



# Galpin Boulevard (CR 117) Improvements Preliminary Design Study

## TH 5 to North City Limits

CITY OF CHAHASSEN AND CARVER COUNTY

CITY PROJECT PW176A

AUGUST 2018

Prepared By:

**Kimley»Horn**

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## INTRODUCTION

On November 13, 2017, the Chanhassen City Council approved a consultant contract with Kimley-Horn and Associates to assist the City in preparing a preliminary design study for Galpin Boulevard between Trunk Highway (TH) 5 and the north City limits. Galpin Boulevard is currently a 4-lane urban section roadway between TH 5 and West 78<sup>th</sup> Street and a 2-lane rural section roadway north of West 78<sup>th</sup> Street. A project location map is provided in Appendix A and a layout detailing the existing conditions is provided in Appendix B.

Carver County currently operates and maintains Galpin Boulevard; however, the County has identified this section of Galpin Boulevard as a potential turnback since it functions more as a local collector roadway than a County roadway. This study has included the following tasks to assist the City and County in evaluating the potential turnback of the roadway:

- A public involvement process to inform stakeholders and gather input
- A study of existing and future traffic operations
- An evaluation of potential improvements to address safety and operational concerns
- An investigation of potential bicycle and pedestrian improvements
- Determination of a preferred layout and profile
- Development of a proposed storm drainage plan
- Determination of estimated costs and a funding plan

The improvements to Galpin Boulevard are current programmed for construction in 2022. This study was completed well in advance of construction to allow the City and County to better plan for future development along the corridor and to develop a funding plan for the proposed improvements.

A Project Management Team (PMT) consisting of staff from the City of Chanhassen and Carver County worked cooperatively to determine the proposed scope of the project improvements. This report summarizes the findings and direction of the PMT, details the scope of the proposed improvements, and establishes estimated costs and a proposed cost share plan for the improvements.

## STUDIED IMPROVEMENTS

The investigation of potential of improvements along the corridor included a traffic forecasting and operations analysis. The analysis included a study of the overall corridor and the following intersections:

- TH 5 (currently a traffic signal)
- West 78<sup>th</sup> Street (currently stop control on West 78<sup>th</sup> Street)
- Brinker Street (currently a three-way stop)
- Longacres Drive (currently stop control on Longacres Drive)
- Lake Lucy Road (currently a four-way stop)
- Pheasant Drive (currently stop control on Pheasant Drive)

A memorandum summarizing the results of the traffic analysis is provided in Appendix C.

The traffic analysis determined that the current roadway configuration with existing intersection control will function at an acceptable level of service for both existing and future design year (2040) traffic volumes; however, intersection improvements would be beneficial at some locations to address operational and safety concerns. The specific intersections of concern are West 78<sup>th</sup> Street, Brinker Street, and Lake Lucy Road. The preliminary design work identified potential improvements at these intersections as follows:

- West 78<sup>th</sup> Street - It is recommended that a roundabout be constructed at this location

- Brinker Street - It is recommended that the existing three-way stop be replaced with either an enhanced pedestrian crossing with stop control on Brinker Street or with a mini-roundabout
- Lake Lucy Road - It is recommended that the existing four-way stop be replaced by either an enhanced pedestrian crossing with stop control on Lake Lucy Road or with a mini-roundabout

Based on technical analysis and input received as a part of the public involvement process, it is recommended that mini-roundabouts be constructed at Brinker Street and Lake Lucy Road.

The preliminary design work has also investigated the need for sidewalk and trail improvements along the corridor. The proposed design includes 10-foot wide trails along both sides of the roadway between TH 5 and Lake Lucy Road, and a 10-foot wide trail along the east side of the roadway north of Lake Lucy Road. Right-of-way limitations and physical constraints make it difficult to include trails along both sides of the roadway north of Lake Lucy Road. A trail on the east side of Galpin Boulevard would connect to a future City of Shorewood trail that will run along the east side of the roadway from the Chanhassen City limits to TH 7. The possible construction of a pedestrian underpass crossing of Galpin Boulevard was also investigated between Hunter Drive and Longacres Drive. Preliminary design information for the underpass is provided in Appendix D. The underpass was found to be difficult and expensive to construct considering topographic and right-of-way limitations.

Galpin Boulevard is proposed to be reconstructed to an urban section roadway, requiring storm drainage improvements including storm sewer and storm water treatment facilities. The preliminary design work identified 4 potential locations for the storm water treatment facilities. One of the facilities would be built on City property at Sugar Bush Park, while the other 3 locations will require easement dedication or acquisition. The southerly portion of the project area falls within the boundaries of the Riley Purgatory Bluff Creek Watershed District, while the northern portion of the project is within the Minnehaha Creek Watershed District. The proposed storm drainage improvements must meet the requirements of the respective watershed districts.

The project area includes pending development of the Prince R. Nelson property along the east side of Galpin Boulevard between West 78<sup>th</sup> Street and Lake Lucy Road. The proposed development plans will need to include the dedication of an additional 17 feet or right-of-way along the westerly edge of the property to provide for the future reconstruction of Galpin Boulevard. In addition, drainage and utility easements are needed for two proposed storm drainage facilities on the property. The proposed drainage plan in Appendix G details the suggested locations for the drainage facilities; however, their exact locations can be somewhat flexible based on the development plans.

The City has investigated the potential burial of existing overhead utilities along the project corridor. Xcel Energy has provided a preliminary cost of \$1,294,000 for the burial work based on some general assumptions. More detailed analysis will be required at the time of the Galpin Boulevard final design work to refine the estimated costs. Some of the overhead utility burial work along the Prince R. Nelson property may occur in conjunction with the proposed development.

This study did not include an evaluation of the need to relocate or replace public utilities, and no estimated costs have been identified for public utility relocation/replacement. The future final design process will need to determine whether public utility improvements are needed.

A preliminary geotechnical exploration program was completed as a part of the preliminary design work. A report summarizing the results of the geotechnical investigation is provided in Appendix E.

The preferred layout and profile for Galpin Boulevard is provided in Appendix F. The proposed drainage plan is provided in Appendix G.

## PUBLIC INVOLVEMENT SUMMARY

A public involvement process was implemented as a part of the preliminary design process to inform the area stakeholders and gather input on the proposed design. The following is a summary of the public involvement activities:

### Public Open House #1

Public Open House #1 was held on March 22, 2018 at the Chanhassen Rec Center. The meeting was attended by over 35 residents and 10 comment cards were received. The feedback on the project was generally very positive with support for changes at the West 78<sup>th</sup> Street, Brinker Street, and Lake Lucy Road intersections. The proposed trail improvements were also viewed as very favorable. Residents requested that the existing horizontal and vertical alignment challenges at the north end of the corridor near Melody Hill Circle be improved as a part of the project.

### Public Open House #2

Public Open House #2 was held on June 12, 2018 at the Chanhassen Rec Center. The meeting was attended by over 45 residents and 16 comment cards were received. The feedback on the proposed improvements was generally positive. There was support for the construction of a roundabout at West 78<sup>th</sup> Street and mini-roundabouts were supported over enhanced pedestrian crossings at Brinker Street and Lake Lucy Road. The proposed trail improvements were also supported by residents.

Input from the Chanhassen City Council was received at work sessions on February 26, 2018, and May 29, 2018. The project was reviewed with the Carver County Board on June 5, 2018. The Chanhassen City Council adopted a resolution in support of the feasibility study findings on June 25, 2018.

## ESTIMATED COSTS AND FUNDING

The estimated costs for the Galpin Boulevard (CR 117) Improvements project are summarized below and detailed in the table provided in Appendix H. The estimated costs include a 10% contingency and 4% escalation for the planned 2022 construction year. Planning/design costs have been estimated at 20% of the construction cost.

Estimated Construction Cost	\$ 6,930,000
Contingency	\$ 690,000
Escalation for 2022 Construction	\$ 300,000
Right-of-Way/Easements	\$ 400,000
<u>Indirect Costs</u>	<u>\$ 1,670,000</u>
Total Estimated Project Cost	\$ 9,990,000

A proposed cost sharing plan has been developed based on Carver County's current cost sharing policy and additional clarification/direction provided by County staff. Based on the current policy, the City of Chanhassen's cost share for the project would be approximately \$3.1 million as detailed in Appendix H. The City and County will need to agree upon a final cost share split and a Joint Powers Agreement (JPA) will be needed between the City and County detailing the turnback terms.

Estimated total project costs for the optional pedestrian underpass and overhead utility burial improvements are as follows:

Pedestrian Underpass	\$ 2,600,000
Overhead Utility Burial	\$ 1,294,000

## PROJECT SCHEDULE

A proposed project schedule is summarized below assuming that the improvements are constructed in 2022 as currently programmed.

Feasibility Study and Preliminary Design Complete	July 2018
Final Design	2020*
Right-of-Way/Easement Acquisition	2021*
Bidding	Winter 2021/2022
Begin Construction	2022*

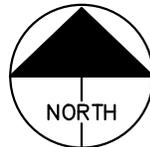
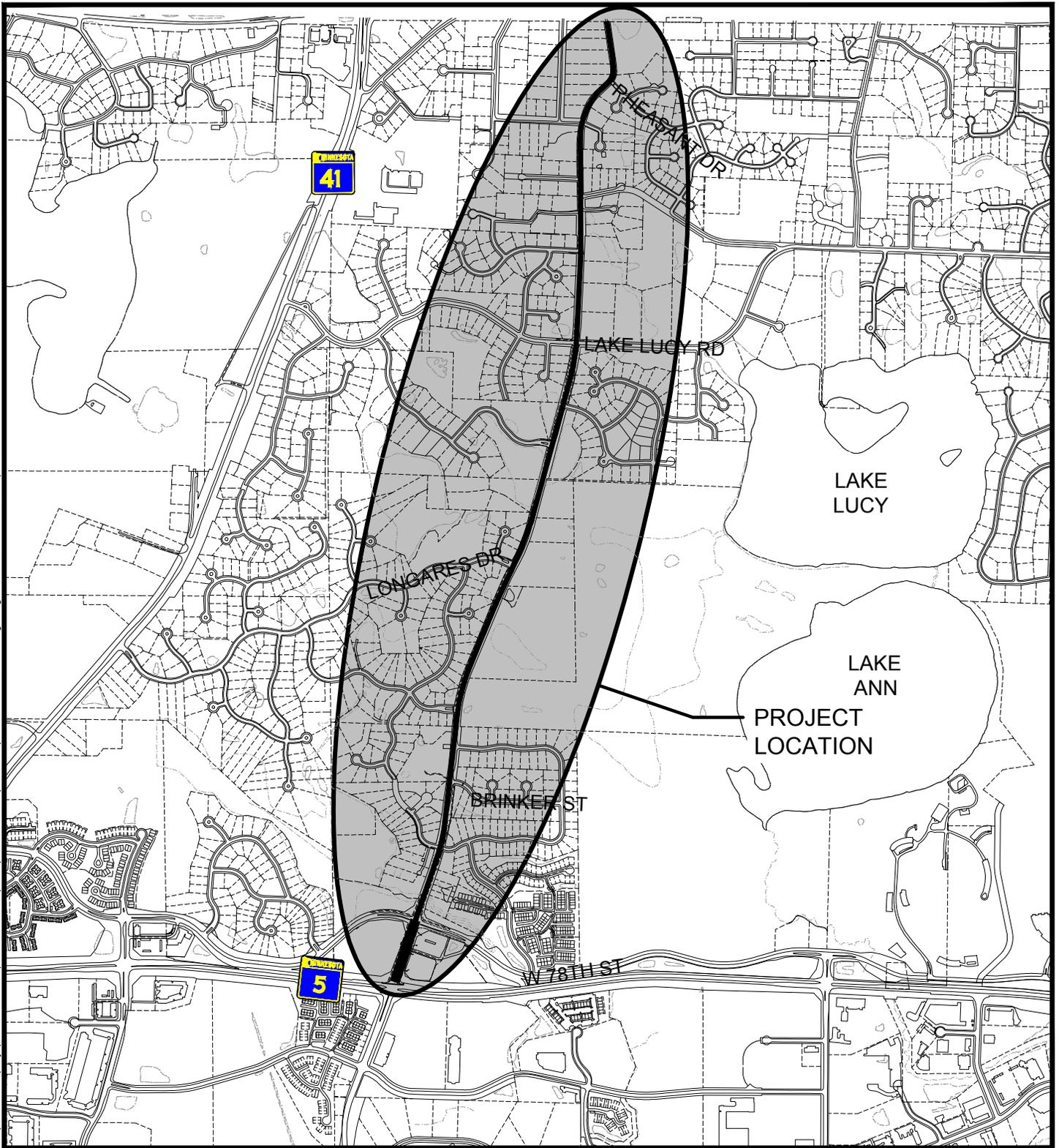
*\*Contingent on City and County agreement on a funding plan for the improvements*

# APPENDICIES

## APPENDIX A – PROJECT LOCATION MAP



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PROJECT LOCATION MAP



GALPIN BOULEVARD (CR 117)  
RECONSTRUCTION

## APPENDIX B – EXISTING CONDITIONS LAYOUT





APPENDIX C – TRAFFIC MEMORANDUM



## MEMORANDUM

To: Paul Oehme, P.E.  
Director of Public Works / City Engineer  
City of Chanhassen

Darin Mielke, P.E., LSIT, PMP  
Assistant Public Works Director / Deputy County Engineer  
Carver County Public Works

Dan McCormick, P.E., PTOE  
Transportation Manager  
Carver County Public Works

From: Brandon Bourdon, P.E.  
Douglas Arnold, P.E.

Date: March 8, 2018

Re: Galpin Boulevard (CR 117) Reconstruction  
Corridor Safety and Operations Analysis

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## Introduction

Carver County is proposing to turn back Galpin Boulevard (CR 117) to the City of Chanhassen from Trunk Highway (TH) 5 to the northern City limit. As part of the turnback process, Kimley-Horn performed a traffic analysis to determine existing and future operating conditions of the corridor, and determine if any roadway/intersection improvements should be made as a part of the corridor reconstruction that will occur prior to turn back to the City.

This memorandum provides a summary of historic crash data along the study corridor, intersection capacity analysis for Existing and Design Year conditions, and a discussion on potential roadway and intersection improvement alternatives. This memo uses traffic forecasts documented in the Traffic Forecasting Memorandum dated January 4, 2018 (see **Appendix**).

## Existing Conditions Analysis

The segment of Galpin Boulevard that was the focus of this corridor analysis is between TH 5 and the northern city limit. Based on discussion with City and County staff, the following intersections along Galpin Boulevard were the focus of the traffic analysis; TH 5, W 78<sup>th</sup> Street, Brinker Street, Longacres Drive, Lake Lucy Road, and Pheasant Drive.

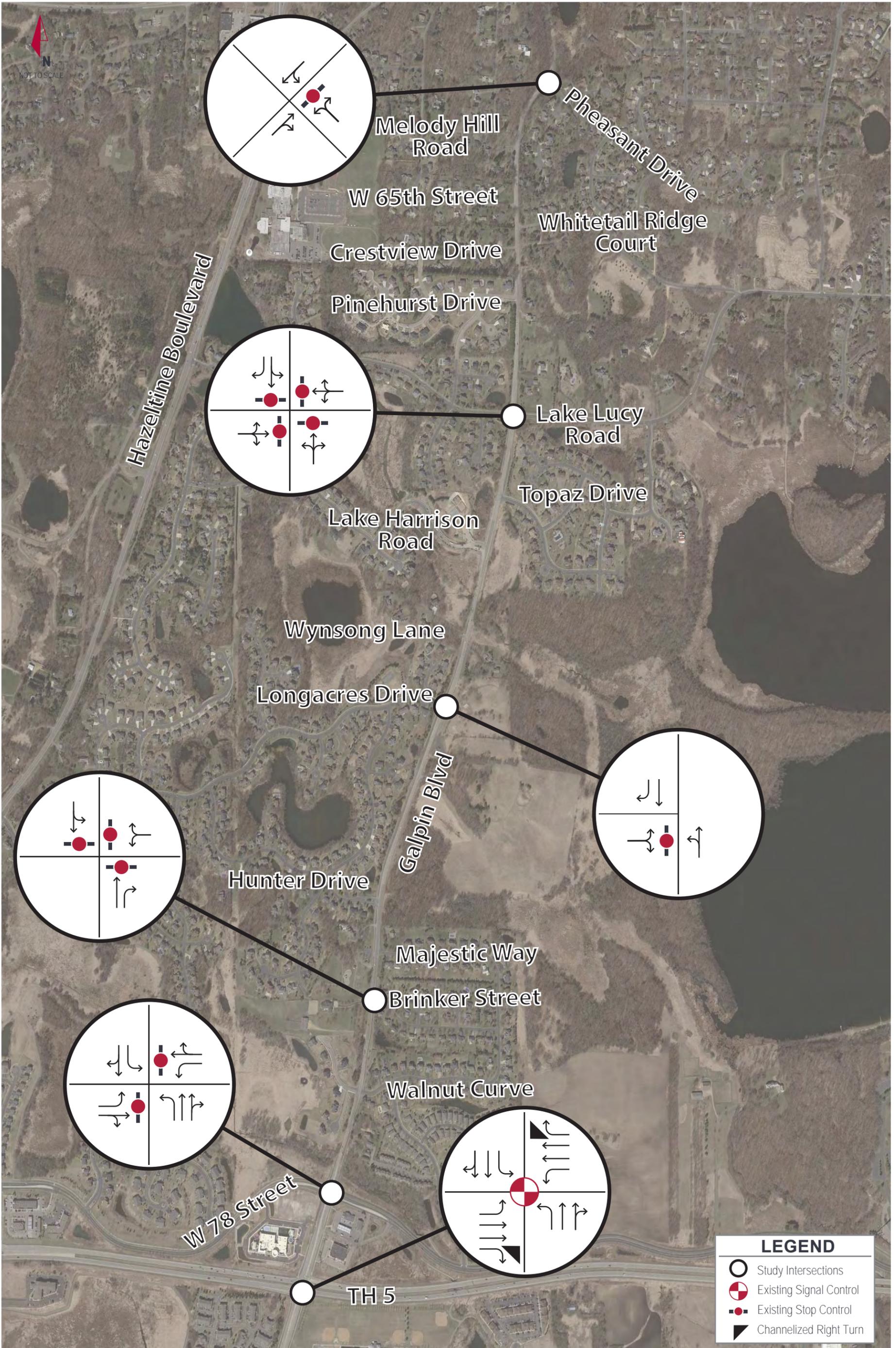
### Roadway Conditions

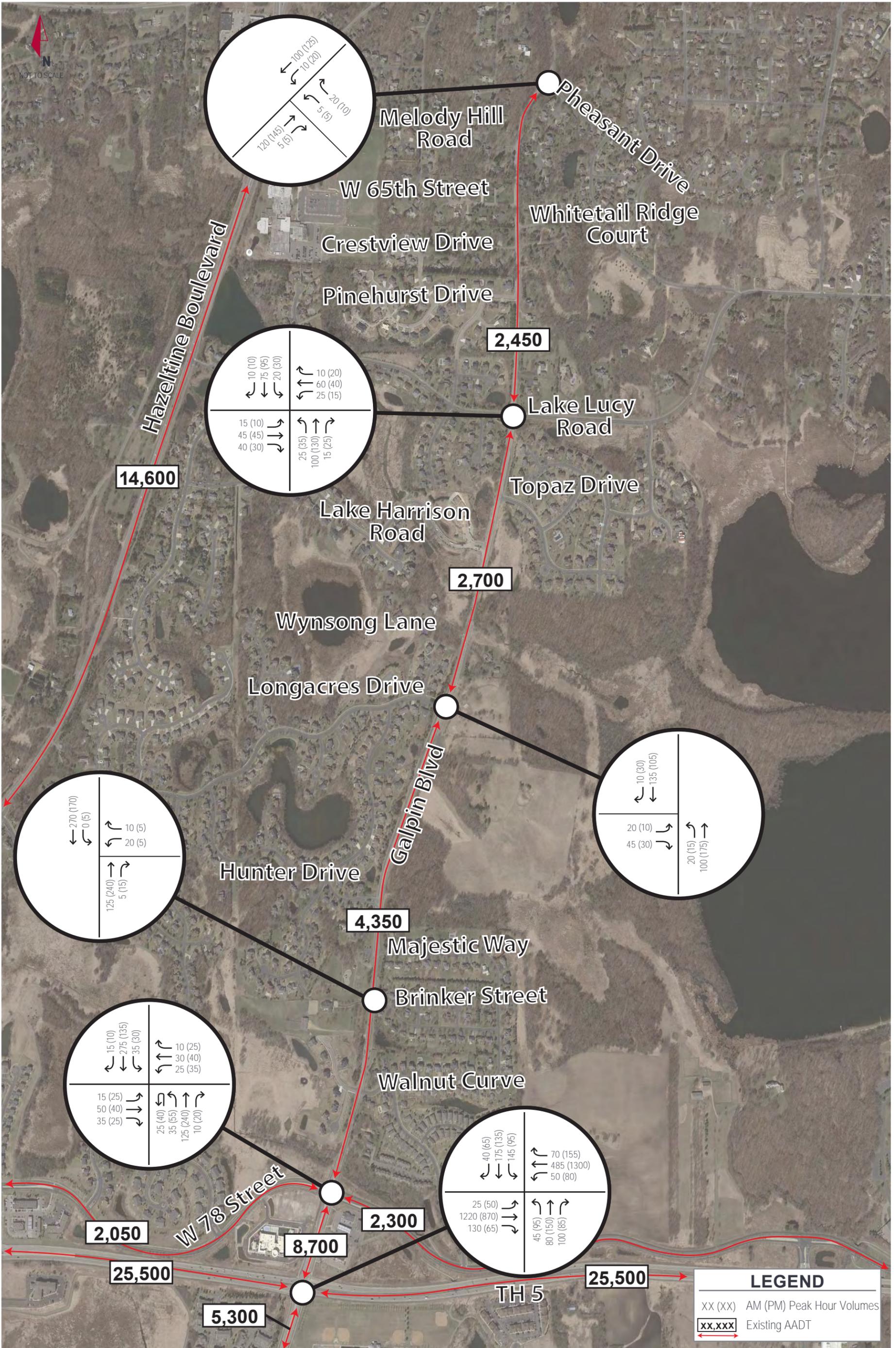
Galpin Boulevard is a north-south roadway that connects Lyman Boulevard (to the south) with TH 7 (to the north), located between Hazeltine Boulevard (to the west) and Powers Boulevard (to the east). The approximately 2-mile study corridor begins at TH 5 and ends at the City of Chanhassen's northern border. Galpin Boulevard currently has a posted speed limit of 45 mph on the south end (south of Lake Lucy Drive) and 40 mph on the north end. Galpin Boulevard is currently a two-lane undivided roadway that is classified as a Major Collector within the study limits in Carver County's Comprehensive Plan. **Exhibit 1** provides the existing lane geometry and intersection control for the study area.

### Existing Traffic Volumes

The existing Average Daily Traffic (ADT) is 5,300 vehicles per day (vpd) south of TH 5, 8,700 vpd between W 78<sup>th</sup> Street and TH 5, 4,350 vpd between Longacres Drive and W 78<sup>th</sup> Street, 2,700 vehicles per day between Lake Lucy Road and Longacres Drive, and 2,450 vehicles per day north of Lake Lucy Road. **Exhibit 2** provides the ADT volumes along the study corridor.

The Traffic Volume Forecasting Memorandum included in the **Appendix** provides information regarding the collection of existing turning movement volumes at the study intersections. This data was collected in December 2017. **Exhibit 2** provides the intersection turning movement counts for the AM and PM peak hours.





**Existing Traffic Operations**

An intersection capacity analysis was performed at the study intersections using the weekday AM and PM peak hour turning movement volumes. The capacity analysis was performed using Synchro/SimTraffic software to determine a baseline of operations at the study intersections. The level of service (LOS) boundaries, as documented in the Highway Capacity Manual, are shown in **Table 1** for signalized and unsignalized intersections. LOS A through LOS D are considered to be acceptable levels of operation for both signalized and unsignalized intersections.

**Table 1: Level of Service Boundaries**

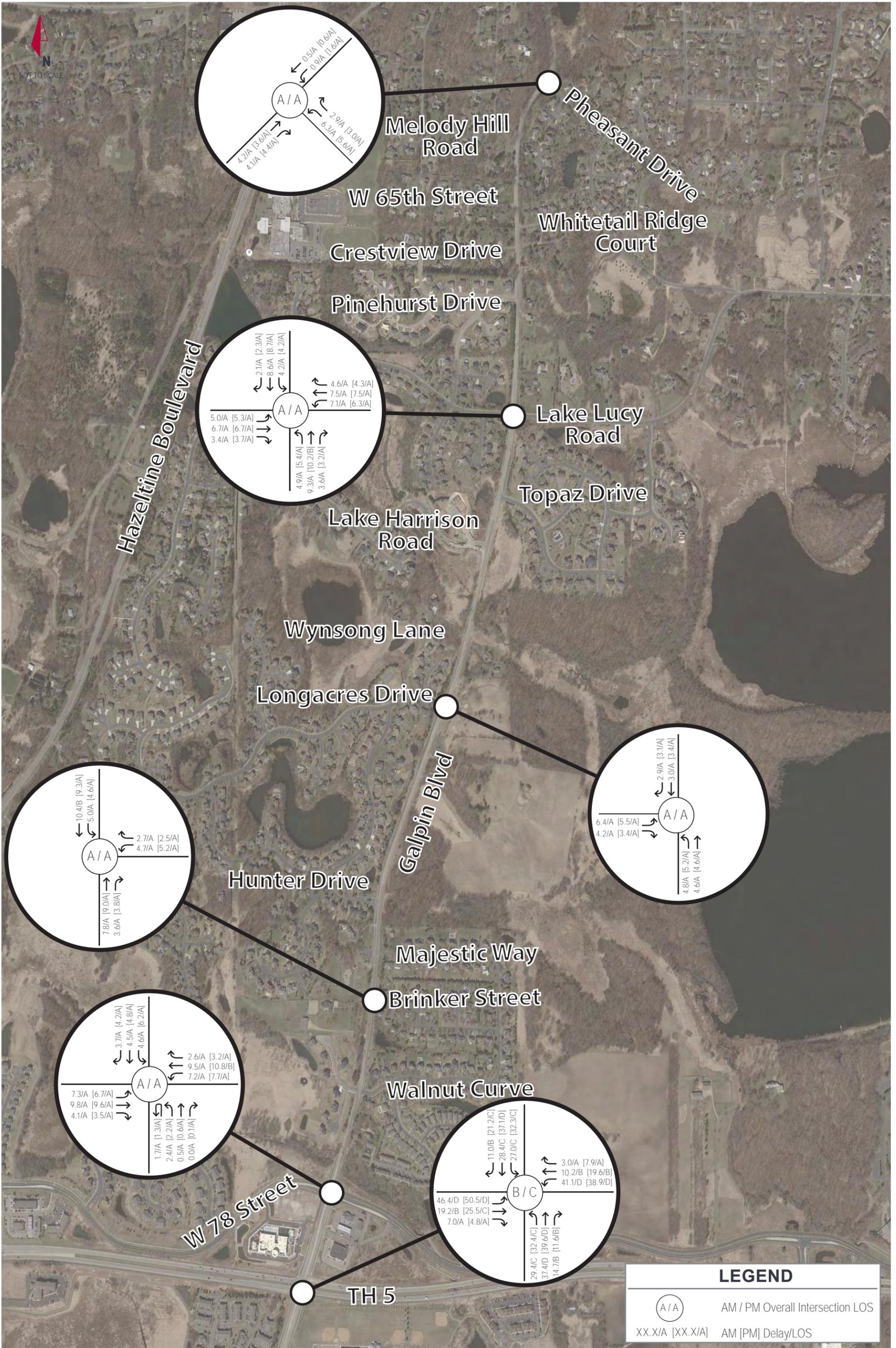
Level of Service	Average Control Delay per Vehicle (sec/veh)		Description
	Signalized	Unsignalized	
A and B	$\leq 10$ (A) $> 10$ and $\leq 20$ (B)	$\leq 10$ (A) $> 10$ and $\leq 15$ (B)	No delays at intersections with continuous flow traffic. Uncongested operations; high frequency of long gaps available for all left and right-turning traffic; no observable queues.
C	$> 20$ and $\leq 35$	$> 15$ and $\leq 25$	Moderate delays at intersections with satisfactory to good traffic flow. Light congestion; infrequent backups on critical approaches.
D	$> 35$ and $\leq 55$	$> 25$ and $\leq 35$	Increased probability of delays along every approach. Significant congestion on critical approaches, but intersection functional. No long standing lines formed.
E	$> 55$ and $\leq 80$	$> 35$ and $\leq 50$	Heavy traffic flow condition. Heavy delays probable. No available gaps for cross-street traffic or main street turning traffic. Limit of stable flow.
F	$> 80$	$> 50$	Unstable traffic flow. Heavy congestion. Traffic moves in forced flow condition. Average delays greater than one minute highly probable. Total breakdown.

**Table 2** provides a summary of the delay (seconds per vehicle) and LOS for each individual movement of the study intersections. The LOS information is also summarized by movement in **Exhibit 3**. Based on the Existing Conditions capacity analysis, all intersections are currently operating at an acceptable LOS during the weekday AM and PM peak hours. Additionally, all individual movements are operating at LOS D or better for both the AM and PM peak hours. The SimTraffic reports are included in the **Appendix**.

**Table 2: Existing Year Peak Hour Delay and Level of Service Results**

Intersection			AM PEAK HOUR								PM PEAK HOUR							
			Left		Through		Right		Overall		Left		Through		Right		Overall	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Galpin Boulevard & Pheasant Drive	Side-Street Stop Controlled	WB	6.3	A	--	--	2.9	A	2.6	A	5.6	A	--	--	3.0	A	2.6	A
		NB	--	--	4.2	A	4.1	A			--	--	3.6	A	4.4	A		
		SB	0.9	A	0.5	A	--	--			1.6	A	0.6	A	--	--		
Galpin Boulevard & Lake Lucy Road	All-Way Stop Controlled	EB	5.0	A	6.7	A	3.4	A	6.9	A	5.3	A	6.7	A	3.7	A	7.2	A
		WB	7.1	A	7.5	A	4.6	A			6.3	A	7.5	A	4.3	A		
		NB	4.9	A	9.3	A	3.6	A			5.4	A	10.2	B	3.2	A		
		SB	4.2	A	8.6	A	2.1	A			4.2	A	8.7	A	2.3	A		
Galpin Boulevard & Longacres Drive	Side-Street Stop Controlled	EB	6.4	A	--	--	4.2	A	4.0	A	5.5	A	--	--	3.4	A	4.2	A
		NB	4.8	A	4.6	A	--	--			5.2	A	4.6	A	--	--		
		SB	--	--	3.0	A	2.9	A			--	--	3.4	A	3.1	A		
Galpin Boulevard & Brinker Street	All-Way Stop Controlled	WB	4.7	A	--	--	2.7	A	9.0	A	5.2	A	--	--	2.5	A	8.8	A
		NB	--	--	7.8	A	3.6	A			--	--	9.0	A	3.8	A		
		SB	5.0	A	10.4	B	--	--			4.6	A	9.3	A	--	--		
Galpin Boulevard & W 78th Street	Side-Street Stop Controlled	EB	7.3	A	9.8	A	4.1	A	4.2	A	6.7	A	9.6	A	3.5	A	3.6	A
		WB	7.2	A	9.5	A	2.6	A			7.7	A	10.8	B	3.2	A		
		NB	<sup>(1)</sup> (1.7) 2.4	<sup>(1)</sup> (A) A	0.5	A	0.0	A			<sup>(1)</sup> (1.3) 2.2	<sup>(1)</sup> (A) A	0.6	A	0.1	A		
		SB	4.6	A	4.5	A	3.7	A			6.2	A	4.8	A	4.2	A		
Galpin Boulevard & TH 5	Signalized	EB	46.4	D	19.2	B	7.0	A	18.6	B	50.5	D	25.5	C	4.8	A	23.5	C
		WB	41.1	D	10.2	B	3.0	A			38.9	D	19.6	B	7.9	A		
		NB	29.4	C	37.4	D	14.7	B			32.4	C	39.6	D	11.6	B		
		SB	27.0	C	28.4	C	11.0	B			32.3	C	37.1	D	21.2	C		

<sup>(1)</sup> Delay and LOS are reported for both the (U-turn) and left movements for the northbound left turn lane at Galpin Boulevard and W 78<sup>th</sup> Street



**Existing Queue Analysis**

A review of existing vehicle queueing based on the SimTraffic analysis and field observations show no significant queueing issues. All queueing can be accommodated from the existing storage provided at the turn lanes. Additionally, at the intersection of Galpin Boulevard and TH 5, the through queues are not blocking entry into the turn lanes. The SimTraffic reports that provide the queueing information are included in the **Appendix**.

**Crash Analysis**

Historical crash data was obtained for the previous ten (10) year period using MnDOT’s Crash Mapping Analysis Tool (MnCMAT). A review of the crash data showed that there was a total of 97 crashes at study intersections. Of the 97 crashes, there were 0 fatalities, 1 incapacitating injury, 4 non-incapacitating injuries, 21 possible injuries, and 71 property damage only crashes.

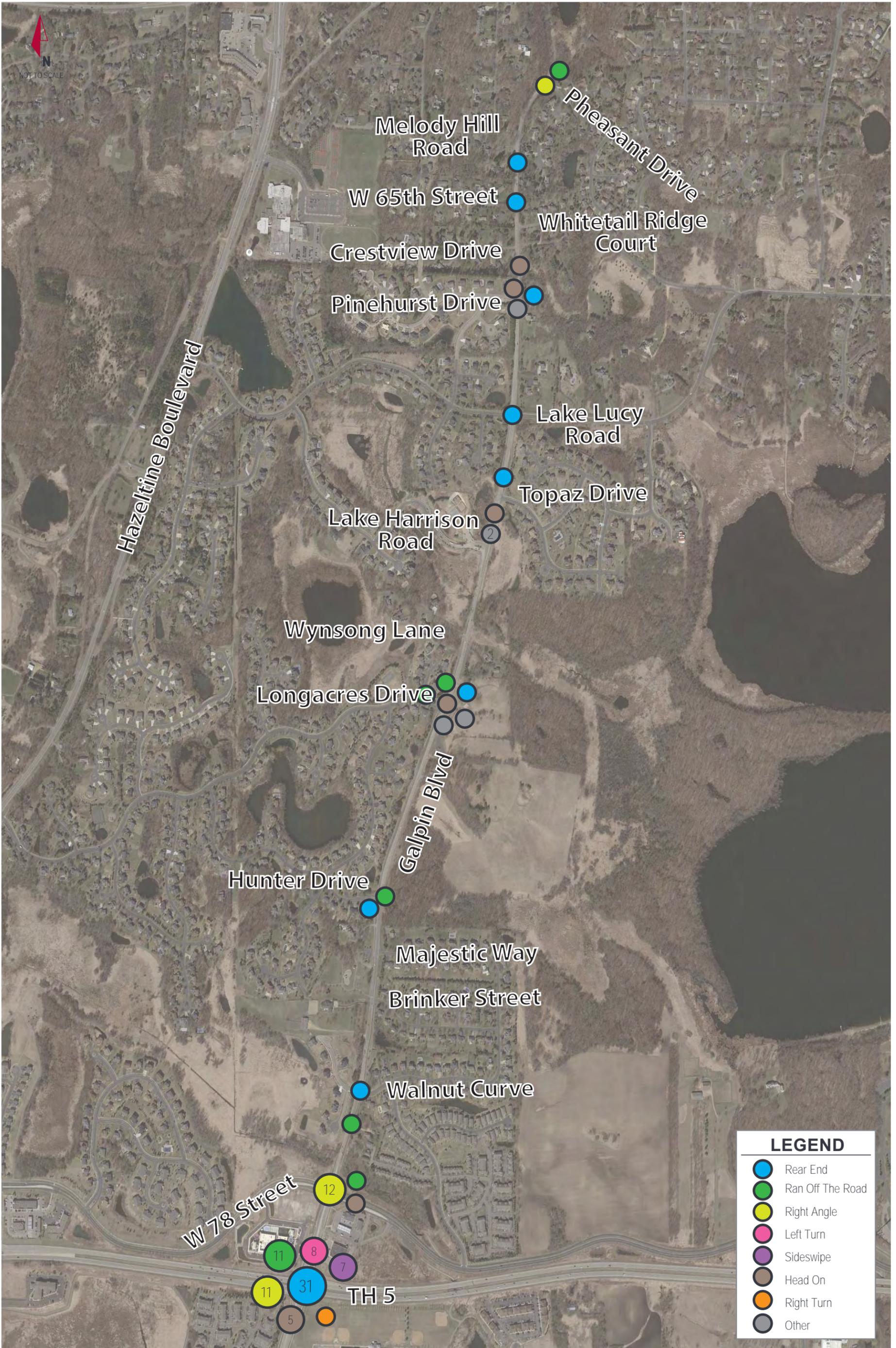
Intersection crash rates, both site specific and statewide average, are included in **Table 3**. Crash rates provide an indication of the number of crashes that can be expected per entering vehicle over a given analysis period. Using MnDOT’s 2015 “Green Sheets,” intersection crash rates were calculated and compared against metro and statewide average values to develop a critical index value (for the purposes of this analysis, the statewide and metro average are assumed to be the same value). This value is used to determine if an intersection is operating outside of the expected normal range, where a critical index value over 1.0 means the intersection is outside of the normal range.

**Table 3: Crash Summary**

Intersection	Total Number of Crashes	Crash Type					Observed Crash Rate	Average Crash Rate	Critical Crash Rate	Critical Index
		PD	C	B	A	K				
Galpin Boulevard & Pheasant Drive	2	2	0	0	0	0	0.19	0.19	0.58	0.33
Galpin Boulevard & Lake Lucy Road	1	0	1	0	0	0	0.06	0.35	0.74	0.08
Galpin Boulevard & Longacres Drive	6	5	1	0	0	0	0.42	0.19	0.52	0.81
Galpin Boulevard & Brinker Street	0	0	0	0	0	0	0.00	0.35	0.75	0.00
Galpin Boulevard & W 78th Street	14	13	1	0	0	0	0.44	0.19	0.41	1.07
Galpin Boulevard & TH 5	74	51	18	4	1	0	0.62	0.45	0.62	1.00

The intersection of Galpin Boulevard and W 78<sup>th</sup> Street has a historic crash rate that is above the critical index. Of the total crashes at W 78<sup>th</sup> Street, twelve were right angle crashes with the side street vehicle failing to yield the right-of-way. While W 78<sup>th</sup> Street is over the critical index by a small margin, all but one of the crashes resulted in property damage only, and there were no injuries or fatalities. No specific trends among the right-angle crashes at W 78<sup>th</sup> Street were identified.

Along the corridor, there were only 14 reported crashes during the previous ten years. Six (6) crashes occurred along the roadway, seven (7) took place at other non-study intersections along the corridor, and one (1) occurred at a residential driveway with access directly to Galpin Boulevard. **Exhibit 4** provides a summary of the crashes (including crash type) along the corridor.



## Design Year (2040) No-Action Intersection Analysis

A capacity analysis was performed at the study intersections for the Design Year (2040) to get an idea of baseline operating conditions along the corridor in the future. Below is a summary of the Design Year (2040) volume development and anticipated operating conditions during the AM and PM peak hours.

### Design Year (2040) Volume Forecast

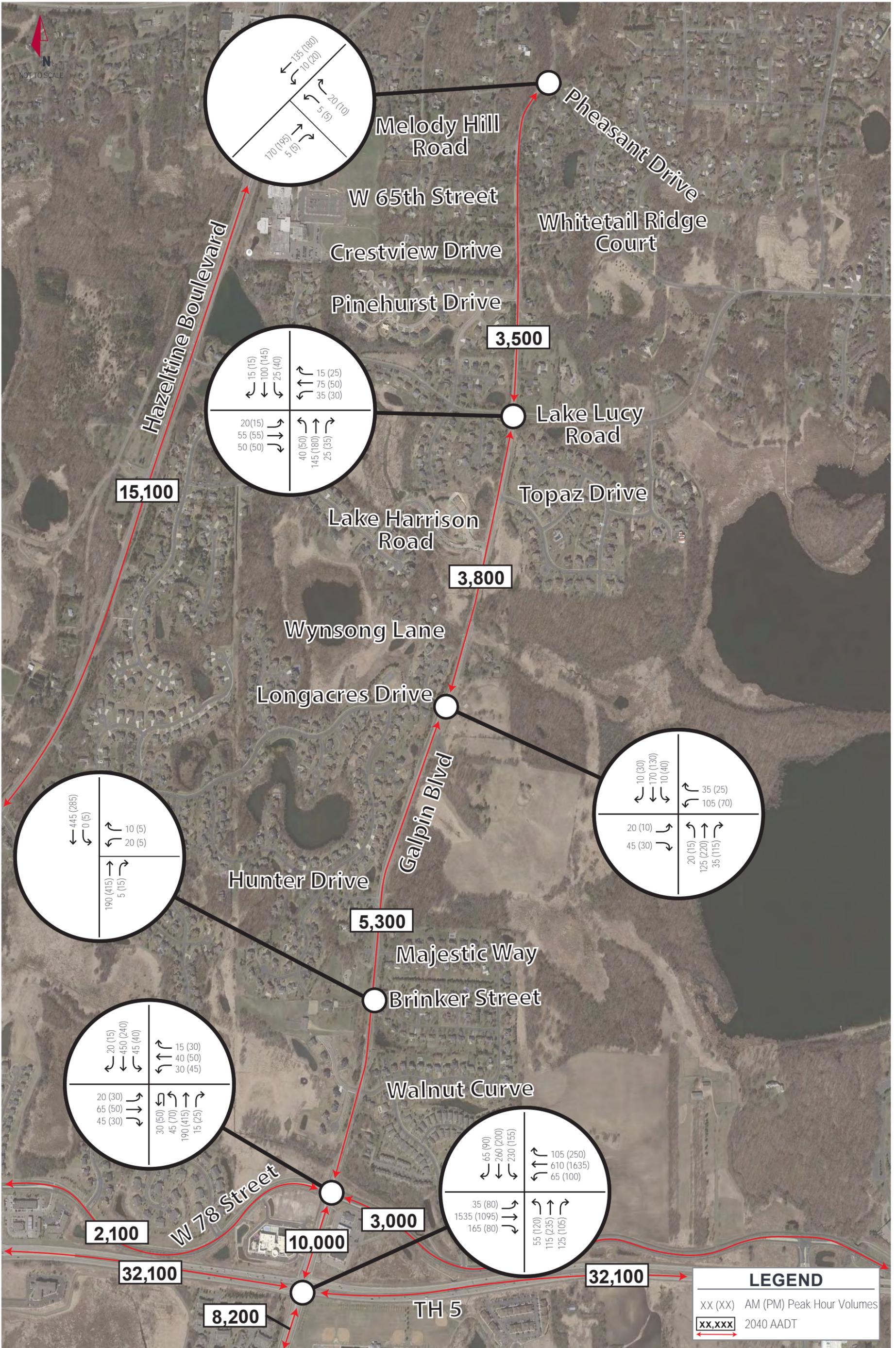
Based on the Traffic Volume Forecasting Memorandum, which considered historical growth and forecasted growth in the City of Chanhassen's 2040 Comprehensive Plan, a 1.0% annual growth rate was applied to the existing traffic counts to develop background traffic volumes along Galpin Boulevard. Based on discussion with City staff, the large tract of land on the east side of Galpin Boulevard between W 78th Street and Lake Lucy Road is anticipated to be developed into a residential subdivision with approximately 250 single family dwelling units. At this point, access to the development is expected to be provided via a connection to the intersection of Galpin Boulevard and Longacres Drive. Based on existing traffic counts, it is anticipated that 75% of the traffic will access the site to/from the south and 25% to/from the north. **Exhibit 5** provides a summary of the Design Year (2040) forecasted turning movement volumes, which accounts for both background growth and anticipated traffic from the adjacent residential subdivision. The exhibit also provides 2040 ADT volumes, which was based on the City's 2040 Comprehensive Plan except for the TH 5 forecast. The TH 5 forecast was estimated based by applying a 1.0% growth rate that was based on a review of historic traffic growth in the area and the regional travel demand model.

### Design Year (2040) No-Action Intersection Capacity Analysis

Using the forecasted Design Year (2040) AM and PM peak hour turning movement volumes, a capacity analysis was performed at the study intersections to determine baseline operating conditions in 2040. Existing intersection control and geometry were assumed for this No-Action analysis. **Table 4** provides a summary of the delay (seconds/vehicle) and LOS at the study intersections. **Exhibit 6** also provides a summary of the delay and LOS for each individual movement at the study intersections. Based on the analysis, all turning movements are anticipated to operate at LOS D or better except for several left-turn movements at the intersection of Galpin Boulevard and TH 5 that are LOS E. This is not a concern because the traffic volumes for these movements are not very high, the operations are not negatively impacting adjacent movements, and it is not unique for left-turning traffic with lower turning movements to experience LOS E at a traffic signal under forecast traffic conditions. The SimTraffic reports are included in the **Appendix**.

### Design Year (2040) No-Action Queue Analysis

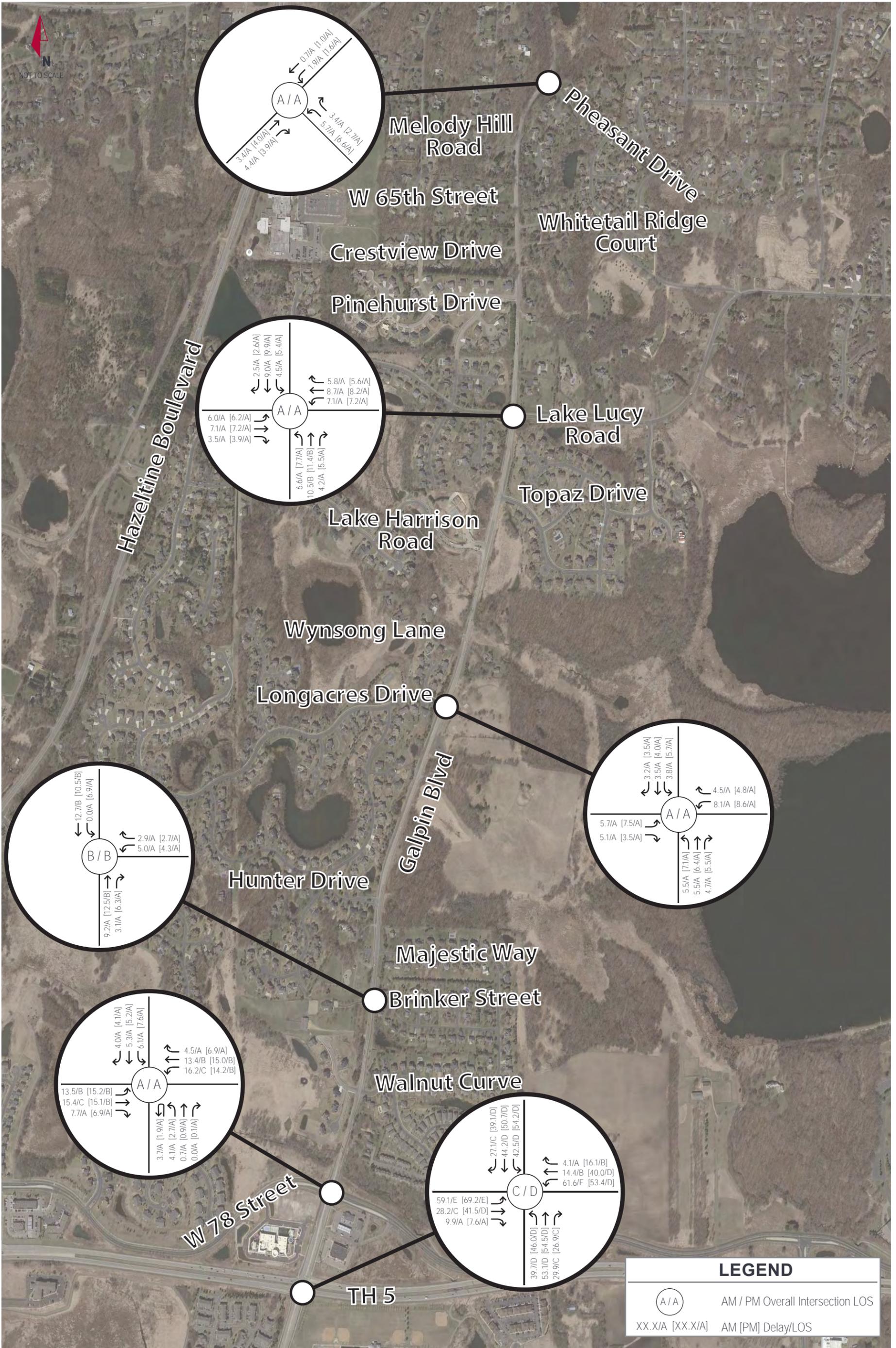
Similar to Existing Conditions, the provided storage at the turn lanes along the corridor are anticipated to accommodate the 95<sup>th</sup> percentile queue for the Design Year (2040) No-Action weekday AM and PM peak hours. As traffic increases along TH 5, the through movement queues are anticipated to increase, so there may be a few occasions in the eastbound direction during both peak hours and the westbound direction during the PM peak hour where the through queue has the potential to block entry into the dedicated turn lanes; however, since these occurrences are anticipated to be low, there are no recommended changes to the turn lanes.



**Table 4: Design Year (2040) No-Action Capacity Analysis Summary**

Intersection			AM PEAK HOUR								PM PEAK HOUR							
			Left		Through		Right		Overall		Left		Through		Right		Overall	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Galpin Boulevard & Pheasant Drive	Side-Street Stop Controlled	WB	5.7	A	--	--	3.4	A	3.0	A	6.6	A	--	--	2.7	A	2.9	A
		NB	--	--	3.4	A	4.4	A			--	--	4.0	A	3.9	A		
		SB	1.9	A	0.7	A	--	--			1.6	A	1.0	A	--	--		
Galpin Boulevard & Lake Lucy Road	All-Way Stop Controlled	EB	6.0	A	7.1	A	3.5	A	7.8	A	6.2	A	7.2	A	3.9	A	8.4	A
		WB	7.1	A	8.7	A	5.8	A			7.2	A	8.2	A	5.6	A		
		NB	6.6	A	10.5	B	4.2	A			7.7	A	11.4	B	5.5	A		
		SB	4.5	A	9.0	A	2.5	A			5.4	A	9.9	A	2.6	A		
Galpin Boulevard & Longacres Drive	Side-Street Stop Controlled	EB	5.7	A	--	--	5.1	A	5.2	A	7.5	A	--	--	3.5	A	5.7	A
		WB	8.1	A	--	--	4.5	A			8.6	A	--	--	4.8	A		
		NB	5.5	A	5.5	A	4.7	A			7.1	A	6.4	A	5.5	A		
		SB	3.8	A	3.5	A	3.2	A			5.7	A	4.0	A	3.5	A		
Galpin Boulevard & Brinker Street	All-Way Stop Controlled	WB	5.0	A	--	--	2.9	A	11.2	B	4.3	A	--	--	2.7	A	11.5	B
		NB	--	--	9.2	A	3.1	A			--	--	12.5	B	6.3	A		
		SB	0.0	A	12.7	B	--	--			6.9	A	10.5	B	--	--		
Galpin Boulevard & W 78th Street	Side-Street Stop Controlled	EB	13.5	B	15.4	C	7.7	A	5.7	A	15.2	B	15.1	B	6.9	A	4.8	A
		WB	16.2	C	13.4	B	4.5	A			14.2	B	15.0	B	6.9	A		
		NB	<sup>(1)</sup> (3.7)	<sup>(1)</sup> (A)	0.7	A	0.0	A			<sup>(1)</sup> (1.9)	<sup>(1)</sup> (A)	0.9	A	0.1	A		
		SB	4.1	A	5.3	A	4.0	A			2.7	A	5.2	A	4.1	A		
Galpin Boulevard & TH 5	Signalized	EB	59.1	E	28.2	C	9.9	A	28.3	C	69.2	E	41.5	D	7.6	A	40.9	D
		WB	61.6	E	14.4	B	4.1	A			53.4	D	40.0	D	16.1	B		
		NB	39.7	D	53.1	D	29.9	C			46.0	D	54.5	D	26.9	C		
		SB	42.5	D	44.2	D	27.1	C			54.2	D	50.7	D	39.1	D		

<sup>(1)</sup> Delay and LOS are reported for both the (U-turn) and left movements for the northbound left turn lane at Galpin Boulevard and W 78<sup>th</sup> Street



## Design Year (2040) Alternatives Analysis

As part of the corridor study, multiple roadway and intersection alternatives were considered. In total, three (3) alternatives were considered. The first alternative (Alternative A) considers the reconstruction of the roadway without any intersection control or lane assignment changes. From a traffic analysis perspective, the delays and LOS for Alternative A will be the same as the No-Action scenario. The second alternative (Alternative B) adds dedicated turn lanes (left-turn and right-turn) to all major intersections along the study corridor, including W 78<sup>th</sup> Street, Brinker Street, Longacres Road, and Lake Lucy Road, in addition to the removal of the all-way stop control at Brinker Street. Turn lane modifications at W 78<sup>th</sup> Street are anticipated to clarify operations by removing the through-right lanes northbound and southbound and the lane drop northbound that currently exists within the intersection, both of which are anticipated to have a positive impact on reducing the crash rate at this intersection. The third alternative (Alternative C) includes the installation of roundabouts or mini-roundabouts at W 78<sup>th</sup> Street, Brinker Street, and Lake Lucy Road.

**Exhibit 7** provides the intersection control and lane assignments at the major intersections for all three alternatives. Under Alternatives A and B, the intersection at Lake Lucy Road will remain all-way stop control. Under all scenarios, the intersection at Longacres Road will remain side-street stop control.

Operating conditions of the major intersections were reviewed using Synchro/SimTraffic for Alternatives A and B and RODEL for Alternative C. The purpose of this review is to provide a comparison of operating conditions between No-Action/Alternative A and Alternatives B and C. As mentioned previously, there are no proposed changes to intersection control or lane assignments under Alternative A, so the delay and LOS results are the same as presented previously in **Table 4**.

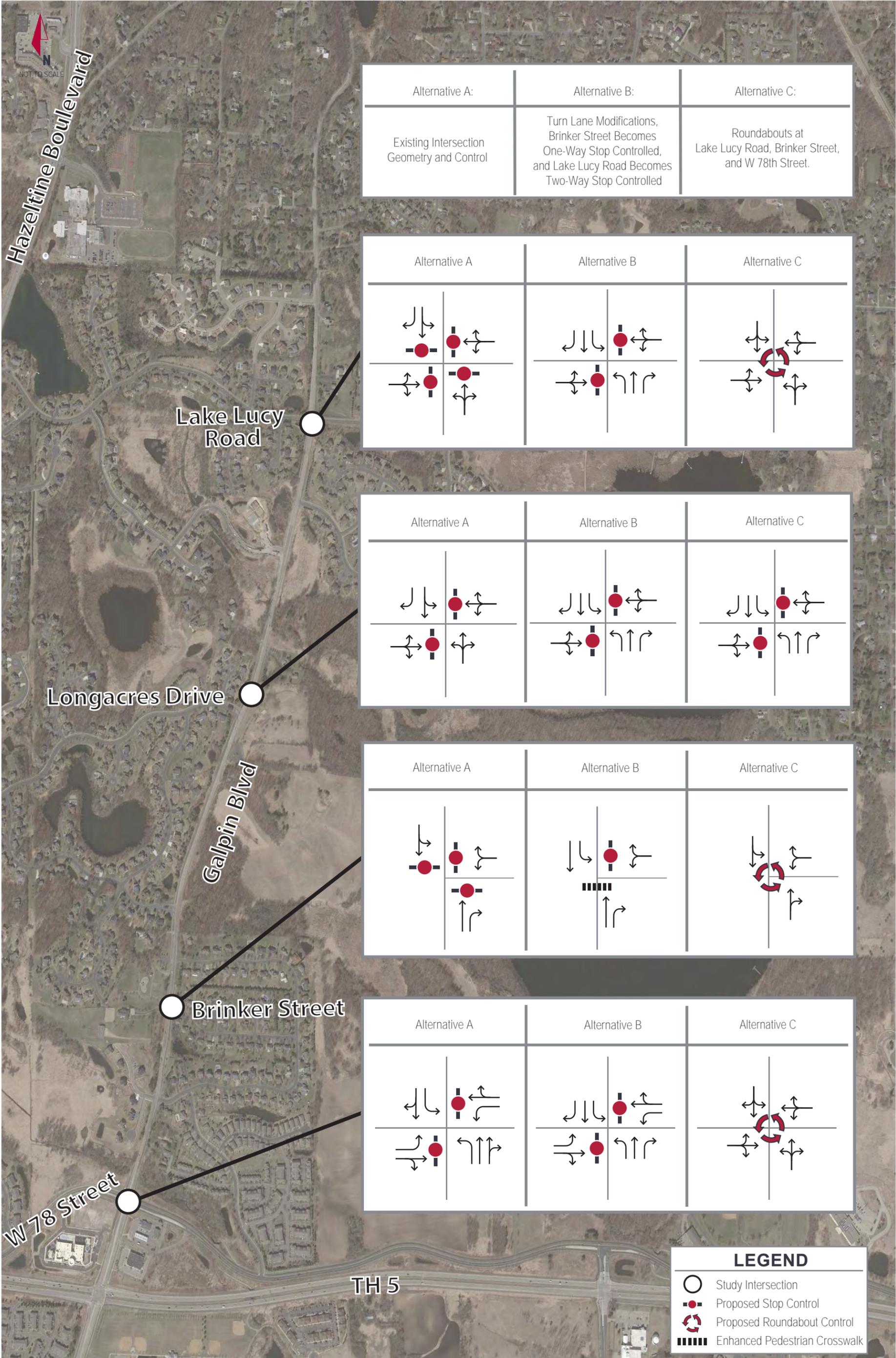
**Table 5** provides a summary of vehicle delay and LOS at the major intersections for Alternative B. Based on the analysis, all intersections are anticipated to operate at LOS A during the AM and PM peak hours with the proposed turn lane improvements. Additionally, all movements are anticipated to operate at LOS B or better during the AM and PM peak hours. These results are similar to the No-Action operating conditions at these intersections. The SimTraffic reports are provided in the **Appendix**.

**Table 6** provides a summary of vehicle delay and LOS at the W 78<sup>th</sup> Street, Brinker Street, and Lake Lucy Road intersections for Alternative C. There are no changes proposed between Alternative B and Alternative C at the Longacres Road intersection. Based on the analysis, the three intersections are anticipated to operate at LOS A during the AM and PM peak hours as single-lane roundabouts. These operating conditions are similar to the No-Action operating conditions for these intersections. The RODEL reports are provided in the **Appendix**.

**Exhibit 8** provides the intersection delay and LOS at the major intersections for all three alternatives.

Based on a review of all three corridor alternatives, the study intersections are all anticipated to operate at acceptable LOS through the Design Year (2040) for No-Action as well as the three alternatives. Although there isn't a significant crash history along the corridor, implementing Alternative B should provide safer operations throughout the corridor as all Galpin Boulevard turning traffic at the study intersections will turn from dedicated turn lanes instead of the through lane.

The roundabouts included as part of Alternative C typically result in fewer right-angle and left-turn related crashes which is anticipated to result in a reduction of the most prevalent crash type at the intersection of Galpin Boulevard and W 78<sup>th</sup> Street (right angle). Alternative C would also replace the all-way stop control at Brinker Street and Lake Lucy Road reducing delay for the northbound and southbound through movements without having any significant impacts on the eastbound and westbound minor approach. Roundabouts also reduce travel speeds near the roundabout which can serve as a form of traffic calming. The queuing at TH 5 for southbound Galpin Boulevard was also reviewed as queues that extend into a roundabout cause safety and operational concerns. The 95<sup>th</sup> percentile queue for the southbound Galpin Boulevard movement at TH 5 does not exceed 250 feet under the design year (2040) scenario. Given the distance between the intersections is approximately 750 feet, queuing is not anticipated to negatively impact the operations of the roundabout at Galpin Boulevard and W 78<sup>th</sup> Street.



Alternative A:	Alternative B:	Alternative C:
Existing Intersection Geometry and Control	Turn Lane Modifications, Brinker Street Becomes One-Way Stop Controlled, and Lake Lucy Road Becomes Two-Way Stop Controlled	Roundabouts at Lake Lucy Road, Brinker Street, and W 78th Street.

Alternative A	Alternative B	Alternative C

Alternative A	Alternative B	Alternative C

Alternative A	Alternative B	Alternative C

Alternative A	Alternative B	Alternative C

LEGEND	
	Study Intersection
	Proposed Stop Control
	Proposed Roundabout Control
	Enhanced Pedestrian Crosswalk

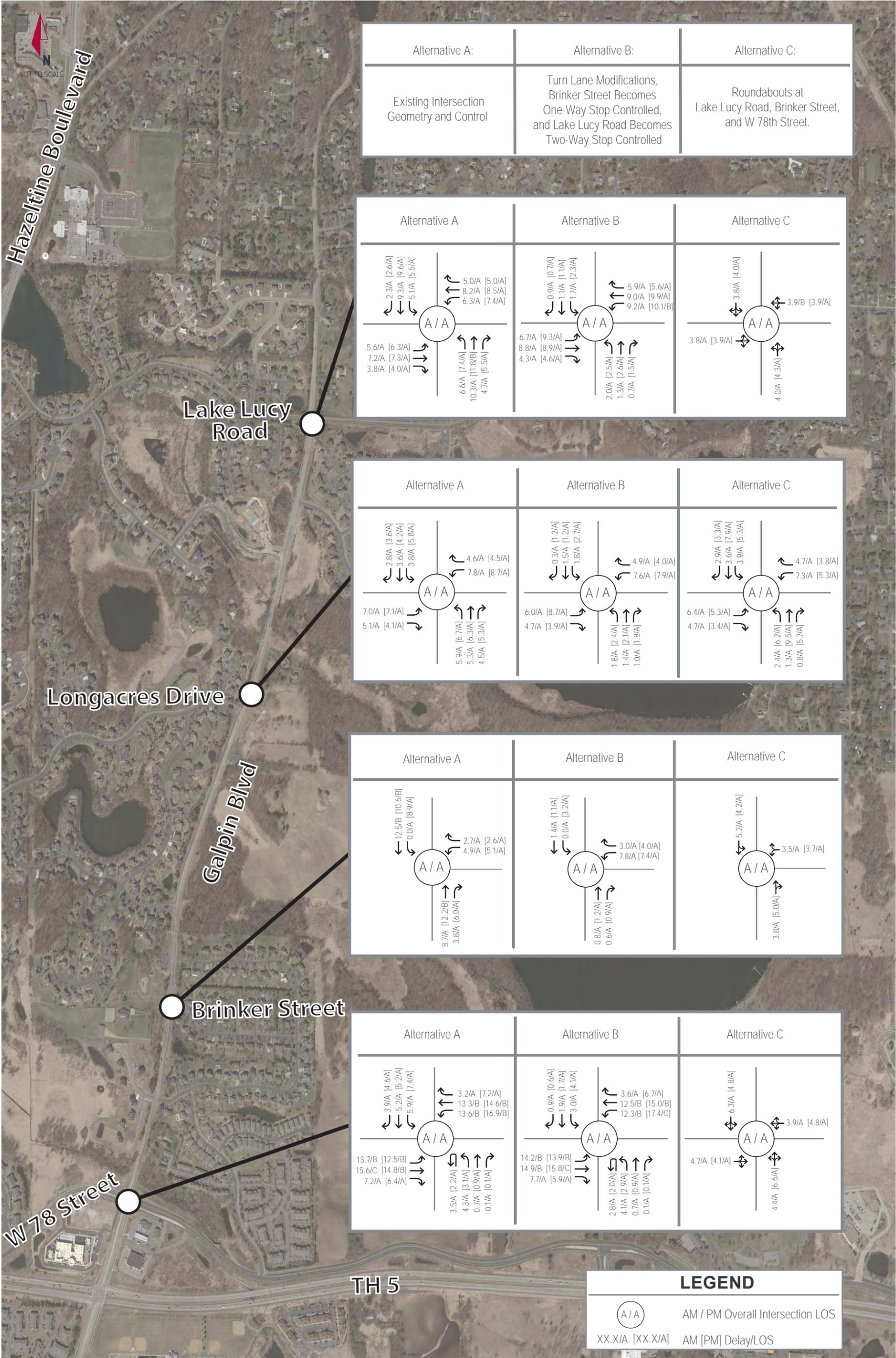
**Table 5: Design Year (2040) Alternative B Capacity Analysis Summary**

Intersection			AM PEAK HOUR								PM PEAK HOUR							
			Left		Through		Right		Overall		Left		Through		Right		Overall	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Galpin Boulevard & Lake Lucy Road	All-Way Stop Controlled	EB	6.7	A	8.8	A	4.3	A	3.8	A	9.3	A	8.9	A	4.6	A	3.9	A
		WB	9.2	A	9.0	A	5.9	A			10.1	B	9.9	A	5.6	A		
		NB	2.0	A	1.3	A	0.7	A			2.5	A	2.6	A	1.5	A		
		SB	4.7	A	9.1	A	3.3	A			2.3	A	1.1	A	0.7	A		
Galpin Boulevard & Longacres Drive	Side-Street Stop Controlled	EB	6.0	A	--	--	4.7	A	3.1	A	8.7	A	--	--	3.9	A	2.7	A
		WB	7.6	A	--	--	4.9	A			7.9	A	--	--	4.0	A		
		NB	1.8	A	1.4	A	1.0	A			2.4	A	2.1	A	1.8	A		
		SB	1.8	A	1.5	A	0.3	A			2.7	A	1.2	A	1.2	A		
Galpin Boulevard & Brinker Street	Side-Street Stop Controlled	WB	7.8	A	--	--	3.0	A	1.5	A	7.4	A	--	--	4.0	A	1.8	A
		NB	--	--	0.8	A	0.6	A			--	--	1.2	A	0.9	A		
		SB	0.0	A	1.4	A	--	--			3.2	1.1	2.7	A	--	--		
Galpin Boulevard & W 78th Street	Side-Street Stop Controlled	EB	14.2	B	14.9	B	7.7	A	3.9	A	13.9	B	15.8	C	5.9	A	3.9	A
		WB	12.3	B	12.5	B	3.6	A			17.4	C	15.0	B	6.7	A		
		NB	<sup>(1)</sup> (2.8)	<sup>(1)</sup> (A)	0.7	A	0.1	A			<sup>(1)</sup> (2.0)	<sup>(1)</sup> (A)	0.9	A	0.1	A		
		SB	4.1	A	0.7	A	0.1	A			2.9	A	0.9	A	0.1	A		
		SB	3.0	A	1.9	A	0.9	A			4.1	A	1.7	A	0.6	A		

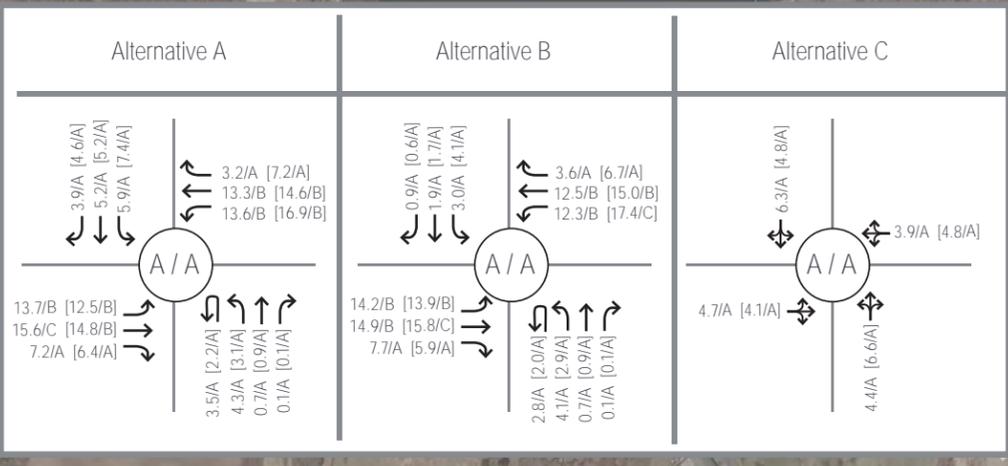
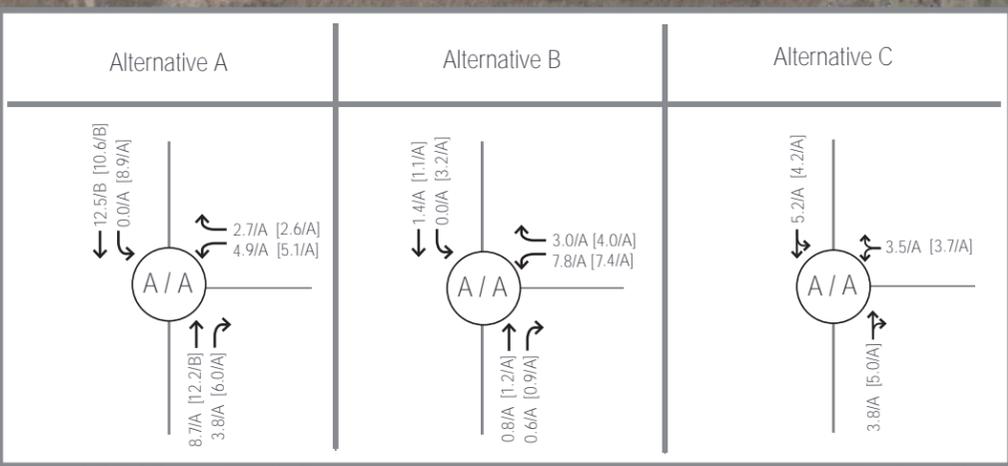
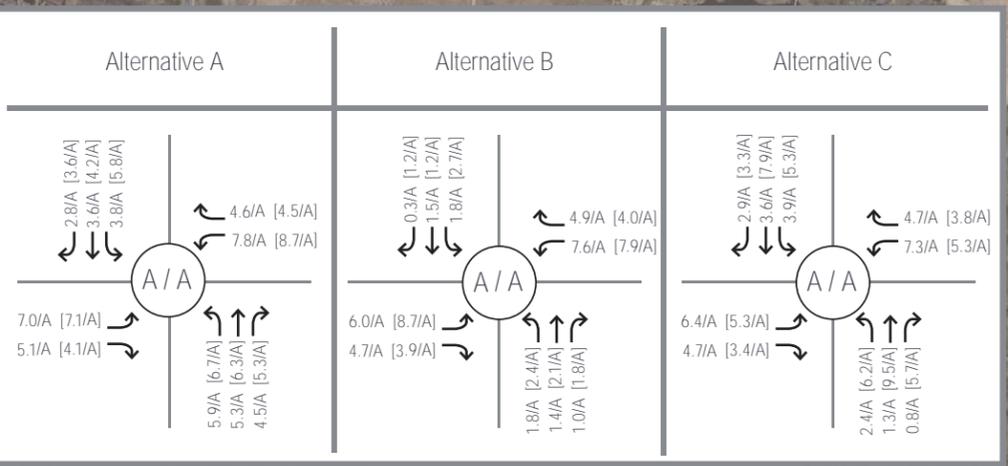
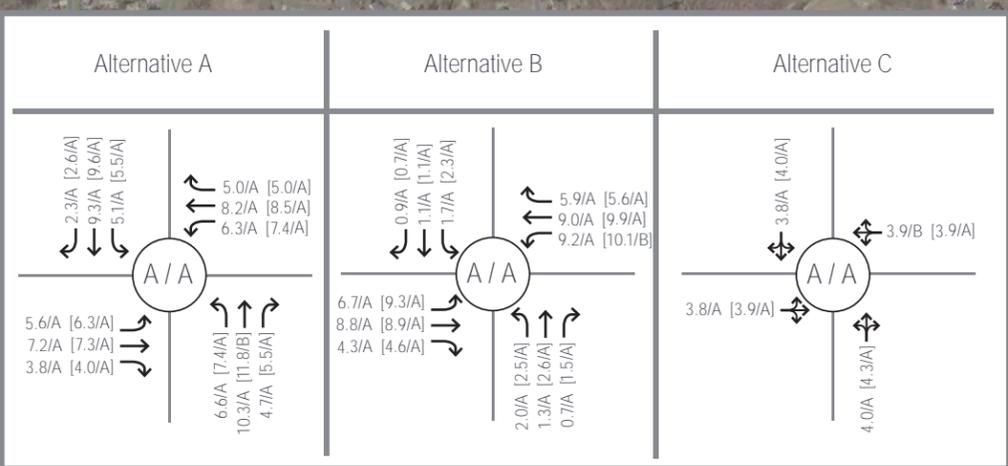
<sup>(1)</sup> Delay and LOS are reported for both the (U-turn) and left movements for the northbound approach at Galpin Boulevard and W 78<sup>th</sup> Street.

**Table 6: Design Year (2040) Alternative C Capacity Analysis Summary**

Intersection			AM Peak Hour				PM Peak Hour			
			Approach		Overall		Approach		Overall	
			Delay (s/veh)	LOS	Delay	LOS	Delay (s/veh)	LOS	Delay	LOS
Galpin Boulevard & Lake Lucy Road	Roundabout	EB Approach	3.8	A	3.9	A	3.9	A	4.1	A
		WB Approach	3.9	A			3.9	A		
		NB Approach	4.0	A			4.3	A		
		SB Approach	3.8	A			4.0	A		
Galpin Boulevard & Brinker Street	Roundabout	WB Approach	3.5	A	4.7	A	3.7	A	4.7	A
		NB Approach	3.8	A			5.0	A		
		SB Approach	5.2	A			4.2	A		
Galpin Boulevard & W 78th Street	Roundabout	EB Approach	4.7	A	5.4	A	4.1	A	5.7	A
		WB Approach	3.9	A			4.8	A		
		NB Approach	4.4	A			6.6	A		
		SB Approach	6.3	A			4.8	A		



Alternative A:	Alternative B:	Alternative C:
Existing Intersection Geometry and Control	Turn Lane Modifications, Brinker Street Becomes One-Way Stop Controlled, and Lake Lucy Road Becomes Two-Way Stop Controlled	Roundabouts at Lake Lucy Road, Brinker Street, and W 78th Street.



LEGEND	
(A/A)	AM / PM Overall Intersection LOS
XX.X/A [XX.X/A]	AM [PM] Delay/LOS

## Conclusions and Recommendations

Carver County is preparing to turn back Galpin Boulevard (CR 117) to the City of Chanhassen from TH 5 to the northern City limit. As part of the turnback process, a traffic analysis was completed to determine existing and future operating conditions of the corridor, and determine if any roadway/intersection improvements should be made as a part of the proposed corridor reconstruction. This memorandum provides a summary of existing intersection operations, historic crash data, volume forecasting, and 2040 analysis of No-Action and three proposed reconstruction alternatives (Alternatives A, B and C) for Galpin Boulevard.

Based on the existing operations analysis, all intersections are operating at an acceptable LOS during the AM and PM peak hours. A review of the crash data shows that all intersections are operating within normal expected ranges with the exception of W 78<sup>th</sup> Street, where the critical index exceeds 0.99. At this intersection, the majority of crashes were right-angle with no injuries or fatalities being reported. Improvements to the W 78<sup>th</sup> Street intersection should be considered during alternative development to reduce the future number of crashes.

The Design Year (2040) No-Action intersection analysis, which took into consideration background growth of 1.0% annually and traffic from the proposed residential subdivision in the project area, showed that all intersections are anticipated to operate at an acceptable LOS under all scenarios including No-Action. Although there isn't a significant crash history along the corridor, implementing Alternative B would provide safer operations throughout the corridor as all turning traffic off Galpin Boulevard will turn from a dedicated lane instead of the through lane. The roundabouts included as a part of Alternative C typically result in fewer right-angle and left-turn related crashes. Alternative C would also replace the all-way stop control at Brinker Street and Lake Lucy Road reducing delay for the northbound and southbound through movements without having any significant impacts on the eastbound and westbound approaches. Roundabouts also reduce travel speeds and can serve as a form of traffic calming.

The analysis showed that the 2040 No-Action intersection geometry would be acceptable from a traffic operations and safety perspective. Given current design standards and the expectation of drivers, it is recommended that either Alternative B or C, or a combination of the improvements proposed for these alternatives be implemented. The ultimate decision should be based on a variety of considerations including public input, construction costs, right-of-way impacts, etc. It is important to note that roundabout control or all-way stops are not warranted at Brinker Street, Lake Lucy Road, or W 78<sup>th</sup> Street based on a review of the traffic volumes and operations analysis. If roundabouts are ultimately selected as these intersections, Roundabout Justification Reports (RJR) will be required if State Aid funding is proposed for the roadway reconstruction.

## Appendix

- 1. Traffic Forecasting Memorandum**
- 2. Existing Year (2017) SimTraffic Reports**
- 3. Design Year (2040) No-Action/Alternative A SimTraffic Reports**
- 4. Design Year (2040) Alternative B SimTraffic Reports**
- 5. Design Year (2040) Alternative C RODEL Reports**

1. TRAFFIC FORECASTING MEMORANDUM

## DRAFT MEMORANDUM

To: Paul Oehme, P.E.  
Director of Public Works / City Engineer  
City of Chanhassen, MN

Darin Mielke, P.E., LSIT, PMP  
Assistant Public Works Director / Deputy County Engineer  
Carver County Public Works

Dan McCormick, P.E., PTOE  
Transportation Manager  
Carver County Public Works

From: Brandon Bourdon, P.E.  
Doug Arnold, P.E.

Date: January 5, 2018

Re: Galpin Boulevard (CR 117) Reconstruction - Traffic Volume Forecasting

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### Background Information

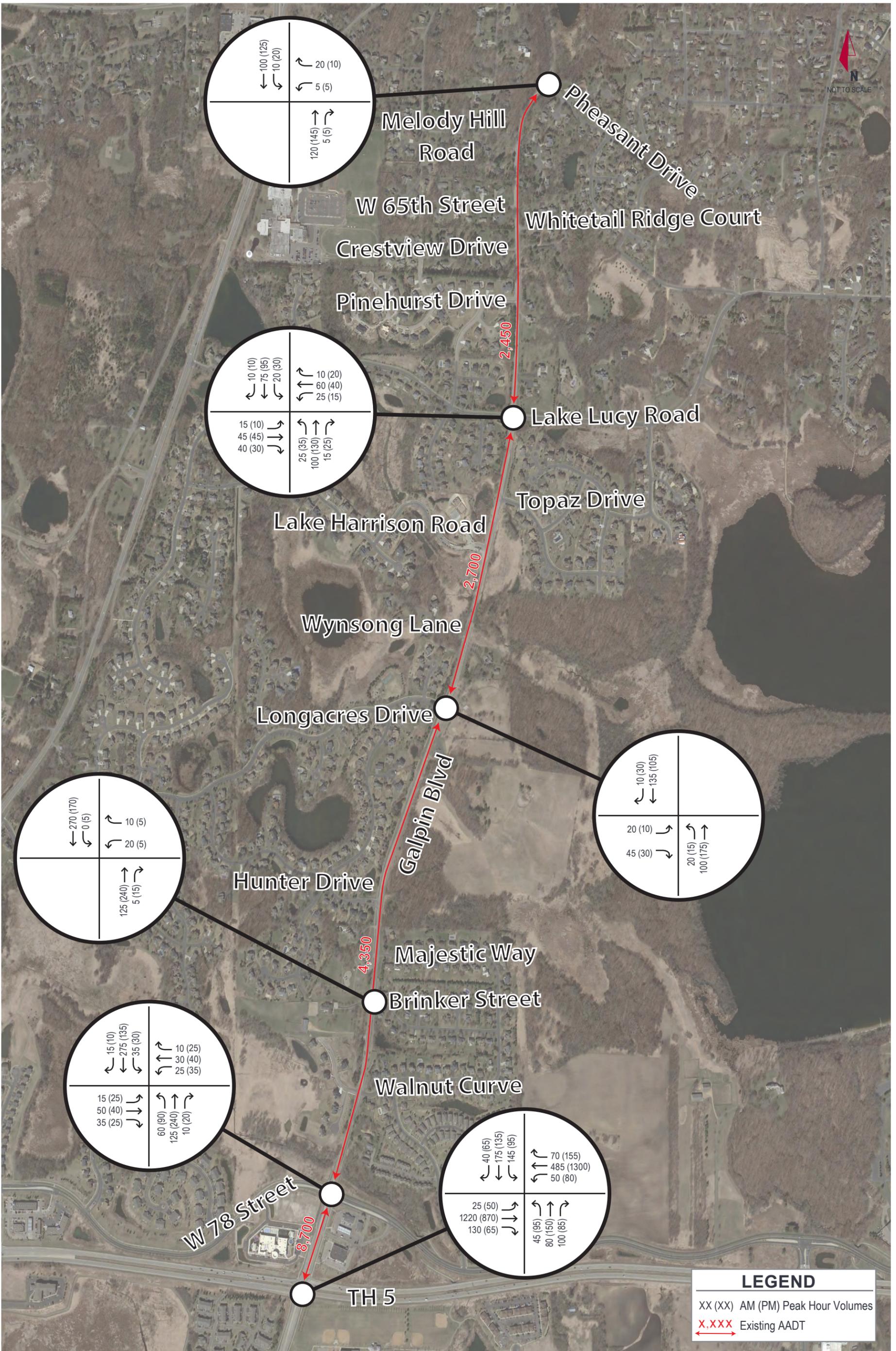
Kimley-Horn has been hired by the City of Chanhassen to provide preliminary design and traffic engineering services for the potential reconstruction of Galpin Boulevard (CR 117) between Arboretum Boulevard (TH 5) and the northern border of the City of Chanhassen. As part of the preliminary engineering, a traffic analysis is being performed at critical intersections along the study corridor to determine the most appropriate intersection control and geometry recommended to accommodate existing conditions and anticipated growth along the corridor.

This memorandum provides a summary of existing weekday peak hour turning movement volumes at the study intersections, and documents the future volume forecasting process, assumptions, and the 2040 Design Year volume forecasts.

### Existing Conditions

Existing turning movement volumes and pedestrian volumes were collected in December 2017 at the following study intersections along Galpin Boulevard: Arboretum Boulevard (TH 5), W 78<sup>th</sup> Street, Brinker Street, Longacres Drive, Lake Lucy Road, and Pheasant Drive.

**Exhibit 1** provides a summary of the turning movement volumes during the weekday AM and PM peak hours along with existing AADT volumes. Raw traffic data from the field data collection is included in the **Appendix**.



### Design Year (2040) Volume Forecast

Future traffic was projected along the study corridor to determine peak hour traffic volumes at the study intersections for the 2040 Design Year (approximately 20 years beyond opening). Historic daily traffic volumes from MnDOT and forecasted volume information from the City of Chanhassen’s 2040 Comprehensive Plan were used to develop the annual growth rates used to project the Design Year 2040 traffic volumes.

Additionally, changes in local land use were considered when developing the 2040 Design Year turning movement volumes. The following sections provide a summary of the future volume forecast development.

#### Historic ADT Volume Growth

Historic traffic volumes were summarized based on information obtained from MnDOT. **Table 1** provides the Annual Average Daily Traffic (AADT) volumes along Galpin Boulevard in 2005, 2011, and 2015. Historic growth rates were calculated for short term (2011 to 2015) and long term (2005 to 2015) time periods to help understand the historic growth patterns that have occurred along the study corridor.

Based on the volumes, the Galpin Boulevard corridor has experienced growth ranging from 0.0% to 4.9% over the previous ten years. On average, the corridor grew at 0.9% annually from 2005 to 2015.

**TABLE 1: HISTORIC GROWTH SUMMARY**

Count Location	Count Year			Rate	
	2005	2011	2015	2011-2015	2005-2015
Galpin Blvd Between TH 5 and Coulter Blvd	4,900	4,600	-	4.8%	0.9%
Galpin Blvd Between TH 5 and 78th St	5,400	5,000	8,700	14.9%	4.9%
Galpin Blvd Between 78th St and Longacres Dr	5,400	5,000	4,350	-3.4%	-2.1%
Galpin Blvd Between Longacres Dr and Pheasant Dr	2,450	2,400	2,450	0.5%	0.0%

#### City of Chanhassen 2040 Comprehensive Plan Growth

Traffic volumes from the current 2040 Comprehensive Plan for the City of Chanhassen were reviewed. Volumes were provided for Existing Year (2015), and Design Year (2040). **Table 2** provides a summary of volume growth within the project study area.

Based on the 2040 Comprehensive Plan, the Galpin Boulevard corridor is anticipated to experience growth ranging from 0.6% to 1.4% annually, with an average growth rate of 0.9%.

**TABLE 2: 2030 COMPREHENSIVE PLAN GROWTH SUMMARY**

Volume Location	Year		Rate
	2015	2040	
Galpin Blvd Between TH 5 and Coulter Blvd	5,300	6,200	<b>0.6%</b>
Galpin Blvd Between TH 5 and 78th St	8,700	10,000	<b>0.6%</b>
Galpin Blvd Between 78th St and Longacres Dr	4,350	5,300	<b>0.8%</b>
Galpin Blvd Between Longacres Dr and Pheasant Dr	2,450	3,500	<b>1.4%</b>

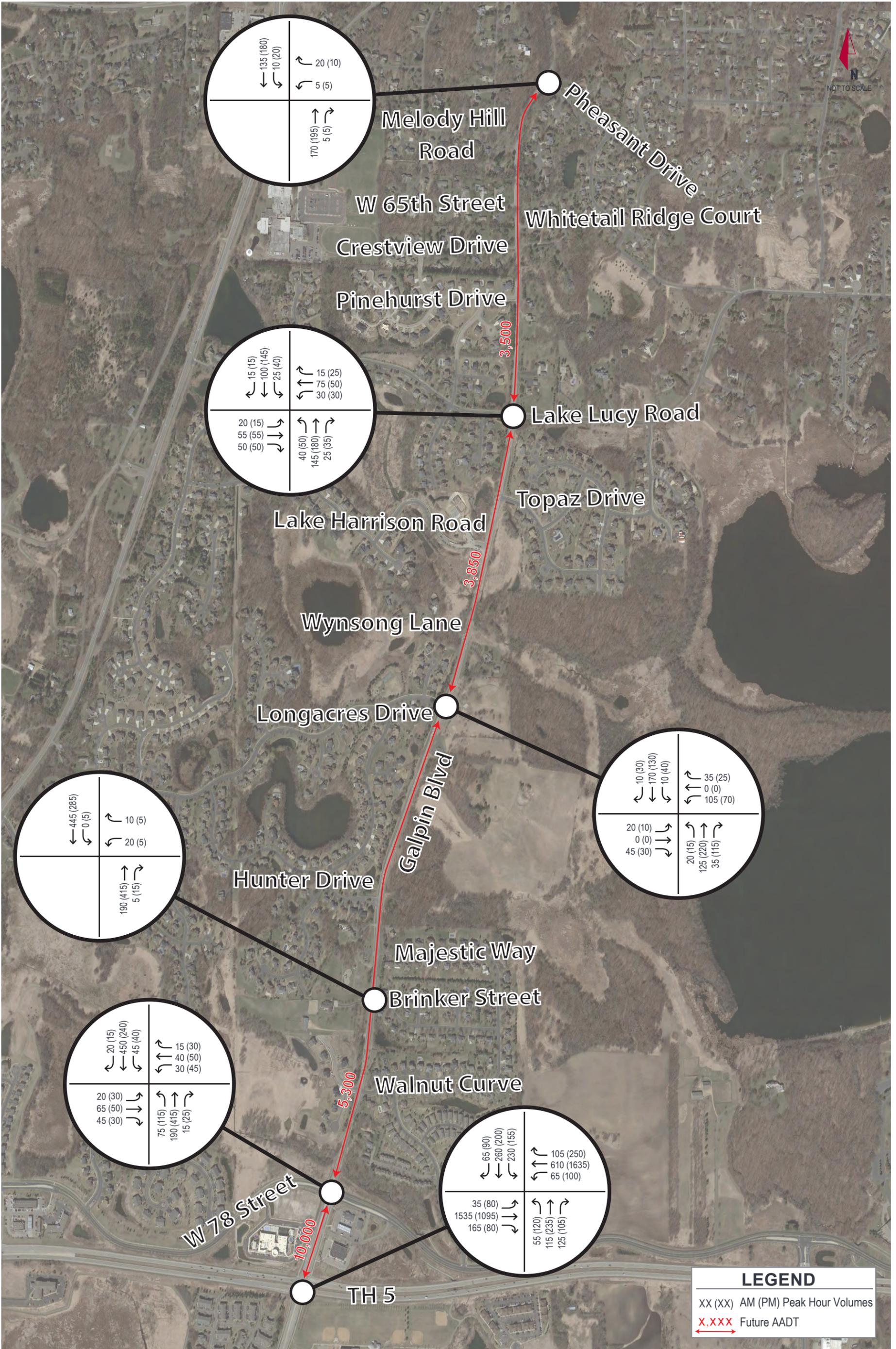
### **Development Along Study Corridor**

Based on discussion with City staff, the large tract of land on the east side of Galpin Boulevard between W 78<sup>th</sup> Street and Lake Lucy Road is anticipated to be redeveloped into a residential development with approximately 250 single family dwelling units. At this point, access to the development is expected to be provided via a connection to the intersection of Galpin Boulevard & Longacres Drive. Based on existing traffic counts, it is anticipated that 75% of the traffic will access the site to/from the south and 25% to/from the north.

### **Recommendation**

Based on the historical growth and forecasted growth in the 2040 Comprehensive Plan, a 1.0% annual background growth rate is recommended for traffic volumes along Galpin Boulevard. In addition to background growth, traffic from the proposed residential development was also included in the future volume forecast. **Exhibit 2** provides a summary of the forecasted 2040 AM and PM peak hour turning movement volumes at the study intersections.

The forecasted 2040 AADT along Galpin Boulevard ranges from 10,000 at the south end of the corridor to 3,500 at the north end of the corridor.



LEGEND	
XX (XX)	AM (PM) Peak Hour Volumes
X,XXX	Future AADT

# APPENDIX

Kimley-Horn : Saint Paul (MN)  
2550 University Ave W, Suite 238N

Saint Paul, Minnesota, United States, 55114  
612.617.7993 Keelee.Roggenbuck@kimley-horn.com

Count Name: Galpin Boulevard & Pheasant Drive  
Site Code: Intersection 1  
Start Date: 12/05/2017  
Page No: 1

### Turning Movement Data

Start Time	Pheasant Drive Westbound				Galpin Boulevard Southbound				Galpin Boulevard Northbound				Int. Total	
	Left	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Thru	Right	Peds		App. Total
6:00 AM	0	1	0	1	0	2	0	2	0	10	0	0	10	13
6:15 AM	0	2	0	2	0	8	0	8	0	13	0	0	13	23
6:30 AM	0	5	0	5	1	6	0	7	0	16	0	0	16	28
6:45 AM	1	4	0	5	1	6	0	7	0	27	0	0	27	39
Hourly Total	1	12	0	13	2	22	0	24	0	66	0	0	66	103
7:00 AM	1	4	0	5	0	9	0	9	0	26	1	0	27	41
7:15 AM	2	7	0	9	4	10	0	14	0	43	1	0	44	67
7:30 AM	0	6	0	6	1	15	0	16	0	32	2	0	34	56
7:45 AM	0	6	0	6	4	20	0	24	0	31	1	0	32	62
Hourly Total	3	23	0	26	9	54	0	63	0	132	5	0	137	226
8:00 AM	0	1	0	1	0	29	0	29	0	30	1	0	31	61
8:15 AM	1	5	0	6	2	32	0	34	1	25	0	0	26	66
8:30 AM	1	1	0	2	2	18	0	20	0	22	0	0	22	44
8:45 AM	0	3	0	3	1	27	0	28	0	35	0	0	35	66
Hourly Total	2	10	0	12	5	106	0	111	1	112	1	0	114	237
9:00 AM	0	5	0	5	4	27	0	31	0	26	0	0	26	62
9:15 AM	1	2	0	3	3	19	0	22	0	20	0	0	20	45
9:30 AM	0	5	0	5	3	12	0	15	0	23	0	0	23	43
9:45 AM	0	2	0	2	1	8	0	9	0	18	0	0	18	29
Hourly Total	1	14	0	15	11	66	0	77	0	87	0	0	87	179
10:00 AM	0	0	0	0	1	9	0	10	0	12	0	0	12	22
10:15 AM	1	2	0	3	3	4	0	7	0	14	0	0	14	24
10:30 AM	1	1	0	2	0	8	0	8	0	5	0	0	5	15
10:45 AM	0	1	0	1	3	5	0	8	0	18	1	0	19	28
Hourly Total	2	4	0	6	7	26	0	33	0	49	1	0	50	89
11:00 AM	0	6	0	6	2	4	0	6	0	13	4	0	17	29
11:15 AM	1	2	0	3	0	7	0	7	0	12	0	0	12	22
11:30 AM	0	1	0	1	3	14	0	17	0	11	2	0	13	31
11:45 AM	2	0	0	2	2	14	0	16	0	7	0	0	7	25
Hourly Total	3	9	0	12	7	39	0	46	0	43	6	0	49	107
12:00 PM	0	1	0	1	1	10	0	11	0	9	0	0	9	21
12:15 PM	0	2	0	2	3	6	0	9	0	22	0	0	22	33
12:30 PM	0	1	0	1	4	5	0	9	0	8	1	0	9	19
12:45 PM	0	2	0	2	3	8	0	11	0	15	0	0	15	28
Hourly Total	0	6	0	6	11	29	0	40	0	54	1	0	55	101
1:00 PM	0	0	0	0	1	10	0	11	0	14	0	0	14	25
1:15 PM	1	1	0	2	2	10	0	12	0	12	0	0	12	26
1:30 PM	0	1	0	1	4	12	0	16	0	5	0	0	5	22
1:45 PM	0	1	0	1	1	7	0	8	0	14	1	0	15	24
Hourly Total	1	3	0	4	8	39	0	47	0	45	1	0	46	97
2:00 PM	0	1	0	1	1	8	0	9	0	15	1	0	16	26

2:15 PM	0	4	0	4	3	14	0	17	0	16	0	0	16	37
2:30 PM	0	2	0	2	5	9	0	14	0	16	0	0	16	32
2:45 PM	0	2	0	2	2	18	0	20	0	23	0	0	23	45
Hourly Total	0	9	0	9	11	49	0	60	0	70	1	0	71	140
3:00 PM	2	0	0	2	4	27	0	31	0	20	1	0	21	54
3:15 PM	0	3	0	3	2	16	0	18	0	26	1	0	27	48
3:30 PM	0	1	0	1	3	19	0	22	0	34	0	0	34	57
3:45 PM	1	6	0	7	2	27	0	29	0	27	0	0	27	63
Hourly Total	3	10	0	13	11	89	0	100	0	107	2	0	109	222
4:00 PM	0	1	0	1	2	28	0	30	0	29	2	1	31	62
4:15 PM	0	3	0	3	5	36	0	41	0	34	1	0	35	79
4:30 PM	0	0	0	0	7	30	0	37	0	30	1	0	31	68
4:45 PM	1	3	0	4	6	29	0	35	0	32	2	0	34	73
Hourly Total	1	7	0	8	20	123	0	143	0	125	6	1	131	282
5:00 PM	1	2	0	3	2	32	0	34	0	42	2	0	44	81
5:15 PM	1	4	0	5	3	34	0	37	0	37	0	0	37	79
5:30 PM	1	2	0	3	7	23	0	30	0	26	0	0	26	59
5:45 PM	4	2	0	6	4	31	0	35	0	29	1	0	30	71
Hourly Total	7	10	0	17	16	120	0	136	0	134	3	0	137	290
6:00 PM	0	2	0	2	5	26	0	31	0	27	0	0	27	60
6:15 PM	0	2	0	2	4	21	0	25	0	21	0	0	21	48
6:30 PM	0	2	0	2	3	23	0	26	0	21	0	0	21	49
6:45 PM	0	2	0	2	5	11	0	16	0	24	2	0	26	44
Hourly Total	0	8	0	8	17	81	0	98	0	93	2	0	95	201
Grand Total	24	125	0	149	135	843	0	978	1	1117	29	1	1147	2274
Approach %	16.1	83.9	-	-	13.8	86.2	-	-	0.1	97.4	2.5	-	-	-
Total %	1.1	5.5	-	6.6	5.9	37.1	-	43.0	0.0	49.1	1.3	-	50.4	-
Lights	22	124	-	146	133	826	-	959	1	1088	25	-	1114	2219
% Lights	91.7	99.2	-	98.0	98.5	98.0	-	98.1	100.0	97.4	86.2	-	97.1	97.6
Mediums	2	1	-	3	2	17	-	19	0	29	4	-	33	55
% Mediums	8.3	0.8	-	2.0	1.5	2.0	-	1.9	0.0	2.6	13.8	-	2.9	2.4
Articulated Trucks	0	0	-	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	-	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	0	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	0	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-











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Count Name: Galpin Boulevard & Lake Lucy Road  
Site Code: Intersection 2  
Start Date: 12/07/2017  
Page No: 1

### Turning Movement Data

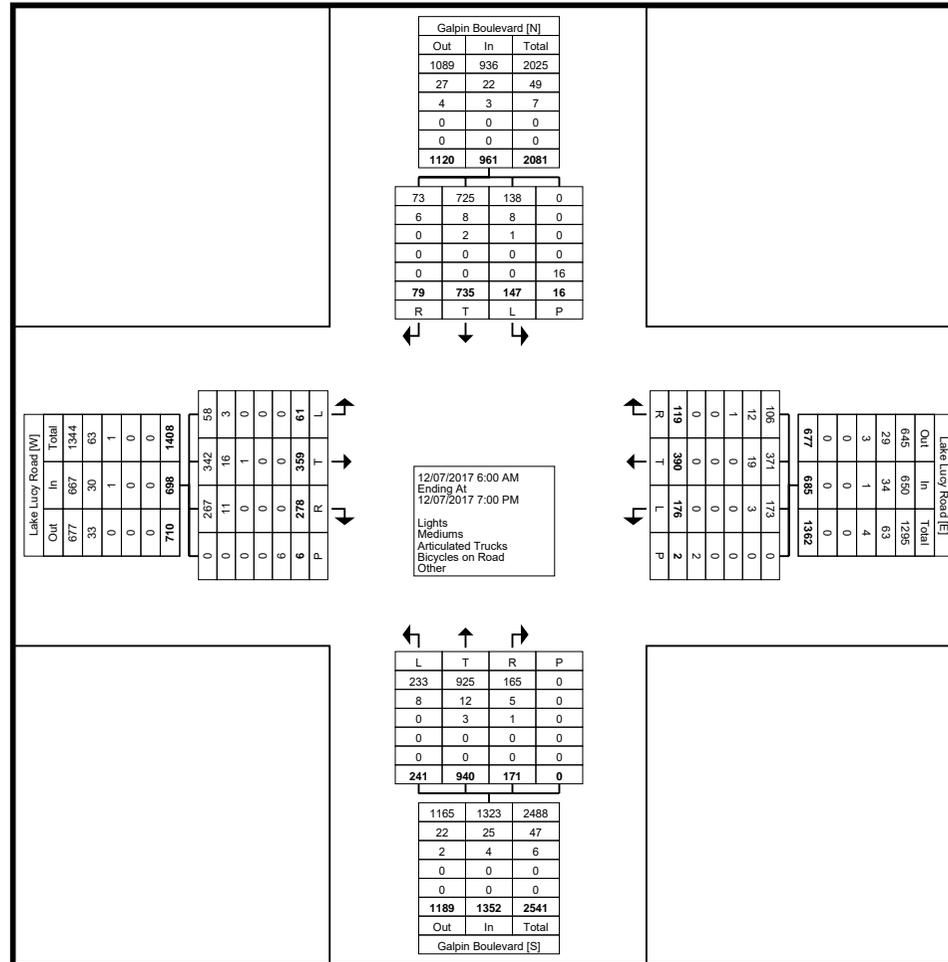
Start Time	Lake Lucy Road Westbound					Lake Lucy Road Eastbound					Galpin Boulevard Southbound					Galpin Boulevard Northbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
6:00 AM	0	0	0	0	0	0	2	0	1	2	0	6	0	0	6	1	3	0	0	4	12
6:15 AM	2	1	0	0	3	1	3	4	0	8	0	8	0	0	8	2	10	0	0	12	31
6:30 AM	0	4	2	0	6	1	4	4	0	9	2	7	0	1	9	2	15	2	0	19	43
6:45 AM	4	1	1	0	6	1	4	7	0	12	0	9	1	1	10	1	21	1	0	23	51
Hourly Total	6	6	3	0	15	3	13	15	1	31	2	30	1	2	33	6	49	3	0	58	137
7:00 AM	4	4	1	0	9	1	6	5	0	12	0	8	0	0	8	2	28	2	0	32	61
7:15 AM	9	5	4	0	18	2	12	9	0	23	1	20	5	0	26	4	31	3	0	38	105
7:30 AM	4	5	1	0	10	4	13	13	0	30	1	15	2	0	18	6	35	5	0	46	104
7:45 AM	10	13	4	0	27	2	15	9	0	26	4	27	1	2	32	5	23	2	0	30	115
Hourly Total	27	27	10	0	64	9	46	36	0	91	6	70	8	2	84	17	117	12	0	146	385
8:00 AM	3	18	0	0	21	3	9	7	0	19	8	11	2	2	21	7	20	4	0	31	92
8:15 AM	6	20	2	0	28	2	5	11	1	18	5	20	3	0	28	6	19	2	0	27	101
8:30 AM	7	7	1	0	15	1	4	13	0	18	7	21	0	0	28	4	18	0	0	22	83
8:45 AM	1	12	2	0	15	1	11	10	0	22	2	19	8	0	29	5	17	0	0	22	88
Hourly Total	17	57	5	0	79	7	29	41	1	77	22	71	13	2	106	22	74	6	0	102	364
9:00 AM	4	17	0	0	21	0	2	9	0	11	6	17	1	0	24	2	16	0	0	18	74
9:15 AM	5	6	7	0	18	0	4	6	0	10	4	14	0	0	18	2	15	5	0	22	68
9:30 AM	4	4	0	0	8	0	4	3	0	7	3	5	0	0	8	3	15	5	0	23	46
9:45 AM	3	2	1	0	6	0	6	5	0	11	3	9	1	0	13	1	9	2	0	12	42
Hourly Total	16	29	8	0	53	0	16	23	0	39	16	45	2	0	63	8	55	12	0	75	230
10:00 AM	2	2	2	0	6	0	1	2	0	3	3	10	1	0	14	3	11	4	0	18	41
10:15 AM	3	3	1	0	7	2	8	4	0	14	2	10	1	0	13	2	10	3	0	15	49
10:30 AM	1	1	1	0	3	1	7	5	0	13	2	9	0	1	11	3	11	2	0	16	43
10:45 AM	1	6	2	1	9	1	5	6	0	12	1	8	0	0	9	2	10	5	0	17	47
Hourly Total	7	12	6	1	25	4	21	17	0	42	8	37	2	1	47	10	42	14	0	66	180
11:00 AM	5	6	3	0	14	0	6	1	0	7	2	7	1	0	10	7	10	3	0	20	51
11:15 AM	2	0	2	0	4	0	3	1	0	4	4	7	3	0	14	2	16	3	0	21	43
11:30 AM	2	3	2	0	7	0	4	3	0	7	0	11	2	0	13	3	16	1	0	20	47
11:45 AM	2	6	1	0	9	0	8	2	0	10	4	10	0	0	14	4	12	3	0	19	52
Hourly Total	11	15	8	0	34	0	21	7	0	28	10	35	6	0	51	16	54	10	0	80	193
12:00 PM	3	2	3	0	8	2	7	2	0	11	2	10	1	0	13	7	7	2	0	16	48
12:15 PM	0	4	3	0	7	0	7	5	1	12	0	10	3	0	13	2	14	3	0	19	51
12:30 PM	3	4	1	0	8	0	2	1	0	3	1	8	0	0	9	6	9	1	0	16	36
12:45 PM	1	2	2	0	5	0	8	4	0	12	1	7	1	0	9	1	10	3	0	14	40
Hourly Total	7	12	9	0	28	2	24	12	1	38	4	35	5	0	44	16	40	9	0	65	175
1:00 PM	6	8	1	0	15	1	3	5	0	9	2	8	3	0	13	2	19	3	0	24	61
1:15 PM	3	8	1	0	12	0	5	3	0	8	1	9	1	0	11	1	13	4	0	18	49
1:30 PM	4	4	1	0	9	0	1	1	0	2	1	11	1	0	13	1	5	4	0	10	34
1:45 PM	3	5	2	0	10	0	7	5	0	12	3	9	0	0	12	5	15	1	0	21	55
Hourly Total	16	25	5	0	46	1	16	14	0	31	7	37	5	0	49	9	52	12	0	73	199
2:00 PM	2	4	3	0	9	1	4	2	0	7	2	7	0	0	9	6	7	1	0	14	39

2:15 PM	2	3	1	0	6	2	2	7	0	11	1	9	3	0	13	5	22	4	0	31	61
2:30 PM	4	7	1	0	12	1	8	4	0	13	1	13	1	0	15	3	17	2	0	22	62
2:45 PM	2	9	4	0	15	1	10	5	0	16	2	22	4	1	28	2	22	4	0	28	87
Hourly Total	10	23	9	0	42	5	24	18	0	47	6	51	8	1	65	16	68	11	0	95	249
3:00 PM	3	12	2	0	17	2	11	3	0	16	1	21	4	1	26	15	16	4	0	35	94
3:15 PM	4	10	5	0	19	1	11	7	1	19	2	15	1	0	18	9	14	11	0	34	90
3:30 PM	5	13	3	0	21	2	5	6	1	13	2	12	2	0	16	6	23	3	0	32	82
3:45 PM	2	18	4	0	24	2	6	3	0	11	3	20	4	0	27	4	27	5	0	36	98
Hourly Total	14	53	14	0	81	7	33	19	2	59	8	68	11	1	87	34	80	23	0	137	364
4:00 PM	6	14	3	0	23	4	16	15	0	35	3	28	1	1	32	8	20	5	0	33	123
4:15 PM	4	9	3	0	16	2	13	4	0	19	5	30	3	4	38	13	39	5	0	57	130
4:30 PM	4	7	2	0	13	4	10	6	1	20	6	21	1	2	28	8	36	5	0	49	110
4:45 PM	3	14	4	0	21	0	13	4	0	17	8	24	3	0	35	6	23	7	0	36	109
Hourly Total	17	44	12	0	73	10	52	29	1	91	22	103	8	7	133	35	118	22	0	175	472
5:00 PM	5	11	5	0	21	0	9	11	0	20	6	22	3	0	31	11	37	4	0	52	124
5:15 PM	3	8	6	0	17	2	10	5	0	17	8	25	1	0	34	8	30	8	0	46	114
5:30 PM	4	12	7	0	23	1	9	9	0	19	5	18	3	0	26	5	28	4	0	37	105
5:45 PM	2	16	4	0	22	4	8	5	0	17	6	31	1	0	38	9	23	6	0	38	115
Hourly Total	14	47	22	0	83	7	36	30	0	73	25	96	8	0	129	33	118	22	0	173	458
6:00 PM	2	8	4	0	14	1	9	2	0	12	3	20	1	0	24	4	24	2	0	30	80
6:15 PM	6	9	3	0	18	3	7	4	0	14	4	16	0	0	20	7	14	3	0	24	76
6:30 PM	3	12	0	0	15	1	9	5	0	15	2	12	1	0	15	2	16	8	0	26	71
6:45 PM	3	11	1	1	15	1	3	6	0	10	2	9	0	0	11	6	19	2	0	27	63
Hourly Total	14	40	8	1	62	6	28	17	0	51	11	57	2	0	70	19	73	15	0	107	290
Grand Total	176	390	119	2	685	61	359	278	6	698	147	735	79	16	961	241	940	171	0	1352	3696
Approach %	25.7	56.9	17.4	-	-	8.7	51.4	39.8	-	-	15.3	76.5	8.2	-	-	17.8	69.5	12.6	-	-	-
Total %	4.8	10.6	3.2	-	18.5	1.7	9.7	7.5	-	18.9	4.0	19.9	2.1	-	26.0	6.5	25.4	4.6	-	36.6	-
Lights	173	371	106	-	650	58	342	267	-	667	138	725	73	-	936	233	925	165	-	1323	3576
% Lights	98.3	95.1	89.1	-	94.9	95.1	95.3	96.0	-	95.6	93.9	98.6	92.4	-	97.4	96.7	98.4	96.5	-	97.9	96.8
Mediums	3	19	12	-	34	3	16	11	-	30	8	8	6	-	22	8	12	5	-	25	111
% Mediums	1.7	4.9	10.1	-	5.0	4.9	4.5	4.0	-	4.3	5.4	1.1	7.6	-	2.3	3.3	1.3	2.9	-	1.8	3.0
Articulated Trucks	0	0	1	-	1	0	1	0	-	1	1	2	0	-	3	0	3	1	-	4	9
% Articulated Trucks	0.0	0.0	0.8	-	0.1	0.0	0.3	0.0	-	0.1	0.7	0.3	0.0	-	0.3	0.0	0.3	0.6	-	0.3	0.2
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	1	-	-	-	-	1	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	16.7	-	-	-	-	6.3	-	-	-	-	-	-	-
Pedestrians	-	-	-	2	-	-	-	-	5	-	-	-	-	15	-	-	-	-	0	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	83.3	-	-	-	-	93.8	-	-	-	-	-	-	-

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Count Name: Galpin Boulevard & Lake Lucy  
 Road  
 Site Code: Intersection 2  
 Start Date: 12/07/2017  
 Page No: 3



Turning Movement Data Plot

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Count Name: Galpin Boulevard & Lake Lucy Road  
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Page No: 4

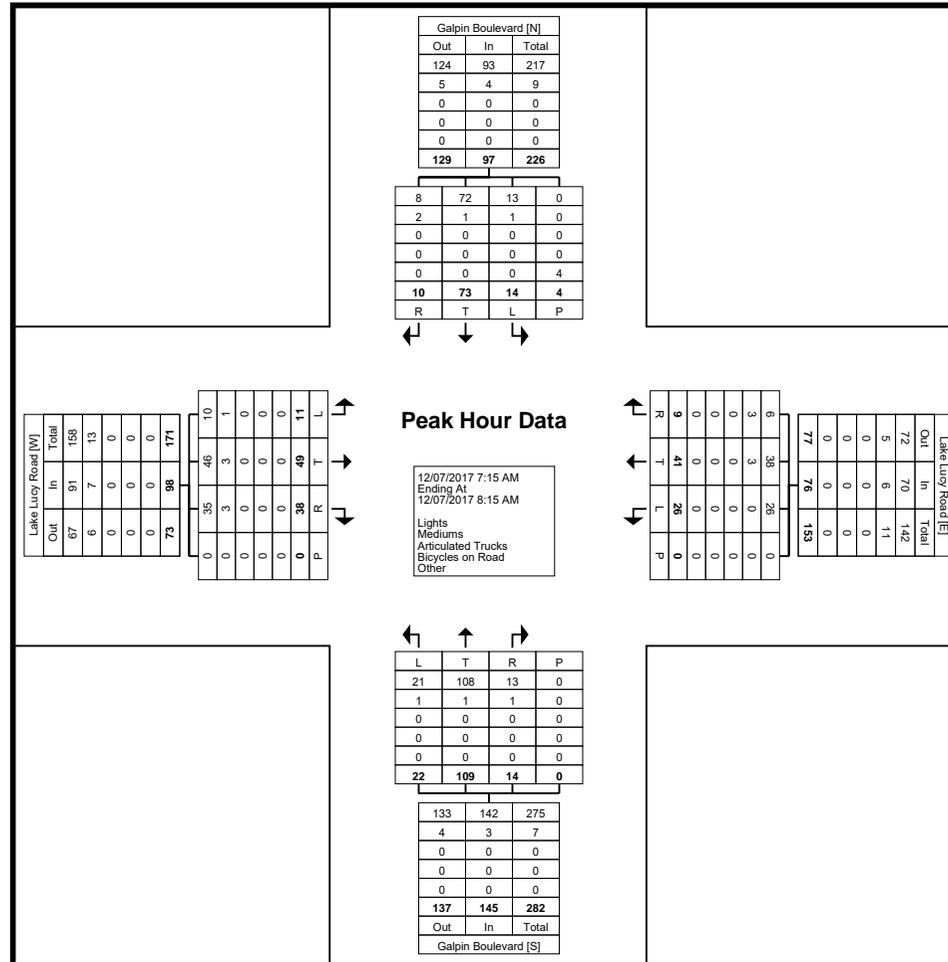
### Turning Movement Peak Hour Data (7:15 AM)

Start Time	Lake Lucy Road Westbound					Lake Lucy Road Eastbound					Galpin Boulevard Southbound					Galpin Boulevard Northbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:15 AM	9	5	4	0	18	2	12	9	0	23	1	20	5	0	26	4	31	3	0	38	105
7:30 AM	4	5	1	0	10	4	13	13	0	30	1	15	2	0	18	6	35	5	0	46	104
7:45 AM	10	13	4	0	27	2	15	9	0	26	4	27	1	2	32	5	23	2	0	30	115
8:00 AM	3	18	0	0	21	3	9	7	0	19	8	11	2	2	21	7	20	4	0	31	92
Total	26	41	9	0	76	11	49	38	0	98	14	73	10	4	97	22	109	14	0	145	416
Approach %	34.2	53.9	11.8	-	-	11.2	50.0	38.8	-	-	14.4	75.3	10.3	-	-	15.2	75.2	9.7	-	-	-
Total %	6.3	9.9	2.2	-	18.3	2.6	11.8	9.1	-	23.6	3.4	17.5	2.4	-	23.3	5.3	26.2	3.4	-	34.9	-
PHF	0.650	0.569	0.563	-	0.704	0.688	0.817	0.731	-	0.817	0.438	0.676	0.500	-	0.758	0.786	0.779	0.700	-	0.788	0.904
Lights	26	38	6	-	70	10	46	35	-	91	13	72	8	-	93	21	108	13	-	142	396
% Lights	100.0	92.7	66.7	-	92.1	90.9	93.9	92.1	-	92.9	92.9	98.6	80.0	-	95.9	95.5	99.1	92.9	-	97.9	95.2
Mediums	0	3	3	-	6	1	3	3	-	7	1	1	2	-	4	1	1	1	-	3	20
% Mediums	0.0	7.3	33.3	-	7.9	9.1	6.1	7.9	-	7.1	7.1	1.4	20.0	-	4.1	4.5	0.9	7.1	-	2.1	4.8
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated 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	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	4	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-

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Count Name: Galpin Boulevard & Lake Lucy  
 Road  
 Site Code: Intersection 2  
 Start Date: 12/07/2017  
 Page No: 5



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

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Count Name: Galpin Boulevard & Lake Lucy  
Road  
Site Code: Intersection 2  
Start Date: 12/07/2017  
Page No: 6

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

Start Time	Lake Lucy Road Westbound					Lake Lucy Road Eastbound					Galpin Boulevard Southbound					Galpin Boulevard Northbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
4:15 PM	4	9	3	0	16	2	13	4	0	19	5	30	3	4	38	13	39	5	0	57	130
4:30 PM	4	7	2	0	13	4	10	6	1	20	6	21	1	2	28	8	36	5	0	49	110
4:45 PM	3	14	4	0	21	0	13	4	0	17	8	24	3	0	35	6	23	7	0	36	109
5:00 PM	5	11	5	0	21	0	9	11	0	20	6	22	3	0	31	11	37	4	0	52	124
Total	16	41	14	0	71	6	45	25	1	76	25	97	10	6	132	38	135	21	0	194	473
Approach %	22.5	57.7	19.7	-	-	7.9	59.2	32.9	-	-	18.9	73.5	7.6	-	-	19.6	69.6	10.8	-	-	-
Total %	3.4	8.7	3.0	-	15.0	1.3	9.5	5.3	-	16.1	5.3	20.5	2.1	-	27.9	8.0	28.5	4.4	-	41.0	-
PHF	0.800	0.732	0.700	-	0.845	0.375	0.865	0.568	-	0.950	0.781	0.808	0.833	-	0.868	0.731	0.865	0.750	-	0.851	0.910
Lights	16	41	12	-	69	6	43	24	-	73	23	97	9	-	129	37	133	21	-	191	462
% Lights	100.0	100.0	85.7	-	97.2	100.0	95.6	96.0	-	96.1	92.0	100.0	90.0	-	97.7	97.4	98.5	100.0	-	98.5	97.7
Mediums	0	0	2	-	2	0	2	1	-	3	2	0	1	-	3	1	2	0	-	3	11
% Mediums	0.0	0.0	14.3	-	2.8	0.0	4.4	4.0	-	3.9	8.0	0.0	10.0	-	2.3	2.6	1.5	0.0	-	1.5	2.3
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated 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	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	6	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Galpin Boulevard & Longacres  
Drive  
Site Code: Intersection 3  
Start Date: 12/07/2017  
Page No: 1

### Turning Movement Data

Start Time	Longacres Drive Eastbound				Galpin Boulevard Southbound				Galpin Boulevard Northbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	
6:00 AM	0	0	2	0	6	0	0	6	1	4	0	5	11
6:15 AM	0	3	0	3	14	0	0	14	4	10	0	14	31
6:30 AM	4	6	1	10	5	0	0	5	0	20	0	20	35
6:45 AM	7	5	1	12	23	0	0	23	1	18	0	19	54
Hourly Total	11	14	4	25	48	0	0	48	6	52	0	58	131
7:00 AM	9	9	0	18	18	0	0	18	1	25	0	26	62
7:15 AM	8	5	0	13	41	4	0	45	2	28	0	30	88
7:30 AM	9	15	0	24	34	4	0	38	1	33	0	34	96
7:45 AM	1	17	0	18	45	1	0	46	9	23	0	32	96
Hourly Total	27	46	0	73	138	9	0	147	13	109	0	122	342
8:00 AM	6	7	0	13	24	0	0	24	7	23	0	30	67
8:15 AM	1	5	1	6	32	1	0	33	1	20	0	21	60
8:30 AM	3	4	0	7	37	2	0	39	3	17	0	20	66
8:45 AM	2	1	0	3	32	1	0	33	3	16	0	19	55
Hourly Total	12	17	1	29	125	4	0	129	14	76	0	90	248
9:00 AM	2	4	1	6	22	4	0	26	0	16	0	16	48
9:15 AM	2	7	0	9	25	2	0	27	1	20	0	21	57
9:30 AM	0	6	0	6	15	2	0	17	2	22	0	24	47
9:45 AM	2	3	1	5	16	0	0	16	4	13	0	17	38
Hourly Total	6	20	2	26	78	8	0	86	7	71	0	78	190
10:00 AM	3	3	0	6	14	0	0	14	2	16	0	18	38
10:15 AM	2	0	0	2	14	0	0	14	4	12	0	16	32
10:30 AM	5	2	0	7	15	0	0	15	0	9	0	9	31
10:45 AM	2	5	0	7	17	0	0	17	2	14	0	16	40
Hourly Total	12	10	0	22	60	0	0	60	8	51	0	59	141
11:00 AM	2	3	0	5	7	0	0	7	3	16	0	19	31
11:15 AM	0	5	0	5	9	2	0	11	1	24	0	25	41
11:30 AM	0	2	0	2	13	2	0	15	2	19	0	21	38
11:45 AM	2	1	0	3	14	2	0	16	1	16	0	17	36
Hourly Total	4	11	0	15	43	6	0	49	7	75	0	82	146
12:00 PM	2	4	0	6	15	1	0	16	1	15	0	16	38
12:15 PM	1	4	0	5	14	0	0	14	2	16	0	18	37
12:30 PM	2	2	0	4	15	0	0	15	0	12	0	12	31
12:45 PM	2	2	0	4	11	1	0	12	2	8	0	10	26
Hourly Total	7	12	0	19	55	2	0	57	5	51	0	56	132
1:00 PM	0	1	0	1	18	1	0	19	5	27	0	32	52
1:15 PM	1	4	0	5	17	2	0	19	5	18	0	23	47
1:30 PM	2	4	0	6	15	1	0	16	2	9	0	11	33
1:45 PM	3	7	0	10	15	3	0	18	4	17	0	21	49
Hourly Total	6	16	0	22	65	7	0	72	16	71	0	87	181
2:00 PM	2	6	0	8	9	3	0	12	1	13	0	14	34



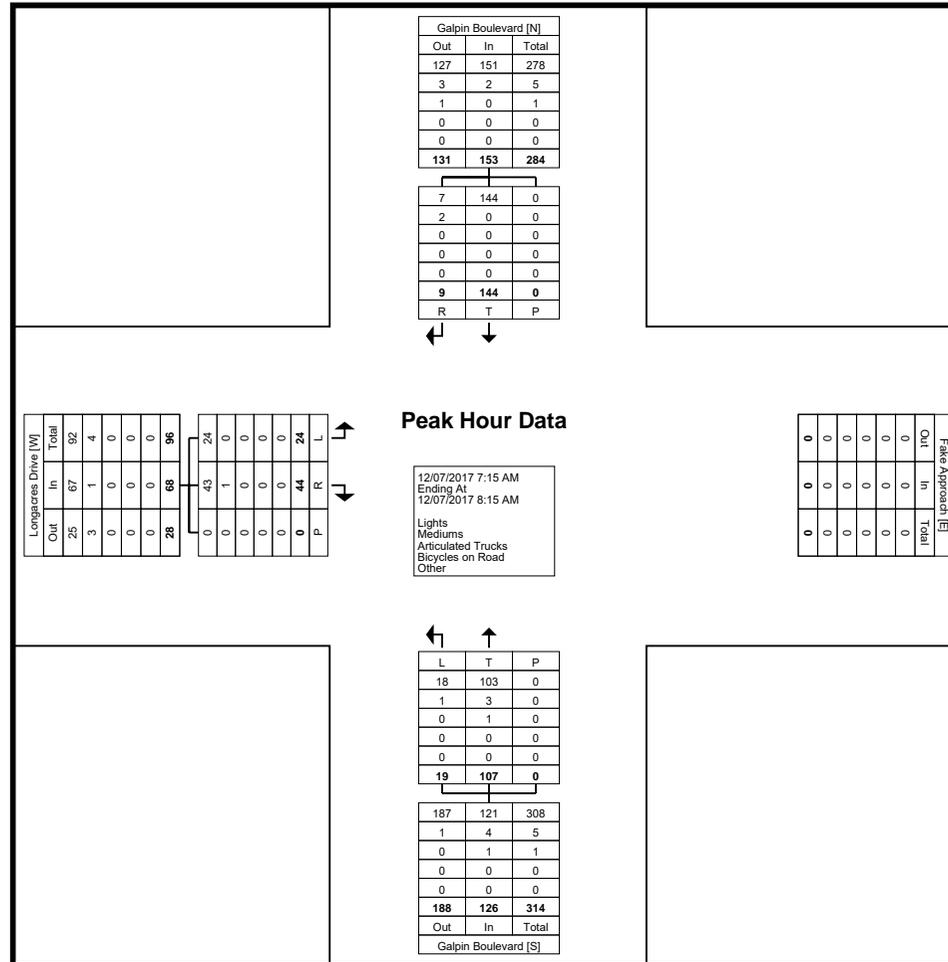




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Count Name: Galpin Boulevard & Longacres Drive  
Site Code: Intersection 3  
Start Date: 12/07/2017  
Page No: 5



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





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Count Name: Galpin Boulevard & Brinker Street  
Site Code: Intersection 4  
Start Date: 12/07/2017  
Page No: 1

### Turning Movement Data

Start Time	Brinker Street Westbound					Private Driveway Eastbound					Galpin Boulevard Southbound					Galpin Boulevard Northbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
6:00 AM	3	0	0	0	3	0	0	0	0	0	0	9	0	0	9	0	4	0	0	4	16
6:15 AM	0	0	1	0	1	0	0	0	0	0	0	19	0	0	19	0	17	1	0	18	38
6:30 AM	2	0	1	0	3	0	0	0	0	0	0	16	0	1	16	0	16	0	0	16	35
6:45 AM	4	0	0	0	4	0	0	0	0	0	0	39	0	1	39	0	18	0	0	18	61
Hourly Total	9	0	2	0	11	0	0	0	0	0	0	83	0	2	83	0	55	1	0	56	150
7:00 AM	3	0	2	0	5	0	0	0	0	0	0	44	0	0	44	0	24	0	0	24	73
7:15 AM	7	0	1	0	8	0	0	0	0	0	1	53	0	0	54	0	23	0	0	23	85
7:30 AM	6	0	3	1	9	0	0	0	0	0	0	79	0	0	79	0	33	2	0	35	123
7:45 AM	4	0	1	0	5	0	0	0	0	0	0	88	0	0	88	0	33	0	0	33	126
Hourly Total	20	0	7	1	27	0	0	0	0	0	1	264	0	0	265	0	113	2	0	115	407
8:00 AM	4	0	2	0	6	0	0	0	0	0	0	50	0	0	50	0	30	1	0	31	87
8:15 AM	4	0	1	0	5	0	0	0	0	0	0	50	0	1	50	0	28	1	0	29	84
8:30 AM	1	0	0	0	1	0	0	0	0	0	1	57	0	0	58	0	22	1	0	23	82
8:45 AM	0	0	0	0	0	0	0	0	0	0	1	45	0	0	46	1	25	1	0	27	73
Hourly Total	9	0	3	0	12	0	0	0	0	0	2	202	0	1	204	1	105	4	0	110	326
9:00 AM	3	0	1	0	4	0	0	0	0	0	0	36	0	0	36	0	20	1	0	21	61
9:15 AM	0	0	1	0	1	0	0	0	0	0	0	39	0	0	39	0	26	0	0	26	66
9:30 AM	1	0	0	1	1	0	0	0	0	0	1	25	0	1	26	0	23	0	0	23	50
9:45 AM	1	0	0	0	1	0	0	0	0	0	2	23	0	0	25	0	28	1	0	29	55
Hourly Total	5	0	2	1	7	0	0	0	0	0	3	123	0	1	126	0	97	2	0	99	232
10:00 AM	1	0	0	0	1	0	0	0	0	0	0	24	0	0	24	0	17	1	0	18	43
10:15 AM	0	0	1	0	1	0	0	0	0	0	0	24	0	0	24	0	17	0	0	17	42
10:30 AM	1	0	0	0	1	0	0	0	0	0	1	20	0	0	21	0	16	0	0	16	38
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	25	0	0	25	0	18	0	0	18	43
Hourly Total	2	0	1	0	3	0	0	0	0	0	1	93	0	0	94	0	68	1	0	69	166
11:00 AM	2	0	0	0	2	0	0	0	0	0	0	19	0	0	19	0	25	1	0	26	47
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	20	0	0	20	0	28	3	0	31	51
11:30 AM	2	0	0	0	2	0	0	0	0	0	2	25	0	0	27	0	20	0	0	20	49
11:45 AM	3	0	0	0	3	0	0	0	0	0	0	17	0	0	17	0	25	0	0	25	45
Hourly Total	7	0	0	0	7	0	0	0	0	0	2	81	0	0	83	0	98	4	0	102	192
12:00 PM	1	0	1	0	2	0	0	1	0	1	1	17	0	0	18	0	23	1	0	24	45
12:15 PM	1	0	0	0	1	0	0	0	0	0	0	23	0	0	23	0	19	0	0	19	43
12:30 PM	2	0	0	0	2	0	0	0	0	0	0	21	0	0	21	1	13	1	0	15	38
12:45 PM	1	0	0	0	1	0	0	0	0	0	1	22	0	0	23	0	21	4	0	25	49
Hourly Total	5	0	1	0	6	0	0	1	0	1	2	83	0	0	85	1	76	6	0	83	175
1:00 PM	0	0	1	0	1	0	0	0	0	0	0	17	0	0	17	0	33	2	0	35	53
1:15 PM	1	0	1	0	2	0	0	0	0	0	0	24	0	0	24	0	29	0	0	29	55
1:30 PM	2	0	0	0	2	0	0	0	0	0	0	19	0	0	19	1	19	5	0	25	46
1:45 PM	4	0	0	0	4	0	0	0	0	0	0	24	0	0	24	0	31	2	0	33	61
Hourly Total	7	0	2	0	9	0	0	0	0	0	0	84	0	0	84	1	112	9	0	122	215
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	18	0	0	18	0	27	1	0	28	46

2:15 PM	1	0	0	0	1	0	0	0	0	0	0	25	0	0	25	0	32	0	0	32	58
2:30 PM	0	0	1	0	1	0	0	0	0	0	0	31	0	0	31	0	21	2	0	23	55
2:45 PM	1	0	0	0	1	0	0	0	0	0	0	25	0	0	25	0	45	3	0	48	74
Hourly Total	2	0	1	0	3	0	0	0	0	0	0	99	0	0	99	0	125	6	0	131	233
3:00 PM	1	0	1	0	2	0	0	0	0	0	1	23	0	0	24	0	57	3	0	60	86
3:15 PM	0	0	1	0	1	0	0	0	0	0	1	29	0	0	30	0	49	1	0	50	81
3:30 PM	1	0	0	0	1	0	0	0	0	0	0	32	0	0	32	0	35	2	0	37	70
3:45 PM	3	0	0	0	3	0	0	0	0	0	0	36	0	0	36	0	40	1	0	41	80
Hourly Total	5	0	2	0	7	0	0	0	0	0	2	120	0	0	122	0	181	7	0	188	317
4:00 PM	4	0	0	0	4	0	0	0	0	0	0	43	0	0	43	0	40	1	0	41	88
4:15 PM	3	0	1	2	4	0	0	0	0	0	1	40	0	2	41	0	67	1	0	68	113
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	37	0	0	38	0	54	4	0	58	96
4:45 PM	3	0	0	2	3	0	0	0	0	0	0	33	0	2	33	0	53	2	0	55	91
Hourly Total	10	0	1	4	11	0	0	0	0	0	2	153	0	4	155	0	214	8	0	222	388
5:00 PM	0	0	0	0	0	0	0	0	0	0	1	48	0	0	49	0	71	4	0	75	124
5:15 PM	1	0	2	0	3	0	0	0	0	0	1	48	0	0	49	0	58	3	0	61	113
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	40	0	0	41	0	67	7	0	74	115
5:45 PM	4	0	0	0	4	0	0	0	0	0	0	47	0	0	47	0	49	3	0	52	103
Hourly Total	5	0	2	0	7	0	0	0	0	0	3	183	0	0	186	0	245	17	0	262	455
6:00 PM	5	0	0	0	5	0	0	0	0	0	1	21	0	0	22	0	46	3	0	49	76
6:15 PM	4	0	1	0	5	0	0	0	0	0	0	35	0	0	35	0	52	4	0	56	96
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	33	0	0	33	0	39	4	0	43	76
6:45 PM	0	0	0	2	0	0	0	0	0	0	1	24	0	2	25	0	36	5	0	41	66
Hourly Total	9	0	1	2	10	0	0	0	0	0	2	113	0	2	115	0	173	16	0	189	314
Grand Total	95	0	25	8	120	0	0	1	0	1	20	1681	0	10	1701	3	1662	83	0	1748	3570
Approach %	79.2	0.0	20.8	-	-	0.0	0.0	100.0	-	-	1.2	98.8	0.0	-	-	0.2	95.1	4.7	-	-	-
Total %	2.7	0.0	0.7	-	3.4	0.0	0.0	0.0	-	0.0	0.6	47.1	0.0	-	47.6	0.1	46.6	2.3	-	49.0	-
Lights	88	0	17	-	105	0	0	1	-	1	17	1637	0	-	1654	3	1617	81	-	1701	3461
% Lights	92.6	-	68.0	-	87.5	-	-	100.0	-	100.0	85.0	97.4	-	-	97.2	100.0	97.3	97.6	-	97.3	96.9
Mediums	7	0	8	-	15	0	0	0	-	0	3	35	0	-	38	0	37	1	-	38	91
% Mediums	7.4	-	32.0	-	12.5	-	-	0.0	-	0.0	15.0	2.1	-	-	2.2	0.0	2.2	1.2	-	2.2	2.5
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	9	0	-	9	0	8	1	-	9	18
% Articulated Trucks	0.0	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0	0.5	-	-	0.5	0.0	0.5	1.2	-	0.5	0.5
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	0.0	-	0.0	-	-	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	0	-	-	-	-	-	2	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	25.0	-	-	-	-	-	-	-	-	-	20.0	-	-	-	-	-	-	-
Pedestrians	-	-	-	6	-	-	-	-	0	-	-	-	-	8	-	-	-	-	0	-	-
% Pedestrians	-	-	-	75.0	-	-	-	-	-	-	-	-	-	80.0	-	-	-	-	-	-	-







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Count Name: Galpin Boulevard & Brinker Street  
Site Code: Intersection 4  
Start Date: 12/07/2017  
Page No: 6

### Turning Movement Peak Hour Data (5:00 PM)

Start Time	Brinker Street Westbound					Private Driveway Eastbound					Galpin Blvd Southbound					Galpin Boulevard Northbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
5:00 PM	0	0	0	0	0	0	0	0	0	0	1	48	0	0	49	0	71	4	0	75	124
5:15 PM	1	0	2	0	3	0	0	0	0	0	1	48	0	0	49	0	58	3	0	61	113
5:30 PM	0	0	0	0	0	0	0	0	0	0	1	40	0	0	41	0	67	7	0	74	115
5:45 PM	4	0	0	0	4	0	0	0	0	0	0	47	0	0	47	0	49	3	0	52	103
Total	5	0	2	0	7	0	0	0	0	0	3	183	0	0	186	0	245	17	0	262	455
Approach %	71.4	0.0	28.6	-	-	NaN	NaN	NaN	-	-	1.6	98.4	0.0	-	-	0.0	93.5	6.5	-	-	-
Total %	1.1	0.0	0.4	-	1.5	0.0	0.0	0.0	-	0.0	0.7	40.2	0.0	-	40.9	0.0	53.8	3.7	-	57.6	-
PHF	0.313	0.000	0.250	-	0.438	0.000	0.000	0.000	-	0.000	0.750	0.953	0.000	-	0.949	0.000	0.863	0.607	-	0.873	0.917
Lights	5	0	2	-	7	0	0	0	-	0	3	182	0	-	185	0	244	17	-	261	453
% Lights	100.0	-	100.0	-	100.0	-	-	-	-	-	100.0	99.5	-	-	99.5	-	99.6	100.0	-	99.6	99.6
Mediums	0	0	0	-	0	0	0	0	-	0	0	1	0	-	1	0	1	0	-	1	2
% Mediums	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0	0.5	-	-	0.5	-	0.4	0.0	-	0.4	0.4
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0	0.0	-	-	0.0	-	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Count Name: Galpin Boulevard & W 78th Street  
Site Code: Intersection 5  
Start Date: 12/05/2017  
Page No: 1

### Turning Movement Data

Start Time	78th Street Westbound					78th Street Eastbound					Galpin Boulevard Southbound					Galpin Boulevard Northbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
6:00 AM	1	1	0	0	2	1	2	4	0	7	2	13	0	0	15	4	4	1	0	9	33
6:15 AM	5	2	0	0	7	3	4	2	0	9	3	14	0	0	17	2	6	1	0	9	42
6:30 AM	8	4	1	0	13	3	8	5	0	16	9	16	2	0	27	4	14	1	0	19	75
6:45 AM	4	0	1	0	5	1	9	5	0	15	12	33	2	0	47	9	15	3	0	27	94
Hourly Total	18	7	2	0	27	8	23	16	0	47	26	76	4	0	106	19	39	6	0	64	244
7:00 AM	6	8	1	0	15	3	11	8	0	22	12	39	1	0	52	11	17	3	0	31	120
7:15 AM	5	2	1	0	8	2	10	9	0	21	11	47	3	0	61	6	20	3	0	29	119
7:30 AM	6	6	3	0	15	2	13	12	0	27	13	85	2	0	100	15	19	0	0	34	176
7:45 AM	7	5	4	0	16	4	11	11	0	26	4	86	3	0	93	14	41	3	0	58	193
Hourly Total	24	21	9	0	54	11	45	40	0	96	40	257	9	0	306	46	97	9	0	152	608
8:00 AM	2	6	1	0	9	1	16	5	0	22	9	52	4	0	65	15	38	4	0	57	153
8:15 AM	7	9	2	1	18	4	9	7	0	20	6	52	3	0	61	12	23	3	0	38	137
8:30 AM	9	3	1	1	13	7	9	10	0	26	5	40	4	0	49	14	25	5	0	44	132
8:45 AM	6	6	3	0	15	2	9	6	0	17	7	45	1	0	53	15	25	1	0	41	126
Hourly Total	24	24	7	2	55	14	43	28	0	85	27	189	12	0	228	56	111	13	0	180	548
9:00 AM	3	6	3	0	12	6	7	6	0	19	4	30	5	0	39	14	34	1	0	49	119
9:15 AM	6	3	3	0	12	0	6	5	0	11	6	26	6	1	38	15	21	1	0	37	98
9:30 AM	4	6	3	0	13	7	6	5	0	18	7	24	2	0	33	12	23	3	0	38	102
9:45 AM	5	4	2	0	11	5	7	5	0	17	4	21	4	0	29	11	26	4	0	41	98
Hourly Total	18	19	11	0	48	18	26	21	0	65	21	101	17	1	139	52	104	9	0	165	417
10:00 AM	6	4	1	0	11	1	6	1	0	8	7	15	0	0	22	8	18	2	0	28	69
10:15 AM	4	2	6	0	12	0	5	1	0	6	3	15	1	0	19	11	25	1	0	37	74
10:30 AM	4	2	0	0	6	2	5	3	0	10	6	16	4	0	26	5	18	2	0	25	67
10:45 AM	7	6	5	0	18	2	8	6	0	16	9	14	3	0	26	16	20	4	0	40	100
Hourly Total	21	14	12	0	47	5	24	11	0	40	25	60	8	0	93	40	81	9	0	130	310
11:00 AM	7	2	3	0	12	1	3	1	1	5	4	8	4	0	16	11	19	0	0	30	63
11:15 AM	0	5	2	0	7	2	8	1	0	11	2	19	1	0	22	16	15	2	0	33	73
11:30 AM	3	2	2	0	7	1	5	8	0	14	2	13	1	0	16	10	13	3	0	26	63
11:45 AM	7	0	2	0	9	2	8	6	0	16	5	25	3	0	33	13	18	3	0	34	92
Hourly Total	17	9	9	0	35	6	24	16	1	46	13	65	9	0	87	50	65	8	0	123	291
12:00 PM	5	7	1	0	13	1	11	5	0	17	6	10	0	0	16	17	17	3	0	37	83
12:15 PM	3	7	2	0	12	2	8	6	0	16	3	15	1	0	19	20	27	3	0	50	97
12:30 PM	10	5	2	1	17	0	12	10	0	22	5	12	1	0	18	22	16	3	0	41	98
12:45 PM	5	3	3	0	11	4	8	6	0	18	3	14	1	0	18	26	16	4	0	46	93
Hourly Total	23	22	8	1	53	7	39	27	0	73	17	51	3	0	71	85	76	13	0	174	371
1:00 PM	6	5	3	0	14	2	8	4	0	14	6	13	3	0	22	7	14	4	0	25	75
1:15 PM	10	7	3	0	20	4	7	6	0	17	6	12	0	0	18	4	21	2	0	27	82
1:30 PM	8	6	3	0	17	3	7	2	0	12	2	18	0	0	20	11	9	0	0	20	69
1:45 PM	4	11	8	0	23	2	6	10	0	18	7	18	0	0	25	7	14	3	0	24	90
Hourly Total	28	29	17	0	74	11	28	22	0	61	21	61	3	0	85	29	58	9	0	96	316
2:00 PM	2	1	1	0	4	3	4	3	0	10	5	8	0	0	13	22	20	3	0	45	72

2:15 PM	3	4	2	0	9	4	11	5	0	20	4	13	4	0	21	12	21	3	0	36	86
2:30 PM	7	3	4	0	14	4	4	4	0	12	5	16	0	0	21	16	20	4	0	40	87
2:45 PM	3	5	2	0	10	5	6	5	0	16	5	13	1	0	19	15	38	1	0	54	99
Hourly Total	15	13	9	0	37	16	25	17	0	58	19	50	5	0	74	65	99	11	0	175	344
3:00 PM	3	5	3	0	11	2	15	5	0	22	5	30	1	0	36	22	43	3	0	68	137
3:15 PM	7	7	6	0	20	1	5	5	0	11	7	25	3	1	35	21	34	6	0	61	127
3:30 PM	11	7	8	0	26	4	11	5	0	20	6	26	2	0	34	16	32	1	0	49	129
3:45 PM	5	4	3	0	12	3	8	8	0	19	8	26	1	0	35	21	38	4	0	63	129
Hourly Total	26	23	20	0	69	10	39	23	0	72	26	107	7	1	140	80	147	14	0	241	522
4:00 PM	12	4	10	0	26	3	11	6	1	20	7	36	5	1	48	16	54	3	0	73	167
4:15 PM	9	11	8	0	28	3	10	3	0	16	6	29	7	0	42	30	41	4	0	75	161
4:30 PM	5	8	6	0	19	6	11	5	0	22	5	30	1	0	36	22	65	7	0	94	171
4:45 PM	9	12	6	0	27	9	8	3	0	20	8	36	0	0	44	26	56	2	0	84	175
Hourly Total	35	35	30	0	100	21	40	17	1	78	26	131	13	1	170	94	216	16	0	326	674
5:00 PM	6	6	5	0	17	2	8	5	0	15	5	21	4	0	30	13	61	6	0	80	142
5:15 PM	12	12	6	0	30	6	12	9	0	27	8	47	1	0	56	26	54	5	0	85	198
5:30 PM	1	11	9	0	21	1	7	9	0	17	5	21	3	0	29	23	58	3	0	84	151
5:45 PM	15	12	9	0	36	8	12	9	0	29	7	25	9	0	41	19	65	4	0	88	194
Hourly Total	34	41	29	0	104	17	39	32	0	88	25	114	17	0	156	81	238	18	0	337	685
6:00 PM	7	10	7	0	24	4	9	7	0	20	3	34	1	0	38	24	44	7	0	75	157
6:15 PM	5	11	7	0	23	4	6	2	0	12	2	26	5	0	33	24	53	1	0	78	146
6:30 PM	9	6	6	0	21	2	10	6	0	18	7	20	1	0	28	19	43	3	0	65	132
6:45 PM	10	4	1	0	15	7	6	6	0	19	6	32	1	0	39	8	38	3	0	49	122
Hourly Total	31	31	21	0	83	17	31	21	0	69	18	112	8	0	138	75	178	14	0	267	557
Grand Total	314	288	184	3	786	161	426	291	2	878	304	1374	115	3	1793	772	1509	149	0	2430	5887
Approach %	39.9	36.6	23.4	-	-	18.3	48.5	33.1	-	-	17.0	76.6	6.4	-	-	31.8	62.1	6.1	-	-	-
Total %	5.3	4.9	3.1	-	13.4	2.7	7.2	4.9	-	14.9	5.2	23.3	2.0	-	30.5	13.1	25.6	2.5	-	41.3	-
Lights	295	285	175	-	755	156	419	286	-	861	297	1349	107	-	1753	765	1481	144	-	2390	5759
% Lights	93.9	99.0	95.1	-	96.1	96.9	98.4	98.3	-	98.1	97.7	98.2	93.0	-	97.8	99.1	98.1	96.6	-	98.4	97.8
Mediums	14	3	8	-	25	5	7	5	-	17	7	25	8	-	40	6	27	5	-	38	120
% Mediums	4.5	1.0	4.3	-	3.2	3.1	1.6	1.7	-	1.9	2.3	1.8	7.0	-	2.2	0.8	1.8	3.4	-	1.6	2.0
Articulated Trucks	5	0	1	-	6	0	0	0	-	0	0	0	0	-	0	1	1	0	-	2	8
% Articulated Trucks	1.6	0.0	0.5	-	0.8	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	-	0.1	0.1
Bicycles on Road	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	2	-	-	-	-	1	-	-	-	-	1	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	66.7	-	-	-	-	50.0	-	-	-	-	33.3	-	-	-	-	-	-	-
Pedestrians	-	-	-	1	-	-	-	-	1	-	-	-	-	2	-	-	-	-	0	-	-
% Pedestrians	-	-	-	33.3	-	-	-	-	50.0	-	-	-	-	66.7	-	-	-	-	-	-	-





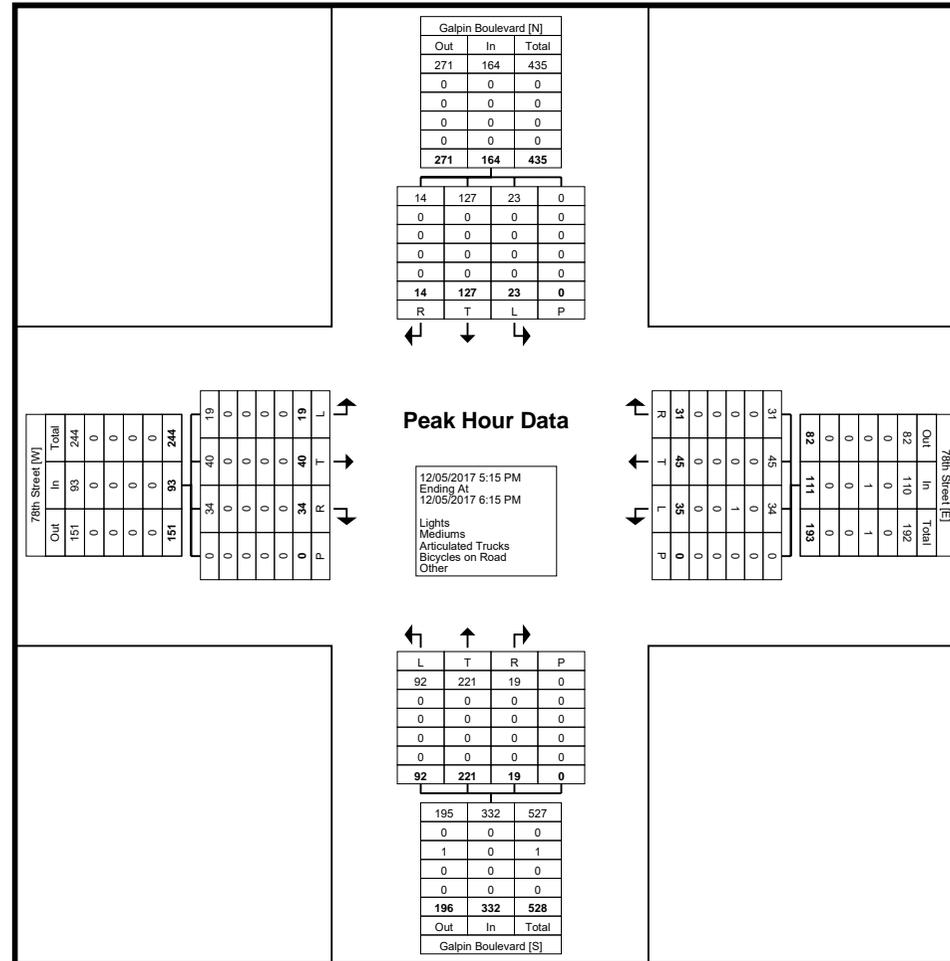




Kimley-Horn : Saint Paul (MN)  
 2550 University Ave W, Suite 238N

Saint Paul, Minnesota, United States, 55114  
 612.617.7993 Keelee.Roggenbuck@kimley-horn.com

Count Name: Galpin Boulevard & W 78th Street  
 Site Code: Intersection 5  
 Start Date: 12/05/2017  
 Page No: 7



Turning Movement Peak Hour Data Plot (5:15 PM)

Kimley-Horn : Saint Paul (MN)  
2550 University Ave W, Suite 238N

Saint Paul, Minnesota, United States, 55114  
612.617.7993 Keelee.Roggenbuck@kimley-horn.com

Count Name: Galpin Boulevard & TH 5  
Site Code: Intersection 6  
Start Date: 12/05/2017  
Page No: 1

### Turning Movement Data

Start Time	TH 5 Westbound					TH 5 Eastbound					Galpin Boulevard Southbound					Galpin Boulevard Northbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
7:00 AM	6	0	0	0	6	0	162	14	0	176	0	20	12	0	32	3	0	0	0	3	217
7:15 AM	8	0	0	0	8	0	234	13	0	247	0	29	4	0	33	10	0	0	0	10	298
7:30 AM	21	0	0	0	21	0	206	17	0	223	0	59	6	0	65	10	0	0	0	10	319
7:45 AM	15	0	0	0	15	0	198	32	0	230	0	72	6	0	78	17	0	0	0	17	340
Hourly Total	50	0	0	0	50	0	800	76	0	876	0	180	28	0	208	40	0	0	0	40	1174
8:00 AM	10	0	0	0	10	0	205	33	0	238	0	32	8	0	40	12	0	0	0	12	300
8:15 AM	12	0	0	0	12	0	218	24	0	242	0	23	5	0	28	7	0	0	0	7	289
8:30 AM	15	0	0	0	15	0	216	16	0	232	0	33	17	0	50	21	0	0	0	21	318
8:45 AM	7	0	0	0	7	0	220	19	0	239	0	27	9	0	36	19	0	0	0	19	301
Hourly Total	44	0	0	0	44	0	859	92	0	951	0	115	39	0	154	59	0	0	0	59	1208
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	11	253	24	0	288	10	143	11	1	164	30	16	13	0	59	25	41	16	0	82	593
4:15 PM	12	285	38	0	335	10	150	7	0	167	10	26	12	0	48	26	22	10	0	58	608
4:30 PM	22	282	42	0	346	9	203	11	42	223	22	26	11	0	59	23	47	12	0	82	710
4:45 PM	13	288	34	0	335	11	219	15	0	245	21	24	17	0	62	18	30	14	0	62	704
Hourly Total	58	1108	138	0	1304	40	715	44	1	799	83	92	53	0	228	92	140	52	0	284	2615
5:00 PM	20	251	28	0	299	16	165	18	0	199	9	19	11	0	39	18	40	17	0	75	612
5:15 PM	20	261	38	0	319	10	208	10	0	228	29	34	16	0	79	21	35	25	0	81	707
5:30 PM	24	267	39	0	330	7	155	17	0	179	21	11	13	0	45	27	34	26	0	87	641
5:45 PM	31	261	51	0	343	14	118	19	0	151	13	28	12	0	53	16	30	13	0	59	606
Hourly Total	95	1040	156	0	1291	47	646	64	0	757	72	92	52	0	216	82	139	81	0	302	2566
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6:00 AM	3	60	4	0	67	3	145	8	0	156	8	9	0	0	17	0	7	9	0	16	256
6:15 AM	7	72	8	1	87	3	208	6	0	217	13	8	1	0	22	6	7	10	0	23	349
6:30 AM	4	78	6	0	88	4	226	18	0	248	21	6	0	0	27	4	7	16	0	27	390
6:45 AM	6	116	2	0	124	6	276	14	0	296	37	12	4	0	53	2	10	21	0	33	506
Hourly Total	20	326	20	1	366	16	855	46	0	917	79	35	5	0	119	12	31	56	0	99	1501
7:00 AM	8	82	7	0	97	6	296	28	0	330	21	13	7	0	41	6	16	25	0	47	515
7:15 AM	15	103	6	0	124	7	291	28	0	326	33	25	14	0	72	9	8	17	0	34	556
7:30 AM	15	115	16	0	146	8	311	37	0	356	31	65	7	0	103	11	22	14	0	47	652
7:45 AM	13	138	20	0	171	3	294	48	0	345	38	65	9	0	112	13	18	40	0	71	699
Hourly Total	51	438	49	0	538	24	1192	141	0	1357	123	168	37	0	328	39	64	96	0	199	2422
8:00 AM	11	129	18	0	158	2	303	27	0	332	42	14	10	0	66	17	21	17	0	55	611
8:15 AM	7	102	12	0	121	8	309	18	0	335	30	27	14	0	71	2	17	27	0	46	573
8:30 AM	16	139	12	2	167	7	278	25	0	310	30	28	8	0	66	21	20	32	0	73	616
8:45 AM	9	127	17	0	153	6	247	20	0	273	37	15	7	0	59	12	17	17	0	46	531
Hourly Total	43	497	59	2	599	23	1137	90	0	1250	139	84	39	0	262	52	75	93	0	220	2331
9:00 AM	13	165	16	0	194	11	186	5	0	202	20	21	15	0	56	6	8	15	0	29	481
9:15 AM	5	134	21	0	160	11	187	13	0	211	18	10	10	0	38	10	6	5	0	21	430
9:30 AM	9	113	24	0	146	14	226	11	0	251	19	6	13	0	38	11	13	7	0	31	466
9:45 AM	9	120	15	0	144	5	171	8	0	184	20	15	3	0	38	6	14	11	0	31	397

Hourly Total	36	532	76	0	644	41	770	37	0	848	77	52	41	0	170	33	41	38	0	112	1774
10:00 AM	7	116	12	0	135	14	157	8	0	179	16	10	6	0	32	5	10	6	0	21	367
10:15 AM	13	103	8	0	124	9	156	10	0	175	18	14	7	0	39	9	9	6	0	24	362
10:30 AM	7	89	15	0	111	8	177	3	0	188	18	8	7	0	33	7	5	11	0	23	355
10:45 AM	10	128	16	0	154	6	175	8	0	189	19	11	11	0	41	5	16	8	0	29	413
Hourly Total	37	436	51	0	524	37	665	29	0	731	71	43	31	0	145	26	40	31	0	97	1497
11:00 AM	5	112	25	0	142	11	182	7	0	200	12	13	9	0	34	7	5	20	0	32	408
11:15 AM	11	138	14	0	163	13	193	9	0	215	27	3	8	0	38	8	10	15	0	33	449
11:30 AM	15	153	14	0	182	10	201	8	0	219	20	12	7	0	39	12	12	19	0	43	483
11:45 AM	14	177	25	0	216	10	204	8	0	222	16	9	9	0	34	8	12	28	0	48	520
Hourly Total	45	580	78	0	703	44	780	32	0	856	75	37	33	0	145	35	39	82	0	156	1860
12:00 PM	20	146	24	0	190	15	210	5	0	230	14	17	6	0	37	6	19	25	0	50	507
12:15 PM	16	188	12	0	216	9	218	9	0	236	24	7	12	0	43	9	12	26	0	47	542
12:30 PM	24	164	10	0	198	7	162	6	0	175	24	16	13	0	53	7	10	24	0	41	467
12:45 PM	25	186	20	0	231	8	184	8	0	200	23	11	12	0	46	4	14	21	0	39	516
Hourly Total	85	684	66	0	835	39	774	28	0	841	85	51	43	0	179	26	55	96	0	177	2032
1:00 PM	26	179	24	0	229	11	156	7	0	174	16	13	3	0	32	5	15	19	0	39	474
1:15 PM	15	163	26	0	204	6	180	10	0	196	17	10	8	0	35	11	13	11	0	35	470
1:30 PM	12	188	29	0	229	2	153	6	0	161	16	13	11	0	40	12	2	6	0	20	450
1:45 PM	14	187	21	0	222	0	176	4	0	180	17	12	10	0	39	24	17	15	0	56	497
Hourly Total	67	717	100	0	884	19	665	27	0	711	66	48	32	0	146	52	47	51	0	150	1891
2:00 PM	11	192	30	0	233	5	124	2	0	131	18	10	10	0	38	17	14	13	0	44	446
2:15 PM	10	200	20	0	230	6	177	6	0	189	14	15	11	0	40	18	10	7	0	35	494
2:30 PM	11	191	22	0	224	8	186	7	0	201	13	12	10	0	35	14	9	18	0	41	501
2:45 PM	18	203	34	0	255	8	132	19	0	159	9	19	18	0	46	31	31	22	0	84	544
Hourly Total	50	786	106	0	942	27	619	34	0	680	54	56	49	0	159	80	64	60	0	204	1985
3:00 PM	20	258	28	0	306	7	193	10	0	210	12	23	9	0	44	31	45	23	0	99	659
3:15 PM	18	262	31	0	311	8	177	6	0	191	15	14	15	0	44	20	33	28	0	81	627
3:30 PM	21	244	25	0	290	9	202	6	0	217	21	17	13	0	51	19	20	16	0	55	613
3:45 PM	13	303	23	0	339	7	190	11	0	208	17	19	10	0	46	21	23	19	0	63	656
Hourly Total	72	1067	107	0	1246	31	762	33	0	826	65	73	47	0	185	91	121	86	0	298	2555
4:00 PM	23	301	37	0	361	16	186	7	0	209	32	17	15	0	64	30	17	15	0	62	696
4:15 PM	25	326	39	0	390	13	217	21	0	251	19	17	12	0	48	25	32	21	0	78	767
4:30 PM	21	312	35	1	368	19	197	17	0	233	29	26	18	0	73	25	40	18	0	83	757
4:45 PM	15	341	29	0	385	11	211	20	0	242	18	29	17	0	64	22	24	20	0	66	757
Hourly Total	84	1280	140	1	1504	59	811	65	0	935	98	89	62	0	249	102	113	74	0	289	2977
5:00 PM	19	314	48	1	381	11	223	17	0	251	22	30	11	0	63	26	48	19	0	93	788
5:15 PM	25	331	42	0	398	5	237	10	0	252	26	32	16	0	74	18	37	28	0	83	807
5:30 PM	24	291	51	0	366	7	204	9	0	220	25	19	17	0	61	19	34	17	0	70	717
5:45 PM	17	263	41	0	321	9	180	11	0	200	22	32	13	0	67	20	25	12	0	57	645
Hourly Total	85	1199	182	1	1466	32	844	47	0	923	95	113	57	0	265	83	144	76	0	303	2957
6:00 PM	21	288	46	0	355	6	160	15	0	181	19	14	4	0	37	20	19	12	0	51	624
6:15 PM	33	314	41	0	388	10	130	28	0	168	19	20	17	0	56	17	34	12	0	63	675
6:30 PM	18	224	30	0	272	2	138	13	0	153	24	20	13	0	57	11	20	20	0	51	533
6:45 PM	10	211	27	0	248	14	118	10	0	142	14	12	8	0	34	10	17	9	0	36	460
Hourly Total	82	1037	144	0	1263	32	546	66	0	644	76	66	42	0	184	58	90	53	0	201	2292
Grand Total	1004	11727	1472	5	14203	511	13440	951	1	14902	1258	1394	690	0	3342	962	1203	1025	0	3190	35637
Approach %	7.1	82.6	10.4	-	-	3.4	90.2	6.4	-	-	37.6	41.7	20.6	-	-	30.2	37.7	32.1	-	-	-
Total %	2.8	32.9	4.1	-	39.9	1.4	37.7	2.7	-	41.8	3.5	3.9	1.9	-	9.4	2.7	3.4	2.9	-	9.0	-
Lights	964	11429	1437	-	13830	503	13076	932	-	14511	1225	1355	672	-	3252	937	1173	982	-	3092	34685
% Lights	96.0	97.5	97.6	-	97.4	98.4	97.3	98.0	-	97.4	97.4	97.2	97.4	-	97.3	97.4	97.5	95.8	-	96.9	97.3
Mediums	31	180	20	-	231	5	231	13	-	249	24	34	12	-	70	23	24	33	-	80	630







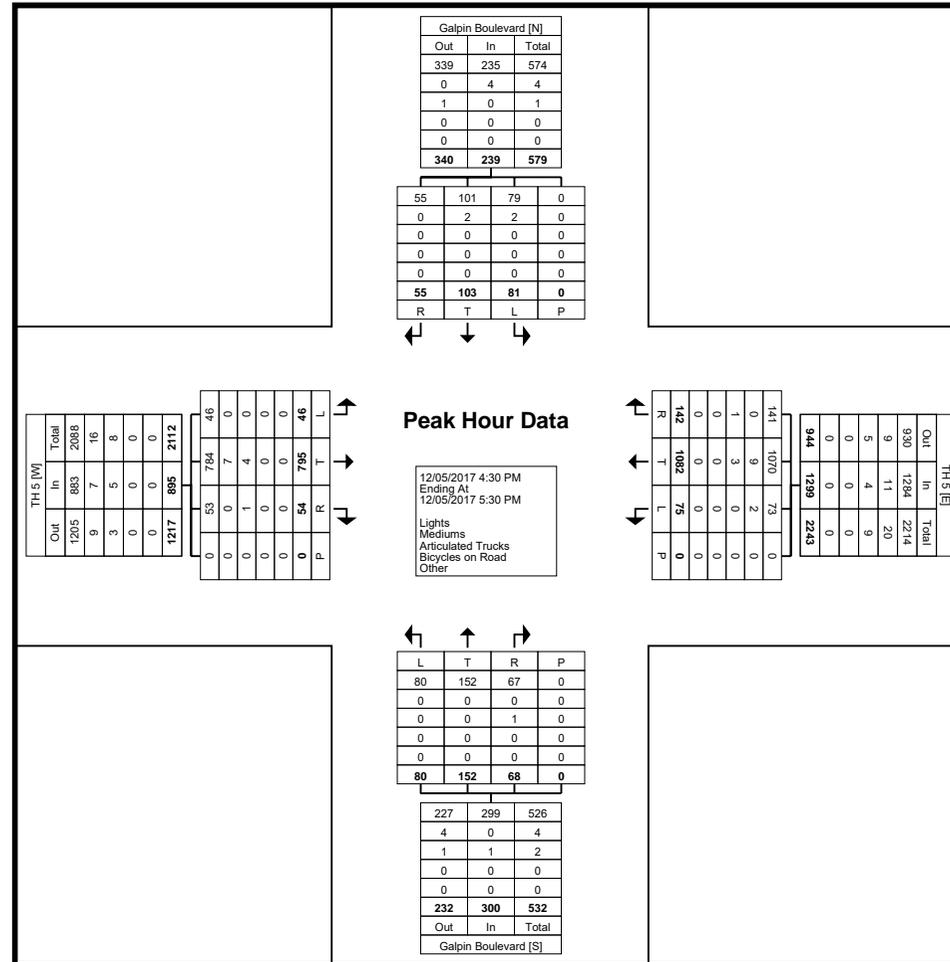




Kimley-Horn : Saint Paul (MN)  
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Count Name: Galpin Boulevard & TH 5  
Site Code: Intersection 6  
Start Date: 12/05/2017  
Page No: 8



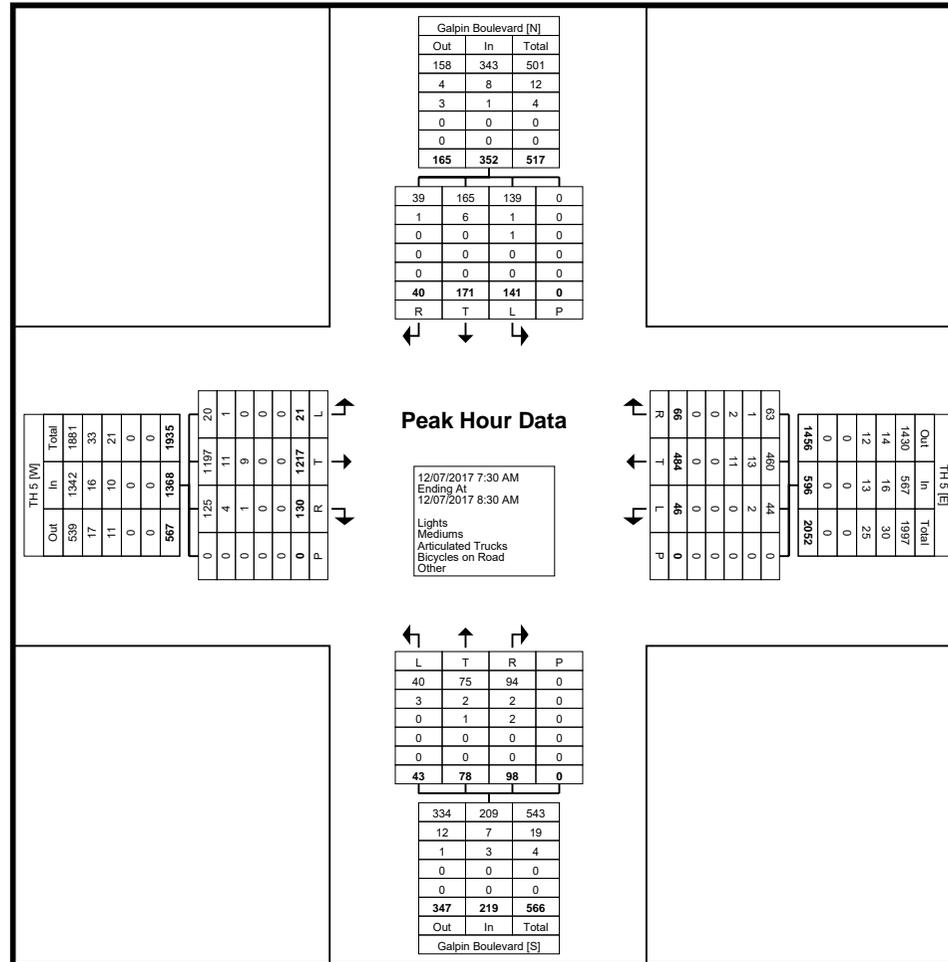
Turning Movement Peak Hour Data Plot (4:30 PM)



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 Site Code: Intersection 6  
 Start Date: 12/05/2017  
 Page No: 10



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





2. EXISTING YEAR (2017) SIMTRAFFIC REPORTS

1: Phaesant Drive & Galpin Blvd Performance by movement

Movement	EBL	EBR	SBL	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.1	0.2	0.1	0.1	0.1
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Total Del/Veh (s)	4.2	4.1	0.9	0.5	6.3	2.9	2.6
Vehicles Entered	122	6	9	107	4	20	268
Vehicles Exited	121	6	9	107	4	20	267
Hourly Exit Rate	121	6	9	107	4	20	267
Input Volume	120	5	10	100	5	20	260
% of Volume	101	114	88	107	76	101	102

2: Galpin Blvd & Lake Lucy Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.2	0.1	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.2	0.0
Total Del/Veh (s)	5.0	6.7	3.4	7.1	7.5	4.6	4.9	9.3	3.6	4.2	8.6	2.1
Vehicles Entered	14	42	41	22	58	10	21	105	15	22	80	11
Vehicles Exited	14	42	42	22	58	10	22	104	15	22	81	12
Hourly Exit Rate	14	42	42	22	58	10	22	104	15	22	81	12
Input Volume	15	45	40	25	60	10	25	100	15	20	76	10
% of Volume	95	93	106	88	96	98	88	104	102	111	107	117

2: Galpin Blvd & Lake Lucy Road Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.1
Total Delay (hr)	0.9
Total Del/Veh (s)	6.9
Vehicles Entered	441
Vehicles Exited	444
Hourly Exit Rate	444
Input Volume	441
% of Volume	101

3: Galpin Blvd & Longacres Drive Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.1	0.0	0.2	0.1	0.0	0.4
Total Del/Veh (s)	6.4	4.2	4.8	4.6	3.0	2.9	4.0
Vehicles Entered	20	42	21	117	138	9	347
Vehicles Exited	20	42	21	117	137	10	347
Hourly Exit Rate	20	42	21	117	137	10	347
Input Volume	20	45	20	116	135	10	345
% of Volume	101	93	106	101	101	98	101

4: Galpin Blvd & Brinker Street Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Total Delay (hr)	0.0	0.0	0.3	0.0	0.0	0.8	1.1
Total Del/Veh (s)	4.7	2.7	7.8	3.6	5.0	10.4	9.0
Vehicles Entered	24	10	148	4	1	268	455
Vehicles Exited	24	10	148	4	1	266	453
Hourly Exit Rate	24	10	148	4	1	266	453
Input Volume	20	10	145	5	1	270	451
% of Volume	122	98	102	76	100	99	100

5: Galpin Blvd & 78th Street W Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	2.6	0.1	0.2	1.6	0.2	0.1	0.0	0.0	0.0	0.0	0.6	0.0
Total Delay (hr)	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Total Del/Veh (s)	7.3	9.8	4.1	7.2	9.5	2.6	1.7	2.4	0.5	0.0	4.6	4.5
Vehicles Entered	13	49	35	22	29	11	20	40	128	11	34	277
Vehicles Exited	14	49	34	22	29	11	20	40	128	11	34	276
Hourly Exit Rate	14	49	34	22	29	11	20	40	128	11	34	276
Input Volume	15	50	35	25	30	10	25	35	125	10	35	275
% of Volume	95	98	96	88	96	107	81	113	102	107	96	100

5: Galpin Blvd & 78th Street W Performance by movement

Movement	SBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.2
Total Delay (hr)	0.0	0.8
Total Del/Veh (s)	3.7	4.2
Vehicles Entered	14	683
Vehicles Exited	15	683
Hourly Exit Rate	15	683
Input Volume	15	686
% of Volume	102	100

6: Galpin Blvd & TH 5 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.7	0.3	0.7	0.7	0.1	0.9	1.1	0.1	0.1	0.0	0.0	0.0
Total Delay (hr)	0.3	6.6	0.3	0.6	1.4	0.1	0.4	0.9	0.4	1.1	1.4	0.1
Total Del/Veh (s)	46.4	19.2	7.0	41.1	10.2	3.0	29.4	37.4	14.7	27.0	28.4	11.0
Vehicles Entered	26	1214	128	50	480	71	47	84	105	141	172	40
Vehicles Exited	25	1216	129	50	483	71	46	85	105	142	172	40
Hourly Exit Rate	25	1216	129	50	483	71	46	85	105	142	172	40
Input Volume	25	1220	130	50	485	70	45	80	100	145	177	40
% of Volume	100	100	99	100	100	101	102	106	105	98	97	101

6: Galpin Blvd & TH 5 Performance by movement

Movement	All
Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.3
Total Delay (hr)	13.5
Total Del/Veh (s)	18.6
Vehicles Entered	2558
Vehicles Exited	2564
Hourly Exit Rate	2564
Input Volume	2568
% of Volume	100

Total Network Performance

Denied Delay (hr)	0.2
Denied Del/Veh (s)	0.3
Total Delay (hr)	22.2
Total Del/Veh (s)	26.1
Vehicles Entered	2955
Vehicles Exited	2966
Hourly Exit Rate	2966
Input Volume	8219
% of Volume	36

**Intersection: 1: Phaesant Drive & Galpin Blvd**

Movement	EB	SB	NW
Directions Served	LR	LR	LR
Maximum Queue (ft)	5	18	37
Average Queue (ft)	0	1	15
95th Queue (ft)	3	8	38
Link Distance (ft)	2616	941	964
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 2: Galpin Blvd & Lake Lucy Road**

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	69	64	70	57	26
Average Queue (ft)	35	38	30	32	7
95th Queue (ft)	59	63	52	48	24
Link Distance (ft)	1930	4160	2284	2616	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					200
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 3: Galpin Blvd & Longacres Drive**

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	66	22
Average Queue (ft)	28	3
95th Queue (ft)	54	15
Link Distance (ft)	3536	2341
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 4: Galpin Blvd & Brinker Street**

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	50	78	31	83
Average Queue (ft)	20	36	3	47
95th Queue (ft)	43	58	18	71
Link Distance (ft)	1138	1467		2341
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 5: Galpin Blvd & 78th Street W**

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	UL	L	TR
Maximum Queue (ft)	32	72	38	50	51	31	4
Average Queue (ft)	10	32	12	17	14	3	0
95th Queue (ft)	31	54	32	38	39	18	0
Link Distance (ft)		2061		2211			1467
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	100		200		200	100	
Storage Blk Time (%)		0					
Queuing Penalty (veh)		0					

**Intersection: 6: Galpin Blvd & TH 5**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	L	T	TR	L	T	TR
Maximum Queue (ft)	66	306	334	102	116	111	91	118	118	173	132	125
Average Queue (ft)	21	146	164	38	51	59	30	52	50	77	52	55
95th Queue (ft)	53	253	270	81	95	108	72	101	93	143	99	101
Link Distance (ft)		4461	4461		4585	4585		3524	3524		407	407
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	350			350			300			250		
Storage Blk Time (%)		0	0							0		
Queuing Penalty (veh)		0	0							0		

**Network Summary**

Network wide Queuing Penalty: 0
---------------------------------

1: Phaasant Drive & Galpin Blvd Performance by movement

Movement	EBL	EBT	EBR	SBL	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1
Total Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total Del/Veh (s)	4.2	3.6	4.4	1.6	0.6	5.6	3.0	2.6
Vehicles Entered	142	12	5	20	128	3	13	323
Vehicles Exited	142	12	5	20	128	3	13	323
Hourly Exit Rate	142	12	5	20	128	3	13	323
Input Volume	145	11	5	20	125	5	10	322
% of Volume	98	109	100	99	102	60	127	100

2: Galpin Blvd & Lake Lucy Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay (hr)	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.4	0.0	0.0	0.2	0.0
Total Del/Veh (s)	5.3	6.7	3.7	6.3	7.5	4.3	5.4	10.2	3.2	4.2	8.7	2.3
Vehicles Entered	9	42	31	14	35	20	38	131	27	30	92	13
Vehicles Exited	9	43	32	14	35	20	37	131	27	30	94	13
Hourly Exit Rate	9	43	32	14	35	20	37	131	27	30	94	13
Input Volume	10	45	30	15	40	20	35	130	25	30	95	10
% of Volume	88	96	108	92	88	99	106	101	107	101	99	127

2: Galpin Blvd & Lake Lucy Road Performance by movement

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.0
Total Delay (hr)	1.0
Total Del/Veh (s)	7.2
Vehicles Entered	482
Vehicles Exited	485
Hourly Exit Rate	485
Input Volume	485
% of Volume	100

3: Galpin Blvd & Longacres Drive Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.0	0.3	0.1	0.0	0.5
Total Del/Veh (s)	5.5	3.4	5.2	4.6	3.4	3.1	4.2
Vehicles Entered	10	25	14	236	107	33	425
Vehicles Exited	10	25	14	238	107	33	427
Hourly Exit Rate	10	25	14	238	107	33	427
Input Volume	10	30	15	230	110	30	425
% of Volume	98	84	92	103	97	111	100

4: Galpin Blvd & Brinker Street Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.7	0.0	0.0	0.4	1.2
Total Del/Veh (s)	5.2	2.5	9.0	3.8	4.6	9.3	8.8
Vehicles Entered	4	7	281	14	4	160	470
Vehicles Exited	4	7	280	14	4	160	469
Hourly Exit Rate	4	7	280	14	4	160	469
Input Volume	5	5	276	15	5	170	476
% of Volume	80	140	102	92	80	94	99

5: Galpin Blvd & 78th Street W Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	1.9	0.2	0.2	1.6	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total Del/Veh (s)	6.7	9.6	3.5	7.7	10.8	3.2	1.3	2.2	0.6	0.1	6.2	4.8
Vehicles Entered	27	36	24	34	39	27	38	53	242	18	24	132
Vehicles Exited	26	36	25	34	39	27	38	53	242	18	24	133
Hourly Exit Rate	26	36	25	34	39	27	38	53	242	18	24	133
Input Volume	25	40	25	35	40	25	40	55	240	20	30	136
% of Volume	103	91	99	98	98	107	95	96	101	89	81	98

5: Galpin Blvd & 78th Street W Performance by movement

Movement	SBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.2
Total Delay (hr)	0.0	0.7
Total Del/Veh (s)	4.2	3.6
Vehicles Entered	9	703
Vehicles Exited	9	704
Hourly Exit Rate	9	704
Input Volume	10	722
% of Volume	88	98

6: Galpin Blvd & TH 5 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.9	0.2	0.6	0.7	0.3	0.7	1.2	0.1	0.1	0.0	0.0	0.0
Total Delay (hr)	0.7	6.2	0.1	0.8	7.2	0.4	0.8	1.6	0.3	0.8	1.3	0.4
Total Del/Veh (s)	50.5	25.5	4.8	38.9	19.6	7.9	32.4	39.6	11.6	32.3	37.1	21.2
Vehicles Entered	51	855	64	77	1302	159	86	143	80	92	128	66
Vehicles Exited	51	854	64	76	1303	158	88	141	79	92	128	66
Hourly Exit Rate	51	854	64	76	1303	158	88	141	79	92	128	66
Input Volume	50	870	65	80	1300	155	95	150	85	95	135	65
% of Volume	102	98	98	95	100	102	93	94	93	97	95	102

6: Galpin Blvd & TH 5 Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.3
Total Delay (hr)	20.6
Total Del/Veh (s)	23.5
Vehicles Entered	3103
Vehicles Exited	3100
Hourly Exit Rate	3100
Input Volume	3145
% of Volume	99

Total Network Performance

Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.3
Total Delay (hr)	31.3
Total Del/Veh (s)	31.2
Vehicles Entered	3471
Vehicles Exited	3471
Hourly Exit Rate	3471
Input Volume	9578
% of Volume	36

**Intersection: 1: Phaesant Drive & Galpin Blvd**

Movement	EB	SB	NW
Directions Served	LR	LR	LR
Maximum Queue (ft)	9	38	28
Average Queue (ft)	0	3	10
95th Queue (ft)	5	17	31
Link Distance (ft)	2616	941	964
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 2: Galpin Blvd & Lake Lucy Road**

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	69	67	64	59	24
Average Queue (ft)	34	34	36	32	8
95th Queue (ft)	57	59	58	50	26
Link Distance (ft)	1930	4160	2284	2616	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					200
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 3: Galpin Blvd & Longacres Drive**

Movement	EB	NB	SB
Directions Served	LR	LT	R
Maximum Queue (ft)	50	16	4
Average Queue (ft)	20	1	0
95th Queue (ft)	46	10	3
Link Distance (ft)	3536	2341	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			225
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 4: Galpin Blvd & Brinker Street**

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	28	77	31	72
Average Queue (ft)	8	46	11	39
95th Queue (ft)	28	68	34	61
Link Distance (ft)	1138	1467		2341
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 5: Galpin Blvd & 78th Street W**

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	TR	UL	R	L
Maximum Queue (ft)	38	59	50	56	61	5	33
Average Queue (ft)	17	29	18	22	12	0	5
95th Queue (ft)	39	50	41	42	40	3	22
Link Distance (ft)		2061		2211		226	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	100		200		200		100
Storage Blk Time (%)							
Queuing Penalty (veh)							

**Intersection: 6: Galpin Blvd & TH 5**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	L	T	TR	L	T	TR
Maximum Queue (ft)	107	352	354	115	316	324	134	149	131	123	116	124
Average Queue (ft)	37	155	175	51	163	183	52	75	45	60	51	61
95th Queue (ft)	80	287	291	98	264	279	112	135	93	103	92	113
Link Distance (ft)		4461	4461		4585	4585		3524	3524		407	407
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	350			350			300			250		
Storage Blk Time (%)		0	0		0	0						
Queuing Penalty (veh)		0	0		0	0						

**Network Summary**

Network wide Queuing Penalty: 1
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3. DESIGN YEAR (2040) NO-ACTION/ALTERNATIVE A  
SIMTRAFFIC REPORTS

**1: Phaesant Drive & Galpin Blvd Performance by movement**

Movement	EBL	EBT	EBR	SBL	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1
Total Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Total Del/Veh (s)	4.6	3.4	4.4	1.9	0.7	5.7	3.4	3.0
Vehicles Entered	175	5	6	11	132	5	20	354
Vehicles Exited	175	5	6	11	132	5	20	354
Hourly Exit Rate	175	5	6	11	132	5	20	354
Input Volume	170	4	5	10	135	5	20	350
% of Volume	103	111	114	107	98	95	101	101

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.1	0.0	0.1	0.2	0.0	0.1	0.5	0.0	0.0	0.3	0.0
Total Del/Veh (s)	6.0	7.1	3.5	7.1	8.7	5.8	6.6	10.5	4.2	4.5	9.0	2.5
Vehicles Entered	18	54	46	36	74	17	40	153	27	22	101	15
Vehicles Exited	18	53	47	36	72	16	40	152	27	23	100	15
Hourly Exit Rate	18	53	47	36	72	16	40	152	27	23	100	15
Input Volume	20	55	50	35	75	15	40	145	25	25	101	15
% of Volume	91	96	94	102	96	108	101	105	108	92	99	102

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.1
Total Delay (hr)	1.3
Total Del/Veh (s)	7.8
Vehicles Entered	603
Vehicles Exited	599
Hourly Exit Rate	599
Input Volume	600
% of Volume	100

**3: Galpin Blvd & Longacres Drive/Future Development Driveway Performance by movement**

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total Delay (hr)	0.0	0.1	0.2	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.9
Total Del/Veh (s)	5.7	5.1	8.1	4.5	5.5	5.5	4.7	3.8	3.5	3.2	5.2
Vehicles Entered	16	50	104	34	20	159	35	10	168	11	607
Vehicles Exited	17	50	103	34	20	158	35	10	169	11	607
Hourly Exit Rate	17	50	103	34	20	158	35	10	169	11	607
Input Volume	20	45	105	35	20	145	35	10	171	10	596
% of Volume	86	111	98	97	101	109	100	98	99	107	102

**4: Galpin Blvd & Brinker Street Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1	0.1
Total Delay (hr)	0.0	0.0	0.6	0.0	1.6	2.3
Total Del/Veh (s)	5.0	2.9	9.2	3.1	12.7	11.2
Vehicles Entered	19	11	234	4	451	719
Vehicles Exited	19	11	233	4	452	719
Hourly Exit Rate	19	11	233	4	452	719
Input Volume	20	10	219	5	445	700
% of Volume	96	107	106	76	102	103

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	1.6	0.2	0.2	1.7	0.2	0.2	0.0	0.0	0.0	0.0	0.5	0.0
Total Delay (hr)	0.1	0.3	0.1	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.7
Total Del/Veh (s)	13.5	15.4	7.7	16.2	13.4	4.5	3.7	4.1	0.7	0.0	6.1	5.3
Vehicles Entered	22	59	43	29	43	13	29	47	203	17	46	451
Vehicles Exited	22	59	43	28	44	13	30	47	203	17	47	453
Hourly Exit Rate	22	59	43	28	44	13	30	47	203	17	47	453
Input Volume	20	65	45	30	40	15	30	45	190	15	45	450
% of Volume	111	91	96	93	111	88	100	104	107	115	104	101

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	SBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.2
Total Delay (hr)	0.0	1.6
Total Del/Veh (s)	4.0	5.7
Vehicles Entered	22	1024
Vehicles Exited	23	1029
Hourly Exit Rate	23	1029
Input Volume	20	1008
% of Volume	116	102

**6: Galpin Blvd & TH 5 Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.9	0.4	0.8	0.9	0.2	0.7	1.3	0.1	0.1	0.0	0.0	0.0
Total Delay (hr)	0.6	12.3	0.5	1.1	2.5	0.1	0.6	1.6	1.0	2.7	3.4	0.5
Total Del/Veh (s)	59.1	28.2	9.9	61.6	14.4	4.1	39.7	53.1	29.9	42.5	44.2	27.1
Vehicles Entered	34	1514	161	64	599	113	51	106	123	227	276	69
Vehicles Exited	32	1522	160	64	603	113	50	104	123	227	276	69
Hourly Exit Rate	32	1522	160	64	603	113	50	104	123	227	276	69
Input Volume	35	1535	165	65	610	105	55	115	125	230	262	65
% of Volume	91	99	97	99	99	107	90	91	98	99	106	107

**6: Galpin Blvd & TH 5 Performance by movement**

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.3
Total Delay (hr)	26.9
Total Del/Veh (s)	28.3
Vehicles Entered	3337
Vehicles Exited	3343
Hourly Exit Rate	3343
Input Volume	3367
% of Volume	99

**Total Network Performance**

Denied Delay (hr)	0.4
Denied Del/Veh (s)	0.3
Total Delay (hr)	41.5
Total Del/Veh (s)	36.7
Vehicles Entered	3894
Vehicles Exited	3895
Hourly Exit Rate	3895
Input Volume	11290
% of Volume	34

**Intersection: 1: Phaesant Drive & Galpin Blvd**

Movement	EB	SB	NW
Directions Served	LR	LR	LR
Maximum Queue (ft)	9	32	32
Average Queue (ft)	0	2	15
95th Queue (ft)	5	15	37
Link Distance (ft)	2616	941	964
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 2: Galpin Blvd & Lake Lucy Road**

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	73	80	74	62	25
Average Queue (ft)	38	45	39	33	9
95th Queue (ft)	61	71	63	52	28
Link Distance (ft)	1930	4160	2280	2616	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					200
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 3: Galpin Blvd & Longacres Drive/Future Development Driveway**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LT
Maximum Queue (ft)	60	82	36	14
Average Queue (ft)	28	44	3	1
95th Queue (ft)	53	69	17	7
Link Distance (ft)	3535	1821	2335	2280
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 4: Galpin Blvd & Brinker Street**

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	42	90	31	119
Average Queue (ft)	17	46	4	60
95th Queue (ft)	39	73	20	94
Link Distance (ft)	1138	1467		2335
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 5: Galpin Blvd & 78th Street W**

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	UL	T	L	TR
Maximum Queue (ft)	46	91	60	62	71	3	38	14
Average Queue (ft)	14	40	16	22	24	0	8	0
95th Queue (ft)	38	71	43	44	53	0	29	5
Link Distance (ft)		2061		2211		226		1467
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100		200		200		100	
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

**Intersection: 6: Galpin Blvd & TH 5**

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	L	T	TR	L	T
Maximum Queue (ft)	92	488	486	23	140	170	181	105	139	171	258	221
Average Queue (ft)	31	272	287	1	57	88	96	37	72	77	147	107
95th Queue (ft)	71	418	431	17	115	155	164	83	128	139	238	185
Link Distance (ft)		4461	4461			4585	4585		3524	3524		407
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	350			350	350			300			250	
Storage Blk Time (%)		3	3								1	0
Queuing Penalty (veh)		1	6								1	0

**Intersection: 6: Galpin Blvd & TH 5**

Movement	SB
Directions Served	TR
Maximum Queue (ft)	207
Average Queue (ft)	111
95th Queue (ft)	183
Link Distance (ft)	407
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Network Summary**

Network wide Queuing Penalty: 8
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**1: Phaesant Drive & Galpin Blvd Performance by movement**

Movement	EBL	EBT	EBR	SBL	SBR	NWL	NWR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1
Total Delay (hr)	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Total Del/Veh (s)	4.6	4.0	3.9	1.6	1.0	6.6	2.7	2.9
Vehicles Entered	199	20	5	22	177	5	9	437
Vehicles Exited	199	20	5	21	177	5	9	436
Hourly Exit Rate	199	20	5	21	177	5	9	436
Input Volume	195	20	5	20	180	5	10	436
% of Volume	102	98	100	104	98	100	88	100

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.2	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay (hr)	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.6	0.1	0.1	0.4	0.0
Total Del/Veh (s)	6.2	7.2	3.9	7.2	8.2	5.6	7.7	11.4	5.5	5.4	9.9	2.6
Vehicles Entered	14	55	50	27	51	28	49	180	37	43	137	14
Vehicles Exited	14	54	50	28	50	28	49	182	36	42	137	14
Hourly Exit Rate	14	54	50	28	50	28	49	182	36	42	137	14
Input Volume	15	55	50	30	50	25	50	180	35	40	145	15
% of Volume	95	98	100	93	100	112	98	101	102	106	94	95

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.1
Total Delay (hr)	1.6
Total Del/Veh (s)	8.4
Vehicles Entered	685
Vehicles Exited	684
Hourly Exit Rate	684
Input Volume	690
% of Volume	99

**3: Galpin Blvd & Longacres Drive/Future Development Driveway Performance by movement**

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.5	0.2	0.1	0.2	0.0	1.2
Total Del/Veh (s)	7.5	3.5	8.6	4.8	7.1	6.4	5.5	5.7	4.0	3.5	5.7
Vehicles Entered	6	31	71	23	12	296	112	43	143	30	767
Vehicles Exited	7	31	72	24	12	296	111	43	142	29	767
Hourly Exit Rate	7	31	72	24	12	296	111	43	142	29	767
Input Volume	10	30	70	25	15	290	115	40	155	30	781
% of Volume	68	102	103	97	81	102	96	108	92	96	98

**4: Galpin Blvd & Brinker Street Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.0	0.0	1.6	0.0	0.0	0.8	2.5
Total Del/Veh (s)	4.3	2.7	12.5	6.3	6.9	10.5	11.5
Vehicles Entered	5	8	462	14	4	270	763
Vehicles Exited	5	8	461	14	4	272	764
Hourly Exit Rate	5	8	461	14	4	272	764
Input Volume	5	5	461	15	5	285	776
% of Volume	95	152	100	95	76	96	98

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	2.2	0.1	0.2	1.5	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.1	0.2	0.1	0.2	0.2	0.1	0.0	0.0	0.1	0.0	0.1	0.3
Total Del/Veh (s)	15.2	15.1	6.9	14.2	15.0	6.9	1.9	2.7	0.9	0.1	7.6	5.2
Vehicles Entered	30	47	33	41	50	31	52	63	419	21	32	232
Vehicles Exited	31	46	33	41	50	31	52	63	419	20	33	232
Hourly Exit Rate	31	46	33	41	50	31	52	63	419	20	33	232
Input Volume	30	50	30	45	50	30	50	70	420	25	40	240
% of Volume	102	92	109	91	100	102	103	90	100	80	83	97

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	SBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.0	0.1
Total Delay (hr)	0.0	1.4
Total Del/Veh (s)	4.1	4.8
Vehicles Entered	16	1067
Vehicles Exited	16	1067
Hourly Exit Rate	16	1067
Input Volume	15	1096
% of Volume	108	97

**6: Galpin Blvd & TH 5 Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.8	0.2	0.7	0.9	0.5	0.8	1.1	0.1	0.1	0.0	0.0	0.1
Total Delay (hr)	1.5	12.8	0.2	1.5	18.9	1.1	1.6	3.8	0.8	2.4	2.8	1.0
Total Del/Veh (s)	69.2	41.5	7.6	53.4	40.0	16.1	46.0	54.5	26.9	54.2	50.7	39.1
Vehicles Entered	77	1084	84	96	1651	240	122	243	108	150	197	88
Vehicles Exited	78	1086	84	93	1666	240	123	241	107	155	195	88
Hourly Exit Rate	78	1086	84	93	1666	240	123	241	107	155	195	88
Input Volume	80	1095	80	100	1635	250	120	235	105	155	200	90
% of Volume	97	99	105	93	102	96	102	103	102	100	97	98

**6: Galpin Blvd & TH 5 Performance by movement**

Movement	All
Denied Delay (hr)	0.5
Denied Del/Veh (s)	0.4
Total Delay (hr)	48.3
Total Del/Veh (s)	40.9
Vehicles Entered	4140
Vehicles Exited	4156
Hourly Exit Rate	4156
Input Volume	4146
% of Volume	100

**Total Network Performance**

Denied Delay (hr)	0.5
Denied Del/Veh (s)	0.4
Total Delay (hr)	67.7
Total Del/Veh (s)	49.5
Vehicles Entered	4685
Vehicles Exited	4703
Hourly Exit Rate	4703
Input Volume	13382
% of Volume	35

**Intersection: 1: Phaesant Drive & Galpin Blvd**

Movement	EB	SB	NW
Directions Served	LR	LR	LR
Maximum Queue (ft)	27	26	32
Average Queue (ft)	1	2	10
95th Queue (ft)	12	14	31
Link Distance (ft)	2616	941	964
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 2: Galpin Blvd & Lake Lucy Road**

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	59	74	75	66	26
Average Queue (ft)	38	42	43	37	9
95th Queue (ft)	58	67	68	58	28
Link Distance (ft)	1930	4160	2280	2616	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					200
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 3: Galpin Blvd & Longacres Drive/Future Development Driveway**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LT
Maximum Queue (ft)	55	80	35	40
Average Queue (ft)	19	39	2	11
95th Queue (ft)	43	66	16	32
Link Distance (ft)	3535	1821	2335	2280
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 4: Galpin Blvd & Brinker Street**

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	32	145	31	79
Average Queue (ft)	11	72	11	44
95th Queue (ft)	32	115	35	66
Link Distance (ft)	1138	1467		2335
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

**Intersection: 5: Galpin Blvd & 78th Street W**

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	TR	L	TR	UL	L	TR
Maximum Queue (ft)	57	79	73	83	69	43	4
Average Queue (ft)	21	37	22	29	20	8	0
95th Queue (ft)	47	66	48	61	51	31	3
Link Distance (ft)		2061		2211			1467
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	100		200		200	100	
Storage Blk Time (%)		0					
Queuing Penalty (veh)		0					

**Intersection: 6: Galpin Blvd & TH 5**

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	TR	L	T
Maximum Queue (ft)	230	530	543	315	767	769	548	184	266	260	220	185
Average Queue (ft)	75	286	308	75	368	384	55	84	149	104	115	95
95th Queue (ft)	167	457	480	206	645	658	326	153	232	200	197	153
Link Distance (ft)		4461	4461		4585	4585			3524	3524		407
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	350			350			350	300			250	
Storage Blk Time (%)		5	7		9	11			0			0
Queuing Penalty (veh)		4	6		9	27			0			0

**Intersection: 6: Galpin Blvd & TH 5**

Movement	SB
Directions Served	TR
Maximum Queue (ft)	209
Average Queue (ft)	108
95th Queue (ft)	175
Link Distance (ft)	407
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Network Summary**

Network wide Queuing Penalty: 46
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4. DESIGN YEAR (2040) ALTERNATIVE B SIMTRAFFIC REPORTS

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.2	0.2	0.1	0.2	0.2	0.2	0.5	0.0	0.6	0.0	0.0	0.0
Total Delay (hr)	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.7	8.8	4.3	9.2	9.0	5.9	2.0	1.3	0.7	1.7	1.1	0.9
Vehicles Entered	20	52	50	31	73	16	33	151	23	30	109	14
Vehicles Exited	19	52	50	32	72	16	33	150	23	30	109	15
Hourly Exit Rate	19	52	50	32	72	16	33	150	23	30	109	15
Input Volume	20	55	50	35	75	15	40	145	25	25	101	15
% of Volume	96	94	100	91	96	108	83	103	92	120	108	102

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.1
Total Delay (hr)	0.7
Total Del/Veh (s)	3.8
Vehicles Entered	602
Vehicles Exited	601
Hourly Exit Rate	601
Input Volume	600
% of Volume	100

**3: Galpin Blvd & Longacres Drive/Future Development Driveway Performance by movement**

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.1
Total Delay (hr)	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.5
Total Del/Veh (s)	6.0	4.7	7.6	4.9	1.8	1.4	1.0	1.8	1.5	0.3	3.1
Vehicles Entered	20	44	103	35	20	141	37	11	174	10	595
Vehicles Exited	20	43	103	34	20	140	38	11	176	9	594
Hourly Exit Rate	20	43	103	34	20	140	38	11	176	9	594
Input Volume	20	45	105	35	20	145	35	10	171	10	596
% of Volume	101	96	98	97	101	96	109	107	103	88	100

**4: Galpin Blvd & Brinker Street Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1	0.1
Total Delay (hr)	0.1	0.0	0.1	0.0	0.2	0.3
Total Del/Veh (s)	7.8	3.0	0.8	0.6	1.4	1.5
Vehicles Entered	23	13	214	5	441	696
Vehicles Exited	24	13	214	5	442	698
Hourly Exit Rate	24	13	214	5	442	698
Input Volume	20	10	219	5	445	700
% of Volume	122	127	98	95	99	100

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	1.8	0.2	0.2	1.5	0.2	0.1	0.0	0.0	0.0	0.0	0.5	0.0
Total Delay (hr)	0.1	0.3	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.2
Total Del/Veh (s)	14.2	14.9	7.7	12.3	12.5	3.6	2.8	4.1	0.7	0.1	3.0	1.9
Vehicles Entered	19	65	40	29	42	16	27	48	183	16	44	450
Vehicles Exited	19	64	41	29	43	16	27	49	183	16	45	449
Hourly Exit Rate	19	64	41	29	43	16	27	49	183	16	45	449
Input Volume	20	65	45	30	40	15	30	45	190	15	45	450
% of Volume	96	99	91	96	108	108	90	109	96	108	100	100

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	SBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.4	0.2
Total Delay (hr)	0.0	1.1
Total Del/Veh (s)	0.9	3.9
Vehicles Entered	19	998
Vehicles Exited	19	1000
Hourly Exit Rate	19	1000
Input Volume	20	1008
% of Volume	96	99

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**Total Zone Performance**

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Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.3
Total Delay (hr)	2.6
Total Del/Veh (s)	120.0
Vehicles Entered	921
Vehicles Exited	46
Hourly Exit Rate	46
Input Volume	2904
% of Volume	2

**Intersection: 2: Galpin Blvd & Lake Lucy Road**

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	R	L
Maximum Queue (ft)	69	84	28	5	30
Average Queue (ft)	39	38	3	0	3
95th Queue (ft)	61	68	17	2	18
Link Distance (ft)	1924	4142			
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			150	150	150
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 3: Galpin Blvd & Longacres Drive/Future Development Driveway**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	74	88	21	23
Average Queue (ft)	26	41	2	1
95th Queue (ft)	50	70	15	9
Link Distance (ft)	3529	1807		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	150
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 4: Galpin Blvd & Brinker Street**

Movement	WB
Directions Served	LR
Maximum Queue (ft)	41
Average Queue (ft)	21
95th Queue (ft)	43
Link Distance (ft)	1138
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Intersection: 5: Galpin Blvd & 78th Street W**

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	UL	R	L	T	R
Maximum Queue (ft)	36	99	49	54	81	3	43	4	9
Average Queue (ft)	13	37	17	23	24	0	6	0	0
95th Queue (ft)	36	70	42	43	60	2	28	3	5
Link Distance (ft)		2054		2211		226		1467	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	100		200		200		100		100
Storage Blk Time (%)		1							
Queuing Penalty (veh)		0							

**Zone Summary**

Zone wide Queuing Penalty: 0

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.2	0.0	0.0
Total Delay (hr)	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	9.3	8.9	4.6	10.1	9.9	5.6	2.5	2.6	1.5	2.3	1.1	0.7
Vehicles Entered	15	56	48	28	48	26	51	190	39	44	143	15
Vehicles Exited	15	56	47	28	48	26	50	189	39	43	144	14
Hourly Exit Rate	15	56	47	28	48	26	50	189	39	43	144	14
Input Volume	15	55	50	30	50	25	50	180	35	40	145	15
% of Volume	102	101	94	93	96	104	100	105	111	108	99	95

**2: Galpin Blvd & Lake Lucy Road Performance by movement**

Movement	All
Denied Delay (hr)	0.0
Denied Del/Veh (s)	0.1
Total Delay (hr)	0.8
Total Del/Veh (s)	3.9
Vehicles Entered	703
Vehicles Exited	699
Hourly Exit Rate	699
Input Volume	690
% of Volume	101

**3: Galpin Blvd & Longacres Drive/Future Development Driveway Performance by movement**

Movement	EBL	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.6
Total Del/Veh (s)	8.7	3.9	7.9	4.0	2.4	2.1	1.8	2.7	1.2	1.2	2.7
Vehicles Entered	11	29	72	23	13	302	109	39	153	27	778
Vehicles Exited	10	30	73	24	12	302	109	39	154	27	780
Hourly Exit Rate	10	30	73	24	12	302	109	39	154	27	780
Input Volume	10	30	70	25	15	290	115	40	155	30	781
% of Volume	98	99	104	97	81	104	95	98	99	89	100

**4: Galpin Blvd & Brinker Street Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.4	0.1	0.0
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.1	0.3
Total Del/Veh (s)	7.4	4.0	1.2	0.9	3.2	1.1	1.2
Vehicles Entered	3	6	466	13	4	293	785
Vehicles Exited	3	6	466	13	4	295	787
Hourly Exit Rate	3	6	466	13	4	295	787
Input Volume	5	5	461	15	5	285	776
% of Volume	57	114	101	88	76	104	101

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	2.3	0.1	0.2	1.7	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.1	0.2	0.1	0.2	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.1
Total Del/Veh (s)	13.9	15.8	5.9	17.4	15.0	6.7	2.0	2.9	0.9	0.1	4.1	1.7
Vehicles Entered	33	47	31	40	52	29	48	73	425	22	40	248
Vehicles Exited	33	46	31	40	51	29	48	73	425	22	39	249
Hourly Exit Rate	33	46	31	40	51	29	48	73	425	22	39	249
Input Volume	30	50	30	45	50	30	50	70	420	25	40	240
% of Volume	109	92	102	89	102	96	96	104	101	88	98	104

**5: Galpin Blvd & 78th Street W Performance by movement**

Movement	SBR	All
Denied Delay (hr)	0.0	0.0
Denied Del/Veh (s)	0.1	0.2
Total Delay (hr)	0.0	1.2
Total Del/Veh (s)	0.6	3.9
Vehicles Entered	14	1102
Vehicles Exited	14	1100
Hourly Exit Rate	14	1100
Input Volume	15	1096
% of Volume	95	100

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**Total Zone Performance**

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Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.4
Total Delay (hr)	2.8
Total Del/Veh (s)	58.9
Vehicles Entered	685
Vehicles Exited	145
Hourly Exit Rate	145
Input Volume	3342
% of Volume	4

**Intersection: 2: Galpin Blvd & Lake Lucy Road**

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	L
Maximum Queue (ft)	76	95	25	2	41
Average Queue (ft)	39	42	6	0	7
95th Queue (ft)	63	73	21	2	28
Link Distance (ft)	1924	4154		2278	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			150		150
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 3: Galpin Blvd & Longacres Drive/Future Development Driveway**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	54	79	16	42
Average Queue (ft)	23	35	1	7
95th Queue (ft)	46	63	7	26
Link Distance (ft)	3529	1807		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	150
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 4: Galpin Blvd & Brinker Street**

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	28	27
Average Queue (ft)	8	1
95th Queue (ft)	28	11
Link Distance (ft)	1138	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		150
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 5: Galpin Blvd & 78th Street W**

Movement	EB	EB	WB	WB	NB	NB	NB	SB
Directions Served	L	TR	L	TR	UL	T	R	L
Maximum Queue (ft)	54	68	63	84	74	3	11	45
Average Queue (ft)	21	31	22	28	26	0	0	11
95th Queue (ft)	46	58	49	55	59	2	5	34
Link Distance (ft)		2054		2211		226	226	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100		200		200			100
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

**Zone Summary**

Zone wide Queuing Penalty: 0

5. DESIGN YEAR (2040) ALTERNATIVE C RODEL REPORTS

## Scheme Summary

### Control Data

#### Control Data and Model Parameters

Galpin Blvd and Lake Lucy Rd	2040 PHF Flow Profile (veh)
2040 AM Peak	7.5 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
AM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	50% Confidence Level

#### Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	No
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

## Operational Data

### Main Geometry (ft)

#### Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle ?
1	Galpin Blvd SB	0	0	12.00	1	14.00	1	164.00	66.00	30.00
2	Lake Lucy Rd EB	90	0	12.00	1	14.00	1	164.00	66.00	30.00
3	Galpin Blvd NB	180	0	12.00	1	14.00	1	164.00	66.00	30.00
4	Lake Lucy Rd WB	270	0	12.00	1	14.00	1	164.00	66.00	30.00

#### Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	Galpin Blvd SB	164.00	15.00	1	14.00	1	12.00	1
2	Lake Lucy Rd EB	164.00	15.00	1	14.00	1	12.00	1
3	Galpin Blvd NB	164.00	15.00	1	14.00	1	12.00	1
4	Lake Lucy Rd WB	164.00	15.00	1	14.00	1	12.00	1

#### Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	Galpin Blvd SB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
2	Lake Lucy Rd EB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
3	Galpin Blvd NB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
4	Lake Lucy Rd WB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0

## Traffic Flow Data (veh/hr)

### 2040 AM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows					Flow Modifiers		
		U-Turn	Exit-3	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor	Peak Hour Factor
1	Galpin Blvd SB	0	25	100	15	0	5.0	1.00	0.9
2	Lake Lucy Rd EB	0	20	55	50	0	5.0	1.00	0.9
3	Galpin Blvd NB	0	40	145	25	0	5.0	1.00	0.9
4	Lake Lucy Rd WB	0	35	75	15	0	5.0	1.00	0.9

## Operational Results

### 2040 AM Peak - 60 minutes

#### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Galpin Blvd SB	None	140		150		180	1024		0.1387
2	Lake Lucy Rd EB	None	125		160		130	1019		0.1244
3	Galpin Blvd NB	None	210		100		185	1049		0.2032
4	Lake Lucy Rd WB	None	125		205		105	997		0.1272

#### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	3.81		3.81	0.45		A		A
2	Lake Lucy Rd EB	None	3.77		3.77	0.40		A		A
3	Galpin Blvd NB	None	3.99		3.99	0.72		A		A
4	Lake Lucy Rd WB	None	3.86		3.86	0.41		A		A

## 2040 AM Peak - 15 minutes

### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Galpin Blvd SB	None	157		168		202	1015		0.1562
2	Lake Lucy Rd EB	None	140		180		146	1009		0.1402
3	Galpin Blvd NB	None	236		112		208	1042		0.2282
4	Lake Lucy Rd WB	None	140		230		118	985		0.1438

### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	3.76		3.76	0.45		A		A
2	Lake Lucy Rd EB	None	3.72		3.72	0.40		A		A
3	Galpin Blvd NB	None	3.96		3.96	0.72		A		A
4	Lake Lucy Rd WB	None	3.82		3.82	0.41		A		A

## Approach Flow Profile

### 2040 AM Peak - Approach Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Lake Lucy Rd EB	Galpin Blvd NB	Lake Lucy Rd WB
0.0 - 7.5	16.78	14.98	25.17	14.98
7.5 - 15.0	16.78	14.98	25.17	14.98
15.0 - 22.5	16.78	14.98	25.17	14.98
22.5 - 30.0	19.66	17.56	29.49	17.56
30.0 - 37.5	19.66	17.56	29.49	17.56
37.5 - 45.0	16.78	14.98	25.17	14.98
45.0 - 52.5	16.78	14.98	25.17	14.98
52.5 - 60.0	16.78	14.98	25.17	14.98
Peak 15 min	19.66	17.56	29.49	17.56
Peak 60 min	17.50	15.63	26.25	15.63

## Exit Flow Profile

### 2040 AM Peak - Exit Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Lake Lucy Rd EB	Galpin Blvd NB	Lake Lucy Rd WB
0.0 - 7.5	21.56	15.57	22.16	12.58
7.5 - 15.0	21.57	15.58	22.17	12.58
15.0 - 22.5	21.57	15.58	22.17	12.58
22.5 - 30.0	25.26	18.24	25.96	14.74
30.0 - 37.5	25.28	18.26	25.98	14.75
37.5 - 45.0	21.59	15.59	22.19	12.60
45.0 - 52.5	21.57	15.58	22.17	12.58
52.5 - 60.0	21.57	15.58	22.17	12.58
0-60	180	130	185	105
%Trucks	5.00	5.00	5.00	5.00

## Economics

### Economic Input Data

#### 2040 - Vehicle Delay Parameters

Peaks	Peak / Day	Days / Year	Delay Cost (\$ / hour)
AM Peak	1	325	15.00
OFF Peak	14	325	15.00
PM Peak	1	325	15.00

#### 2040 - Accident Severity Proportions and Costs

Accident Type	Proportion (%)	Cost (\$)
Fatal Vehicle Accident	0.3	0
Incapacitating Vehicle Accident	17.7	0
Non-incapacitating Vehicle Accident	82	0
Damage Only Vehicle Accident	100	0
Pedestrian Injury Accident	100	0

## Economics - Results Data

#### 2040 Delay and Accident Costs

Peak	Delay Costs		Accident Costs			Total Costs	
	Delays Veh.hrs	Costs (\$)	Accident Types	Annual Accidents	Accident Costs	Cost Type	Costs (\$/year)
AM	209.90	3148	Vehicles Injury	0.00	0	Vehicle Delay Cost	3148
OFF	0.00	0	Vehicles DO	0.00	0	Vehicle Injury Acc Cost	0
PM	0.00	0	Pedestrians	0.00	0	Vehicle DO Acc Cost	0
						Pedestrian Accident Cost	0
						Total Accident Cost	0
Total	209.90	3148	Totals	0.00	0	TOTAL COST	3148

## Global Results

### Performance and Accidents

#### 2040 AM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	600		600
Capacity	veh/hr	4088		4088
Average Delay	sec/veh	3.87		3.87
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	0.65		0.65

## Scheme Summary

### Control Data

#### Control Data and Model Parameters

Galpin Blvd and Lake Lucy Rd	2040 PHF Flow Profile (veh)
2040 PM Peak	7.5 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
PM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	50% Confidence Level

#### Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	No
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

## Operational Data

### Main Geometry (ft)

#### Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle ?
1	Galpin Blvd SB	0	0	12.00	1	14.00	1	164.00	66.00	30.00
2	Lake Lucy Rd EB	90	0	12.00	1	14.00	1	164.00	66.00	30.00
3	Galpin Blvd NB	180	0	12.00	1	14.00	1	164.00	66.00	30.00
4	Lake Lucy Rd WB	270	0	12.00	1	14.00	1	164.00	66.00	30.00

#### Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	Galpin Blvd SB	164.00	15.00	1	14.00	1	12.00	1
2	Lake Lucy Rd EB	164.00	15.00	1	14.00	1	12.00	1
3	Galpin Blvd NB	164.00	15.00	1	14.00	1	12.00	1
4	Lake Lucy Rd WB	164.00	15.00	1	14.00	1	12.00	1

#### Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	Galpin Blvd SB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
2	Lake Lucy Rd EB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
3	Galpin Blvd NB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
4	Lake Lucy Rd WB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0

## Traffic Flow Data (veh/hr)

### 2040 PM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows					Flow Modifiers		
		U-Turn	Exit-3	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor	Peak Hour Factor
1	Galpin Blvd SB	0	40	145	15	0	5.0	1.00	0.9
2	Lake Lucy Rd EB	0	15	55	50	0	5.0	1.00	0.9
3	Galpin Blvd NB	0	50	180	35	0	5.0	1.00	0.9
4	Lake Lucy Rd WB	0	30	50	25	0	5.0	1.00	0.9

## Operational Results

### 2040 PM Peak - 60 minutes

#### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Galpin Blvd SB	None	200		130		220	1034		0.1954
2	Lake Lucy Rd EB	None	120		215		115	992		0.1221
3	Galpin Blvd NB	None	265		110		225	1044		0.2566
4	Lake Lucy Rd WB	None	105		245		130	977		0.1085

#### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	4.04		4.04	0.63		A		A
2	Lake Lucy Rd EB	None	3.88		3.88	0.36		A		A
3	Galpin Blvd NB	None	4.30		4.30	0.89		A		A
4	Lake Lucy Rd WB	None	3.88		3.88	0.32		A		A

## 2040 PM Peak - 15 minutes

### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Galpin Blvd SB	None	211		137		232	1030		0.2061
2	Lake Lucy Rd EB	None	126		226		121	986		0.1291
3	Galpin Blvd NB	None	279		116		237	1041		0.2705
4	Lake Lucy Rd WB	None	111		258		137	971		0.1148

### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	4.01		4.01	0.63		A		A
2	Lake Lucy Rd EB	None	3.85		3.85	0.36		A		A
3	Galpin Blvd NB	None	4.29		4.29	0.89		A		A
4	Lake Lucy Rd WB	None	3.85		3.85	0.32		A		A

## Approach Flow Profile

### 2040 PM Peak - Approach Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Lake Lucy Rd EB	Galpin Blvd NB	Lake Lucy Rd WB
0.0 - 7.5	24.56	14.74	32.54	12.89
7.5 - 15.0	24.56	14.74	32.54	12.89
15.0 - 22.5	24.56	14.74	32.54	12.89
22.5 - 30.0	26.32	15.79	34.87	13.82
30.0 - 37.5	26.32	15.79	34.87	13.82
37.5 - 45.0	24.56	14.74	32.54	12.89
45.0 - 52.5	24.56	14.74	32.54	12.89
52.5 - 60.0	24.56	14.74	32.54	12.89
Peak 15 min	26.32	15.79	34.87	13.82
Peak 60 min	25.00	15.00	33.12	13.13

## Exit Flow Profile

### 2040 PM Peak - Exit Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Lake Lucy Rd EB	Galpin Blvd NB	Lake Lucy Rd WB
0.0 - 7.5	27.01	14.12	27.62	15.96
7.5 - 15.0	27.02	14.12	27.63	15.96
15.0 - 22.5	27.02	14.12	27.63	15.96
22.5 - 30.0	28.94	15.13	29.59	17.10
30.0 - 37.5	28.95	15.13	29.61	17.11
37.5 - 45.0	27.03	14.13	27.64	15.97
45.0 - 52.5	27.02	14.12	27.63	15.96
52.5 - 60.0	27.02	14.12	27.63	15.96
0-60	220	115	225	130
%Trucks	5.00	5.00	5.00	5.00

## Economics

### Economic Input Data

#### 2040 - Vehicle Delay Parameters

Peaks	Peak / Day	Days / Year	Delay Cost (\$ / hour)
AM Peak	1	325	15.00
OFF Peak	14	325	15.00
PM Peak	1	325	15.00

#### 2040 - Accident Severity Proportions and Costs

Accident Type	Proportion (%)	Cost (\$)
Fatal Vehicle Accident	0.3	0
Incapacitating Vehicle Accident	17.7	0
Non-incapacitating Vehicle Accident	82	0
Damage Only Vehicle Accident	100	0
Pedestrian Injury Accident	100	0

## Economics - Results Data

#### 2040 Delay and Accident Costs

Peak	Delay Costs		Accident Costs			Total Costs	
	Delays Veh.hrs	Costs (\$)	Accident Types	Annual Accidents	Accident Costs	Cost Type	Costs (\$/year)
AM	0.00	0	Vehicles Injury	0.00	0	Vehicle Delay Cost	3818
OFF	0.00	0	Vehicles DO	0.00	0	Vehicle Injury Acc Cost	0
PM	254.52	3818	Pedestrians	0.00	0	Vehicle DO Acc Cost	0
						Pedestrian Accident Cost	0
						Total Accident Cost	0
Total	254.52	3818	Totals	0.00	0	TOTAL COST	3818

## Global Results

### Performance and Accidents

#### 2040 PM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	690		690
Capacity	veh/hr	4047		4047
Average Delay	sec/veh	4.09		4.09
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	0.78		0.78

## Scheme Summary

### Control Data

#### Control Data and Model Parameters

Galpin Blvd and Brinker St	2040 PHF Flow Profile (veh)
2040 AM peak	7.5 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
AM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	50% Confidence Level

#### Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	No
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

## Operational Data

### Main Geometry (ft)

#### Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle ?
1	Galpin Blvd SB	0	0	12.00	1	14.00	1	33.00	66.00	30.00
2	Galpin Blvd NB	180	0	12.00	1	14.00	1	33.00	66.00	30.00
3	Brinker St WB	270	0	12.00	1	14.00	1	33.00	66.00	30.00

#### Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	Galpin Blvd SB	131.00	15.00	1	14.00	1	12.00	1
2	Galpin Blvd NB	131.00	15.00	1	14.00	1	12.00	1
3	Brinker St WB	131.00	15.00	1	14.00	1	12.00	1

#### Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	Galpin Blvd SB	0	1.000	0	1.000	12.00	1792	0	12.00	1792	0
2	Galpin Blvd NB	0	1.000	0	1.000	12.00	1792	0	12.00	1792	0
3	Brinker St WB	0	1.000	0	1.000	12.00	1792	0	12.00	1792	0

## Traffic Flow Data (veh/hr)

### 2040 AM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows				Flow Modifiers		
		U-Turn	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor	Peak Hour Factor
1	Galpin Blvd SB	0	0	445	0	5.0	1.00	0.9
2	Galpin Blvd NB	0	190	5	0	5.0	1.00	0.9
3	Brinker St WB	0	20	10	0	5.0	1.00	0.9

## Operational Results

### 2040 AM Peak - 60 minutes

#### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Exit Flow	Entry	Bypass	Entry
1	Galpin Blvd SB	None	445		20		200	1080		0.4188
2	Galpin Blvd NB	None	195		0		465	1091		0.1812
3	Brinker St WB	None	30		190		5	992		0.0307

#### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	5.16		5.16	2.02		A		A
2	Galpin Blvd NB	None	3.75		3.75	0.62		A		A
3	Brinker St WB	None	3.52		3.52	0.09		A		A

## 2040 AM Peak - 15 minutes

### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Exit Flow	Entry	Bypass	Entry
1	Galpin Blvd SB	None	500		22		225	1079		0.4685
2	Galpin Blvd NB	None	219		0		522	1091		0.2025
3	Brinker St WB	None	34		213		6	980		0.0346

### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	5.27		5.27	2.02		A		A
2	Galpin Blvd NB	None	3.69		3.69	0.62		A		A
3	Brinker St WB	None	3.45		3.45	0.09		A		A

## Approach Flow Profile

### 2040 AM Peak - Approach Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Galpin Blvd NB	Brinker St WB
0.0 - 7.5	53.33	23.37	3.60
7.5 - 15.0	53.33	23.37	3.60
15.0 - 22.5	53.33	23.37	3.60
22.5 - 30.0	62.50	27.39	4.21
30.0 - 37.5	62.50	27.39	4.21
37.5 - 45.0	53.33	23.37	3.60
45.0 - 52.5	53.33	23.37	3.60
52.5 - 60.0	53.33	23.37	3.60
Peak 15 min	62.50	27.39	4.21
Peak 60 min	55.62	24.38	3.75

## Exit Flow Profile

### 2040 AM Peak - Exit Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Galpin Blvd NB	Brinker St WB
0.0 - 7.5	23.95	55.67	0.60
7.5 - 15.0	23.97	55.73	0.60
15.0 - 22.5	23.97	55.73	0.60
22.5 - 30.0	28.07	65.22	0.70
30.0 - 37.5	28.09	65.31	0.70
37.5 - 45.0	23.99	55.82	0.60
45.0 - 52.5	23.97	55.73	0.60
52.5 - 60.0	23.97	55.73	0.60
0-60	200	465	5
%Trucks	5.00	5.00	5.00

## Economics

### Economic Input Data

#### 2040 - Vehicle Delay Parameters

Peaks	Peak / Day	Days / Year	Delay Cost (\$ / hour)
AM Peak	1	325	15.00
OFF Peak	14	325	15.00
PM Peak	1	325	15.00

#### 2040 - Accident Severity Proportions and Costs

Accident Type	Proportion (%)	Cost (\$)
Fatal Vehicle Accident	0.3	0
Incapacitating Vehicle Accident	17.7	0
Non-incapacitating Vehicle Accident	82	0
Damage Only Vehicle Accident	100	0
Pedestrian Injury Accident	100	0

## Economics - Results Data

#### 2040 Delay and Accident Costs

Peak	Delay Costs		Accident Costs			Total Costs	
	Delays Veh.hrs	Costs (\$)	Accident Types	Annual Accidents	Accident Costs	Cost Type	Costs (\$/year)
AM	282.76	4241	Vehicles Injury	0.00	0	Vehicle Delay Cost	4241
OFF	0.00	0	Vehicles DO	0.00	0	Vehicle Injury Acc Cost	0
PM	0.00	0	Pedestrians	0.00	0	Vehicle DO Acc Cost	0
						Pedestrian Accident Cost	0
						Total Accident Cost	0
Total	282.76	4241	Totals	0.00	0	TOTAL COST	4241

## Global Results

### Performance and Accidents

#### 2040 AM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	670		670
Capacity	veh/hr	3163		3163
Average Delay	sec/veh	4.67		4.67
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	0.87		0.87

## Scheme Summary

### Control Data

#### Control Data and Model Parameters

Galpin Blvd and Brinker St	2040 PHF Flow Profile (veh)
2040 PM peak	7.5 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
PM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	50% Confidence Level

#### Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	No
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

## Operational Data

### Main Geometry (ft)

#### Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle ?
1	Galpin Blvd SB	0	0	12.00	1	14.00	1	33.00	66.00	30.00
2	Galpin Blvd NB	180	0	12.00	1	14.00	1	33.00	66.00	30.00
3	Brinker St WB	270	0	12.00	1	14.00	1	33.00	66.00	30.00

#### Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	Galpin Blvd SB	131.00	15.00	1	14.00	1	12.00	1
2	Galpin Blvd NB	131.00	15.00	1	14.00	1	12.00	1
3	Brinker St WB	131.00	15.00	1	14.00	1	12.00	1

#### Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	Galpin Blvd SB	0	1.000	0	1.000	12.00	1792	0	12.00	1792	0
2	Galpin Blvd NB	0	1.000	0	1.000	12.00	1792	0	12.00	1792	0
3	Brinker St WB	0	1.000	0	1.000	12.00	1792	0	12.00	1792	0

## Traffic Flow Data (veh/hr)

### 2040 PM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows				Flow Modifiers		
		U-Turn	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor	Peak Hour Factor
1	Galpin Blvd SB	0	5	285	0	5.0	1.00	0.9
2	Galpin Blvd NB	0	415	15	0	5.0	1.00	0.9
3	Brinker St WB	0	5	5	0	5.0	1.00	0.9

## Operational Results

### 2040 PM Peak - 60 minutes

#### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Galpin Blvd SB	None	290		5		420	1088		0.2693
2	Galpin Blvd NB	None	430		5		290	1088		0.4000
3	Brinker St WB	None	10		415		20	876		0.0115

#### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	4.19		4.19	0.95		A		A
2	Galpin Blvd NB	None	5.01		5.01	1.69		A		A
3	Brinker St WB	None	3.71		3.71	0.03		A		A

## 2040 PM Peak - 15 minutes

### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Exit Flow	Entry	Bypass	Entry
1	Galpin Blvd SB	None	305		5		442	1088		0.2832
2	Galpin Blvd NB	None	453		5		305	1088		0.4206
3	Brinker St WB	None	11		437		21	865		0.0123

### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	4.17		4.17	0.95		A		A
2	Galpin Blvd NB	None	5.02		5.02	1.69		A		A
3	Brinker St WB	None	3.90		3.90	0.03		A		A

## Approach Flow Profile

### 2040 PM Peak - Approach Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Galpin Blvd NB	Brinker St WB
0.0 - 7.5	35.61	52.81	1.23
7.5 - 15.0	35.61	52.81	1.23
15.0 - 22.5	35.61	52.81	1.23
22.5 - 30.0	38.16	56.58	1.32
30.0 - 37.5	38.16	56.58	1.32
37.5 - 45.0	35.61	52.81	1.23
45.0 - 52.5	35.61	52.81	1.23
52.5 - 60.0	35.61	52.81	1.23
Peak 15 min	38.16	56.58	1.32
Peak 60 min	36.25	53.75	1.25

## Exit Flow Profile

### 2040 PM Peak - Exit Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	Galpin Blvd NB	Brinker St WB
0.0 - 7.5	51.55	35.60	2.45
7.5 - 15.0	51.58	35.61	2.46
15.0 - 22.5	51.58	35.61	2.46
22.5 - 30.0	55.23	38.14	2.63
30.0 - 37.5	55.26	38.16	2.63
37.5 - 45.0	51.61	35.63	2.46
45.0 - 52.5	51.58	35.61	2.46
52.5 - 60.0	51.58	35.61	2.46
0-60	420	290	20
%Trucks	5.00	5.00	5.00

## Economics

### Economic Input Data

#### 2040 - Vehicle Delay Parameters

Peaks	Peak / Day	Days / Year	Delay Cost (\$ / hour)
AM Peak	1	325	15.00
OFF Peak	14	325	15.00
PM Peak	1	325	15.00

#### 2040 - Accident Severity Proportions and Costs

Accident Type	Proportion (%)	Cost (\$)
Fatal Vehicle Accident	0.3	0
Incapacitating Vehicle Accident	17.7	0
Non-incapacitating Vehicle Accident	82	0
Damage Only Vehicle Accident	100	0
Pedestrian Injury Accident	100	0

## Economics - Results Data

#### 2040 Delay and Accident Costs

Peak	Delay Costs		Accident Costs			Total Costs	
	Delays Veh.hrs	Costs (\$)	Accident Types	Annual Accidents	Accident Costs	Cost Type	Costs (\$/year)
AM	0.00	0	Vehicles Injury	0.00	0	Vehicle Delay Cost	4611
OFF	0.00	0	Vehicles DO	0.00	0	Vehicle Injury Acc Cost	0
PM	307.39	4611	Pedestrians	0.00	0	Vehicle DO Acc Cost	0
						Pedestrian Accident Cost	0
						Total Accident Cost	0
Total	307.39	4611	Totals	0.00	0	TOTAL COST	4611

## Global Results

### Performance and Accidents

#### 2040 PM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	730		730
Capacity	veh/hr	3052		3052
Average Delay	sec/veh	4.66		4.66
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	0.95		0.95

## Scheme Summary

### Control Data

#### Control Data and Model Parameters

Galpin Blvd and W 78th St	2040 PHF Flow Profile (veh)
2040 AM Peak single-lane option	7.5 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
AM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	50% Confidence Level

#### Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	No
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

## Operational Data

### Main Geometry (ft)

#### Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle ?
1	Galpin Blvd SB	0	0	12.00	1	14.00	1	164.00	66.00	30.00
2	78th St EB	90	0	12.00	1	14.00	1	164.00	66.00	30.00
3	Galpin Blvd NB	180	0	12.00	1	14.00	1	164.00	66.00	30.00
4	78th St WB	270	0	12.00	1	14.00	1	164.00	66.00	30.00

#### Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	Galpin Blvd SB	164.00	15.00	1	14.00	1	12.00	1
2	78th St EB	164.00	15.00	1	14.00	1	12.00	1
3	Galpin Blvd NB	164.00	15.00	1	14.00	1	12.00	1
4	78th St WB	164.00	15.00	1	14.00	1	12.00	1

#### Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	Galpin Blvd SB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
2	78th St EB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
3	Galpin Blvd NB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
4	78th St WB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0

## Traffic Flow Data (veh/hr)

### 2040 AM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows					Flow Modifiers		
		U-Turn	Exit-3	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor	Peak Hour Factor
1	Galpin Blvd SB	0	45	450	20	0	5.0	1.00	0.9
2	78th St EB	0	20	65	45	0	5.0	1.00	0.9
3	Galpin Blvd NB	0	75	190	15	0	5.0	1.00	0.9
4	78th St WB	0	30	40	15	0	5.0	1.00	0.9

## Operational Results

### 2040 AM Peak - 60 minutes

#### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Exit Flow	Entry	Bypass	Entry
1	Galpin Blvd SB	None	515		145		225	1026		0.5117
2	78th St EB	None	130		525		135	840		0.1578
3	Galpin Blvd NB	None	280		130		525	1034		0.2750
4	78th St WB	None	85		285		125	958		0.0901

#### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	6.33		6.33	2.97		A		A
2	78th St EB	None	4.74		4.74	0.54		A		A
3	Galpin Blvd NB	None	4.42		4.42	1.07		A		A
4	78th St WB	None	3.87		3.87	0.28		A		A

## 2040 AM Peak - 15 minutes

### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Galpin Blvd SB	None	579		163		253	1018		0.5764
2	78th St EB	None	146		589		152	808		0.1826
3	Galpin Blvd NB	None	315		146		589	1026		0.3095
4	78th St WB	None	96		320		140	940		0.1024

### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	6.66		6.66	2.97		A		A
2	78th St EB	None	4.80		4.80	0.54		A		A
3	Galpin Blvd NB	None	4.43		4.43	1.07		A		A
4	78th St WB	None	3.83		3.83	0.28		A		A

## Approach Flow Profile

### 2040 AM Peak - Approach Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	78th St EB	Galpin Blvd NB	78th St WB
0.0 - 7.5	61.72	15.58	33.56	10.19
7.5 - 15.0	61.72	15.58	33.56	10.19
15.0 - 22.5	61.72	15.58	33.56	10.19
22.5 - 30.0	72.33	18.26	39.33	11.94
30.0 - 37.5	72.33	18.26	39.33	11.94
37.5 - 45.0	61.72	15.58	33.56	10.19
45.0 - 52.5	61.72	15.58	33.56	10.19
52.5 - 60.0	61.72	15.58	33.56	10.19
Peak 15 min	72.33	18.26	39.33	11.94
Peak 60 min	64.38	16.25	35.00	10.63

## Exit Flow Profile

### 2040 AM Peak - Exit Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	78th St EB	Galpin Blvd NB	78th St WB
0.0 - 7.5	26.94	16.16	62.83	14.96
7.5 - 15.0	26.97	16.18	62.92	14.98
15.0 - 22.5	26.97	16.18	62.92	14.98
22.5 - 30.0	31.57	18.94	73.59	17.53
30.0 - 37.5	31.60	18.96	73.73	17.55
37.5 - 45.0	27.00	16.20	63.06	15.01
45.0 - 52.5	26.97	16.18	62.93	14.98
52.5 - 60.0	26.97	16.18	62.92	14.98
0-60	225	135	525	125
%Trucks	5.00	5.00	5.00	5.00

## Economics

### Economic Input Data

#### 2040 - Vehicle Delay Parameters

Peaks	Peak / Day	Days / Year	Delay Cost (\$ / hour)
AM Peak	1	325	15.00
OFF Peak	14	325	15.00
PM Peak	1	325	15.00

#### 2040 - Accident Severity Proportions and Costs

Accident Type	Proportion (%)	Cost (\$)
Fatal Vehicle Accident	0.3	0
Incapacitating Vehicle Accident	17.7	0
Non-incapacitating Vehicle Accident	82	0
Damage Only Vehicle Accident	100	0
Pedestrian Injury Accident	100	0

## Economics - Results Data

#### 2040 Delay and Accident Costs

Peak	Delay Costs		Accident Costs			Total Costs	
	Delays Veh.hrs	Costs (\$)	Accident Types	Annual Accidents	Accident Costs	Cost Type	Costs (\$/year)
AM	491.04	7366	Vehicles Injury	0.00	0	Vehicle Delay Cost	7366
OFF	0.00	0	Vehicles DO	0.00	0	Vehicle Injury Acc Cost	0
PM	0.00	0	Pedestrians	0.00	0	Vehicle DO Acc Cost	0
						Pedestrian Accident Cost	0
						Total Accident Cost	0
Total	491.04	7366	Totals	0.00	0	TOTAL COST	7366

## Global Results

### Performance and Accidents

#### 2040 AM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	1010		1010
Capacity	veh/hr	3858		3858
Average Delay	sec/veh	5.39		5.39
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	1.51		1.51

## Scheme Summary

### Control Data

#### Control Data and Model Parameters

Galpin Blvd and W 78th St	2040 PHF Flow Profile (veh)
2040 PM Peak single lane option	7.5 min Time Slice
Rodel-Win1	Queuing Delays (sec)
Right Hand Drive	Daylight conditions
PM Peak Hour	Peak 60/15 min Results
Full Geometry	Output flows: Vehicles
English Units (ft)	50% Confidence Level

#### Available Data

Entry Capacity Calibrated	No
Entry Capacity Modified	No
Crosswalks	No
Flows Factored	No
Approach/Exit Road Capacity Calibrated	No
Accidents	No
Accident Costs	No
Bypass Model	No
Bypass Calibration	No
Global Results	Yes

## Operational Data

### Main Geometry (ft)

#### Approach and Entry Geometry

Leg	Leg Names	Approach Bearing (deg)	Grade Separation G	Half Width V	Approach Lanes n	Entry Width E	Entry Lanes n	Flare Length L'	Entry Radius R	Entry Angle ?
1	Galpin Blvd SB	0	0	12.00	1	14.00	1	164.00	66.00	30.00
2	78th St EB	90	0	12.00	1	14.00	1	164.00	66.00	30.00
3	Galpin Blvd NB	180	0	12.00	1	14.00	1	164.00	66.00	30.00
4	78th St WB	270	0	12.00	1	14.00	1	164.00	66.00	30.00

#### Circulating and Exit Geometry

Leg	Leg Names	Inscribed Diameter D	Circulating Width C	Circulating Lanes nc	Exit Width Ex	Exit Lanes nex	Exit Half Width Vx	Exit Half Width Lanes nvx
1	Galpin Blvd SB	164.00	15.00	1	14.00	1	12.00	1
2	78th St EB	164.00	15.00	1	14.00	1	12.00	1
3	Galpin Blvd NB	164.00	15.00	1	14.00	1	12.00	1
4	78th St WB	164.00	15.00	1	14.00	1	12.00	1

#### Capacity Modifiers and Capacity Calibration (veh/hr)

Leg	Leg Names	Entry Capacity		Entry Calibration		Approach Road			Exit Road		
		Capacity + or -	XWalk Factor	Intercept + or -	Slope Factor	V (ft)	Default Capacity	Calib Capacity	V (ft)	Default Capacity	Calib Capacity
1	Galpin Blvd SB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
2	78th St EB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
3	Galpin Blvd NB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0
4	78th St WB	0	1.000	0	1.000	20.00	1792	0	12.00	1792	0

## Traffic Flow Data (veh/hr)

### 2040 PM Peak Peak Hour Flows

Leg	Leg Names	Turning Flows					Flow Modifiers		
		U-Turn	Exit-3	Exit-2	Exit-1	Bypass	Trucks %	Flow Factor	Peak Hour Factor
1	Galpin Blvd SB	0	40	240	15	0	5.0	1.00	0.9
2	78th St EB	0	30	50	30	0	5.0	1.00	0.9
3	Galpin Blvd NB	0	115	415	25	0	5.0	1.00	0.9
4	78th St WB	0	45	50	30	0	5.0	1.00	0.9

## Operational Results

### 2040 PM Peak - 60 minutes

#### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Exit Flow	Entry	Bypass	Entry
1	Galpin Blvd SB	None	295		210		475	994		0.3001
2	78th St EB	None	110		325		180	938		0.1185
3	Galpin Blvd NB	None	555		120		315	1039		0.5427
4	78th St WB	None	125		560		115	823		0.1538

#### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	4.76		4.76	1.11		A		A
2	78th St EB	None	4.09		4.09	0.35		A		A
3	Galpin Blvd NB	None	6.64		6.64	2.92		A		A
4	78th St WB	None	4.83		4.83	0.48		A		A

## 2040 PM Peak - 15 minutes

### Flows and Capacity

Leg	Leg Names	Bypass Type	Flows (veh/hr)				Capacity (veh/hr)			
			Arrival Flow		Opposing Flow		Capacity		Average VCR	
			Entry	Bypass	Entry	Bypass	Entry	Bypass	Entry	Bypass
1	Galpin Blvd SB	None	311		221		500	989		0.3172
2	78th St EB	None	116		342		189	930		0.1257
3	Galpin Blvd NB	None	584		126		331	1036		0.5723
4	78th St WB	None	132		589		121	808		0.1645

### Delays, Queues and Level of Service

Leg	Leg Names	Bypass Type	Average Delay (sec)			95% Queue (veh)		Level of Service		
			Entry	Bypass	Leg	Entry	Bypass	Entry	Bypass	Leg
1	Galpin Blvd SB	None	4.77		4.77	1.11		A		A
2	78th St EB	None	4.07		4.07	0.35		A		A
3	Galpin Blvd NB	None	6.76		6.76	2.92		A		A
4	78th St WB	None	4.85		4.85	0.48		A		A

## Approach Flow Profile

### 2040 PM Peak - Approach Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	78th St EB	Galpin Blvd NB	78th St WB
0.0 - 7.5	36.23	13.51	68.16	15.35
7.5 - 15.0	36.23	13.51	68.16	15.35
15.0 - 22.5	36.23	13.51	68.16	15.35
22.5 - 30.0	38.82	14.47	73.03	16.45
30.0 - 37.5	38.82	14.47	73.03	16.45
37.5 - 45.0	36.23	13.51	68.16	15.35
45.0 - 52.5	36.23	13.51	68.16	15.35
52.5 - 60.0	36.23	13.51	68.16	15.35
Peak 15 min	38.82	14.47	73.03	16.45
Peak 60 min	36.88	13.75	69.38	15.62

## Exit Flow Profile

### 2040 PM Peak - Exit Flows (Veh / Hour)

Time Slice	Galpin Blvd SB	78th St EB	Galpin Blvd NB	78th St WB
0.0 - 7.5	58.29	22.09	38.67	14.12
7.5 - 15.0	58.33	22.10	38.68	14.12
15.0 - 22.5	58.33	22.11	38.68	14.12
22.5 - 30.0	62.44	23.67	41.43	15.12
30.0 - 37.5	62.49	23.68	41.45	15.13
37.5 - 45.0	58.38	22.12	38.70	14.13
45.0 - 52.5	58.34	22.11	38.69	14.12
52.5 - 60.0	58.33	22.11	38.68	14.12
0-60	475	180	315	115
%Trucks	5.00	5.00	5.00	5.00

## Economics

### Economic Input Data

#### 2040 - Vehicle Delay Parameters

Peaks	Peak / Day	Days / Year	Delay Cost (\$ / hour)
AM Peak	1	325	15.00
OFF Peak	14	325	15.00
PM Peak	1	325	15.00

#### 2040 - Accident Severity Proportions and Costs

Accident Type	Proportion (%)	Cost (\$)
Fatal Vehicle Accident	0.3	0
Incapacitating Vehicle Accident	17.7	0
Non-incapacitating Vehicle Accident	82	0
Damage Only Vehicle Accident	100	0
Pedestrian Injury Accident	100	0

## Economics - Results Data

#### 2040 Delay and Accident Costs

Peak	Delay Costs		Accident Costs			Total Costs	
	Delays Veh.hrs	Costs (\$)	Accident Types	Annual Accidents	Accident Costs	Cost Type	Costs (\$/year)
AM	0.00	0	Vehicles Injury	0.00	0	Vehicle Delay Cost	8316
OFF	0.00	0	Vehicles DO	0.00	0	Vehicle Injury Acc Cost	0
PM	554.43	8316	Pedestrians	0.00	0	Vehicle DO Acc Cost	0
						Pedestrian Accident Cost	0
						Total Accident Cost	0
Total	554.43	8316	Totals	0.00	0	TOTAL COST	8316

## Global Results

### Performance and Accidents

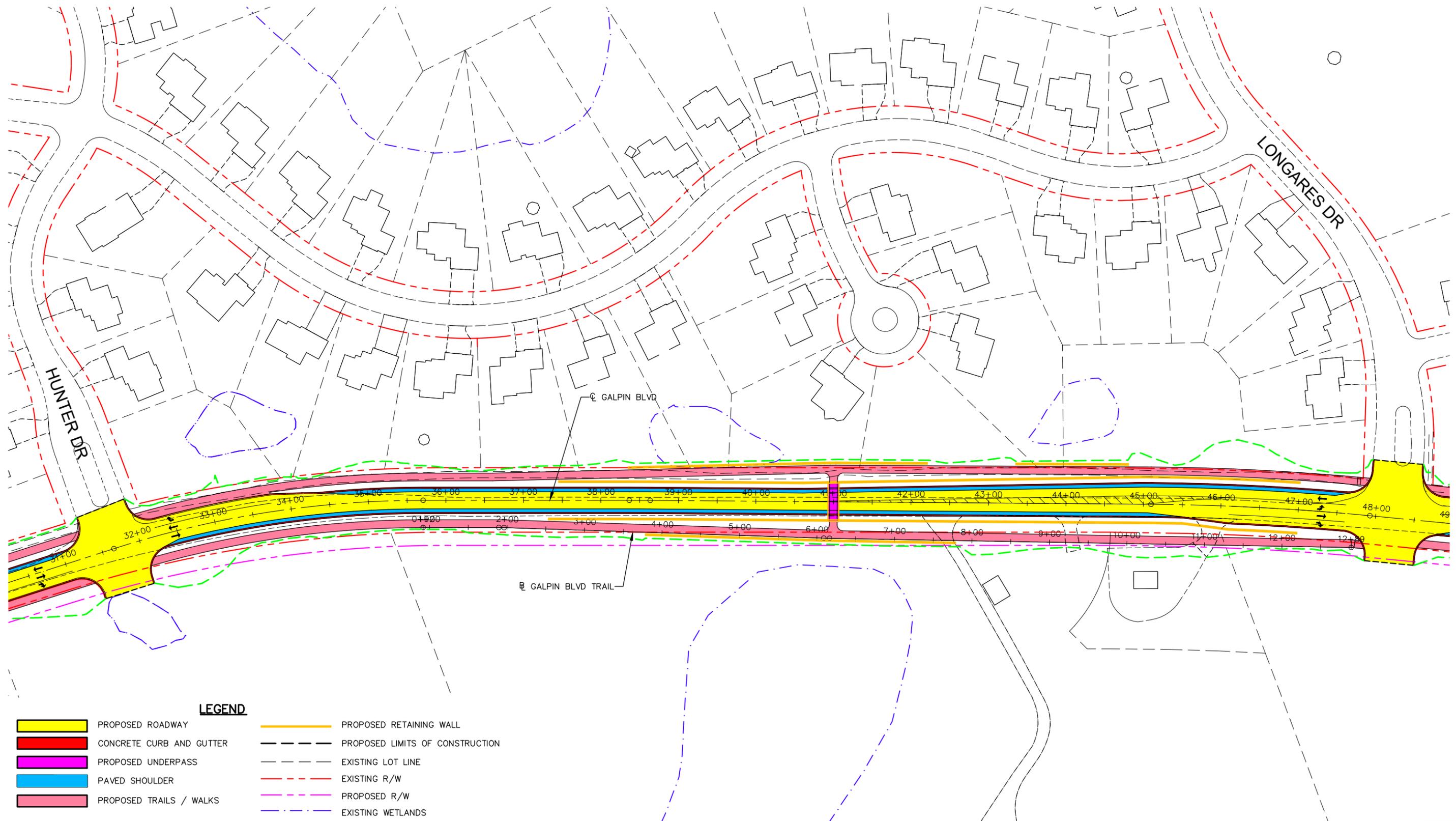
#### 2040 PM Peak Global Performance

Parameter	Units	Entries	Bypasses	Total
Arrive Flows	veh/hr	1085		1085
Capacity	veh/hr	3794		3794
Average Delay	sec/veh	5.66		5.66
L.O.S. (Signal)	A – F	A		A
L.O.S. (Unsig)	A – F	A		A
Total Delay	veh.hrs	1.71		1.71

## APPENDIX D – POTENTIAL UNDERPASS PLAN

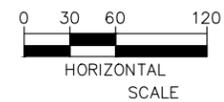


K:\TWC\_Civil\City\CHANHASSEN\GALPIN BLVD\CAD\Plan Sheets\Exhibits\GALPIN Under Pass.dwg 6/25/2018 1:50 PM



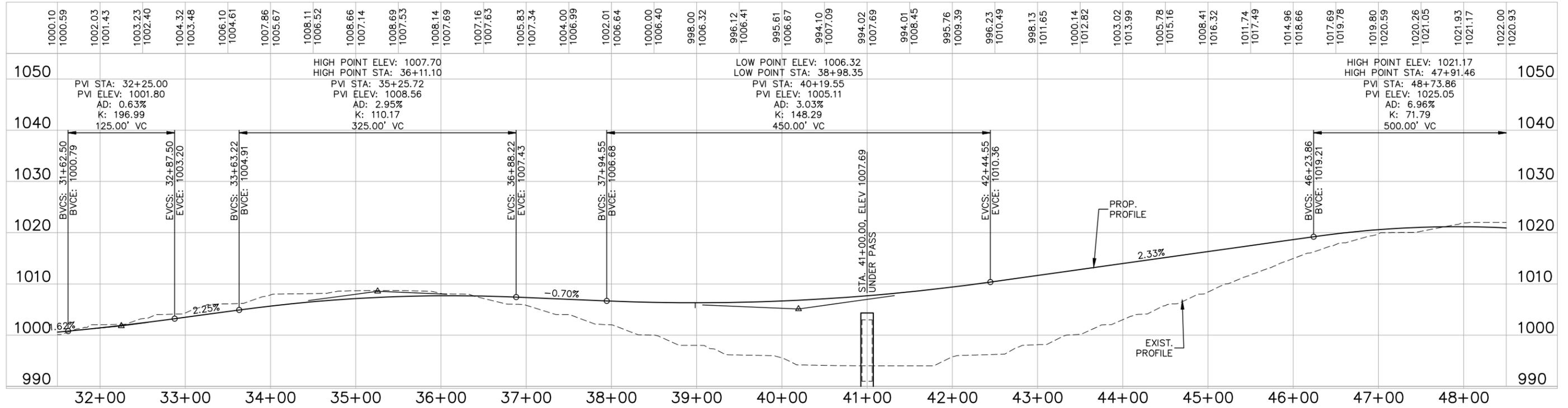
**LEGEND**

	PROPOSED ROADWAY		PROPOSED RETAINING WALL
	CONCRETE CURB AND GUTTER		PROPOSED LIMITS OF CONSTRUCTION
	PROPOSED UNDERPASS		EXISTING LOT LINE
	PAVED SHOULDER		EXISTING R/W
	PROPOSED TRAILS / WALKS		PROPOSED R/W
			EXISTING WETLANDS

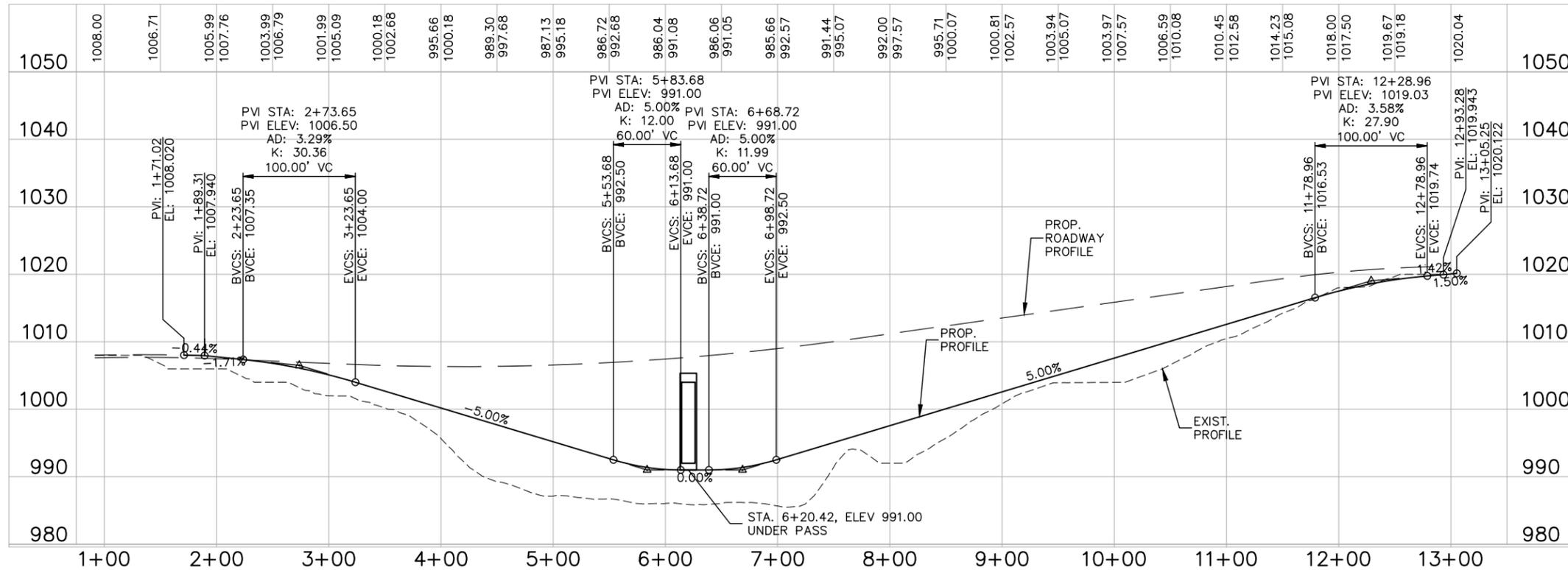


GALPIN BOULEVARD (CR 117)  
RECONSTRUCTION  
TRAIL UNDERPASS PLAN  
EXHIBIT 1

### GALPIN BLVD ROADWAY PROFILE

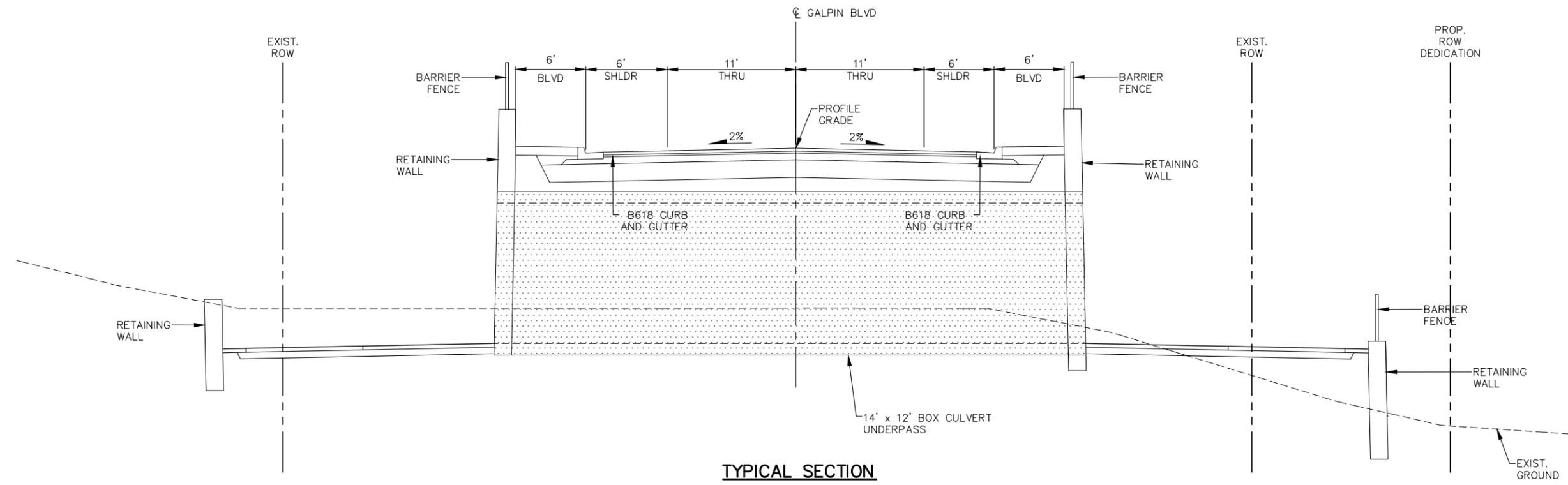


### GALPIN BLVD TRAIL PROFILE



GALPIN BOULEVARD (CR 117)  
 RECONSTRUCTION  
 TRAIL UNDERPASS PROFILE  
 EXHIBIT 2

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## APPENDIX E – GEOTECHNICAL REPORT

# Geotechnical Evaluation Report

Galpin Boulevard (CR 117) Preliminary Design  
TH 5 to the Hennepin County Line  
Chanhassen, Minnesota

*Prepared for*

**Kimley-Horn and Associates, Inc.**

## **Professional Certification:**

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.



Brian J. Schreurs, PE  
Project Engineer  
License Number: 53147  
May 4, 2018



Project B1802734

Braun Intertec Corporation

May 4, 2018

Project B1802734

Jon Horn, PE  
Kimley-Horn and Associates, Inc.  
2550 University Avenue West, Suite 238N  
Saint Paul, MN 55114

Re: Geotechnical Evaluation  
Galpin Boulevard (CR 117) Preliminary Design  
TH 5 to the Hennepin County Line  
Chanhassen, Minnesota

Dear Mr. Horn:

We are pleased to present this Geotechnical Evaluation Report for the proposed reconstruction of Galpin Boulevard (CR 117) in Chanhassen, Minnesota.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Brian Schreurs at 651.487.7055 (bschreurs@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION



Brian J. Schreurs, PE  
Project Engineer



Neil G. Lund, PE  
Senior Engineer

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### Appendix

Soil Boring Location Sketch  
Log of Boring Sheets ST-1 through ST-7  
Descriptive Terminology of Soil  
Traffic/ESAL Calculations  
MnPAVE-Flexible Design Output (Two Sheets)

## A. Introduction

### A.1. Project Description

Per our conversations with Kimley-Horn and Associates (KHA), this project will include reconstructing approximately 2 miles of Galpin Boulevard, from Trunk Highway (TH) 5 to the Hennepin County Line. We assume the reconstructed roadway will generally remain within the existing core with grade changes of less than 2 feet above or 5 feet below the existing roadway profile. We understand new trails will be constructed outside of the existing footprint parallel to the roadway requiring up to 10 feet of additional fill along the roadway alignment. In addition, curb and gutter and utilities (storm sewer) will be included as part of the proposed reconstruction project.

Additional design details associated with the project are provided in Table 1 below. Bituminous equivalent single axle loads (BESALs) were calculated using the provided traffic counts and the Minnesota Department of Transportation's (MnDOT) "State Aid 10 Ton ESAL Traffic Forecast Calculator" (04/07/2017), with an urban vehicle class distribution. The BESAL calculations are attached in the Appendix.

**Table 1. Design Details for Galpin Boulevard**

Roadway	Segment	2018 Current AADT*	2040 Projected AADT*	20-year BESALs
Galpin Boulevard (CR 117)	TH 5 to the Hennepin County Line	8,700	10,000	1,179,000

\*Average annual daily traffic (AADT) counts provided by KHA.

### A.2. Site Conditions and History

Currently, Galpin Boulevard is a two-lane roadway with occasional turn lanes generally running north and south through a residential area in the city of Chanhassen.

Current grades along the existing roadway core range in elevation from 965 to 1055 feet Above Mean Sea Level (MSL). Generally, the roadway slopes up from south (TH 5) to north with gradual hills and valleys; the steepest grade is located around Melody Hill Road where the roadway slopes down to Mayflower Road.

### **A.3. Purpose**

The purpose of this geotechnical evaluation was to characterize subsurface geologic conditions at selected exploration locations and provide geotechnical recommendations for the Galpin Boulevard (CR 117) reconstruction project.

### **A.4. Background Information and Reference Documents**

We reviewed the following information:

- Communications with KHA regarding the proposed reconstruction project.
- The Geologic Atlas of Carver County available from the Minnesota Geologic Survey.

In addition to the above sources, we used several publicly available sources of information such as Google Earth.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

### **A.5. Scope of Services**

We performed our scope of services for the project in accordance with our Proposal to Mr. Jon Horn with KHA, dated March 30, 2018, and authorized through an Individual Project Order on April 16, 2018. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Staking and coordinating the clearing of the exploration locations of underground utilities. KHA selected and we staked the exploration locations in the field. We acquired the surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings.

- Performing seven standard penetration test (SPT) borings, denoted as ST-1 to ST-7, to nominal depths of 10 to 14 1/2 feet below grade along the roadway.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for subgrade preparation and design of pavements.

Our scope of services did not include environmental services or testing, and we did not train the personnel performing this evaluation to provide environmental services or testing. We can provide these services or testing at your request.

## **B. Results**

### **B.1. Geologic Overview**

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

### **B.2. Boring Results**

Table 2 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in Table 2.

**Table 2. Subsurface Profile Summary\***

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Pavement section**	---	---	<ul style="list-style-type: none"> <li>▪ Overall thickness ranges from 13 to 18 inches.</li> <li>▪ Bituminous thickness ranges from 5 1/2 to 10 inches.</li> <li>▪ Aggregate base thickness ranges from 5 to 10 inches.</li> <li>▪ “Aggregate base” represents the layer immediately underlying the bituminous pavement as identified during drill. The term does not connote a particular gradation or classification (i.e. Class 5).</li> </ul>
Fill	SM, SC, CL	6 to 24 BPF	<ul style="list-style-type: none"> <li>▪ Not encountered at Boring ST-6.</li> <li>▪ Generally, dark brown and brown to black.</li> <li>▪ Moisture condition generally moist.</li> <li>▪ Thicknesses at boring locations varied from 4 to 13 feet below existing grades.</li> <li>▪ Highly variable, soils intermixed.</li> <li>▪ Occasional layers of slightly organic soils, likely representing buried topsoil, encountered at Borings ST-1, ST-2, ST-3, and ST-5.</li> <li>▪ Contained variable amounts of gravel.</li> </ul>
Glacial deposits (till)	SC, CL	4 to 14 BPF	<ul style="list-style-type: none"> <li>▪ Encountered beneath the fill and/or pavement materials.</li> <li>▪ General penetration resistance of 7 to 14 BPF.</li> <li>▪ Generally brown and gray to gray.</li> <li>▪ Variable amounts of gravel; may contain cobbles and boulders.</li> <li>▪ Moisture condition moist.</li> </ul>

\*Abbreviations defined in the attached Descriptive Terminology sheet.

\*\* Where discernable, we attempted to measure the in-place thickness of bituminous and apparent aggregate base to the nearest 1/2 inch. These measurements were taken within the 8-inch diameter borehole. It can be difficult to identify strata boundaries, particularly between the aggregate base consisting of sand and gravel and the sand subbase or sandy subgrade soils.

For simplicity in this report, we define fill to mean existing, uncontrolled or undocumented fill.

### **B.3. Groundwater**

We did not observe groundwater while advancing our borings. Therefore, it appears that groundwater is below the depths explored. However, we anticipate groundwater may be encountered at/near the surface level of the wetlands along Galpin Boulevard (near Borings ST-3, ST-4, and ST-7), which currently range in elevation from 864 to 870 feet above MSL. Occasional zones of perched groundwater could also be located above wetland and low-lying areas.

Groundwater may take days or longer to reach equilibrium in the boreholes and we immediately backfilled the boreholes in accordance with our scope of work. If the project team identifies a need for more accurate determination of groundwater depth, we can install piezometers. Project planning should anticipate seasonal and annual fluctuations of groundwater.

## **B.4. Laboratory Test Results**

### **B.4.a. Moisture Contents**

We performed moisture content (MC) tests (per ASTM D2216) on selected samples to aid in our classifications and estimations of the materials' engineering properties. The moisture contents for the soils overall ranged from 11 to 24 percent. The Log of Boring Sheets attached in the Appendix present the results of the moisture content tests in the "MC" column.

### **B.4.b. Organic Contents**

We performed organic content (OC) tests (per ASTM D2974) on selected samples to determine the reusability of the material for pavement design. The organic content of the material tested ranged from 3 to 4 percent, which makes them "slightly organic" according to MnDOT terminology. The Log of Boring sheets in the Appendix show the results of the organic content tests in the "Tests or Notes" column.

### **B.4.c. Percent Passing the #200 Sieve Tests**

We performed tests to evaluate the percent of particles passing the #200 sieve (P200) (per ASTM D1140) to estimate the engineering properties of the granular material. The results of these tests indicated the tested soils had P200s ranging from 38 to 70 percent. The Log of Boring sheets list the results of P200 tests in the "P200" column.

## **C. Recommendations**

### **C.1. Discussion**

#### **C.1.a. Pavement Subgrade Preparation and Soil Corrections**

We recommend typical subgrade preparation procedures as outlined in Section C.2 to prepare the new pavement and trail areas. These procedures primarily involve pavement stripping (removal) and subcutting to the proposed grades, proofrolling and then moisture conditioning and compaction of loose or soft areas of exposed subgrade soils.

Based on our review of the Geologic Atlas of Carver County, it appears pockets of organic soils are present along Galpin Boulevard within the wetland and low-lying areas near Borings ST-3, ST-4, and ST-7. Based on the soils encountered in our borings, we anticipate excavation depths of up to 5 feet from existing grades will be required to remove unsuitable soils below the proposed widening and the associated embankments and oversize areas. Deeper areas of excavation, particularly in the wetland areas, should also be anticipated. Our exploration outside of the existing roadway/shoulders was limited due to site vegetation, slopes, and overhead utilities and additional investigations such as hand auger borings and/or test pits could be performed to help identify the limits of these unsuitable soils prior to final design.

#### **C.1.b. Reuse of Pavement Materials**

Based on the thicknesses encountered in the borings, it appears reclamation (or milling) of the existing bituminous pavement for reuse as recycled aggregate base or as a component to new pavements is feasible. We recommend following MnDOT Specification 3135 for reclaimed materials left in place. Processed millings replaced as MnDOT Class 5 or Class 6 will require quality control practices including sieve analyses, asphalt contents and other tests to meet the requirements of Specification 3138.

#### **C.1.c. Reuse of On-Site Soils**

The non-organic native and fill soils consisting of silty sand, clayey sand and sandy lean clay generally appear suitable for reuse, although some moisture conditioning and removal of unsuitable materials may be required. Soils with organic contents of greater than 5 percent by weight should not be reused as pavement and/or trail subgrade fill anywhere on the project. Organic soils can be stockpiled for use as a component in topsoil dressing or in other areas where loads will not be supported. Any materials to be reused as engineered fill should be tested and approved by the engineer prior to reuse.

#### **C.1.d. Disturbance of On-Site Soils**

The contractor should note the on-site clayey and silty soils are susceptible to disturbance due to repeated construction traffic and/or exposure to precipitation. Disturbance of these soils may cause areas that were previously prepared or suitable for pavement support to become unstable and require additional moisture conditioning, compaction, and/or subcutting. Care should be taken to avoid disturbing the on-site soils.

#### **C.1.e. Precautions Regarding Changed Information**

We have attempted to describe our understanding of the proposed construction to the extent it was reported to us by others. Depending on the extent of available information, assumptions may have been

made based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, we should be notified. New or changed information could require additional evaluation, analyses and/or recommendations.

## **C.2. Site Grading and Subgrade Preparation**

### **C.2.a. Pavement and Trail Subgrade Preparation and Excavations**

For subgrade preparation within the existing roadway, we recommend removal of the pavement section and subcutting to the proposed subgrade depth per design specifications. Based on the borings, we anticipate excavations to generally range from 1 to 1 1/2 feet to remove the existing pavement section along the alignment. In addition, we recommend removing topsoil and organic soils (> 5 percent organics by weight) to at least 3 feet below proposed pavement and trail areas to reduce the risk of settlement and instability and subsequent effects to roadway performance and maintenance. The exposed subgrade soils should be evaluated in the field by a geotechnical engineer, then scarified and surface compacted prior to performing the subgrade proofroll described in Section C.2.d.

As discussed above in Section C.1.a, pockets of organic soils may be present along the alignment and will generally be encountered adjacent to the roadway in the wetland/low-lying swamp areas near Borings ST-3, ST-4, and ST-7. Outside of the existing roadway, we recommend removing any vegetation, topsoil, organic soils and unstable soils from below the proposed road/trail alignment, embankment, and oversize areas until suitable non-organic soils are encountered.

Excavation depths will vary between the borings. Portions of the excavations may also extend deeper than indicated by the borings. A geotechnical representative should observe the excavations to make the necessary field judgments regarding the suitability of the exposed soils.

To provide lateral support to replacement backfill, additional required fill and the loads they will support, we recommend oversizing (widening) the excavations 1 foot horizontally beyond the outer edges of the toe of the embankment slope for each foot the excavations extend below bottom of existing grade. We recommend benches be excavated into the soils of existing slopes that are steeper than 5:1 (horizontal:vertical) prior to placement of fill. The "stair step"-shaped benches are recommended to key the fill into existing slopes, allow fill to be spread and compact on level surfaces and reduce risk of fill instability. Benches should be cut at vertical intervals of 2 to 3 feet and be at least 3 feet wide.

### **C.2.b. Groundwater Control**

We anticipate groundwater may be encountered at/near the surface level of the wetlands along Galpin Boulevard (near Borings ST-3, ST-4, and ST-7), which currently range in elevation from 864 to 870 feet above MSL.

We recommend removing the groundwater from the excavations to facilitate proper fill placement and backfilling. Sumps and pumps would likely be suitable for short-term groundwater control in shallow excavations or trenches near or slightly below groundwater levels or within excavations terminating in clayey soils.

### **C.2.c. Excavation Side Slopes**

The on-site soils mostly appear to consist of soils meeting OSHA Type B and C requirements. In accordance with OSHA requirements, we recommend excavation side slopes be constructed to lie back at a horizontal to vertical slope of 1 1/2:1 (H:V) or flatter. However, in organic soils, or where saturated soils are present (including saturated sand seams), excavation side slopes may need to lie back at slopes of 5:1 (H:V) or flatter to prevent sloughing.

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states that excavation safety is the responsibility of the contractor. Reference to these OSHA requirements should be included in the project specifications.

### **C.2.d. Subgrade Fill and Compaction**

To limit differential movement of widened portions of the roadway embankment, we recommend that materials used in these areas closely match the fill and native soils encountered within the existing roadway core: usually silty sand, clayey sand, and sandy lean clay. This recommendation includes extending any cohesive pavement subgrade encountered in the existing roadway to the edges of the widened embankment. We recommend the plasticity index (PI) of any clayey materials used to match existing subgrade soils not exceed 15.

We recommend spreading engineered fill in loose lifts of approximately 8 to 12 inches thick.

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

The fill materials should be compacted to a minimum 100 percent of its standard Proctor maximum dry density (ASTM D 698) within 3 feet of pavement subgrade, and compacted to a minimum 95 percent of its standard Proctor maximum dry density below 3 feet of the pavement subgrade. We recommend any granular fill material have a moisture content within 3 percentage points of its optimum moisture content (OMC), and any cohesive fill material have a moisture content no more than 1 percentage point below, or 3 percentage points above its OMC.

#### **C.2.e. Proofroll**

Prior to placing pavement materials, we recommend proofrolling pavement subgrades to determine if the subgrade materials are loose, soft or weak, and in need of further stabilization, compaction or subexcavation and recompaction or replacement. Areas that yield or rut more than 1 inch due to wheel traffic (fully-loaded dump truck with a rear tandem axle) should be corrected. Failed areas should be compacted, or if too wet, we recommend scarifying the upper 1 foot of the resulting subgrade and dried to a moisture content not more than 3 percentage points above OMC. The soil should then be compacted to a minimum of 100 percent of its standard Proctor maximum dry density (ASTM D 698).

If there are areas that still cannot be compacted, we recommend subexcavating the unstable materials to a minimum depth of 1 foot, replacing them with suitable materials, and compacting them as specified for the fill. Depending on the depth of subcut and underlying material, suitable subcut backfill material may consist of MnDOT select granular material, aggregate base or larger crushed aggregate (such as 3-inch minus). We should be consulted regarding subcut depths and backfill material.

#### **C.2.f. Embankment Side Slopes**

We recommend designing embankments with a maximum slope gradient of 3:1 (H:V) or flatter, assuming soil corrections are performed to remove unstable and organic soils as described in Section C.2.a above.

#### **C.2.g. Embankment Settlement and Performance**

In areas where embankment widening is required, we anticipate total settlement of the newly constructed embankments to generally be less than 1 inch provided the embankments consist of soils meeting the requirements of Section C.1.c. and the subgrade preparation in Section C.2.a is performed. However, some long-term settlement of the embankment (and fill areas) should be anticipated where organic or compressible soils are left in place. This settlement may result in an increase in pavement maintenance or re-leveling of surface grades. We can establish a more precise magnitude and timeframe for settlement once fill materials and depths are known.

### C.3. Pavement Design

#### C.3.a. Subgrade R-Value

Assuming grading soils will be similar to the existing fill soils and native soils present on site, we anticipate the subgrade will consist mostly of sandy lean clay with the possibility of silty sand and clayey sand pockets. Based on the anticipated subgrade soils, we recommend an R-value of 12 for pavement thickness design.

#### C.3.b. Recommended Pavement Sections

For the above subgrade and projected traffic, the bituminous pavement section for Galpin Boulevard in Table 3 is adequate to 90 percentile reliability according to MnPAVE-Flexible design methodology and its available Monte Carlo simulation.

**Table 3. Minimum Pavement Thicknesses without Sand Subbase and Specifications**

Alignment	Section	Specification
Galpin Boulevard (TH 5 to the Hennepin County Line)	<ul style="list-style-type: none"> <li>▪ 3 inches bituminous wear</li> <li>▪ 4 inches bituminous non-wear</li> <li>▪ 9 inches aggregate base</li> </ul>	<ul style="list-style-type: none"> <li>▪ MnDOT 2360 (SPWEA340C)</li> <li>▪ MnDOT 2360 (SPNWB330B)</li> <li>▪ MnDOT 3138 (Class 5 or Class 6)</li> </ul>
Pedestrian trail	<ul style="list-style-type: none"> <li>▪ 3 inches bituminous surface</li> <li>▪ 8 inches aggregate base</li> </ul>	<ul style="list-style-type: none"> <li>▪ MnDOT 2360 (SPWEA230B)</li> <li>▪ MnDOT 3138 (Class 5 or Class 6)</li> </ul>

Table 4 shows an alternative pavement design that includes a select granular subbase for Galpin Boulevard. In our opinion, the sand subbase will aid in the overall performance, life, and maintenance costs associated with the pavement over its service life.

**Table 4. Minimum Pavement Thicknesses with Granular Subbase and Specifications**

Alignment	Section	Specification
Galpin Boulevard (TH 5 to the Hennepin County Line)	<ul style="list-style-type: none"> <li>▪ 3 inches bituminous wear</li> <li>▪ 2 inches bituminous non-wear</li> <li>▪ 7 inches aggregate base</li> <li>▪ 18 inches of Select Granular Material</li> </ul>	<ul style="list-style-type: none"> <li>▪ MnDOT 2360 (SPWEA340C)</li> <li>▪ MnDOT 2360 (SPNWB330B)</li> <li>▪ MnDOT 3138 (Class 5 or Class 6)</li> <li>▪ MnDOT 3149.2.B.2</li> </ul>

We based the above pavement designs on a 20-year performance life. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life assumes routine

maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

It is common to place the non-wear course of bituminous and then delay placement of wear course. For this situation, we recommend evaluating if the reduced pavement section will have sufficient structure to support construction traffic.

Many conditions affect the overall performance of the pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With regard to bituminous pavements in particular, it is common to have thermal cracking develop within the first few years of placement, and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

### **C.3.c. Bituminous Pavement Materials and Compaction**

We recommend specifying crushed aggregate base meeting the requirements of MnDOT Specification 3138 for Class 5 or 6. We recommend that the bituminous wear and base courses meet the requirements of MnDOT Specifications 2360.

## **D. Procedures**

### **D.1. Penetration Test Borings**

We drilled the penetration test borings with a truck-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance to ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

### **D.2. Exploration Logs**

#### **D.2.a. Log of Boring Sheets**

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance tests

performed. The logs also present the results of laboratory tests performed on penetration test samples and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

#### **D.2.b. Geologic Origins**

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

### **D.3. Material Classification and Testing**

#### **D.3.a. Visual and Manual Classification**

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

#### **D.3.b. Laboratory Testing**

The exploration logs in the Appendix note most of the results of the laboratory tests performed on geologic material samples. The remaining laboratory test results follow the exploration logs. We performed the tests in general accordance with ASTM or AASHTO procedures.

### **D.4. Groundwater Measurements**

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes as noted on the boring logs.

## **E. Qualifications**

### **E.1. Variations in Subsurface Conditions**

#### **E.1.a. Material Strata**

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

#### **E.1.b. Groundwater Levels**

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

### **E.2. Continuity of Professional Responsibility**

#### **E.2.a. Plan Review**

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

### **E.2.b. Construction Observations and Testing**

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

### **E.3. Use of Report**

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

### **E.4. Standard of Care**

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

## Appendix



(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\X PROJECTS\2018\02734.GPJ BRAUN\_V8\_CURRENT.GDT 4/27/18 1.1:14

Braun Project B1802734 GEOTECHNICAL EVALUATION Galpin Boulevard (CR 117) TH 5 to the Hennepin County Line Chanhasen, Minnesota				BORING: <b>ST-1</b>			
DRILLER: C. McClain		METHOD: 3 1/4" HSA, Autohammer		DATE: 3/30/18		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
964.4	0.0	PAV	7 inches of bituminous over 10 inches of aggregate base.				Benchmark: Elevations were obtained using GPS and the State of Minnesota's permanent base station network.
963.0	1.4	FILL	FILL: Silty Sand, fine-grained, trace Gravel, brown, moist.	15		11	
959.4	5.0	FILL	FILL: Sandy Lean Clay, trace Gravel, brown and dark brown, moist.	30		14	
955.4	9.0	FILL	FILL: Sandy Lean Clay, slightly organic, dark brown to black moist.	8			
951.4	13.0	FILL	FILL: Sandy Lean Clay, slightly organic, dark brown to black moist.	6		23	
949.9	14.5	CL	SANDY LEAN CLAY, with lenses of Silt, gray and brown, moist, soft. (Glacial Till)	4			
			END OF BORING.  Water not observed while drilling.  Boring immediately backfilled.				OC=4%

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2018\02734.GPJ BRAUN\_V8\_CURRENT.GDT 4/27/18 11:14

<b>Braun Project B1802734</b> <b>GEOTECHNICAL EVALUATION</b> <b>Galpin Boulevard (CR 117)</b> <b>TH 5 to the Hennepin County Line</b> <b>Chanhasen, Minnesota</b>				<b>BORING: ST-2</b> LOCATION: N: 183707, E: 549134. See attached sketch.			
DRILLER: C. McClain		METHOD: 3 1/4" HSA, Autohammer		DATE: 3/30/18		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
986.9	0.0	PAV	10 inches of bituminous over 8 inches of aggregate base.				
985.4	1.5	FILL	FILL: Sandy Lean Clay, slightly organic, dark brown to black, moist.	7		17	OC=3%
982.9	4.0	CL	SANDY LEAN CLAY, trace Gravel, brown and gray with some iron stains, moist, medium to stiff. (Glacial Till)	7		21	
				7			
975.9	11.0		END OF BORING.  Water not observed while drilling.  Boring immediately backfilled.	9			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\X PROJECTS\2018\02734.GPJ BRAUN\_V8\_CURRENT.GDT 4/27/18 1.1:14

Braun Project B1802734 GEOTECHNICAL EVALUATION Galpin Boulevard (CR 117) TH 5 to the Hennepin County Line Chanhassen, Minnesota				BORING: <b>ST-3</b>				
DRILLER: C. McClain		METHOD: 3 1/4" HSA, Autohammer		DATE: <b>3/30/18</b>		SCALE: <b>1" = 4'</b>		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
995.3	0.0	PAV	8 inches of inches of bituminous over 6 inches of aggregate base.					
994.1	1.2	FILL	FILL: Sandy Lean Clay, trace Gravel, brown, dark brown and gray, moist.	9		22	70	
986.3	9.0	FILL	FILL: Sandy Lean Clay, slightly organic, trace roots, with lenses of Silt and Silty Sand, dark brown to black, moist	9		20		OC=3%
981.3	14.0	CL	SANDY LEAN CLAY, trace Gravel, gray, moist, soft (Glacial Till)	4				
980.8	14.5	CL	END OF BORING.  Water not observed while drilling.  Boring immediately backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\X PROJECTS\2018\02734.GPJ BRAUN\_V8\_CURRENT.GDT 4/27/18 1.1:14

Braun Project B1802734 GEOTECHNICAL EVALUATION Galpin Boulevard (CR 117) TH 5 to the Hennepin County Line Chanhasen, Minnesota				BORING: <b>ST-4</b>			
DRILLER: C. McClain		METHOD: 3 1/4" HSA, Autohammer		DATE: <b>3/30/18</b>		SCALE: <b>1" = 4'</b>	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
976.8	0.0						
975.3	1.5	PAV	8 inches of bituminous over 10 inches of aggregate base.				
		FILL	FILL: Mix of Clayey Sand and Sandy Lean Clay, trace Gravel, dark brown and gray, moist.	14		12	
				16		22	
969.8	7.0	SC	CLAYEY SAND, fine-grained, trace Gravel, brown and gray, moist, medium dense. (Glacial Till)	12			
967.8	9.0	CL	SANDY LEAN CLAY, trace Gravel, brown and gray, moist, stiff. (Glacial Till)	14			
965.8	11.0		END OF BORING.  Water not observed while drilling.  Boring immediately backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\X PROJECTS\2018\02734.GPJ BRAUN\_V8\_CURRENT.GDT 4/27/18 11:14

Braun Project B1802734 GEOTECHNICAL EVALUATION Galpin Boulevard (CR 117) TH 5 to the Hennepin County Line Chanhassen, Minnesota				BORING: <b>ST-5</b>			
DRILLER: C. McClain		METHOD: 3 1/4" HSA, Autohammer		DATE: <b>3/30/18</b>		SCALE: <b>1" = 4'</b>	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
993.0	0.0						
991.8	1.2	PAV	7 inches of bituminous over 7 inches of aggregate base.				
		FILL	FILL: Sandy Lean Clay, trace Gravel, gray and dark brown, moist.  With a seam of Silty Sand at 5 feet.	9 12		13	
984.0	9.0	FILL	FILL: Sandy Lean Clay, slightly organic, trace roots, dark brown, moist.	9		18	
		FILL	FILL: Sandy Lean Clay, slightly organic, trace roots, dark brown, moist.	7		24	OC=4%
981.0	12.0	CL	SANDY LEAN CLAY, trace Gravel, gray, moist, medium. (Glacial Till)				
978.5	14.5		END OF BORING.  Water not observed while drilling.  Boring immediately backfilled.	7			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2018\02734.GPJ BRAUN\_V8\_CURRENT.GDT 4/27/18 11:14

<b>Braun Project B1802734</b> <b>GEOTECHNICAL EVALUATION</b> <b>Galpin Boulevard (CR 117)</b> <b>TH 5 to the Hennepin County Line</b> <b>Chanhassen, Minnesota</b>					<b>BORING: ST-6</b> LOCATION: N: 189427, E: 550515. See attached sketch.		
DRILLER: C. McClain		METHOD: 3 1/4" HSA, Autohammer		DATE: 3/30/18		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
1031.5	0.0	PAV	5 1/2 inches of bituminous over 9 inches of aggregate base.				
1030.3	1.2	CL	SANDY LEAN CLAY, with lenses of Clayey Sand, brown and gray with iron stains, moist, medium to stiff. (Glacial Till)	9		18	
				7			
				11		16	
1020.5	11.0		END OF BORING.  Water not observed while drilling.  Boring immediately backfilled.	11			

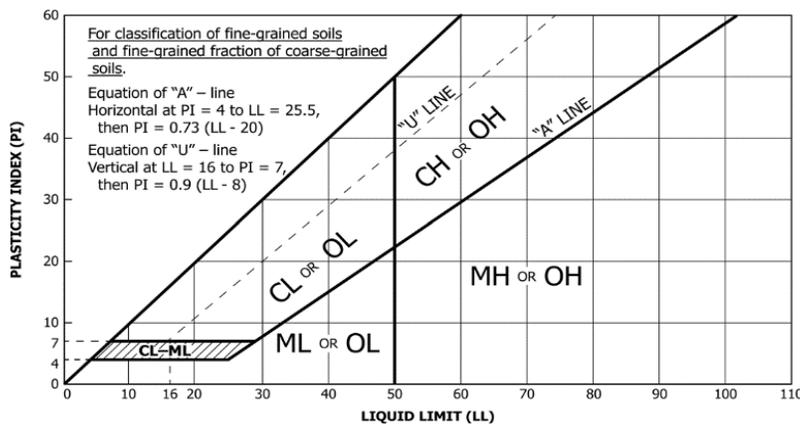
(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\X PROJECTS\2018\02734.GPJ BRAUN\_V8\_CURRENT.GDT 4/27/18 11:14

Braun Project B1802734 GEOTECHNICAL EVALUATION Galpin Boulevard (CR 117) TH 5 to the Hennepin County Line Chanhasen, Minnesota				BORING: <b>ST-7</b>				
DRILLER: C. McClain		METHOD: 3 1/4" HSA, Autohammer		DATE: <b>3/30/18</b>		SCALE: <b>1" = 4'</b>		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
984.1	0.0	PAV	7 inches of bituminous over 5 inches of aggregate base.					
983.1	1.0	FILL	FILL: Clayey Sand, fine-grained, trace Gravel, dark brown and gray, moist.	24		11	38	
980.1	4.0	FILL	FILL: Clayey Sand, fine-grained, with lenses of Lean Clay, dark gray, moist.	8				
977.1	7.0	SC	CLAYEY SAND, fine-grained, with Sand lenses, gray and brown, moist, very loose. (Glacial Till)	4		21		
975.1	9.0	CL	SANDY LEAN CLAY, trace Gravel, brown and gray, moist, stiff. (Glacial Till)	14				
973.1	11.0		END OF BORING.  Water not observed while drilling.  Boring immediately backfilled.					

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>				Soil Classification	
				Group Symbol	Group Name <sup>B</sup>
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines <sup>C</sup> )	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel <sup>E</sup>
			$C_u < 4$ and/or ( $C_c < 1$ or $C_c > 3$ ) <sup>D</sup>	GP	Poorly graded gravel <sup>E</sup>
		Gravels with Fines (More than 12% fines <sup>C</sup> )	Fines classify as ML or MH	GM	Silty gravel <sup>EFG</sup>
			Fines Classify as CL or CH	GC	Clayey gravel <sup>EFG</sup>
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines <sup>H</sup> )	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand <sup>I</sup>
			$C_u < 6$ and/or ( $C_c < 1$ or $C_c > 3$ ) <sup>D</sup>	SP	Poorly graded sand <sup>I</sup>
		Sands with Fines (More than 12% fines <sup>H</sup> )	Fines classify as ML or MH	SM	Silty sand <sup>FGI</sup>
			Fines classify as CL or CH	SC	Clayey sand <sup>FGI</sup>
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silt and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line <sup>J</sup>	CL	Lean clay <sup>KLM</sup>
			PI < 4 or plots below "A" line <sup>J</sup>	ML	Silt <sup>KLM</sup>
		Organic	Liquid Limit – oven dried < 0.75	OL	Organic clay <sup>KLMN</sup> Organic silt <sup>KLM O</sup>
			Liquid Limit – not dried < 0.75	OH	Organic clay <sup>KLM P</sup> Organic silt <sup>KLM Q</sup>
	Silt and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay <sup>KLM</sup>
			PI plots below "A" line	MH	Elastic silt <sup>KLM</sup>
		Organic	Liquid Limit – oven dried < 0.75	OL	Organic clay <sup>KLM P</sup> Organic silt <sup>KLM Q</sup>
			Liquid Limit – not dried < 0.75	OH	Organic clay <sup>KLM P</sup> Organic silt <sup>KLM Q</sup>
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

- A. Based on the material passing the 3-inch (75-mm) sieve.
- B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
- C. Gravels with 5 to 12% fines require dual symbols:
  - GW-GM well-graded gravel with silt
  - GW-GC well-graded gravel with clay
  - GP-GM poorly graded gravel with silt
  - GP-GC poorly graded gravel with clay
- D.  $C_u = D_{60} / D_{10}$        $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
- E. If soil contains  $\geq 15\%$  sand, add "with sand" to group name.
- F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
- G. If fines are organic, add "with organic fines" to group name.
- H. Sands with 5 to 12% fines require dual symbols:
  - SW-SM well-graded sand with silt
  - SW-SC well-graded sand with clay
  - SP-SM poorly graded sand with silt
  - SP-SC poorly graded sand with clay
- I. If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.
- J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
- K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
- L. If soil contains  $\geq 30\%$  plus No. 200, predominantly sand, add "sandy" to group name.
- M. If soil contains  $\geq 30\%$  plus No. 200 predominantly gravel, add "gravelly" to group name.
- N.  $PI \geq 4$  and plots on or above "A" line.
- O.  $PI < 4$  or plots below "A" line.
- P. PI plots on or above "A" line.
- Q. PI plots below "A" line.



Laboratory Tests			
DD	Dry Density, pcf	OC	Organic content, %
WD	Wet Density, pcf	$q_p$	Pocket penetrometer strength, tsf
P200	% Passing #200 sieve	MC	Moisture content, %
		PL	Plastic limit
		LL	Liquid limit
		PI	Plasticity Index

**Particle Size Identification**

- Boulders..... over 12"
- Cobbles..... 3" to 12"
- Gravel
  - Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  - Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
- Sand
  - Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  - Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  - Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
- Silt..... No. 200 (0.075 mm) to .005 mm
- Clay..... < .005 mm

**Relative Proportions<sup>L, M</sup>**

- trace..... 0 to 5%
- little..... 6 to 14%
- with.....  $\geq 15\%$

**Inclusion Thicknesses**

- lens..... 0 to 1/8"
- seam..... 1/8" to 1"
- layer..... over 1"

**Apparent Relative Density of Cohesionless Soils**

- Very loose ..... 0 to 4 BPF
- Loose ..... 5 to 10 BPF
- Medium dense..... 11 to 30 BPF
- Dense..... 31 to 50 BPF
- Very dense..... over 50 BPF

**Consistency of Cohesive Soils      Blows Per Foot      Approximate Unconfined Compressive Strength**

- Very soft..... 0 to 1 BPF..... < 1/4 tsf
- Soft..... 2 to 4 BPF..... 1/4 to 1/2 tsf
- Medium..... 5 to 8 BPF..... 1/2 to 1 tsf
- Stiff..... 9 to 15 BPF..... 1 to 2 tsf
- Very Stiff..... 16 to 30 BPF..... 2 to 4 tsf
- Hard..... over 30 BPF..... > 4 tsf

**Moisture Content:**

- Dry:** Absence of moisture, dusty, dry to the touch.
- Moist:** Damp but no visible water.
- Wet:** Visible free water, usually soil is below water table.

**Drilling Notes:**

**BPF:** Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6 inches into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6-inch increments, and added to get BPF.

**Partial Penetration:** If the sampler cannot be driven the full 12 inches beyond the initial 6-inch set, the number of blows for that partial penetration is shown as "No./X" (i.e., 50/2"). If the sampler cannot be advanced beyond the initial 6-inch set, the depth of penetration will be recorded in the Notes column as "No. to set X" (i.e., 50 to set 4").

**WH:** WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

**WR:** WR indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

**WL:** WL indicates the water level measured by the drillers either while drilling or following drilling.

# State Aid 10 Ton ESAL Traffic Forecast Calculator

This ESAL calculator is for use with **default Heavy Commercial Traffic values**; click "User Defined Traffic Values" sheet below if you wish to enter your own Heavy Commercial Traffic values.

Instructions: All yellow boxes require an input value.

Dropdown choices are provided for Base Year (C18), Number of Lanes (C19), and Urban or Rural (C21).

You must click on cells C18, C19, and C21 to access the dropdown choices.

## General Information

Date	4/3/2018	
Forecast Performed by	Brian Schreurs (Braun Intertec)	
Name of County or City	Carver County - City of Chanhassen	
Project Number	B1802734	
Project Description	Galpin Boulevard (CSAH 117) Reconstruction	
Route Number	from W. 78th Street to north of Pheasant Dr.	
Base Year (i.e. opening to traffic)	2020	
Number of Lanes (total both directions)	2 = typical 2 lane	
Current AADT	8,700	
Urban or Rural	Urban	
Historical AADT (enter a minimum of two years)	<b>Year</b>	<b>AADT</b>
Enter oldest traffic data here	2018	8,700
Enter second oldest traffic data here	2040	10,000
Enter third oldest traffic data here		
Enter fourth oldest traffic data here		
Base Year AADT	2020	8,820
20-Year AADT	2040	10,000
35-Year AADT	2055	10,890
Growth Rate	0.67%	

Vehicle Type	Vehicle Class %	ESAL Factors	
		Flexible	Rigid
2AX-6TIRE SU	1.45%	0.25	0.24
3AX+SU	0.08%	0.58	0.85
3AX TST	0.12%	0.39	0.37
4AX TST	0.24%	0.51	0.53
5AX+TST	1.75%	1.13	1.89
TR TR, BUSES	0.64%	0.57	0.74
TWIN TRAILERS	0.00%	2.40	2.33
<b>Total</b>	<b>4.27%</b>	<b>NA</b>	<b>NA</b>

<b>20-Year Flexible Forecast (10 Ton) =</b>	<b>1,179,000</b>
<b>20-Year Rigid Forecast (10 Ton) =</b>	<b>1,764,000</b>
<b>35-Year Flexible Forecast (10 Ton) =</b>	<b>2,116,000</b>
<b>35-Year Rigid Forecast (10 Ton) =</b>	<b>3,167,000</b>

For State Aid questions and information concerning this tool, please contact State Aid Pavement Engineer Joel Ulring at joel.ulring@state.mn.us or 651-366-3831.

## MnPAVE Design Summary

MnPAVE 6.304 Simulation Input File: Galpin Blvd - no sand subbase

Confidence Level for Preliminary Life Estimate = 70%

Confidence and Reliability may not agree. Thickness and modulus are reduced when Confidence > 50%. Monte Carlo Reliability randomly selects values for each layer. Use Reliability for final design.

Preliminary Life Estimate		20-Year Reliability (2,500 cycles)	
Fatigue	Rutting	Fatigue	Rutting
>50 years	21 years	100%	92.6%

### Project Information

District	County	City
Metro	Carver	Chanhassen
Project Number	Route	Reference Post
B1802734	Galpin Blvd. (CSAH 117)	from -- to --
Letting Date	Construction Type	
05/04/20	Reconstruction	
Designer	Soils Engineer	
KHA	Brian Schreurs Braun Intertec	

### Climate Information

Seasons	Location
5	44° 48' Latitude, 93° 46' Longitude

### Structural Information (Design Level: Basic)

Layer	Type	Subtype	Height (in.)
1a	Hot-Mix Asphalt (Pb = 5.0%)	PG58-34 (2360F 1/2")	4.00
1b	Hot-Mix Asphalt (Pb = 5.0%)	PG58-28 (2360F 1/2")	3.00
2	Aggregate Base	MnDOT Class 5	9.00
3	Engineered Soil	Unified CL	12.00
4	Undisturbed Soil	Unified CL	

### Traffic Information (Speed = 45 mph)

Load Type	First Year ESAL	Growth Rate	Total Repetitions
ESAL	55,420	0.7% (simple)	1,179,000

### Notes

From West 78th Street to north of Pheasant Drive

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## MnPAVE Design Summary

MnPAVE 6.304 Simulation Input File: Galpin Blvd - with sand subbase

Confidence Level for Preliminary Life Estimate = 70%

Confidence and Reliability may not agree. Thickness and modulus are reduced when Confidence > 50%. Monte Carlo Reliability randomly selects values for each layer. Use Reliability for final design.

Preliminary Life Estimate		20-Year Reliability (2,500 cycles)	
Fatigue	Rutting	Fatigue	Rutting
>50 years	>50 years	100%	99.9%

### Project Information

District	County	City
Metro	Carver	Chanhassen
Project Number	Route	Reference Post
B1802734	Galpin Blvd. (CSAH 117)	from -- to --
Letting Date	Construction Type	
05/04/20	Reconstruction	
Designer	Soils Engineer	
KHA	Brian Schreurs Braun Intertec	

### Climate Information

Seasons	Location
5	44° 48' Latitude, 93° 46' Longitude

### Structural Information (Design Level: Intermediate)

Layer	Type	Subtype	Height (in.)
1	Hot-Mix Asphalt (Pb = 5.0%)	PG58-34 (2360F 1/2")	5.00
2	Aggregate Base	MnDOT Class 5	7.00
3	Aggregate Subbase	MnDOT Select Granular	18.00
4	Engineered Soil	R-Value = 12 (CL)	12.00
5	Undisturbed Soil	Engineered Soil Modulus/2	

### Traffic Information (Speed = 45 mph)

Load Type	First Year ESAL	Growth Rate	Total Repetitions
ESAL	55,420	0.7% (simple)	1,179,000

### Notes

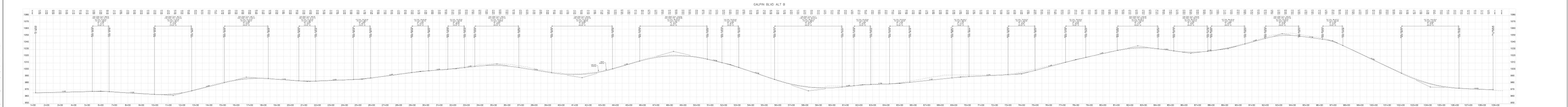
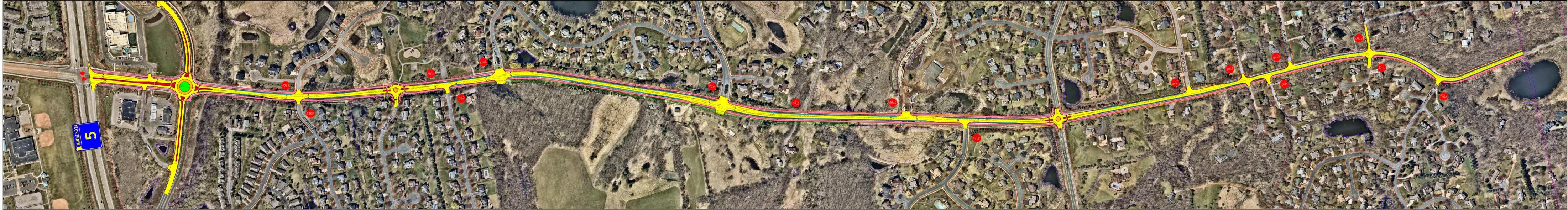
From West 78th Street to north of Pheasant Drive

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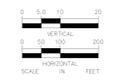
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## APPENDIX F – PREFERRED LAYOUT AND PROFILE





- LEGEND**
- PROPOSED ROADWAY
  - CONCRETE CURB AND GUTTER
  - TRUCK APRON
  - PAVED MEDIAN
  - UTILITY MEDIAN
  - PAVED SHOULDER
  - PROPOSED TRAILS / WALKS
  - PROPOSED RIGHT OF WAY
  - PROPOSED RETAINING WALL
  - PROPOSED LIMITS OF CONSTRUCTION
  - EXISTING LOT LINE
  - EXISTING R/W
  - EXISTING EDGE OF PAVEMENT
  - EXISTING WETLANDS



**GALPIN BOULEVARD (CR 117)  
RECONSTRUCTION**

**PROPOSED ROADWAY  
PLAN AND PROFILE  
ALTERNATIVE B**

APPENDIX G – PROPOSED DRAINAGE PLAN





## APPENDIX H – ESTIMATED COSTS AND FUNDING



PRELIMINARY COST ESTIMATE AND COST PARTICIPATION PLAN									
<b>Project:</b> GALPIN BOULEVARD (CR 177) RECONSTRUCTION <b>Owner:</b> CITY OF CHANHASSEN AND CARVER COUNTY <b>Description:</b> PRELIMINARY COST ESTIMATE - LAYOUT ALTERNATIVE B MAY 31, 2018							COST PARTICIPATION PLAN		
Item No.		Item Description	Unit	Contract Quantity	Unit Price	Amount	County	City	Cost Share Notes
1	2021.501	MOBILIZATION	LUMP SUM	1	\$ 350,000.00	\$ 350,000.00	\$ 248,500.00	\$ 101,500.00	Prorated by construction cost share - 71% County/29% City
2	2101.505	CLEARING/GRUBBING	LUMP SUM	1	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ -	County
3	2101.505	MISCELLANEOUS REMOVALS	LUMP SUM	1	\$ 50,000.00	\$ 50,000.00	\$ 45,500.00	\$ 4,500.00	County except West 78th Street (City)
4	2104.503	SAWING BIT PAVEMENT (FULL DEPTH)	LIN FT	1400	\$ 3.00	\$ 4,200.00	\$ 3,800.00	\$ 400.00	County except West 78th Street (City)
5	2104.503	REMOVE CURB & GUTTER	LIN FT	8500	\$ 3.00	\$ 25,500.00	\$ 12,750.00	\$ 12,750.00	County except West 78th Street (City)
6	2104.504	REMOVE CONCRETE WALK	SQ YD	1750	\$ 6.00	\$ 10,500.00	\$ 4,200.00	\$ 6,300.00	County except West 78th Street (City)
7	2104.504	REMOVE BITUMINOUS PAVEMENT	SQ YD	52500	\$ 3.00	\$ 157,500.00	\$ 139,900.00	\$ 17,600.00	County except West 78th Street (City)
8	2105.507	COMMON EXCAVATION	CU YD	75000	\$ 8.00	\$ 600,000.00	\$ 546,000.00	\$ 54,000.00	County except West 78th Street (City)
9	2105.507	POND EXCAVATION	CU YD	35000	\$ 8.00	\$ 280,000.00	\$ 238,000.00	\$ 42,000.00	Contributing flow - 85% County/15% City
10	2105.507	MUCK EXCAVATION	CU YD	7500	\$ 10.00	\$ 75,000.00	\$ 75,000.00	\$ -	County
11	2105.507	SELECT GRANULAR BORROW (CV)	CU YD	40000	\$ 15.00	\$ 600,000.00	\$ 546,000.00	\$ 54,000.00	County except West 78th Street (City)
12	2211.507	AGGREGATE BASE (CV) CLASS 5	CU YD	13000	\$ 22.00	\$ 286,000.00	\$ 260,300.00	\$ 25,700.00	County except West 78th Street (City)
13	2360.509	BITUMINOUS TRAIL	SQ FT	180000	\$ 2.00	\$ 360,000.00	\$ -	\$ 360,000.00	City
14	2360.509	BITUMINOUS NON WEAR COURSE MIX (ROADWAY)	TON	6500	\$ 60.00	\$ 390,000.00	\$ 355,500.00	\$ 34,500.00	County except West 78th Street (City)
15	2360.509	BITUMINOUS WEARING COURSE MIX (ROADWAY)	TON	9800	\$ 65.00	\$ 637,000.00	\$ 581,750.00	\$ 55,250.00	County except West 78th Street (City)
16	2503.503	STORM SEWER PIPE (15"-18")	LIN FT	7750	\$ 40.00	\$ 310,000.00	\$ 263,500.00	\$ 46,500.00	Contributing flow - 85% County/15% City
17	2503.503	STORM SEWER PIPE (24"-36")	LIN FT	5500	\$ 60.00	\$ 330,000.00	\$ 280,500.00	\$ 49,500.00	Contributing flow - 85% County/15% City
18	2503.603	DRAINTILE	LIN FT	24500	\$ 8.00	\$ 196,000.00	\$ 178,400.00	\$ 17,600.00	County
19	2503.603	42" CULVERT EXTENSION	LIN FT	50	\$ 250.00	\$ 12,500.00	\$ 12,500.00	\$ -	County
20	2506.602	CATCH BASINS	EACH	55	\$ 2,500.00	\$ 137,500.00	\$ 116,900.00	\$ 20,600.00	Contributing flow - 85% County/15% City
21	2506.602	MANHOLE/CATCH BASINS	EACH	60	\$ 4,000.00	\$ 240,000.00	\$ 204,000.00	\$ 36,000.00	Contributing flow - 85% County/15% City
22	2506.602	POND OUTLET CONTROL STRUCTURES	EACH	5	\$ 10,000.00	\$ 50,000.00	\$ 42,500.00	\$ 7,500.00	Contributing flow - 85% County/15% City
23	2501.603	FLARED END SECTION WITH TRASH GUARD (24"-36")	EACH	5	\$ 2,000.00	\$ 10,000.00	\$ 8,500.00	\$ 1,500.00	Contributing flow - 85% County/15% City
24	2531.503	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	33000	\$ 14.00	\$ 462,000.00	\$ 33,600.00	\$ 428,400.00	2,400 LF County/30,600 LF City
25	2531.504	CONCRETE MEDIAN	SQ YD	1500	\$ 45.00	\$ 67,500.00	\$ 45,000.00	\$ 22,500.00	County except West 78th Street (City)
26	2411.618	MODULAR BLOCK RETAINING WALL	SQ FT	24000	\$ 26.00	\$ 624,000.00	\$ 312,000.00	\$ 312,000.00	50/50
27	2557.603	48" CHAIN LINK FENCE	LIN FT	2700	\$ 20.00	\$ 54,000.00	\$ 27,000.00	\$ 27,000.00	50/50
28	2531.504	6" CONCRETE DRIVEWAY PAVEMENT/ROUNDAABOUT APRON	SQ YD	1000	\$ 65.00	\$ 65,000.00	\$ 32,500.00	\$ 32,500.00	50/50
29	2360.602	DRIVEWAY REMOVAL/REPLACEMENT	EACH	18	\$ 3,000.00	\$ 54,000.00	\$ 45,000.00	\$ 9,000.00	County
30	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$ 30,000.00	\$ 30,000.00	\$ 21,300.00	\$ 8,700.00	Prorated by construction cost share - 71% County/29% City
31	2573.601	EROSION CONTROL	LUMP SUM	1	\$ 75,000.00	\$ 75,000.00	\$ 53,250.00	\$ 21,750.00	Prorated by construction cost share - 71% County/29% City
32	2575.601	TURF ESTABLISHMENT	LUMP SUM	1	\$ 50,000.00	\$ 50,000.00	\$ 45,500.00	\$ 4,500.00	County except West 78th Street (City)
33	2571.501	TREES	LUMP SUM	1	\$ 50,000.00	\$ 50,000.00	\$ -	\$ 50,000.00	City
34	2582.601	SIGNING/STRIPING	LUMP SUM	1	\$ 50,000.00	\$ 50,000.00	\$ 45,500.00	\$ 4,500.00	County except West 78th Street (City)
35	2545.511	STREET LIGHTING (AT ROUNDABOUTS AND INTERSECTIONS)	EACH	28	\$ 8,000.00	\$ 224,000.00	\$ 32,000.00	\$ 192,000.00	4 EACH County/24 EACH City
<b>Subtotal:</b>						\$ 6,927,200.00	\$ 4,866,650.00	\$ 2,060,550.00	
<b>10% Contingency:</b>						\$ 693,000.00	\$ 487,000.00	\$ 206,000.00	
<b>Subtotal with Contingency:</b>						\$ 7,620,200.00	\$ 5,353,650.00	\$ 2,266,550.00	
<b>4% Escalation (2018 to 2022):</b>						\$ 305,000.00	\$ 215,000.00	\$ 90,000.00	
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>						\$ 7,925,200.00	\$ 5,568,650.00	\$ 2,356,550.00	
RIGHT-OF-WAY/EASEMENT ACQUISITION COSTS			LUMP SUM	1	\$ 400,000.00	\$ 400,000.00	\$ 200,000.00	\$ 200,000.00	50/50
<b>TOTAL ESTIMATED CONSTRUCTION AND RIGHT-OF-WAY COST</b>						\$ 8,325,200.00	\$ 5,768,650.00	\$ 2,556,550.00	
<b>20% INDIRECT COST</b>						\$ 1,665,000.00	\$ 1,154,000.00	\$ 511,000.00	
<b>TOTAL ESTIMATED PROJECT COST</b>						\$ 9,990,200.00	\$ 6,922,650.00	\$ 3,067,550.00	

**NOTES:**

1. INCLUDES 10% CONTINGENCY AND 4% FOR ESCALATON FOR 2022 CONSTRUCTION PRICING
2. ASSUMES PAVEMENT SECTION OF 5" BITUMINOUS, 7" AGGREGATE BASE, AND 18" SELECT GRANULAR MATERIAL (PER BRAUN GEOTECH REPORT)
3. ASSUMES NO WATER MAIN OR SANITARY SEWER IMPROVEMENTS
4. INCLUDES 7,500 CY OF MUCK EXCAVATION AND SELECT GRANULAR BACKFILL FOR SOIL CORRECTION - SOIL CORRECTION NEEDS TO BE FURTHER DEFINED AS A PART OF FUTURE DESIGN EFFORTS
5. ROW/EASEMENT ACQUISITION COSTS ASSUME THAT EASEMENT AREAS FOR STORM WATER FACILITIES ON CITY PARK LAND AND THE PRINCE PROPERTY WILL BE DEDICATED AND THAT ACQUISITION COSTS WILL BE INCURRED FOR ROADWAY RIGHT-OF-WAY AND THE 2 STORM WATER FACILITIES ON PRIVATE PROPERTY