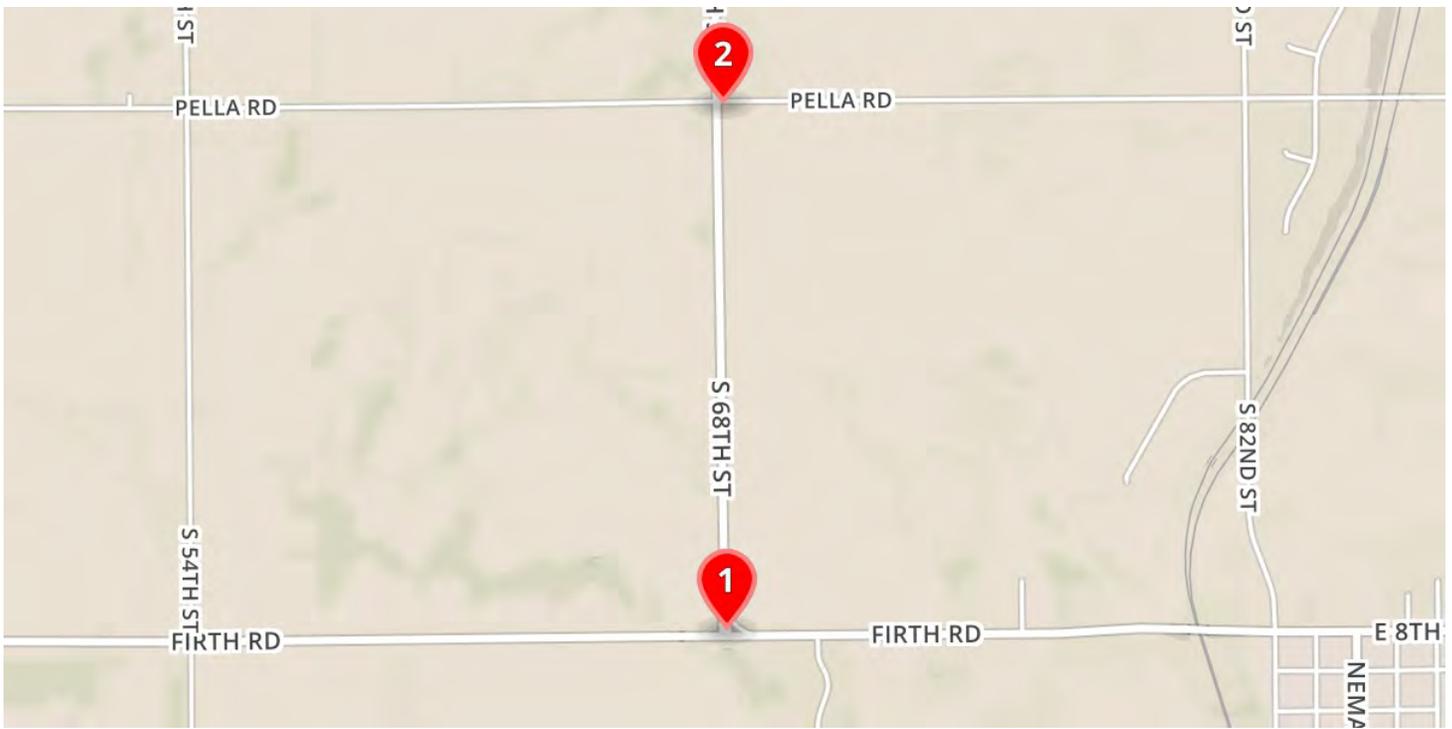


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## **South #5**

# Travel Time Summary

2 Locations | Firth, NE | Tue May 1, 2018 | 7:00AM - 10:00AM (3.0h)



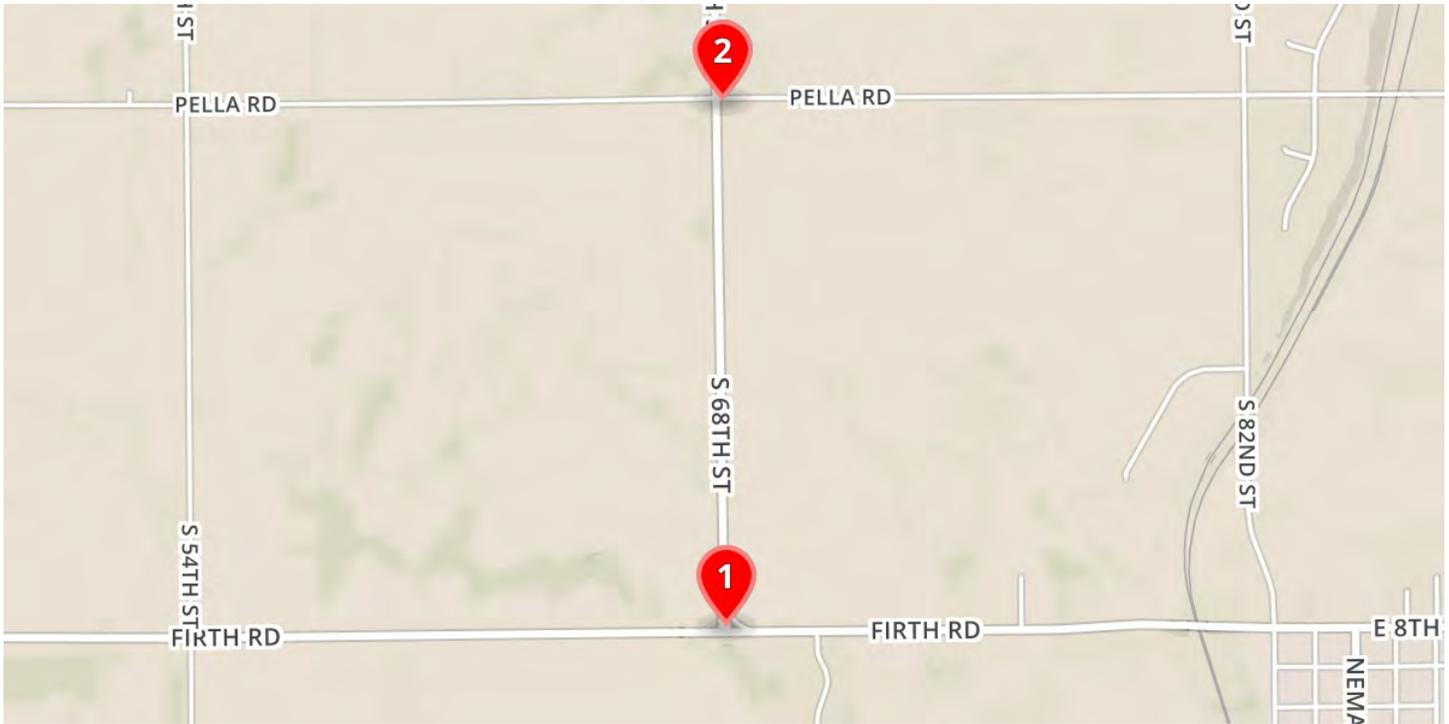
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1</sup>	Speed (mph) <sup>2</sup>					
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max
1 68th St & Firth Rd	2 7355 Pella Road	10	1.02	1.07	1.12	1.01	0.82	1.15	1.0	59.13	62.89	69.45	59.87	52.26	73.59
2 7355 Pella Road	1 68th St & Firth Rd	9	1.10	1.47	1.55	1.17	0.83	1.58	1.0	56.30	61.72	69.36	54.94	39.11	74.31

<sup>1</sup> 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](http://help.miovision.com/kb/distance) for more information.

<sup>2</sup> 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

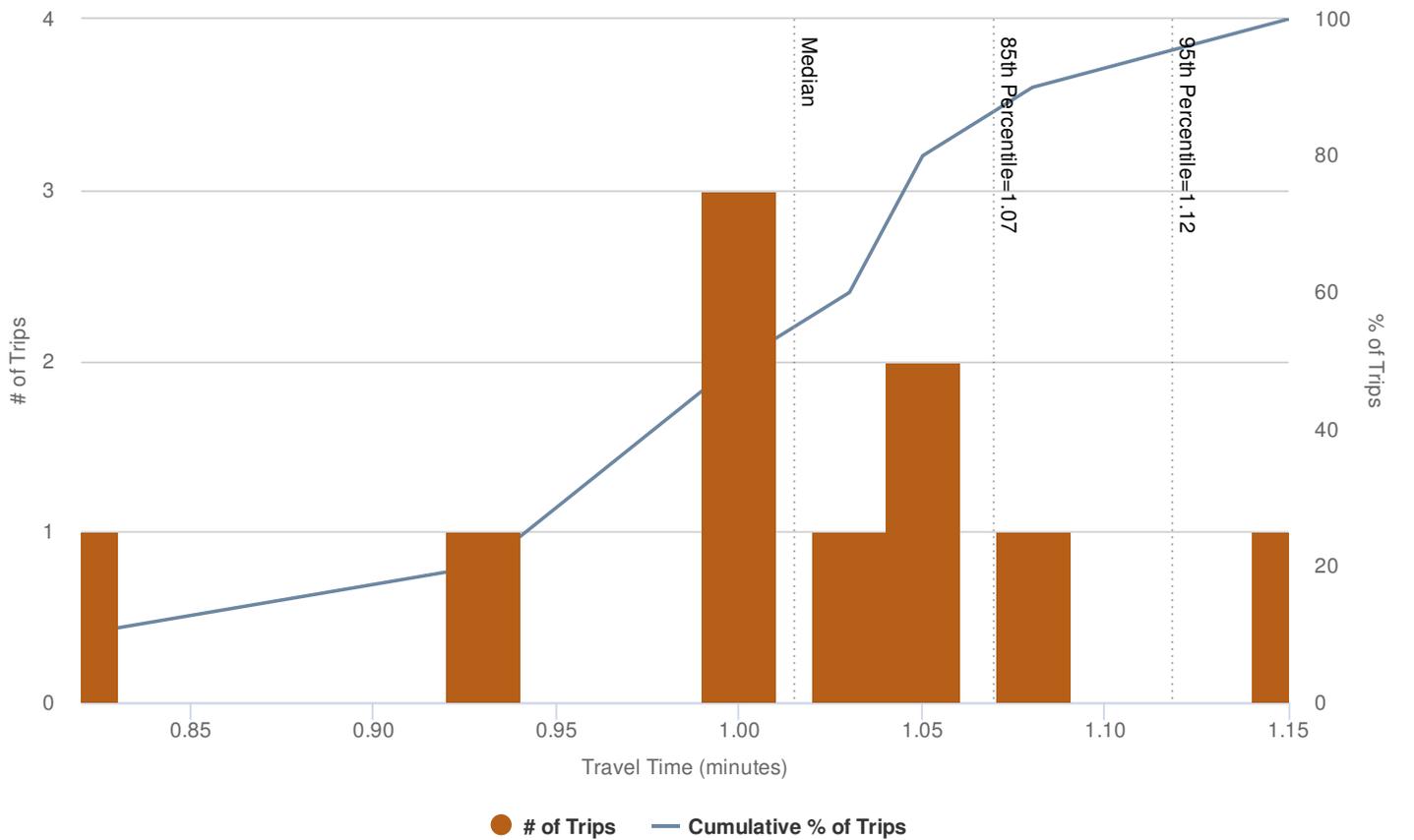
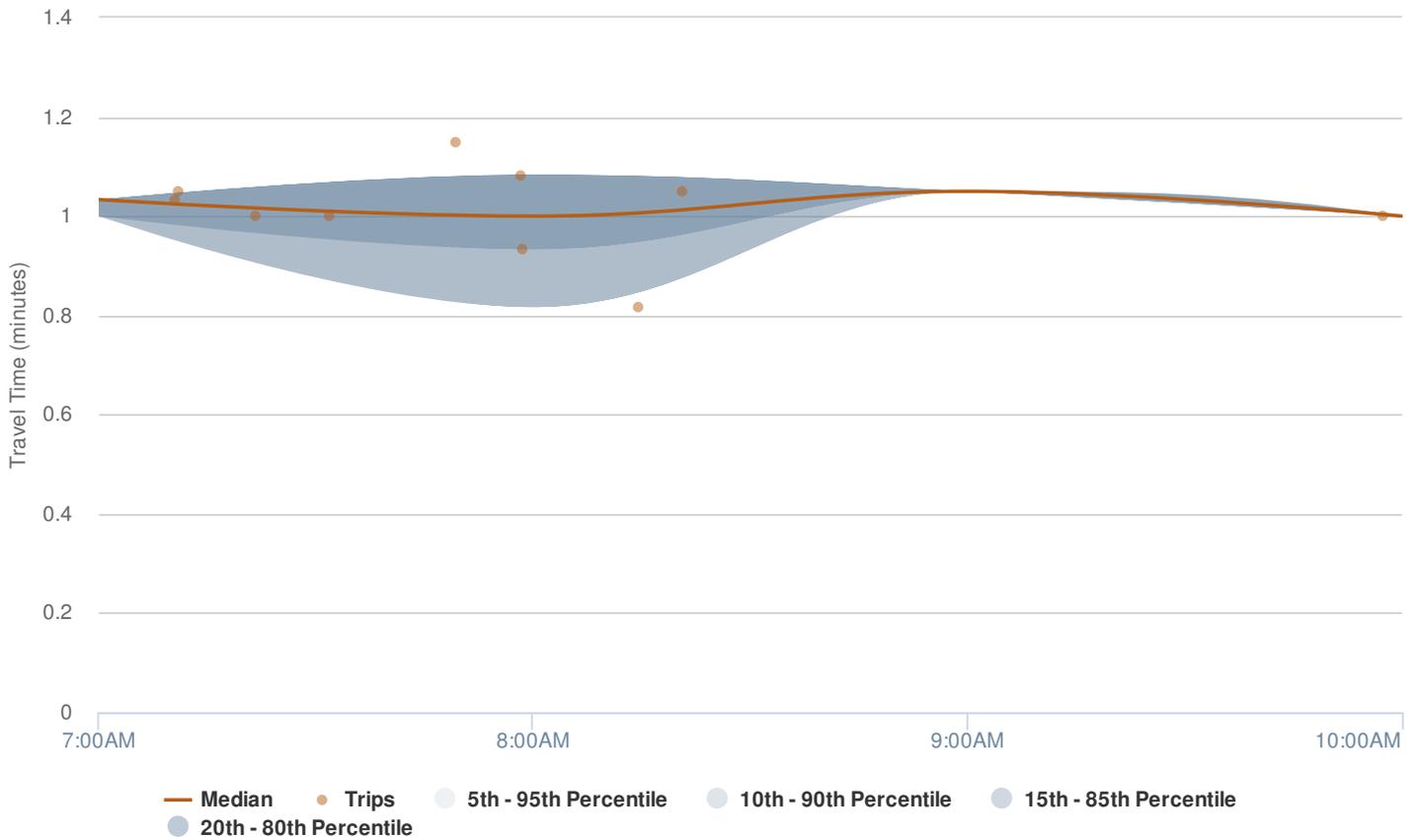
2 Locations | Firth, NE | Tue May 1, 2018 | 7:00AM - 10:00AM (3.0h)



Start Location	End Location	Planning Time Index AM (6am - 9am)	Travel Time Index AM (6am - 9am)	Buffer Time Index AM (6am - 9am)
1   68th St & Firth Rd	2   7355 Pella Road	1.08	1.01	0.07
2   7355 Pella Road	1   68th St & Firth Rd	1.16	1.09	0.06

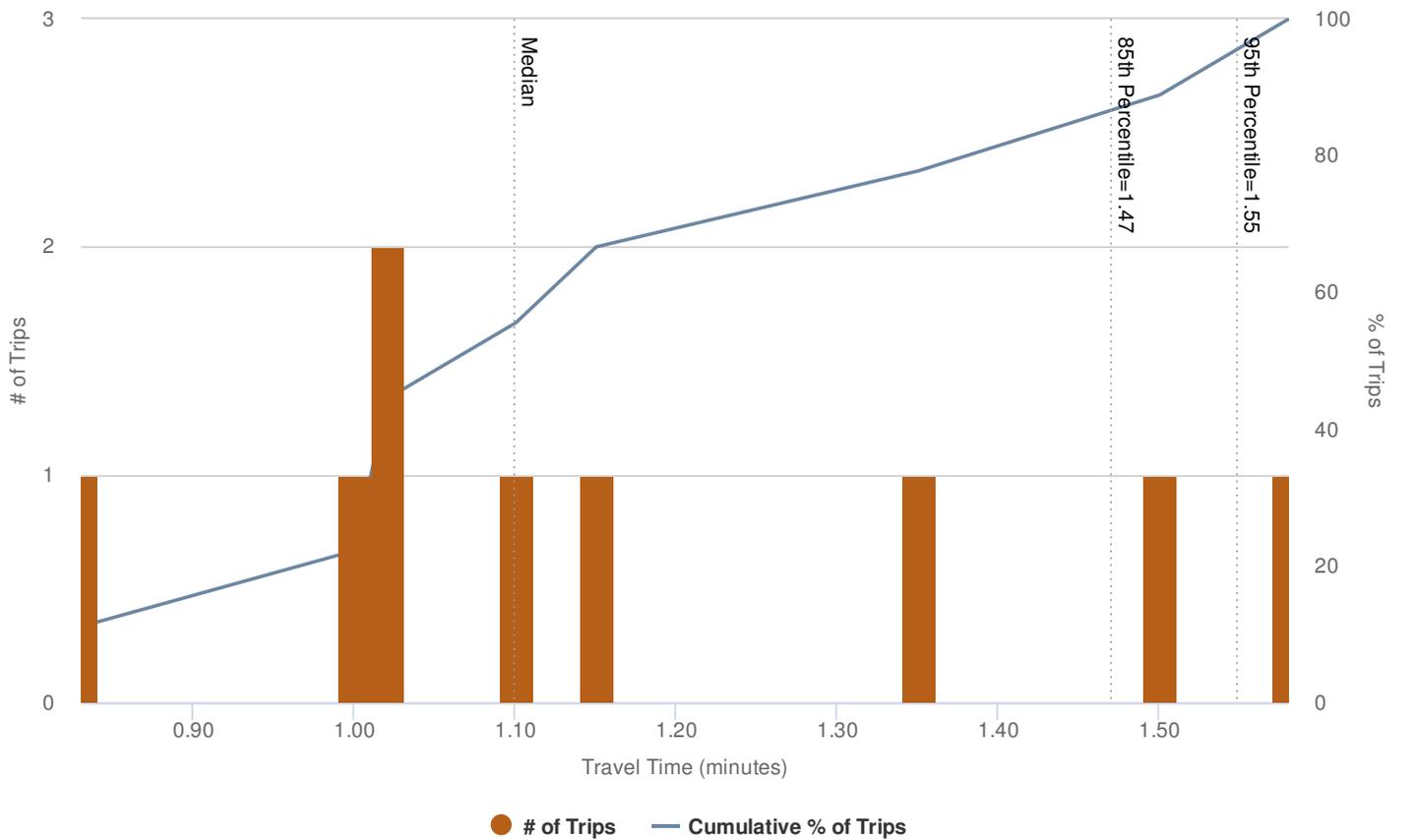
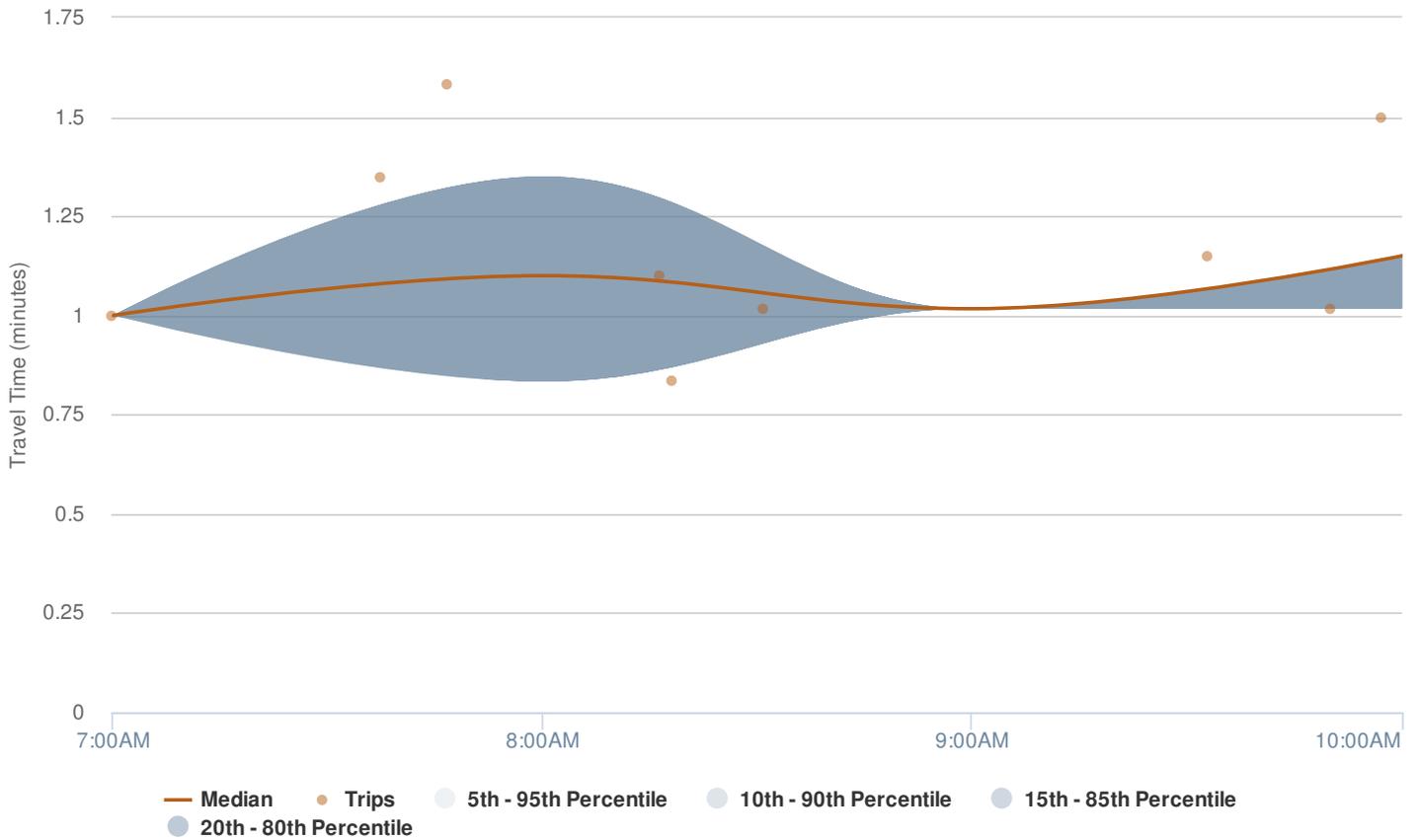
# 68th St & Firth Rd to 7355 Pella Road

1 to 2 | (40.538207, -96.628871) to (40.552475, -96.628998)



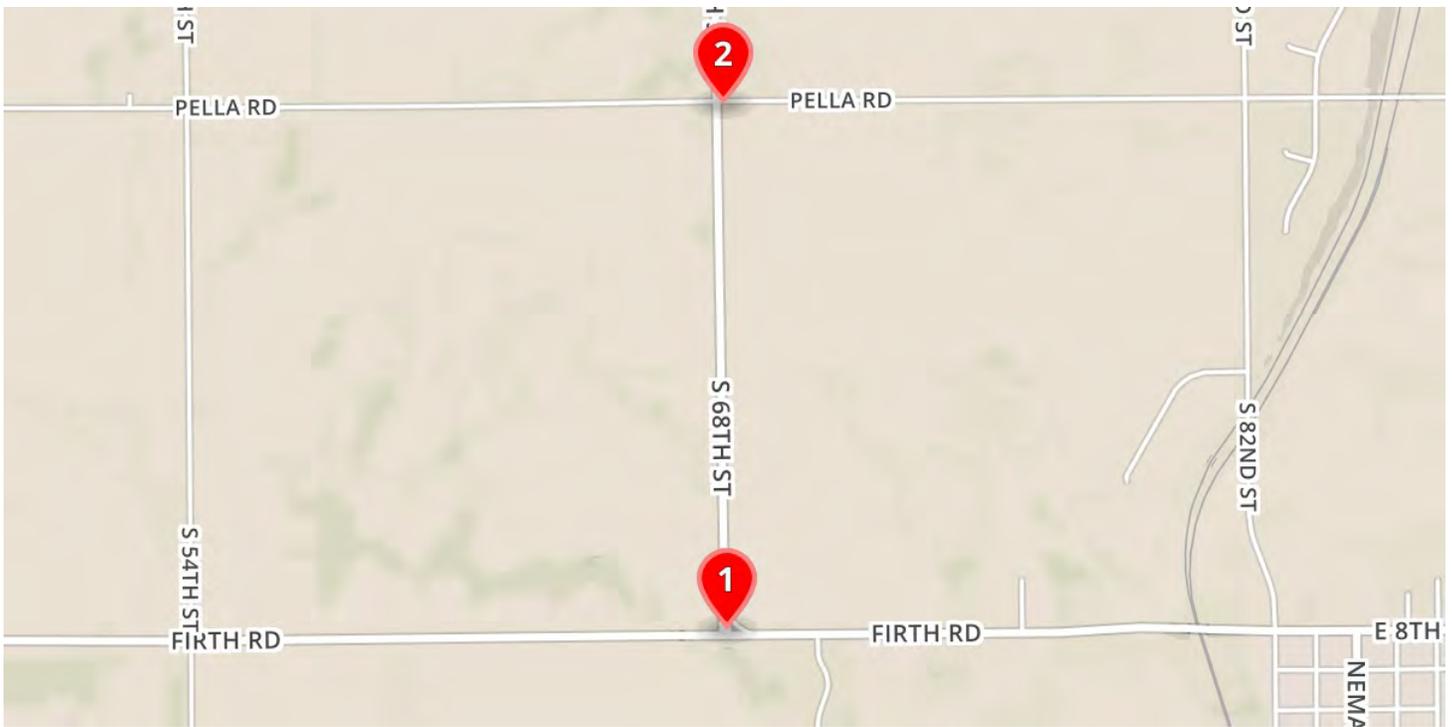
# 7355 Pella Road to 68th St & Firth Rd

2 to 1 | (40.552475, -96.628998) to (40.538207, -96.628871)



# Travel Time Summary

2 Locations | Firth, NE | Tue May 1, 2018 | 2:00PM - 7:00PM (5.0h)



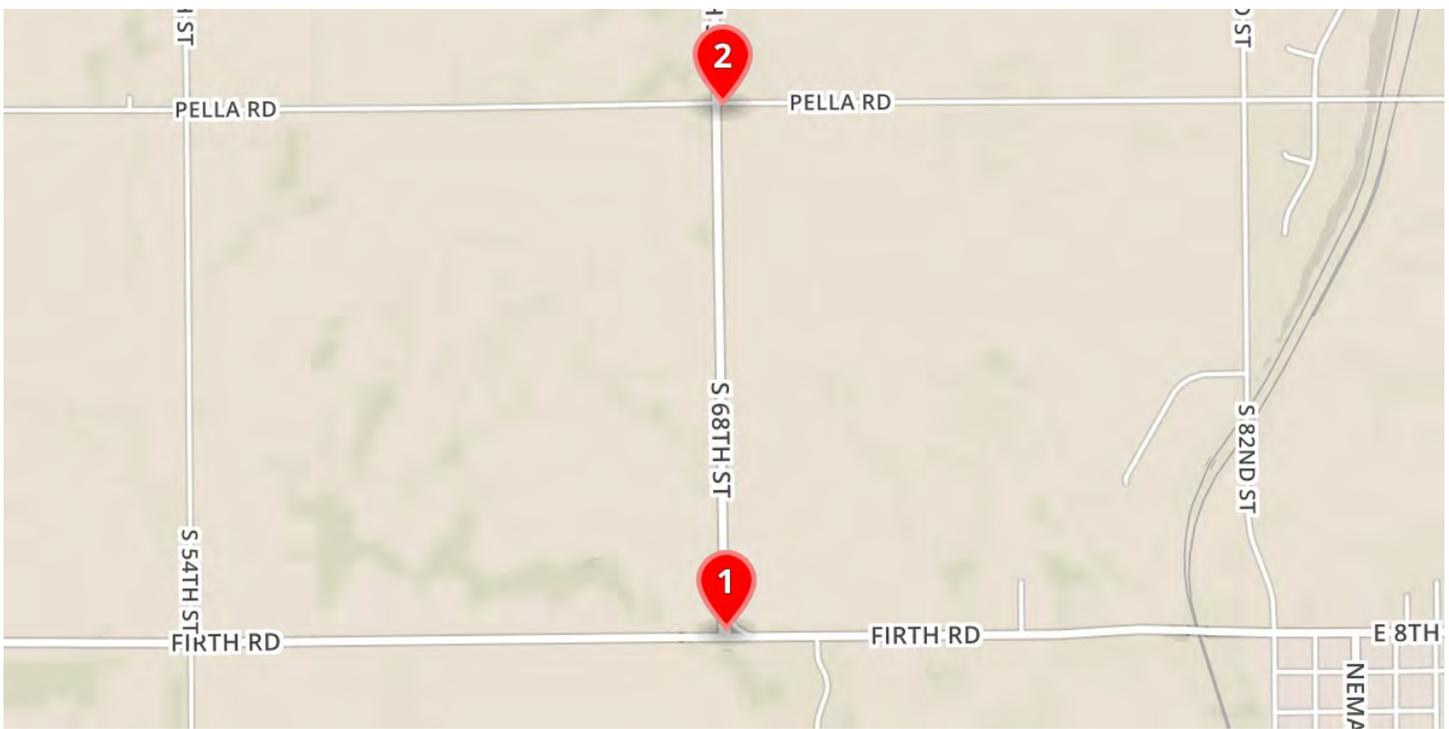
Start Location	End Location	# of Trips	Travel Time (minutes)						Distance (mis) <sup>1</sup>	Speed (mph) <sup>2</sup>							
			Median	85th Percentile	95th Percentile	Mean	Min	Max		Median	85th Percentile	95th Percentile	Mean	Min	Max		
1	68th St & Firth Rd	2	7355 Pella Road	6	1.01	1.09	1.14	1.04	0.98	1.17	1.0	59.61	61.12	61.12	58.22	51.51	61.12
2	7355 Pella Road	1	68th St & Firth Rd	24	1.19	1.46	1.50	1.21	0.82	1.52	1.0	51.97	61.47	69.72	52.90	40.83	75.83

<sup>1</sup> 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](http://help.miovision.com/kb/distance) for more information.

<sup>2</sup> 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

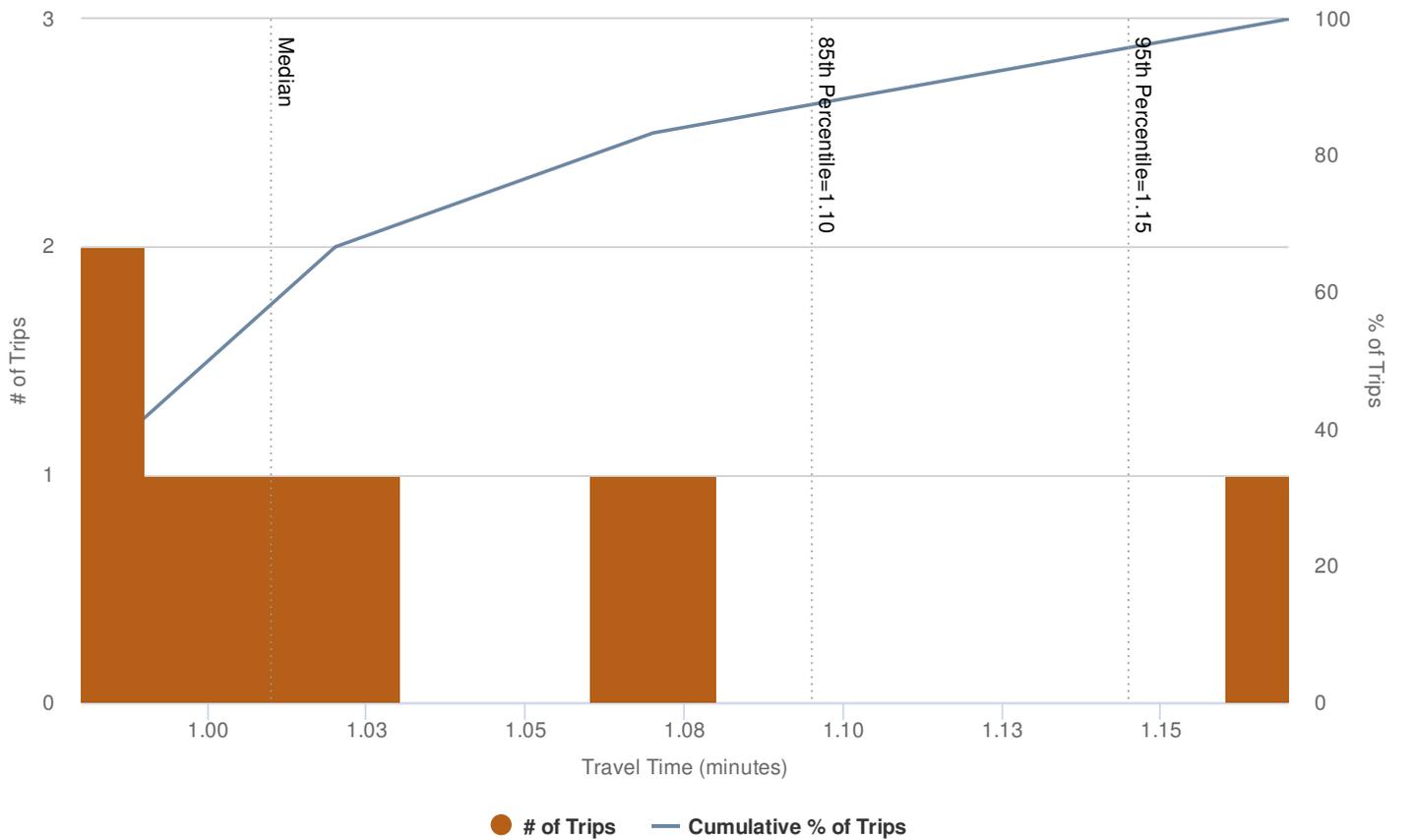
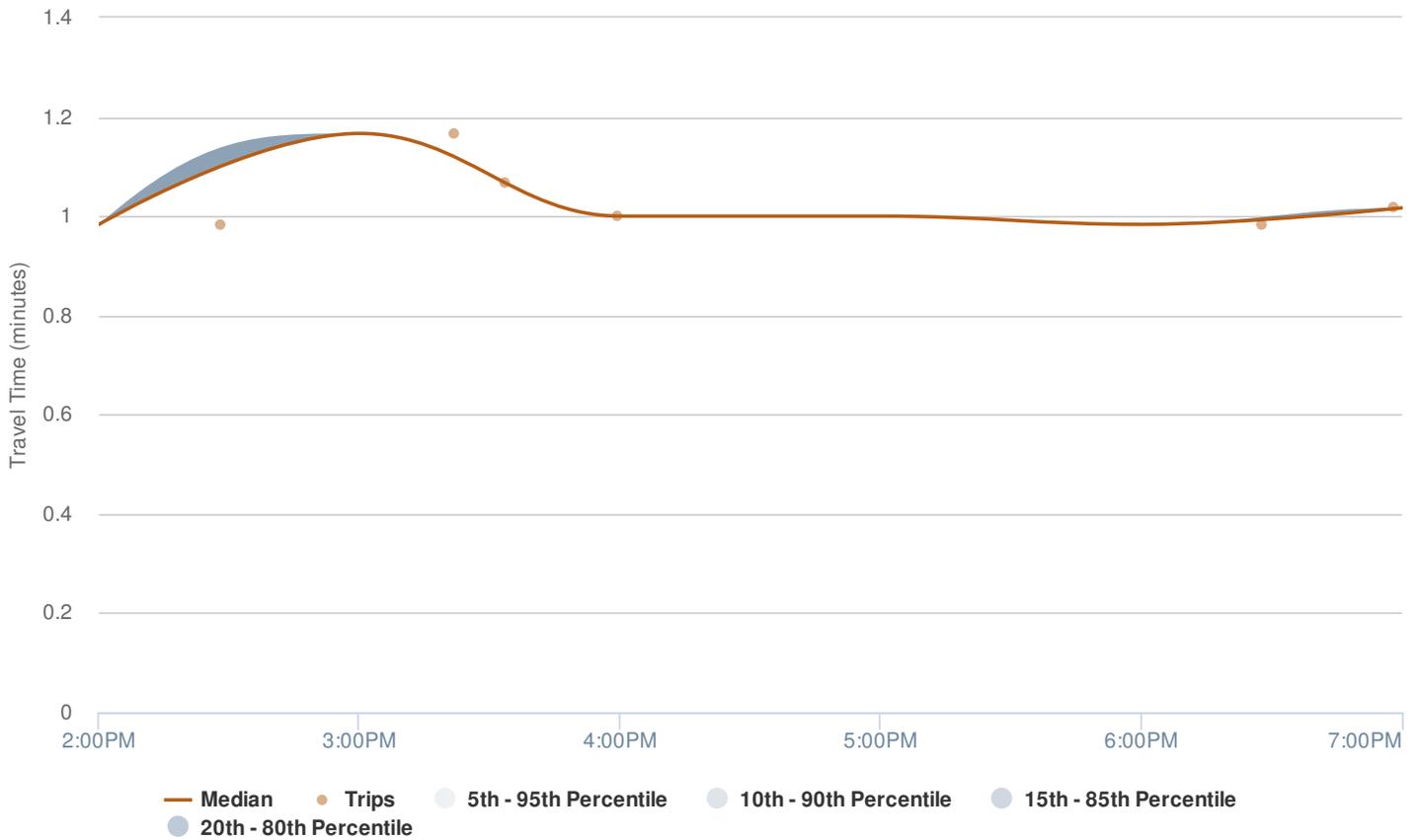
2 Locations | Firth, NE | Tue May 1, 2018 | 2:00PM - 7:00PM (5.0h)



Start Location	End Location	Planning Time Index PM (4pm - 7pm)	Travel Time Index PM (4pm - 7pm)	Buffer Time Index PM (4pm - 7pm)
1   68th St & Firth Rd	2   7355 Pella Road	1.01	1.00	0.01
2   7355 Pella Road	1   68th St & Firth Rd	1.23	1.03	0.19

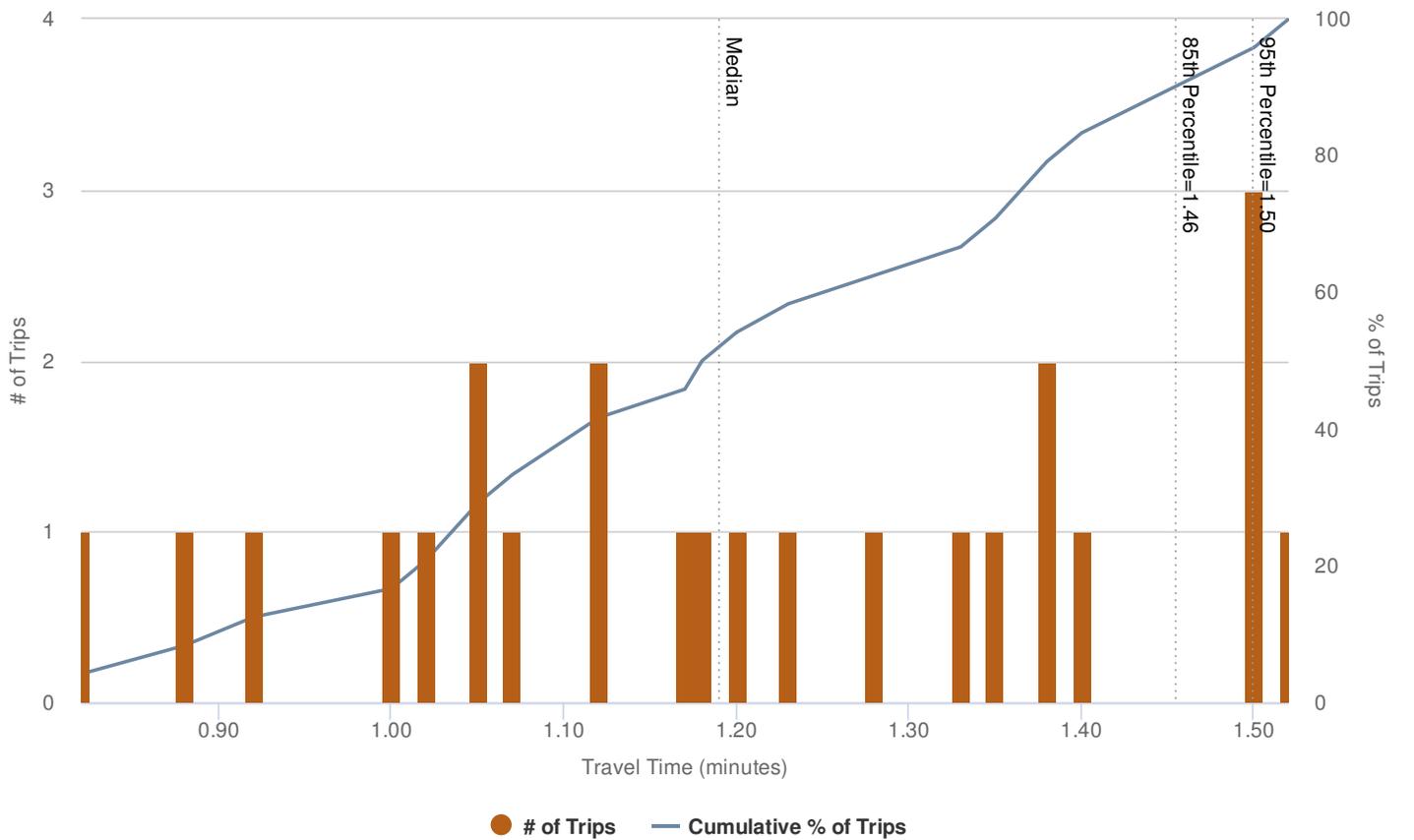
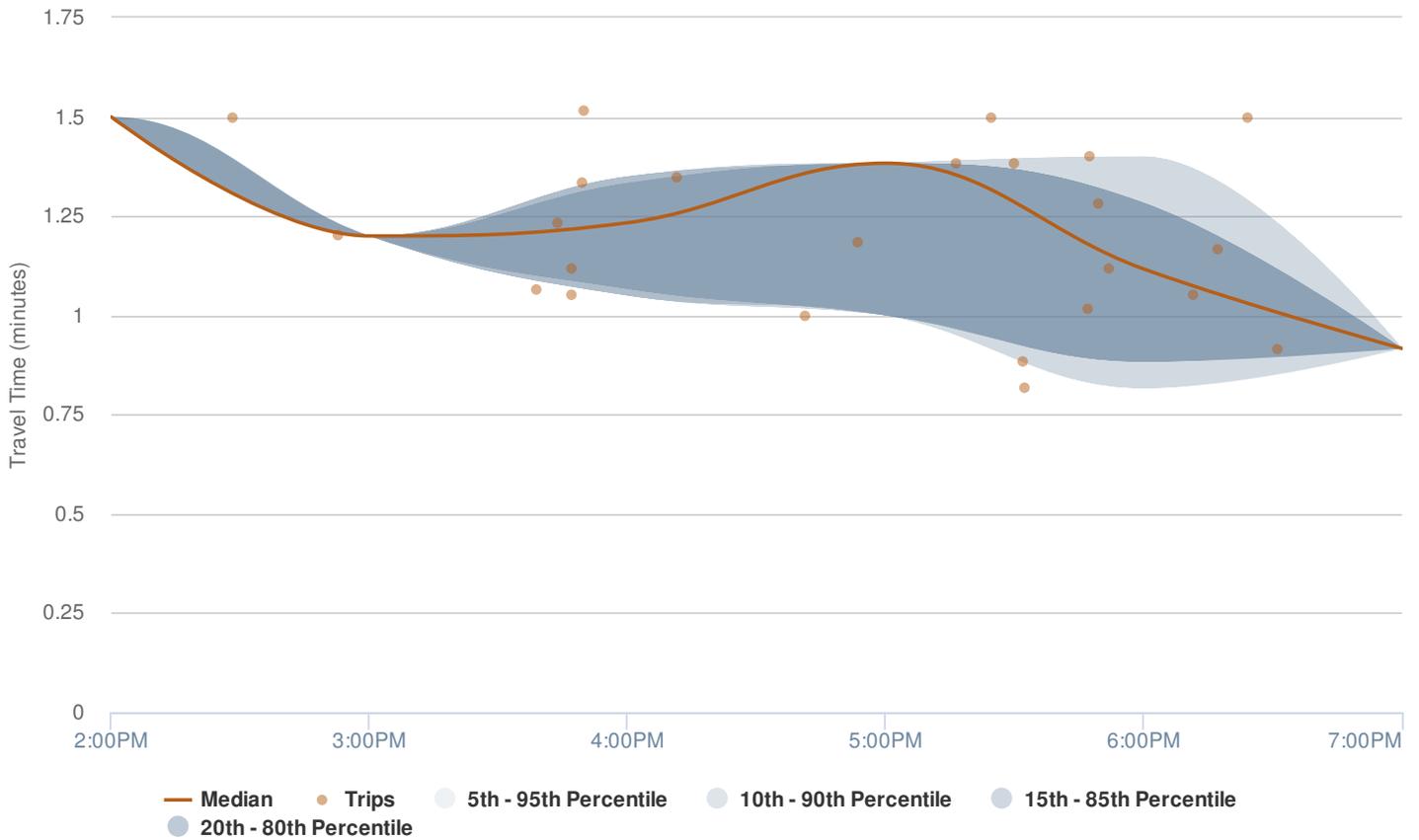
# 68th St & Firth Rd to 7355 Pella Road

1 to 2 | (40.538207, -96.628871) to (40.552475, -96.628998)



# 7355 Pella Road to 68th St & Firth Rd

2 to 1 | (40.552475, -96.628998) to (40.538207, -96.628871)



August 3, 2018  
S. 68<sup>th</sup> Street Speed Studies Memo  
Attachments

## **USLIMITS2 Report**

# USLIMITS2 Speed Zoning Report

## Project Name: Lancaster 68th Street speed limit

**Analyst:** Peyton Weiss

**Date:** 08-01-2018

### Basic Project Information

Project Number: 1  
Route Name: 68th 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: 5 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: 6595 veh/day  
Total Number of Crashes: 48  
Total Number of Injury Crashes: 13  
Section Crash Rate: 77 per 100 MVM  
Section Injury Crash Rate: 21 per 100 MVM  
Crash Rate Average for Similar Roads: 122  
Injury Rate Average for Similar Roads: 41

### Traffic Information

85th Percentile Speed: 62 mph  
50th Percentile Speed: 54 mph  
AADT: 6595 veh/day

**Project Description:** north of Hickman

## 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)

$$M = (\text{Section AADT} * 365 * \text{Section Length} * \text{Duration of Crash Data}) / (100000000)$$
$$M = (6595 * 365 * 5 * 5.17) / (100000000)$$
$$M = 0.6219$$

### Crash Rate (Rc)

$$Rc = (\text{Section Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Rc = (9.29 * 100000000) / (6595 * 365 * 5)$$
$$Rc = 77.19 \text{ crashes per 100 MVM}$$

### Injury Rate (Ri)

$$Ri = (\text{Section Injury Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Ri = (2.52 * 100000000) / (6595 * 365 * 5)$$
$$Ri = 20.91 \text{ injuries per 100 MVM}$$

*Critical Crash Rate (Cc)*

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

$Cc = 121.91 + 1.645 * (121.91 / 0.6219)^{(1/2)} + (1 / (2 * 0.6219))$

$Cc = 145.74$  crashes per 100 MVM

*Critical Injury Rate (Ic)*

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

$Ic = 41.46 + 1.645 * (41.46 / 0.6219)^{(1/2)} + (1 / (2 * 0.6219))$

$Ic = 55.69$  injuries per 100 MVM

# USLIMITS2 Speed Zoning Report

## Project Name: Lancaster 68th Street speed limit

**Analyst:** Peyton Weiss

**Date:** 08-01-2018

### Basic Project Information

Project Number: 1  
Route Name: 68th 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: 5 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: 4240 veh/day  
Total Number of Crashes: 31  
Total Number of Injury Crashes: 17  
Section Crash Rate: 78 per 100 MVM  
Section Injury Crash Rate: 43 per 100 MVM  
Crash Rate Average for Similar Roads: 134  
Injury Rate Average for Similar Roads: 44

### Traffic Information

85th Percentile Speed: 64 mph  
50th Percentile Speed: 55 mph  
AADT: 4240 veh/day

**Project Description:** south of Hickman

### 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)

$$M = (\text{Section AADT} * 365 * \text{Section Length} * \text{Duration of Crash Data}) / (100000000)$$
$$M = (4240 * 365 * 5 * 5.17) / (100000000)$$
$$M = 0.3998$$

#### Crash Rate (Rc)

$$Rc = (\text{Section Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Rc = (6.00 * 100000000) / (4240 * 365 * 5)$$
$$Rc = 77.54 \text{ crashes per 100 MVM}$$

#### Injury Rate (Ri)

$$Ri = (\text{Section Injury Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Ri = (3.29 * 100000000) / (4240 * 365 * 5)$$
$$Ri = 42.52 \text{ injuries per 100 MVM}$$

*Critical Crash Rate (Cc)*

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

$Cc = 133.96 + 1.645 * (133.96 / 0.3998)^{(1/2)} + (1 / (2 * 0.3998))$

$Cc = 165.33$  crashes per 100 MVM

*Critical Injury Rate (Ic)*

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

$Ic = 43.89 + 1.645 * (43.89 / 0.3998)^{(1/2)} + (1 / (2 * 0.3998))$

$Ic = 62.38$  injuries per 100 MVM

# USLIMITS2 Speed Zoning Report

## Project Name: Lancaster 68th Street speed limit

**Analyst:** Peyton Weiss

**Date:** 08-03-2018

### Basic Project Information

Route Name: 68th 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: 6595 veh/day  
Total Number of Crashes: 111  
Total Number of Injury Crashes: 47  
Section Crash Rate: 81 per 100 MVM  
Section Injury Crash Rate: 34 per 100 MVM  
Crash Rate Average for Similar Roads: 122  
Injury Rate Average for Similar Roads: 41

### 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: 63 mph  
50th Percentile Speed: 54 mph  
AADT: 6595 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)

$$M = (\text{Section AADT} * 365 * \text{Section Length} * \text{Duration of Crash Data}) / (100000000)$$
$$M = (6595 * 365 * 11 * 5.17) / (100000000)$$
$$M = 1.3681$$

#### Crash Rate (Rc)

$$Rc = (\text{Section Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Rc = (21.48 * 100000000) / (6595 * 365 * 11)$$
$$Rc = 81.14 \text{ crashes per 100 MVM}$$

#### Injury Rate (Ri)

$$Ri = (\text{Section Injury Crash Average} * 100000000) / (\text{Section AADT} * 365 * \text{Section Length})$$
$$Ri = (9.10 * 100000000) / (6595 * 365 * 11)$$
$$Ri = 34.35 \text{ injuries per 100 MVM}$$

#### Critical Crash Rate (Cc)

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

$C_c = 121.91 + 1.645 * (121.91 / 1.3681)^{(1/2)} + (1 / (2 * 1.3681))$

$C_c = 137.80$  crashes per 100 MVM

*Critical Injury Rate (Ic)*

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

$I_c = 41.46 + 1.645 * (41.46 / 1.3681)^{(1/2)} + (1 / (2 * 1.3681))$

$I_c = 50.88$  injuries per 100 MVM

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**TRAFFIC COUNT DATA**



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Firth Rd  
Site Code: 6812  
Start Date: 05/01/2018  
Page No: 1

### Turning Movement Data

Start Time	68th Street Southbound			Firth Rd Westbound			Firth Rd Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
12:00 AM	3	0	3	0	0	0	0	2	2	5
12:15 AM	1	0	1	0	0	0	1	0	1	2
12:30 AM	3	0	3	0	0	0	0	1	1	4
12:45 AM	0	0	0	0	2	2	0	0	0	2
Hourly Total	7	0	7	0	2	2	1	3	4	13
1:00 AM	2	0	2	0	0	0	0	1	1	3
1:15 AM	0	0	0	0	0	0	0	1	1	1
1:30 AM	0	0	0	0	0	0	0	0	0	0
1:45 AM	0	0	0	1	0	1	0	0	0	1
Hourly Total	2	0	2	1	0	1	0	2	2	5
2:00 AM	2	0	2	0	0	0	0	0	0	2
2:15 AM	0	0	0	0	0	0	0	0	0	0
2:30 AM	0	0	0	0	0	0	0	1	1	1
2:45 AM	0	0	0	0	0	0	0	1	1	1
Hourly Total	2	0	2	0	0	0	0	2	2	4
3:00 AM	1	0	1	0	1	1	0	0	0	2
3:15 AM	0	0	0	1	0	1	0	0	0	1
3:30 AM	0	0	0	2	0	2	0	0	0	2
3:45 AM	0	0	0	1	0	1	0	0	0	1
Hourly Total	1	0	1	4	1	5	0	0	0	6
4:00 AM	1	0	1	0	2	2	1	0	1	4
4:15 AM	0	0	0	1	1	2	0	0	0	2
4:30 AM	1	0	1	1	5	6	0	0	0	7
4:45 AM	0	1	1	1	2	3	0	0	0	4
Hourly Total	2	1	3	3	10	13	1	0	1	17
5:00 AM	4	1	5	8	3	11	0	1	1	17
5:15 AM	1	1	2	1	3	4	0	0	0	6
5:30 AM	0	1	1	8	10	18	0	1	1	20
5:45 AM	1	2	3	10	5	15	3	1	4	22
Hourly Total	6	5	11	27	21	48	3	3	6	65
6:00 AM	3	1	4	8	10	18	1	3	4	26
6:15 AM	4	3	7	9	15	24	2	2	4	35
6:30 AM	3	1	4	7	18	25	1	6	7	36
6:45 AM	5	1	6	15	26	41	7	5	12	59
Hourly Total	15	6	21	39	69	108	11	16	27	156
7:00 AM	5	4	9	16	35	51	1	1	2	62
7:15 AM	12	5	17	18	38	56	7	4	11	84
7:30 AM	4	6	10	10	38	48	5	3	8	66

7:45 AM	13	5	18	11	56	67	21	4	25	110
Hourly Total	34	20	54	55	167	222	34	12	46	322
8:00 AM	7	6	13	17	50	67	32	3	35	115
8:15 AM	20	7	27	7	43	50	14	7	21	98
8:30 AM	13	6	19	4	17	21	2	2	4	44
8:45 AM	8	4	12	2	12	14	5	4	9	35
Hourly Total	48	23	71	30	122	152	53	16	69	292
9:00 AM	12	1	13	0	13	13	2	5	7	33
9:15 AM	3	2	5	3	8	11	7	0	7	23
9:30 AM	5	3	8	4	10	14	4	5	9	31
9:45 AM	7	1	8	5	8	13	2	10	12	33
Hourly Total	27	7	34	12	39	51	15	20	35	120
10:00 AM	9	2	11	5	4	9	3	6	9	29
10:15 AM	9	1	10	5	10	15	4	1	5	30
10:30 AM	8	0	8	2	11	13	5	5	10	31
10:45 AM	12	1	13	3	5	8	3	1	4	25
Hourly Total	38	4	42	15	30	45	15	13	28	115
11:00 AM	10	1	11	4	11	15	3	3	6	32
11:15 AM	7	0	7	4	10	14	1	3	4	25
11:30 AM	6	3	9	4	8	12	0	3	3	24
11:45 AM	7	2	9	2	9	11	1	6	7	27
Hourly Total	30	6	36	14	38	52	5	15	20	108
12:00 PM	7	1	8	3	15	18	5	5	10	36
12:15 PM	11	3	14	4	12	16	1	1	2	32
12:30 PM	7	2	9	2	10	12	2	3	5	26
12:45 PM	8	3	11	3	10	13	1	2	3	27
Hourly Total	33	9	42	12	47	59	9	11	20	121
1:00 PM	15	7	22	3	19	22	1	6	7	51
1:15 PM	12	2	14	4	11	15	2	1	3	32
1:30 PM	13	2	15	3	4	7	3	2	5	27
1:45 PM	9	5	14	3	7	10	4	1	5	29
Hourly Total	49	16	65	13	41	54	10	10	20	139
2:00 PM	19	4	23	2	6	8	3	8	11	42
2:15 PM	7	1	8	6	14	20	2	3	5	33
2:30 PM	11	1	12	0	7	7	3	6	9	28
2:45 PM	7	4	11	5	15	20	1	7	8	39
Hourly Total	44	10	54	13	42	55	9	24	33	142
3:00 PM	16	5	21	4	17	21	6	6	12	54
3:15 PM	24	3	27	4	19	23	4	3	7	57
3:30 PM	56	25	81	8	11	19	3	6	9	109
3:45 PM	33	3	36	2	16	18	5	6	11	65
Hourly Total	129	36	165	18	63	81	18	21	39	285
4:00 PM	22	7	29	5	14	19	4	3	7	55
4:15 PM	27	18	45	7	21	28	6	8	14	87
4:30 PM	27	8	35	9	24	33	8	9	17	85
4:45 PM	40	11	51	3	16	19	1	5	6	76
Hourly Total	116	44	160	24	75	99	19	25	44	303
5:00 PM	41	15	56	5	18	23	2	7	9	88
5:15 PM	39	15	54	6	12	18	6	7	13	85
5:30 PM	32	5	37	5	20	25	5	8	13	75
5:45 PM	42	14	56	3	4	7	3	7	10	73
Hourly Total	154	49	203	19	54	73	16	29	45	321

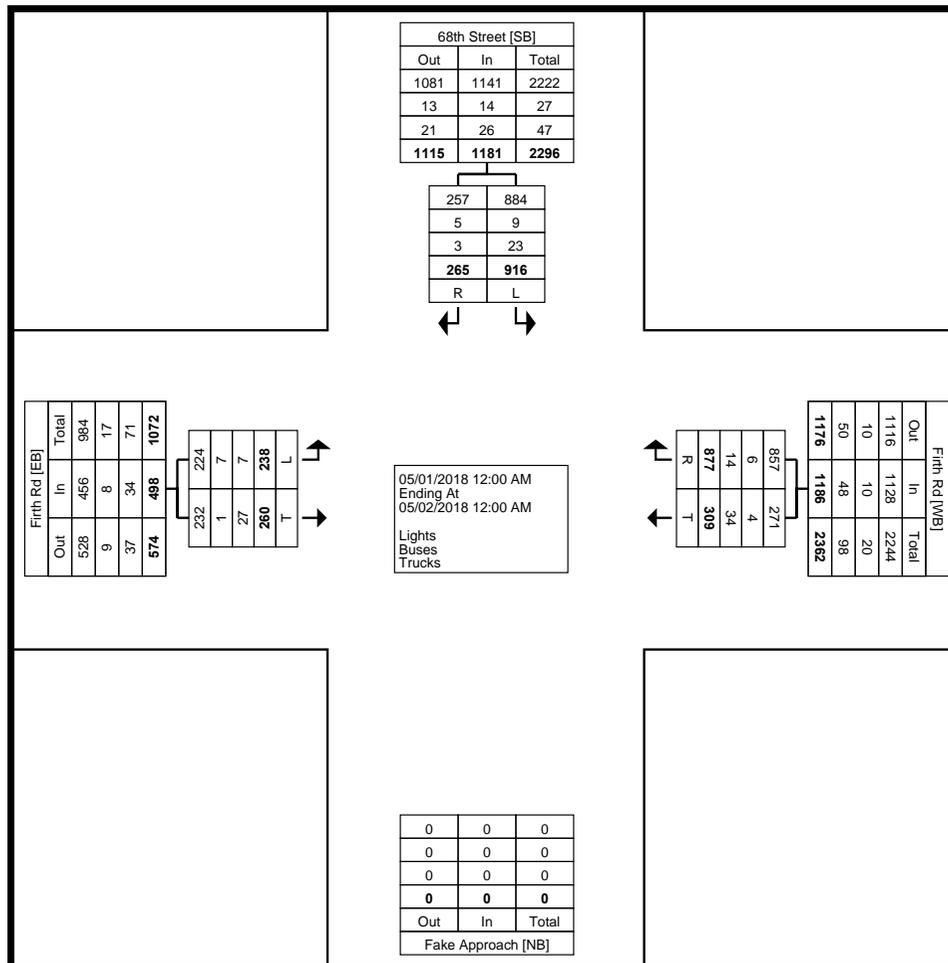
6:00 PM	29	6	35	1	10	11	2	14	16	62
6:15 PM	24	2	26	2	6	8	0	6	6	40
6:30 PM	20	3	23	1	6	7	2	1	3	33
6:45 PM	9	2	11	2	5	7	1	4	5	23
Hourly Total	82	13	95	6	27	33	5	25	30	158
7:00 PM	8	0	8	0	2	2	5	1	6	16
7:15 PM	5	0	5	1	3	4	1	2	3	12
7:30 PM	7	3	10	1	2	3	1	1	2	15
7:45 PM	6	3	9	0	1	1	2	1	3	13
Hourly Total	26	6	32	2	8	10	9	5	14	56
8:00 PM	6	0	6	0	3	3	0	1	1	10
8:15 PM	5	2	7	0	2	2	1	0	1	10
8:30 PM	5	2	7	0	4	4	0	2	2	13
8:45 PM	8	0	8	0	0	0	0	0	0	8
Hourly Total	24	4	28	0	9	9	1	3	4	41
9:00 PM	5	2	7	0	2	2	0	0	0	9
9:15 PM	8	0	8	0	1	1	0	2	2	11
9:30 PM	7	0	7	0	0	0	1	0	1	8
9:45 PM	8	0	8	0	0	0	0	0	0	8
Hourly Total	28	2	30	0	3	3	1	2	3	36
10:00 PM	6	1	7	0	6	6	1	1	2	15
10:15 PM	2	1	3	0	2	2	1	1	2	7
10:30 PM	2	0	2	0	1	1	0	1	1	4
10:45 PM	3	1	4	1	0	1	1	0	1	6
Hourly Total	13	3	16	1	9	10	3	3	6	32
11:00 PM	2	0	2	0	0	0	0	0	0	2
11:15 PM	3	0	3	1	0	1	0	0	0	4
11:30 PM	1	0	1	0	0	0	0	0	0	1
11:45 PM	0	1	1	0	0	0	0	0	0	1
Hourly Total	6	1	7	1	0	1	0	0	0	8
Grand Total	916	265	1181	309	877	1186	238	260	498	2865
Approach %	77.6	22.4	-	26.1	73.9	-	47.8	52.2	-	-
Total %	32.0	9.2	41.2	10.8	30.6	41.4	8.3	9.1	17.4	-
Lights	884	257	1141	271	857	1128	224	232	456	2725
% Lights	96.5	97.0	96.6	87.7	97.7	95.1	94.1	89.2	91.6	95.1
Buses	9	5	14	4	6	10	7	1	8	32
% Buses	1.0	1.9	1.2	1.3	0.7	0.8	2.9	0.4	1.6	1.1
Trucks	23	3	26	34	14	48	7	27	34	108
% Trucks	2.5	1.1	2.2	11.0	1.6	4.0	2.9	10.4	6.8	3.8



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Firth Rd  
Site Code: 6812  
Start Date: 05/01/2018  
Page No: 4



Turning Movement Data Plot



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Firth Rd  
Site Code: 6812  
Start Date: 05/01/2018  
Page No: 5

### Turning Movement Peak Hour Data (7:30 AM)

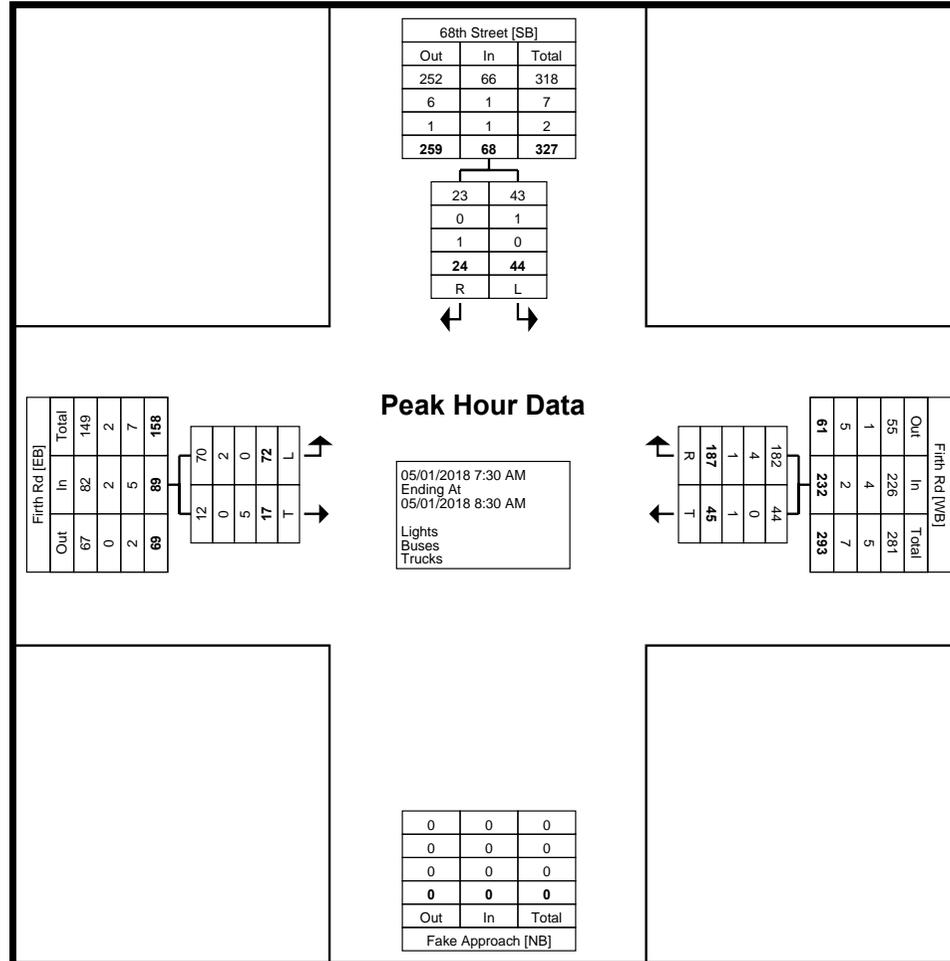
Start Time	68th Street Southbound			Firth Rd Westbound			Firth Rd Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
7:30 AM	4	6	10	10	38	48	5	3	8	66
7:45 AM	13	5	18	11	56	67	21	4	25	110
8:00 AM	7	6	13	17	50	67	32	3	35	115
8:15 AM	20	7	27	7	43	50	14	7	21	98
Total	44	24	68	45	187	232	72	17	89	389
Approach %	64.7	35.3	-	19.4	80.6	-	80.9	19.1	-	-
Total %	11.3	6.2	17.5	11.6	48.1	59.6	18.5	4.4	22.9	-
PHF	0.550	0.857	0.630	0.662	0.835	0.866	0.563	0.607	0.636	0.846
Lights	43	23	66	44	182	226	70	12	82	374
% Lights	97.7	95.8	97.1	97.8	97.3	97.4	97.2	70.6	92.1	96.1
Buses	1	0	1	0	4	4	2	0	2	7
% Buses	2.3	0.0	1.5	0.0	2.1	1.7	2.8	0.0	2.2	1.8
Trucks	0	1	1	1	1	2	0	5	5	8
% Trucks	0.0	4.2	1.5	2.2	0.5	0.9	0.0	29.4	5.6	2.1



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Firth Rd  
Site Code: 6812  
Start Date: 05/01/2018  
Page No: 6



Turning Movement Peak Hour Data Plot (7:30 AM)



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Firth Rd  
Site Code: 6812  
Start Date: 05/01/2018  
Page No: 7

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

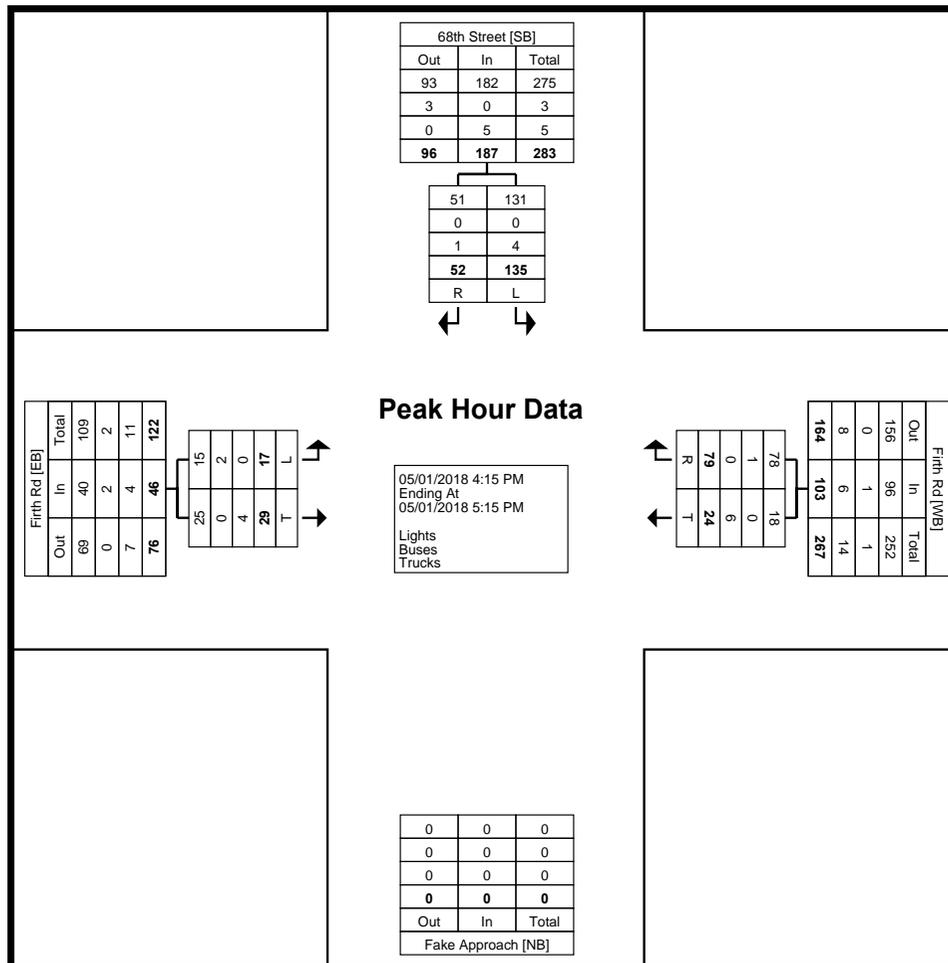
Start Time	68th Street Southbound			Firth Rd Westbound			Firth Rd Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
4:15 PM	27	18	45	7	21	28	6	8	14	87
4:30 PM	27	8	35	9	24	33	8	9	17	85
4:45 PM	40	11	51	3	16	19	1	5	6	76
5:00 PM	41	15	56	5	18	23	2	7	9	88
Total	135	52	187	24	79	103	17	29	46	336
Approach %	72.2	27.8	-	23.3	76.7	-	37.0	63.0	-	-
Total %	40.2	15.5	55.7	7.1	23.5	30.7	5.1	8.6	13.7	-
PHF	0.823	0.722	0.835	0.667	0.823	0.780	0.531	0.806	0.676	0.955
Lights	131	51	182	18	78	96	15	25	40	318
% Lights	97.0	98.1	97.3	75.0	98.7	93.2	88.2	86.2	87.0	94.6
Buses	0	0	0	0	1	1	2	0	2	3
% Buses	0.0	0.0	0.0	0.0	1.3	1.0	11.8	0.0	4.3	0.9
Trucks	4	1	5	6	0	6	0	4	4	15
% Trucks	3.0	1.9	2.7	25.0	0.0	5.8	0.0	13.8	8.7	4.5



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Firth Rd  
Site Code: 6812  
Start Date: 05/01/2018  
Page No: 8



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: 68th St & N School Dr  
Site Code: 6810  
Start Date: 04/25/2018  
Page No: 1

### Turning Movement Data

Start Time	68th St Southbound			68th St Northbound			N School Dr Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	
7:00 AM	4	46	50	13	34	47	45	5	50	147
7:15 AM	5	10	15	6	30	36	11	2	13	64
7:30 AM	17	26	43	6	38	44	5	1	6	93
7:45 AM	24	29	53	5	33	38	4	2	6	97
Hourly Total	50	111	161	30	135	165	65	10	75	401
8:00 AM	50	70	120	14	32	46	6	4	10	176
8:15 AM	114	63	177	13	46	59	31	5	36	272
8:30 AM	35	31	66	8	26	34	35	5	40	140
8:45 AM	9	4	13	1	16	17	1	0	1	31
Hourly Total	208	168	376	36	120	156	73	14	87	619
9:00 AM	13	2	15	0	16	16	3	1	4	35
9:15 AM	12	8	20	1	14	15	5	0	5	40
9:30 AM	14	6	20	1	11	12	2	0	2	34
9:45 AM	13	4	17	1	14	15	1	1	2	34
Hourly Total	52	20	72	3	55	58	11	2	13	143
*** BREAK ***	-	-	-	-	-	-	-	-	-	-
2:00 PM	12	0	12	2	19	21	5	4	9	42
2:15 PM	23	1	24	1	16	17	8	1	9	50
2:30 PM	13	3	16	0	19	19	4	0	4	39
2:45 PM	16	6	22	2	23	25	10	0	10	57
Hourly Total	64	10	74	5	77	82	27	5	32	188
3:00 PM	24	7	31	1	18	19	4	0	4	54
3:15 PM	22	22	44	7	29	36	4	0	4	84
3:30 PM	21	43	64	7	112	119	29	10	39	222
3:45 PM	44	9	53	0	65	65	61	7	68	186
Hourly Total	111	81	192	15	224	239	98	17	115	546
4:00 PM	29	7	36	1	25	26	17	3	20	82
4:15 PM	40	10	50	2	31	33	14	4	18	101
4:30 PM	28	10	38	4	43	47	29	6	35	120
4:45 PM	36	5	41	2	42	44	23	4	27	112
Hourly Total	133	32	165	9	141	150	83	17	100	415
5:00 PM	28	11	39	4	58	62	26	3	29	130
5:15 PM	52	20	72	0	39	39	21	3	24	135
5:30 PM	49	10	59	2	54	56	15	3	18	133
5:45 PM	52	7	59	2	40	42	10	2	12	113
Hourly Total	181	48	229	8	191	199	72	11	83	511
6:00 PM	54	8	62	1	33	34	6	1	7	103
6:15 PM	42	1	43	0	22	22	2	1	3	68

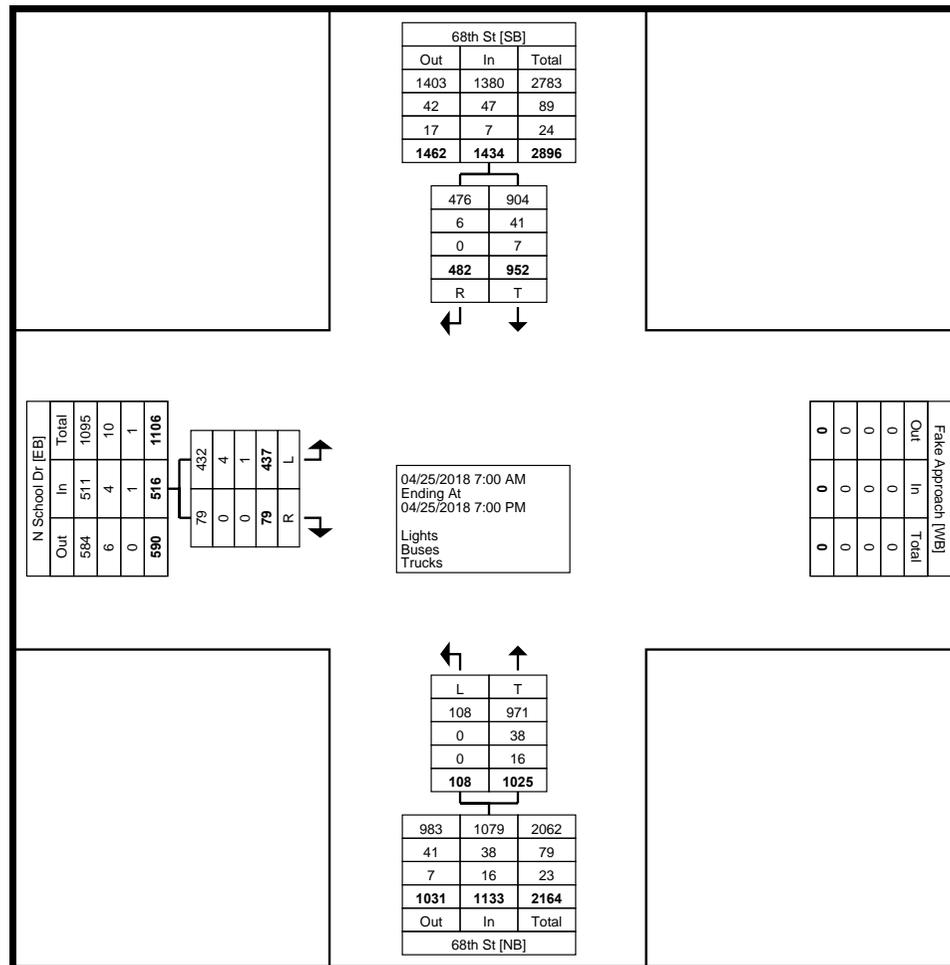
6:30 PM	31	2	33	0	12	12	0	0	0	45
6:45 PM	26	1	27	1	15	16	0	1	1	44
Hourly Total	153	12	165	2	82	84	8	3	11	260
Grand Total	952	482	1434	108	1025	1133	437	79	516	3083
Approach %	66.4	33.6	-	9.5	90.5	-	84.7	15.3	-	-
Total %	30.9	15.6	46.5	3.5	33.2	36.7	14.2	2.6	16.7	-
Lights	904	476	1380	108	971	1079	432	79	511	2970
% Lights	95.0	98.8	96.2	100.0	94.7	95.2	98.9	100.0	99.0	96.3
Buses	41	6	47	0	38	38	4	0	4	89
% Buses	4.3	1.2	3.3	0.0	3.7	3.4	0.9	0.0	0.8	2.9
Trucks	7	0	7	0	16	16	1	0	1	24
% Trucks	0.7	0.0	0.5	0.0	1.6	1.4	0.2	0.0	0.2	0.8



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & N School Dr  
Site Code: 6810  
Start Date: 04/25/2018  
Page No: 3



Turning Movement Data Plot



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & N School Dr  
Site Code: 6810  
Start Date: 04/25/2018  
Page No: 4

### Turning Movement Peak Hour Data (7:45 AM)

Start Time	68th St Southbound			Left	68th St Northbound		Left	N School Dr Eastbound			Int. Total
	Thru	Right	App. Total		Thru	App. Total		Right	App. Total		
7:45 AM	24	29	53	5	33	38	4	2	6	97	
8:00 AM	50	70	120	14	32	46	6	4	10	176	
8:15 AM	114	63	177	13	46	59	31	5	36	272	
8:30 AM	35	31	66	8	26	34	35	5	40	140	
Total	223	193	416	40	137	177	76	16	92	685	
Approach %	53.6	46.4	-	22.6	77.4	-	82.6	17.4	-	-	
Total %	32.6	28.2	60.7	5.8	20.0	25.8	11.1	2.3	13.4	-	
PHF	0.489	0.689	0.588	0.714	0.745	0.750	0.543	0.800	0.575	0.630	
Lights	203	192	395	40	126	166	76	16	92	653	
% Lights	91.0	99.5	95.0	100.0	92.0	93.8	100.0	100.0	100.0	95.3	
Buses	20	1	21	0	8	8	0	0	0	29	
% Buses	9.0	0.5	5.0	0.0	5.8	4.5	0.0	0.0	0.0	4.2	
Trucks	0	0	0	0	3	3	0	0	0	3	
% Trucks	0.0	0.0	0.0	0.0	2.2	1.7	0.0	0.0	0.0	0.4	





MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & N School Dr  
Site Code: 6810  
Start Date: 04/25/2018  
Page No: 6

### Turning Movement Peak Hour Data (3:30 PM)

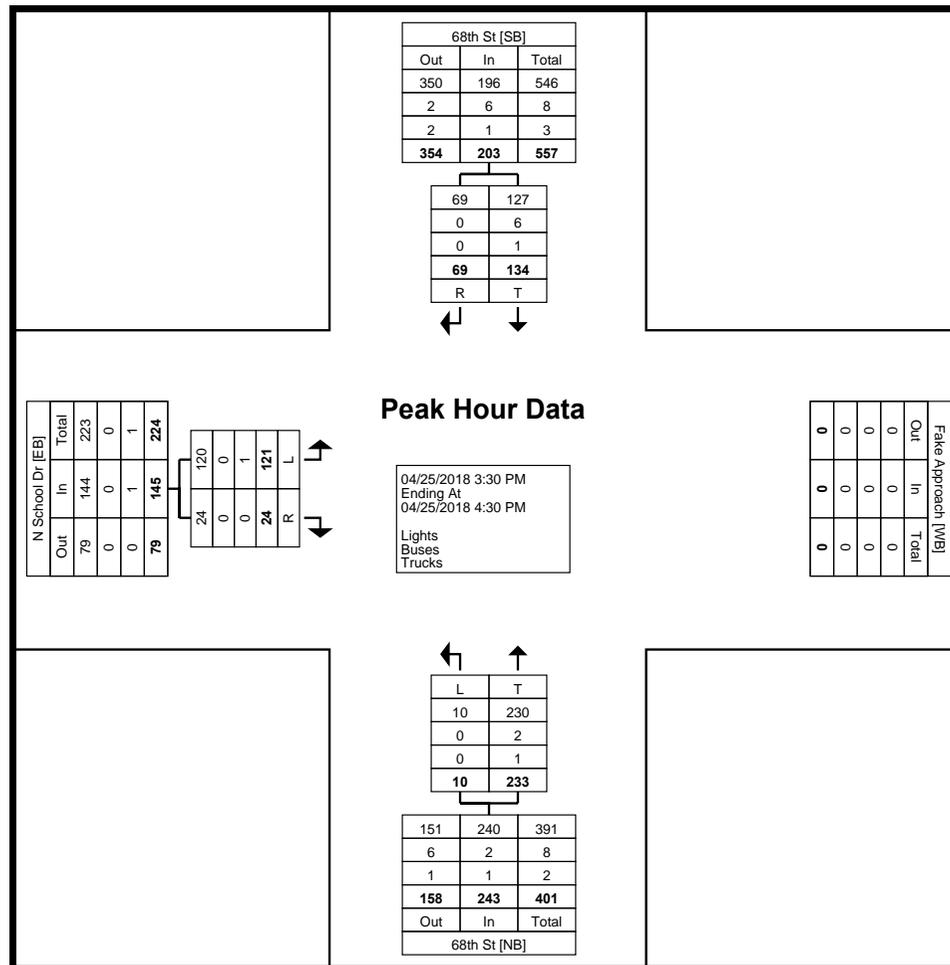
Start Time	68th St Southbound			Left	68th St Northbound		Left	N School Dr Eastbound		Int. Total
	Thru	Right	App. Total		Thru	App. Total		Right	App. Total	
3:30 PM	21	43	64	7	112	119	29	10	39	222
3:45 PM	44	9	53	0	65	65	61	7	68	186
4:00 PM	29	7	36	1	25	26	17	3	20	82
4:15 PM	40	10	50	2	31	33	14	4	18	101
Total	134	69	203	10	233	243	121	24	145	591
Approach %	66.0	34.0	-	4.1	95.9	-	83.4	16.6	-	-
Total %	22.7	11.7	34.3	1.7	39.4	41.1	20.5	4.1	24.5	-
PHF	0.761	0.401	0.793	0.357	0.520	0.511	0.496	0.600	0.533	0.666
Lights	127	69	196	10	230	240	120	24	144	580
% Lights	94.8	100.0	96.6	100.0	98.7	98.8	99.2	100.0	99.3	98.1
Buses	6	0	6	0	2	2	0	0	0	8
% Buses	4.5	0.0	3.0	0.0	0.9	0.8	0.0	0.0	0.0	1.4
Trucks	1	0	1	0	1	1	1	0	1	3
% Trucks	0.7	0.0	0.5	0.0	0.4	0.4	0.8	0.0	0.7	0.5



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & N School Dr  
Site Code: 6810  
Start Date: 04/25/2018  
Page No: 7



Turning Movement Peak Hour Data Plot (3:30 PM)



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Panama Rd  
Site Code: 6807  
Start Date: 04/24/2018  
Page No: 1

### Turning Movement Data

Start Time	68th St Southbound				Panama Rd Westbound				68th St Northbound				Panama 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	7	13	1	21	3	3	12	18	1	46	1	48	1	0	0	1	88
7:15 AM	6	52	0	58	9	3	13	25	2	48	2	52	0	0	0	0	135
7:30 AM	3	44	1	48	16	1	12	29	0	45	2	47	2	0	0	2	126
7:45 AM	7	133	1	141	20	1	11	32	0	28	3	31	2	1	1	4	208
Hourly Total	23	242	3	268	48	8	48	104	3	167	8	178	5	1	1	7	557
8:00 AM	4	157	0	161	22	0	7	29	0	60	6	66	0	0	5	5	261
8:15 AM	0	79	0	79	9	1	5	15	0	99	6	105	1	0	2	3	202
8:30 AM	6	16	1	23	2	0	5	7	0	46	1	47	0	0	1	1	78
8:45 AM	5	10	1	16	0	1	4	5	0	26	2	28	2	0	0	2	51
Hourly Total	15	262	2	279	33	2	21	56	0	231	15	246	3	0	8	11	592
9:00 AM	5	18	0	23	1	0	3	4	0	20	1	21	2	1	1	4	52
9:15 AM	3	16	2	21	3	0	2	5	0	24	0	24	2	1	0	3	53
9:30 AM	4	22	0	26	1	0	3	4	0	19	2	21	0	0	0	0	51
9:45 AM	5	11	1	17	2	0	5	7	0	11	2	13	0	0	1	1	38
Hourly Total	17	67	3	87	7	0	13	20	0	74	5	79	4	2	2	8	194
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:00 PM	2	15	2	19	2	0	2	4	0	25	1	26	0	0	0	0	49
2:15 PM	3	25	2	30	1	0	4	5	0	17	2	19	1	1	0	2	56
2:30 PM	3	37	2	42	7	2	4	13	0	23	1	24	1	4	0	5	84
2:45 PM	0	59	1	60	6	2	1	9	0	19	1	20	2	0	3	5	94
Hourly Total	8	136	7	151	16	4	11	31	0	84	5	89	4	5	3	12	283
3:00 PM	2	66	2	70	6	0	7	13	0	19	0	19	1	1	2	4	106
3:15 PM	3	80	1	84	8	0	5	13	0	37	3	40	0	0	2	2	139
3:30 PM	3	50	0	53	4	0	2	6	2	183	24	209	1	0	0	1	269
3:45 PM	8	45	1	54	1	1	8	10	0	63	7	70	1	2	1	4	138
Hourly Total	16	241	4	261	19	1	22	42	2	302	34	338	3	3	5	11	652
4:00 PM	2	55	2	59	2	1	2	5	0	67	6	73	0	1	1	2	139
4:15 PM	3	58	0	61	6	3	7	16	0	52	5	57	1	0	0	1	135
4:30 PM	5	48	1	54	2	0	4	6	1	75	9	85	2	1	0	3	148
4:45 PM	10	41	3	54	3	0	12	15	0	88	10	98	1	2	0	3	170
Hourly Total	20	202	6	228	13	4	25	42	1	282	30	313	4	4	1	9	592
5:00 PM	6	52	1	59	5	1	3	9	1	77	0	78	0	1	0	1	147
5:15 PM	10	52	0	62	3	0	3	6	0	42	7	49	1	2	1	4	121
5:30 PM	8	54	2	64	4	2	3	9	1	67	8	76	1	2	1	4	153
5:45 PM	12	53	3	68	4	1	4	9	0	46	7	53	0	0	0	0	130
Hourly Total	36	211	6	253	16	4	13	33	2	232	22	256	2	5	2	9	551
6:00 PM	6	41	2	49	4	0	2	6	0	40	1	41	0	2	0	2	98
6:15 PM	9	44	4	57	2	3	9	14	0	19	3	22	0	0	1	1	94

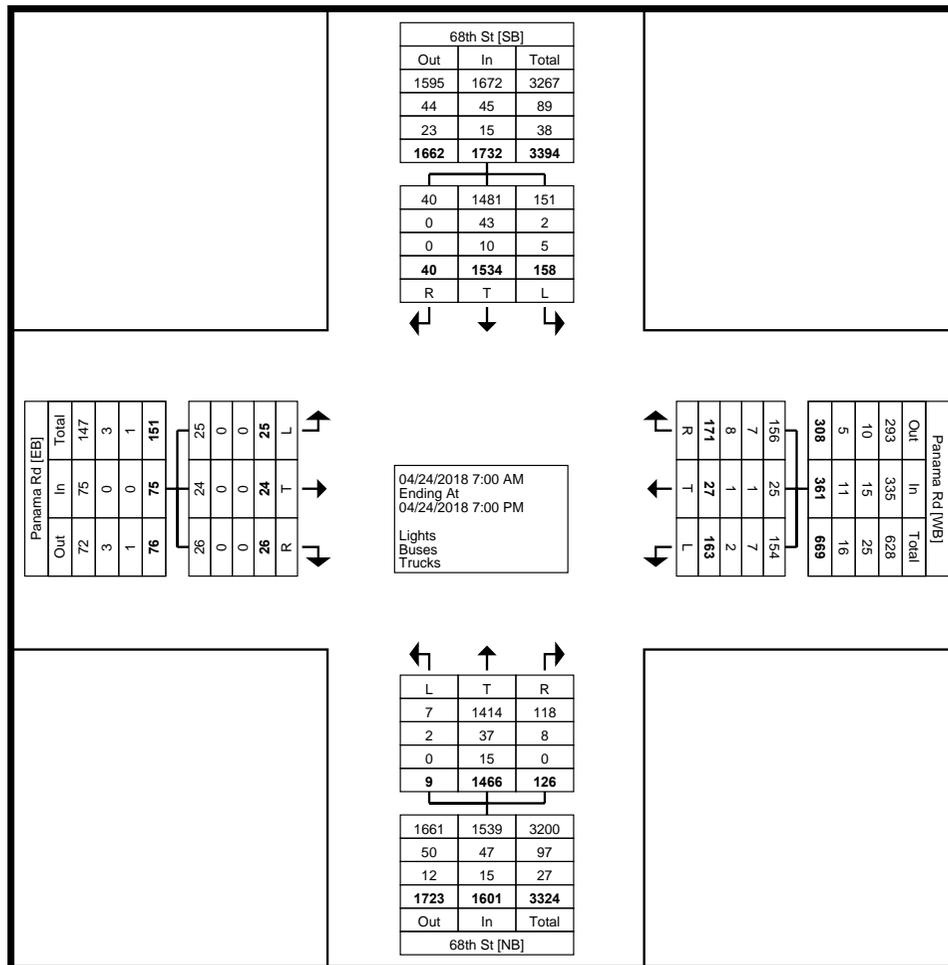
6:30 PM	5	41	1	47	3	0	4	7	1	18	2	21	0	2	0	2	77
6:45 PM	3	47	2	52	2	1	3	6	0	17	1	18	0	0	3	3	79
Hourly Total	23	173	9	205	11	4	18	33	1	94	7	102	0	4	4	8	348
Grand Total	158	1534	40	1732	163	27	171	361	9	1466	126	1601	25	24	26	75	3769
Approach %	9.1	88.6	2.3	-	45.2	7.5	47.4	-	0.6	91.6	7.9	-	33.3	32.0	34.7	-	-
Total %	4.2	40.7	1.1	46.0	4.3	0.7	4.5	9.6	0.2	38.9	3.3	42.5	0.7	0.6	0.7	2.0	-
Lights	151	1481	40	1672	154	25	156	335	7	1414	118	1539	25	24	26	75	3621
% Lights	95.6	96.5	100.0	96.5	94.5	92.6	91.2	92.8	77.8	96.5	93.7	96.1	100.0	100.0	100.0	100.0	96.1
Buses	2	43	0	45	7	1	7	15	2	37	8	47	0	0	0	0	107
% Buses	1.3	2.8	0.0	2.6	4.3	3.7	4.1	4.2	22.2	2.5	6.3	2.9	0.0	0.0	0.0	0.0	2.8
Trucks	5	10	0	15	2	1	8	11	0	15	0	15	0	0	0	0	41
% Trucks	3.2	0.7	0.0	0.9	1.2	3.7	4.7	3.0	0.0	1.0	0.0	0.9	0.0	0.0	0.0	0.0	1.1



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Panama Rd  
Site Code: 6807  
Start Date: 04/24/2018  
Page No: 3



Turning Movement Data Plot



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Panama Rd  
Site Code: 6807  
Start Date: 04/24/2018  
Page No: 4

### Turning Movement Peak Hour Data (7:30 AM)

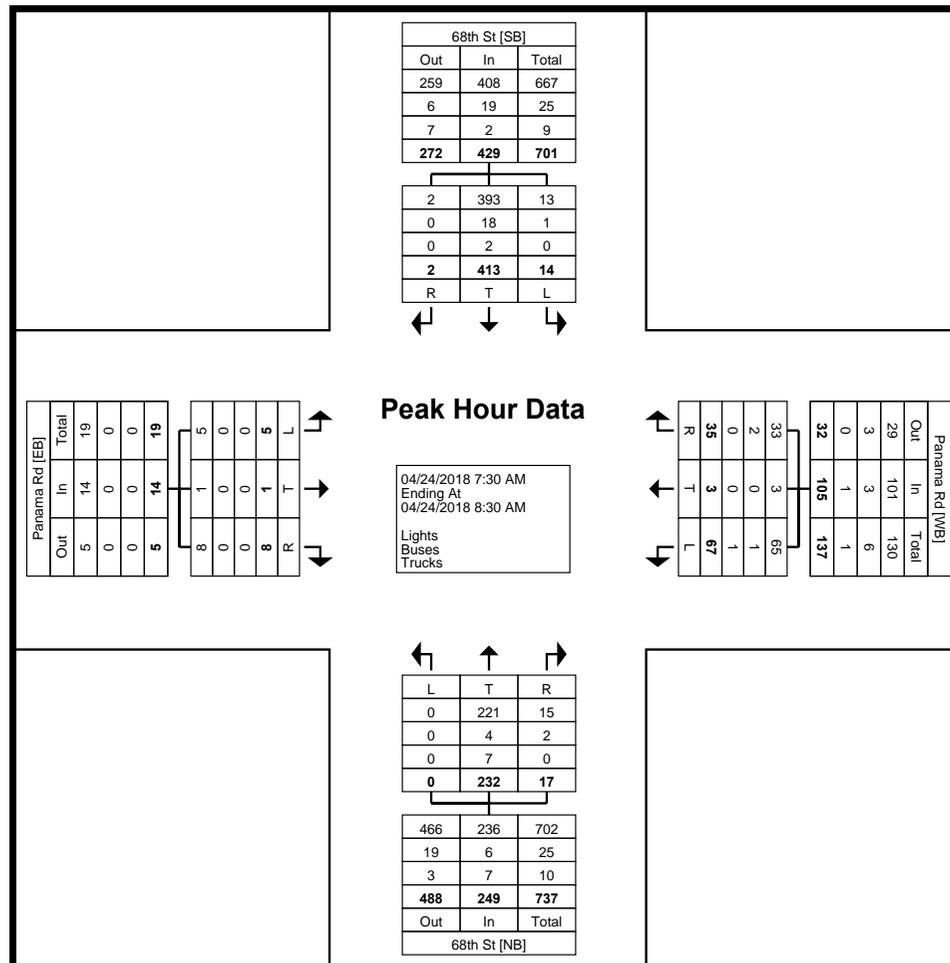
Start Time	68th St Southbound				Panama Rd Westbound				68th St Northbound				Panama Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:30 AM	3	44	1	48	16	1	12	29	0	45	2	47	2	0	0	2	126
7:45 AM	7	133	1	141	20	1	11	32	0	28	3	31	2	1	1	4	208
8:00 AM	4	157	0	161	22	0	7	29	0	60	6	66	0	0	5	5	261
8:15 AM	0	79	0	79	9	1	5	15	0	99	6	105	1	0	2	3	202
Total	14	413	2	429	67	3	35	105	0	232	17	249	5	1	8	14	797
Approach %	3.3	96.3	0.5	-	63.8	2.9	33.3	-	0.0	93.2	6.8	-	35.7	7.1	57.1	-	-
Total %	1.8	51.8	0.3	53.8	8.4	0.4	4.4	13.2	0.0	29.1	2.1	31.2	0.6	0.1	1.0	1.8	-
PHF	0.500	0.658	0.500	0.666	0.761	0.750	0.729	0.820	0.000	0.586	0.708	0.593	0.625	0.250	0.400	0.700	0.763
Lights	13	393	2	408	65	3	33	101	0	221	15	236	5	1	8	14	759
% Lights	92.9	95.2	100.0	95.1	97.0	100.0	94.3	96.2	-	95.3	88.2	94.8	100.0	100.0	100.0	100.0	95.2
Buses	1	18	0	19	1	0	2	3	0	4	2	6	0	0	0	0	28
% Buses	7.1	4.4	0.0	4.4	1.5	0.0	5.7	2.9	-	1.7	11.8	2.4	0.0	0.0	0.0	0.0	3.5
Trucks	0	2	0	2	1	0	0	1	0	7	0	7	0	0	0	0	10
% Trucks	0.0	0.5	0.0	0.5	1.5	0.0	0.0	1.0	-	3.0	0.0	2.8	0.0	0.0	0.0	0.0	1.3



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Panama Rd  
Site Code: 6807  
Start Date: 04/24/2018  
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Panama Rd  
Site Code: 6807  
Start Date: 04/24/2018  
Page No: 6

### Turning Movement Peak Hour Data (3:15 PM)

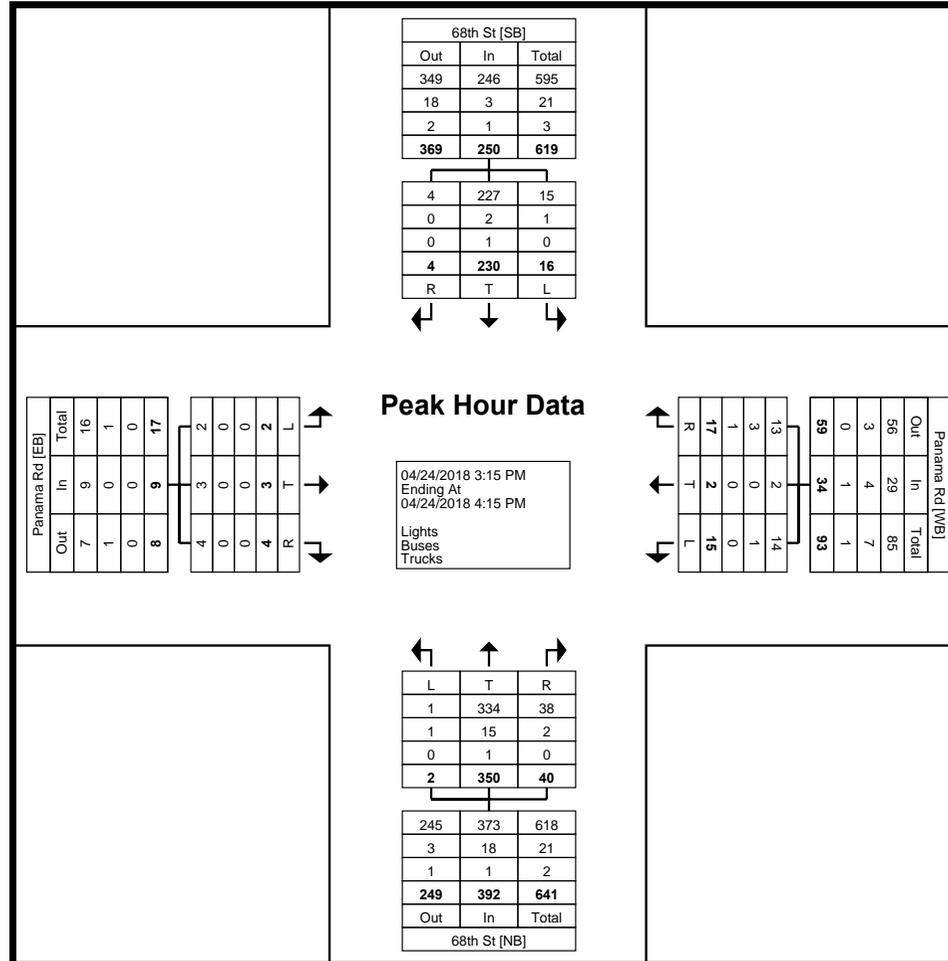
Start Time	68th St Southbound				Panama Rd Westbound				68th St Northbound				Panama Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
3:15 PM	3	80	1	84	8	0	5	13	0	37	3	40	0	0	2	2	139
3:30 PM	3	50	0	53	4	0	2	6	2	183	24	209	1	0	0	1	269
3:45 PM	8	45	1	54	1	1	8	10	0	63	7	70	1	2	1	4	138
4:00 PM	2	55	2	59	2	1	2	5	0	67	6	73	0	1	1	2	139
Total	16	230	4	250	15	2	17	34	2	350	40	392	2	3	4	9	685
Approach %	6.4	92.0	1.6	-	44.1	5.9	50.0	-	0.5	89.3	10.2	-	22.2	33.3	44.4	-	-
Total %	2.3	33.6	0.6	36.5	2.2	0.3	2.5	5.0	0.3	51.1	5.8	57.2	0.3	0.4	0.6	1.3	-
PHF	0.500	0.719	0.500	0.744	0.469	0.500	0.531	0.654	0.250	0.478	0.417	0.469	0.500	0.375	0.500	0.563	0.637
Lights	15	227	4	246	14	2	13	29	1	334	38	373	2	3	4	9	657
% Lights	93.8	98.7	100.0	98.4	93.3	100.0	76.5	85.3	50.0	95.4	95.0	95.2	100.0	100.0	100.0	100.0	95.9
Buses	1	2	0	3	1	0	3	4	1	15	2	18	0	0	0	0	25
% Buses	6.3	0.9	0.0	1.2	6.7	0.0	17.6	11.8	50.0	4.3	5.0	4.6	0.0	0.0	0.0	0.0	3.6
Trucks	0	1	0	1	0	0	1	1	0	1	0	1	0	0	0	0	3
% Trucks	0.0	0.4	0.0	0.4	0.0	0.0	5.9	2.9	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.4



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Panama Rd  
Site Code: 6807  
Start Date: 04/24/2018  
Page No: 7



Turning Movement Peak Hour Data Plot (3:15 PM)



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Princeton Rd  
Site Code: 6809  
Start Date: 04/26/2018  
Page No: 1

### Turning Movement Data

Start Time	Princeton Rd Eastbound				Princeton Rd Westbound				68th St Northbound				68th St Southbound				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	0	0	4	4	2	0	0	2	2	83	1	86	0	54	1	55	147
7:15 AM	0	0	0	0	0	0	3	3	1	35	0	36	0	12	3	15	54
7:30 AM	1	0	1	2	0	0	2	2	2	36	1	39	0	39	10	49	92
7:45 AM	1	0	2	3	0	1	1	2	4	38	0	42	0	55	20	75	122
Hourly Total	2	0	7	9	2	1	6	9	9	192	2	203	0	160	34	194	415
8:00 AM	3	0	3	6	3	3	3	9	12	28	1	41	0	116	44	160	216
8:15 AM	22	1	30	53	3	3	2	8	15	49	0	64	0	169	28	197	322
8:30 AM	16	1	6	23	1	1	0	2	0	68	1	69	0	55	11	66	160
8:45 AM	3	0	0	3	0	0	0	0	2	13	0	15	1	19	3	23	41
Hourly Total	44	2	39	85	7	7	5	19	29	158	2	189	1	359	86	446	739
9:00 AM	0	0	2	2	0	0	2	2	0	35	0	35	1	39	4	44	83
9:15 AM	0	0	0	0	0	0	0	0	0	31	1	32	0	11	0	11	43
9:30 AM	1	0	0	1	0	0	0	0	2	18	1	21	1	17	2	20	42
9:45 AM	1	1	0	2	1	1	0	2	0	16	0	16	0	17	1	18	38
Hourly Total	2	1	2	5	1	1	2	4	2	100	2	104	2	84	7	93	206
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2:00 PM	2	0	0	2	0	0	1	1	0	26	0	26	0	18	1	19	48
2:15 PM	7	0	0	7	0	0	1	1	1	16	0	17	0	19	7	26	51
2:30 PM	4	0	3	7	0	0	1	1	3	21	0	24	0	28	4	32	64
2:45 PM	3	0	2	5	0	0	1	1	2	15	0	17	0	17	2	19	42
Hourly Total	16	0	5	21	0	0	4	4	6	78	0	84	0	82	14	96	205
3:00 PM	3	0	2	5	0	0	0	0	9	16	0	25	0	30	10	40	70
3:15 PM	3	0	1	4	0	2	1	3	13	20	0	33	3	43	12	58	98
3:30 PM	5	1	3	9	2	0	2	4	10	127	1	138	0	45	14	59	210
3:45 PM	46	0	14	60	0	0	0	0	1	160	3	164	1	25	4	30	254
Hourly Total	57	1	20	78	2	2	3	7	33	323	4	360	4	143	40	187	632
4:00 PM	14	0	3	17	0	0	1	1	1	52	2	55	2	29	0	31	104
4:15 PM	20	0	4	24	0	0	1	1	1	43	1	45	2	32	3	37	107
4:30 PM	7	0	2	9	0	0	0	0	0	49	0	49	0	39	4	43	101
4:45 PM	4	0	4	8	0	0	0	0	0	48	1	49	1	31	2	34	91
Hourly Total	45	0	13	58	0	0	2	2	2	192	4	198	5	131	9	145	403
5:00 PM	7	0	2	9	0	1	1	2	0	44	1	45	1	31	6	38	94
5:15 PM	5	0	1	6	0	0	0	0	1	47	0	48	0	45	7	52	106
5:30 PM	3	1	0	4	1	0	0	1	0	33	0	33	2	54	2	58	96
5:45 PM	6	0	2	8	2	0	1	3	0	62	3	65	2	49	2	53	129
Hourly Total	21	1	5	27	3	1	2	6	1	186	4	191	5	179	17	201	425
6:00 PM	1	1	2	4	4	0	1	5	1	21	1	23	0	65	3	68	100
6:15 PM	0	1	1	2	1	0	0	1	0	17	0	17	0	25	2	27	47

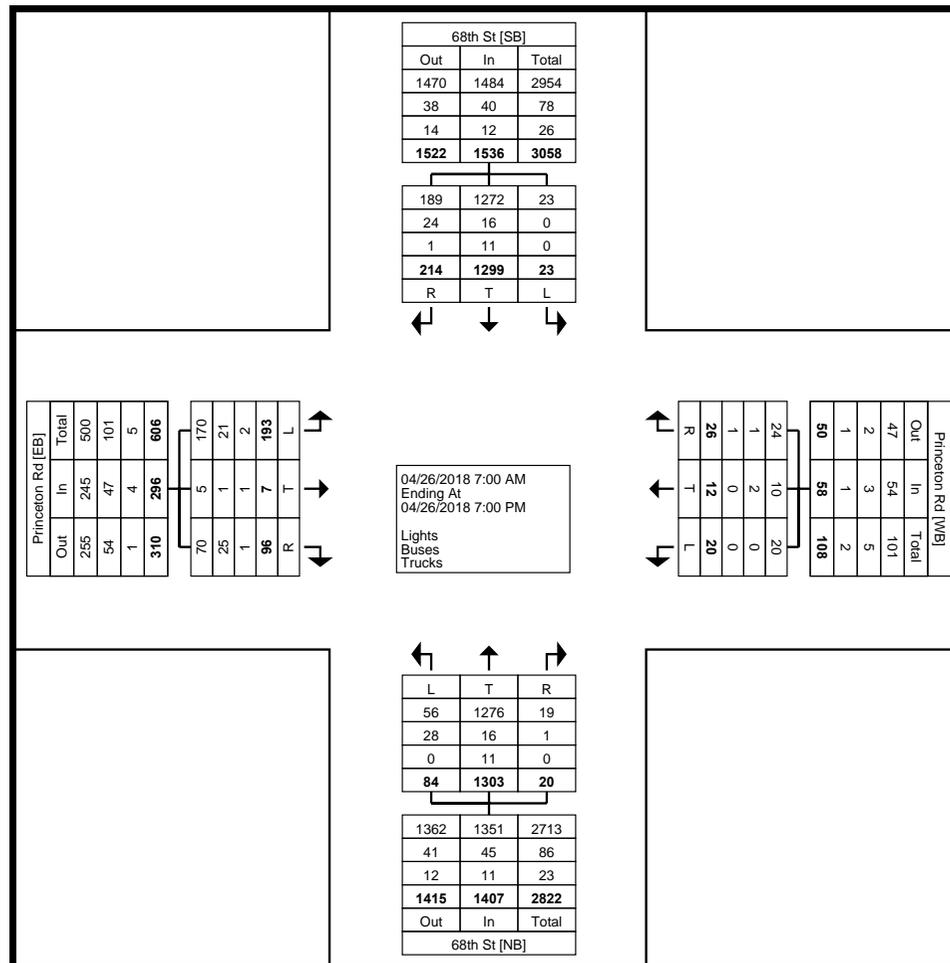
6:30 PM	2	0	2	4	0	0	0	0	1	11	1	13	0	36	1	37	54
6:45 PM	3	0	0	3	0	0	1	1	0	25	0	25	6	35	1	42	71
Hourly Total	6	2	5	13	5	0	2	7	2	74	2	78	6	161	7	174	272
Grand Total	193	7	96	296	20	12	26	58	84	1303	20	1407	23	1299	214	1536	3297
Approach %	65.2	2.4	32.4	-	34.5	20.7	44.8	-	6.0	92.6	1.4	-	1.5	84.6	13.9	-	-
Total %	5.9	0.2	2.9	9.0	0.6	0.4	0.8	1.8	2.5	39.5	0.6	42.7	0.7	39.4	6.5	46.6	-
Lights	170	5	70	245	20	10	24	54	56	1276	19	1351	23	1272	189	1484	3134
% Lights	88.1	71.4	72.9	82.8	100.0	83.3	92.3	93.1	66.7	97.9	95.0	96.0	100.0	97.9	88.3	96.6	95.1
Buses	21	1	25	47	0	2	1	3	28	16	1	45	0	16	24	40	135
% Buses	10.9	14.3	26.0	15.9	0.0	16.7	3.8	5.2	33.3	1.2	5.0	3.2	0.0	1.2	11.2	2.6	4.1
Trucks	2	1	1	4	0	0	1	1	0	11	0	11	0	11	1	12	28
% Trucks	1.0	14.3	1.0	1.4	0.0	0.0	3.8	1.7	0.0	0.8	0.0	0.8	0.0	0.8	0.5	0.8	0.8



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Princeton Rd  
Site Code: 6809  
Start Date: 04/26/2018  
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Turning Movement Data Plot



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Princeton Rd  
Site Code: 6809  
Start Date: 04/26/2018  
Page No: 4

### Turning Movement Peak Hour Data (7:45 AM)

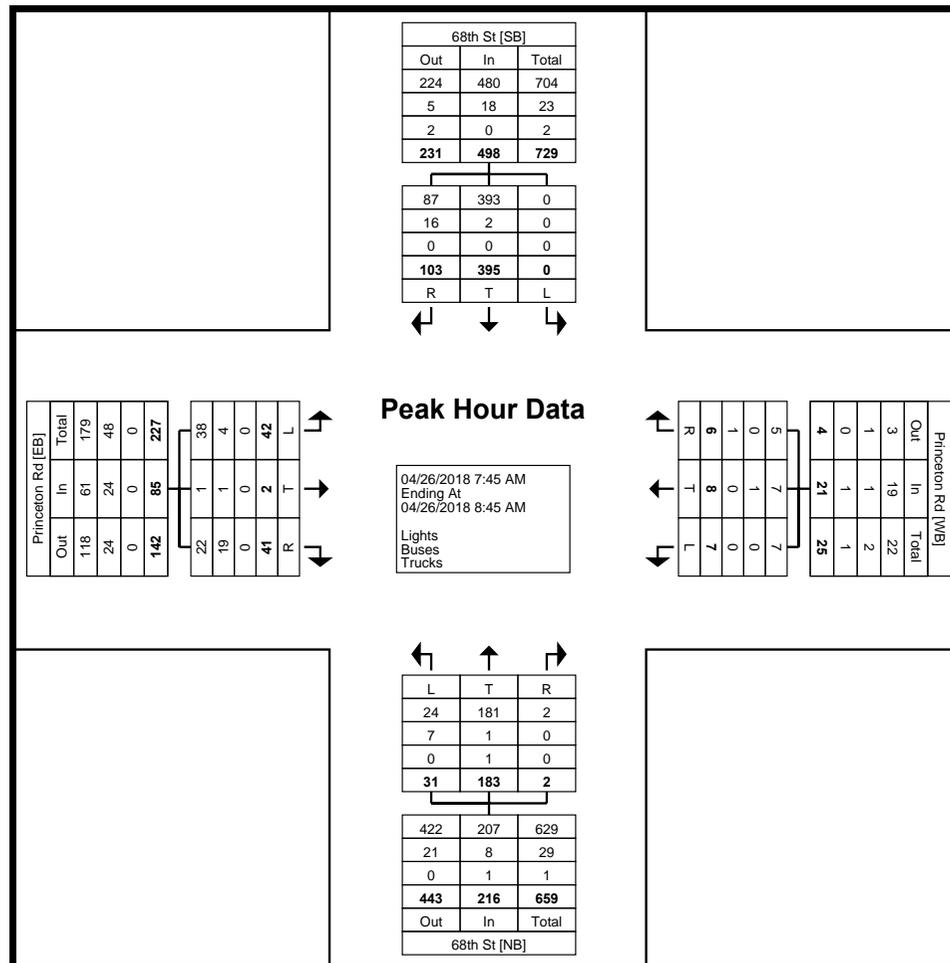
Start Time	Princeton Rd Eastbound				Princeton Rd Westbound				68th St Northbound				68th St Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:45 AM	1	0	2	3	0	1	1	2	4	38	0	42	0	55	20	75	122
8:00 AM	3	0	3	6	3	3	3	9	12	28	1	41	0	116	44	160	216
8:15 AM	22	1	30	53	3	3	2	8	15	49	0	64	0	169	28	197	322
8:30 AM	16	1	6	23	1	1	0	2	0	68	1	69	0	55	11	66	160
Total	42	2	41	85	7	8	6	21	31	183	2	216	0	395	103	498	820
Approach %	49.4	2.4	48.2	-	33.3	38.1	28.6	-	14.4	84.7	0.9	-	0.0	79.3	20.7	-	-
Total %	5.1	0.2	5.0	10.4	0.9	1.0	0.7	2.6	3.8	22.3	0.2	26.3	0.0	48.2	12.6	60.7	-
PHF	0.477	0.500	0.342	0.401	0.583	0.667	0.500	0.583	0.517	0.673	0.500	0.783	0.000	0.584	0.585	0.632	0.637
Lights	38	1	22	61	7	7	5	19	24	181	2	207	0	393	87	480	767
% Lights	90.5	50.0	53.7	71.8	100.0	87.5	83.3	90.5	77.4	98.9	100.0	95.8	-	99.5	84.5	96.4	93.5
Buses	4	1	19	24	0	1	0	1	7	1	0	8	0	2	16	18	51
% Buses	9.5	50.0	46.3	28.2	0.0	12.5	0.0	4.8	22.6	0.5	0.0	3.7	-	0.5	15.5	3.6	6.2
Trucks	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	0	2
% Trucks	0.0	0.0	0.0	0.0	0.0	0.0	16.7	4.8	0.0	0.5	0.0	0.5	-	0.0	0.0	0.0	0.2



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Princeton Rd  
Site Code: 6809  
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Turning Movement Peak Hour Data Plot (7:45 AM)



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Princeton Rd  
Site Code: 6809  
Start Date: 04/26/2018  
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### Turning Movement Peak Hour Data (3:30 PM)

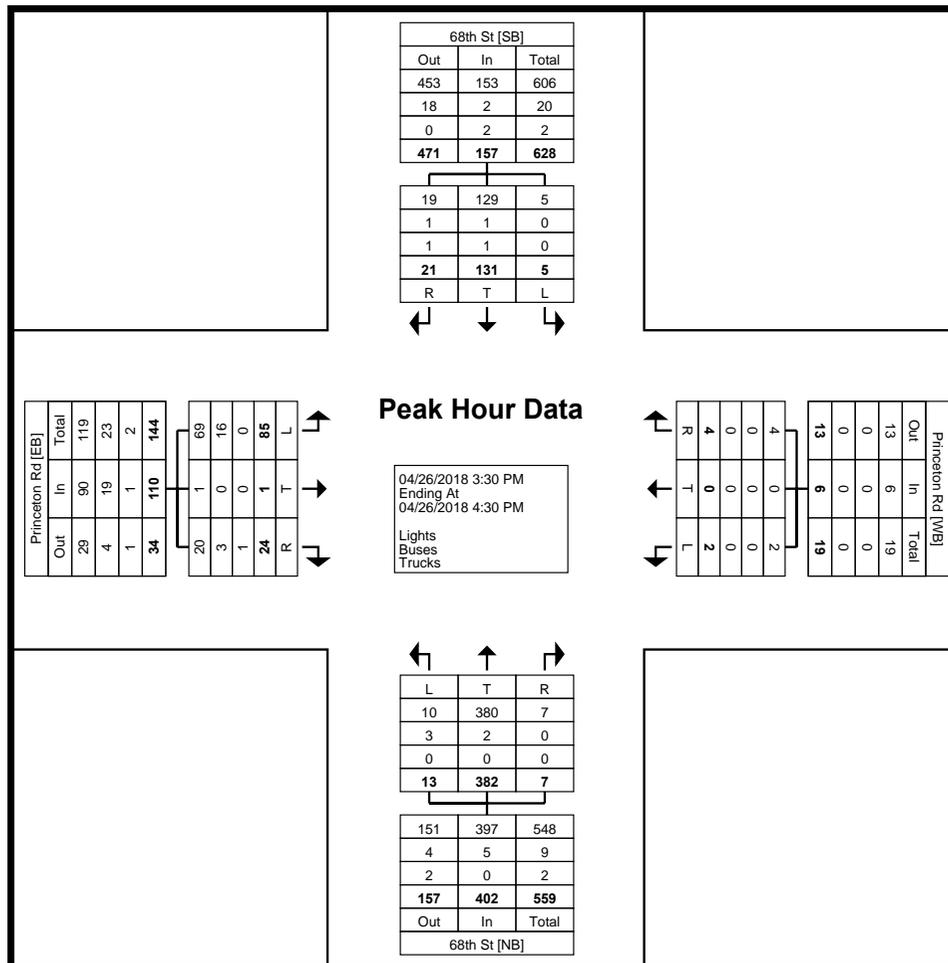
Start Time	Princeton Rd Eastbound				Princeton Rd Westbound				68th St Northbound				68th St Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
3:30 PM	5	1	3	9	2	0	2	4	10	127	1	138	0	45	14	59	210
3:45 PM	46	0	14	60	0	0	0	0	1	160	3	164	1	25	4	30	254
4:00 PM	14	0	3	17	0	0	1	1	1	52	2	55	2	29	0	31	104
4:15 PM	20	0	4	24	0	0	1	1	1	43	1	45	2	32	3	37	107
Total	85	1	24	110	2	0	4	6	13	382	7	402	5	131	21	157	675
Approach %	77.3	0.9	21.8	-	33.3	0.0	66.7	-	3.2	95.0	1.7	-	3.2	83.4	13.4	-	-
Total %	12.6	0.1	3.6	16.3	0.3	0.0	0.6	0.9	1.9	56.6	1.0	59.6	0.7	19.4	3.1	23.3	-
PHF	0.462	0.250	0.429	0.458	0.250	0.000	0.500	0.375	0.325	0.597	0.583	0.613	0.625	0.728	0.375	0.665	0.664
Lights	69	1	20	90	2	0	4	6	10	380	7	397	5	129	19	153	646
% Lights	81.2	100.0	83.3	81.8	100.0	-	100.0	100.0	76.9	99.5	100.0	98.8	100.0	98.5	90.5	97.5	95.7
Buses	16	0	3	19	0	0	0	0	3	2	0	5	0	1	1	2	26
% Buses	18.8	0.0	12.5	17.3	0.0	-	0.0	0.0	23.1	0.5	0.0	1.2	0.0	0.8	4.8	1.3	3.9
Trucks	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	2	3
% Trucks	0.0	0.0	4.2	0.9	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	4.8	1.3	0.4



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Princeton Rd  
Site Code: 6809  
Start Date: 04/26/2018  
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Turning Movement Peak Hour Data Plot (3:30 PM)



2:45 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Hourly Total	0	1	0	1	0	0	0	0	0	1	0	1	0	1	0	1	3
3:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
3:15 AM	0	1	0	1	0	0	1	1	0	0	0	0	0	1	0	1	3
3:30 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
3:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	1	0	2	0	0	1	1	0	1	0	1	0	1	0	1	5
4:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
4:15 AM	0	0	0	0	0	0	0	0	0	9	0	9	0	0	0	0	9
4:30 AM	0	0	0	0	1	0	1	2	0	5	0	5	0	0	0	0	7
4:45 AM	1	1	0	2	0	1	0	1	0	5	1	6	0	0	0	0	9
Hourly Total	1	1	0	2	1	1	1	3	0	20	1	21	0	0	0	0	26
5:00 AM	0	0	0	0	0	2	0	2	0	9	1	10	0	0	2	2	14
5:15 AM	0	3	0	3	0	2	2	4	2	16	0	18	0	1	0	1	26
5:30 AM	0	4	0	4	0	2	1	3	0	21	0	21	0	0	1	1	29
5:45 AM	1	7	0	8	1	0	5	6	0	24	0	24	0	0	1	1	39
Hourly Total	1	14	0	15	1	6	8	15	2	70	1	73	0	1	4	5	108
6:00 AM	0	6	0	6	1	0	3	4	3	30	0	33	0	1	0	1	44
6:15 AM	2	11	0	13	0	4	13	17	3	39	1	43	1	0	0	1	74
6:30 AM	2	9	0	11	1	6	4	11	2	46	1	49	0	1	0	1	72
6:45 AM	4	10	1	15	0	7	16	23	4	57	1	62	0	3	1	4	104
Hourly Total	8	36	1	45	2	17	36	55	12	172	3	187	1	5	1	7	294
7:00 AM	4	16	0	20	2	11	20	33	9	73	0	82	0	2	6	8	143
7:15 AM	8	28	0	36	1	10	28	39	6	102	2	110	1	6	6	13	198
7:30 AM	6	56	1	63	1	10	26	37	3	103	3	109	0	2	5	7	216
7:45 AM	3	59	0	62	2	7	16	25	5	74	5	84	0	3	12	15	186
Hourly Total	21	159	1	181	6	38	90	134	23	352	10	385	1	13	29	43	743
8:00 AM	8	63	1	72	6	4	12	22	6	72	1	79	1	3	15	19	192
8:15 AM	9	31	0	40	2	5	16	23	2	82	8	92	1	2	4	7	162
8:30 AM	6	17	0	23	3	6	13	22	3	75	4	82	0	7	3	10	137
8:45 AM	8	24	0	32	4	3	6	13	4	44	4	52	2	6	7	15	112
Hourly Total	31	135	1	167	15	18	47	80	15	273	17	305	4	18	29	51	603
9:00 AM	6	25	2	33	0	1	8	9	4	59	1	64	0	0	4	4	110
9:15 AM	4	21	1	26	0	2	10	12	2	36	0	38	1	2	1	4	80
9:30 AM	11	23	2	36	2	3	10	15	3	38	2	43	2	2	3	7	101
9:45 AM	8	28	1	37	2	2	12	16	5	36	1	42	1	0	4	5	100
Hourly Total	29	97	6	132	4	8	40	52	14	169	4	187	4	4	12	20	391
10:00 AM	6	18	1	25	0	3	4	7	3	33	1	37	1	5	0	6	75
10:15 AM	4	27	1	32	1	3	9	13	2	24	1	27	3	2	1	6	78
10:30 AM	2	24	1	27	1	2	10	13	1	29	0	30	1	1	2	4	74
10:45 AM	10	32	0	42	0	1	8	9	2	36	2	40	0	0	0	0	91
Hourly Total	22	101	3	126	2	9	31	42	8	122	4	134	5	8	3	16	318
11:00 AM	4	26	1	31	2	1	12	15	5	34	4	43	1	1	2	4	93
11:15 AM	5	34	1	40	1	5	5	11	2	29	0	31	3	3	4	10	92
11:30 AM	1	29	1	31	1	3	7	11	1	21	0	22	2	4	4	10	74
11:45 AM	7	31	0	38	2	1	5	8	4	31	4	39	1	2	5	8	93
Hourly Total	17	120	3	140	6	10	29	45	12	115	8	135	7	10	15	32	352
12:00 PM	8	34	1	43	2	3	8	13	2	37	1	40	1	2	6	9	105
12:15 PM	9	31	1	41	1	4	4	9	6	22	4	32	1	1	4	6	88
12:30 PM	6	29	6	41	1	0	7	8	5	26	2	33	1	7	1	9	91
12:45 PM	3	30	3	36	2	5	6	13	3	31	2	36	1	3	4	8	93
Hourly Total	26	124	11	161	6	12	25	43	16	116	9	141	4	13	15	32	377

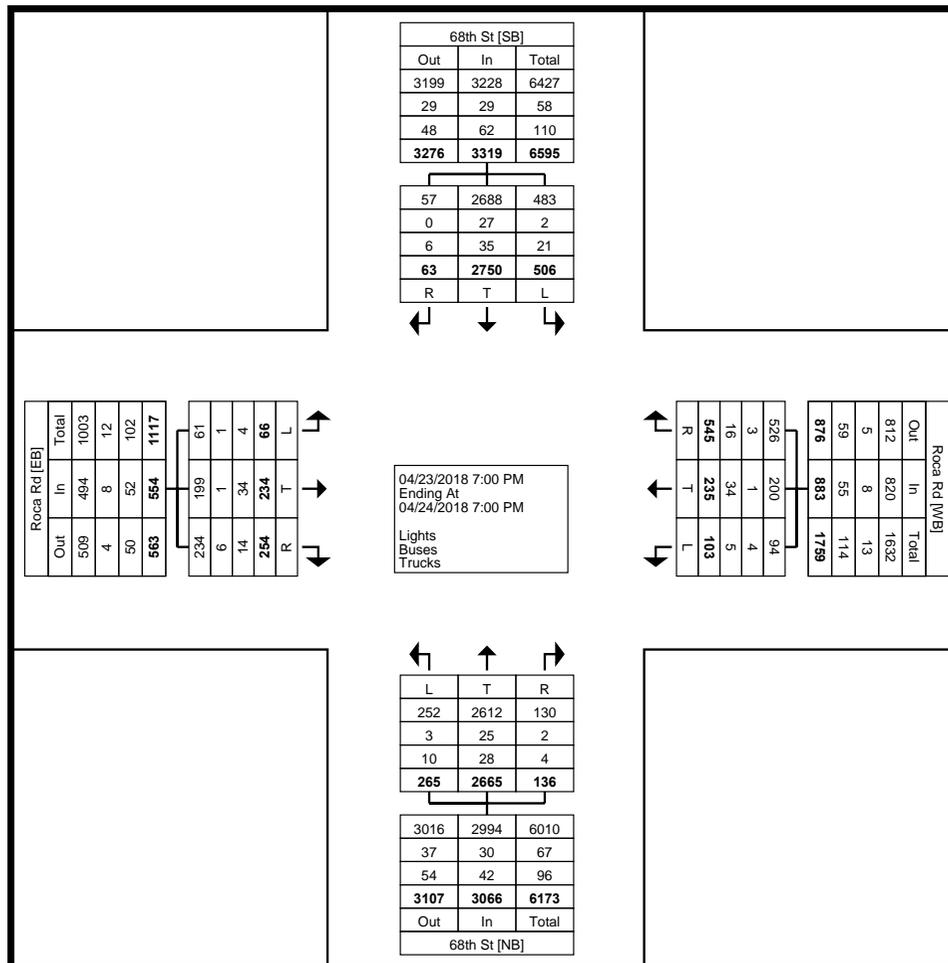
1:00 PM	2	38	4	44	2	3	4	9	5	24	1	30	1	4	0	5	88
1:15 PM	4	31	2	37	1	4	3	8	4	25	1	30	0	4	2	6	81
1:30 PM	8	30	1	39	0	3	1	4	2	30	2	34	1	9	1	11	88
1:45 PM	6	29	3	38	2	3	6	11	2	36	2	40	5	7	5	17	106
Hourly Total	20	128	10	158	5	13	14	32	13	115	6	134	7	24	8	39	363
2:00 PM	5	25	5	35	2	5	7	14	2	29	2	33	0	3	4	7	89
2:15 PM	5	46	1	52	2	3	9	14	1	29	2	32	6	2	2	10	108
2:30 PM	17	39	2	58	1	4	6	11	2	27	1	30	2	1	3	6	105
2:45 PM	6	58	0	64	1	6	13	20	4	27	0	31	3	4	8	15	130
Hourly Total	33	168	8	209	6	18	35	59	9	112	5	126	11	10	17	38	432
3:00 PM	7	53	1	61	3	6	3	12	1	26	4	31	0	5	4	9	113
3:15 PM	10	68	3	81	2	2	10	14	5	32	0	37	0	7	3	10	142
3:30 PM	18	61	1	80	2	6	6	14	17	65	4	86	0	6	3	9	189
3:45 PM	11	71	0	82	2	4	6	12	10	69	3	82	3	8	4	15	191
Hourly Total	46	253	5	304	9	18	25	52	33	192	11	236	3	26	14	43	635
4:00 PM	17	68	1	86	3	4	5	12	4	49	4	57	2	8	1	11	166
4:15 PM	17	68	1	86	3	5	10	18	3	63	2	68	3	6	1	10	182
4:30 PM	16	78	0	94	1	8	7	16	4	59	5	68	1	10	10	21	199
4:45 PM	7	88	0	95	4	3	9	16	9	67	2	78	2	4	6	12	201
Hourly Total	57	302	2	361	11	20	31	62	20	238	13	271	8	28	18	54	748
5:00 PM	24	83	2	109	0	6	7	13	12	73	1	86	3	9	4	16	224
5:15 PM	16	109	1	126	0	2	16	18	7	51	5	63	0	4	9	13	220
5:30 PM	11	87	2	100	3	4	11	18	6	50	1	57	1	5	11	17	192
5:45 PM	15	77	1	93	2	4	15	21	7	57	6	70	1	8	9	18	202
Hourly Total	66	356	6	428	5	16	49	70	32	231	13	276	5	26	33	64	838
6:00 PM	14	73	2	89	0	2	4	6	8	32	3	43	2	8	3	13	151
6:15 PM	16	77	1	94	4	2	9	15	4	34	4	42	0	1	5	6	157
6:30 PM	11	60	0	71	2	1	6	9	0	32	2	34	1	6	4	11	125
6:45 PM	8	65	1	74	4	3	9	16	2	26	3	31	0	4	3	7	128
Hourly Total	49	275	4	328	10	8	28	46	14	124	12	150	3	19	15	37	561
Grand Total	506	2750	63	3319	103	235	545	883	265	2665	136	3066	66	234	254	554	7822
Approach %	15.2	82.9	1.9	-	11.7	26.6	61.7	-	8.6	86.9	4.4	-	11.9	42.2	45.8	-	-
Total %	6.5	35.2	0.8	42.4	1.3	3.0	7.0	11.3	3.4	34.1	1.7	39.2	0.8	3.0	3.2	7.1	-
Lights	483	2688	57	3228	94	200	526	820	252	2612	130	2994	61	199	234	494	7536
% Lights	95.5	97.7	90.5	97.3	91.3	85.1	96.5	92.9	95.1	98.0	95.6	97.7	92.4	85.0	92.1	89.2	96.3
Buses	2	27	0	29	4	1	3	8	3	25	2	30	1	1	6	8	75
% Buses	0.4	1.0	0.0	0.9	3.9	0.4	0.6	0.9	1.1	0.9	1.5	1.0	1.5	0.4	2.4	1.4	1.0
Trucks	21	35	6	62	5	34	16	55	10	28	4	42	4	34	14	52	211
% Trucks	4.2	1.3	9.5	1.9	4.9	14.5	2.9	6.2	3.8	1.1	2.9	1.4	6.1	14.5	5.5	9.4	2.7



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Roca Rd  
Site Code: 6804  
Start Date: 04/23/2018  
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Turning Movement Data Plot



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Roca Rd  
Site Code: 6804  
Start Date: 04/23/2018  
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### Turning Movement Peak Hour Data (7:30 PM)

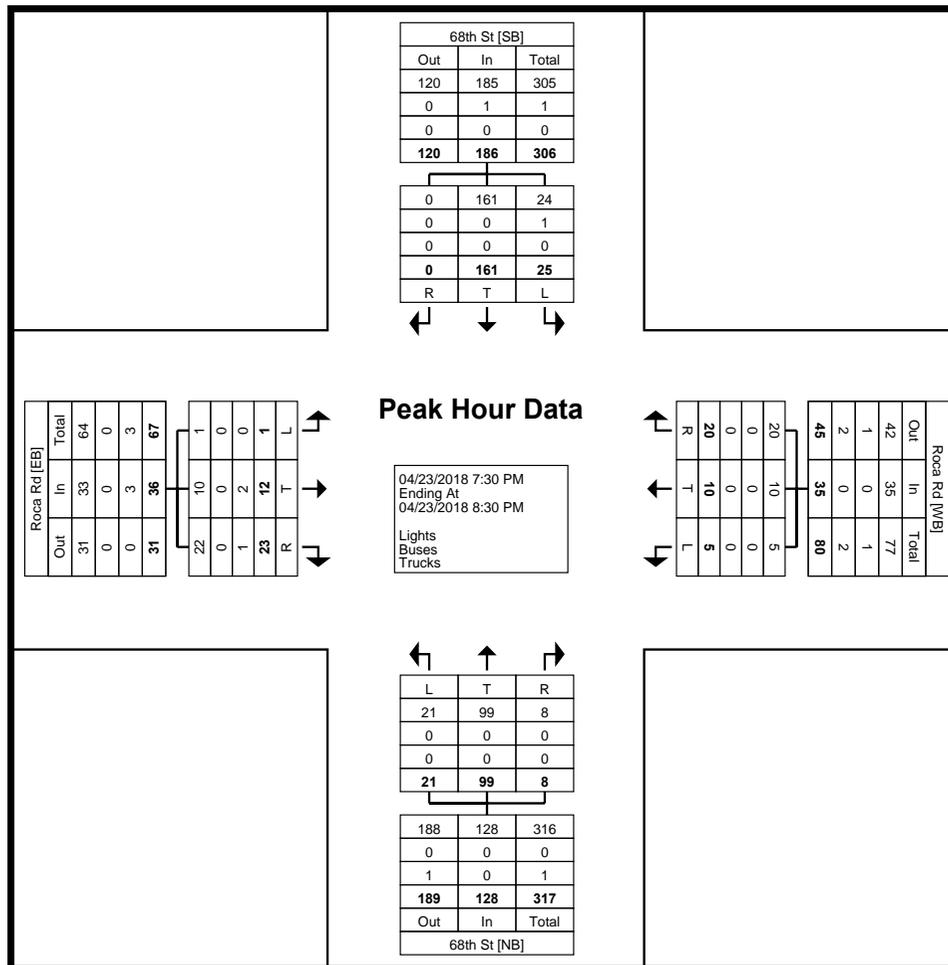
Start Time	68th St Southbound				Roca Rd Westbound				68th St Northbound				Roca Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:30 PM	8	42	0	50	1	2	6	9	6	27	1	34	1	0	4	5	98
7:45 PM	6	34	0	40	1	2	5	8	2	23	2	27	0	1	3	4	79
8:00 PM	6	44	0	50	2	2	4	8	6	12	2	20	0	5	9	14	92
8:15 PM	5	41	0	46	1	4	5	10	7	37	3	47	0	6	7	13	116
Total	25	161	0	186	5	10	20	35	21	99	8	128	1	12	23	36	385
Approach %	13.4	86.6	0.0	-	14.3	28.6	57.1	-	16.4	77.3	6.3	-	2.8	33.3	63.9	-	-
Total %	6.5	41.8	0.0	48.3	1.3	2.6	5.2	9.1	5.5	25.7	2.1	33.2	0.3	3.1	6.0	9.4	-
PHF	0.781	0.915	0.000	0.930	0.625	0.625	0.833	0.875	0.750	0.669	0.667	0.681	0.250	0.500	0.639	0.643	0.830
Lights	24	161	0	185	5	10	20	35	21	99	8	128	1	10	22	33	381
% Lights	96.0	100.0	-	99.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	83.3	95.7	91.7	99.0
Buses	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Buses	4.0	0.0	-	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	3
% Trucks	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	4.3	8.3	0.8



MNRG - Omaha  
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Turning Movement Peak Hour Data Plot (7:30 PM)



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Roca Rd  
Site Code: 6804  
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### Turning Movement Peak Hour Data (7:15 AM)

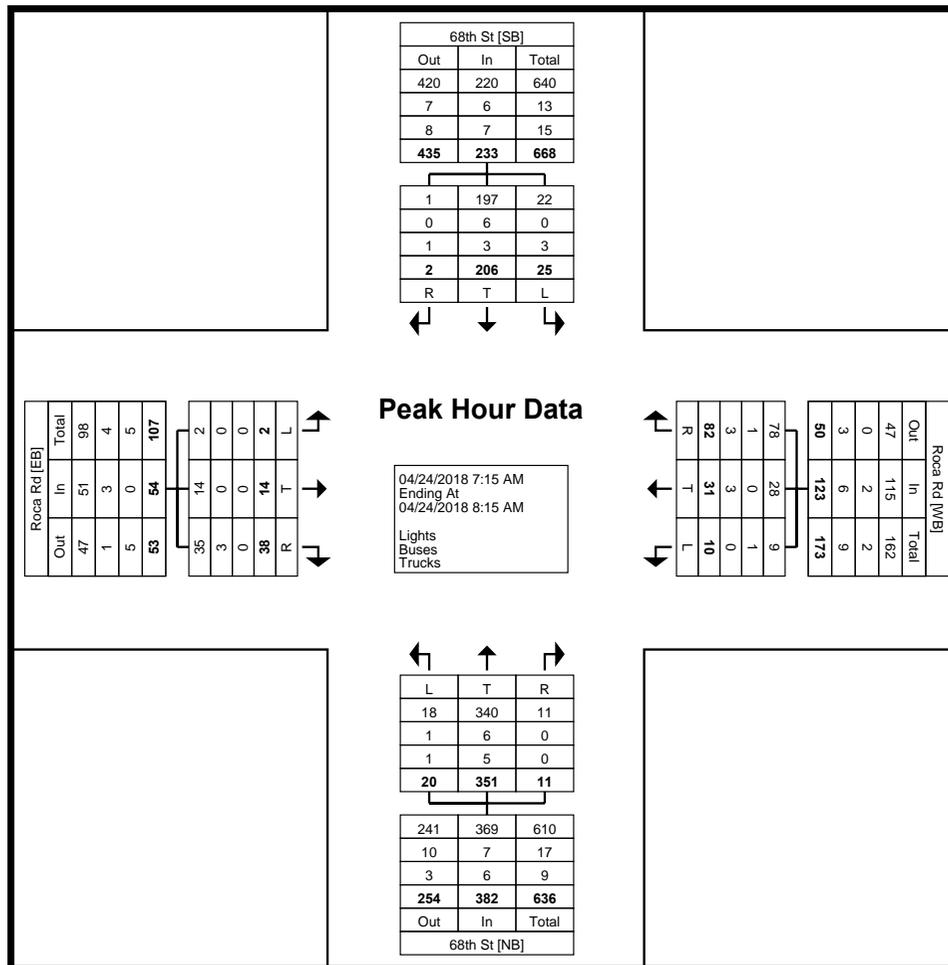
Start Time	68th St Southbound				Roca Rd Westbound				68th St Northbound				Roca Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
7:15 AM	8	28	0	36	1	10	28	39	6	102	2	110	1	6	6	13	198
7:30 AM	6	56	1	63	1	10	26	37	3	103	3	109	0	2	5	7	216
7:45 AM	3	59	0	62	2	7	16	25	5	74	5	84	0	3	12	15	186
8:00 AM	8	63	1	72	6	4	12	22	6	72	1	79	1	3	15	19	192
Total	25	206	2	233	10	31	82	123	20	351	11	382	2	14	38	54	792
Approach %	10.7	88.4	0.9	-	8.1	25.2	66.7	-	5.2	91.9	2.9	-	3.7	25.9	70.4	-	-
Total %	3.2	26.0	0.3	29.4	1.3	3.9	10.4	15.5	2.5	44.3	1.4	48.2	0.3	1.8	4.8	6.8	-
PHF	0.781	0.817	0.500	0.809	0.417	0.775	0.732	0.788	0.833	0.852	0.550	0.868	0.500	0.583	0.633	0.711	0.917
Lights	22	197	1	220	9	28	78	115	18	340	11	369	2	14	35	51	755
% Lights	88.0	95.6	50.0	94.4	90.0	90.3	95.1	93.5	90.0	96.9	100.0	96.6	100.0	100.0	92.1	94.4	95.3
Buses	0	6	0	6	1	0	1	2	1	6	0	7	0	0	3	3	18
% Buses	0.0	2.9	0.0	2.6	10.0	0.0	1.2	1.6	5.0	1.7	0.0	1.8	0.0	0.0	7.9	5.6	2.3
Trucks	3	3	1	7	0	3	3	6	1	5	0	6	0	0	0	0	19
% Trucks	12.0	1.5	50.0	3.0	0.0	9.7	3.7	4.9	5.0	1.4	0.0	1.6	0.0	0.0	0.0	0.0	2.4



MNRG - Omaha  
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Count Name: 68th St & Roca Rd  
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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: 68th St & Roca Rd  
Site Code: 6804  
Start Date: 04/23/2018  
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### Turning Movement Peak Hour Data (4:30 PM)

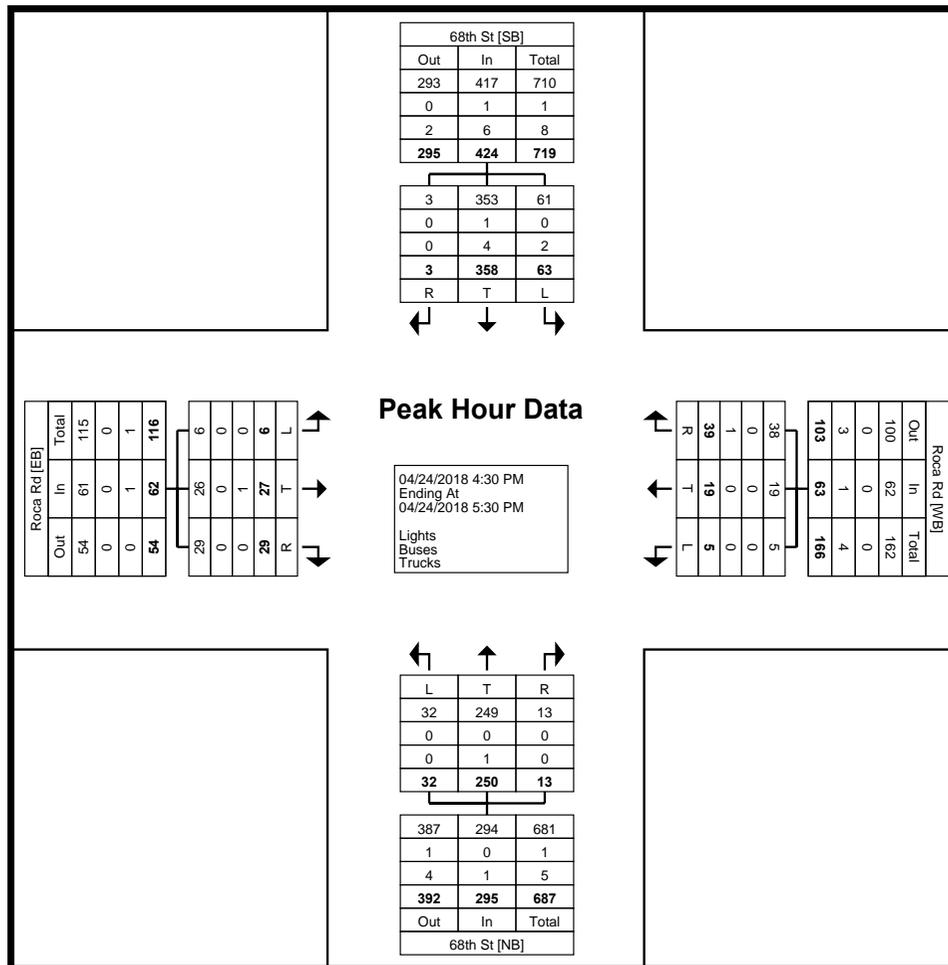
Start Time	68th St Southbound				Roca Rd Westbound				68th St Northbound				Roca Rd Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
4:30 PM	16	78	0	94	1	8	7	16	4	59	5	68	1	10	10	21	199
4:45 PM	7	88	0	95	4	3	9	16	9	67	2	78	2	4	6	12	201
5:00 PM	24	83	2	109	0	6	7	13	12	73	1	86	3	9	4	16	224
5:15 PM	16	109	1	126	0	2	16	18	7	51	5	63	0	4	9	13	220
Total	63	358	3	424	5	19	39	63	32	250	13	295	6	27	29	62	844
Approach %	14.9	84.4	0.7	-	7.9	30.2	61.9	-	10.8	84.7	4.4	-	9.7	43.5	46.8	-	-
Total %	7.5	42.4	0.4	50.2	0.6	2.3	4.6	7.5	3.8	29.6	1.5	35.0	0.7	3.2	3.4	7.3	-
PHF	0.656	0.821	0.375	0.841	0.313	0.594	0.609	0.875	0.667	0.856	0.650	0.858	0.500	0.675	0.725	0.738	0.942
Lights	61	353	3	417	5	19	38	62	32	249	13	294	6	26	29	61	834
% Lights	96.8	98.6	100.0	98.3	100.0	100.0	97.4	98.4	100.0	99.6	100.0	99.7	100.0	96.3	100.0	98.4	98.8
Buses	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Buses	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trucks	2	4	0	6	0	0	1	1	0	1	0	1	0	1	0	1	9
% Trucks	3.2	1.1	0.0	1.4	0.0	0.0	2.6	1.6	0.0	0.4	0.0	0.3	0.0	3.7	0.0	1.6	1.1



MNRG - Omaha  
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Count Name: 68th St & Roca Rd  
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Turning Movement Peak Hour Data Plot (4:30 PM)



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Saltillo Rd  
Site Code: 6801  
Start Date: 04/26/2018  
Page No: 1

### Turning Movement Data

Start Time	Saltillo Rd Westbound			68th St Northbound			Saltillo Rd Eastbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
1:00 AM	1	1	2	2	0	2	1	0	1	5
1:15 AM	1	0	1	0	0	0	2	2	4	5
1:30 AM	0	0	0	0	0	0	1	2	3	3
1:45 AM	0	0	0	1	1	2	1	1	2	4
Hourly Total	2	1	3	3	1	4	5	5	10	17
2:00 AM	0	0	0	0	0	0	2	2	4	4
2:15 AM	1	1	2	0	1	1	0	0	0	3
2:30 AM	1	0	1	1	1	2	2	1	3	6
2:45 AM	0	0	0	0	1	1	0	0	0	1
Hourly Total	2	1	3	1	3	4	4	3	7	14
3:00 AM	0	0	0	0	1	1	1	0	1	2
3:15 AM	1	1	2	0	2	2	2	0	2	6
3:30 AM	1	0	1	0	0	0	1	0	1	2
3:45 AM	1	1	2	0	0	0	0	0	0	2
Hourly Total	3	2	5	0	3	3	4	0	4	12
4:00 AM	0	3	3	1	2	3	3	0	3	9
4:15 AM	0	2	2	0	2	2	2	1	3	7
4:30 AM	0	0	0	2	4	6	4	0	4	10
4:45 AM	1	3	4	0	2	2	2	0	2	8
Hourly Total	1	8	9	3	10	13	11	1	12	34
5:00 AM	1	3	4	3	4	7	0	1	1	12
5:15 AM	3	8	11	5	7	12	8	0	8	31
5:30 AM	2	15	17	9	15	24	10	2	12	53
5:45 AM	4	8	12	22	10	32	11	2	13	57
Hourly Total	10	34	44	39	36	75	29	5	34	153
6:00 AM	4	18	22	13	14	27	21	7	28	77
6:15 AM	4	21	25	21	17	38	18	6	24	87
6:30 AM	12	20	32	20	29	49	42	10	52	133
6:45 AM	10	29	39	31	36	67	44	9	53	159
Hourly Total	30	88	118	85	96	181	125	32	157	456
7:00 AM	8	43	51	54	61	115	46	8	54	220
7:15 AM	23	49	72	49	71	120	70	20	90	282
7:30 AM	38	56	94	45	60	105	73	27	100	299
7:45 AM	39	51	90	63	64	127	62	41	103	320
Hourly Total	108	199	307	211	256	467	251	96	347	1121
8:00 AM	30	43	73	36	46	82	57	23	80	235
8:15 AM	14	42	56	48	42	90	53	16	69	215
8:30 AM	12	34	46	43	40	83	51	14	65	194

8:45 AM	10	32	42	41	28	69	43	20	63	174
Hourly Total	66	151	217	168	156	324	204	73	277	818
9:00 AM	13	21	34	36	27	63	29	20	49	146
9:15 AM	21	28	49	24	22	46	22	21	43	138
9:30 AM	22	25	47	30	22	52	50	21	71	170
9:45 AM	22	29	51	26	22	48	37	15	52	151
Hourly Total	78	103	181	116	93	209	138	77	215	605
10:00 AM	15	29	44	18	18	36	42	20	62	142
10:15 AM	9	26	35	28	21	49	33	23	56	140
10:30 AM	13	22	35	20	14	34	36	17	53	122
10:45 AM	23	24	47	20	17	37	23	22	45	129
Hourly Total	60	101	161	86	70	156	134	82	216	533
11:00 AM	21	37	58	28	15	43	35	18	53	154
11:15 AM	10	32	42	25	13	38	23	20	43	123
11:30 AM	18	33	51	28	24	52	27	22	49	152
11:45 AM	18	27	45	25	23	48	27	17	44	137
Hourly Total	67	129	196	106	75	181	112	77	189	566
12:00 PM	21	29	50	34	16	50	30	28	58	158
12:15 PM	22	37	59	34	14	48	33	23	56	163
12:30 PM	16	25	41	23	18	41	44	24	68	150
12:45 PM	20	33	53	29	14	43	26	28	54	150
Hourly Total	79	124	203	120	62	182	133	103	236	621
1:00 PM	22	27	49	26	12	38	37	32	69	156
1:15 PM	16	32	48	21	9	30	32	28	60	138
1:30 PM	27	23	50	24	19	43	37	28	65	158
1:45 PM	24	36	60	23	19	42	31	21	52	154
Hourly Total	89	118	207	94	59	153	137	109	246	606
2:00 PM	17	36	53	13	23	36	28	32	60	149
2:15 PM	21	33	54	23	16	39	26	32	58	151
2:30 PM	19	39	58	30	24	54	31	29	60	172
2:45 PM	25	31	56	24	19	43	28	36	64	163
Hourly Total	82	139	221	90	82	172	113	129	242	635
3:00 PM	25	36	61	26	21	47	32	29	61	169
3:15 PM	33	37	70	18	27	45	42	33	75	190
3:30 PM	35	37	72	32	28	60	45	45	90	222
3:45 PM	42	50	92	46	46	92	35	49	84	268
Hourly Total	135	160	295	122	122	244	154	156	310	849
4:00 PM	31	44	75	31	28	59	42	59	101	235
4:15 PM	46	53	99	53	28	81	53	56	109	289
4:30 PM	44	52	96	38	30	68	61	52	113	277
4:45 PM	58	56	114	38	25	63	59	68	127	304
Hourly Total	179	205	384	160	111	271	215	235	450	1105
5:00 PM	54	55	109	38	30	68	55	62	117	294
5:15 PM	73	65	138	40	29	69	73	62	135	342
5:30 PM	56	39	95	39	30	69	62	58	120	284
5:45 PM	43	60	103	45	32	77	57	61	118	298
Hourly Total	226	219	445	162	121	283	247	243	490	1218
6:00 PM	37	40	77	34	21	55	39	38	77	209
6:15 PM	29	33	62	23	19	42	27	50	77	181
6:30 PM	29	28	57	32	17	49	19	33	52	158
6:45 PM	24	27	51	16	20	36	11	37	48	135
Hourly Total	119	128	247	105	77	182	96	158	254	683

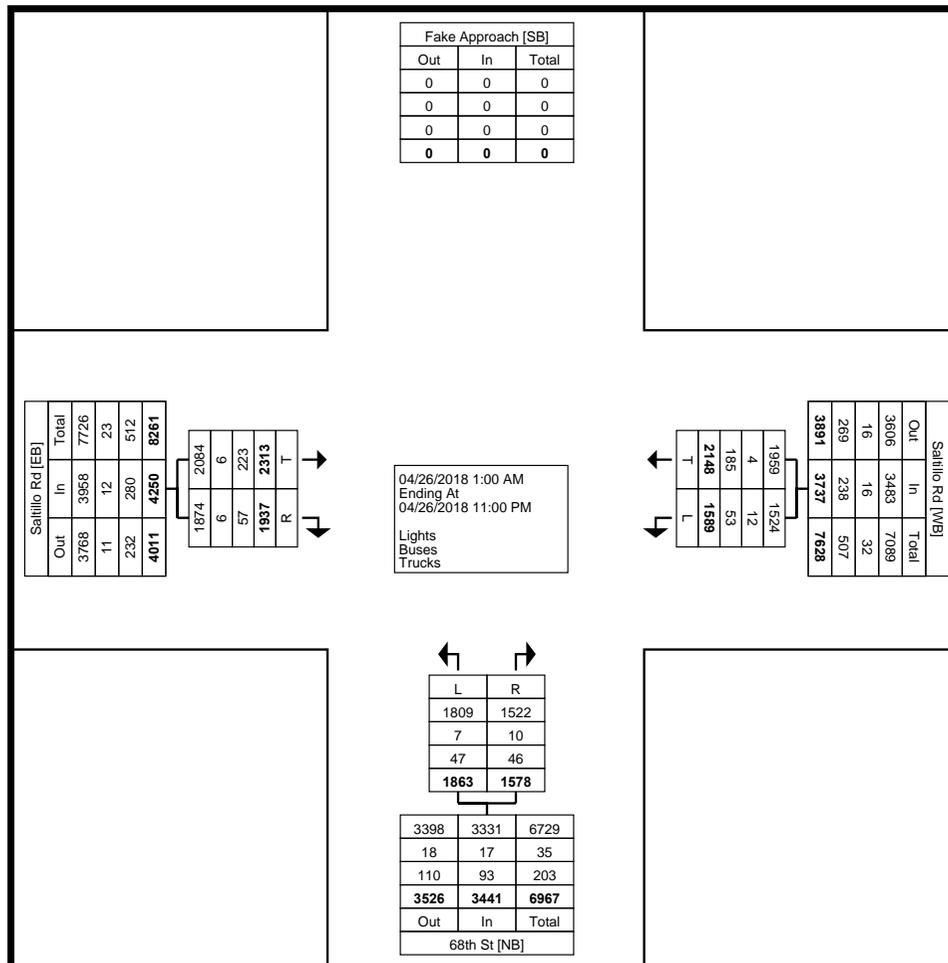
7:00 PM	29	30	59	21	14	35	20	45	65	159
7:15 PM	22	28	50	17	12	29	17	32	49	128
7:30 PM	16	25	41	12	18	30	16	29	45	116
7:45 PM	21	28	49	20	10	30	18	27	45	124
Hourly Total	88	111	199	70	54	124	71	133	204	527
8:00 PM	23	14	37	25	8	33	24	32	56	126
8:15 PM	26	20	46	11	8	19	15	33	48	113
8:30 PM	20	23	43	15	14	29	21	23	44	116
8:45 PM	19	14	33	10	13	23	20	28	48	104
Hourly Total	88	71	159	61	43	104	80	116	196	459
9:00 PM	12	7	19	20	19	39	10	18	28	86
9:15 PM	17	11	28	4	9	13	9	25	34	75
9:30 PM	9	7	16	9	5	14	8	10	18	48
9:45 PM	13	5	18	11	6	17	7	12	19	54
Hourly Total	51	30	81	44	39	83	34	65	99	263
10:00 PM	13	8	21	2	3	5	5	14	19	45
10:15 PM	6	9	15	5	3	8	8	13	21	44
10:30 PM	4	8	12	4	2	6	2	9	11	29
10:45 PM	3	1	4	6	1	7	1	3	4	15
Hourly Total	26	26	52	17	9	26	16	39	55	133
Grand Total	1589	2148	3737	1863	1578	3441	2313	1937	4250	11428
Approach %	42.5	57.5	-	54.1	45.9	-	54.4	45.6	-	-
Total %	13.9	18.8	32.7	16.3	13.8	30.1	20.2	16.9	37.2	-
Lights	1524	1959	3483	1809	1522	3331	2084	1874	3958	10772
% Lights	95.9	91.2	93.2	97.1	96.5	96.8	90.1	96.7	93.1	94.3
Buses	12	4	16	7	10	17	6	6	12	45
% Buses	0.8	0.2	0.4	0.4	0.6	0.5	0.3	0.3	0.3	0.4
Trucks	53	185	238	47	46	93	223	57	280	611
% Trucks	3.3	8.6	6.4	2.5	2.9	2.7	9.6	2.9	6.6	5.3



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Saltillo Rd  
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Turning Movement Data Plot



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Saltillo Rd  
Site Code: 6801  
Start Date: 04/26/2018  
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### Turning Movement Peak Hour Data (7:15 AM)

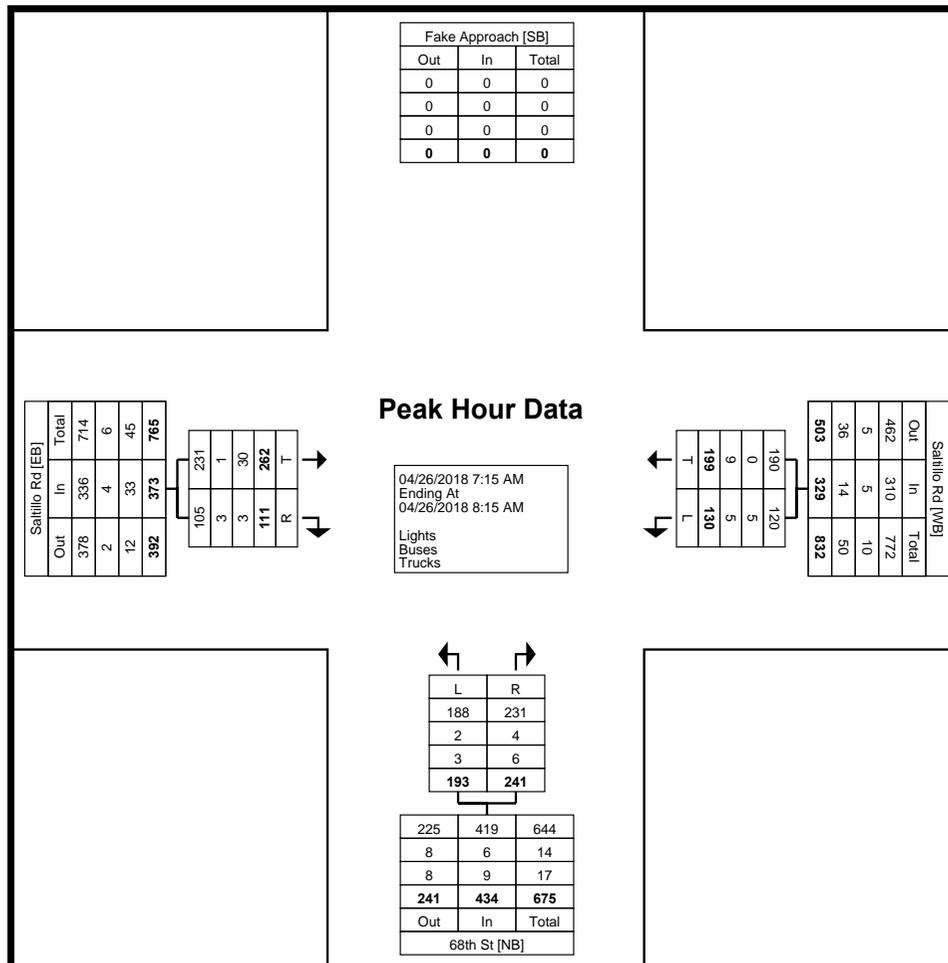
Start Time	Saltillo Rd Westbound			68th St Northbound			Saltillo Rd Eastbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
7:15 AM	23	49	72	49	71	120	70	20	90	282
7:30 AM	38	56	94	45	60	105	73	27	100	299
7:45 AM	39	51	90	63	64	127	62	41	103	320
8:00 AM	30	43	73	36	46	82	57	23	80	235
Total	130	199	329	193	241	434	262	111	373	1136
Approach %	39.5	60.5	-	44.5	55.5	-	70.2	29.8	-	-
Total %	11.4	17.5	29.0	17.0	21.2	38.2	23.1	9.8	32.8	-
PHF	0.833	0.888	0.875	0.766	0.849	0.854	0.897	0.677	0.905	0.888
Lights	120	190	310	188	231	419	231	105	336	1065
% Lights	92.3	95.5	94.2	97.4	95.9	96.5	88.2	94.6	90.1	93.8
Buses	5	0	5	2	4	6	1	3	4	15
% Buses	3.8	0.0	1.5	1.0	1.7	1.4	0.4	2.7	1.1	1.3
Trucks	5	9	14	3	6	9	30	3	33	56
% Trucks	3.8	4.5	4.3	1.6	2.5	2.1	11.5	2.7	8.8	4.9



MNRG - Omaha  
1753 S. 107th St

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

Count Name: 68th St & Saltillo Rd  
Site Code: 6801  
Start Date: 04/26/2018  
Page No: 6



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: 68th St & Saltillo Rd  
Site Code: 6801  
Start Date: 04/26/2018  
Page No: 7

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

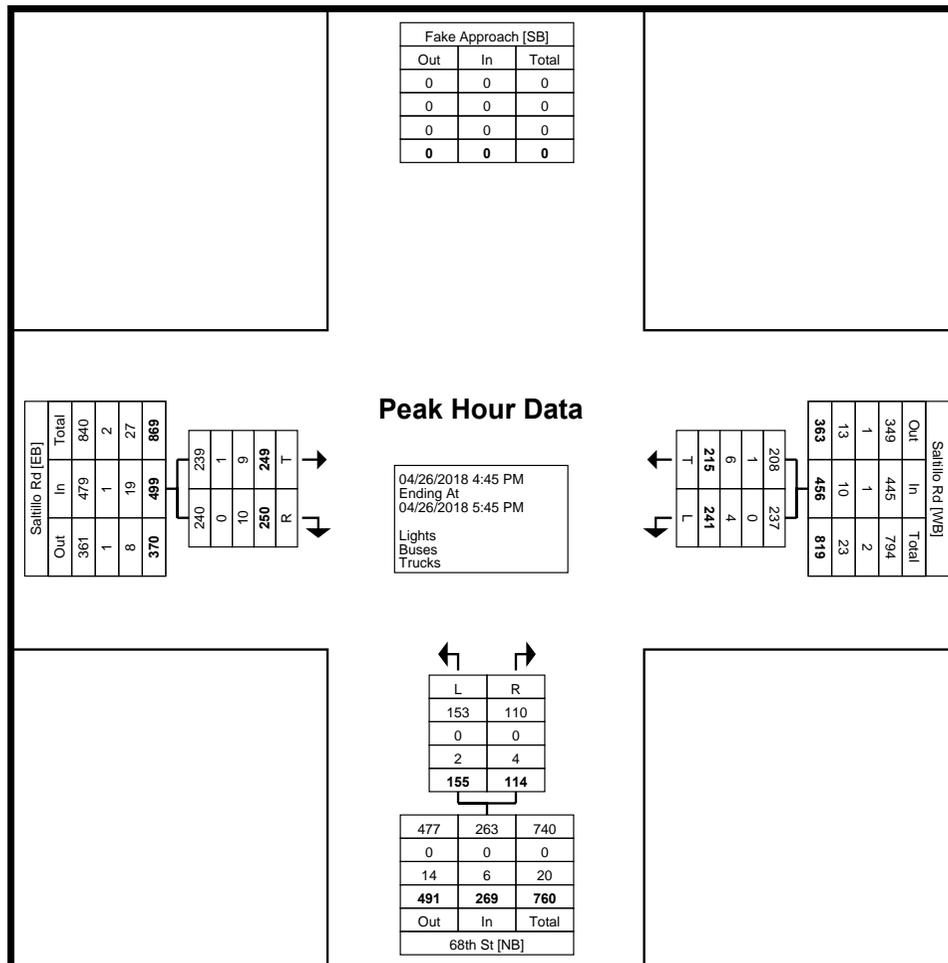
Start Time	Saltillo Rd Westbound			68th St Northbound			Saltillo Rd Eastbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	
4:45 PM	58	56	114	38	25	63	59	68	127	304
5:00 PM	54	55	109	38	30	68	55	62	117	294
5:15 PM	73	65	138	40	29	69	73	62	135	342
5:30 PM	56	39	95	39	30	69	62	58	120	284
Total	241	215	456	155	114	269	249	250	499	1224
Approach %	52.9	47.1	-	57.6	42.4	-	49.9	50.1	-	-
Total %	19.7	17.6	37.3	12.7	9.3	22.0	20.3	20.4	40.8	-
PHF	0.825	0.827	0.826	0.969	0.950	0.975	0.853	0.919	0.924	0.895
Lights	237	208	445	153	110	263	239	240	479	1187
% Lights	98.3	96.7	97.6	98.7	96.5	97.8	96.0	96.0	96.0	97.0
Buses	0	1	1	0	0	0	1	0	1	2
% Buses	0.0	0.5	0.2	0.0	0.0	0.0	0.4	0.0	0.2	0.2
Trucks	4	6	10	2	4	6	9	10	19	35
% Trucks	1.7	2.8	2.2	1.3	3.5	2.2	3.6	4.0	3.8	2.9



MNRG - Omaha  
1753 S. 107th St

Omaha, Nebraska, United States 68124  
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Count Name: 68th St & Saltillo Rd  
Site Code: 6801  
Start Date: 04/26/2018  
Page No: 8



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

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**CAPACITY ANALYSIS WORKSHEETS**

Intersection						
Int Delay, s/veh	15.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	262	111	130	199	193	241
Future Vol, veh/h	262	111	130	199	193	241
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	125	-	0	375
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	68	83	89	77	85
Heavy Vehicles, %	12	5	8	5	3	4
Mvmt Flow	291	163	157	224	251	284

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	454	0	829
Stage 1	-	-	-	-	291
Stage 2	-	-	-	-	538
Critical Hdwy	-	-	4.18	-	6.43
Critical Hdwy Stg 1	-	-	-	-	5.43
Critical Hdwy Stg 2	-	-	-	-	5.43
Follow-up Hdwy	-	-	2.272	-	3.527
Pot Cap-1 Maneuver	-	-	1076	-	339
Stage 1	-	-	-	-	756
Stage 2	-	-	-	-	583
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1076	-	290
Mov Cap-2 Maneuver	-	-	-	-	290
Stage 1	-	-	-	-	646
Stage 2	-	-	-	-	583

Approach	EB	WB	NB
HCM Control Delay, s	0	3.7	36.3
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	290	743	-	-	1076	-
HCM Lane V/C Ratio	0.864	0.382	-	-	0.146	-
HCM Control Delay (s)	62.8	12.8	-	-	8.9	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	7.5	1.8	-	-	0.5	-

Intersection												
Int Delay, s/veh	4.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Vol, veh/h	2	14	38	10	31	82	20	351	11	25	206	2
Future Vol, veh/h	2	14	38	10	31	82	20	351	11	25	206	2
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	100	-	-	80	-	-	100	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	58	63	42	78	73	83	85	55	78	82	50
Heavy Vehicles, %	0	0	8	10	10	5	10	3	0	12	4	50
Mvmt Flow	4	24	60	24	40	112	24	413	20	32	251	4

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	864	798	253	830	790	423	255	0	0	433	0	0
Stage 1	317	317	-	471	471	-	-	-	-	-	-	-
Stage 2	547	481	-	359	319	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.28	7.2	6.6	6.25	4.2	-	-	4.22	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.372	3.59	4.09	3.345	2.29	-	-	2.308	-	-
Pot Cap-1 Maneuver	277	321	771	280	313	624	1265	-	-	1075	-	-
Stage 1	698	658	-	558	546	-	-	-	-	-	-	-
Stage 2	525	557	-	643	639	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	197	306	771	234	298	624	1265	-	-	1075	-	-
Mov Cap-2 Maneuver	197	306	-	234	298	-	-	-	-	-	-	-
Stage 1	685	638	-	547	536	-	-	-	-	-	-	-
Stage 2	391	546	-	553	620	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	13.4		16.7		0.4		0.9	
HCM LOS	B		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1265	-	-	197	538	234	485	1075	-	-
HCM Lane V/C Ratio	0.019	-	-	0.02	0.157	0.102	0.314	0.03	-	-
HCM Control Delay (s)	7.9	-	-	23.7	12.9	22.1	15.8	8.5	-	-
HCM Lane LOS	A	-	-	C	B	C	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.6	0.3	1.3	0.1	-	-

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Vol, veh/h	5	1	8	67	3	35	0	232	17	14	413	2
Future Vol, veh/h	5	1	8	67	3	35	0	232	17	14	413	2
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	-	-	175	-	-	150	-	-	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	63	25	40	76	75	73	100	59	71	50	66	50
Heavy Vehicles, %	0	0	0	3	0	6	0	5	12	7	5	0
Mvmt Flow	8	4	20	88	4	48	0	393	24	28	626	4

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1115	1101	628	1101	1091	405	630	0	0	417	0	0
Stage 1	684	684	-	405	405	-	-	-	-	-	-	-
Stage 2	431	417	-	696	686	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.26	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.354	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	187	214	487	188	217	637	962	-	-	1116	-	-
Stage 1	442	452	-	620	602	-	-	-	-	-	-	-
Stage 2	607	595	-	430	451	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	167	209	487	174	212	637	962	-	-	1116	-	-
Mov Cap-2 Maneuver	167	209	-	174	212	-	-	-	-	-	-	-
Stage 1	442	441	-	620	602	-	-	-	-	-	-	-
Stage 2	558	595	-	398	440	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.8	33	0	0.4
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	962	-	-	167	399	174	552	1116	-	-
HCM Lane V/C Ratio	-	-	-	0.048	0.06	0.507	0.094	0.025	-	-
HCM Control Delay (s)	0	-	-	27.6	14.6	45.2	12.2	8.3	-	-
HCM Lane LOS	A	-	-	D	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	2.5	0.3	0.1	-	-

Intersection												
Int Delay, s/veh	18.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	42	2	41	7	8	6	31	183	2	0	395	103
Future Vol, veh/h	42	2	41	7	8	6	31	183	2	0	395	103
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	48	50	34	58	67	50	52	67	50	100	58	59
Heavy Vehicles, %	10	50	46	0	13	17	23	1	0	0	1	16
Mvmt Flow	88	4	121	12	12	12	60	273	4	0	681	175

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1176	1166	769	1226	1251	275	856	0	0	277	0	0
Stage 1	769	769	-	395	395	-	-	-	-	-	-	-
Stage 2	407	397	-	831	856	-	-	-	-	-	-	-
Critical Hdwy	7.2	7	6.66	7.1	6.63	6.37	4.33	-	-	4.1	-	-
Critical Hdwy Stg 1	6.2	6	-	6.1	5.63	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	6	-	6.1	5.63	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.45	3.714	3.5	4.117	3.453	2.407	-	-	2.2	-	-
Pot Cap-1 Maneuver	162	158	338	157	164	729	702	-	-	1298	-	-
Stage 1	382	348	-	634	586	-	-	-	-	-	-	-
Stage 2	605	528	-	367	360	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	138	142	338	91	147	729	702	-	-	1298	-	-
Mov Cap-2 Maneuver	138	142	-	91	147	-	-	-	-	-	-	-
Stage 1	343	348	-	570	527	-	-	-	-	-	-	-
Stage 2	523	475	-	233	360	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	116		34.9		1.9		0	
HCM LOS	F		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	702	-	-	208	156	1298	-	-
HCM Lane V/C Ratio	0.085	-	-	1.02	0.231	-	-	-
HCM Control Delay (s)	10.6	0	-	116	34.9	0	-	-
HCM Lane LOS	B	A	-	F	D	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	9.2	0.9	0	-	-

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	76	16	40	137	223	193
Future Vol, veh/h	76	16	40	137	223	193
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	175
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	54	80	71	74	49	69
Heavy Vehicles, %	0	0	0	8	9	1
Mvmt Flow	141	20	56	185	455	280

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	752	455	735	0	-	0
Stage 1	455	-	-	-	-	-
Stage 2	297	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	381	609	879	-	-	-
Stage 1	643	-	-	-	-	-
Stage 2	758	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	357	609	879	-	-	-
Mov Cap-2 Maneuver	357	-	-	-	-	-
Stage 1	602	-	-	-	-	-
Stage 2	758	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.5	2.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	879	-	376	-	-
HCM Lane V/C Ratio	0.064	-	0.428	-	-
HCM Control Delay (s)	9.4	-	21.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	2.1	-	-

Intersection						
Int Delay, s/veh	6.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	72	17	45	0	44	24
Future Vol, veh/h	72	17	45	0	44	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	56	61	66	83	55	86
Heavy Vehicles, %	3	29	2	3	2	4
Mvmt Flow	129	28	68	0	80	28

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	68	0	0	354	68
Stage 1	-	-	-	68	-
Stage 2	-	-	-	286	-
Critical Hdwy	4.13	-	-	6.42	6.24
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.227	-	-	3.518	3.336
Pot Cap-1 Maneuver	1527	-	-	644	990
Stage 1	-	-	-	955	-
Stage 2	-	-	-	763	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1527	-	-	589	990
Mov Cap-2 Maneuver	-	-	-	589	-
Stage 1	-	-	-	873	-
Stage 2	-	-	-	763	-

Approach	EB	WB	SB
HCM Control Delay, s	6.2	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1527	-	-	-	658
HCM Lane V/C Ratio	0.084	-	-	-	0.164
HCM Control Delay (s)	7.6	0	-	-	11.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.6

Intersection						
Int Delay, s/veh	17.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	249	250	241	215	155	114
Future Vol, veh/h	249	250	241	215	155	114
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	125	-	0	375
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	92	83	83	97	95
Heavy Vehicles, %	4	4	2	3	1	4
Mvmt Flow	293	272	290	259	160	120

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	565	0	1132
Stage 1	-	-	-	-	293
Stage 2	-	-	-	-	839
Critical Hdwy	-	-	4.12	-	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	-	-	5.41
Follow-up Hdwy	-	-	2.218	-	3.509
Pot Cap-1 Maneuver	-	-	1007	-	226
Stage 1	-	-	-	-	759
Stage 2	-	-	-	-	426
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1007	-	161
Mov Cap-2 Maneuver	-	-	-	-	161
Stage 1	-	-	-	-	540
Stage 2	-	-	-	-	426

Approach	EB	WB	NB
HCM Control Delay, s	0	5.3	76.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	161	742	-	-	1007	-
HCM Lane V/C Ratio	0.993	0.162	-	-	0.288	-
HCM Control Delay (s)	125.6	10.8	-	-	10	-
HCM Lane LOS	F	B	-	-	B	-
HCM 95th %tile Q(veh)	7.7	0.6	-	-	1.2	-

Intersection												
Int Delay, s/veh	4.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Vol, veh/h	6	27	29	5	19	39	32	250	13	63	358	3
Future Vol, veh/h	6	27	29	5	19	39	32	250	13	63	358	3
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	100	-	-	80	-	-	100	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	68	73	31	59	61	67	86	65	66	82	38
Heavy Vehicles, %	0	4	0	0	0	3	0	0	0	3	1	0
Mvmt Flow	12	40	40	16	32	64	48	291	20	95	437	8

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1076	1038	441	1068	1032	301	445	0	0	311	0	0
Stage 1	631	631	-	397	397	-	-	-	-	-	-	-
Stage 2	445	407	-	671	635	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.2	7.1	6.5	6.23	4.1	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.3	3.5	4	3.327	2.2	-	-	2.227	-	-
Pot Cap-1 Maneuver	199	229	621	201	235	736	1126	-	-	1244	-	-
Stage 1	472	471	-	633	607	-	-	-	-	-	-	-
Stage 2	596	594	-	449	476	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	146	202	621	146	208	736	1126	-	-	1244	-	-
Mov Cap-2 Maneuver	146	202	-	146	208	-	-	-	-	-	-	-
Stage 1	452	435	-	606	581	-	-	-	-	-	-	-
Stage 2	492	568	-	353	440	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	22.3		19.2		1.1		1.4	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1126	-	-	146	305	146	398	1244	-	-
HCM Lane V/C Ratio	0.042	-	-	0.082	0.26	0.11	0.242	0.077	-	-
HCM Control Delay (s)	8.3	-	-	31.9	20.9	32.7	16.9	8.1	-	-
HCM Lane LOS	A	-	-	D	C	D	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	1	0.4	0.9	0.2	-	-

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↷		↶	↷	
Traffic Vol, veh/h	2	3	4	15	2	17	2	350	40	16	230	4
Future Vol, veh/h	2	3	4	15	2	17	2	350	40	16	230	4
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	-	-	175	-	-	150	-	-	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	38	50	47	50	53	25	48	42	50	72	50
Heavy Vehicles, %	0	0	0	7	0	24	50	5	5	6	1	0
Mvmt Flow	4	8	8	32	4	32	8	729	95	32	319	8

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1198	1227	323	1188	1184	777	327	0	0	824	0	0
Stage 1	387	387	-	793	793	-	-	-	-	-	-	-
Stage 2	811	840	-	395	391	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.17	6.5	6.44	4.6	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.563	4	3.516	2.65	-	-	2.254	-	-
Pot Cap-1 Maneuver	164	180	723	161	191	364	1007	-	-	789	-	-
Stage 1	641	613	-	375	403	-	-	-	-	-	-	-
Stage 2	376	384	-	620	611	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	142	171	723	148	182	364	1007	-	-	789	-	-
Mov Cap-2 Maneuver	142	171	-	148	182	-	-	-	-	-	-	-
Stage 1	636	588	-	372	400	-	-	-	-	-	-	-
Stage 2	337	381	-	580	586	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	21.2		26		0.1		0.9	
HCM LOS	C		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1007	-	-	142	278	148	328	789	-	-
HCM Lane V/C Ratio	0.008	-	-	0.028	0.057	0.216	0.11	0.041	-	-
HCM Control Delay (s)	8.6	-	-	31.1	18.7	35.9	17.3	9.8	-	-
HCM Lane LOS	A	-	-	D	C	E	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0.8	0.4	0.1	-	-

Intersection												
Int Delay, s/veh	19.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	85	1	24	2	0	4	13	382	7	5	131	21
Future Vol, veh/h	85	1	24	2	0	4	13	382	7	5	131	21
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	46	25	43	25	100	50	33	60	58	63	73	38
Heavy Vehicles, %	19	0	17	0	0	0	23	1	0	0	2	10
Mvmt Flow	185	4	56	8	0	8	39	637	12	8	179	55

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	948	950	207	974	971	643	234	0	0	649	0	0
Stage 1	223	223	-	721	721	-	-	-	-	-	-	-
Stage 2	725	727	-	253	250	-	-	-	-	-	-	-
Critical Hdwy	7.29	6.5	6.37	7.1	6.5	6.2	4.33	-	-	4.1	-	-
Critical Hdwy Stg 1	6.29	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.29	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.671	4	3.453	3.5	4	3.3	2.407	-	-	2.2	-	-
Pot Cap-1 Maneuver	224	262	797	233	255	477	1219	-	-	947	-	-
Stage 1	743	723	-	422	435	-	-	-	-	-	-	-
Stage 2	391	432	-	756	704	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	210	247	797	204	240	477	1219	-	-	947	-	-
Mov Cap-2 Maneuver	210	247	-	204	240	-	-	-	-	-	-	-
Stage 1	706	716	-	401	413	-	-	-	-	-	-	-
Stage 2	365	410	-	692	697	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	90.8		18.3		0.5		0.3	
HCM LOS	F		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1219	-	-	253	286	947	-	-
HCM Lane V/C Ratio	0.032	-	-	0.967	0.056	0.008	-	-
HCM Control Delay (s)	8.1	0	-	90.8	18.3	8.8	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	9.1	0.2	0	-	-

Intersection						
Int Delay, s/veh	7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	121	24	10	233	134	69
Future Vol, veh/h	121	24	10	233	134	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	125	-	-	175
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	60	36	52	76	40
Heavy Vehicles, %	1	0	0	1	5	0
Mvmt Flow	242	40	28	448	176	173

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	680	176	349	0	-	0
Stage 1	176	-	-	-	-	-
Stage 2	504	-	-	-	-	-
Critical Hdwy	6.41	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	418	872	1221	-	-	-
Stage 1	857	-	-	-	-	-
Stage 2	609	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	408	872	1221	-	-	-
Mov Cap-2 Maneuver	408	-	-	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	609	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	26.5	0.5	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1221	-	441	-	-
HCM Lane V/C Ratio	0.023	-	0.639	-	-
HCM Control Delay (s)	8	-	26.5	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.1	-	4.4	-	-

Intersection						
Int Delay, s/veh	8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Vol, veh/h	17	29	24	0	135	52
Future Vol, veh/h	17	29	24	0	135	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	53	81	67	82	82	72
Heavy Vehicles, %	12	14	25	1	3	2
Mvmt Flow	32	36	36	0	165	72

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	36	0	-	0	136 36
Stage 1	-	-	-	-	36 -
Stage 2	-	-	-	-	100 -
Critical Hdwy	4.22	-	-	-	6.43 6.22
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.308	-	-	-	3.527 3.318
Pot Cap-1 Maneuver	1513	-	-	-	855 1037
Stage 1	-	-	-	-	984 -
Stage 2	-	-	-	-	921 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1513	-	-	-	836 1037
Mov Cap-2 Maneuver	-	-	-	-	836 -
Stage 1	-	-	-	-	962 -
Stage 2	-	-	-	-	921 -

Approach	EB	WB	SB
HCM Control Delay, s	3.5	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1513	-	-	-	889
HCM Lane V/C Ratio	0.021	-	-	-	0.266
HCM Control Delay (s)	7.4	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.1

HCM 6th Signalized Intersection Summary  
681: S 68th St & Saltillo Rd

2040 Future Conditions  
Timing Plan: AM PEAK

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	451	191	224	343	332	415
Future Volume (veh/h)	451	191	224	343	332	415
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1722	1826	1781	1826	1856	1841
Adj Flow Rate, veh/h	475	201	236	361	349	437
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	12	5	8	5	3	4
Cap, veh/h	522	950	271	983	549	733
Arrive On Green	0.30	0.30	0.16	0.54	0.31	0.31
Sat Flow, veh/h	1722	1547	1697	1826	1767	1560
Grp Volume(v), veh/h	475	201	236	361	349	437
Grp Sat Flow(s),veh/h/ln	1722	1547	1697	1826	1767	1560
Q Serve(g_s), s	15.8	3.4	8.1	6.8	10.1	12.3
Cycle Q Clear(g_c), s	15.8	3.4	8.1	6.8	10.1	12.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	522	950	271	983	549	733
V/C Ratio(X)	0.91	0.21	0.87	0.37	0.64	0.60
Avail Cap(c_a), veh/h	535	961	271	996	549	733
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	20.0	5.1	24.4	7.9	17.6	11.6
Incr Delay (d2), s/veh	19.3	0.1	25.2	0.2	5.5	3.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	1.8	4.6	1.7	4.1	3.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	39.3	5.2	49.7	8.1	23.2	15.2
LnGrp LOS	D	A	D	A	C	B
Approach Vol, veh/h	676			597	786	
Approach Delay, s/veh	29.2			24.6	18.7	
Approach LOS	C			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		23.0	14.0	22.6		36.6
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		18.5	9.5	18.5		32.5
Max Q Clear Time (g_c+I1), s		14.3	10.1	17.8		8.8
Green Ext Time (p_c), s		1.2	0.0	0.3		1.8
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			23.8			
HCM 6th LOS			C			

Intersection												
Int Delay, s/veh	4.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↵		↵	↵		↵	↑	↵	↵	↵	
Traffic Vol, veh/h	6	1	10	83	4	44	5	399	29	24	711	3
Future Vol, veh/h	6	1	10	83	4	44	5	399	29	24	711	3
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	-	-	175	-	-	150	-	150	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	3	0	6	0	5	12	7	5	0
Mvmt Flow	6	1	11	87	4	46	5	420	31	25	748	3

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1271	1261	750	1236	1231	420	751	0	0	451	0	0
Stage 1	800	800	-	430	430	-	-	-	-	-	-	-
Stage 2	471	461	-	806	801	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.26	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.354	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	146	172	415	152	179	625	868	-	-	1084	-	-
Stage 1	382	400	-	601	587	-	-	-	-	-	-	-
Stage 2	577	569	-	374	400	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	130	167	415	144	174	625	868	-	-	1084	-	-
Mov Cap-2 Maneuver	130	167	-	144	174	-	-	-	-	-	-	-
Stage 1	380	391	-	597	583	-	-	-	-	-	-	-
Stage 2	527	566	-	355	391	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB		
HCM Control Delay, s	21.9		44.4		0.1			0.3		
HCM LOS	C		E							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	868	-	-	130	366	144	514	1084	-	-
HCM Lane V/C Ratio	0.006	-	-	0.049	0.032	0.607	0.098	0.023	-	-
HCM Control Delay (s)	9.2	-	-	34.1	15.2	62.6	12.8	8.4	-	-
HCM Lane LOS	A	-	-	D	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	3.2	0.3	0.1	-	-

HCM 6th Signalized Intersection Summary  
684: S 68th St & Princeton Rd

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)	52	2	51	9	10	7	53	238	3	5	680	177
Future Volume (veh/h)	52	2	51	9	10	7	53	238	3	5	680	177
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	1159	1159	1159	1707	1707	1707	1559	1885	1885	1885	1885	1663
Adj Flow Rate, veh/h	55	2	54	9	11	7	56	251	3	5	716	186
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, %	50	50	50	13	13	13	23	1	1	1	1	16
Cap, veh/h	161	16	63	139	123	57	354	1262	15	76	1000	749
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.05	0.68	0.68	0.53	0.53	0.53
Sat Flow, veh/h	371	116	462	297	903	420	1485	1859	22	3	1881	1409
Grp Volume(v), veh/h	111	0	0	27	0	0	56	0	254	721	0	186
Grp Sat Flow(s),veh/h/ln	949	0	0	1620	0	0	1485	0	1881	1883	0	1409
Q Serve(g_s), s	4.3	0.0	0.0	0.0	0.0	0.0	0.7	0.0	2.4	0.0	0.0	3.5
Cycle Q Clear(g_c), s	5.5	0.0	0.0	0.7	0.0	0.0	0.7	0.0	2.4	14.1	0.0	3.5
Prop In Lane	0.50		0.49	0.33		0.26	1.00		0.01	0.01		1.00
Lane Grp Cap(c), veh/h	240	0	0	319	0	0	354	0	1277	1076	0	749
V/C Ratio(X)	0.46	0.00	0.00	0.08	0.00	0.00	0.16	0.00	0.20	0.67	0.00	0.25
Avail Cap(c_a), veh/h	456	0	0	659	0	0	425	0	1277	1076	0	749
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	0.00	1.00
Uniform Delay (d), s/veh	20.5	0.0	0.0	18.4	0.0	0.0	6.5	0.0	2.9	8.6	0.0	6.1
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.3	3.3	0.0	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/ln	1.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.2	3.7	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	0.0	0.0	18.6	0.0	0.0	6.7	0.0	3.2	12.0	0.0	6.9
LnGrp LOS	C	A	A	B	A	A	A	A	A	B	A	A
Approach Vol, veh/h		111			27			310				907
Approach Delay, s/veh		21.8			18.6			3.9				10.9
Approach LOS		C			B			A				B
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		37.5		11.1	7.2	30.3		11.1				
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		33.0		18.0	5.0	23.5		18.0				
Max Q Clear Time (g_c+I1), s		4.4		7.5	2.7	16.1		2.7				
Green Ext Time (p_c), s		1.2		0.3	0.0	2.9		0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				10.4								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary  
 685: S 68th St & Norris HS Drive

2040 Future Conditions  
 Timing Plan: AM PEAK



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	131	28	69	236	384	332
Future Volume (veh/h)	131	28	69	236	384	332
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1781	1767	1885
Adj Flow Rate, veh/h	138	29	73	248	404	349
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	8	9	1
Cap, veh/h	201	179	590	1223	1213	1274
Arrive On Green	0.11	0.11	0.69	0.69	0.69	0.69
Sat Flow, veh/h	1810	1610	721	1781	1767	1598
Grp Volume(v), veh/h	138	29	73	248	404	349
Grp Sat Flow(s),veh/h/ln	1810	1610	721	1781	1767	1598
Q Serve(g_s), s	3.3	0.7	2.0	2.3	4.1	2.5
Cycle Q Clear(g_c), s	3.3	0.7	6.2	2.3	4.1	2.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	201	179	590	1223	1213	1274
V/C Ratio(X)	0.69	0.16	0.12	0.20	0.33	0.27
Avail Cap(c_a), veh/h	835	743	590	1223	1213	1274
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	19.0	17.9	4.1	2.5	2.8	1.2
Incr Delay (d2), s/veh	4.1	0.4	0.4	0.4	0.7	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.3	0.2	0.1	0.2	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.1	18.3	4.5	2.9	3.6	1.7
LnGrp LOS	C	B	A	A	A	A
Approach Vol, veh/h	167			321	753	
Approach Delay, s/veh	22.3			3.3	2.7	
Approach LOS	C			A	A	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		35.0		9.4		35.0
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		30.5		20.5		30.5
Max Q Clear Time (g_c+I1), s		8.2		5.3		6.1
Green Ext Time (p_c), s		1.7		0.4		3.3
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			5.5			
HCM 6th LOS			A			

Intersection						
Int Delay, s/veh	6.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↶	↷		↶	
Traffic Vol, veh/h	124	29	77	0	76	41
Future Vol, veh/h	124	29	77	0	76	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	29	2	3	2	4
Mvmt Flow	131	31	81	0	80	43

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	81	0	-	0	374 81
Stage 1	-	-	-	-	81 -
Stage 2	-	-	-	-	293 -
Critical Hdwy	4.13	-	-	-	6.42 6.24
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.227	-	-	-	3.518 3.336
Pot Cap-1 Maneuver	1510	-	-	-	627 973
Stage 1	-	-	-	-	942 -
Stage 2	-	-	-	-	757 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1510	-	-	-	572 973
Mov Cap-2 Maneuver	-	-	-	-	572 -
Stage 1	-	-	-	-	859 -
Stage 2	-	-	-	-	757 -

Approach	EB	WB	SB
HCM Control Delay, s	6.2	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1510	-	-	-	669
HCM Lane V/C Ratio	0.086	-	-	-	0.184
HCM Control Delay (s)	7.6	0	-	-	11.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.7

HCM 6th Signalized Intersection Summary  
681: S 68th St & Saltillo Rd

2040 Future Conditions  
Timing Plan: PM PEAK



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↖	↗
Traffic Volume (veh/h)	429	430	415	370	267	196
Future Volume (veh/h)	429	430	415	370	267	196
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1870	1856	1885	1841
Adj Flow Rate, veh/h	452	453	437	389	281	206
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	2	3	1	4
Cap, veh/h	525	927	468	998	554	756
Arrive On Green	0.29	0.29	0.18	0.54	0.31	0.31
Sat Flow, veh/h	1841	1560	1781	1856	1795	1560
Grp Volume(v), veh/h	452	453	437	389	281	206
Grp Sat Flow(s),veh/h/ln	1841	1560	1781	1856	1795	1560
Q Serve(g_s), s	13.6	9.7	9.6	7.2	7.5	4.6
Cycle Q Clear(g_c), s	13.6	9.7	9.6	7.2	7.5	4.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	525	927	468	998	554	756
V/C Ratio(X)	0.86	0.49	0.93	0.39	0.51	0.27
Avail Cap(c_a), veh/h	568	963	468	1042	554	756
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	19.9	6.8	12.8	7.9	16.6	9.0
Incr Delay (d2), s/veh	12.1	0.4	25.9	0.2	3.3	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	5.0	5.8	1.8	2.9	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.0	7.2	38.7	8.2	19.9	9.9
LnGrp LOS	C	A	D	A	B	A
Approach Vol, veh/h	905			826	487	
Approach Delay, s/veh	19.6			24.3	15.6	
Approach LOS	B			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		22.6	14.8	21.2		36.0
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		18.1	10.3	18.1		32.9
Max Q Clear Time (g_c+I1), s		9.5	11.6	15.6		9.2
Green Ext Time (p_c), s		1.0	0.0	1.1		2.0
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			20.5			
HCM 6th LOS			C			

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↶	↶	↶	↷	↷
Traffic Vol, veh/h	2	4	5	19	2	21	3	603	69	28	396	7
Future Vol, veh/h	2	4	5	19	2	21	3	603	69	28	396	7
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	-	-	175	-	-	150	-	150	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	7	0	24	50	5	5	6	1	0
Mvmt Flow	2	4	5	20	2	22	3	635	73	29	417	7

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1169	1193	421	1124	1123	635	424	0	0	708	0	0
Stage 1	479	479	-	641	641	-	-	-	-	-	-	-
Stage 2	690	714	-	483	482	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.17	6.5	6.44	4.6	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.563	4	3.516	2.65	-	-	2.254	-	-
Pot Cap-1 Maneuver	172	188	637	179	207	441	920	-	-	872	-	-
Stage 1	571	558	-	455	473	-	-	-	-	-	-	-
Stage 2	439	438	-	555	557	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	158	181	637	170	200	441	920	-	-	872	-	-
Mov Cap-2 Maneuver	158	181	-	170	200	-	-	-	-	-	-	-
Stage 1	569	540	-	454	472	-	-	-	-	-	-	-
Stage 2	414	437	-	528	539	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.3	21.1	0	0.6
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	920	-	-	158	301	170	399	872	-	-
HCM Lane V/C Ratio	0.003	-	-	0.013	0.031	0.118	0.061	0.034	-	-
HCM Control Delay (s)	8.9	-	-	28.1	17.3	29	14.6	9.3	-	-
HCM Lane LOS	A	-	-	D	C	D	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0.4	0.2	0.1	-	-

HCM 6th Signalized Intersection Summary  
684: S 68th St & Princeton Rd

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)	106	1	30	2	5	5	22	658	12	9	226	36
Future Volume (veh/h)	106	1	30	2	5	5	22	658	12	9	226	36
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	1559	1885	1885	1870	1870	1752
Adj Flow Rate, veh/h	112	1	32	2	5	5	23	693	13	9	238	38
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	23	1	1	2	2	10
Cap, veh/h	278	2	42	103	115	93	649	1265	24	87	1034	839
Arrive On Green	0.13	0.13	0.13	0.13	0.13	0.13	0.03	0.69	0.69	0.56	0.56	0.56
Sat Flow, veh/h	1142	14	327	120	907	734	1485	1844	35	16	1830	1485
Grp Volume(v), veh/h	145	0	0	12	0	0	23	0	706	247	0	38
Grp Sat Flow(s),veh/h/ln	1483	0	0	1761	0	0	1485	0	1879	1846	0	1485
Q Serve(g_s), s	4.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	9.1	0.0	0.0	0.5
Cycle Q Clear(g_c), s	4.5	0.0	0.0	0.3	0.0	0.0	0.3	0.0	9.1	3.2	0.0	0.5
Prop In Lane	0.77		0.22	0.17		0.42	1.00		0.02	0.04		1.00
Lane Grp Cap(c), veh/h	321	0	0	311	0	0	649	0	1289	1120	0	839
V/C Ratio(X)	0.45	0.00	0.00	0.04	0.00	0.00	0.04	0.00	0.55	0.22	0.00	0.05
Avail Cap(c_a), veh/h	684	0	0	725	0	0	763	0	1289	1120	0	839
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	0.00	1.00
Uniform Delay (d), s/veh	20.3	0.0	0.0	18.5	0.0	0.0	3.6	0.0	3.8	5.2	0.0	4.7
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.7	0.5	0.0	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	1.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.8	0.7	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.3	0.0	0.0	18.5	0.0	0.0	3.6	0.0	5.5	5.7	0.0	4.8
LnGrp LOS	C	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		145			12			729				285
Approach Delay, s/veh		21.3			18.5			5.4				5.6
Approach LOS		C			B			A				A
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		37.5		10.6	5.8	31.7		10.6				
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		33.0		18.0	5.0	23.5		18.0				
Max Q Clear Time (g_c+I1), s		11.1		6.5	2.3	5.2		2.3				
Green Ext Time (p_c), s		4.2		0.4	0.0	1.2		0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				7.6								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary  
685: S 68th St & Norris HS Drive

2040 Future Conditions  
Timing Plan: PM PEAK



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	208	41	17	401	231	119
Future Volume (veh/h)	208	41	17	401	231	119
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1885	1826	1900
Adj Flow Rate, veh/h	219	43	18	422	243	125
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	0	0	1	5	0
Cap, veh/h	300	269	756	1203	1165	1297
Arrive On Green	0.17	0.17	0.64	0.64	0.64	0.64
Sat Flow, veh/h	1795	1610	1030	1885	1826	1610
Grp Volume(v), veh/h	219	43	18	422	243	125
Grp Sat Flow(s),veh/h/ln	1795	1610	1030	1885	1826	1610
Q Serve(g_s), s	5.3	1.1	0.3	4.8	2.6	0.8
Cycle Q Clear(g_c), s	5.3	1.1	2.9	4.8	2.6	0.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	300	269	756	1203	1165	1297
V/C Ratio(X)	0.73	0.16	0.02	0.35	0.21	0.10
Avail Cap(c_a), veh/h	835	749	756	1203	1165	1297
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	18.3	16.5	4.1	3.9	3.5	0.9
Incr Delay (d2), s/veh	3.4	0.3	0.1	0.8	0.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.4	0.0	0.6	0.3	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	21.7	16.7	4.2	4.7	3.9	1.1
LnGrp LOS	C	B	A	A	A	A
Approach Vol, veh/h	262			440	368	
Approach Delay, s/veh	20.8			4.7	2.9	
Approach LOS	C			A	A	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		34.0		12.2		34.0
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		29.5		21.5		29.5
Max Q Clear Time (g_c+I1), s		6.8		7.3		4.6
Green Ext Time (p_c), s		2.2		0.7		1.5
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			8.0			
HCM 6th LOS			A			

Intersection						
Int Delay, s/veh	9.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	29	50	41	0	232	90
Future Vol, veh/h	29	50	41	0	232	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	12	14	25	1	3	2
Mvmt Flow	31	53	43	0	244	95

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	43	0	-	0	158 43
Stage 1	-	-	-	-	43 -
Stage 2	-	-	-	-	115 -
Critical Hdwy	4.22	-	-	-	6.43 6.22
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.308	-	-	-	3.527 3.318
Pot Cap-1 Maneuver	1504	-	-	-	831 1027
Stage 1	-	-	-	-	977 -
Stage 2	-	-	-	-	907 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1504	-	-	-	814 1027
Mov Cap-2 Maneuver	-	-	-	-	814 -
Stage 1	-	-	-	-	956 -
Stage 2	-	-	-	-	907 -

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1504	-	-	-	864
HCM Lane V/C Ratio	0.02	-	-	-	0.392
HCM Control Delay (s)	7.4	0	-	-	11.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.9

HCM 6th Signalized Intersection Summary  
681: S 68th St & Saltillo Rd

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	451	191	224	343	332	415
Future Volume (veh/h)	451	191	224	343	332	415
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1722	1826	1781	1826	1856	1841
Adj Flow Rate, veh/h	501	281	270	385	431	488
Peak Hour Factor	0.90	0.68	0.83	0.89	0.77	0.85
Percent Heavy Veh, %	12	5	8	5	3	4
Cap, veh/h	689	619	261	730	707	624
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1722	1547	658	1826	1767	1560
Grp Volume(v), veh/h	501	281	270	385	431	488
Grp Sat Flow(s),veh/h/ln	1722	1547	658	1826	1767	1560
Q Serve(g_s), s	11.1	6.0	6.9	7.2	8.7	12.3
Cycle Q Clear(g_c), s	11.1	6.0	18.0	7.2	8.7	12.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	689	619	261	730	707	624
V/C Ratio(X)	0.73	0.45	1.03	0.53	0.61	0.78
Avail Cap(c_a), veh/h	689	619	261	730	707	624
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	11.4	9.9	21.2	10.3	10.7	11.8
Incr Delay (d2), s/veh	3.9	0.5	64.6	0.7	3.9	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	1.3	6.9	1.8	2.8	4.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.3	10.4	85.8	11.0	14.6	21.2
LnGrp LOS	B	B	F	B	B	C
Approach Vol, veh/h	782			655	919	
Approach Delay, s/veh	13.5			41.8	18.1	
Approach LOS	B			D	B	
Timer - Assigned Phs		2		4		8
Phs Duration (G+Y+Rc), s		22.5		22.5		22.5
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		18.0		18.0		18.0
Max Q Clear Time (g_c+I1), s		14.3		13.1		20.0
Green Ext Time (p_c), s		1.3		1.7		0.0
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			23.2			
HCM 6th LOS			C			

HCM 6th Signalized Intersection Summary  
682: S 68th St & Roca Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	17	47	12	39	102	34	604	19	43	355	3
Future Volume (veh/h)	2	17	47	12	39	102	34	604	19	43	355	3
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	1900	1900	1752	1752	1752	1752	1856	1900	1722	1841	1841
Adj Flow Rate, veh/h	4	29	75	29	50	140	41	711	35	55	433	6
Peak Hour Factor	0.50	0.58	0.63	0.42	0.78	0.73	0.83	0.85	0.55	0.78	0.82	0.50
Percent Heavy Veh, %	0	0	0	10	10	10	10	3	0	12	4	4
Cap, veh/h	306	88	228	379	76	214	570	1005	872	386	981	14
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.54	0.54	0.54	0.54	0.54	0.54
Sat Flow, veh/h	1212	469	1213	1208	407	1140	890	1856	1610	658	1811	25
Grp Volume(v), veh/h	4	0	104	29	0	190	41	711	35	55	0	439
Grp Sat Flow(s),veh/h/ln	1212	0	1682	1208	0	1547	890	1856	1610	658	0	1836
Q Serve(g_s), s	0.1	0.0	1.8	0.7	0.0	3.8	1.0	9.5	0.3	2.3	0.0	4.8
Cycle Q Clear(g_c), s	3.9	0.0	1.8	2.5	0.0	3.8	5.8	9.5	0.3	11.7	0.0	4.8
Prop In Lane	1.00		0.72	1.00		0.74	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	306	0	316	379	0	290	570	1005	872	386	0	994
V/C Ratio(X)	0.01	0.00	0.33	0.08	0.00	0.65	0.07	0.71	0.04	0.14	0.00	0.44
Avail Cap(c_a), veh/h	735	0	911	806	0	838	570	1005	872	386	0	994
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	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.3	0.0	11.7	12.8	0.0	12.5	6.3	5.7	3.6	10.0	0.0	4.6
Incr Delay (d2), s/veh	0.0	0.0	0.6	0.1	0.0	2.5	0.2	4.2	0.1	0.8	0.0	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	0.0	0.0	0.4	0.1	0.0	1.0	0.1	1.4	0.0	0.3	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.3	0.0	12.3	12.9	0.0	15.0	6.6	9.9	3.7	10.8	0.0	6.0
LnGrp LOS	B	A	B	B	A	B	A	A	A	B	A	A
Approach Vol, veh/h		108			219			787			494	
Approach Delay, s/veh		12.4			14.7			9.4			6.5	
Approach LOS		B			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		11.5		5.9		13.7		5.8				
Green Ext Time (p_c), s		2.5		0.3		1.1		0.8				

Intersection Summary

HCM 6th Ctrl Delay	9.5
HCM 6th LOS	A

Intersection												
Int Delay, s/veh	47.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↑	↗	↖	↗	
Traffic Vol, veh/h	6	1	10	83	4	44	5	399	29	24	711	3
Future Vol, veh/h	6	1	10	83	4	44	5	399	29	24	711	3
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	-	-	175	-	-	150	-	150	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	63	25	40	76	75	73	100	59	71	50	66	50
Heavy Vehicles, %	0	0	0	3	0	6	0	5	12	7	5	0
Mvmt Flow	10	4	25	109	5	60	5	676	41	48	1077	6

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1915	1903	1080	1877	1865	676	1083	0	0	717	0	0
Stage 1	1176	1176	-	686	686	-	-	-	-	-	-	-
Stage 2	739	727	-	1191	1179	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.13	6.5	6.26	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.13	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.527	4	3.354	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	52	70	268	~ 54	74	447	652	-	-	861	-	-
Stage 1	235	267	-	436	451	-	-	-	-	-	-	-
Stage 2	412	432	-	228	267	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	40	66	268	~ 44	69	447	652	-	-	861	-	-
Mov Cap-2 Maneuver	40	66	-	~ 44	69	-	-	-	-	-	-	-
Stage 1	233	252	-	433	447	-	-	-	-	-	-	-
Stage 2	349	429	-	192	252	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	50.7	\$ 551.2	0.1	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	652	-	-	40	188	44	309	861	-	-
HCM Lane V/C Ratio	0.008	-	-	0.238	0.154	2.482	0.212	0.056	-	-
HCM Control Delay (s)	10.6	-	-	121.1	27.6	\$ 870.4	19.8	9.4	-	-
HCM Lane LOS	B	-	-	F	D	F	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.8	0.5	11.7	0.8	0.2	-	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

HCM 6th Signalized Intersection Summary  
684: S 68th St & Princeton Rd

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)	52	2	51	9	10	7	53	238	3	5	680	177
Future Volume (veh/h)	52	2	51	9	10	7	53	238	3	5	680	177
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	1159	1159	1159	1707	1707	1707	1559	1885	1885	1885	1885	1663
Adj Flow Rate, veh/h	108	4	150	16	15	14	102	355	6	5	1172	300
Peak Hour Factor	0.48	0.50	0.34	0.58	0.67	0.50	0.52	0.67	0.50	1.00	0.58	0.59
Percent Heavy Veh, %	50	50	50	13	13	13	23	1	1	1	1	16
Cap, veh/h	222	35	171	239	204	144	183	846	14	93	861	645
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.46	0.46	0.46	0.46	0.46	0.46
Sat Flow, veh/h	297	111	547	367	650	459	300	1848	31	2	1882	1409
Grp Volume(v), veh/h	262	0	0	45	0	0	102	0	361	1177	0	300
Grp Sat Flow(s),veh/h/ln	955	0	0	1476	0	0	300	0	1880	1884	0	1409
Q Serve(g_s), s	7.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	3.9	0.0	5.8
Cycle Q Clear(g_c), s	10.1	0.0	0.0	0.8	0.0	0.0	18.0	0.0	5.1	18.0	0.0	5.8
Prop In Lane	0.41		0.57	0.36		0.31	1.00		0.02	0.00		1.00
Lane Grp Cap(c), veh/h	429	0	0	587	0	0	183	0	860	954	0	645
V/C Ratio(X)	0.61	0.00	0.00	0.08	0.00	0.00	0.56	0.00	0.42	1.23	0.00	0.47
Avail Cap(c_a), veh/h	562	0	0	785	0	0	183	0	860	954	0	645
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	0.00	1.00
Uniform Delay (d), s/veh	12.6	0.0	0.0	9.5	0.0	0.0	19.7	0.0	7.2	11.5	0.0	7.4
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.1	0.0	0.0	11.7	0.0	1.5	114.4	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	1.4	0.0	0.0	0.2	0.0	0.0	1.3	0.0	1.2	34.0	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.0	0.0	0.0	9.6	0.0	0.0	31.4	0.0	8.7	125.9	0.0	9.8
LnGrp LOS	B	A	A	A	A	A	C	A	A	F	A	A
Approach Vol, veh/h		262			45			463				1477
Approach Delay, s/veh		14.0			9.6			13.7				102.3
Approach LOS		B			A			B				F
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		16.8		22.5		16.8				
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		12.1		20.0		2.8				
Green Ext Time (p_c), s		0.0		0.7		0.0		0.1				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				71.9								
HCM 6th LOS				E								

HCM 6th Signalized Intersection Summary  
685: S 68th St & Norris HS Drive



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	131	28	69	236	384	332
Future Volume (veh/h)	131	28	69	236	384	332
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1781	1767	1885
Adj Flow Rate, veh/h	243	35	97	319	784	481
Peak Hour Factor	0.54	0.80	0.71	0.74	0.49	0.69
Percent Heavy Veh, %	0	0	0	8	9	1
Cap, veh/h	343	305	293	962	954	863
Arrive On Green	0.19	0.19	0.54	0.54	0.54	0.54
Sat Flow, veh/h	1810	1610	445	1781	1767	1598
Grp Volume(v), veh/h	243	35	97	319	784	481
Grp Sat Flow(s),veh/h/ln	1810	1610	445	1781	1767	1598
Q Serve(g_s), s	4.2	0.6	5.8	3.3	12.2	6.6
Cycle Q Clear(g_c), s	4.2	0.6	18.0	3.3	12.2	6.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	343	305	293	962	954	863
V/C Ratio(X)	0.71	0.11	0.33	0.33	0.82	0.56
Avail Cap(c_a), veh/h	978	870	293	962	954	863
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	12.6	11.2	14.4	4.3	6.3	5.0
Incr Delay (d2), s/veh	2.7	0.2	3.0	0.9	7.9	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.2	0.7	0.3	2.4	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.3	11.3	17.4	5.2	14.2	7.6
LnGrp LOS	B	B	B	A	B	A
Approach Vol, veh/h	278			416	1265	
Approach Delay, s/veh	14.8			8.0	11.7	
Approach LOS	B			A	B	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		22.5		10.8		22.5
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		18.0		18.0		18.0
Max Q Clear Time (g_c+I1), s		20.0		6.2		14.2
Green Ext Time (p_c), s		0.0		0.7		2.2
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			11.4			
HCM 6th LOS			B			

Intersection						
Int Delay, s/veh	9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	124	29	77	0	76	41
Future Vol, veh/h	124	29	77	0	76	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	56	61	66	83	55	86
Heavy Vehicles, %	3	29	2	3	2	4
Mvmt Flow	221	48	117	0	138	48

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	117	0	-	0	607 117
Stage 1	-	-	-	-	117 -
Stage 2	-	-	-	-	490 -
Critical Hdwy	4.13	-	-	-	6.42 6.24
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.227	-	-	-	3.518 3.336
Pot Cap-1 Maneuver	1465	-	-	-	460 930
Stage 1	-	-	-	-	908 -
Stage 2	-	-	-	-	616 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1465	-	-	-	389 930
Mov Cap-2 Maneuver	-	-	-	-	389 -
Stage 1	-	-	-	-	767 -
Stage 2	-	-	-	-	616 -

Approach	EB	WB	SB
HCM Control Delay, s	6.5	0	18.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1465	-	-	-	457
HCM Lane V/C Ratio	0.151	-	-	-	0.407
HCM Control Delay (s)	7.9	0	-	-	18.2
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	1.9

HCM 6th Signalized Intersection Summary  
681: S 68th St & Saltillo Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↖	↗
Traffic Volume (veh/h)	429	430	415	370	267	196
Future Volume (veh/h)	429	430	415	370	267	196
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1870	1856	1885	1841
Adj Flow Rate, veh/h	505	467	500	446	275	206
Peak Hour Factor	0.85	0.92	0.83	0.83	0.97	0.95
Percent Heavy Veh, %	4	4	2	3	1	4
Cap, veh/h	736	624	260	742	718	624
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1841	1560	578	1856	1795	1560
Grp Volume(v), veh/h	505	467	500	446	275	206
Grp Sat Flow(s),veh/h/ln	1841	1560	578	1856	1795	1560
Q Serve(g_s), s	10.2	11.5	7.8	8.5	4.9	4.1
Cycle Q Clear(g_c), s	10.2	11.5	18.0	8.5	4.9	4.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	736	624	260	742	718	624
V/C Ratio(X)	0.69	0.75	1.92	0.60	0.38	0.33
Avail Cap(c_a), veh/h	736	624	260	742	718	624
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	11.2	11.6	21.0	10.7	9.6	9.3
Incr Delay (d2), s/veh	2.7	5.0	428.8	1.4	1.5	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	3.2	33.2	2.3	1.4	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.8	16.5	449.8	12.0	11.1	10.7
LnGrp LOS	B	B	F	B	B	B
Approach Vol, veh/h	972			946	481	
Approach Delay, s/veh	15.1			243.4	11.0	
Approach LOS	B			F	B	
Timer - Assigned Phs		2		4		8
Phs Duration (G+Y+Rc), s		22.5		22.5		22.5
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		18.0		18.0		18.0
Max Q Clear Time (g_c+I1), s		6.9		13.5		20.0
Green Ext Time (p_c), s		1.1		1.9		0.0
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			104.3			
HCM 6th LOS			F			

HCM 6th Signalized Intersection Summary  
682: S 68th St & Roca Rd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	34	36	6	24	49	55	430	22	108	616	5
Future Volume (veh/h)	7	34	36	6	24	49	55	430	22	108	616	5
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	1841	1841	1900	1900	1900	1900	1900	1900	1856	1885	1885
Adj Flow Rate, veh/h	14	50	49	19	41	80	82	500	34	164	751	13
Peak Hour Factor	0.50	0.68	0.73	0.31	0.59	0.61	0.67	0.86	0.65	0.66	0.82	0.38
Percent Heavy Veh, %	0	4	4	0	0	0	0	0	0	3	1	1
Cap, veh/h	327	121	118	345	81	159	428	1087	922	591	1057	18
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	1291	854	837	1317	575	1123	714	1900	1610	863	1847	32
Grp Volume(v), veh/h	14	0	99	19	0	121	82	500	34	164	0	764
Grp Sat Flow(s),veh/h/ln	1291	0	1690	1317	0	1698	714	1900	1610	863	0	1879
Q Serve(g_s), s	0.3	0.0	1.7	0.4	0.0	2.1	2.9	4.8	0.3	4.3	0.0	9.2
Cycle Q Clear(g_c), s	2.4	0.0	1.7	2.1	0.0	2.1	12.2	4.8	0.3	9.1	0.0	9.2
Prop In Lane	1.00		0.49	1.00		0.66	1.00		1.00	1.00		0.02
Lane Grp Cap(c), veh/h	327	0	239	345	0	240	428	1087	922	591	0	1076
V/C Ratio(X)	0.04	0.00	0.41	0.06	0.00	0.50	0.19	0.46	0.04	0.28	0.00	0.71
Avail Cap(c_a), veh/h	883	0	967	912	0	972	428	1087	922	591	0	1076
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	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.6	0.0	12.3	13.3	0.0	12.5	9.2	3.9	2.9	6.5	0.0	4.8
Incr Delay (d2), s/veh	0.1	0.0	1.1	0.1	0.0	1.6	1.0	1.4	0.1	1.2	0.0	4.0
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	0.1	0.0	0.4	0.1	0.0	0.6	0.3	0.4	0.0	0.4	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.6	0.0	13.5	13.3	0.0	14.1	10.2	5.3	3.0	7.7	0.0	8.8
LnGrp LOS	B	A	B	B	A	B	B	A	A	A	A	A
Approach Vol, veh/h		113			140			616			928	
Approach Delay, s/veh		13.5			14.0			5.8			8.6	
Approach LOS		B			B			A			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		14.2		4.4		11.2		4.1				
Green Ext Time (p_c), s		1.2		0.3		3.0		0.5				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				8.4								
HCM 6th LOS				A								

Intersection												
Int Delay, s/veh	9.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↑	↗	↖	↗	
Traffic Vol, veh/h	2	4	5	19	2	21	3	603	69	28	396	7
Future Vol, veh/h	2	4	5	19	2	21	3	603	69	28	396	7
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	-	-	175	-	-	150	-	150	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	38	50	47	50	53	25	48	42	50	72	50
Heavy Vehicles, %	0	0	0	7	0	24	50	5	5	6	1	0
Mvmt Flow	4	11	10	40	4	40	12	1256	164	56	550	14

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	2053	2113	557	1960	1956	1256	564	0	0	1420	0	0
Stage 1	669	669	-	1280	1280	-	-	-	-	-	-	-
Stage 2	1384	1444	-	680	676	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.17	6.5	6.44	4.6	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.17	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.563	4	3.516	2.65	-	-	2.254	-	-
Pot Cap-1 Maneuver	41	51	534	46	65	188	807	-	-	467	-	-
Stage 1	450	459	-	199	239	-	-	-	-	-	-	-
Stage 2	179	199	-	433	456	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	28	44	534	~ 33	56	188	807	-	-	467	-	-
Mov Cap-2 Maneuver	28	44	-	~ 33	56	-	-	-	-	-	-	-
Stage 1	443	404	-	196	235	-	-	-	-	-	-	-
Stage 2	137	196	-	364	401	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	79.4	218.9	0.1	1.2
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	807	-	-	28	80	33	155	467	-	-
HCM Lane V/C Ratio	0.015	-	-	0.143	0.257	1.225	0.281	0.12	-	-
HCM Control Delay (s)	9.5	-	-	153.9	64.9	415.1	37.1	13.8	-	-
HCM Lane LOS	A	-	-	F	F	F	E	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.9	4.4	1.1	0.4	-	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

HCM 6th Signalized Intersection Summary  
684: S 68th St & Princeton Rd

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)	106	1	30	2	5	5	22	658	12	9	226	36
Future Volume (veh/h)	106	1	30	2	5	5	22	658	12	9	226	36
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	1559	1885	1885	1870	1870	1752
Adj Flow Rate, veh/h	230	4	70	8	5	10	67	1097	21	14	310	95
Peak Hour Factor	0.46	0.25	0.43	0.25	1.00	0.50	0.33	0.60	0.58	0.63	0.73	0.38
Percent Heavy Veh, %	0	0	0	0	0	0	23	1	1	2	2	10
Cap, veh/h	458	13	89	237	154	199	197	907	17	103	638	730
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	1088	50	340	398	588	759	817	1844	35	0	1296	1485
Grp Volume(v), veh/h	304	0	0	23	0	0	67	0	1118	324	0	95
Grp Sat Flow(s),veh/h/ln	1479	0	0	1746	0	0	817	0	1879	1296	0	1485
Q Serve(g_s), s	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	1.3
Cycle Q Clear(g_c), s	7.0	0.0	0.0	0.4	0.0	0.0	18.0	0.0	18.0	18.0	0.0	1.3
Prop In Lane	0.76		0.23	0.35		0.43	1.00		0.02	0.04		1.00
Lane Grp Cap(c), veh/h	560	0	0	590	0	0	197	0	924	740	0	730
V/C Ratio(X)	0.54	0.00	0.00	0.04	0.00	0.00	0.34	0.00	1.21	0.44	0.00	0.13
Avail Cap(c_a), veh/h	897	0	0	948	0	0	197	0	924	740	0	730
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	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.5	0.0	0.0	10.1	0.0	0.0	18.3	0.0	9.3	6.1	0.0	5.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.0	0.0	0.0	4.6	0.0	104.4	1.9	0.0	0.4
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	1.5	0.0	0.0	0.1	0.0	0.0	0.7	0.0	28.9	0.8	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.3	0.0	0.0	10.1	0.0	0.0	22.9	0.0	113.7	8.0	0.0	5.4
LnGrp LOS	B	A	A	B	A	A	C	A	F	A	A	A
Approach Vol, veh/h		304			23			1185				419
Approach Delay, s/veh		13.3			10.1			108.6				7.4
Approach LOS		B			B			F				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		14.1		22.5		14.1				
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		9.0		20.0		2.4				
Green Ext Time (p_c), s		0.0		1.0		0.0		0.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				70.5								
HCM 6th LOS				E								

HCM 6th Signalized Intersection Summary  
685: S 68th St & Norris HS Drive



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	208	41	17	401	231	119
Future Volume (veh/h)	208	41	17	401	231	119
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1885	1900	1900	1885	1826	1900
Adj Flow Rate, veh/h	416	68	47	771	304	298
Peak Hour Factor	0.50	0.60	0.36	0.52	0.76	0.40
Percent Heavy Veh, %	1	0	0	1	5	0
Cap, veh/h	525	470	493	890	862	760
Arrive On Green	0.29	0.29	0.47	0.47	0.47	0.47
Sat Flow, veh/h	1795	1610	830	1885	1826	1610
Grp Volume(v), veh/h	416	68	47	771	304	298
Grp Sat Flow(s),veh/h/ln	1795	1610	830	1885	1826	1610
Q Serve(g_s), s	8.1	1.2	1.5	13.9	4.0	4.6
Cycle Q Clear(g_c), s	8.1	1.2	5.5	13.9	4.0	4.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	525	470	493	890	862	760
V/C Ratio(X)	0.79	0.14	0.10	0.87	0.35	0.39
Avail Cap(c_a), veh/h	847	760	493	890	862	760
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	12.4	10.0	8.1	9.0	6.4	6.5
Incr Delay (d2), s/veh	2.8	0.1	0.4	11.1	1.1	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.4	0.2	4.8	0.8	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.2	10.1	8.5	20.1	7.5	8.0
LnGrp LOS	B	B	A	C	A	A
Approach Vol, veh/h	484			818	602	
Approach Delay, s/veh	14.5			19.4	7.8	
Approach LOS	B			B	A	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		22.5		15.6		22.5
Change Period (Y+Rc), s		4.5		4.5		4.5
Max Green Setting (Gmax), s		18.0		18.0		18.0
Max Q Clear Time (g_c+l1), s		15.9		10.1		6.6
Green Ext Time (p_c), s		1.0		1.1		2.0
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			14.5			
HCM 6th LOS			B			

Intersection						
Int Delay, s/veh	10.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	29	50	41	0	232	90
Future Vol, veh/h	29	50	41	0	232	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	53	81	67	82	82	72
Heavy Vehicles, %	12	14	25	1	3	2
Mvmt Flow	55	62	61	0	283	125

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	61	0	-	0	233 61
Stage 1	-	-	-	-	61 -
Stage 2	-	-	-	-	172 -
Critical Hdwy	4.22	-	-	-	6.43 6.22
Critical Hdwy Stg 1	-	-	-	-	5.43 -
Critical Hdwy Stg 2	-	-	-	-	5.43 -
Follow-up Hdwy	2.308	-	-	-	3.527 3.318
Pot Cap-1 Maneuver	1481	-	-	-	753 1004
Stage 1	-	-	-	-	959 -
Stage 2	-	-	-	-	856 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1481	-	-	-	724 1004
Mov Cap-2 Maneuver	-	-	-	-	724 -
Stage 1	-	-	-	-	923 -
Stage 2	-	-	-	-	856 -

Approach	EB	WB	SB
HCM Control Delay, s	3.5	0	14.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1481	-	-	-	792
HCM Lane V/C Ratio	0.037	-	-	-	0.515
HCM Control Delay (s)	7.5	0	-	-	14.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	3

# LANE LEVEL OF SERVICE

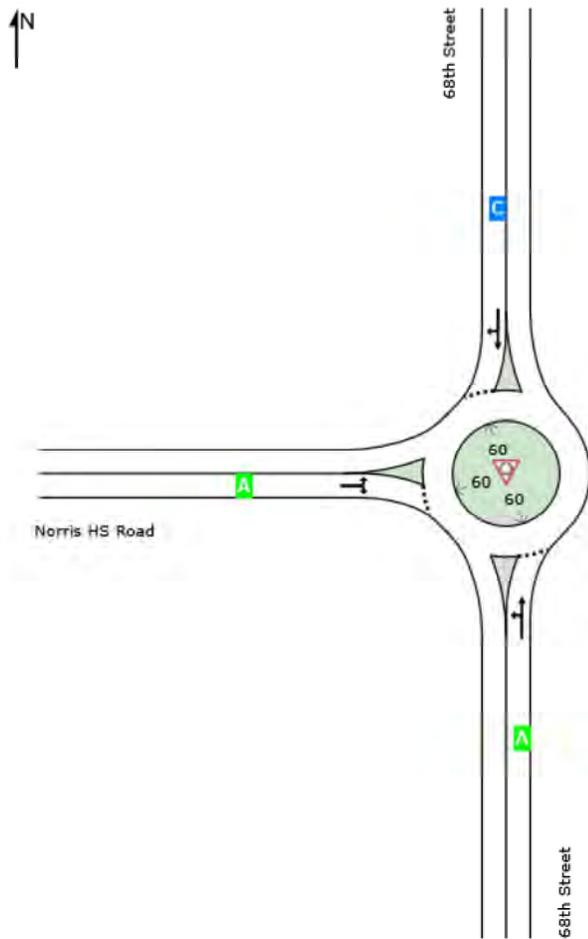
## Lane Level of Service

 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

	Approaches			Intersection
	South	North	West	
LOS	A	C	A	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)

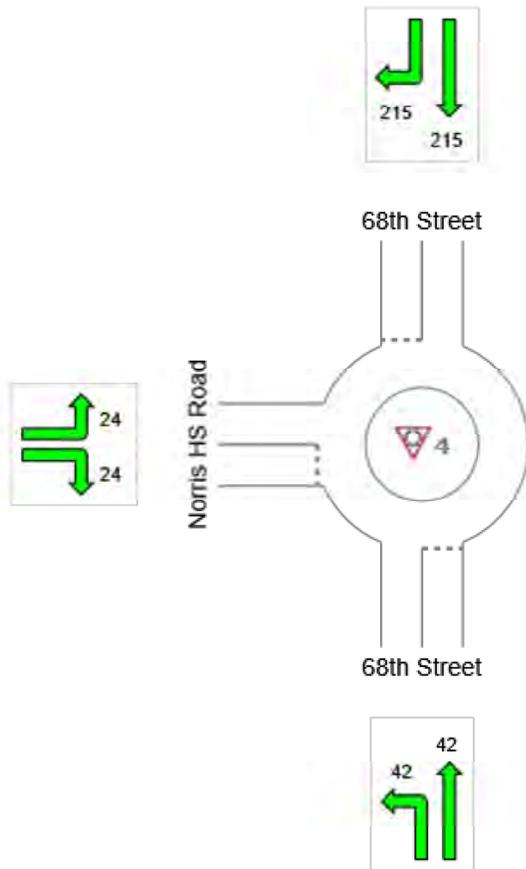
 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 68th

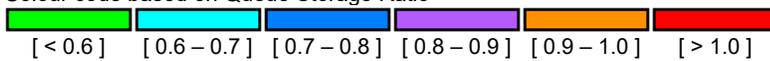
Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches			Intersection
	South	North	West	
Vehicle Queue (%ile)	42	215	24	215



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

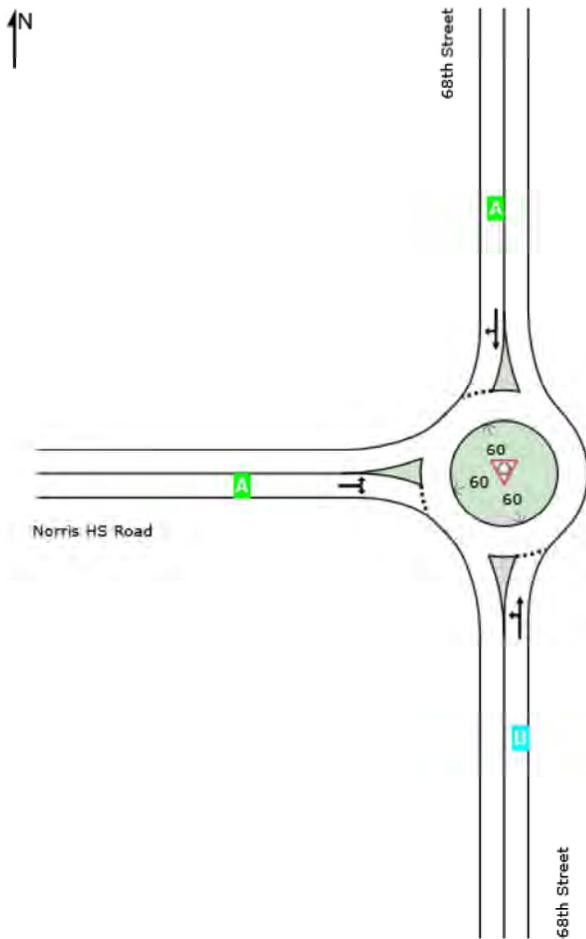
## Lane Level of Service

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

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

	Approaches			Intersection
	South	North	West	
LOS	B	A	A	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)

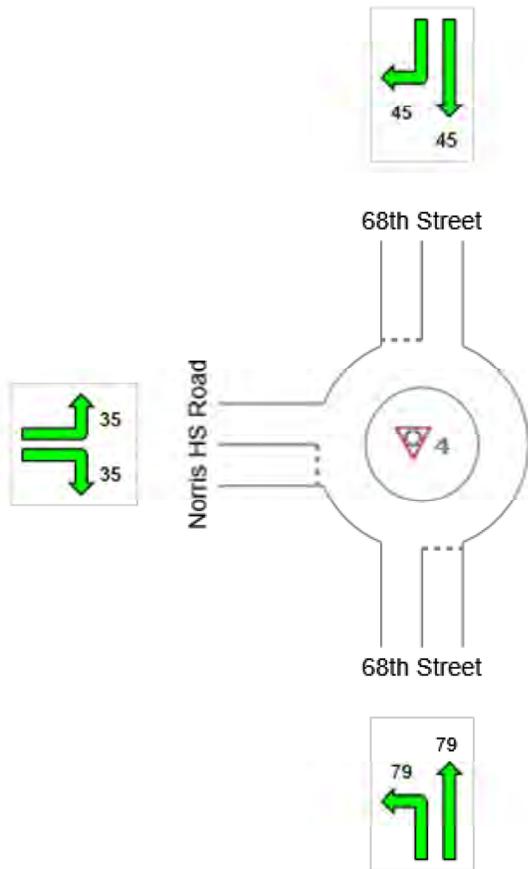
 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches			Intersection
	South	North	West	
Vehicle Queue (%ile)	79	45	35	79



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

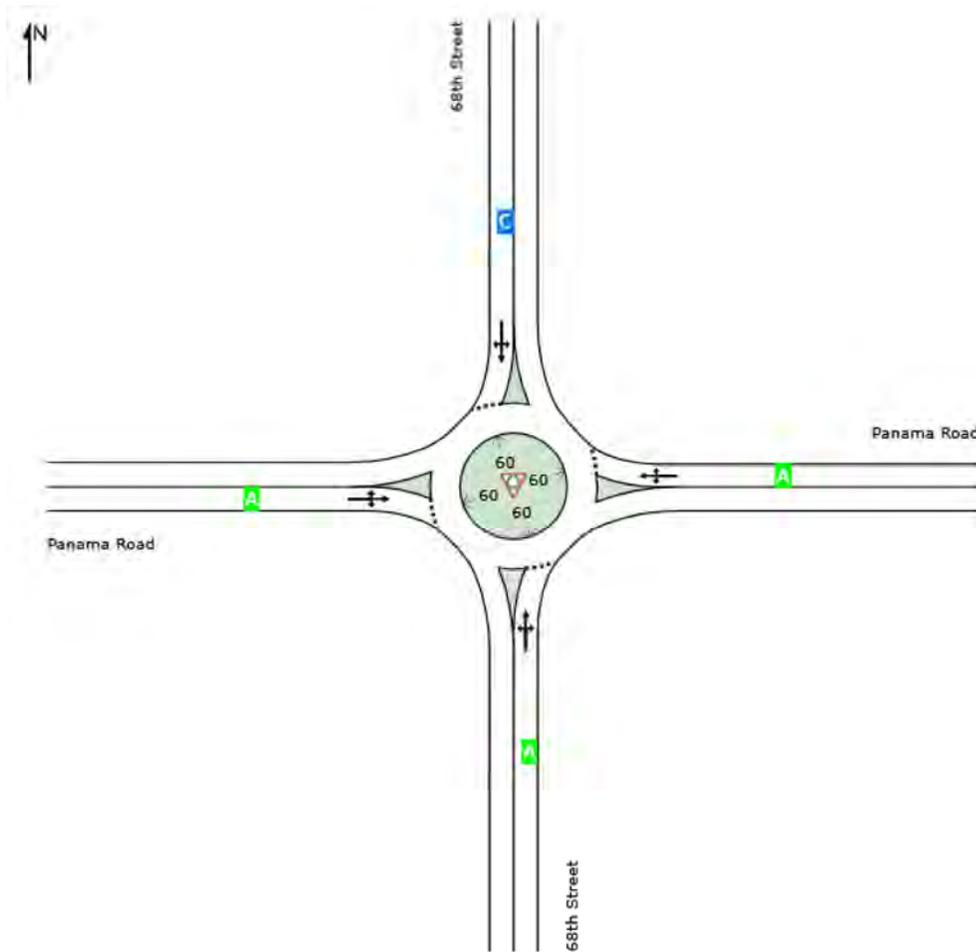
## Lane Level of Service

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

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	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)

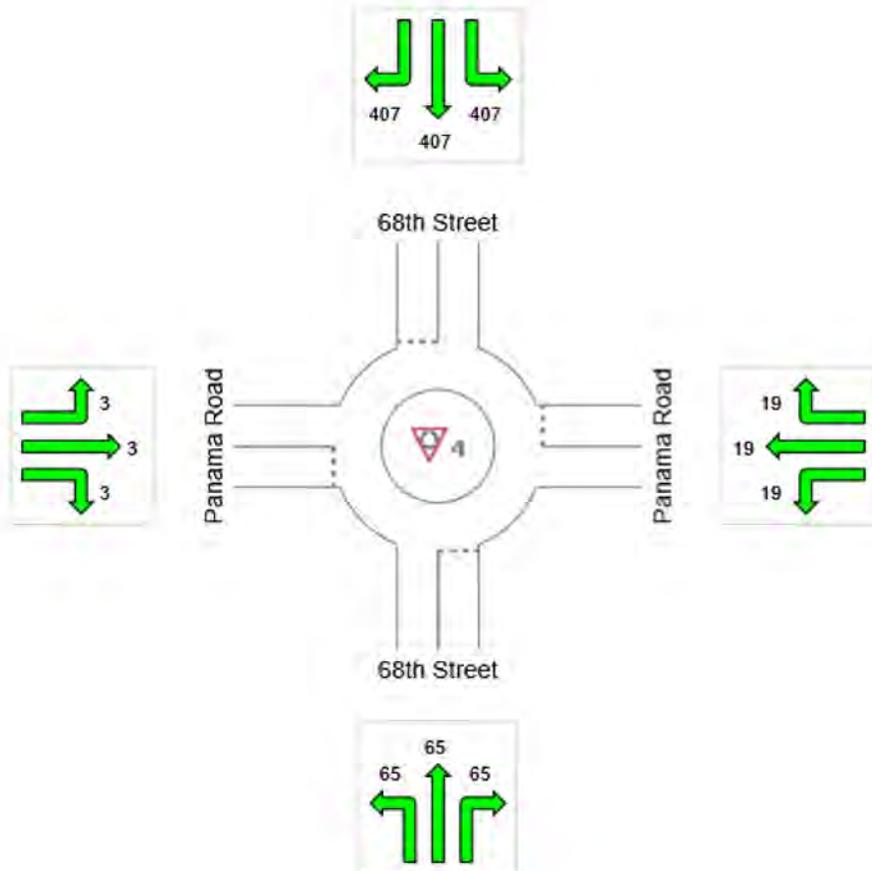
 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 68th

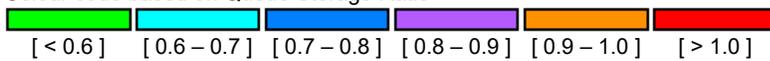
Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	65	19	407	3	407



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

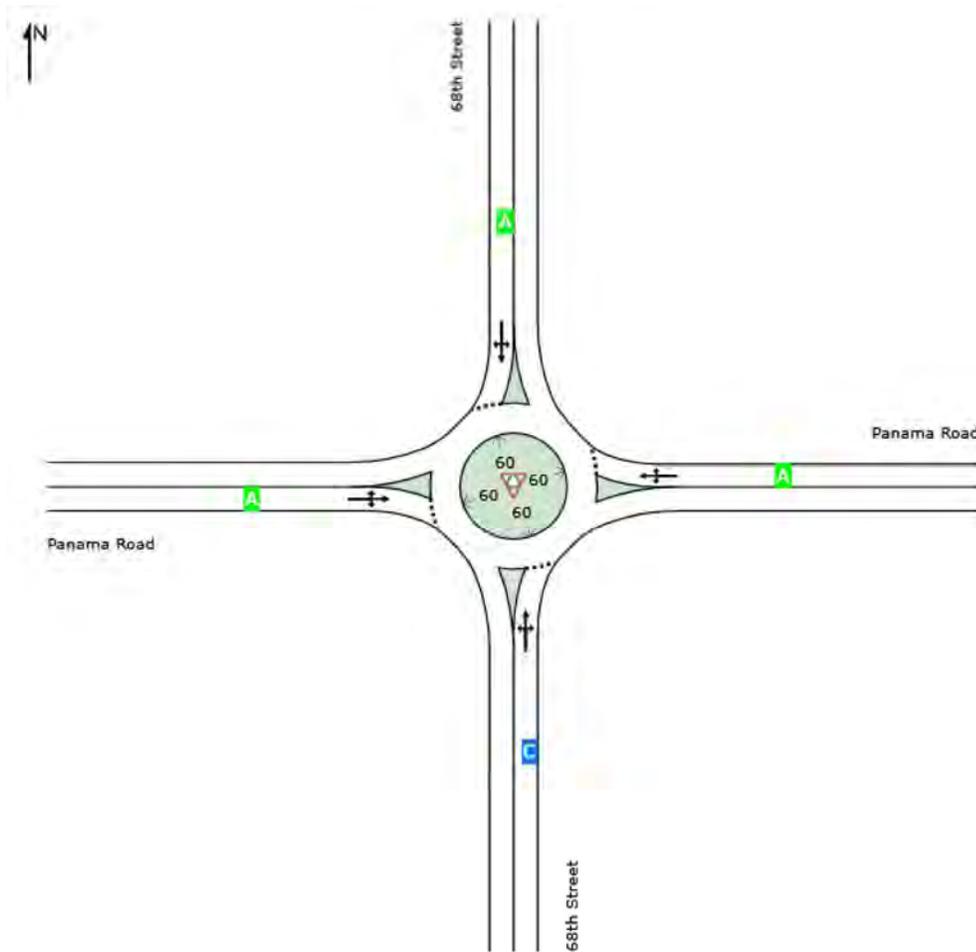
## Lane Level of Service

 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

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

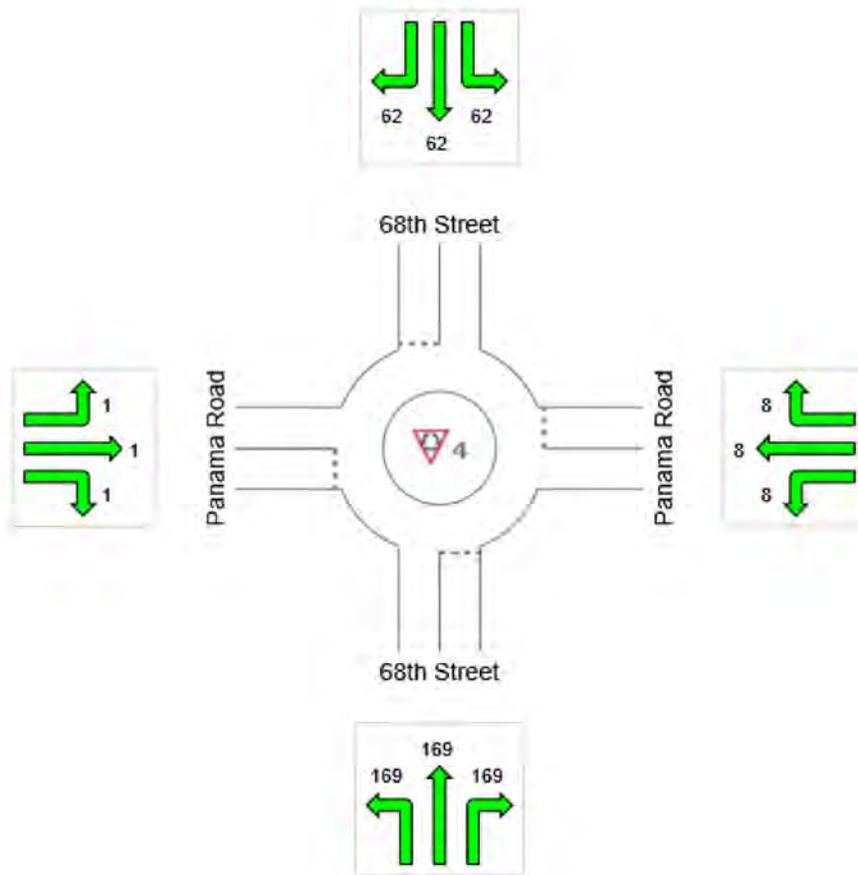
 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

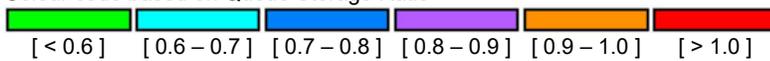
Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	169	8	62	1	169



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

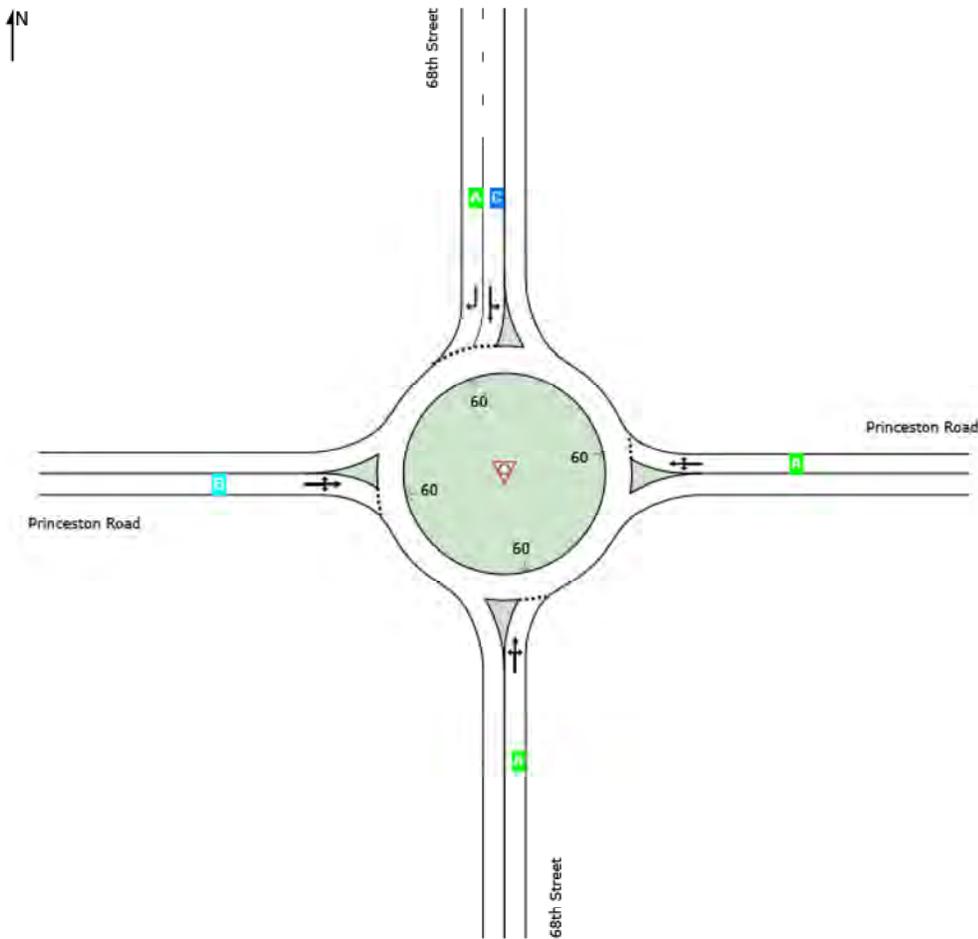
## Lane Level of Service

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

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	A	A	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)

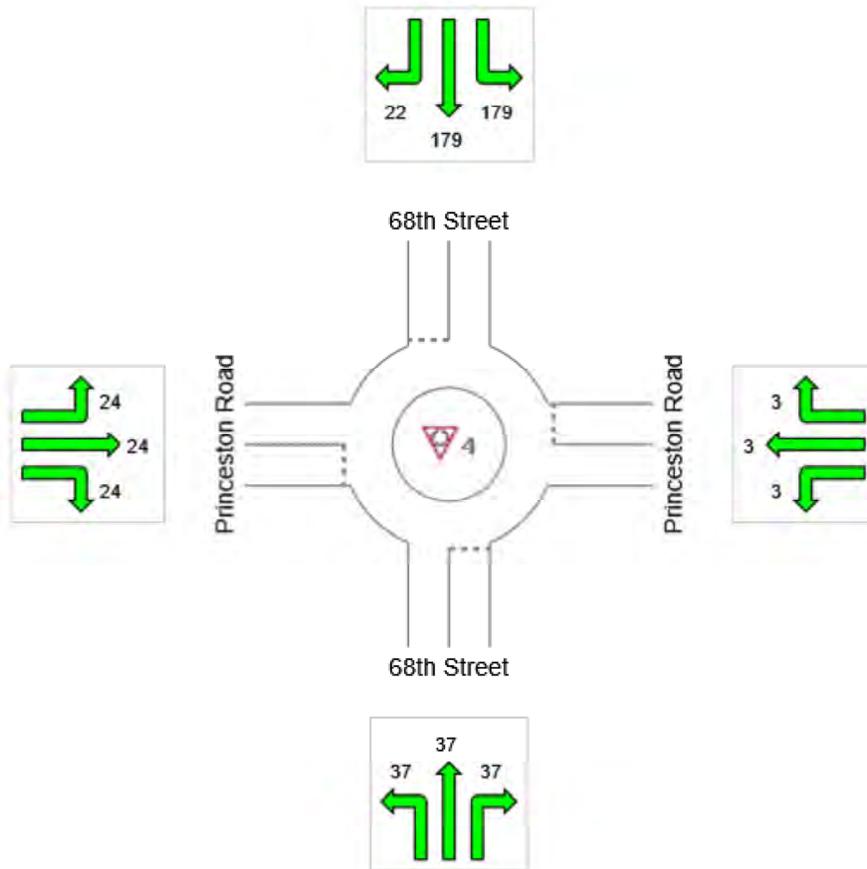
 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	37	3	179	24	179



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

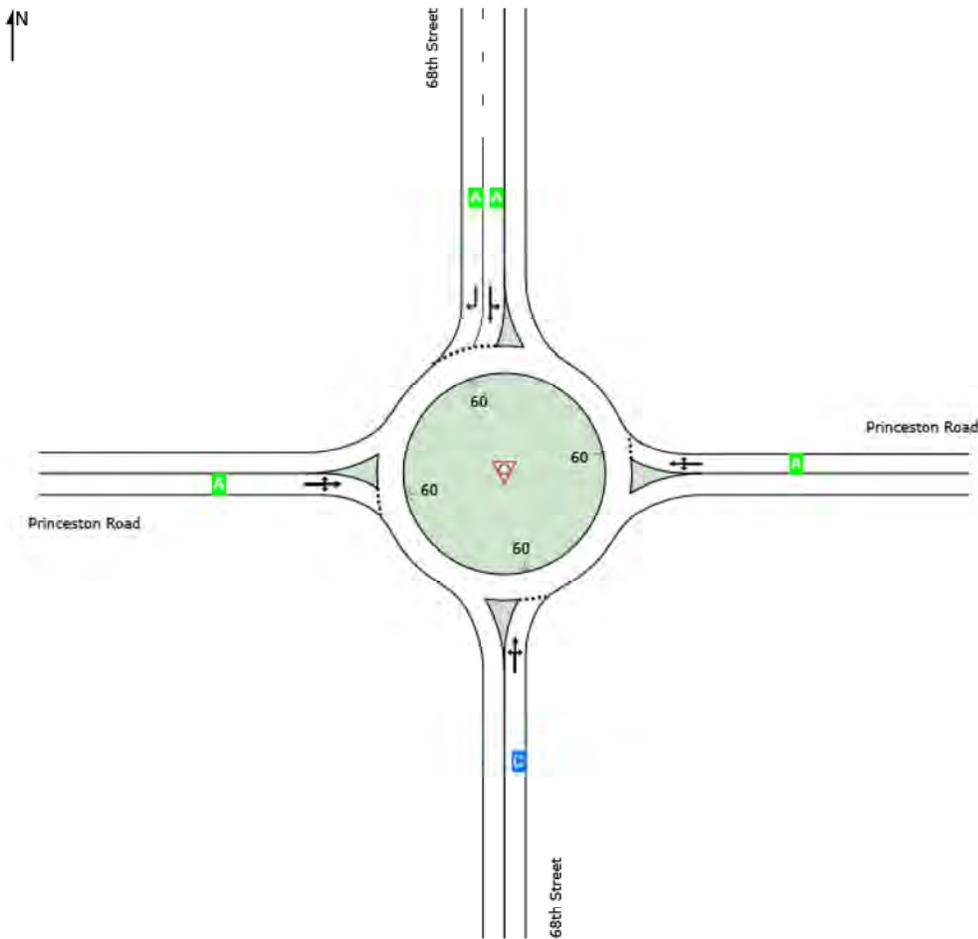
## Lane Level of Service

 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

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

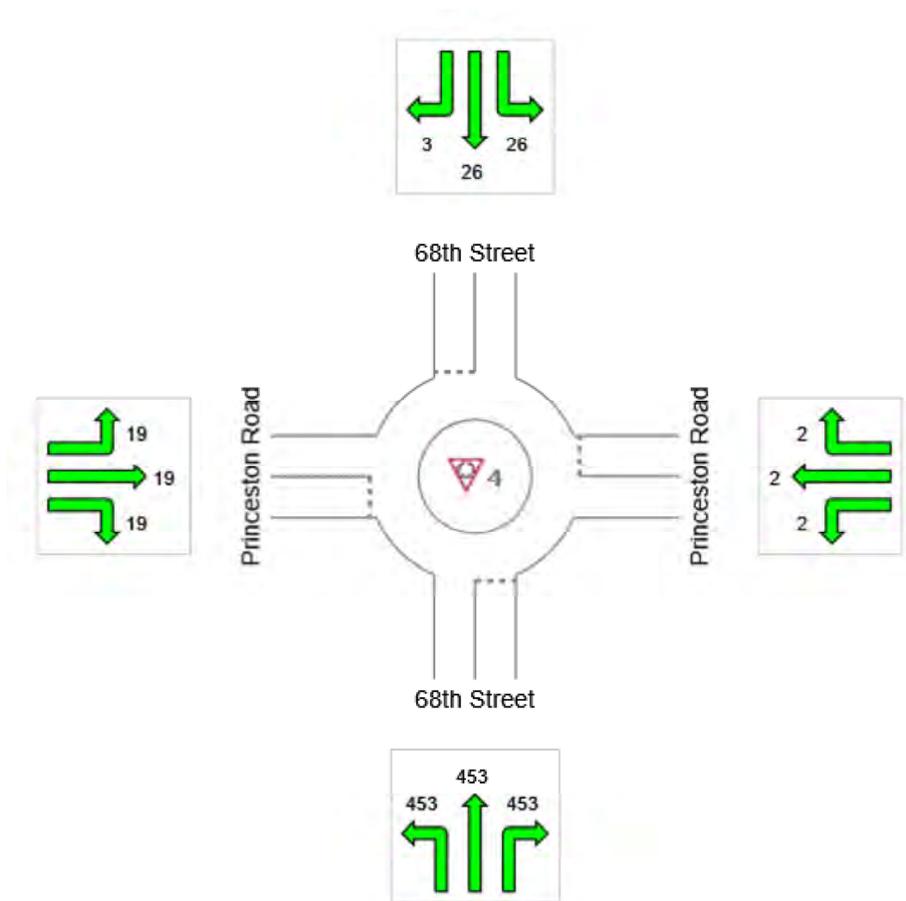
 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	453	2	26	19	453



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

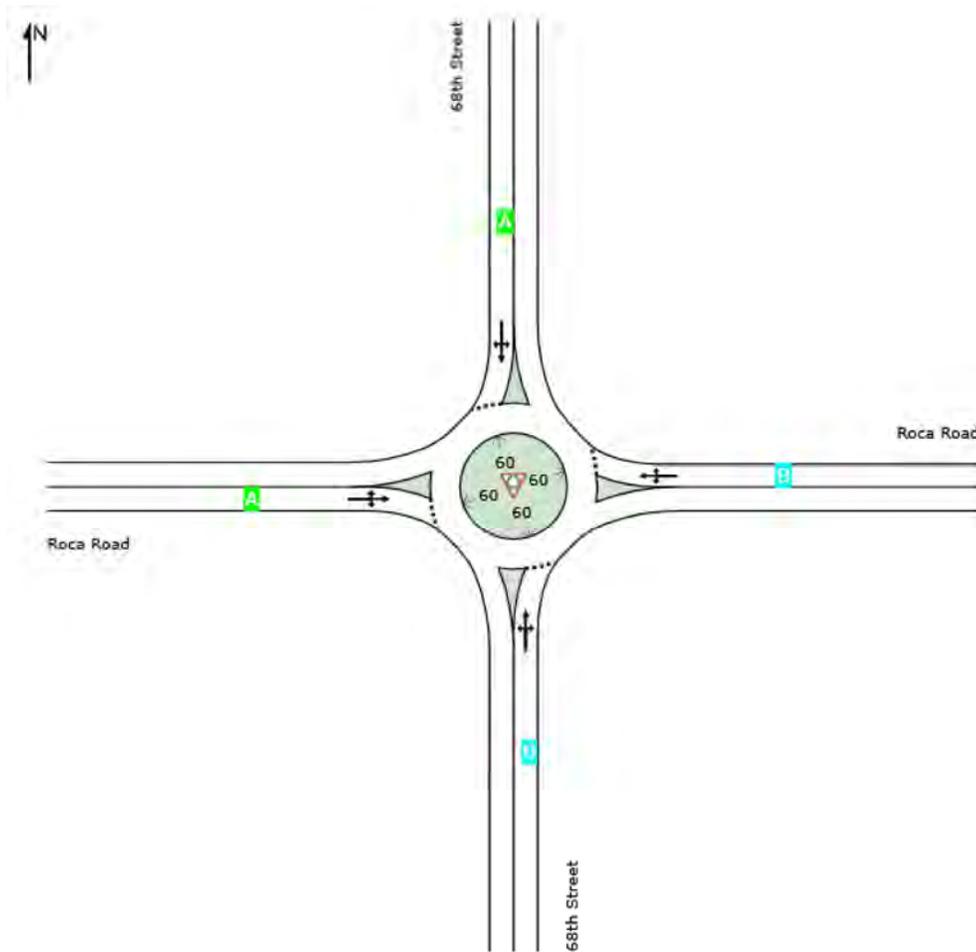
## Lane Level of Service

 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

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

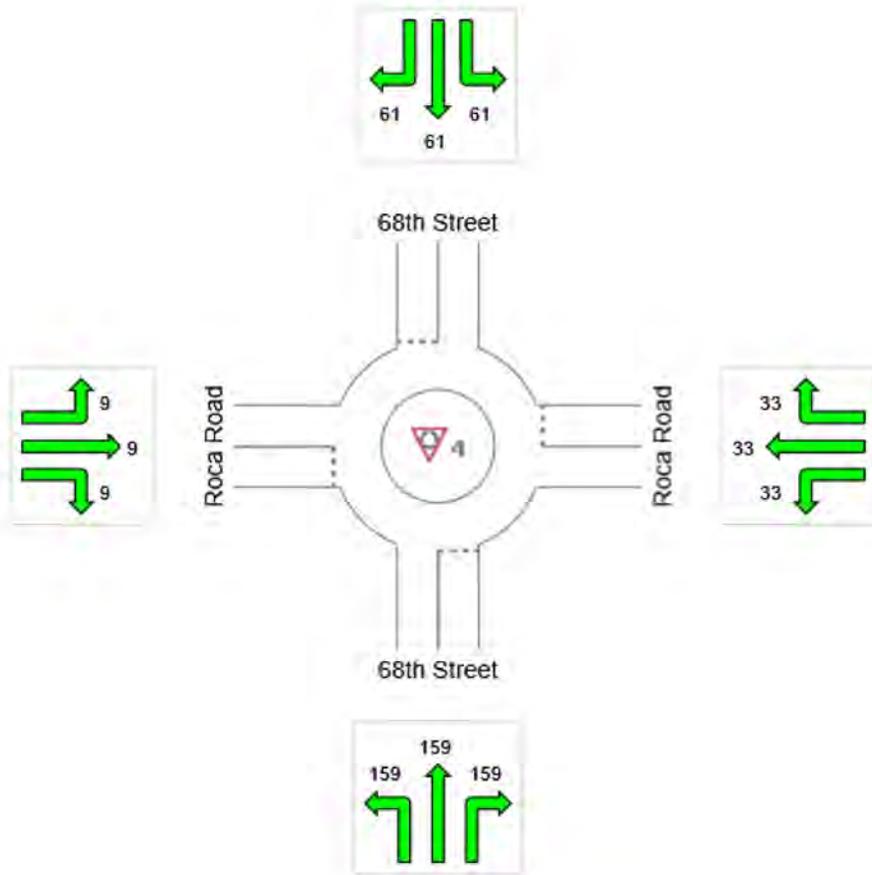
 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	159	33	61	9	159



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

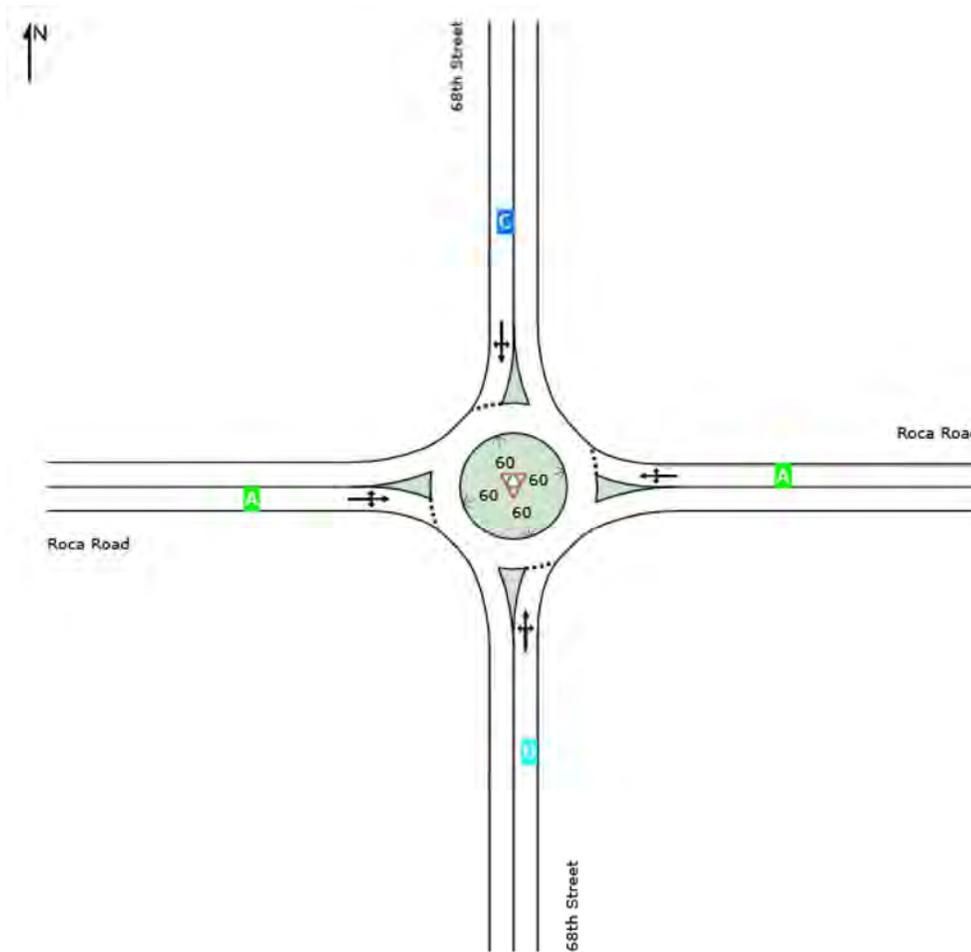
## Lane Level of Service

 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

	Approaches				Intersection
	South	East	North	West	
LOS	B	A	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)

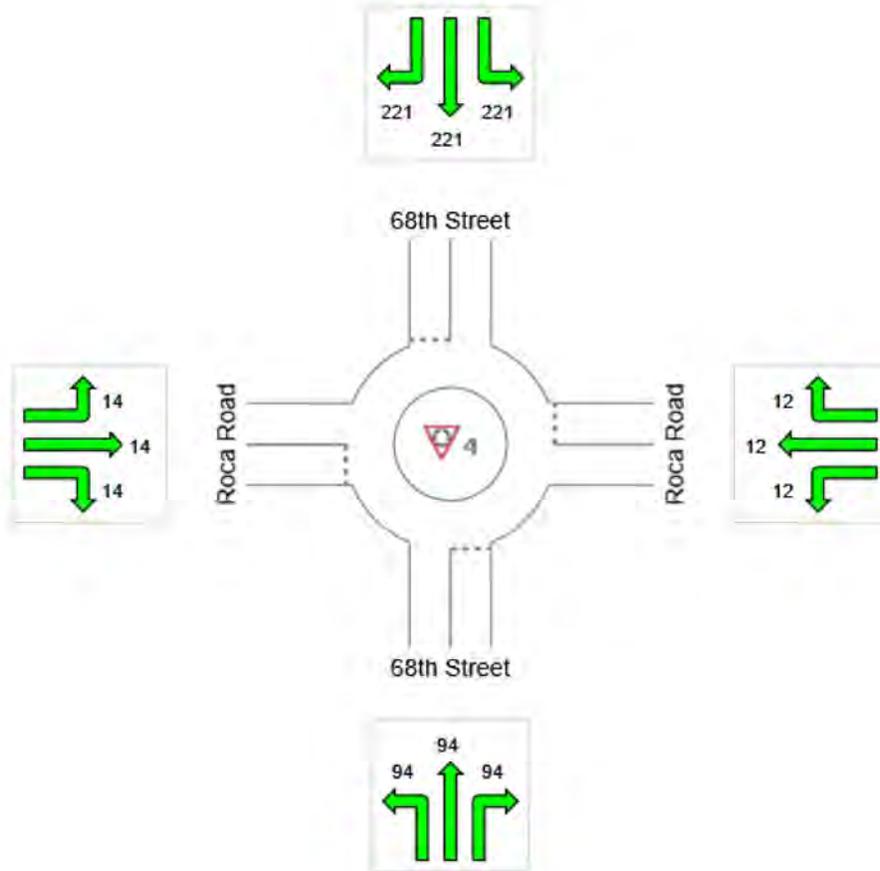
 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	94	12	221	14	221



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

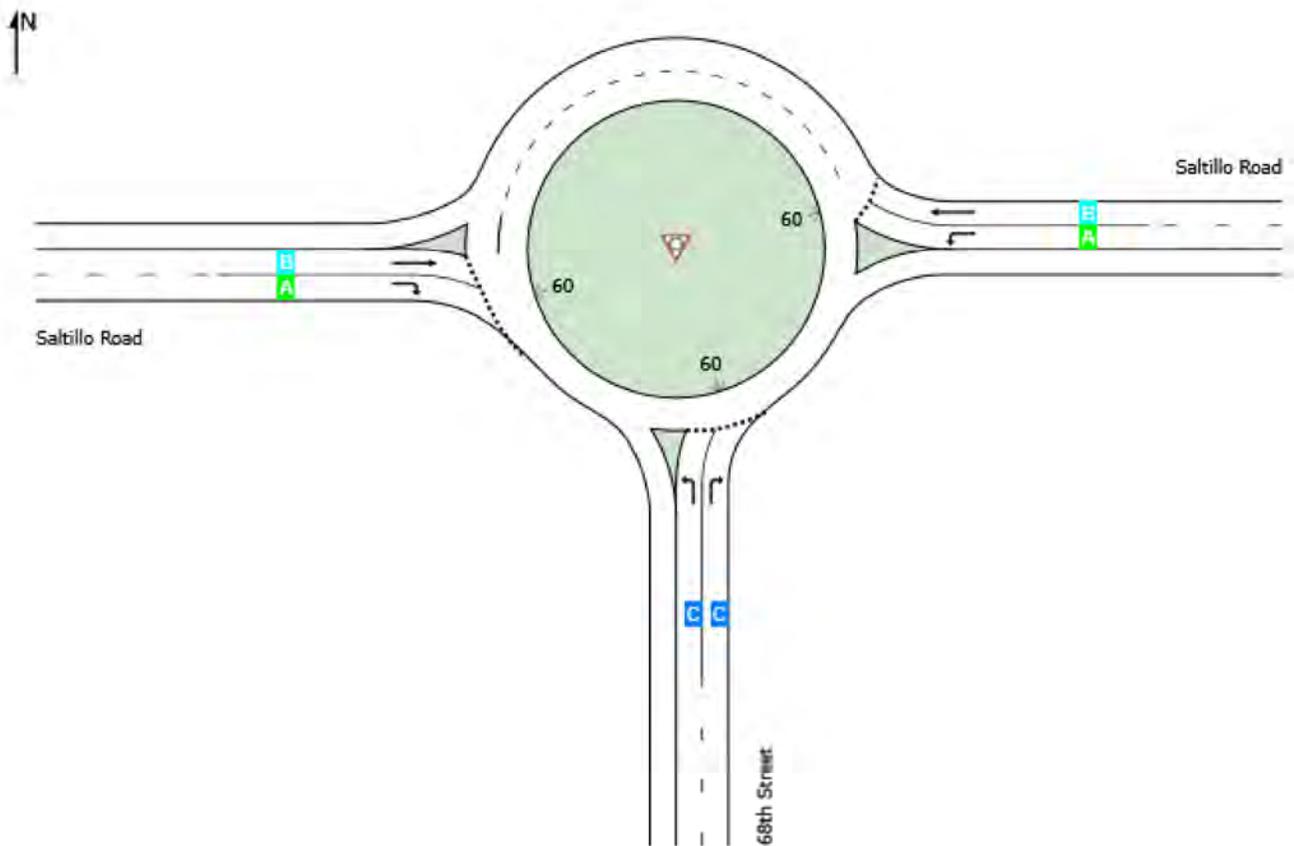
## Lane Level of Service

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

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

	Approaches			Intersection
	South	East	West	
LOS	C	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)

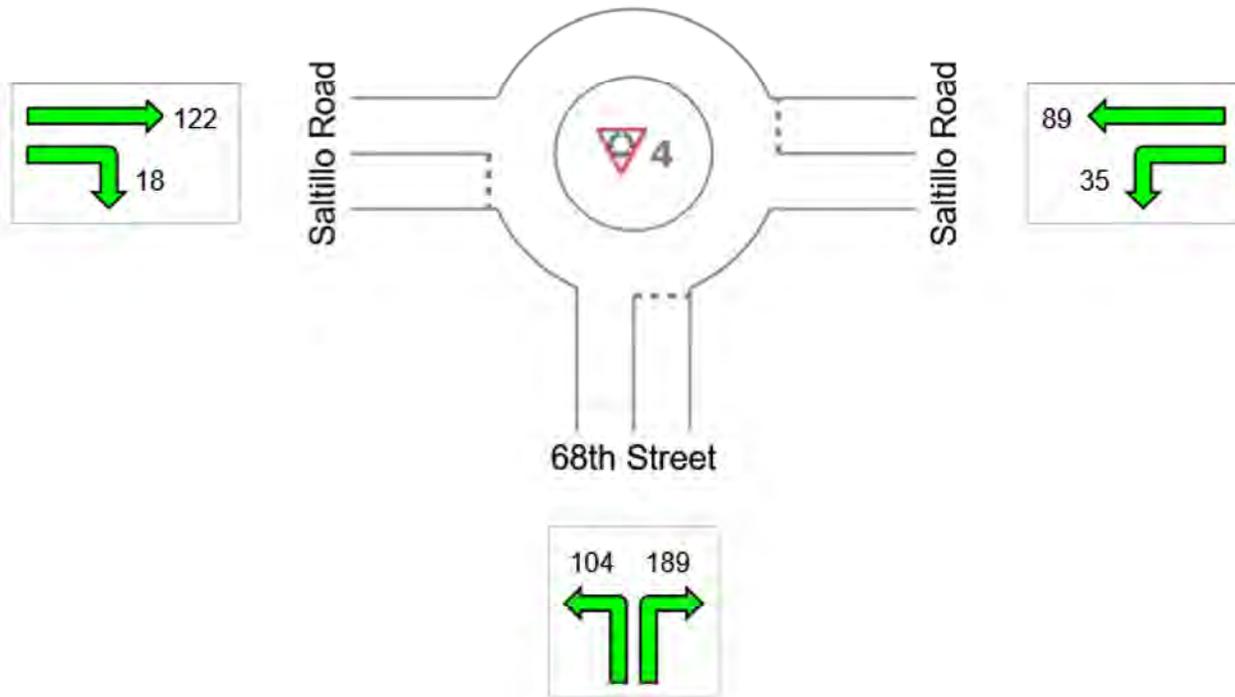
 Site: 4 [2040 AM Peak]

Lancaster Safety Study - 68th

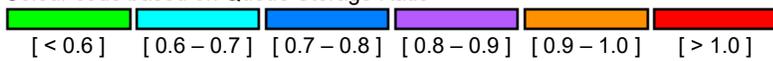
Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches			Intersection
	South	East	West	
Vehicle Queue (%ile)	189	89	122	189



Colour code based on Queue Storage Ratio



# LANE LEVEL OF SERVICE

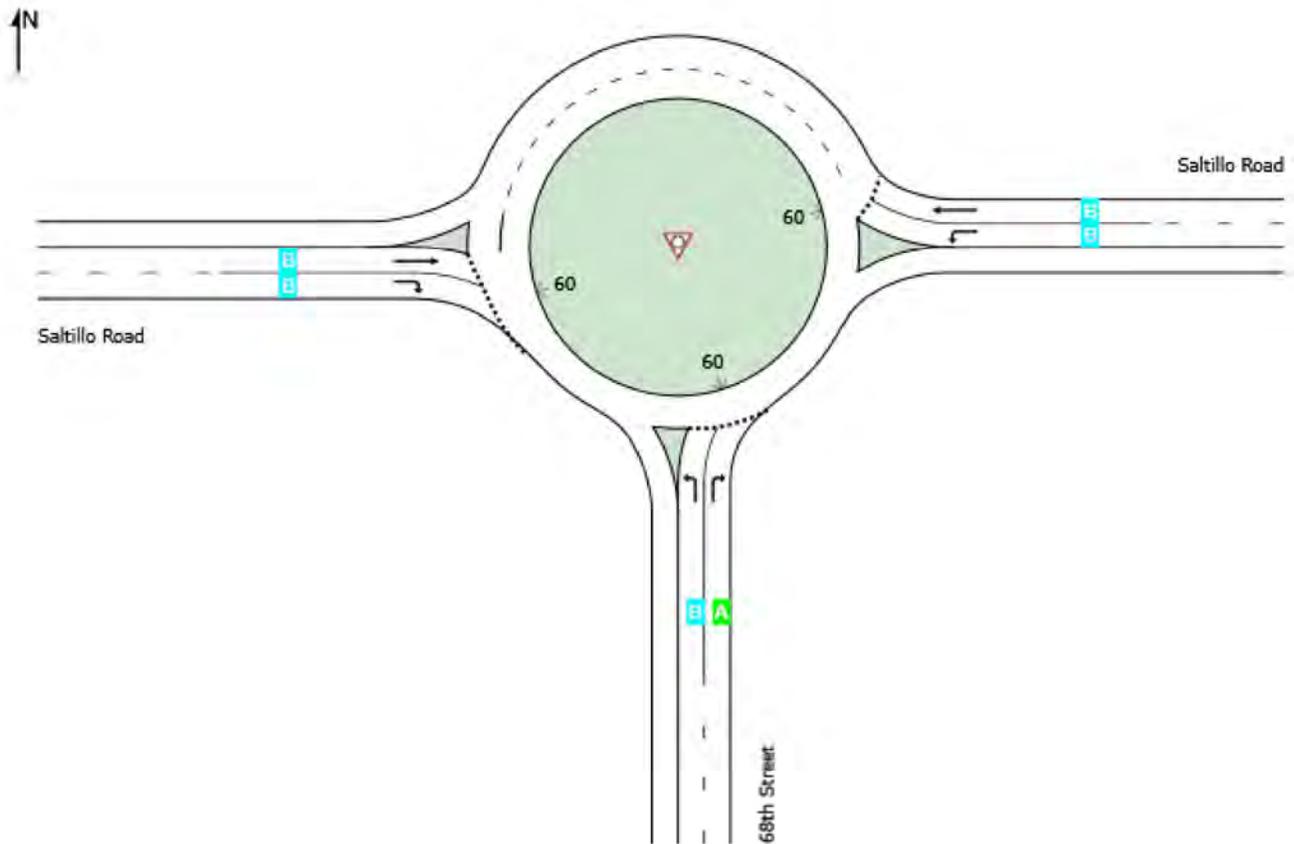
## Lane Level of Service

 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

Site Category: (None)  
Roundabout

	Approaches			Intersection
	South	East	West	
LOS	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)

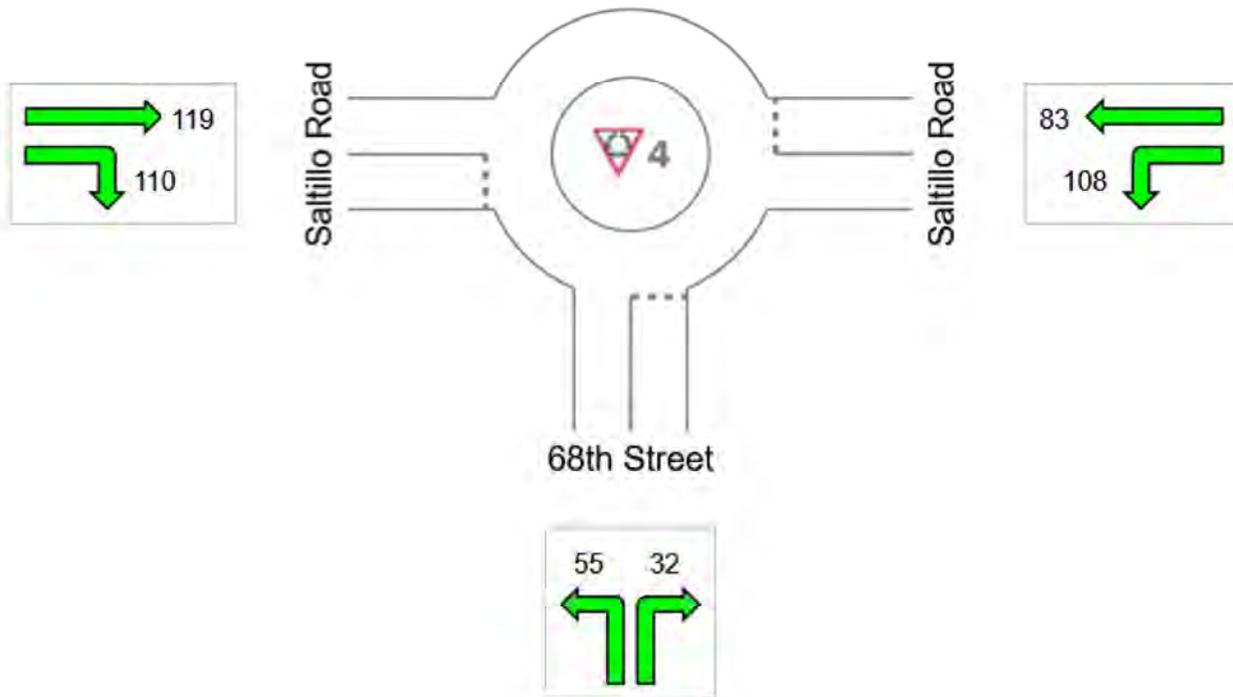
 Site: 4 [2040 PM Peak]

Lancaster Safety Study - 68th

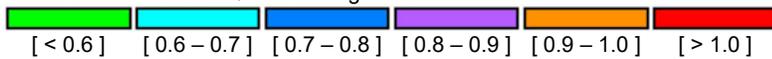
Site Category: (None)  
Roundabout

## All Movement Classes

	Approaches			Intersection
	South	East	West	
Vehicle Queue (%ile)	55	108	119	119



Colour code based on Queue Storage Ratio



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**MUTCD SIGNAL WARRANTS**

**MUTCD Volume-based Warrant Evaluation - 2018 Existing (0% WB rights)  
Firth Road and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Firth 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 Approchs. Major Street	1	350 (280)	187	176	164	153	141	130	118	107
Highest Apprch. Minor Street	1	105 (84)	89	84	78	73	67	62	56	51

**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 Approchs. Major Street	1	525 (420)	187	176	164	153	141	130	118	107
Highest Apprch. Minor Street	1	53 (42)	89	84	78	73	67	62	56	51

**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 Approchs. Major Street	1	187	176	164	153
Highest Apprch. Minor Street	1	89	84	78	73

**MUTCD Volume-based Warrant Evaluation - 2040 Future (0% WB rights)  
Firth Road and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Firth 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 Approchs. Major Street	1	350 (280)	322	302	283	263	243	223	204	184
Highest Apprch. Minor Street	1	105 (84)	153	144	134	125	115	106	97	87

**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 Approchs. Major Street	1	525 (420)	322	302	283	263	243	223	204	184
Highest Apprch. Minor Street	1	53 (42)	153	144	134	125	115	106	97	87

**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 Approchs. Major Street	1	322	302	283	263
Highest Apprch. Minor Street	1	153	144	134	125

**MUTCD Volume-based Warrant Evaluation - 2018 Existing  
Norris HS and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Norris HS  
 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 Approchs. Major Street	2 or more	420 (336)	593	557	520	484	448	411	375	339
Highest Apprch. Minor Street	1	105 (84)	145	136	127	118	109	101	92	83

**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 Approchs. Major Street	2 or more	630 (504)	593	557	520	484	448	411	375	339
Highest Apprch. Minor Street	1	53 (42)	145	136	127	118	109	101	92	83

**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 Approchs. Major Street	2 or more	593	557	520	484
Highest Apprch. Minor Street	1	145	136	127	118

**MUTCD Volume-based Warrant Evaluation - 2040 Future  
Norris HS and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Norris HS  
 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 Approchs. Major Street	2 or more	420 (336)	1021	958	896	833	771	708	646	583
Highest Apprch. Minor Street	2 or more	140 (112)	249	234	218	203	188	173	157	142

**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 Approchs. Major Street	2 or more	630 (504)	1021	958	896	833	771	708	646	583
Highest Apprch. Minor Street	2 or more	70 (56)	249	234	218	203	188	173	157	142

**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 Approchs. Major Street	2 or more	1021	958	896	833
Highest Apprch. Minor Street	2 or more	249	234	218	203

**MUTCD Volume-based Warrant Evaluation - 2018 Existing  
Panama Road and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Panama 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 Approchs. Major Street	2 or more	420 (336)	678	636	595	553	512	470	429	387
Highest Apprch. Minor Street	2 or more	140 (112)	105	99	92	86	79	73	66	60

**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 Approchs. Major Street	2 or more	630 (504)	678	636	595	553	512	470	429	387
Highest Apprch. Minor Street	2 or more	70 (56)	105	99	92	86	79	73	66	60

**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 Approchs. Major Street	2 or more	678	636	595	553
Highest Apprch. Minor Street	2 or more	105	99	92	86

**MUTCD Volume-based Warrant Evaluation - 2040 Future (0% WB rights)  
Panama Rd and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Panama Rd  
 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 Approchs. Major Street	2 or more	420 (336)	1171	1099	1027	956	884	812	740	669
Highest Apprch. Minor Street	2 or more	140 (112)	87	82	76	71	66	60	55	50

**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 Approchs. Major Street	2 or more	630 (504)	1171	1099	1027	956	884	812	740	669
Highest Apprch. Minor Street	2 or more	70 (56)	87	82	76	71	66	60	55	50

**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 Approchs. Major Street	2 or more	1171	1099	1027	956
Highest Apprch. Minor Street	2 or more	87	82	76	71

**MUTCD Volume-based Warrant Evaluation - 2018 Existing  
Princeton Road and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Princeton 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 Approchs. Major Street	1	350 (280)	714	670	626	583	539	495	451	408
Highest Apprch. Minor Street	1	105 (84)	110	103	97	90	83	76	70	63

**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 Approchs. Major Street	1	525 (420)	714	670	626	583	539	495	451	408
Highest Apprch. Minor Street	1	53 (42)	110	103	97	90	83	76	70	63

**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 Approchs. Major Street	1	714	670	626	583
Highest Apprch. Minor Street	1	110	103	97	90

**MUTCD Volume-based Warrant Evaluation - 2040 Future  
Princeton Road and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Princeton 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 Approchs. Major Street	2 or more	420 (336)	1156	1085	1014	943	873	802	731	660
Highest Apprch. Minor Street	1	105 (84)	137	129	120	112	103	95	87	78

**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 Approchs. Major Street	2 or more	630 (504)	1156	1085	1014	943	873	802	731	660
Highest Apprch. Minor Street	1	53 (42)	137	129	120	112	103	95	87	78

**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 Approchs. Major Street	2 or more	1156	1085	1014	943
Highest Apprch. Minor Street	1	137	129	120	112

**MUTCD Volume-based Warrant Evaluation - 2018 Existing  
Roca Road and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Roca 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	2 or more	420 (336)	719	675	631	587	543	499	455	411
Highest Apprch. Minor Street	2 or more	140 (112)	123	115	108	100	93	85	78	70

**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)	719	675	631	587	543	499	455	411
Highest Apprch. Minor Street	2 or more	70 (56)	123	115	108	100	93	85	78	70

**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	2 or more	719	675	631	587
Highest Apprch. Minor Street	2 or more	123	115	108	100

**MUTCD Volume-based Warrant Evaluation - 2040 Future  
Roca Road and S. 68th Street**

Major Street: S. 68th Street  
 Minor Street: Roca 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	2 or more	420 (336)	1236	1160	1085	1009	933	857	782	706
Highest Apprch. Minor Street	2 or more	140 (112)	153	144	134	125	115	106	97	87

**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)	1236	1160	1085	1009	933	857	782	706
Highest Apprch. Minor Street	2 or more	70 (56)	153	144	134	125	115	106	97	87

**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	1236	1160	1085	1009
Highest Apprch. Minor Street	2 or more	153	144	134	125

**MUTCD Volume-based Warrant Evaluation - 2018 Existing  
Saltillo Road and S. 68th Street**

Major Street: Saltillo Road  
 Minor Street: S. 68th Street  
 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)	955	896	838	779	721	662	604	545
Highest Apprch. Minor Street	2 or more	140 (112)	434	407	381	354	328	301	274	248

**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)	955	896	838	779	721	662	604	545
Highest Apprch. Minor Street	2 or more	70 (56)	434	407	381	354	328	301	274	248

**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	955	896	838	779
Highest Apprch. Minor Street	2 or more	434	407	381	354

**MUTCD Volume-based Warrant Evaluation - 2040 Future  
Saltillo Road and S. 68th Street**

Major Street: Saltillo Road  
 Minor Street: S. 68th Street  
 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)	1644	1543	1442	1342	1241	1140	1039	939
Highest Apprch. Minor Street	2 or more	140 (112)	747	701	655	610	564	518	472	427

**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)	1644	1543	1442	1342	1241	1140	1039	939
Highest Apprch. Minor Street	2 or more	70 (56)	747	701	655	610	564	518	472	427

**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	1644	1543	1442	1342
Highest Apprch. Minor Street	2 or more	747	701	655	610

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**AUXILIARY TURN LANE WARRANTS**

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

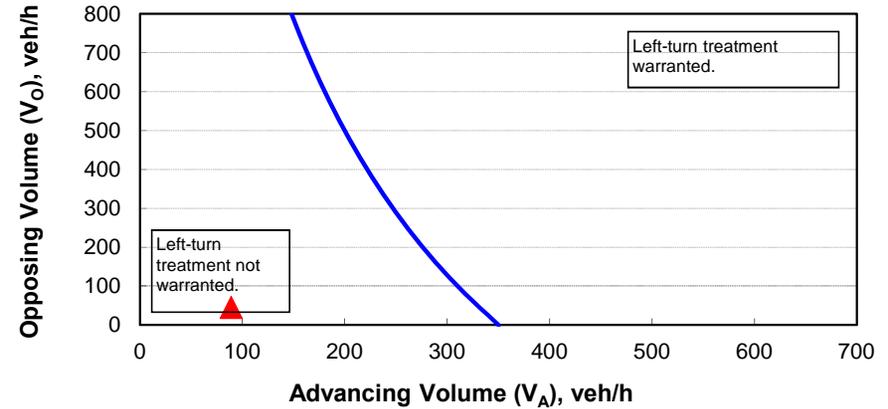
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	81%
Advancing volume ( $V_A$ ), veh/h:	89
Opposing volume ( $V_O$ ), veh/h:	45

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	331
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** Firth Road

**Minor Roadway:** 68th Street

**Approach:** Eastbound

**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.**

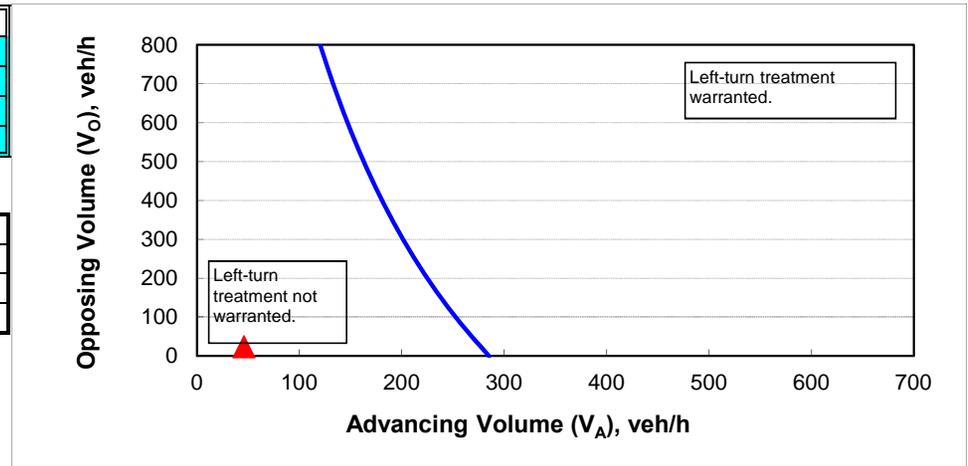
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	37%
Advancing volume ( $V_A$ ), veh/h:	46
Opposing volume ( $V_O$ ), veh/h:	24

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	277
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** Firth Road

**Minor Roadway:** 68th 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.**

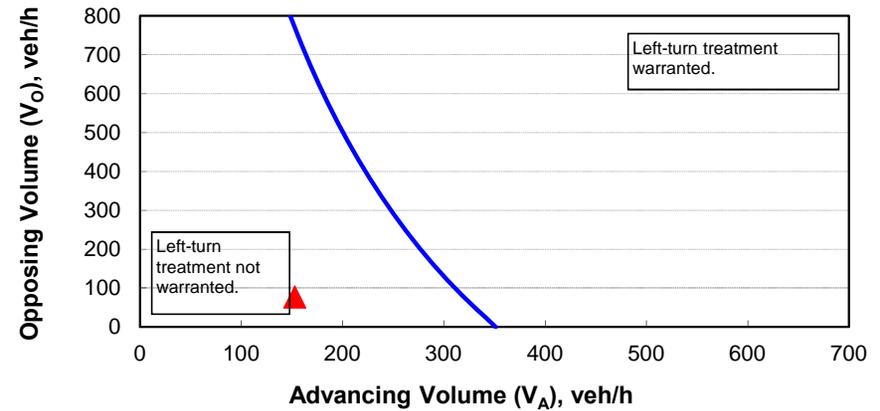
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	81%
Advancing volume ( $V_A$ ), veh/h:	153
Opposing volume ( $V_O$ ), veh/h:	77

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	320
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** Firth Road

**Minor Roadway:** 68th Street

**Approach:** Eastbound

**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.**

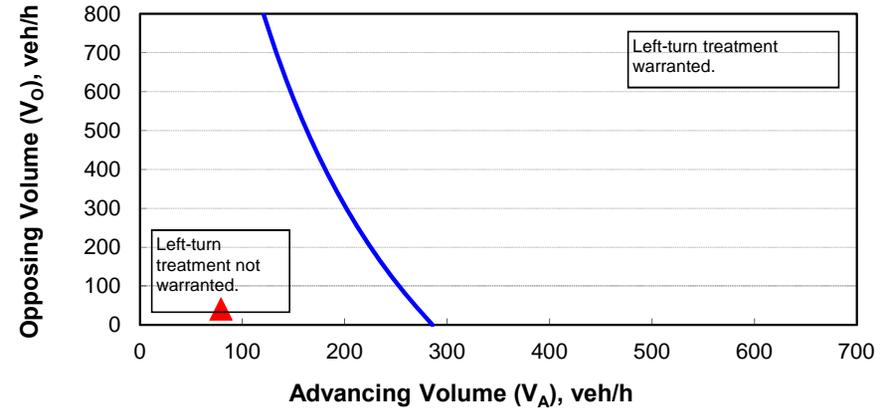
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	37%
Advancing volume ( $V_A$ ), veh/h:	79
Opposing volume ( $V_O$ ), veh/h:	41

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	271
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** Firth Road

**Minor Roadway:** 68th 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:	134
Percentage of right-turns on minor road, %:	35%
Minor-road volume (one direction), veh/h:	68

**OUTPUT**

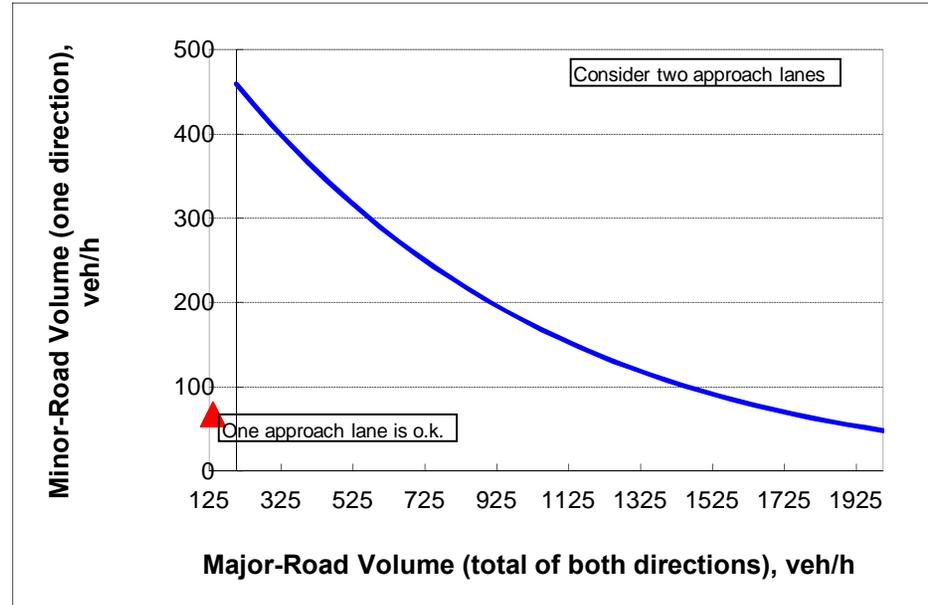
Variable	Value
Limiting minor-road volume (one direction), veh/h:	494
<b>Guidance for determining minor-road approach geometry:</b>	
<b>ONE approach lane is o.k.</b>	

**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:** Firth Road  
**Minor Roadway:** S 68th Street  
**Approach** Southbound  
**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:	70
Percentage of right-turns on minor road, %:	28%
Minor-road volume (one direction), veh/h:	187

**OUTPUT**

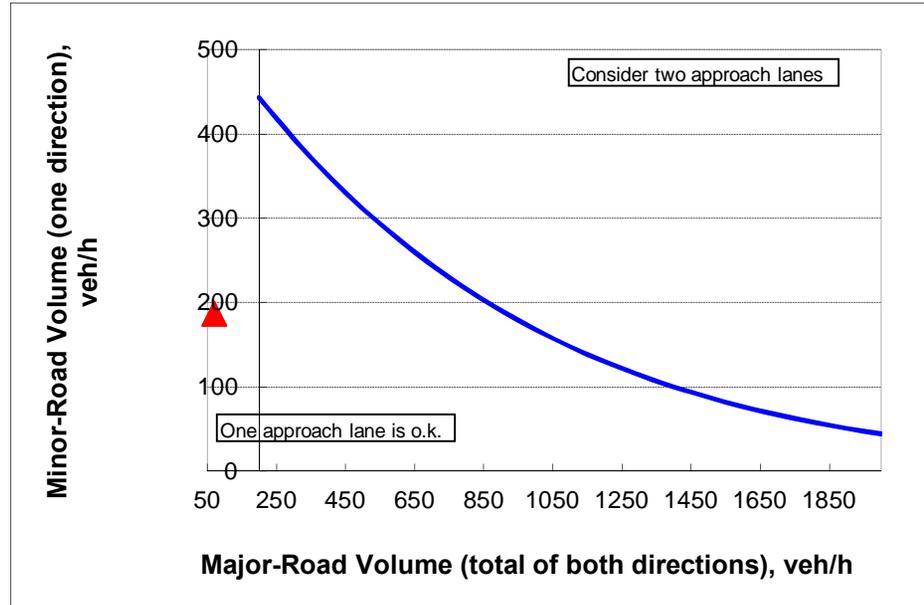
Variable	Value
Limiting minor-road volume (one direction), veh/h:	514
<b>Guidance for determining minor-road approach geometry:</b>	
ONE approach lane is o.k.	

**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:** Firth Road  
**Minor Roadway:** S 68th Street  
**Approach:** Southbound  
**Peak Period:** PM Peak Hour



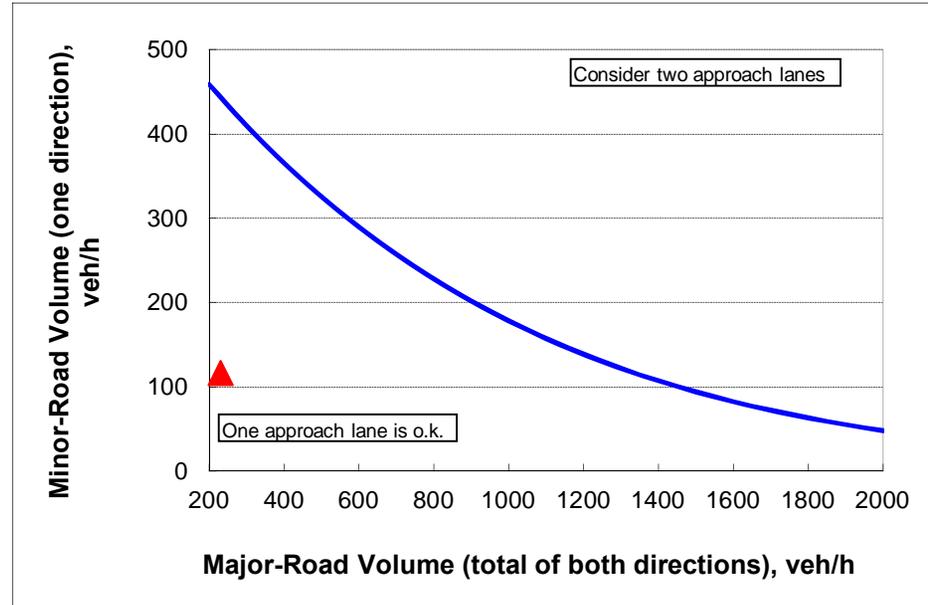
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	230
Percentage of right-turns on minor road, %:	35%
Minor-road volume (one direction), veh/h:	117

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	444
<b>Guidance for determining minor-road approach geometry:</b>	
<b>ONE approach lane is o.k.</b>	



**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:** Firth Road  
**Minor Roadway:** S 68th Street  
**Approach:** Southbound  
**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:	120
Percentage of right-turns on minor road, %:	28%
Minor-road volume (one direction), veh/h:	322

**OUTPUT**

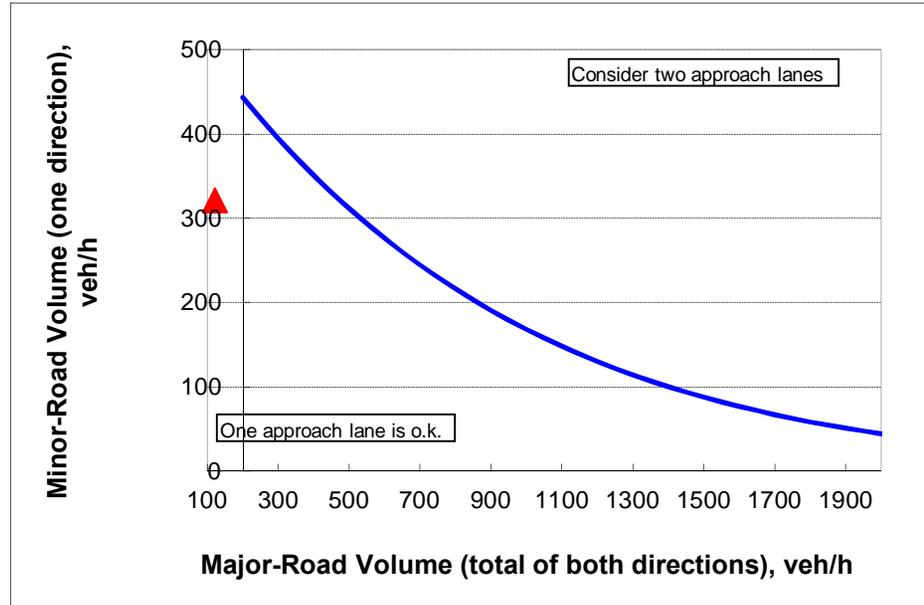
Variable	Value
Limiting minor-road volume (one direction), veh/h:	486
<b>Guidance for determining minor-road approach geometry:</b>	
ONE approach lane is o.k.	

**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:** Firth Road  
**Minor Roadway:** S 68th Street  
**Approach:** Southbound  
**Peak Period:** PM Peak Hour



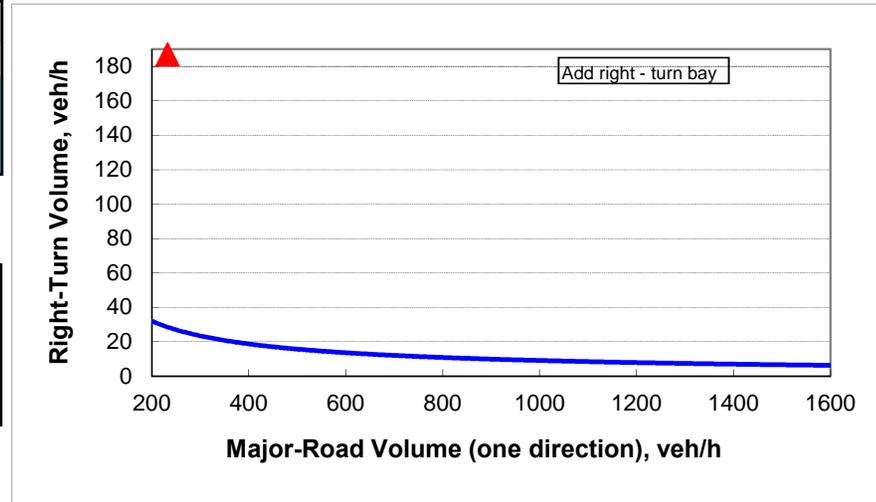
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	232
Right-turn volume, veh/h:	187

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	29
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** Firth Road

**Minor Roadway:** 68th Street

**Approach:** Westbound

**Peak Period:** AM Peak Hour

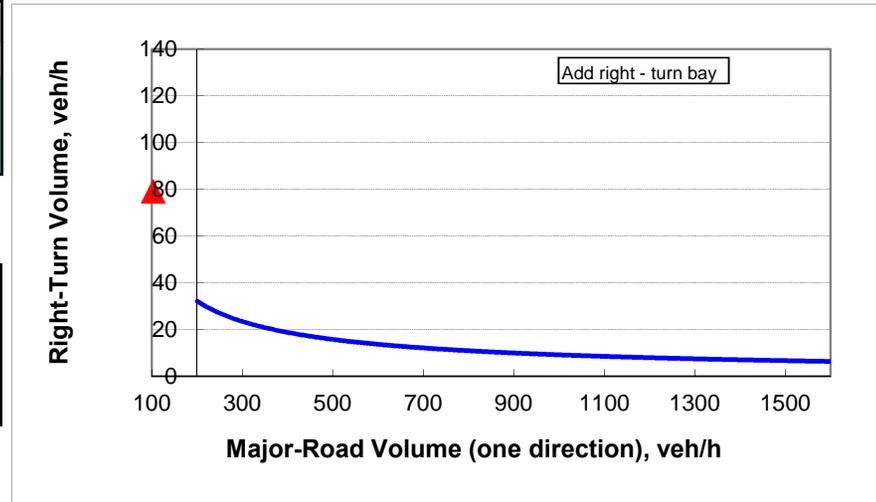
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		103
Right-turn volume, veh/h:		79

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		54
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** Firth Road

**Minor Roadway:** 68th Street

**Approach:** Westbound

**Peak Period:** PM Peak Hour

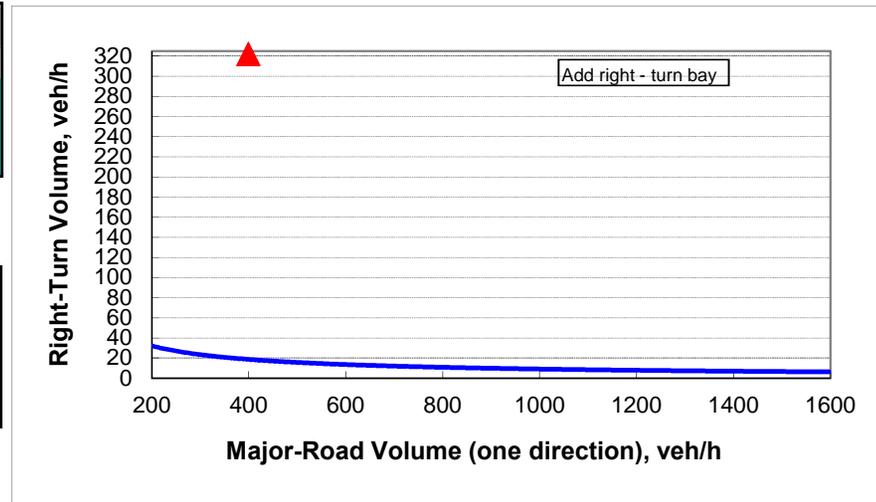
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		399
Right-turn volume, veh/h:		322

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		19
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig  
**Scenario:** 2040 Future  
**Major Roadway:** Firth Road  
**Minor Roadway:** 68th Street  
**Approach:** Westbound  
**Peak Period:** AM Peak Hour

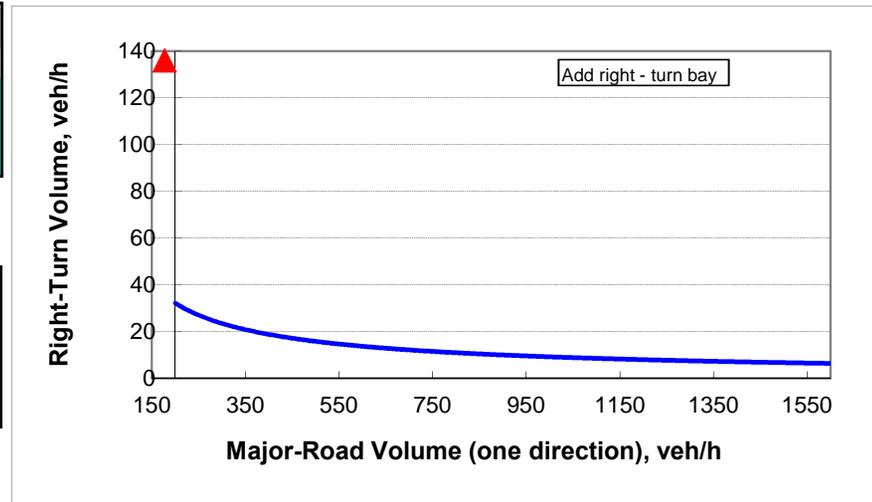
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		177
Right-turn volume, veh/h:		136

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		35
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig  
**Scenario:** 2040 Future  
**Major Roadway:** Firth Road  
**Minor Roadway:** 68th Street  
**Approach:** Westbound  
**Peak Period:** PM Peak Hour

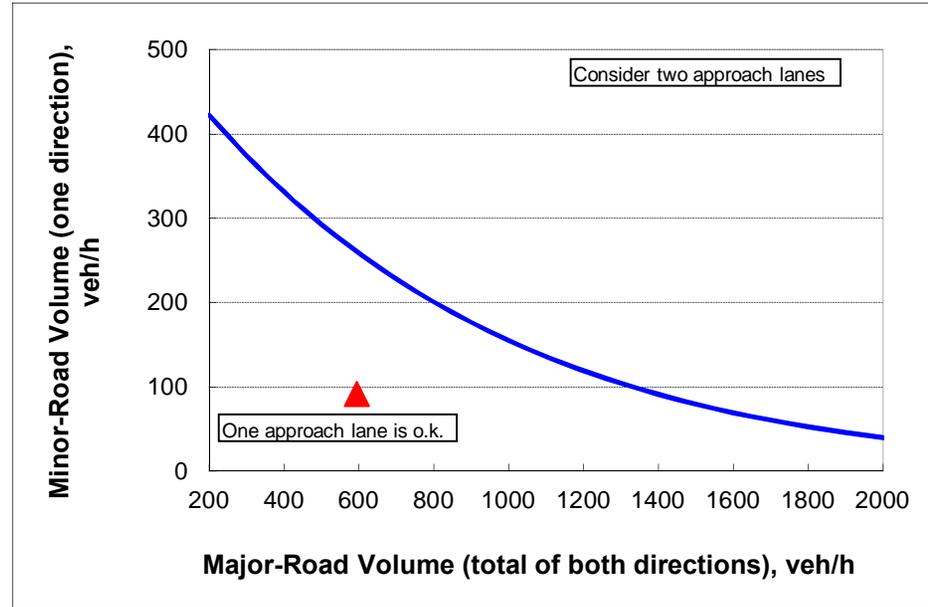
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	593
Percentage of right-turns on minor road, %:	17%
Minor-road volume (one direction), veh/h:	92

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	261
<b>Guidance for determining minor-road approach geometry:</b>	
<b>ONE approach lane is o.k.</b>	



**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:** 68th Street

**Minor Roadway:** Norris High School

**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:	446
Percentage of right-turns on minor road, %:	17%
Minor-road volume (one direction), veh/h:	145

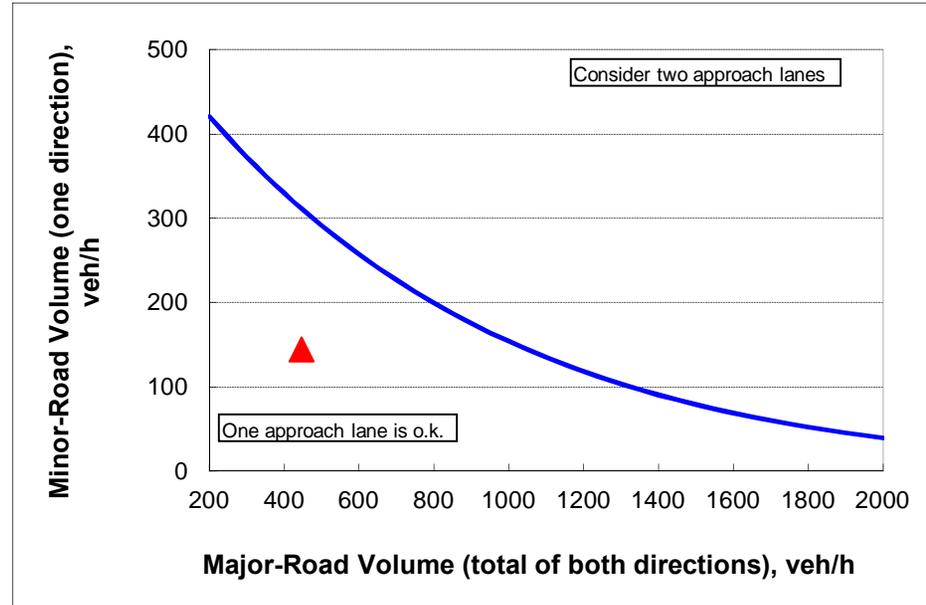
**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	312
<b>Guidance for determining minor-road approach geometry:</b>	
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:** 68th Street  
**Minor Roadway:** Norris High School  
**Approach:** Eastbound  
**Peak Period:** PM Peak Hour

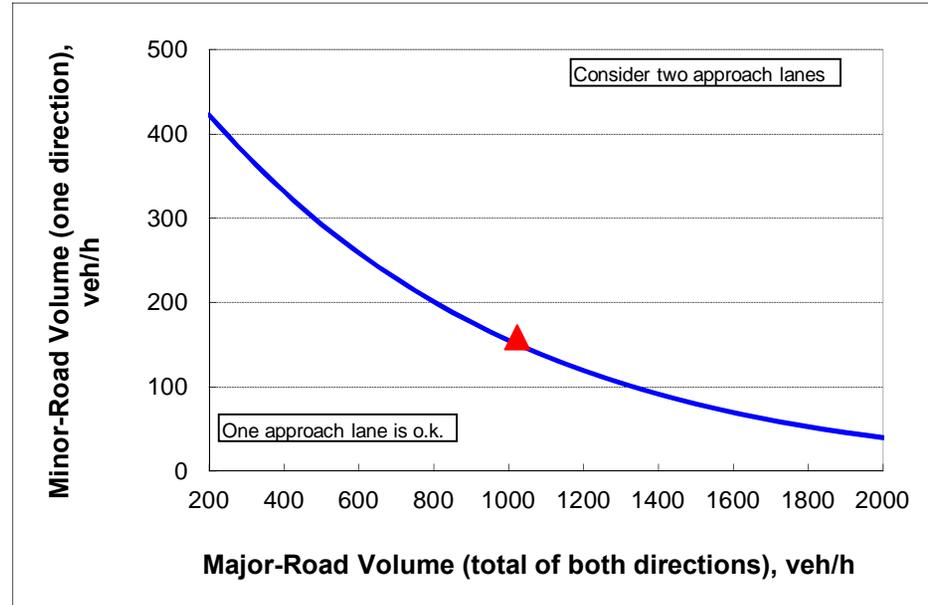
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	1021
Percentage of right-turns on minor road, %:	18%
Minor-road volume (one direction), veh/h:	159

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	151
<b>Guidance for determining minor-road approach geometry:</b>	
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:** 68th Street  
**Minor Roadway:** Norris High School  
**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:	768
Percentage of right-turns on minor road, %:	16%
Minor-road volume (one direction), veh/h:	249

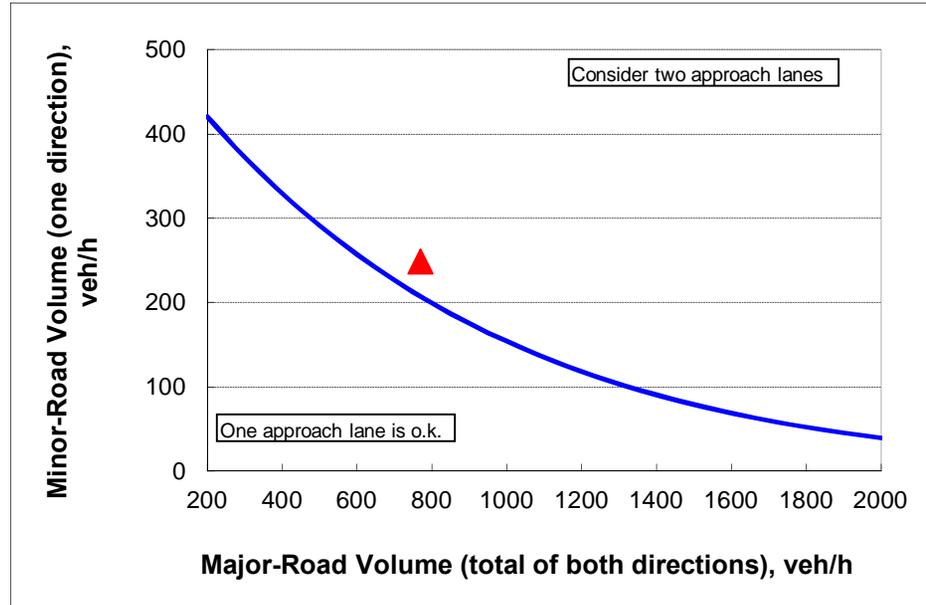
**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	208
<b>Guidance for determining minor-road approach geometry:</b>	
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:** 68th Street  
**Minor Roadway:** Norris High School  
**Approach:** Eastbound  
**Peak Period:** PM Peak Hour

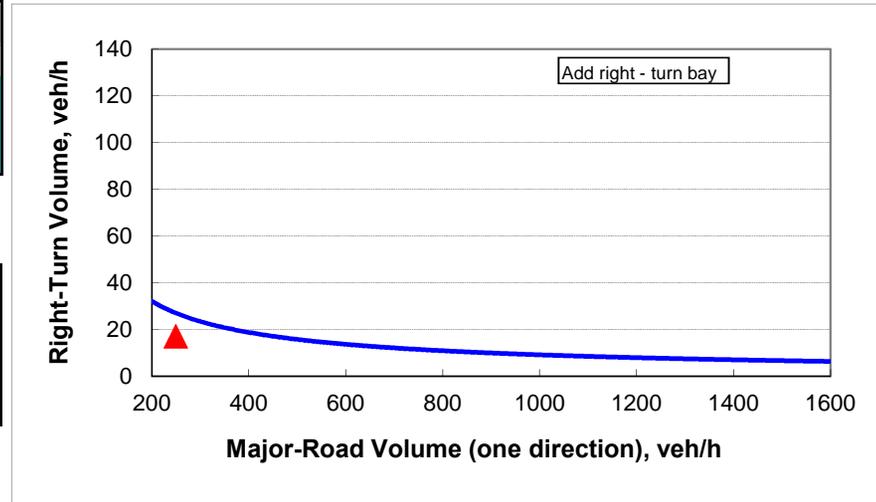
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		249
Right-turn volume, veh/h:		17

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		27
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Do NOT add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Northbound

**Peak Period:** AM Peak Hour

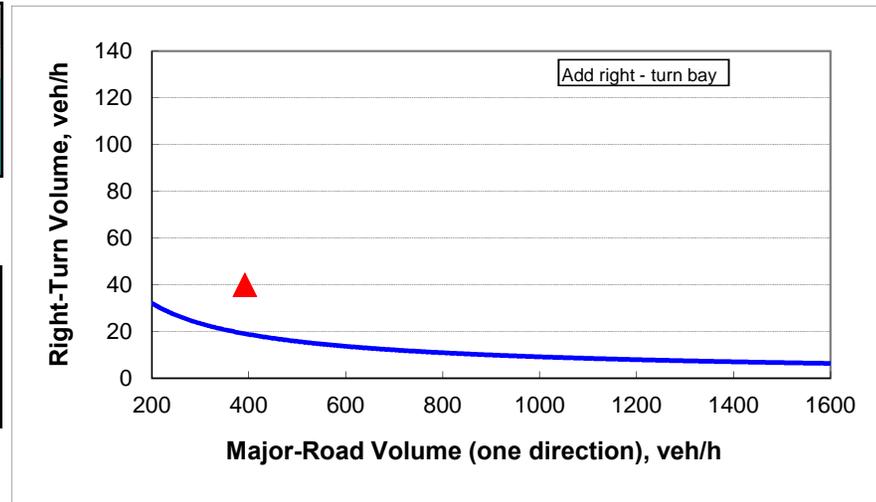
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	392
Right-turn volume, veh/h:	40

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	19
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Northbound

**Peak Period:** PM Peak Hour

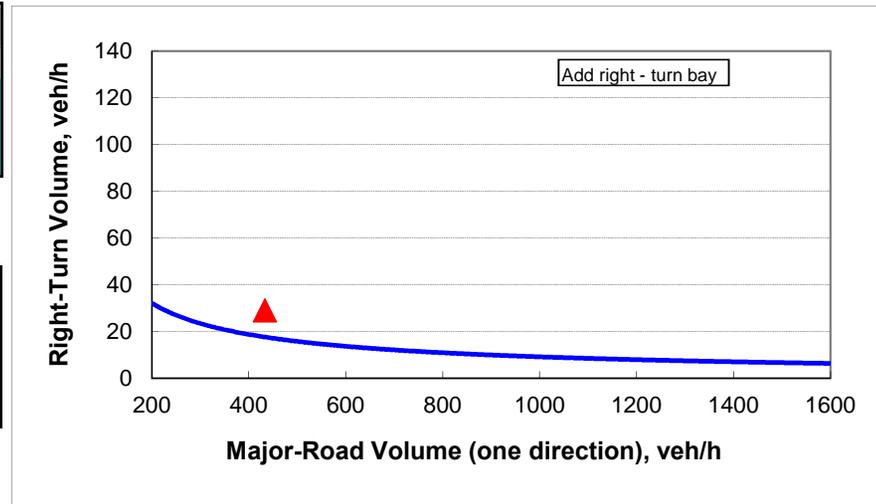
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	433
Right-turn volume, veh/h:	29

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	18
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Northbound

**Peak Period:** AM Peak Hour

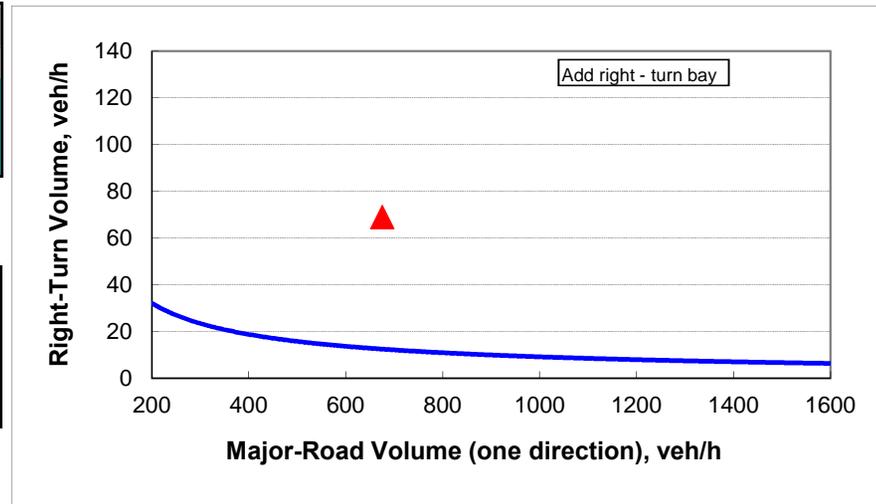
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	675
Right-turn volume, veh/h:	69

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	12
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Northbound

**Peak Period:** PM Peak Hour

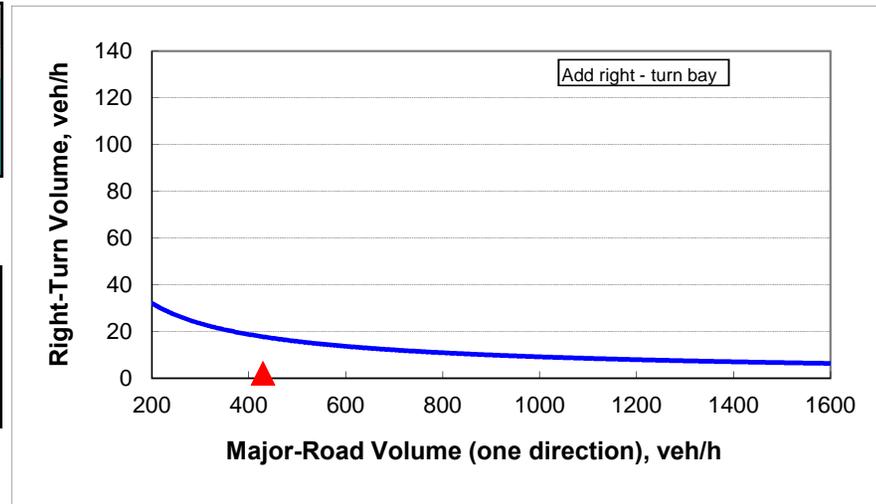
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	429
Right-turn volume, veh/h:	2

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	18
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Do NOT add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Southbound

**Peak Period:** AM Peak Hour

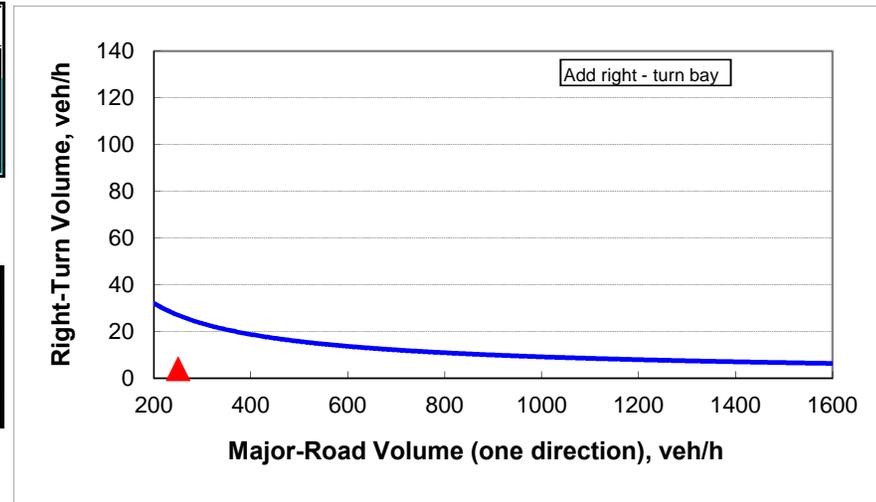
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		250
Right-turn volume, veh/h:		4

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		27
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Do NOT add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig  
**Scenario:** 2018 Existing  
**Major Roadway:** 68th Street  
**Minor Roadway:** Panama Road  
**Approach:** Southbound  
**Peak Period:** PM Peak Hour

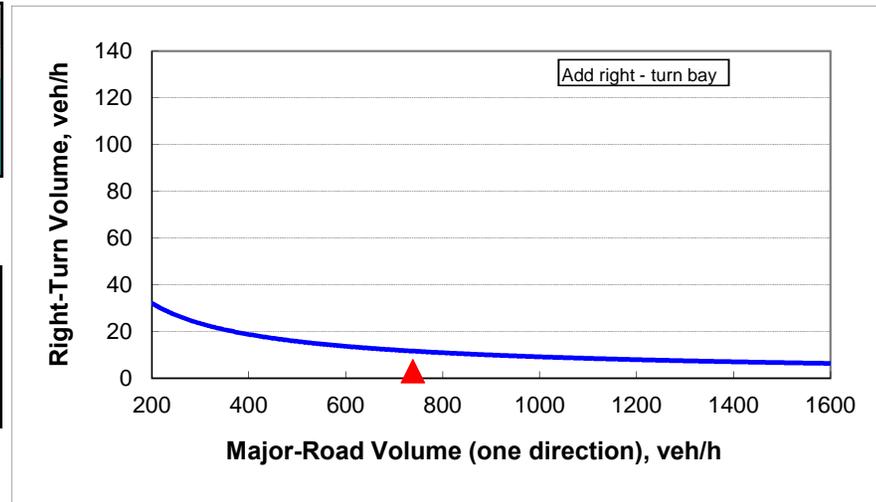
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		738
Right-turn volume, veh/h:		3

OUTPUT

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



**Analyst:** Felsburg Holt & Ullevig  
**Scenario:** 2040 Future  
**Major Roadway:** 68th Street  
**Minor Roadway:** Panama Road  
**Approach:** Southbound  
**Peak Period:** AM Peak Hour

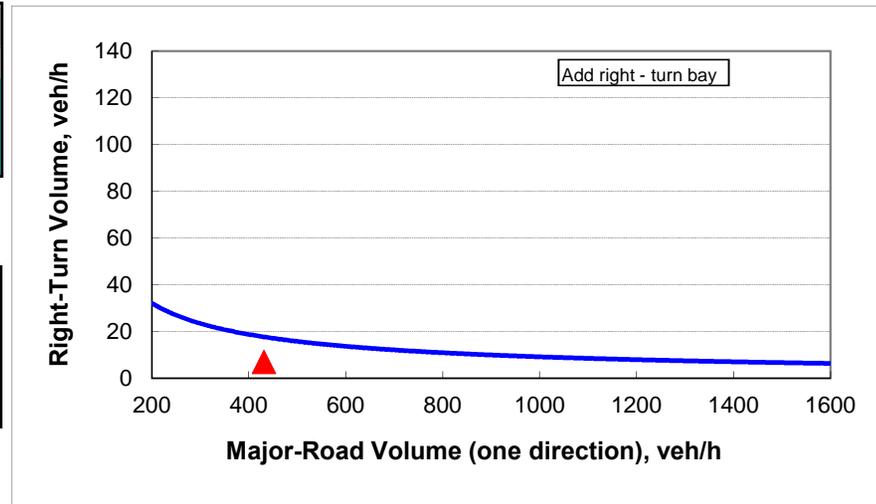
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	431
Right-turn volume, veh/h:	7

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	18
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Do NOT add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Southbound

**Peak Period:** PM Peak Hour

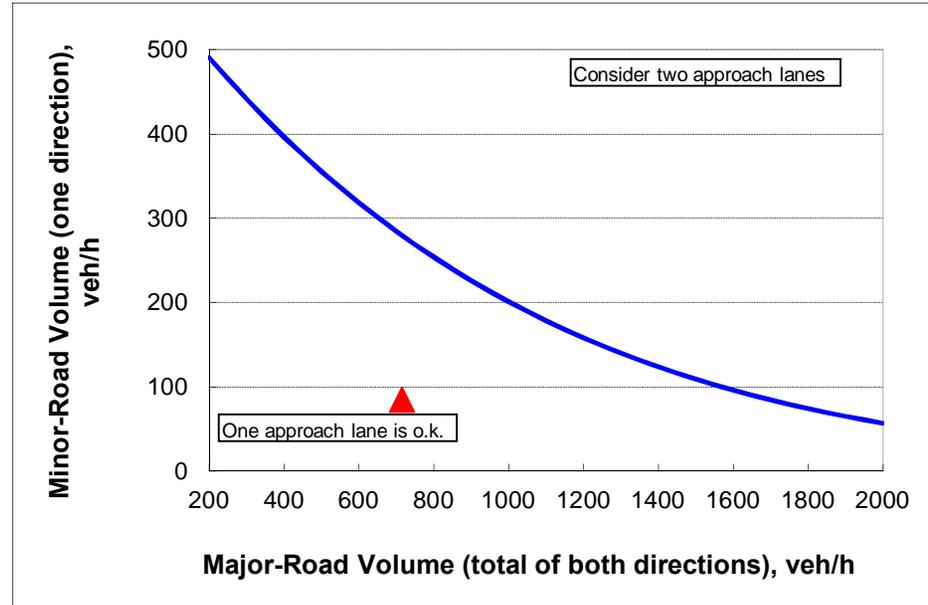
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	714
Percentage of right-turns on minor road, %:	48%
Minor-road volume (one direction), veh/h:	85

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	280
<b>Guidance for determining minor-road approach geometry:</b>	
<b>ONE approach lane is o.k.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton 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:	559
Percentage of right-turns on minor road, %:	22%
Minor-road volume (one direction), veh/h:	110

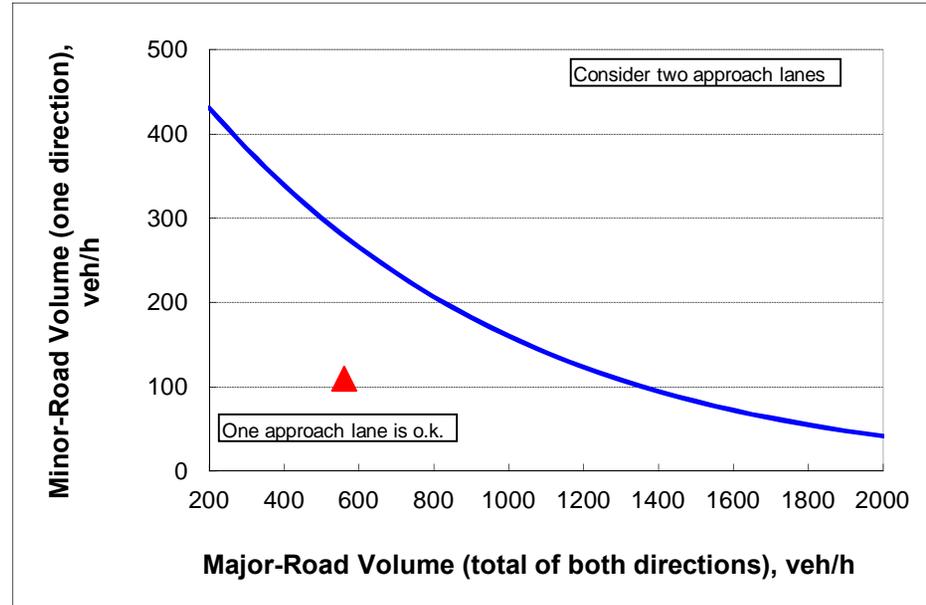
**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	279
<b>Guidance for determining minor-road approach geometry:</b>	
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:** 68th Street  
**Minor Roadway:** Princeton Road  
**Approach:** Eastbound  
**Peak Period:** PM Peak Hour

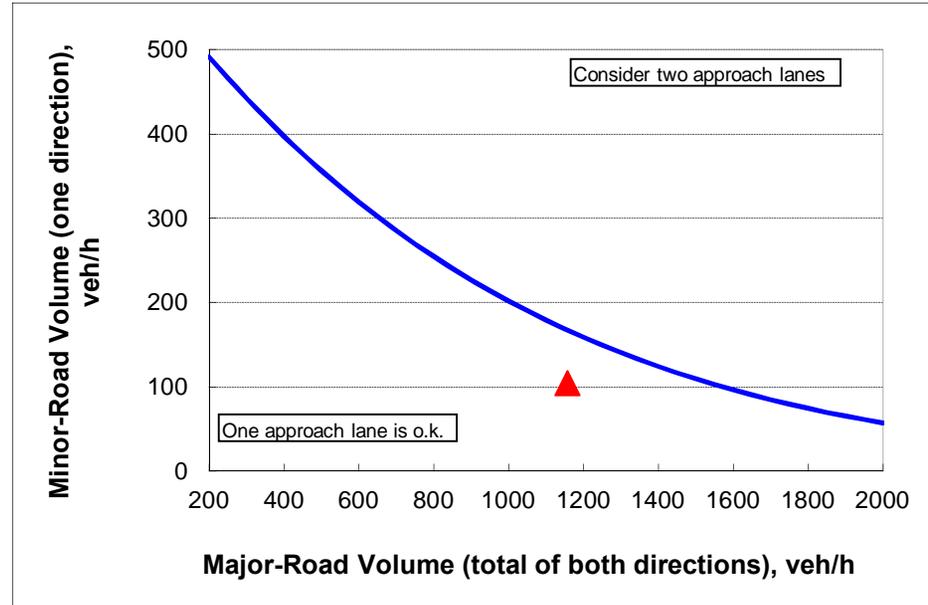
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	1156
Percentage of right-turns on minor road, %:	49%
Minor-road volume (one direction), veh/h:	105

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	168
<b>Guidance for determining minor-road approach geometry:</b>	
<b>ONE approach lane is o.k.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton 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:	963
Percentage of right-turns on minor road, %:	22%
Minor-road volume (one direction), veh/h:	137

**OUTPUT**

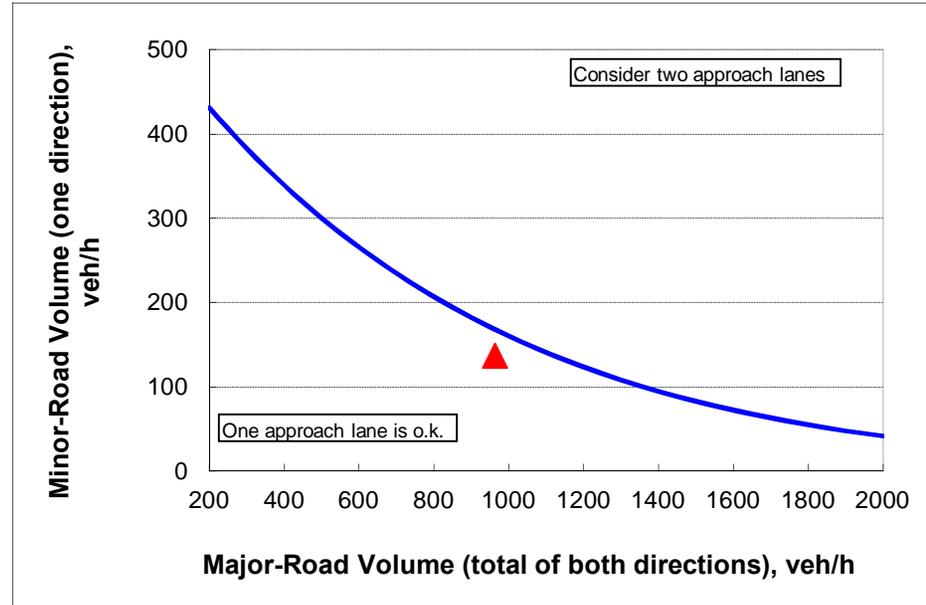
Variable	Value
Limiting minor-road volume (one direction), veh/h:	168
<b>Guidance for determining minor-road approach geometry:</b>	
ONE approach lane is o.k.	

**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:** 68th Street  
**Minor Roadway:** Princeton 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.**

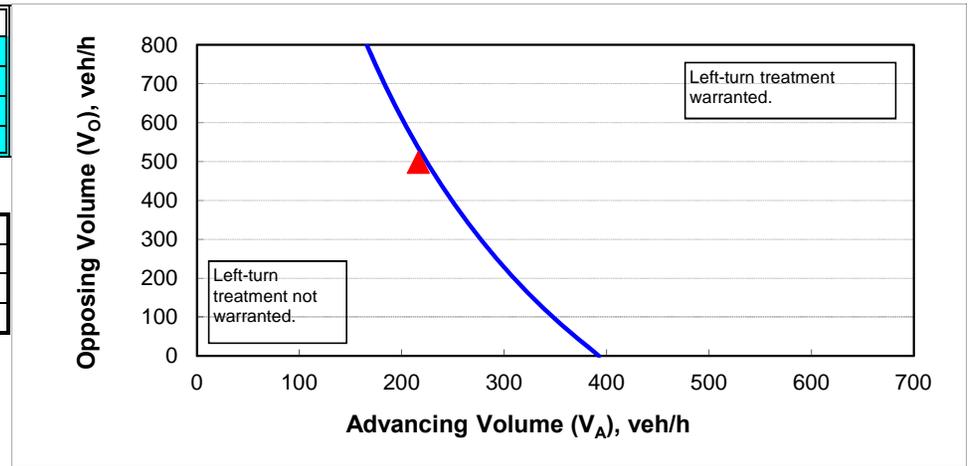
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	14%
Advancing volume ( $V_A$ ), veh/h:	216
Opposing volume ( $V_O$ ), veh/h:	498

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	225
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton Road

**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.**

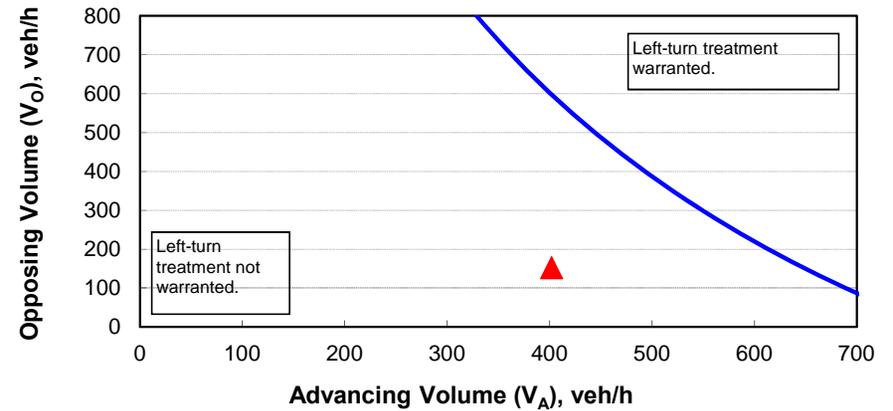
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	3%
Advancing volume ( $V_A$ ), veh/h:	402
Opposing volume ( $V_O$ ), veh/h:	152

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	648
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton 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.**

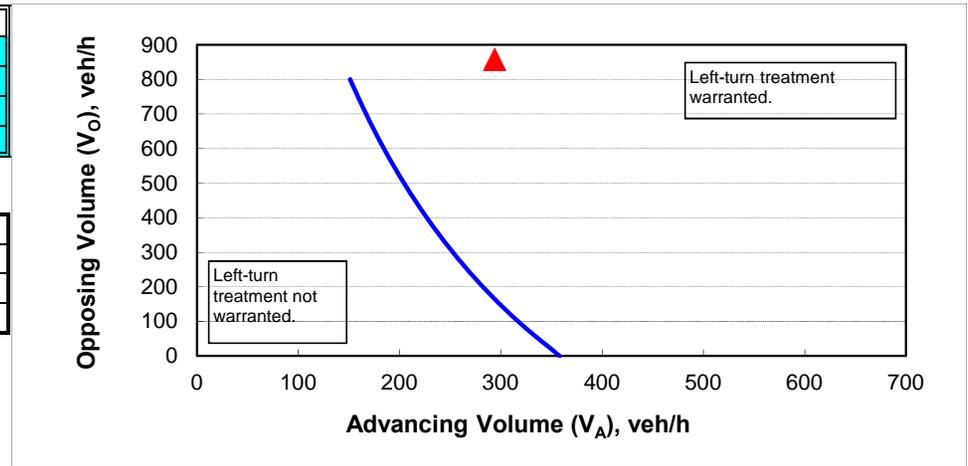
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	18%
Advancing volume ( $V_A$ ), veh/h:	294
Opposing volume ( $V_O$ ), veh/h:	857

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	143
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment warranted.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton Road

**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.**

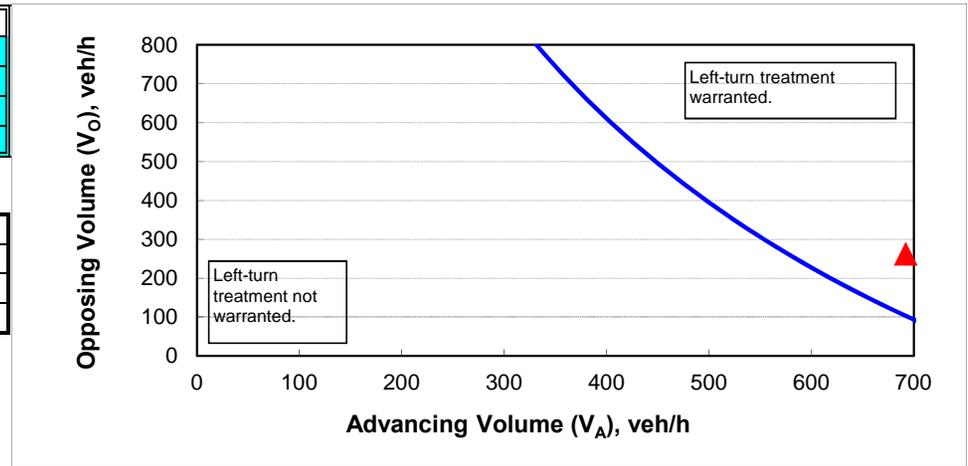
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	3%
Advancing volume ( $V_A$ ), veh/h:	692
Opposing volume ( $V_O$ ), veh/h:	262

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	577
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment warranted.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Northbound

**Peak Period:** PM Peak Hour

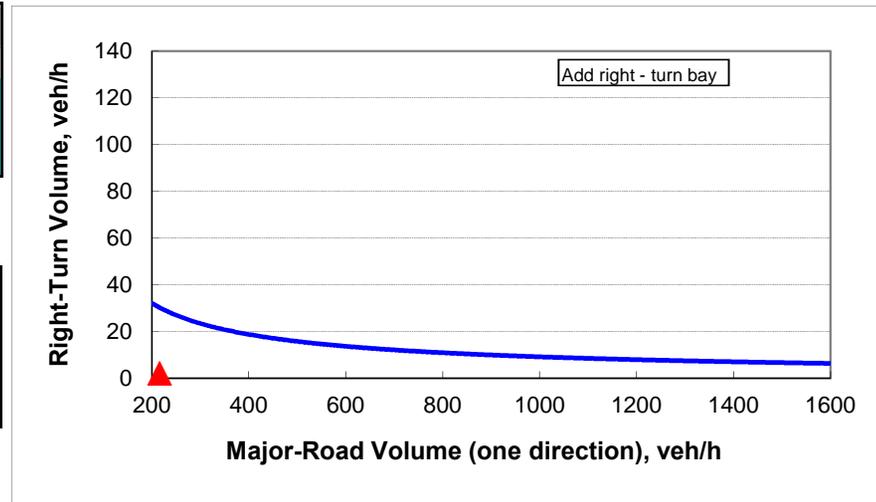
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
Variable	Value	
Major-road speed, mph:	55	
Major-road volume (one direction), veh/h:	216	
Right-turn volume, veh/h:	2	

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	30
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Do NOT add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Northbound

**Peak Period:** AM Peak Hour

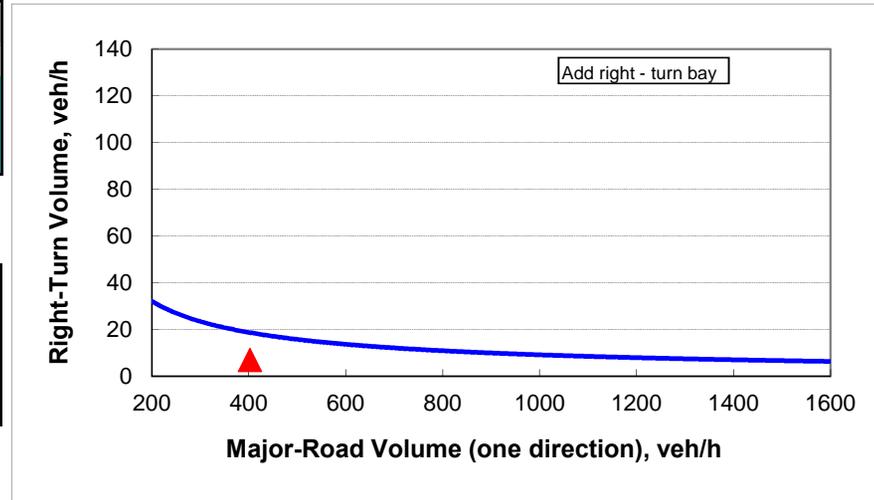
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	402
Right-turn volume, veh/h:	7

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	19
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Do NOT add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Northbound

**Peak Period:** PM Peak Hour

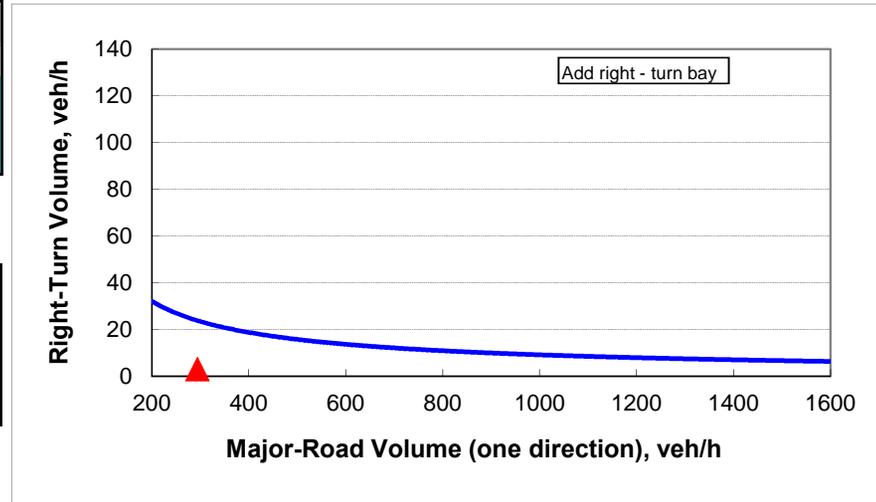
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	294
Right-turn volume, veh/h:	3

OUTPUT

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



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Northbound

**Peak Period:** AM Peak Hour

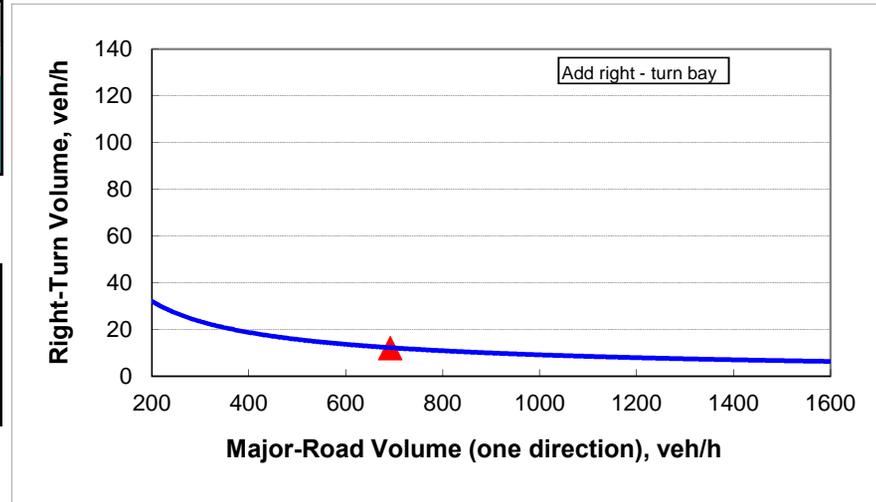
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	692
Right-turn volume, veh/h:	12

OUTPUT

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



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton 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.**

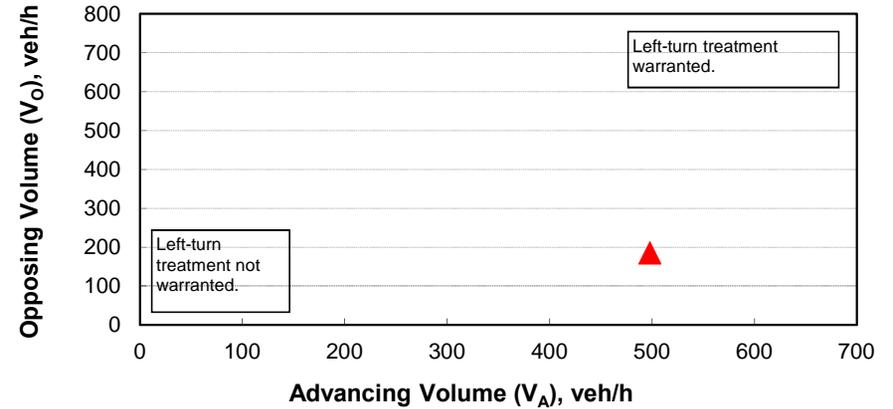
**2-lane roadway (English)**

INPUT

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	0%
Advancing volume ( $V_A$ ), veh/h:	498
Opposing volume ( $V_O$ ), veh/h:	185

OUTPUT

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	2466
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



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:** 68th Street

**Minor Roadway:** Princeton Road

**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.**

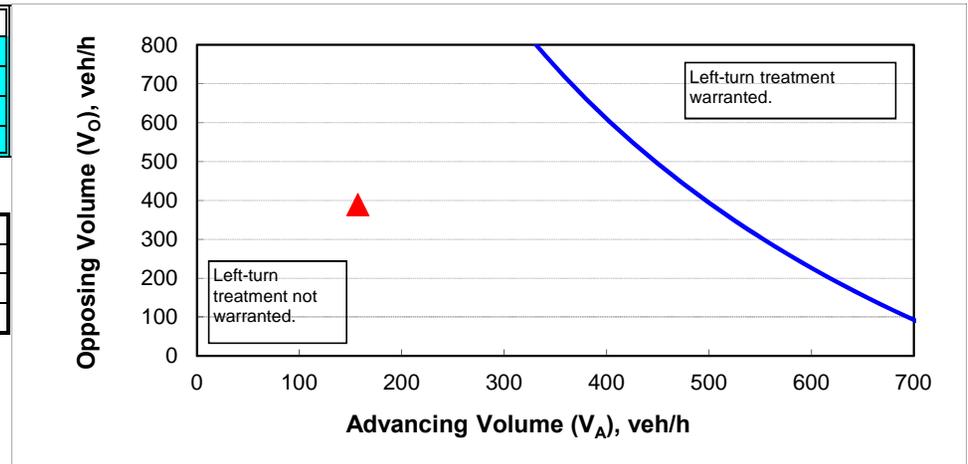
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	3%
Advancing volume ( $V_A$ ), veh/h:	157
Opposing volume ( $V_O$ ), veh/h:	389

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	503
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton Road

**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.**

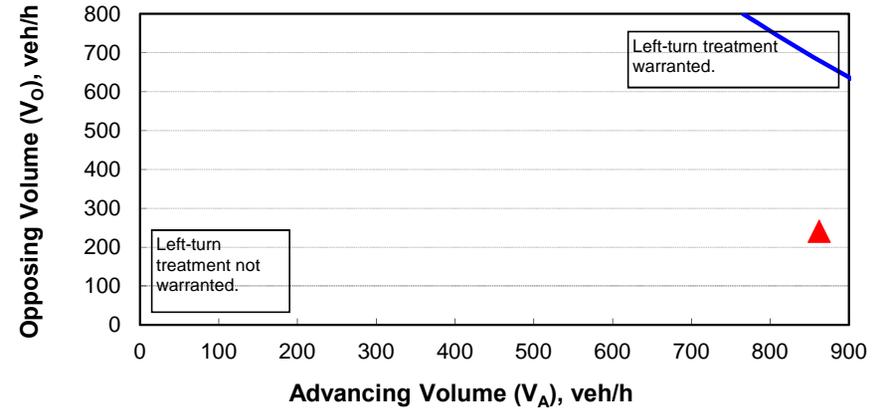
**2-lane roadway (English)**

INPUT

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	1%
Advancing volume ( $V_A$ ), veh/h:	862
Opposing volume ( $V_O$ ), veh/h:	241

OUTPUT

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	1365
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



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:** 68th Street

**Minor Roadway:** Princeton Road

**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.**

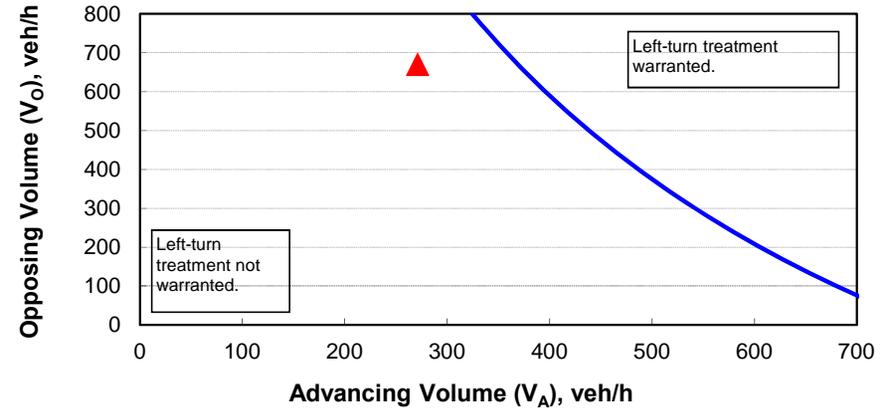
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	55
Percent of left-turns in advancing volume ( $V_A$ ), %:	3%
Advancing volume ( $V_A$ ), veh/h:	271
Opposing volume ( $V_O$ ), veh/h:	670

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	369
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
<b>Left-turn treatment NOT warranted.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Southbound

**Peak Period:** PM Peak Hour

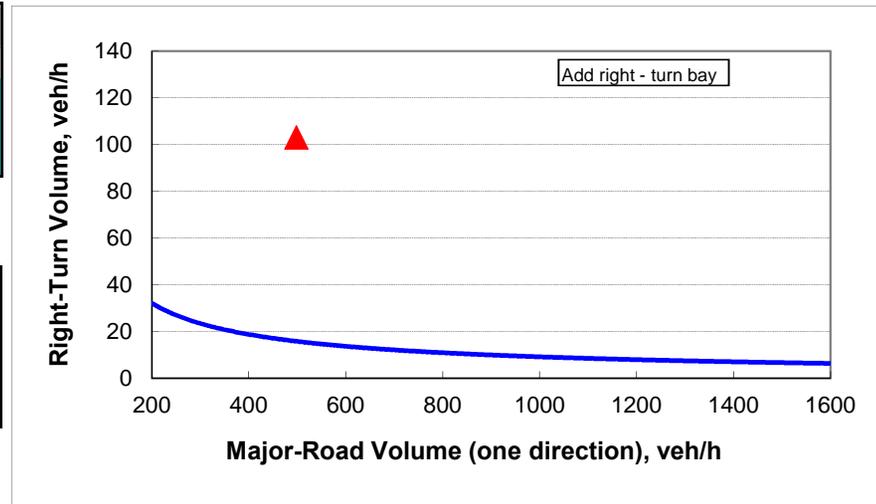
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	498
Right-turn volume, veh/h:	103

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	16
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Southbound

**Peak Period:** AM Peak Hour

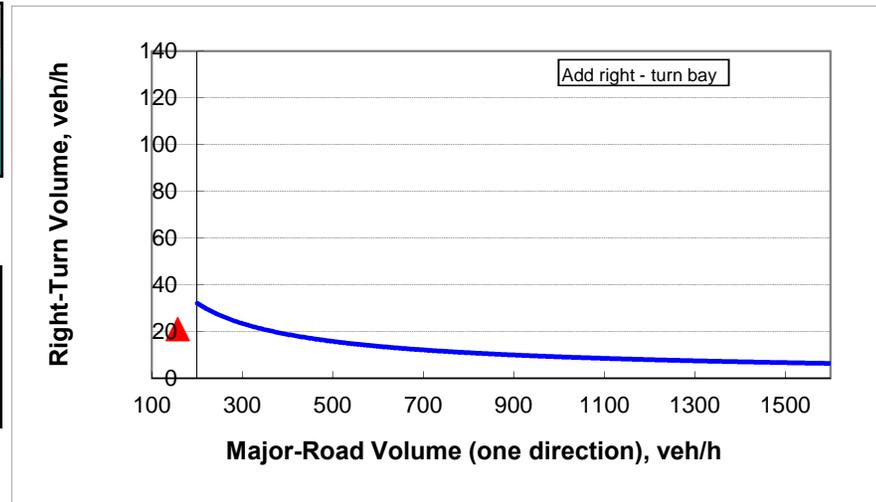
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		157
Right-turn volume, veh/h:		21

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		39
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Do NOT add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Southbound

**Peak Period:** PM Peak Hour

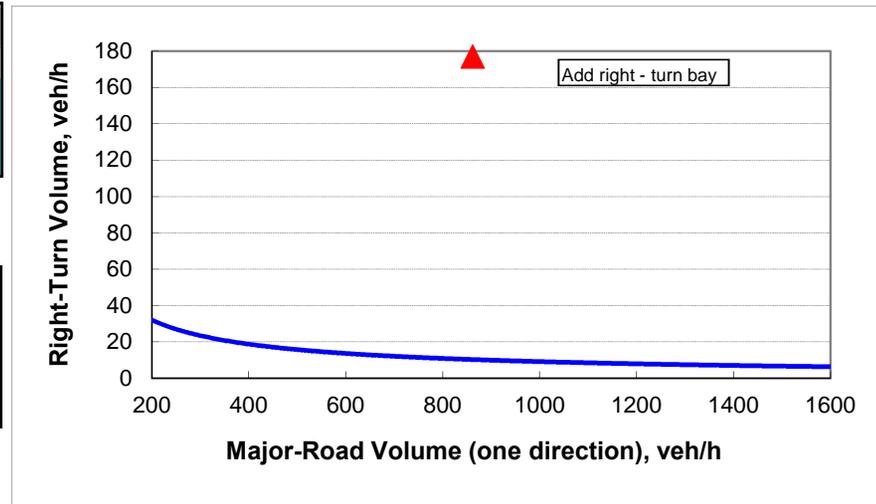
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		862
Right-turn volume, veh/h:		177

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		10
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Southbound

**Peak Period:** AM Peak Hour

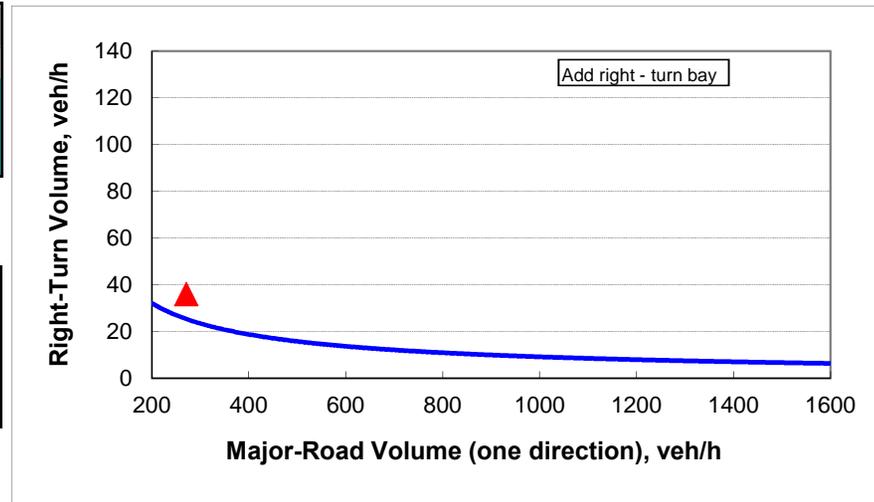
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		271
Right-turn volume, veh/h:		36

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		25
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Southbound

**Peak Period:** PM Peak Hour

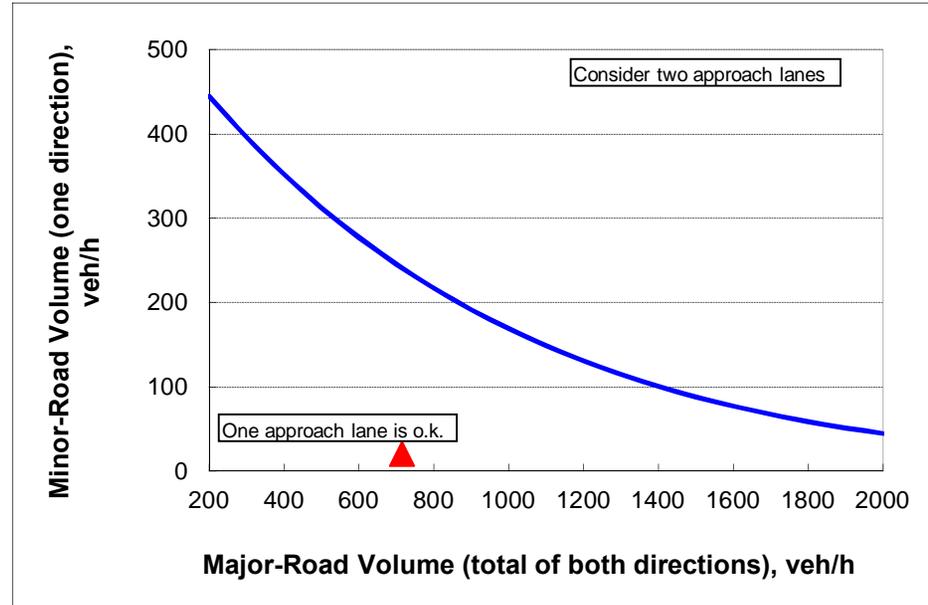
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	714
Percentage of right-turns on minor road, %:	29%
Minor-road volume (one direction), veh/h:	21

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	241
<b>Guidance for determining minor-road approach geometry:</b>	
<b>ONE approach lane is o.k.</b>	



**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

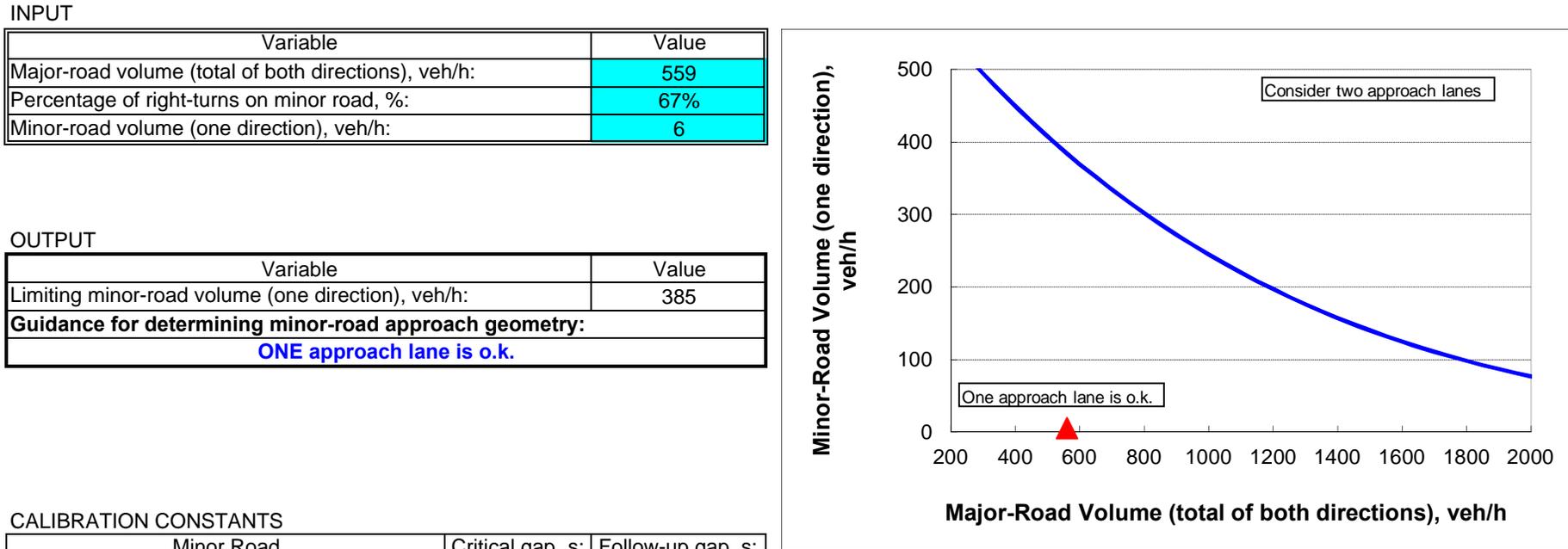
**Major Roadway:** 68th Street

**Minor Roadway:** Princeton Road

**Approach:** Westbound

**Peak Period:** AM Peak Hour

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



**Analyst:** Felsburg Holt & Ullevig  
**Scenario:** 2018 Existing  
**Major Roadway:** 68th Street  
**Minor Roadway:** Princeton Road  
**Approach:** Westbound  
**Peak Period:** PM Peak Hour

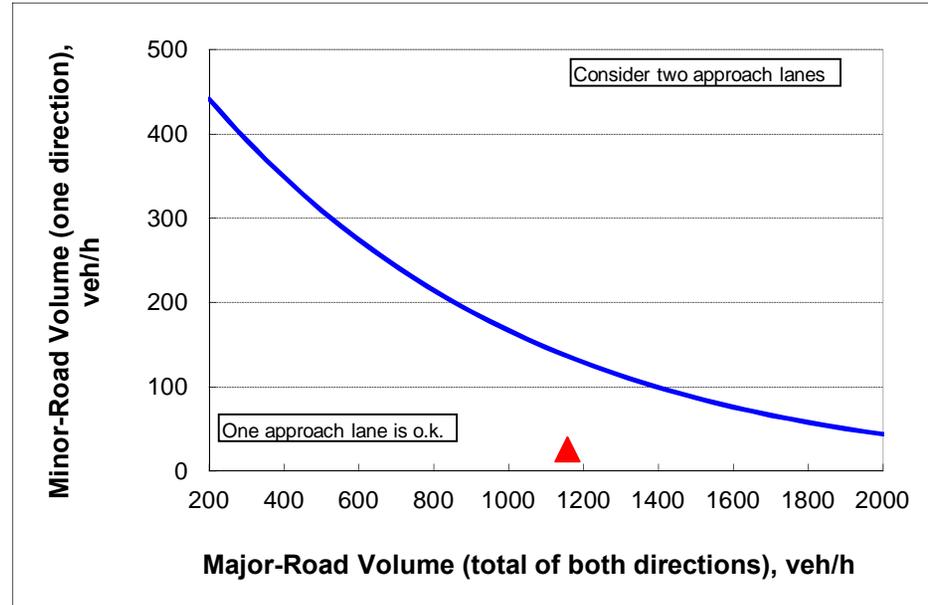
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	1156
Percentage of right-turns on minor road, %:	27%
Minor-road volume (one direction), veh/h:	26

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	137
<b>Guidance for determining minor-road approach geometry:</b>	
<b>ONE approach lane is o.k.</b>	



**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:** 68th Street

**Minor Roadway:** Princeton 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:	963
Percentage of right-turns on minor road, %:	42%
Minor-road volume (one direction), veh/h:	12

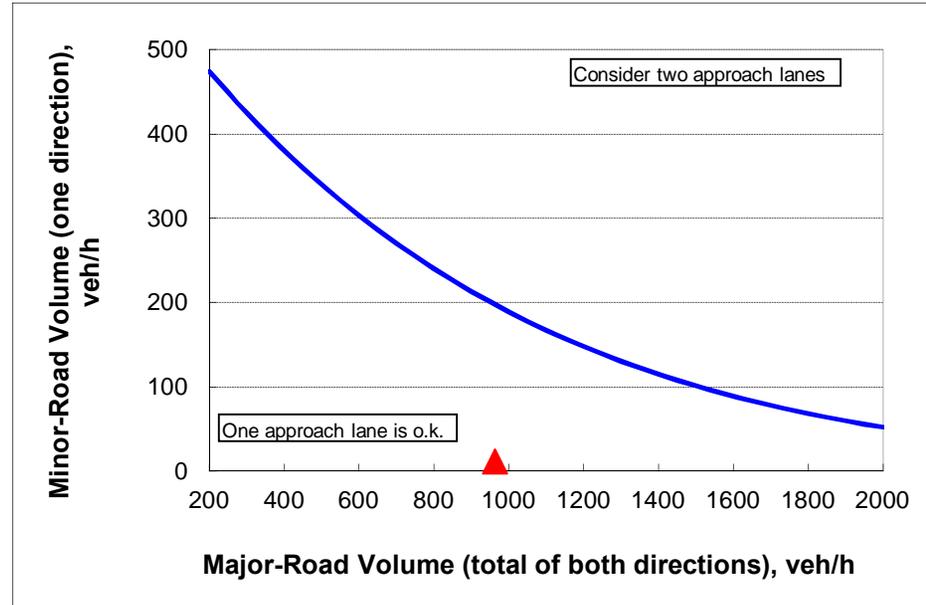
**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	198
<b>Guidance for determining minor-road approach geometry:</b>	
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:** 68th Street  
**Minor Roadway:** Princeton Road  
**Approach:** Westbound  
**Peak Period:** PM Peak Hour

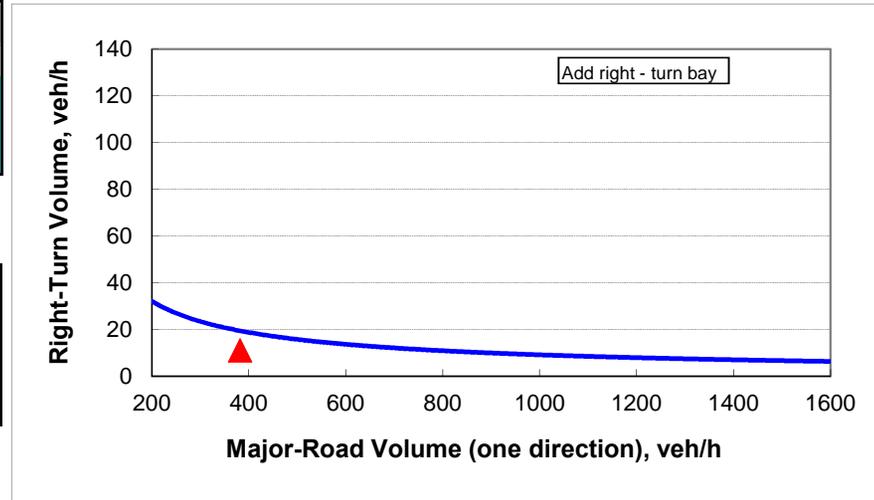
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	382
Right-turn volume, veh/h:	11

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	19
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Do NOT add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Roca Road

**Approach:** Northbound

**Peak Period:** AM Peak Hour

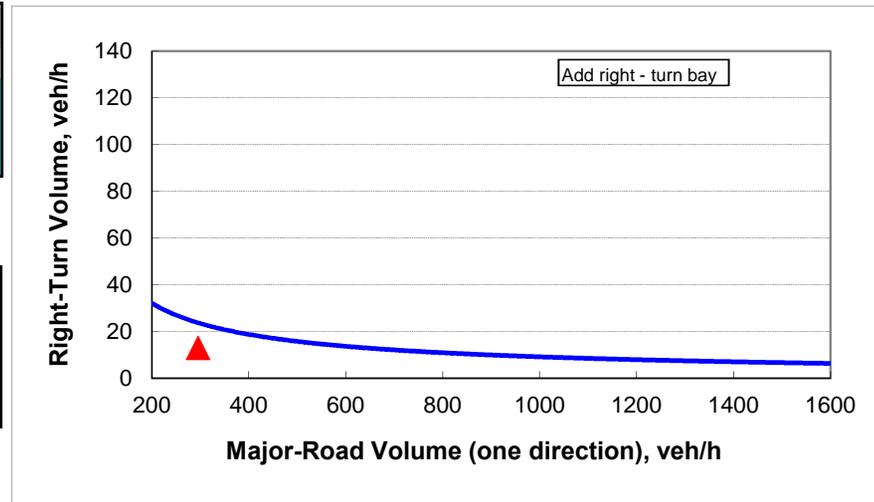
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		295
Right-turn volume, veh/h:		13

OUTPUT

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



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2018 Existing

**Major Roadway:** 68th Street

**Minor Roadway:** Roca Road

**Approach:** Northbound

**Peak Period:** PM Peak Hour

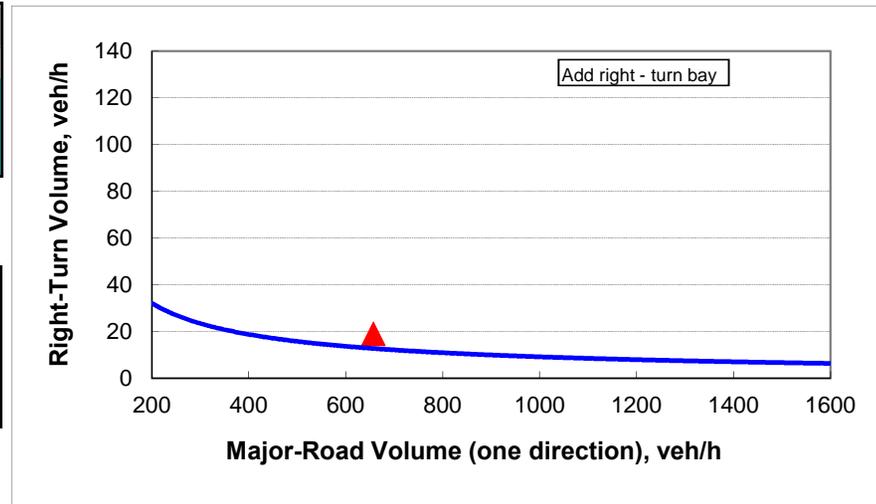
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	657
Right-turn volume, veh/h:	19

OUTPUT

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



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Roca Road

**Approach:** Northbound

**Peak Period:** AM Peak Hour

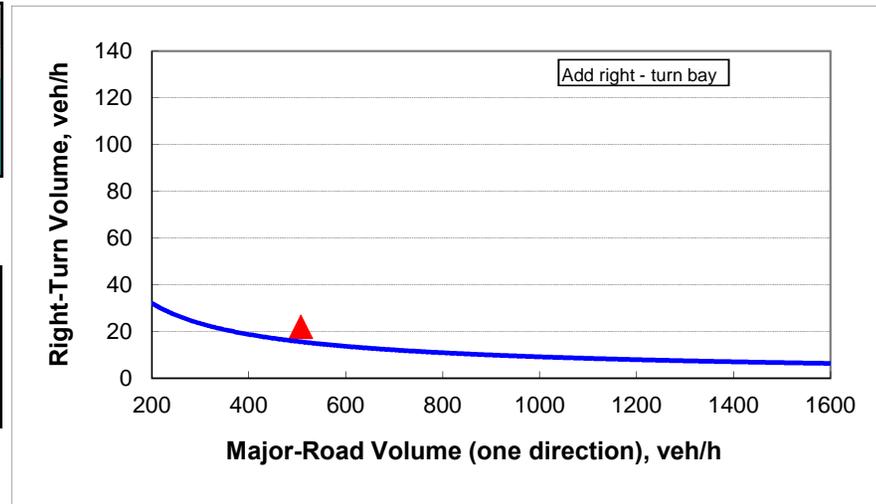
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	507
Right-turn volume, veh/h:	22

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	16
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Roca Road

**Approach:** Northbound

**Peak Period:** PM Peak Hour

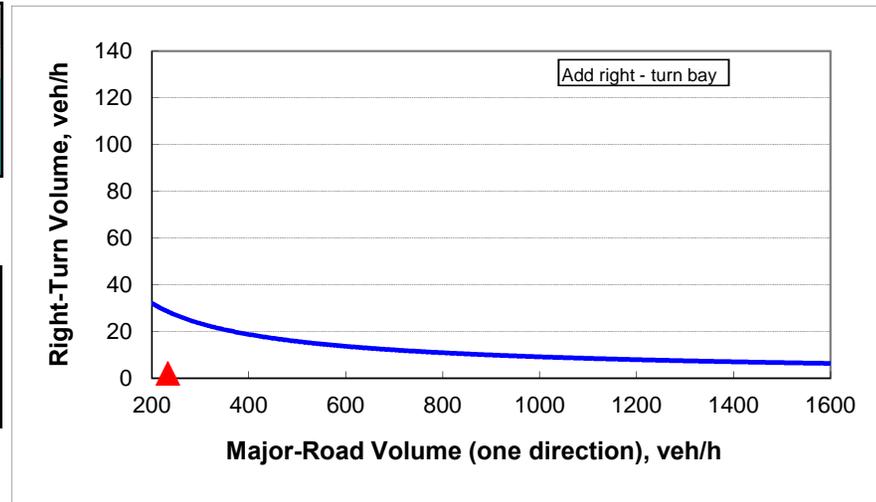
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		233
Right-turn volume, veh/h:		2

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		29
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>		
<b>Do NOT add right-turn bay.</b>		



**Analyst:** Felsburg Holt & Ullevig  
**Scenario:** 2018 Existing  
**Major Roadway:** 68th Street  
**Minor Roadway:** Panama Road  
**Approach:** Southbound  
**Peak Period:** AM Peak Hour

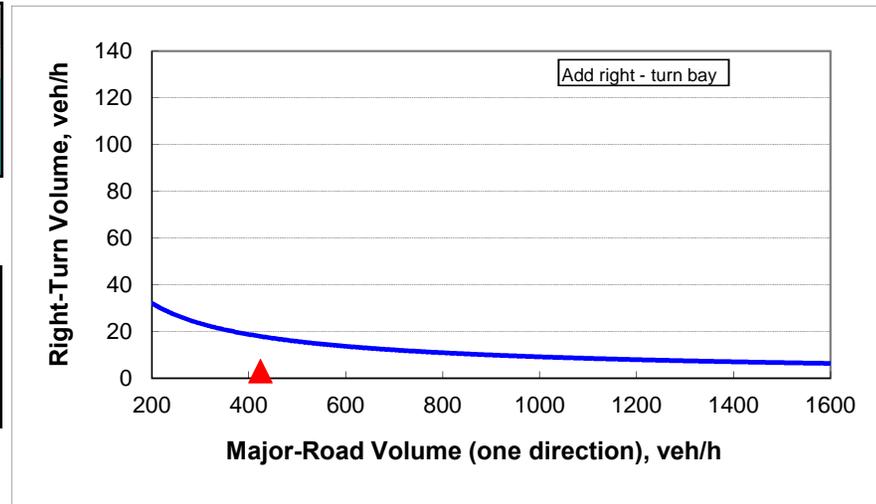
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	424
Right-turn volume, veh/h:	3

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	18
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Do NOT add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig  
**Scenario:** 2018 Existing  
**Major Roadway:** 68th Street  
**Minor Roadway:** Panama Road  
**Approach:** Southbound  
**Peak Period:** PM Peak Hour

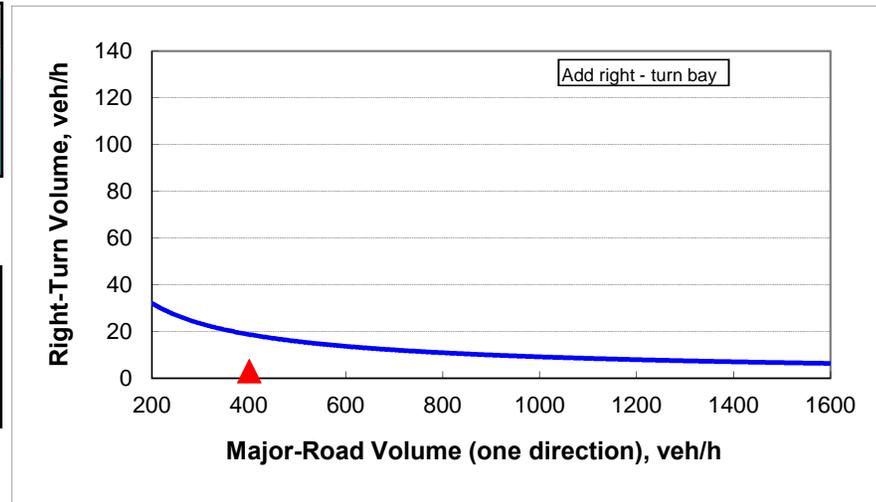
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway
Variable	Value
Major-road speed, mph:	55
Major-road volume (one direction), veh/h:	401
Right-turn volume, veh/h:	3

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	19
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
<b>Do NOT add right-turn bay.</b>	



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Southbound

**Peak Period:** AM Peak Hour

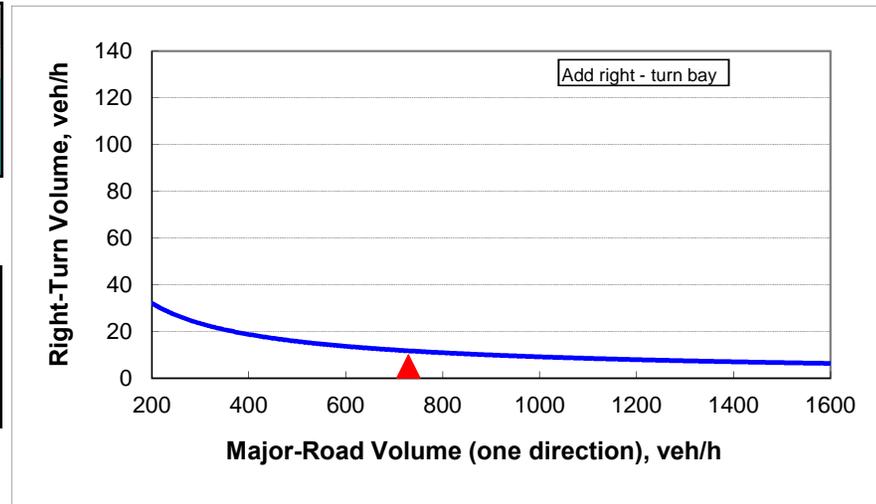
Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

INPUT

Roadway geometry:	2-lane roadway	
	Variable	Value
Major-road speed, mph:		55
Major-road volume (one direction), veh/h:		729
Right-turn volume, veh/h:		5

OUTPUT

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



**Analyst:** Felsburg Holt & Ullevig

**Scenario:** 2040 Future

**Major Roadway:** 68th Street

**Minor Roadway:** Panama Road

**Approach:** Southbound

**Peak Period:** PM Peak Hour

## CRASH HISTORY

## ACCIDENT RATE ANALYSIS

District 1  
Lancaster County  
S. 68<sup>th</sup> St. from Firth Rd. to Saltillo 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 Months Study

During the above stated time period, this section of S. 68<sup>th</sup> St. experienced a total of one hundred and eleven accidents. Of these, two were fatal injury accidents resulting in two deaths and injury to two people. Forty-five were non-fatal injury accidents resulting in injury to seventy people. Fifty-two were reportable property damage only accidents and twelve were non-reportable property damage only accidents.

### **S. 68<sup>th</sup> St. from Firth Rd. (Begin S. 68<sup>th</sup> St. Study) to Hickman S. Corp. Limits**

During the above stated time period, this section of S. 68<sup>th</sup> St. experienced a total of thirty-one accidents. Of these, one was a fatal injury accident resulting in one death and injury to two people. Thirteen were non-fatal injury accidents resulting in injury to twenty-five people. Fourteen were reportable property damage only accidents and three were non-reportable property damage only accidents. The accident rate is 1.031 acc/mvm (accidents/million vehicle miles).

### **S. 68<sup>th</sup> St. from Hickman S. Corp. Limits to Hickman N. Corp. Limits**

During the above stated time period, this section of S. 68<sup>th</sup> St. experienced a total of thirty accidents. Of these, fourteen were non-fatal injury accidents resulting in injury to twenty-one people. Fourteen were reportable property damage only accidents and two were non-reportable property damage only accidents. The accident rate is 2.869 acc/mvm.

### **S. 68<sup>th</sup> St. from Hickman N. Corp. Limits to Saltillo Rd. – End S. 68<sup>th</sup> St. Study**

During the above stated time period, this section of S. 68<sup>th</sup> St. experienced a total of fifty accidents. Of these, one was a fatal injury accident resulting in one death. Eighteen were non-fatal injury accidents resulting in injury to twenty-four people. Twenty-four were reportable property damage only accidents and seven were non-reportable property damage only accidents. The accident rate is 0.775 acc/mvm.

Note: During the above stated time period, seventeen accidents (15%) on S. 68<sup>th</sup> St. were animal related.

#### **Confidential Information:**

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Years	2013	2014	2015	2016	2017	2018	Total	%
<b>TOTAL ACCIDENTS</b>	20	18	24	25	22	2	111	100%
Fatal Accident	0	0	1	0	1	0	2	2%
Nonfatal Injury Accident	7	8	8	11	11	0	45	41%
Property Damage (Reportable)	10	7	14	10	9	2	52	47%
Property Damage (Non-Reportable)	3	3	1	4	1	0	12	11%
<b>CASUALTIES</b>								
Killed	0	0	1	0	1	0	2	3%
Injured	14	12	11	18	17	0	72	97%
<b>MULTI-VEHICLE ACCIDENT TYPE</b>								
Angle	7	5	7	4	5	0	28	25%
Left Turn Leaving	1	1	1	1	2	0	6	5%
Rear-end	5	3	4	10	11	0	33	30%
Head-on	0	0	0	0	0	0	0	0%
Sideswipe (Same Direction)	1	0	3	0	0	0	4	4%
Sideswipe (Opposite Direction)	0	0	1	2	0	2	5	5%
Backing	0	0	0	1	0	0	1	1%
Unknown	0	0	0	0	0	0	0	0%
Not Applicable	6	9	8	7	4	0	34	31%
<b>FIRST HARMFUL EVENT</b>								
Overturn	3	1	1	1	1	0	7	6%
Other Non-Collision	0	0	0	0	0	0	0	0%
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	2	4	6	2	3	0	17	15%
Motor Vehicle	14	9	16	18	18	2	77	69%
Parked Vehicle	0	0	0	0	0	0	0	0%
Fixed Object	1	4	1	4	0	0	10	9%
Other Object	0	0	0	0	0	0	0	0%
Unknown	0	0	0	0	0	0	0	0%
<b>LIGHT CONDITION</b>								
Daylight	13	13	12	15	19	1	73	66%
Dawn/Dusk	1	0	1	2	1	0	5	5%
Dark (Street Lighting)	3	3	3	3	0	0	12	11%
Dark	3	2	8	4	2	1	20	18%
Unknown	0	0	0	1	0	0	1	1%
<b>ROAD SURFACE CONDITION</b>								
Dry	14	14	18	19	20	1	86	77%
Wet	2	0	5	3	1	0	11	10%
Snowy/Icy	3	4	1	1	1	1	11	10%
Unknown	1	0	0	2	0	0	3	3%
<b>ROAD CHARACTER</b>								
Straight and Level	10	8	14	14	15	1	62	56%
Straight and on Slope	9	7	8	11	6	1	42	38%
Straight and on Hilltop	1	1	1	0	0	0	3	3%
Curved and Level	0	1	1	0	0	0	2	2%
Curved and on Slope	0	1	0	0	1	0	2	2%
Curved and on Hilltop	0	0	0	0	0	0	0	0%
Unknown	0	0	0	0	0	0	0	0%
<b>Contributing Circumstances, Road</b>								
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	1	0	0	1	1%
Traffic control device inoperative, etc	0	0	0	0	0	0	0	0%
Shoulders (none, low, soft and high)	0	0	0	0	0	0	0	0%
Other	2	4	2	1	1	1	11	10%
Unknown	1	0	0	0	0	0	1	1%
None	17	14	22	23	21	1	98	88%

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<b>SUMMARY:</b>								
<b>Total Accidents:</b>	111							
<b>Fatal Accidents:</b>	2							
<b>Injury Accidents:</b>	45							
<b>Property Damage (Reportable):</b>	52							
<b>Property Damage (Non-Reportable):</b>	12							
Years	2013	2014	2015	2016	2017	2018	Total	%
<b>WEATHER CONDITION</b>								
Rain	1	0	4	3	1	0	9	8%
Sleet/hail/freezing rain	1	0	0	0	0	0	1	1%
Snow	0	1	0	2	0	0	3	3%
Fog	0	0	0	0	0	0	0	0%
High winds	0	0	0	0	0	0	0	0%
Other	0	1	1	0	0	0	2	2%
No adverse conditions	18	16	19	20	21	2	96	86%
Unknown	0	0	0	0	0	0	0	0%
<b>Contributing Circumstances, Drivers</b>								
No improper driving	16	12	24	22	27	2	103	69%
Failed to yield right of way	5	4	5	3	5	0	22	15%
Disregarded traffic signs, etc	0	1	1	2	1	0	5	3%
Exceeded speed limit	0	0	0	0	0	0	0	0%
Too fast for condition	1	2	1	1	2	0	7	5%
Made an improper turn	2	0	1	0	0	0	3	2%
Wrong side or wrong way	0	0	0	0	0	0	0	0%
Followed too closely	3	1	1	4	5	0	14	9%
Failure to keep in lane, ROR	0	1	2	4	0	1	8	5%
Erratic, reckless, etc.	7	2	2	6	0	1	18	12%
Swerving or avoiding	0	0	0	0	0	0	0	0%
Overcorrect/oversteering	0	0	0	0	0	0	0	0%
Visibility obstructed	0	0	0	0	0	0	0	0%
Inattention	1	0	3	0	5	0	9	6%
Mobile phone distraction	0	0	0	0	0	0	0	0%
Distracted - other	0	0	0	2	1	0	3	2%
Fatigued/asleep	0	1	0	0	0	0	1	1%
Operating defective equipment	0	0	0	0	0	0	0	0%
Other improper action	0	0	2	0	1	0	3	2%
Unknown	0	0	0	0	0	0	0	0%
Not Stated	0	4	0	1	0	0	5	3%
Totals	35	28	42	45	0	0	150	134%
<b>ALCOHOL INVOLVEMENT</b>								
Apparent alcohol involvement	0	0	2	2	0	1	5	5%
No alcohol involvement	20	18	22	23	22	1	106	95%
<b>DRIVER'S RESIDENCE</b>								
Within 25 Miles	27	25	37	27	0	0	116	58%
Over 25 Miles	6	2	5	3	0	0	16	8%
Outside Nebraska	1	1	0	0	0	0	2	1%
Unknown	1	0	0	15	47	4	67	33%
<b>DRIVER'S AGE GROUP</b>								
14 & Under	1	0	1	0	1	0	3	1%
15 - 19	9	10	14	13	17	1	64	32%
20 - 24	6	1	1	6	1	1	16	8%
25 - 34	6	5	8	4	7	0	30	15%
35 - 44	3	4	3	7	9	0	26	13%
45 - 54	4	1	5	5	6	0	21	10%
55 - 64	1	2	6	3	4	1	17	8%
65 - 74	4	3	1	4	1	1	14	7%
75 & Up	1	2	2	2	1	0	8	4%
Unknown	0	0	1	1	0	0	2	1%

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ACCIDENT QUERY LIST  
District 1  
Lancaster County  
S. 68th St. from Firth Rd. to Saltillo Rd.  
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?
<b><u>Intsx. of S. 68th St. and Firth Rd. - Begin S. 68th St. Study</u></b>														
213001988	1/31/2013	THU	1820		S 68TH ST & FIRTH RD-NW OF FIRTH	INJ-C	3	0	Clear	Dark	LT Leavng	MV transprt	Sno	N
=====							===	===						
1							3	0						
<b><u>S. 68th St. between Firth Rd. and Pella Rd. - excluding intsx.</u></b>														
213009529	3/25/2013	MON	2030		S 68TH ST N OF FIRTH RD-NW OF FIRTH	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
213012881	4/16/2013	TUE	1544		S 68TH ST N OF FIRTH RD-NW OF FIRTH	PDO	0	0	Cloudy	Light	Rear-end	MV transprt	Dry	N
214007157	2/16/2014	SUN	1835		S 68TH ST N OF FIRTH RD-NW OF FIRTH	INJ-C	1	0	Clear	Dark	N/A	Oth fix obj	Dry	N
=====							===	===						
3							1	0						
<b><u>Intsx. of S. 68th St. and Pella Rd.</u></b>														
213000760	1/23/2013	WED	1543		S 68TH ST AT PELLA RD-NW OF FIRTH	INJ-B	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
217040959	10/3/2017	TUE	1740		S 68TH ST AT PELLA RD-NW OF FIRTH	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
2							2	0						
<b><u>S. 68th St. between Pella Rd. and Princeton Rd. - excluding intsx.</u></b>														
214016544	4/14/2014	MON	0825		S 68TH ST S OF PRINCETON RD-NW OF FIRTH	N-R	0	0	Clear	Light	Rear-end	MV transprt	Ice	N
214016168	4/24/2014	THU	1628		S 68TH ST S OF PRINCETON RD-ENT-NW OF FIRTH	PDO	0	0	Clear	Light	LT Leavng	MV transprt	Dry	N
214041864	10/23/2014	THU	2045		S 68TH ST S OF PRINCETON RD-ENT-NW OF FIRTH	PDO	0	0	Clear	Dark	Angle	MV transprt	Dry	N
215002598	1/13/2015	TUE	2035		S 68TH ST N OF PELLA RD-NW OF FIRTH	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
215017360	5/4/2015	MON	1533		S 68TH ST S OF PRINCETON RD-ENT-NW OF FIRTH	PDO	0	0	Rain	Light	Angle	MV transprt	Wet	N
217053627	12/22/2017	FRI	0702		S 68TH ST S OF PRINCETON RD-NW OF FIRTH	PDO	0	0	Cloudy	Dark	N/A	Animal	Dry	N
=====							===	===						
6							0	0						
<b><u>Intsx. of S. 68th St. and Princeton Rd.</u></b>														
216001223	1/7/2016	THU	1540		S 68TH ST AT PRINCETON RD-NW OF FIRTH	INJ-C	1	0	Cloudy	Dusk	Rear-end	MV transprt	Wet	N
=====							===	===						
1							1	0						
<b><u>S. 68th St. between Princeton Rd. and Olive Creek Rd. - excluding intsx.</u></b>														
213041912	11/6/2013	WED	0822		S 68TH ST N OF PRINCETON RD-NW OF FIRTH	INJ-B	4	0	Cloudy	Light	Rear-end	MV transprt	Dry	N
213004242	2/15/2013	FRI	1706		S 68TH ST S OF OLIVE CREEK RD-NW OF FIRTH	N-R	0	0	Clear	Light	N/A	Overturn	Sls	N
213048512	12/19/2013	THU	1745		S 68TH ST S OF OLIVE CREEK RD-NW OF FIRTH	N-R	0	0	Clear	Dark	N/A	Animal	Dry	N

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<b><u>S. 68th St. between Princeton Rd. and Olive Creek Rd. - excluding intsx. - continued</u></b>														
214005543	2/4/2014	TUE	1330		S 68TH ST S OF OLIVE CREEK RD-NW OF FIRTH	PDO	0	0	Blowing sanc	Light	N/A	Utility pol	Ice	N
215004344	1/30/2015	FRI	1530		S 68TH ST N OF PRINCETON RD-NW OF FIRTH	INJ-B	2	0	Clear	Light	Rear-end	MV transprt	Dry	N
215036220	8/31/2015	MON	2326		S 68TH ST S OF OLIVE CREEK RD-NW OF FIRTH	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
216011430	3/18/2016	FRI	0823		S 68TH ST S OF OLIVE CREEK RD-NW OF FIRTH	INJ-B	4	0	Cloudy	Light	Rear-end	MV transprt	Dry	N
217037028	9/11/2017	MON	0811		S 68TH ST N OF PRINCETON RD-NW OF FIRTH	INJ-C	3	0	Clear	Light	Rear-end	MV transprt	Dry	N
217038632	9/19/2017	TUE	2008		S 68TH ST N OF PRINCETON RD-NW OF FIRTH	INJ-C	1	0	Clear	Dark	Rear-end	MV transprt	Dry	N
217047521	10/25/2017	WED	1540		S 68TH ST N OF PRINCETON RD-NW OF FIRTH	FATAL	2	1	Clear	Light	Rear-end	MV transprt	Dry	N
217046589	10/25/2017	WED	1540		S 68TH ST N OF PRINCETON RD-NW OF FIRTH	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
11							16	1						
<b><u>Intsx. of S. 68th St. and Olive Creek Rd.</u></b>														
213010257	3/28/2013	THU	1456		S 68TH ST AT OLIVE CREEK RD-S OF HICKMAN	INJ-B	2	0	Clear	Light	Rear-end	MV transprt	Dry	N
215009345	2/27/2015	FRI	1540		S 68TH ST AT OLIVE CREEK RD-S OF HICKMAN	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
216027189	6/26/2016	SUN	0145		S 68TH ST & OLIVE CREEK RD-S OF HICKMAN	PDO	0	0	Clear	Dark	N/A	Overturn	Dry	Y
217020055	5/20/2017	SAT	1303		S 68TH ST & OLIVE CREEK RD-S OF HICKMAN	INJ-C	1	0	Cloudy	Light	SS (opp.)	MV transprt	Dry	N
217044461	10/25/2017	WED	1535		S 68TH ST AT OLIVE CREEK RD-S OF HICKMAN	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
5							4	0						
<b><u>S. 68th St. between Olive Creek Rd. and Panama Rd. - excluding intsx.</u></b>														
218007203	2/7/2018	WED	0800		S 68TH ST S OF PANAMA RD-S OF HICKMAN	PDO	0	0	Clear	Light	SS (opp.)	MV transprt	Ice	N
=====							===	===						
1							0	0						
<b><u>Intsx. of S. 68th St. and Panama Rd.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and Panama Rd.														
<b><u>S. 68th St. between Panama Rd. and Stagecoach Rd. - excluding intsx.</u></b>														
217011516	3/21/2017	TUE	0720		68TH ST(R55Q) S OF STAGECOACH RD-S OF HICKMAN	PDO	0	0	Clear	Dawn	N/A	Animal	Dry	N
=====							===	===						
1							0	0						
<b><u>Intsx. of S. 68th St. and Stagecoach Rd.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and Stagecoach Rd.														

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<b><u>S. 68th St. between Stagecoach Rd. and Hickman S. Corp. Limits</u></b>														
During the above stated time period, there were no accidents referenced to this section of S. 68th St.														
<b><u>S. 68th St. between Hickman S. Corp. Limits and Wagon Train Rd. - excluding intsx.</u></b>														
During the above stated time period, there were no accidents referenced to this section of S. 68th St.														
<b><u>Intsx. of S. 68th St. (Chestnut St.) and Wagon Train Rd.</u></b>														
216013142	3/25/2016	FRI	2499		CHESTNUT ST(R55Q) & WAGON TRAIN RD	PDO	0	0	Clear	Dark	N/A	G-rail face	Dry	N
216022899	5/29/2016	SUN	0200		CHESTNUT ST(R55Q) & WAGON TRAIN RD	INJ-C	1	0	Clear	Dark	N/A	Culvert	Dry	Y
=====							===	===						
2							1	0						
<b><u>S. 68th St. (Chestnut St.) between Wagon Train Rd. and 1st St. - excluding intsx.</u></b>														
214043069	10/29/2014	WED	1549		CHESTNUT ST(R55Q) S OF 1ST ST	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
1							1	0						
<b><u>Intsx. of S. 68th St. (Chestnut St.) and 1st St.</u></b>														
214009123	2/25/2014	TUE	2037		CHESTNUT ST(R55Q) & 1ST ST	PDO	0	0	Clear	Dark	N/A	Oth fix obj	Ice	N
=====							===	===						
1							0	0						
<b><u>S. 68th St. (Chestnut St.) between 1st St. and 2nd St. - excluding intsx.</u></b>														
213040737	10/25/2013	FRI	1432		CHESTNUT ST(R55Q) S OF 2ND ST	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
1							0	0						
<b><u>Intsx. of S. 68th St. (Chestnut St.) and 2nd St.</u></b>														
214005855	1/31/2014	FRI	0802		2ND ST AT CHESTNUT ST(R55Q)	INJ-C	2	0	Snow	Light	Rear-end	MV transprt	Sno	N
=====							===	===						
1							2	0						

**S. 68th St. (Chestnut St.) between 2nd St. and 3rd St. - excluding intsx.**  
 During the above stated time period, there were no accidents referenced to this section of S. 68th St.

**Intsx. of S. 68th St. (Chestnut St.) and 3rd St.**  
 During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and 3rd St.

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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?
<b><u>S. 68th St. (Chestnut St.) between 3rd St. and 4th St. - excluding intsx.</u></b>														
During the above stated time period, there were no accidents referenced to this section of S. 68th St.														
<b><u>Intsx. of S. 68th St. (Chestnut St.) and 4th St.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and 4th St.														
<b><u>S. 68th St. (Chestnut St.) between 4th St. and 5th St. - excluding intsx.</u></b>														
During the above stated time period, there were no accidents referenced to this section of S. 68th St.														
<b><u>Intsx. of S. 68th St. (Chestnut St.) and 5th St.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and 5th St.														
<b><u>S. 68th St. (Chestnut St.) between 5th St. and Hickman Rd. / 7th St. - excluding intsx.</u></b>														
216026848	6/29/2016	WED	1926		CHESTNUT ST(R55Q) N OF 5TH ST	N-R	0	0	Clear	Light	Backing	MV transprt	Dry	N
217006326	2/8/2017	WED	1645		CHESTNUT ST(R55Q) S OF 7TH ST(R55P)-ENT	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
217041455	10/4/2017	WED	1551		CHESTNUT ST(R55Q) S OF 7TH ST(R55P)-ENT	INJ-C	2	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
3							2	0						
<b><u>Intsx. of S. 68th St. (Chestnut St.) and Hickman Rd. / 7th St.</u></b>														
213012027	4/10/2013	WED	2050		7TH ST(R55P) & CHESTNUT ST(R55Q)	PDO	0	0	Sleet, hail, fr	Dark	Angle	MV transprt	Sno	N
213027526	7/25/2013	THU	1531		7TH ST(R55P) & CHESTNUT ST(R55Q)	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
213044376	11/22/2013	FRI	1840		7TH ST(R55P) & CHESTNUT ST(R55Q)	PDO	0	0	Clear	Dark	Angle	MV transprt	Dry	N
214026801	7/9/2014	WED	1323		7TH ST(R55P) & CHESTNUT ST(R55Q)	INJ-B	1	0	Clear	Light	Angle	MV transprt	Dry	N
214040759	10/15/2014	WED	1538		7TH ST(R55P) & CHESTNUT ST(R55Q)	INJ-C	1	0	Clear	Light	N/A	Overturn	Dry	N
215007210	2/1/2015	SUN	1145		7TH ST(R55P) & CHESTNUT ST(R55Q)	PDO	0	0	Clear	Light	Angle	MV transprt	Ice	N
215008289	2/21/2015	SAT	1238		7TH ST(R55P) & CHESTNUT ST(R55Q)	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
215019022	5/14/2015	THU	1215		7TH ST(R55P) & CHESTNUT ST(R55Q)	INJ-C	1	0	Rain	Light	Angle	MV transprt	Wet	N
215030720	8/3/2015	MON	0755		7TH ST(R55P) & CHESTNUT ST(R55Q)	PDO	0	0	Cloudy	Light	Angle	MV transprt	Dry	N
215041721	10/10/2015	SAT	0740		7TH ST(R55P) & CHESTNUT ST(R55Q)	INJ-B	2	0	Clear	Dawn	Angle	MV transprt	Dry	N
216045672	10/28/2016	FRI	1130		CHESTNUT ST(R55Q) AT 7TH ST(R55P)	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
216049147	11/21/2016	MON	1728		7TH ST(R55P) & CHESTNUT ST(R55Q)	INJ-C	3	0	Clear	Dark	LT Leavng	MV transprt	Dry	N
216052892	12/10/2016	SAT	1724		7TH ST(R55P) & CHESTNUT ST(R55Q)	N-R	0	0	Clear	Dark	Angle	MV transprt	Dry	N
217023725	6/13/2017	TUE	0915		S 68TH ST(R55Q) & HICKMAN RD(R55P)	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
=====							===	===						
14							8	0						

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<b><u>S. 68th St. (Chestnut St.) between Hickman Rd. / 7th St. and Prairie View Ln. - excluding intsx.</u></b>														
215011917	3/26/2015	THU	1641		CHESTNUT ST N OF 7TH ST(R55P)-U STOP ENT	INJ-B	1	0	Rain	Light	LT Leavng	MV transprt	Wet	N
217000389	1/3/2017	TUE	1629		CHESTNUT ST N OF 7TH ST(R55P)-U STOP ENT	PDO	0	0	Clear	Light	LT Leavng	MV transprt	Dry	N
217025114	6/16/2017	FRI	1847		S 68TH ST N OF 7TH ST(R55P)-DOLLAR GENERAL ENT	INJ-B	1	0	Cloudy	Light	LT Leavng	MV transprt	Dry	N
=====							===	===						
3							1	0						
<b><u>Intsx. of S. 68th St. and Prairie View Ln.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and Prairie View Ln.														
<b><u>S. 68th St. between Prairie View Ln. and Woodland Blvd. - excluding intsx.</u></b>														
216005828	2/4/2016	THU	1530		S 68TH ST S OF WOODLAND BLVD	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
216029785	7/16/2016	SAT	1309		S 68TH ST N OF PRAIRIE VIEW LN	INJ-B	3	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
2							3	0						
<b><u>Intsx. of S. 68th St. and Woodland Blvd.</u></b>														
216012862	3/28/2016	MON	1646		S 68TH ST AT WOODLAND BLVD	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
1							0	0						
<b><u>S. 68th St. between Woodland Blvd. and Hickman N. Corp. Limits</u></b>														
215040399	9/29/2015	TUE	1720		S 68TH ST N OF WOODLAND BLVD-N OF HICKMAN	INJ-B	1	0	Blowing sanc	Light	N/A	Overturn	Dry	N
=====							===	===						
1							1	0						
<b><u>S. 68th St. between Hickman N. Corp. Limits and Martell Rd. - excluding intsx.</u></b>														
215030430	7/30/2015	THU	2100		S 68TH ST S OF MARTELL RD-N OF HICKMAN	INJ-B	1	0	Clear	Dark	SS (opp.)	MV transprt	Dry	Y
216004158	1/25/2016	MON	1815		S 68TH ST S OF MARTELL RD-N OF HICKMAN	INJ-C	1	0	Snow	Dark	SS (opp.)	MV transprt	Ice	N
=====							===	===						
2							2	0						
<b><u>Intsx. of S. 68th St. and Martell Rd.</u></b>														
215055223	12/31/2015	THU	2107		S 68TH ST & MARTELL RD-N OF HICKMAN	PDO	0	0	Clear	Dark	SS (same)	MV transprt	Dry	N
216022759	6/4/2016	SAT	1421		S 68TH ST & MARTELL RD-N OF HICKMAN	INJ-C	1	0	Clear	Light	Angle	MV transprt	Dry	N
=====							===	===						
2							1	0						

ACCIDENT QUERY LIST  
 District 1  
 Lancaster County  
 S. 68th St. from Firth Rd. to Saltillo Rd.  
 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?
<b><u>S. 68th St. between Martell Rd. and Leisure Ln. - excluding intsx.</u></b>														
215034337	8/24/2015	MON	0910		S 68TH ST S OF LEISURE LN-N OF HICKMAN	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
215037759	9/13/2015	SUN	0820		S 68TH ST S OF LEISURE LN-N OF HICKMAN	INJ-C	2	0	Clear	Light	SS (same)	MV transprt	Dry	N
216014379	4/4/2016	MON	1749		S 68TH ST S OF LEISURE LN-N OF HICKMAN	PDO	0	0	Clear	Light	N/A	Culvert	Dry	N
218002193	1/12/2018	FRI	2105		S 68TH ST N OF MARTELL RD-N OF HICKMAN	PDO	0	0	Clear	Dark	SS (opp.)	MV transprt	Dry	Y
=====							===	===						
4							2	0						
<b><u>Intsx. of S. 68th St. and Leisure Ln.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and Leisure Ln.														
<b><u>S. 68th St. between Leisure Ln. and Roca Rd. - excluding intsx.</u></b>														
213046882	12/9/2013	MON	0758		S 68TH ST N OF LEISURE LN-N OF HICKMAN	INJ-C	1	0	Clear	Light	N/A	Overturn	Sno	N
214046917	11/21/2014	FRI	1059		S 68TH ST N OF LEISURE LN-N OF HICKMAN	INJ-C	1	0	Clear	Light	N/A	Tree	Dry	N
216022897	5/30/2016	MON	1212		S 68TH ST N OF LEISURE LN-N OF HICKMAN	INJ-C	1	0	Clear	Light	SS (opp.)	MV transprt	Dry	N
216036044	8/29/2016	MON	1756		S 68TH ST S OF ROCA RD-N OF HICKMAN	PDO	0	0	Rain	Light	Rear-end	MV transprt	Wtr	N
217000727	1/5/2017	THU	0920		S 68TH ST S OF ROCA RD-N OF HICKMAN	PDO	0	0	Clear	Light	N/A	Overturn	Ice	N
=====							===	===						
5							3	0						
<b><u>Intsx. of S. 68th St. and Roca Rd.</u></b>														
214025350	6/25/2014	WED	1306		S 68TH ST & ROCA RD-N OF HICKMAN	INJ-A	2	0	Clear	Light	SS (same)	MV transprt	Dry	N
214029210	7/27/2014	SUN	1735		S 68TH ST & ROCA RD-N OF HICKMAN	INJ-C	3	0	Clear	Light	Angle	MV transprt	Dry	N
216022895	5/30/2016	MON	1340		S 68TH ST & ROCA RD-N OF HICKMAN	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
=====							===	===						
3							5	0						
<b><u>S. 68th St. between Roca Rd. and Prairieflower Ln. - excluding intsx.</u></b>														
215023050	6/11/2015	THU	2110		S 68TH ST S OF PRAIRIEFLOWER LN-N OF HICKMAN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
215040062	9/26/2015	SAT	2030		S 68TH ST N OF ROCA RD-N OF HICKMAN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
=====							===	===						
2							0	0						
<b><u>Intsx. of S. 68th St. and Prairieflower Ln.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and Prairieflower Ln.														

ACCIDENT QUERY LIST  
 District 1  
 Lancaster County  
 S. 68th St. from Firth Rd. to Saltillo Rd.  
 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?
<b><u>S. 68th St. between Prairieflower Ln. and Wittstruck Rd. - excluding intsx.</u></b>														
214020825	5/28/2014	WED	1708		S 68TH ST N OF PRAIRIEFLOWER LN-N OF HICKMAN	N-R	0	0	Clear	Light	N/A	Animal	Dry	N
215001591	1/7/2015	WED	2499		S 68TH ST N OF PRAIRIEFLOWER LN-N OF HICKMAN	FATAL	0	1	Cloudy	Dark	N/A	Tree	Dry	Y
215048939	11/13/2015	FRI	1945		S 68TH ST S OF WITTSTRUCK RD-N OF HICKMAN	N-R	0	0	Rain	Dark	N/A	Animal	Wet	N
216046442	11/2/2016	WED	2304		S 68TH ST N OF PRAIRIEFLOWER LN-N OF HICKMAN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
=====							===	===						
4							0	1						
<b><u>Intsx. of S. 68th St. and Wittstruck Rd.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and Wittstruck Rd.														
<b><u>S. 68th St. between Wittstruck Rd. and Bennet Rd. - excluding intsx.</u></b>														
213016269	5/6/2013	MON	1839		S 68TH ST S OF BENNET RD-N OF HICKMAN	PDO	0	0	Clear	Light	N/A	Overturn	Dry	N
214039789	10/3/2014	FRI	2250		S 68TH ST S OF BENNET RD-N OF HICKMAN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
214047042	11/18/2014	TUE	1852		S 68TH ST S OF BENNET RD-N OF HICKMAN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
216046632	11/7/2016	MON	1645		S 68TH ST S OF BENNET RD-N OF HICKMAN	N-R	0	0	Rain	Light	Rear-end	MV transprt	Wet	N
216048255	11/10/2016	THU	1901		S 68TH ST N OF WITTSTRUCK RD-N OF HICKMAN	PDO	0	0	Cloudy	Dark	N/A	Animal	Dry	N
216050734	12/3/2016	SAT	1355		S 68TH ST N OF WITTSTRUCK RD-N OF HICKMAN	INJ-C	1	0	Snow	Light	N/A	Ditch	Sls	N
217046802	11/3/2017	FRI	0800		S 68TH ST N OF WITTSTRUCK RD-N OF HICKMAN	INJ-C	1	0	Clear	Light	N/A	Animal	Dry	N
=====							===	===						
7							2	0						
<b><u>Intsx. of S. 68th St. and Bennet Rd.</u></b>														
During the above stated time period, there were no accidents referenced to this intersection of S. 68th St. and Bennet Rd.														
<b><u>S. 68th St. between Bennet Rd. and Saltillo Rd. - excluding intsx.</u></b>														
213049062	12/25/2013	WED	1710		S 68TH ST S OF SALTILLO RD-S OF LINCOLN	PDO	0	0	Clear	Dusk	SS (same)	MV transprt	Dry	N
214012165	3/24/2014	MON	1740		S 68TH ST S OF SALTILLO RD-S OF LINCOLN	PDO	0	0	Clear	Light	N/A	Animal	Dry	N
215003238	1/16/2015	FRI	2005		S 68TH ST S OF SALTILLO RD-S OF LINCOLN	INJ-C	1	0	Clear	Dark	SS (same)	MV transprt	Dry	N
215048484	11/9/2015	MON	1812		S 68TH ST S OF SALTILLO RD-S OF LINCOLN	PDO	0	0	Clear	Dark	N/A	Animal	Dry	N
=====							===	===						
4							1	0						
<b><u>Intsx. of S. 68th St. and Saltillo Rd. - End S. 68th St. Study</u></b>														
212058957	1/11/2013	FRI	1600		S 68TH ST & SALTILLO RD-S OF LINCOLN	INJ-B	1	0	Cloudy	Light	Angle	MV transprt	Dry	N
213023405	6/27/2013	THU	0910		S 68TH ST & SALTILLO RD-S OF LINCOLN	PDO	0	0	Cloudy	Light	Angle	MV transprt	Wet	N
213037003	10/3/2013	THU	0717		S 68TH ST & SALTILLO RD-S OF LINCOLN	N-R	0	0	Rain	Dark	N/A	Sign post	Wet	N

**ACCIDENT QUERY LIST**  
 District 1  
 Lancaster County  
 S. 68th St. from Firth Rd. to Saltillo Rd.  
 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?
<b><u>Intsx. of S. 68th St. and Saltillo Rd. - End S. 68th St. Study - continued</u></b>														
213038403	10/8/2013	TUE	1525		S 68TH ST & SALTILLO RD-S OF LINCOLN	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
213042269	11/9/2013	SAT	0850		S 68TH ST & SALTILLO RD-S OF LINCOLN	INJ-B	2	0	Clear	Light	Angle	MV transprt	Dry	N
214017031	4/22/2014	TUE	1600		S 68TH ST & SALTILLO RD-S OF LINCOLN	N-R	0	0	Clear	Light	Angle	MV transprt	Dry	N
215013073	3/31/2015	TUE	1746		S 68TH ST AT SALTILLO RD-S OF LINCOLN	PDO	0	0	Clear	Light	Rear-end	MV transprt	Dry	N
215044970	10/31/2015	SAT	0721		S 68TH ST AT SALTILLO RD-S OF LINCOLN	PDO	0	0	Cloudy	Dark	Rear-end	MV transprt	Wet	N
216006939	2/14/2016	SUN	1105		S 68TH ST AT SALTILLO RD-S OF LINCOLN	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
216017042	4/20/2016	WED	0830		S 68TH ST AT SALTILLO RD-S OF LINCOLN	N-R	0	0	Rain	Light	Rear-end	MV transprt	Wet	N
216050175	11/29/2016	TUE	1654		S 68TH ST & SALTILLO RD-S OF LINCOLN	PDO	0	0	Clear	Dusk	Angle	MV transprt	Dry	N
217008583	2/27/2017	MON	1620		S 68TH ST & SALTILLO RD-S OF LINCOLN	INJ-C	1	0	Clear	Light	Angle	MV transprt	Dry	N
217009209	3/4/2017	SAT	1124		S 68TH ST & SALTILLO RD-S OF LINCOLN	INJ-A	2	0	Clear	Light	Angle	MV transprt	Dry	N
217014815	4/14/2017	FRI	1131		S 68TH ST AT SALTILLO RD-S OF LINCOLN	N-R	0	0	Rain	Light	Rear-end	MV transprt	Wet	N
217021769	5/26/2017	FRI	0740		S 68TH ST AT SALTILLO RD-S OF LINCOLN	INJ-C	1	0	Clear	Light	Rear-end	MV transprt	Dry	N
217035783	8/31/2017	THU	1750		S 68TH ST & SALTILLO RD-S OF LINCOLN	PDO	0	0	Clear	Light	Angle	MV transprt	Dry	N
217041591	10/4/2017	WED	0843		S 68TH ST AT SALTILLO RD-S OF LINCOLN	PDO	0	0	Cloudy	Light	Rear-end	MV transprt	Dry	N
=====							===	===						
17							8	0						

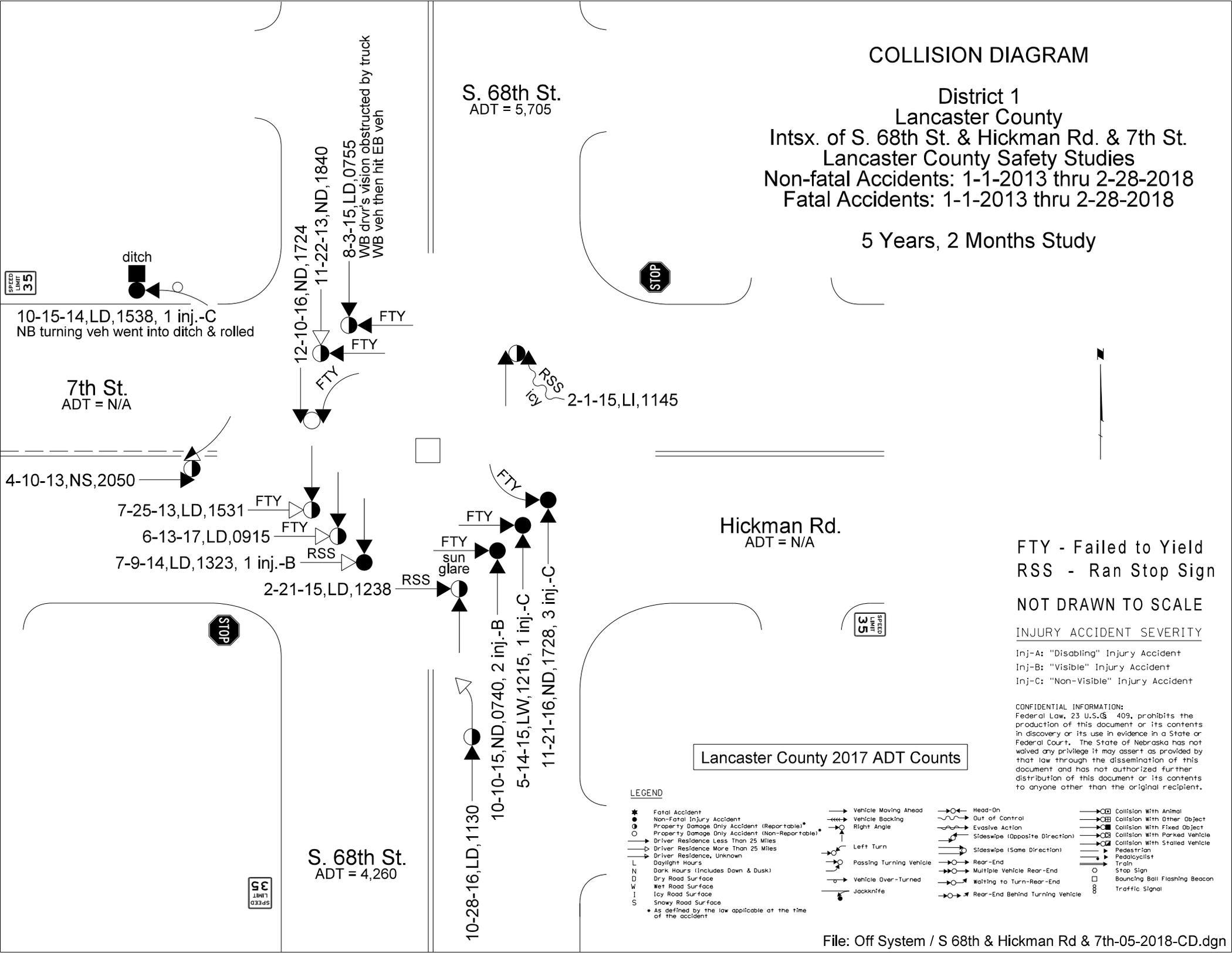
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# COLLISION DIAGRAM

District 1  
Lancaster County  
Intsx. of S. 68th St. & Hickman Rd. & 7th 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 Years, 2 Months Study



FTY - Failed to Yield  
RSS - Ran Stop Sign

NOT DRAWN TO SCALE

### INJURY ACCIDENT SEVERITY

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

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### LEGEND

- |   |                           |                                   |                                  |
|---|---------------------------|-----------------------------------|----------------------------------|
| ★ Fatal Accident                              | → Vehicle Moving Ahead    | ↔ Head-On                         | ↔ Collision With Animal          |
| ● Non-Fatal Injury Accident                   | ← Vehicle Backing         | ↔ Out of Control                  | ↔ Collision With Other Object    |
| ○ Property Damage Only Accident (Reportable)* | ↔ Right Angle             | ↔ Evasive Action                  | ↔ Collision With Fixed Object    |
| → Driver Residence Less Than 25 Miles         | ↔ Left Turn               | ↔ Sideswipe (Opposite Direction)  | ↔ Collision With Parked Vehicle  |
| → Driver Residence More Than 25 Miles         | ↔ Passing Turning Vehicle | ↔ Sideswipe (Same Direction)      | ↔ Collision With Stalled Vehicle |
| L Driver Residence Unknown                    | ↔ Vehicle Over-Turned     | ↔ Rear-End                        | ↔ Pedestrian                     |
| Daylight Hours                                | ↔ Jackknife               | ↔ Multiple Vehicle Rear-End       | ↔ Pedalcyclist                   |
| N Dark Hours (Includes Dawn & Dusk)           |                           | ↔ Waiting to Turn-Rear-End        | ↔ Train                          |
| D Dry Road Surface                            |                           | ↔ Rear-End Behind Turning Vehicle | ○ Stop Sign                      |
| W Wet Road Surface                            |                           |                                   | □ Bouncing Ball Flashing Beacon  |
| I Icy Road Surface                            |                           |                                   | ⊞ Traffic Signal                 |
| S Snowy Road Surface                          |                           |                                   |                                  |
- \* As defined by the law applicable at the time of the accident

# COLLISION DIAGRAM

District 1  
Lancaster County  
Intsx. of S. 68th St. & Olive Creek 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 Years, 2 Months Study

Olive Creek Rd.  
ADT = 149

Olive Creek Rd.  
ADT = 51

S. 68th St.  
ADT = 2,449

3-28-13, LD, 1456, 2 inj.-B  
Front veh stopped on guy wire

5-20-17, LD, 1303, 1 inj.-C  
SB veh then went into ditch

6-26-16, ND, 0145  
SB veh swerved to avoid deer, went into ditch, rolled, & hit guy wire

FTY  
u-turn  
m/c

10-25-17, LD, 1535, 1 inj.-C  
2-27-15, LD, 1540

S. 68th St.  
ADT = 2,333



sub. alco.  
guy wire

Lancaster County 2017 ADT Counts

## LEGEND

- |   |                            |                                    |                                   |
|---|----------------------------|------------------------------------|-----------------------------------|
| ★ Fatal Accident                              | → Vehicle Moving Ahead     | →○ Head-On                         | →○ Collision With Animal          |
| ● Non-Fatal Injury Accident                   | ← Vehicle Backing          | →○ Out of Control                  | →○ Collision With Other Object    |
| ○ Property Damage Only Accident (Reportable)* | →○ Right Angle             | →○ Evasive Action                  | →○ Collision With Fixed Object    |
| → Driver Residence Less Than 25 Miles         | →○ Left Turn               | →○ Sideswipe (Opposite Direction)  | →○ Collision With Parked Vehicle  |
| → Driver Residence More Than 25 Miles         | →○ Passing Turning Vehicle | →○ Sideswipe (Same Direction)      | →○ Collision With Stalled Vehicle |
| → Driver Residence, Unknown                   | →○ Vehicle Over-Turned     | →○ Rear-End                        | →○ Pedestrian                     |
| L Daylight Hours                              | →○ Jackknife               | →○ Multiple Vehicle Rear-End       | →○ Pedalcyclist                   |
| N Dark Hours (Includes Dawn & Dusk)           |                            | →○ Waiting to Turn-Rear-End        | →○ Train                          |
| D Dry Road Surface                            |                            | →○ Rear-End Behind Turning Vehicle | ○ Stop Sign                       |
| W Wet Road Surface                            |                            |                                    | □ Bouncing Ball Flashing Beacon   |
| I Icy Road Surface                            |                            |                                    | ⊗ Traffic Signal                  |
| S Snowy Road Surface                          |                            |                                    |                                   |
- \* As defined by the law applicable at the time of the accident

FTY - Failed to Yield  
m/c - Motorcycle  
NOT DRAWN TO SCALE

## INJURY ACCIDENT SEVERITY

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

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# COLLISION DIAGRAM

District 1  
Lancaster County  
Intsx. of S. 68th St. & Saltillo 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 Years, 2 Months Study



Saltillo Rd.  
ADT = 5,558

Saltillo Rd.  
ADT = 6,610

10-3-13,NW,0717  
WB veh hit sign  
Drv's vision obstructed  
by rain & headlight glare

semi 6-27-13,LW,0910  
10-8-13,LD,1525  
NB drv's vision obstructed  
by NB turning veh

4-22-14,LD,1600

1-11-13,LD,1600, 1 inj.-B  
11-9-13,LD,0850, 2 inj.-B  
EB ven then went into ditch

grass  
median

S. 68th St.  
ADT = 6,913



\* Additional Accidents

- 11-29-16,ND,1654-FTY
- 8-31-17,LD,1750-FTY
- 2-27-17,LD,1620, 1 inj.-C
- 3-4-17,LD,1124, 2 inj.-A

FTY - Failed to Yield  
S&S - Veh Started Forward Then Stopped

NOT DRAWN TO SCALE

INJURY ACCIDENT SEVERITY

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

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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

Lancaster County 2017 ADT Counts



# SPOT MAP

District 1  
 Lancaster County  
 S. 68th St. from Firth Rd. to Saltillo 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 Years, 2 Months Study

Princeton Rd.

Norris Schools N. Ent.

Norris Schools S. Ent.

Pella Rd.

S. 68th St.

Begin S. 68th St. Study

Ctf. to S. 68th St.

Firth Rd.



### 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.

## NOT DRAWN TO SCALE

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Bridge over Hickman  
Branch River

# SPOT MAP

District 1  
Lancaster County  
S. 68th St. from Firth Rd. to Saltillo Rd.  
Lancaster County Safety Studies  
Non-fatal Accidents: 1-1-2013 thru 2-28-2018  
Fatal Accidents: 1-1-2013 thru 2-28-2018

Stagecoach Rd.

5 Years, 2 Months Study



Panama Rd.

S. 68th St.



Olive Creek Rd.

### 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.

## NOT DRAWN TO SCALE

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Driveway to  
24301 S. 68th St. &  
24311 S. 68th St.



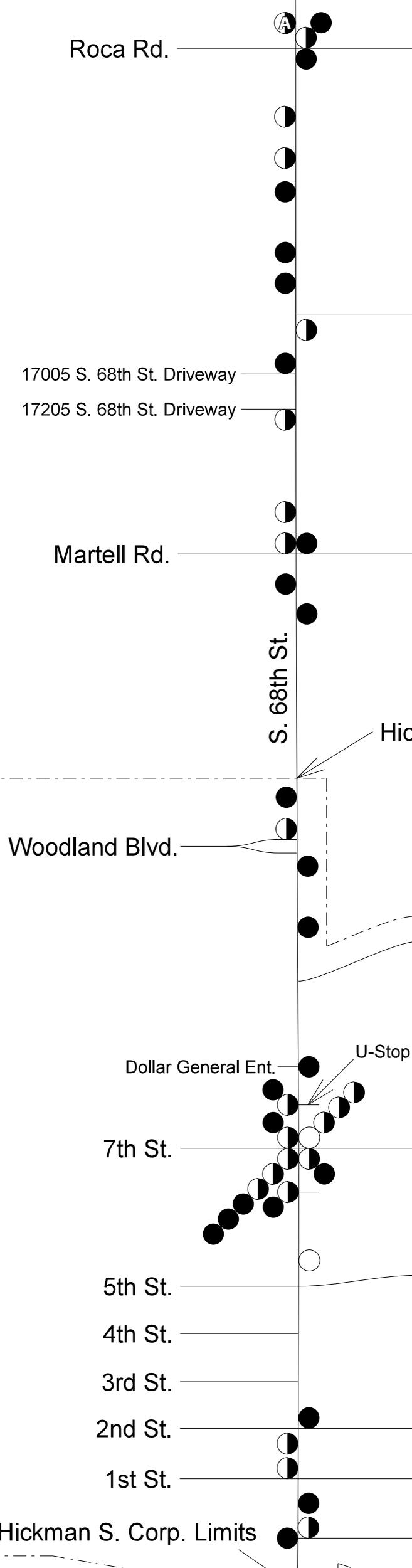
★ 10-25-17



# SPOT MAP

District 1  
 Lancaster County  
 S. 68th St. from Firth Rd. to Saltillo 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 Years, 2 Months Study



Leisure Ln.

17005 S. 68th St. Driveway

17205 S. 68th St. Driveway

Martell Rd.

S. 68th St.

Hickman N. Corp. Limits

Woodland Blvd.

Prairie View Ln.

Dollar General Ent.

U-Stop Ent.

7th St.

Hickman Rd.

5th St.

4th St.

3rd St.

2nd St.

1st St.

Hickman S. Corp. Limits

Wagon Train Rd.



### 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.

## NOT DRAWN TO SCALE

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Saltillo Rd.

End S. 68th St. Study

### SPOT MAP

District 1  
 Lancaster County  
 S. 68th St. from Firth Rd. to Saltillo Rd.  
 Lancaster County Safety Studies  
 Non-fatal Accidents: 1-1-2013 thru 2-28-2018  
 Fatal Accidents: 1-1-2013 thru 2-28-2018

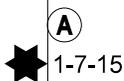
5 Years, 2 Months Study

Bennet Rd.

S. 68th St.

Wittstruck Rd.

Prairieflower Ln.



#### 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.

### NOT DRAWN TO SCALE

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# SPOT MAP

District 1  
Lancaster County  
S. 68th St. from Firth Rd. to Saltillo 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 Years, 2 Months Study

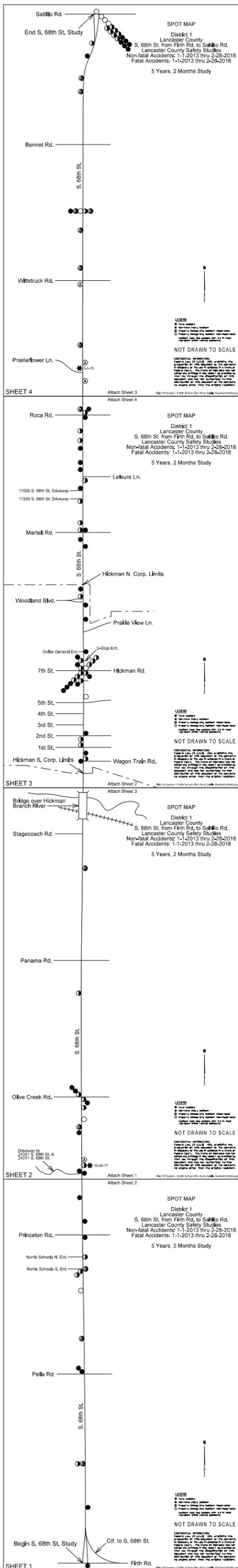
SHEET 4

SHEET 3

SHEET 2

SHEET 1

SHEET 5



## LEGEND

- ★ Fatal Accident
  - Non-Fatal Injury Accident
  - ⓪ Property Damage Only Accident (Reportable)
  - Property Damage Only Accident (Non-Reportable)
- Accident Spot Map symbols with 'A's in them represent animal related accidents.

NOT DRAWN TO SCALE

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**BCA WORKSHEETS**





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**DETAILED COST ESTIMATES**



**Saltillo Road & 68th Street Roundabout  
FHU Project No. 18-122  
Engineer's Opinion of Probable Cost  
Saturday, August 25, 2018**

<b>Grading Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00
Earthwork	CY	1,900.00	\$ 10.00	\$ 19,000.00
Remove Pavement	SY	5,810.00	\$ 9.00	\$ 52,290.00
<b>Group Total</b>				<b>\$ 73,790.00</b>

<b>Pavement Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	6,000	\$ 48.00	\$ 288,000.00
11" Concrete Pavement - Truck Apron	SY	900	\$ 60.00	\$ 54,000.00
<b>Group Total</b>				<b>\$ 342,000.00</b>

<b>Storm Sewer &amp; Culverts</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%	\$	83,158.00
<b>Group Total</b>				<b>\$ 83,158.00</b>

<b>Signing &amp; Striping</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Signing	%	5%	\$	17,100.00
Striping	%	5%	\$	17,100.00
<b>Group Total</b>				<b>\$ 34,200.00</b>

<b>Project Related Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Mobilization	LS	1.00	\$ 42,700.00	\$ 42,700.00
Traffic Control	LS	1.00	\$ 26,700.00	\$ 26,700.00
Right of Way	SF	5,000	\$ 4.00	\$ 20,000.00
Right of Way Design (Title Searches and Acquisition)	EA	2	\$ 4,000.00	\$ 8,000.00
Utilities	%	5%	\$	20,789.50
<b>Group Total</b>				<b>\$ 118,189.50</b>

## Project Totals

	Category	Total
	Grading	\$ 73,790.00
	Pavement	\$ 342,000.00
	Storm Sewer & Culverts	\$ 83,158.00
	Signing and Striping	\$ 34,200.00
	Mobilization	\$ 42,700.00
	Traffic Control	\$ 26,700.00
	Right of Way	\$ 28,000.00
	Utilities	\$ 41,579.00
	<b>Construction Subtotal</b>	<b>\$ 672,130.00</b>
	<b>Contingency</b> 20%	<b>\$ 134,400.00</b>
	<b>Survey</b> 2%	<b>\$ 13,400.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 80,700.00</b>
	<b>Construction Services</b> 8%	<b>\$ 64,500.00</b>
	<b>Project Total</b>	<b>\$ 965,130.00</b>

### 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



**68th Street & Saltillo Rd Signal**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Project Related Items</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
68th Street & Saltillo Rd Signals	SF	1	\$ 150,000.00	\$ 150,000.00
Utilities (5%)	LS	1	\$ 7,500.00	\$ 7,500.00
<b>Group Total</b>				<b>\$ 157,500.00</b>

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

<b>Assumptions:</b>
- 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



**Roca Road & 68th Street Roundabout**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Grading Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00
Earthwork	CY	1,900.00	\$ 10.00	\$ 19,000.00
Remove Pavement	SY	4,800.00	\$ 9.00	\$ 43,200.00
<b>Group Total</b>				<b>\$ 64,700.00</b>

<b>Pavement Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	4,500	\$ 48.00	\$ 216,000.00
11" Concrete Pavement - Truck Apron	SY	750	\$ 60.00	\$ 45,000.00
<b>Group Total</b>				<b>\$ 261,000.00</b>

<b>Storm Sewer &amp; Culverts</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%	\$	65,140.00
<b>Group Total</b>				<b>\$ 65,140.00</b>

<b>Signing &amp; Striping</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Signing	%	5%	\$	13,050.00
Striping	%	5%	\$	13,050.00
<b>Group Total</b>				<b>\$ 26,100.00</b>

<b>Project Related Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Mobilization	LS	1.00	\$ 33,400.00	\$ 33,400.00
Traffic Control	LS	1.00	\$ 20,800.00	\$ 20,800.00
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%	\$	16,285.00
<b>Group Total</b>				<b>\$ 116,245.00</b>

## Project Totals

	Category	Total
	Grading	\$ 64,700.00
	Pavement	\$ 261,000.00
	Storm Sewer & Culverts	\$ 65,140.00
	Signing and Striping	\$ 26,100.00
	Mobilization	\$ 33,400.00
	Traffic Control	\$ 20,800.00
	Right of Way	\$ 45,760.00
	Utilities	\$ 32,570.00
	<b>Construction Subtotal</b>	<b>\$ 549,470.00</b>
	<b>Contingency</b> 20%	<b>\$ 109,900.00</b>
	<b>Survey</b> 2%	<b>\$ 11,000.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 65,900.00</b>
	<b>Construction Services</b> 8%	<b>\$ 52,700.00</b>
	<b>Project Total</b>	<b>\$ 788,970.00</b>

### 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



**68th Street & Panama Roundabout  
FHU Project No. 18-122  
Engineer's Opinion of Probable Cost  
Saturday, August 25, 2018**

<b>Grading Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00
Earthwork	CY	1,900.00	\$ 10.00	\$ 19,000.00
Remove Pavement	SY	3,635.00	\$ 9.00	\$ 32,715.00
<b>Group Total</b>				<b>\$ 54,215.00</b>

<b>Pavement Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	4,250	\$ 48.00	\$ 204,000.00
11" Concrete Pavement - Truck Apron	SY	600	\$ 60.00	\$ 36,000.00
<b>Group Total</b>				<b>\$ 240,000.00</b>

<b>Storm Sewer &amp; Culverts</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%	\$	58,843.00
<b>Group Total</b>				<b>\$ 58,843.00</b>

<b>Signing &amp; Striping</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Signing	%	5%	\$	12,000.00
Striping	%	5%	\$	12,000.00
<b>Group Total</b>				<b>\$ 24,000.00</b>

<b>Project Related Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Mobilization	LS	1.00	\$ 30,200.00	\$ 30,200.00
Traffic Control	LS	1.00	\$ 18,900.00	\$ 18,900.00
Right Of Way	SF	7,440	\$ 4.00	\$ 29,760.00
Right Of Way Design( Title Searches & Acquisition)	EA	4	\$ 4,000.00	\$ 16,000.00
Utilities	%	5%	\$	14,710.75
<b>Group Total</b>				<b>\$ 109,570.75</b>

## Project Totals

	Category	Total
	Grading	\$ 54,215.00
	Pavement	\$ 240,000.00
	Storm Sewer & Culverts	\$ 58,843.00
	Signing and Striping	\$ 24,000.00
	Mobilization	\$ 30,200.00
	Traffic Control	\$ 18,900.00
	Right of Way	\$ 45,760.00
	Utilities	\$ 29,421.50
	<b>Construction Subtotal</b>	<b>\$ 501,340.00</b>
	<b>Contingency</b> 20%	<b>\$ 100,300.00</b>
	<b>Survey</b> 2%	<b>\$ 10,000.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 60,200.00</b>
	<b>Construction Services</b> 8%	<b>\$ 48,100.00</b>
	<b>Project Total</b>	<b>\$ 719,940.00</b>

### Assumptions:

**- This estimate is based on Conceptual Layout**

- Drainage 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



**68th Street & Panama Rd Turn Lane**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Grading Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 1,000.00	\$ 1,000.00
Earthwork	CY	1,000.00	\$ 10.00	\$ 10,000.00
Remove Pavement	SY	100.00	\$ 7.00	\$ 700.00
<b>Group Total</b>				<b>\$ 11,700.00</b>

<b>Pavement Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	800.00	\$ 48.00	\$ 38,400.00
<b>Group Total</b>				<b>\$ 38,400.00</b>

<b>Storm Sewer &amp; Culverts</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%	\$	10,020.00
<b>Group Total</b>				<b>\$ 10,020.00</b>

<b>Signing &amp; Striping</b>				
	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
<b>Group Total</b>				<b>\$ 7,577.75</b>

<b>Project Related Items</b>				
	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	1	\$ 4,000.00	\$ 4,000.00
Utilities	%	10%	\$	5,010.00
<b>Group Total</b>				<b>\$ 23,010.00</b>

## Project Totals

	Category	Total
	Grading	\$ 11,700.00
	Pavement	\$ 38,400.00
	Storm Sewer & Culverts	\$ 10,020.00
	Signing and Striping	\$ 7,577.75
	Mobilization	\$ 5,000.00
	Traffic Control	\$ 5,000.00
	Right of Way	\$ 8,000.00
	Utilities	\$ 5,010.00
	<b>Construction Subtotal</b>	<b>\$ 90,710.00</b>
	<b>Contingency</b> 20%	<b>\$ 18,100.00</b>
	<b>Survey</b> 2%	<b>\$ 1,800.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 10,900.00</b>
	<b>Construction Services</b> 8%	<b>\$ 8,700.00</b>
	<b>Project Total</b>	<b>\$ 130,210.00</b>

### Assumptions:

**- This estimate is based on Conceptual Layout**

- Drainage 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



**68th Street & Princeton Turn Lanes**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Grading Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 1,500.00	\$ 1,500.00
Earthwork	CY	1,500.00	\$ 10.00	\$ 15,000.00
Remove Pavement	SY	150.00	\$ 7.00	\$ 1,050.00
<b>Group Total</b>				<b>\$ 17,550.00</b>

<b>Pavement Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
9" Concrete Pavement	SY	1,600.00	\$ 48.00	\$ 76,800.00
<b>Group Total</b>				<b>\$ 76,800.00</b>

<b>Storm Sewer &amp; Culverts</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%		\$ 18,870.00
<b>Group Total</b>				<b>\$ 18,870.00</b>

<b>Signing &amp; Striping</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
5" White Preformed Pavement Marking, Type 4 Grooved	LF	2250.00	\$ 3.25	\$ 7,312.50
5" Yellow Preformed Pavement Marking, Type 4 Grooved	LF	1200.00	\$ 3.25	\$ 3,900.00
Right Arrow, Preformed Pavement Markings, Type 4 Grooved	EA	6.00	\$ 365.00	\$ 2,190.00
Pavement Marking Removal, Lines	LF	2250.00	\$ 0.25	\$ 562.50
Signs And Poles	LS	1.00	\$ 500.00	\$ 500.00
<b>Group Total</b>				<b>\$ 14,465.00</b>

<b>Project Related Items</b>				
	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	100	\$ 4.00	\$ 400.00
Right Of Way Design( Title Searches & Acquisition)	EA	1	\$ 4,000.00	\$ 4,000.00
Utilities	%	10%		\$ 9,435.00
<b>Group Total</b>				<b>\$ 23,835.00</b>

## Project Totals

	Category	Total
	Grading	\$ 17,550.00
	Pavement	\$ 76,800.00
	Storm Sewer & Culverts	\$ 18,870.00
	Signing and Striping	\$ 14,465.00
	Mobilization	\$ 5,000.00
	Traffic Control	\$ 5,000.00
	Right of Way	\$ 4,400.00
	Utilities	\$ 9,435.00
	<b>Construction Subtotal</b>	<b>\$ 151,520.00</b>
	<b>Contingency</b> 20%	<b>\$ 30,300.00</b>
	<b>Survey</b> 2%	<b>\$ 3,000.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 18,200.00</b>
	<b>Construction Services</b> 8%	<b>\$ 14,500.00</b>
	<b>Project Total</b>	<b>\$ 217,520.00</b>

### Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage 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



**68th Street & Princeton Rd Signal**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Project Related Items</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
68th Street & Princeton Rd Signals	SF	1	\$ 150,000.00	\$ 150,000.00
Utilities (5%)	LS	1	\$ 7,500.00	\$ 7,500.00
<b>Group Total</b>			<b>\$</b>	<b>157,500.00</b>

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

<b>Assumptions:</b>
- 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



**68th Street & Princeton Rd. Roundabout  
FHU Project No. 18-122  
Engineer's Opinion of Probable Cost  
Thursday, August 16, 2018**

<b>Grading Items</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00	
Earthwork	CY	1,900.00	\$ 10.00	\$ 19,000.00	
Remove Pavement	SY	1,100.00	\$ 9.00	\$ 9,900.00	
<b>Group Total</b>				<b>\$</b>	<b>31,400.00</b>

<b>Pavement Items</b>					
	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	
<b>Group Total</b>				<b>\$</b>	<b>212,400.00</b>

<b>Storm Sewer &amp; Culverts</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Drainage	%	20%		\$ 48,760.00	
<b>Group Total</b>				<b>\$</b>	<b>48,760.00</b>

<b>Signing &amp; Striping</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Signing	%	5%		\$ 10,620.00	
Striping	%	5%		\$ 10,620.00	
<b>Group Total</b>				<b>\$</b>	<b>21,240.00</b>

<b>Project Related Items</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Mobilization	LS	1.00	\$ 25,100.00	\$ 25,100.00	
Traffic Control	LS	1.00	\$ 15,700.00	\$ 15,700.00	
Right of Way	SF	5,000	\$ 4.00	\$ 20,000.00	
Right of Way Design (Title Searches and Acquisition)	EA	4	\$ 4,000.00	\$ 16,000.00	
Utilities	%	5%		\$ 12,190.00	
<b>Group Total</b>				<b>\$</b>	<b>88,990.00</b>

## Project Totals

	Category	Total
	Grading	\$ 31,400.00
	Pavement	\$ 212,400.00
	Storm Sewer & Culverts	\$ 48,760.00
	Signing and Striping	\$ 21,240.00
	Mobilization	\$ 25,100.00
	Traffic Control	\$ 15,700.00
	Right of Way	\$ 36,000.00
	Utilities	\$ 24,380.00
	<b>Construction Subtotal</b>	<b>\$ 414,980.00</b>
	<b>Contingency</b> 20%	<b>\$ 83,000.00</b>
	<b>Survey</b> 2.0%	<b>\$ 8,300.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 49,800.00</b>
	<b>Construction Services</b> 8%	<b>\$ 39,800.00</b>
	<b>Project Total</b>	<b>\$ 595,880.00</b>

### Assumptions:

- This estimate is based on Conceptual Layout
- Drainage 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



**Norris HS Drive 2 Lane Approach**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Grading</b>					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$	550.00	\$ 550.00
General Clearing and Grubbing	LS	1	\$	5,000.00	\$ 5,000.00
Earthwork	CY	600	\$	10.00	\$ 6,000.00
<b>Group Total</b>				\$	11,550.00

<b>Surfacing</b>					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$	2,310.00	\$ 2,310.00
Removal of Pavement	SY	120	\$	11.00	\$ 1,320.00
P.C.C. Pavement, 9 in.	SY	1,050	\$	44.00	\$ 46,200.00
<b>Group Total</b>				\$	49,830.00

<b>Drainage</b>					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Mobilization	LS	1	\$	613.80	\$ 613.80
Roadway Storm Sewer and Inlets (20%)	LS	1	\$	12,276.00	\$ 12,276.00
<b>Group Total</b>				\$	12,889.80

<b>Project Related Items</b>					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Utilities (5%)	LS	1.000	\$	3,069.00	\$ 3,069.00
<b>Group Total</b>				\$	3,069.00

<b>Totals</b>					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Grading	LS	1	\$ 11,550.00	\$	11,550.00
Surfacing	LS	1	\$ 49,830.00	\$	49,830.00
Drainage	LS	1	\$ 12,889.80	\$	12,889.80
Project Related Items	LS	1	\$ 3,069.00	\$	3,069.00
<b>Project SubTotal</b>					<b>\$ 77,340.00</b>
<b>Contingency</b> 20%					<b>\$ 15,500.00</b>
<b>Survey</b> 2%					<b>\$ 1,500.00</b>
<b>Engineering Services</b> 10%					<b>\$ 9,300.00</b>
<b>Construction Services</b> 8%					<b>\$ 7,400.00</b>
<b>Project Total</b>					<b>\$ 111,040.00</b>

**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
- Construction Services are estimated at 8% of Construction Cost and Contingency



**68th Street & Norris HS Dr. Signal**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Project Related Items</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
68th Street & Norris HS Dr. Signals	SF	1	\$ 150,000.00	\$ 150,000.00
Utilities (5%)	LS	1	\$ 7,500.00	\$ 7,500.00
<b>Group Total</b>				<b>\$ 157,500.00</b>

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

<b>Assumptions:</b>
- 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



**68th Street and Norris HS Dr Roundabout**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Friday, August 17, 2018**

<b>Grading Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
General Clearing and Grubbing	LS	1.00	\$ 2,500.00	\$ 2,500.00
Earthwork	CY	1,900.00	\$ 10.00	\$ 19,000.00
Remove Pavement	SY	2,000.00	\$ 9.00	\$ 18,000.00
<b>Group Total</b>				<b>\$ 39,500.00</b>

<b>Pavement Items</b>				
	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
<b>Group Total</b>				<b>\$ 212,400.00</b>

<b>Storm Sewer &amp; Culverts</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Drainage	%	20%		\$ 50,380.00
<b>Group Total</b>				<b>\$ 50,380.00</b>

<b>Signing &amp; Striping</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Signing	%	5%		\$ 10,620.00
Striping	%	5%		\$ 10,620.00
<b>Group Total</b>				<b>\$ 21,240.00</b>

<b>Project Related Items</b>				
	Units	2018 Estimate		
		Qty	Unit Price	Total
Mobilization	LS	1.00	\$ 25,900.00	\$ 25,900.00
Traffic Control	LS	1.00	\$ 16,200.00	\$ 16,200.00
Right of Way	SF	7,440	\$ 4.00	\$ 29,760.00
Right of Way Design (Title Searches and Acquisition)	EA	2	\$ 4,000.00	\$ 8,000.00
Utilities	%	5%		\$ 12,595.00
<b>Group Total</b>				<b>\$ 92,455.00</b>

## Project Totals

	Category	Total
	Grading	\$ 39,500.00
	Pavement	\$ 212,400.00
	Storm Sewer & Culverts	\$ 50,380.00
	Signing and Striping	\$ 21,240.00
	Mobilization	\$ 25,900.00
	Traffic Control	\$ 16,200.00
	Right of Way	\$ 37,760.00
	Utilities	\$ 25,190.00
	<b>Construction Subtotal</b>	<b>\$ 428,570.00</b>
	<b>Contingency</b> 20%	<b>\$ 85,700.00</b>
	<b>Survey</b> 2.0%	<b>\$ 8,600.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 51,400.00</b>
	<b>Construction Services</b> 8%	<b>\$ 41,100.00</b>
	<b>Project Total</b>	<b>\$ 615,370.00</b>

### Assumptions:

- This estimate is based on Conceptual Layout
- Drainage is estimated at 10% 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



**68th St & Saltillo Rd Enhanced Intersection Signage**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Thursday, October 11, 2018**

<b>Project Related Items</b>				
	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
<b>Group Total</b>				<b>\$ 5,000.00</b>

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

<b>Assumptions:</b>



**68th Street & Olive Creek Rd NB Turn Lanes**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Grading Items</b>					
	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	250.00	\$ 7.00	\$ 1,750.00	
<b>Group Total</b>				<b>\$ 17,750.00</b>	

<b>Pavement Items</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
9" Concrete Pavement	SY	1,600.00	\$ 48.00	\$ 76,800.00	
<b>Group Total</b>				<b>\$ 76,800.00</b>	

<b>Storm Sewer &amp; Culverts</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Drainage	%	20%	\$	18,910.00	
<b>Group Total</b>				<b>\$ 18,910.00</b>	

<b>Signing &amp; Striping</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
5" White Preformed Pavement Marking, Type 4 Grooved	LF	1500.00	\$ 3.25	\$ 4,875.00	
5" Yellow Preformed Pavement Marking, Type 4 Grooved	LF	750.00	\$ 3.25	\$ 2,437.50	
Right Arrow, Preformed Pavement Markings, Type 4 Grooved	EA	4.00	\$ 365.00	\$ 1,460.00	
Pavement Marking Removal, Lines	LF	750.00	\$ 0.25	\$ 187.50	
Signs And Poles	LS	1.00	\$ 400.00	\$ 400.00	
<b>Group Total</b>				<b>\$ 9,360.00</b>	

<b>Project Related Items</b>					
	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	1,500	\$ 4.00	\$ 6,000.00	
Right Of Way Design( Title Searches & Acquisition)	EA	4	\$ 4,000.00	\$ 16,000.00	
Utilities	%	10%	\$	9,455.00	
<b>Group Total</b>				<b>\$ 41,455.00</b>	

## Project Totals

	Category	Total
	Grading	\$ 17,750.00
	Pavemnet	\$ 76,800.00
	Storm Sewer & Culverts	\$ 18,910.00
	Signing and Striping	\$ 9,360.00
	Mobilization	\$ 5,000.00
	Traffic Control	\$ 5,000.00
	Right of Way	\$ 22,000.00
	Utilities	\$ 9,455.00
	<b>Construction Subtotal</b>	<b>\$ 164,280.00</b>
	<b>Contingency</b> 20%	<b>\$ 32,900.00</b>
	<b>Survey</b> 2.0%	<b>\$ 3,300.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 19,700.00</b>
	<b>Construction Services</b> 8%	<b>\$ 15,800.00</b>
	<b>Project Total</b>	<b>\$ 235,980.00</b>

### Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage 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



**68th Street & Olive Creek Rd SB Turn Lane**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>Grading Items</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
General Clearing and Grubbing	LS	1.00	\$ 1,000.00	\$ 1,000.00	
Earthwork	CY	1,000.00	\$ 10.00	\$ 10,000.00	
Remove Pavement	SY	150.00	\$ 7.00	\$ 1,050.00	
<b>Group Total</b>				<b>\$</b>	<b>12,050.00</b>

<b>Pavement Items</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
9" Concrete Pavement	SY	800.00	\$ 48.00	\$ 38,400.00	
<b>Group Total</b>				<b>\$</b>	<b>38,400.00</b>

<b>Storm Sewer &amp; Culverts</b>					
	Units	2018 Estimate			
		Qty	Unit Price	Total	
Drainage	%	20%		\$ 10,090.00	
<b>Group Total</b>				<b>\$</b>	<b>10,090.00</b>

<b>Signing &amp; Striping</b>					
	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	
<b>Group Total</b>				<b>\$</b>	<b>7,577.75</b>

<b>Project Related Items</b>					
	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	1,500	\$ 4.00	\$ 6,000.00	
Right Of Way Design( Title Searches & Acquisition)	EA	1	\$ 4,000.00	\$ 4,000.00	
Utilities	%	10%		\$ 5,045.00	
<b>Group Total</b>				<b>\$</b>	<b>25,045.00</b>

## Project Totals

	Category	Total
	Grading	\$ 12,050.00
	Pavement	\$ 38,400.00
	Storm Sewer & Culverts	\$ 10,090.00
	Signing and Striping	\$ 7,577.75
	Mobilization	\$ 5,000.00
	Traffic Control	\$ 5,000.00
	Right of Way	\$ 10,000.00
	Utilities	\$ 5,045.00
	<b>Construction Subtotal</b>	<b>\$ 93,160.00</b>
	<b>Contingency</b> 20%	<b>\$ 18,600.00</b>
	<b>Survey</b> 2.0%	<b>\$ 1,900.00</b>
	<b>Engineering Services</b> 10%	<b>\$ 11,200.00</b>
	<b>Construction Services</b> 8%	<b>\$ 8,900.00</b>
	<b>Project Total</b>	<b>\$ 133,760.00</b>

### Assumptions:

- **This estimate is based on Conceptual Layout**
- Drainage 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



**68th Street- Princeton to Olive Creek Shoulder Improvements**  
**FHU Project No. 18-122**  
**Engineer's Opinion of Probable Cost**  
**Saturday, August 25, 2018**

<b>General/Earthwork</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
General Clearing and Grubbing	L.S.	1	\$ 15,000.00	\$ 15,000.00
Earthwork	C.Y.	16,500	\$ 10.00	\$ 165,000.00
<b>Group Total</b>				<b>\$ 180,000.00</b>

<b>Paving</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
P.C.C. 6' Shoulder	S.Y.	7040	\$ 48.00	\$ 337,920.00
Driveway Gravel Surfacing (10 Ton/ Drive)	TON	100	\$ 40.00	\$ 4,000.00
<b>Group Total</b>				<b>\$ 341,920.00</b>

<b>Pavement Marking Items</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Rumble Strips	STA	110	\$ 30.00	\$ 3,300.00
<b>Group Total</b>				<b>\$ 3,300.00</b>

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

<b>Miscellaneous Items</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Mobilization	L.S.	1	\$ 46,000.00	\$ 46,000.00
Traffic Control for Construction	L.S.	1	\$ 25,000.00	\$ 25,000.00
Construction Staking	L.S.	1	\$ 15,000.00	\$ 15,000.00
<b>Group Total</b>				<b>\$ 86,000.00</b>

<b>Construction Totals</b>					
	Units	Qty	2018 Estimate		Total
			Unit Price		
General/Earthwork	L.S.	1	\$	180,000.00	\$ 180,000.00
Paving	L.S.	1	\$	341,920.00	\$ 341,920.00
Pavement Marking Items	L.S.	1	\$	3,300.00	\$ 3,300.00
Storm Drainage (20% of Construction)	L.S.	1	\$	115,040.00	\$ 115,040.00
Erosion Control	L.S.	1	\$	50,000.00	\$ 50,000.00
Miscellaneous Items	L.S.	1	\$	86,000.00	\$ 86,000.00
<b>Project SubTotal</b>					\$ 776,260.00
<b>Construction Contingency - 20%</b>					\$ 155,250.00
<b>Construction Total</b>					<b>\$ 931,510.00</b>

<b>Project Totals</b>					
	Units	Qty	2018 Estimate		Total
			Unit Price		
Engineering Services (10%)	L.S.	1	\$	93,151.00	\$ 93,150.00
Survey (2% of Constrn)	L.S.	1	\$	18,630.20	\$ 18,630.00
Utility Relocations (5% of Constrn)	L.S.	1	\$	46,575.50	\$ 46,580.00
Construction Engineering (8% of Constrn)	L.S.	1	\$	74,520.80	\$ 74,520.00
Construction	L.S.	1	\$	931,510.00	\$ 931,510.00
<b>Project Total \$</b>					<b>1,164,390.00</b>

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



**68th Street Shoulder Improvements  
FHU Project No. 18-122  
Engineer's Opinion of Probable Cost  
Saturday, August 25, 2018**

<b>General/Earthwork</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
General Clearing and Grubbing	L.S.	1	\$ 15,000.00	\$ 15,000.00
Earthwork	C.Y.	121,000	\$ 10.00	\$ 1,210,000.00
<b>Group Total</b>				<b>\$ 1,225,000.00</b>

<b>Paving</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
P.C.C. 6' Shoulder	S.Y.	77333	\$ 48.00	\$ 3,712,000.00
Driveway Gravel Surfacing (10 Ton/ Drive)	TON	700	\$ 40.00	\$ 28,000.00
<b>Group Total</b>				<b>\$ 3,740,000.00</b>

<b>Safety Edge</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Safety Edge	STA	1160	\$ 30.00	\$ 34,800.00
<b>Group Total</b>				<b>\$ 34,800.00</b>

<b>Erosion Control</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Erosion Control	L.S.	1	\$ 75,000.00	\$ 75,000.00
<b>Group Total</b>				<b>\$ 75,000.00</b>

<b>Miscellaneous Items</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Mobilization	L.S.	1	\$ 406,000.00	\$ 406,000.00
Traffic Control for Construction	L.S.	1	\$ 25,000.00	\$ 25,000.00
Construction Staking	L.S.	1	\$ 15,000.00	\$ 15,000.00
<b>Group Total</b>				<b>\$ 446,000.00</b>

Widen ALL shoulder

<b>Construction Totals</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
General/Earthwork	L.S.	1	\$ 1,225,000.00	\$ 1,225,000.00
Paving	L.S.	1	\$ 3,740,000.00	\$ 3,740,000.00
Pavement Marking Items	L.S.	1	\$ 34,800.00	\$ 34,800.00
Storm Drainage (20% of Construction)	L.S.	1	\$ 1,014,960.00	\$ 1,014,960.00
Erosion Control	L.S.	1	\$ 75,000.00	\$ 75,000.00
Miscellaneous Items	L.S.	1	\$ 446,000.00	\$ 446,000.00
<b>Project SubTotal</b>				<b>\$ 6,535,760.00</b>
<b>Construction Contingency - 20%</b>				<b>\$ 1,307,150.00</b>
<b>Construction Total</b>				<b>\$ 7,842,910.00</b>

<b>Project Totals</b>				
	Units	Qty	2018 Estimate	
			Unit Price	Total
Engineering Sevices (10%)	L.S.	1	\$ 784,291.00	\$ 784,290.00
Utility Relocations (5% of Constrn)	L.S.	1	\$ 392,145.50	\$ 392,150.00
Construction Engineering (8% of Constrn)	L.S.	1	\$ 627,432.80	\$ 627,430.00
Construction	L.S.	1	\$ 7,842,910.00	\$ 7,842,910.00
<b>Project Total</b>				<b>\$ 9,646,780.00</b>

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