

TRAFFIC IMPACT STUDY

For

North Gate Subaru
El Paso County, Colorado
PCD File No. PPR2514 & SF2510

September 2024
Revised June 2025

Prepared for:

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Prepared by:



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24-082237

Traffic Engineer's Statement

The attached traffic report and supporting information were prepared under my responsible charge and they comport with the standard of care. So far as is consistent with the standard of care, said report was prepared in general conformance with the criteria established by the County for traffic reports.



Fred Lantz, P.E. #23410

06/25/2025

Date

Developer's Statement

I, the Developer, have read and will comply with all commitments made on my behalf within this report.

Carlson West Povondra Architects
5060 Dodge Street
Omaha, Nebraska 68132

Date

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I. Introduction

Project Overview

This traffic impact study is provided as a planning document and addresses the capacity, geometric, and control requirements associated with the development entitled North Gate Subaru.

This traffic impact study has been revised to address County review comments made to the September 2024 version regarding removal of previously proposed right-in / right-out access onto Struthers Road and an updated long-term planning horizon.

This proposed commercial development consists of a Subaru car dealership. The development is located near the northeast corner of Interstate 25 and North Gate Boulevard in El Paso County, Colorado.

Study Area Boundaries

The study area to be examined in this analysis encompasses the area bounded by Struthers Road from North Gate Boulevard north to Gleneagle Drive, North Gate Boulevard from Voyager Parkway west to the Interstate 25 Interchange, and includes proposed site access. Site access drives internal to the development were not included in this analysis as internal intersection operations are expected to be comparable to, or better than, those projected for the Struthers Road intersections.

Figure 1 illustrates location of the site and study intersections.

Site Description

Land for the development is currently vacant and surrounded by a mix of commercial, lodging, recreational, and residential land uses.

The proposed development is understood to entail the new construction of a Subaru car dealership with a maximum gross floor area of approximately 64,000 square feet.

Access to the development is provided at the following locations: two existing full-movement accesses via Gleneagle Gate View onto Struthers Road, and one existing right-in / right-out access onto Struthers Road currently serving the adjacent Starbucks and 7-Eleven developments (referred to as RIRO Access).

For purposes of this study, it is anticipated that development construction would be completed by end of Year 2026.

General site and access locations are shown on Figure 1. A site plan, as provided by Carlson West Povondra Architects, is shown on Figure 2. This plan is provided for illustrative purposes only.



North

Not to Scale



Figure 1
SITE LOCATION





Not to Scale



NORTH GATE SUBARU
Traffic Impact Study

Figure 2
CONCEPTUAL SITE PLAN

SM ROCHA, LLC

Traffic and Transportation Consultants

June 2025

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Existing and Committed Surface Transportation Network

Within the study area, Gleneagle Gate View and Struthers Road are the primary roadways that will accommodate traffic to and from the proposed development. The secondary roadways include Gleneagle Drive, Shepard Heights, North Gate Boulevard, Voyager Parkway, and Interstate 25. A brief description of each roadway, based on El Paso County's Major Transportation Corridors Plan (MTCP)¹, El Paso County's Engineering Criteria Manual (ECM)², the City of Colorado Springs Major Thoroughfare Plan (MTP)³, and the City of Colorado Spring's Traffic Criteria Manual⁴, is provided below:

Gleneagle Gate View is a loop roadway having two through lanes (one lane in each direction) with a combination of shared and exclusive turn lanes at the intersections within the study area. Gleneagle Gate View is unclassified in El Paso County's MTCP. However, per Section 2.3, Table 2-7 of El Paso County's ECM, and the roadway's estimated right-of-way (ROW) width, Gleneagle Gate View is assumed to be classified as a local roadway with a posted speed limit of 20 MPH.

Struthers Road is a north-south minor arterial roadway providing four through lanes (two lanes in each direction) with exclusive and shared turn lanes at the intersections within the study area. Struthers Road provides a posted speed limit of 40 MPH.

Gleneagle Drive is a north-south minor collector roadway having two through lanes (one lane in each direction) with shared turn lanes at the intersection within the study area. Gleneagle Drive provides a posted speed limit of 30 MPH. Gleneagle Drive ends at Struthers Road and continues south as Gleneagle Gate View.

Shepard Heights is a north-south private roadway having two through lanes (one lane in each direction) with shared lanes at the intersection within the study area. Shepard Heights does not provide a posted speed limit within the study area. Therefore, for purposes of this analysis, a speed limit of 25 MPH was assumed.

North Gate Boulevard is an east-west principal arterial roadway having four through lanes (two lanes in each direction) with exclusive and shared turn lanes at the intersections within the study area. North Gate Boulevard provides a posted speed limit of 40 MPH.

¹ El Paso County Major Transportation Corridors Plan Update, Felsburg Holt & Ullevig, July 2024.

² El Paso County Engineering Criteria Manual, El Paso County, January 2025.

³ Major Thoroughfare Plan, City of Colorado Springs, May 2025.

⁴ Engineering Criteria Manual, Section III: Traffic Criteria Manual, City of Colorado Springs City Engineering, July 2010.

Voyager Parkway is a north-south principal arterial roadway south having four through lanes south of North Gate Boulevard (two lanes in each direction) with exclusive turn lanes at the intersection within the study area. Voyager Parkway provides a posted speed limit of 45 MPH.

North of North Gate Boulevard, Voyager Parkway is a north-south private roadway having two-through lanes (one lane in each direction). Voyager Parkway provides a posted speed limit of 25 MPH.

Interstate 25 at North Gate Boulevard is an existing diamond interchange with Interstate 25 travel above North Gate Boulevard. The interchange is within CDOT jurisdiction. Northbound on / off ramps have a posted advisory speed limit of 55 MPH and southbound on / off ramps have a posted advisory speed limit of 35 MPH. Each interchange ramp has one to two travel lanes with a combination of shared and exclusive turn lanes at North Gate Boulevard.

The North Gate Boulevard intersections with Struthers Road and Voyager Parkway are signalized. The North Gate Boulevard intersections with Interstate 25 Southbound Ramp and Interstate 25 Northbound Ramp, as well as the Struthers Road intersection with Gleneagle Drive, operate under roundabout-controlled conditions. All other study intersections operate under a stop-controlled condition. A stop-controlled intersection is defined as a roadway intersection where vehicle rights-of-way are controlled by one or more “STOP” signs.

Comparison of existing roadway cross-sections of Struthers Road and Voyager Parkway to the City’s Traffic Criteria Manual as well as Struthers Road to the County’s ECM concludes that each roadway is not built to their ultimate width for accommodation of future regional transportation demands. Each roadway has the potential to be widened to six through lanes. However, for purposes of this analysis, it is assumed that each roadway’s existing cross-section will remain

No regional or specific improvements for the above described roadways are known to be planned or committed at this time.

II. Existing Traffic Conditions

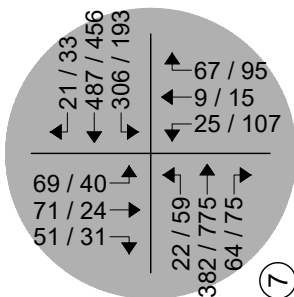
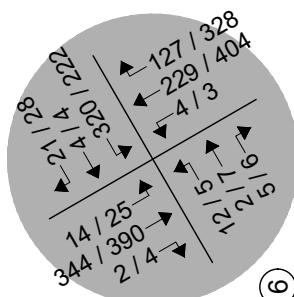
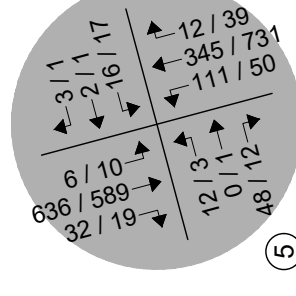
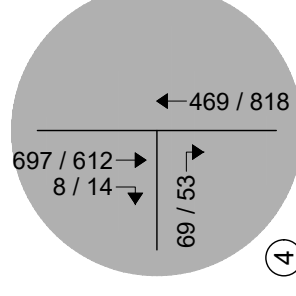
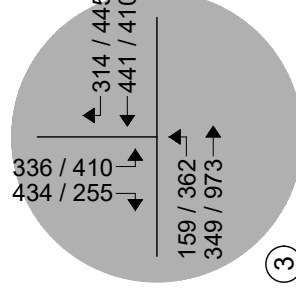
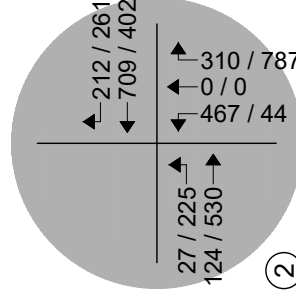
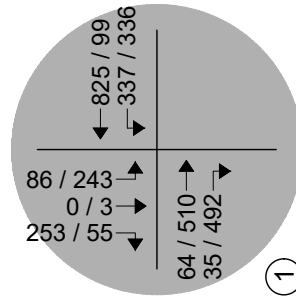
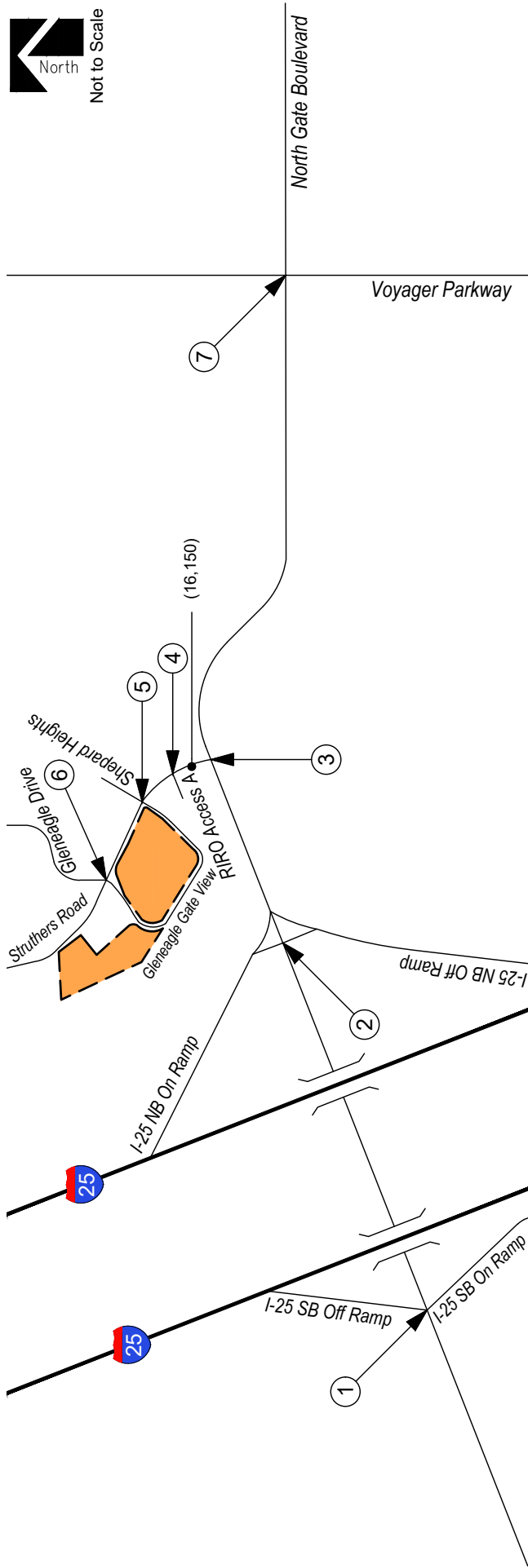
Morning (AM) and afternoon (PM) peak hour traffic counts were collected at the following intersections:

- Interstate 25 Southbound Ramp / North Gate Boulevard
- Interstate 25 Northbound Ramp / North Gate Boulevard
- North Gate Boulevard / Struthers Road
- Struthers Road / RIRO Access A
- Struthers Road / Shepard Heights / Gleneagle Gate View
- Struthers Road / Gleneagle Drive / Gleneagle Gate View
- North Gate Boulevard / Voyager Parkway

Average daily traffic (ADT) volumes were collected over a 24-hour period on Struthers Road. Counts were collected on Tuesday, August 27, 2024, with AM peak hour counts being collected during the period of 7:00 a.m. to 9:00 a.m. and PM peak hour counts being collected during the period of 4:00 p.m. to 6:00 p.m.

Existing traffic volumes are shown on Figure 3. Existing intersection geometry is shown on Figure 3a.

Existing signal timing parameters for the North Gate Boulevard intersections with Struthers Road and Voyager Parkway were obtained from the City of Colorado Springs and used throughout this study to the best extent possible in order to remain consistent with existing signal coordination plans. City signal timing information received is included for reference in Appendix A.



LEGEND

Study Intersection Volumes

Development Site

Figure 3
EXISTING TRAFFIC
 Volumes
 AM / PM Peak Hour
 (ADT) : Average Daily Traffic

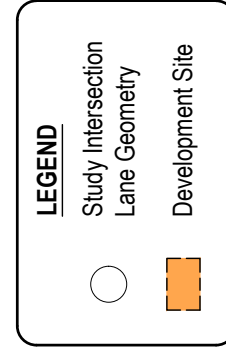
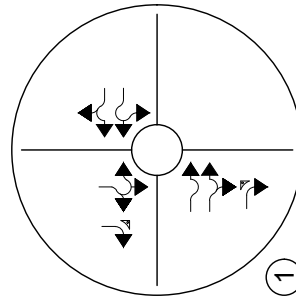
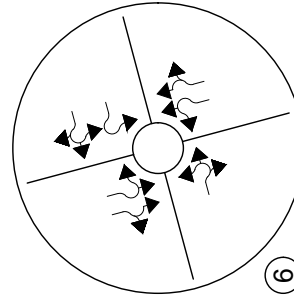
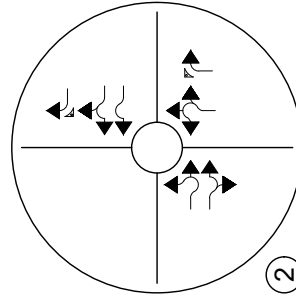
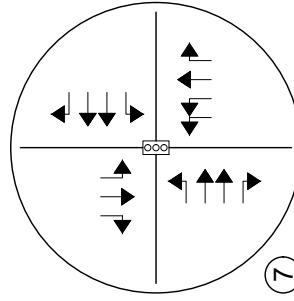
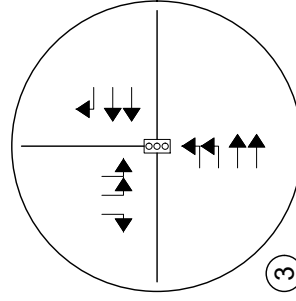
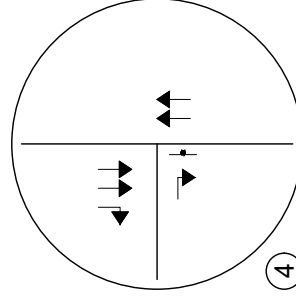
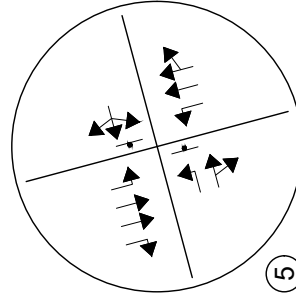
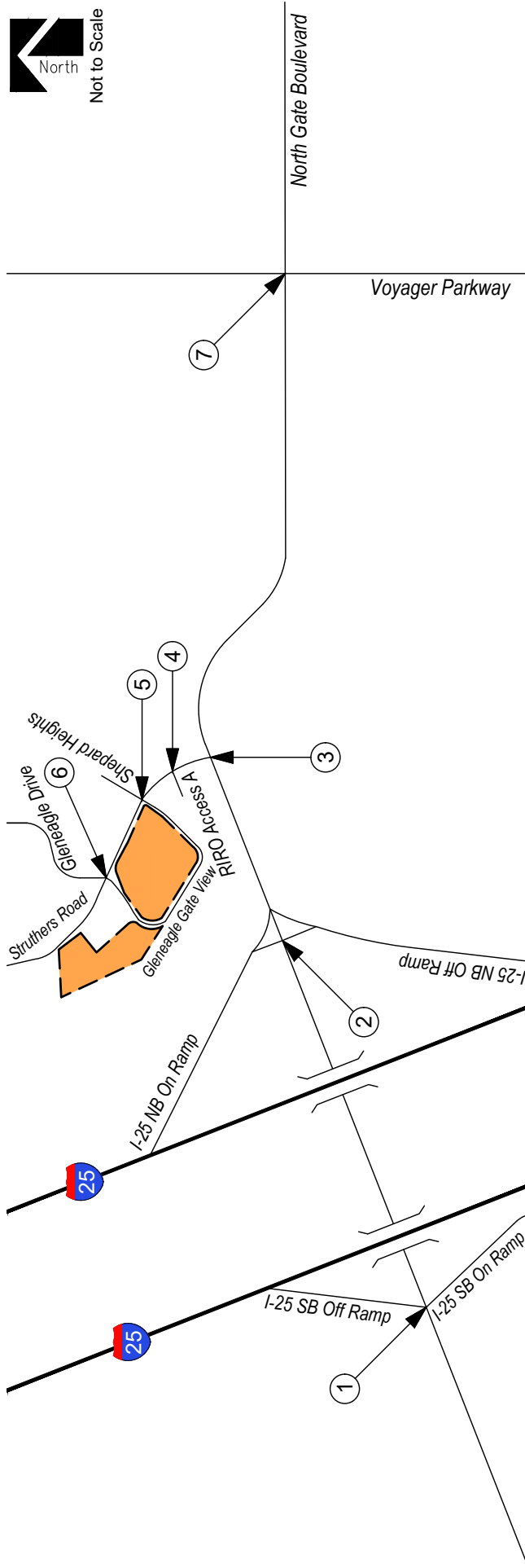


Figure 3a
EXISTING TRAFFIC
Intersection Geometry

Peak Hour Intersection Levels of Service – Existing Traffic

The Signalized, Unsignalized, and Roundabout Intersection Analysis techniques, as published in the Highway Capacity Manual (HCM), 7th Edition, by the Transportation Research Board and as incorporated into the SYNCHRO computer program, were used to analyze the study intersections for existing and future traffic conditions. These nationally accepted techniques allow for the determination of intersection level of service (LOS) based on the congestion and delay of each traffic movement as well as on the volume to capacity ratio and control delay for each approach

Pursuant to Section B.4.1.A of the County's ECM, the design objective for each scenario of this study shall be level of service "D". Level of service is a method of measurement used by transportation professionals to quantify a driver's perception of travel conditions that include travel time, number of stops, and total amount of stopped delay experienced on a roadway network. The HCM categorizes level of service into a range from "A" which indicates little, if any, vehicle delay, to "F" which indicates a level of operation considered unacceptable to most drivers. These levels of service grades with brief descriptions of the operating condition, for unsignalized and signalized intersections, are included for reference in Appendix B and have been used throughout this study.

The level of service analyses results for existing conditions are summarized in Table 1.

Intersection capacity worksheets developed for this study are provided in Appendix C.

Table 1 – Intersection Capacity Analysis Summary – Existing Traffic

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
North Gate Boulevard / Struthers Road (Signalized)	B (14.7)	B (14.0)
North Gate Boulevard / Voyager Parkway (Signalized)	B (12.0)	B (14.8)
Interstate 25 Southbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Through	A	A
Westbound Left and Through	A	A
Westbound Through	A	A
Southbound Left and Through	B	A
Interstate 25 Northbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through	A	A
Westbound Through	B	A
Northbound Left and Through	A	A
Struthers Road / RIRO Access A (Stop-Controlled)		
Eastbound Right	B	B
Struthers Road / Shepard Heights / Gleneagle Gate View (Stop-Controlled)		
Eastbound Left	E	D
Eastbound Through and Right	B	B
Westbound Left, Through and Right	D	E
Northbound Left	A	A
Southbound Left	A	A
Struthers Road / Gleneagle Drive / Gleneagle Gate View (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left	A	A
Westbound Left, Through and Right	A	A
Northbound Left and Through	A	A
Northbound Through and Right	A	A
Southbound Left and Through	A	A
Southbound Through and Right	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)

Roundabout Intersection: Level of Service

Stop-Controlled Intersection: Level of Service

Existing Traffic Analysis Results

Under existing conditions, operational analysis shows that the signalized intersection of North Gate Boulevard and Struthers Road has overall operations at LOS B during the morning and afternoon peak traffic hours.

Operational analysis shows that the signalized intersection of North Gate Boulevard and Voyager Parkway has overall operations at LOS B during the morning and afternoon peak traffic hours.

The roundabout-controlled intersection of Interstate 25 Southbound Ramp and North Gate Boulevard has turning movement operations at LOS B or better during the morning peak traffic hour and LOS A during the afternoon peak traffic hour.

The Interstate 25 Northbound Ramp and North Gate Boulevard has turning movement operations at LOS B or better during the morning peak traffic hour and LOS A during the afternoon peak traffic hour.

The stop-controlled intersection of Struthers Road and RIRO Access A has turning movement operations at LOS B during the morning and afternoon peak traffic hours.

The stop-controlled intersection of Struthers Road and Shepard Heights has turning movement operations at LOS D or better during the morning and afternoon peak traffic hours. Exceptions include the eastbound left turning movement, which operates at LOS E during the morning peak traffic hour, and the westbound turning movements, which operate at LOS E during the afternoon peak traffic hour. The LOS E operations are attributed to the through traffic volume along Struthers Road and the stop-controlled nature of the intersection. Potential mitigations to the LOS E operations include restricting Shepard Heights and Gleneagle Gate View to three-quarter movements.

The roundabout-controlled intersection of Struthers Road and Gleneagle Drive has turning movement operations at LOS A during the morning and afternoon peak traffic hours.

It is to be noted that it is not uncommon for unsignalized movements to or from an arterial roadway, in urban areas, to operate with noticeable delays during peak traffic hours. It is, however, likely that turn movements will operate better than the results obtained with this HCM Two-Way Stop-Control (TWSC) level of service analysis would indicate, as the HCM analysis may not accurately account for the effect of vehicle platooning and gaps caused by upstream signals. The upstream signal control at North Gate Boulevard may tend to create additional gaps in the traffic stream for turning movements at Shepard Heights and Gleneagle Gate View and will most likely provide mitigation to the LOS E operations projected during both peak traffic hours.

III. Future Traffic Conditions Without Proposed Development

Background traffic is the traffic projected to be on area roadways without consideration of the proposed development. Background traffic includes traffic generated by development of vacant parcels in the area.

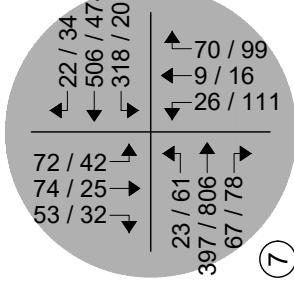
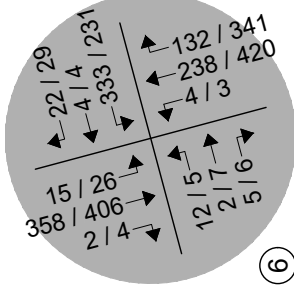
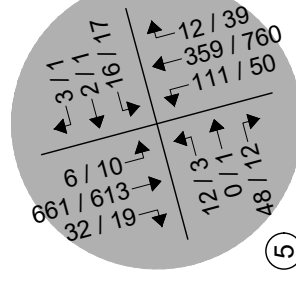
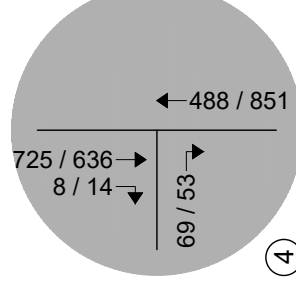
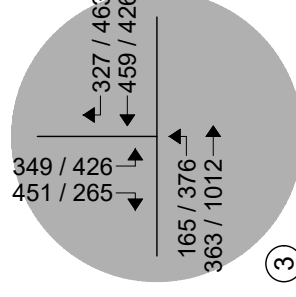
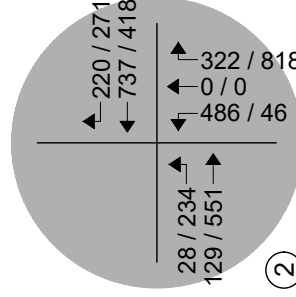
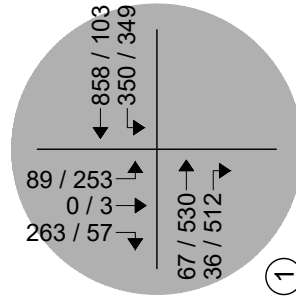
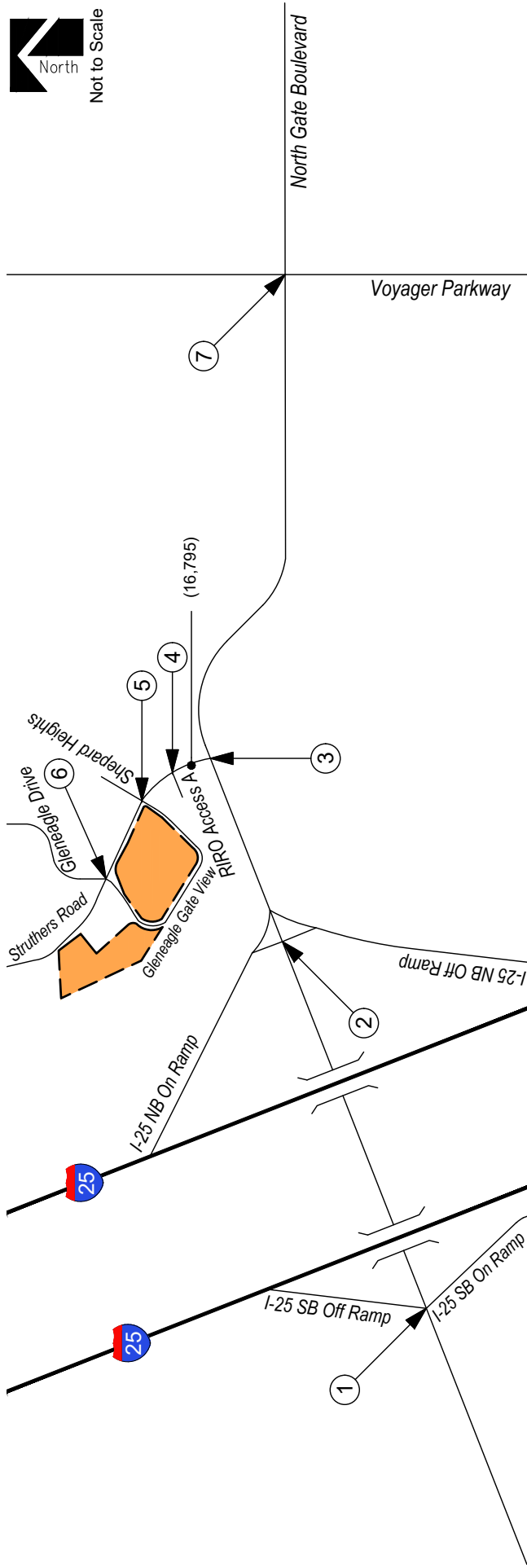
To account for projected increases in background traffic for Years 2026 and 2045, a compounded annual growth rate was determined using historical traffic data provided by CDOT's Online Transportation Information System (OTIS) along the adjacent segment of Interstate 25, which anticipates a 20-year growth rate between one and two percent. Therefore, in order to provide for a conservative analysis, a growth rate of approximately two percent was applied to existing traffic volumes.

It is important to note that ingress and egress traffic volumes at the Struthers Road intersections with Gleneagle Gate View, Shepard Heights, and RIRO Access A are not subject to annual growth patterns since these access drives do not provide connection to other roadways, therefore do not serve regional traffic.

Pursuant to the area roadway improvements discussed in Section I, Year 2026 and Year 2045 background traffic conditions assume no roadway improvements to accommodate regional transportation demands. This assumption provides for a conservative analysis. Year 2045 assumes existing signal timing parameters for the North Gate Boulevard intersections with Struthers Road and Voyager Parkway with optimized intersection splits in effort to better long-term intersection performance.

Projected background traffic volumes and intersection geometry for Year 2026 are shown on Figure 4 and Figure 4a, respectively.

Projected background traffic volumes and intersection geometry for Year 2045 are shown on Figure 5 and Figure 5a, respectively.



LEGEND

- Study Intersection
- Development Site

Figure 4
BACKGROUND TRAFFIC - YEAR 2026
 Volumes
 AM / PM Peak Hour
 (ADT) : Average Daily Traffic

NORTH GATE SUBARU
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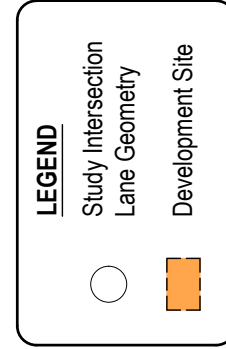
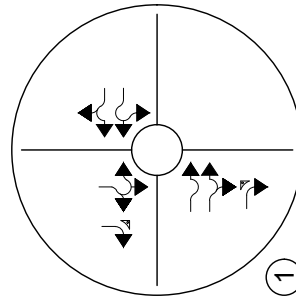
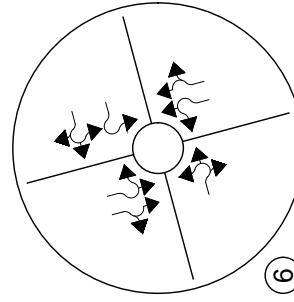
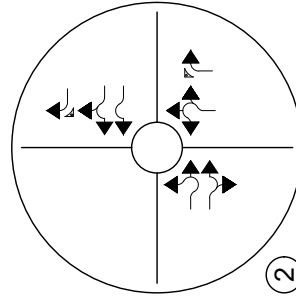
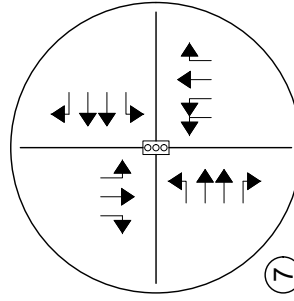
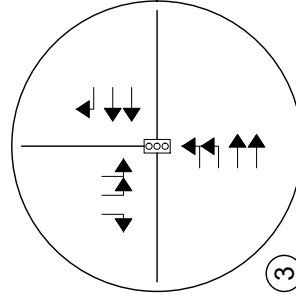
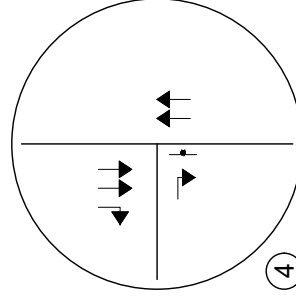
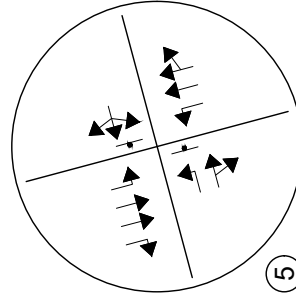
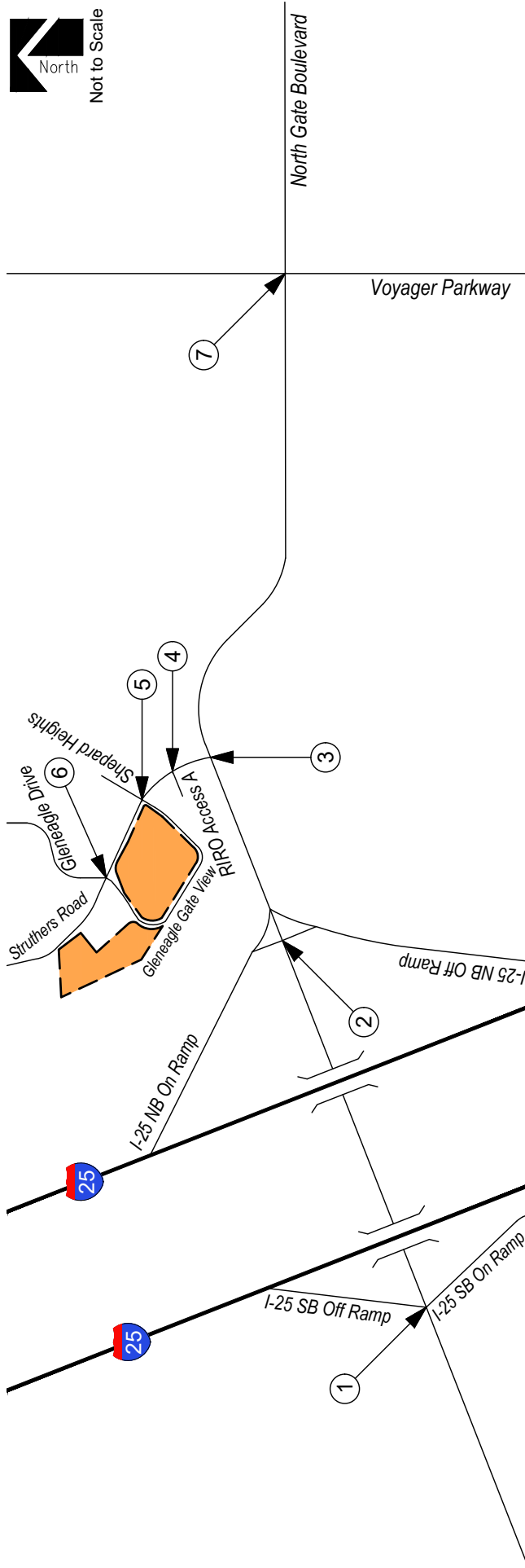


Figure 4a
BACKGROUND TRAFFIC - YEAR 2026
Intersection Geometry

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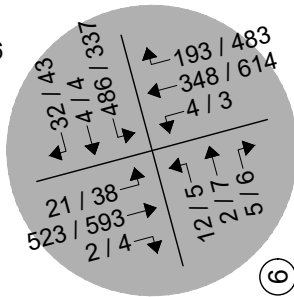
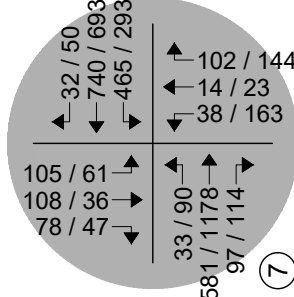
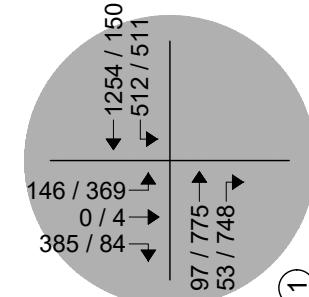
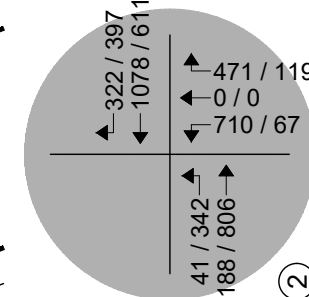
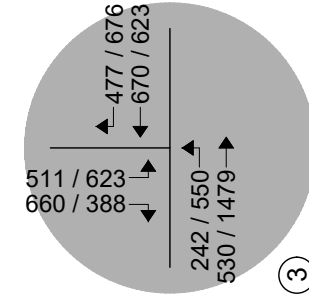
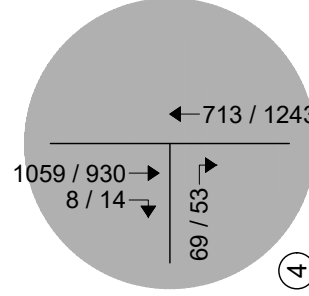
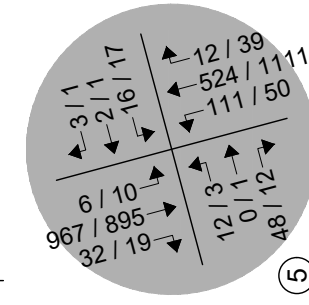
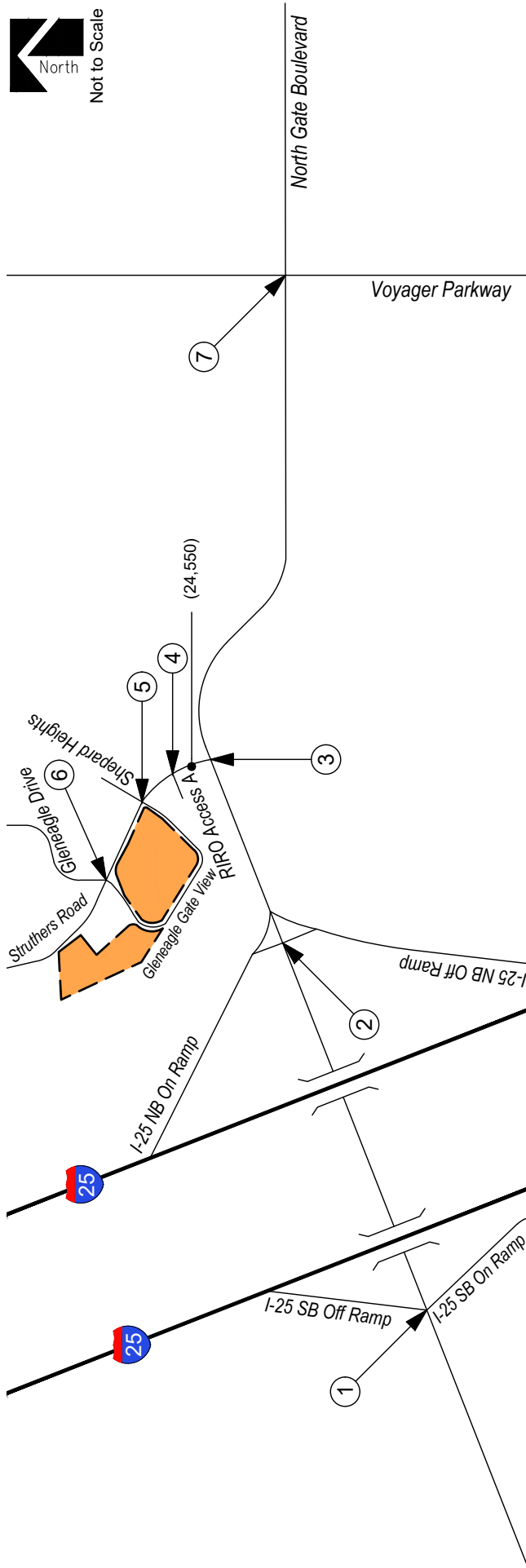


Figure 5
BACKGROUND TRAFFIC - YEAR 2045
 Volumes
 AM / PM Peak Hour
 (ADT) : Average Daily Traffic

NORTH GATE SUBARU
 Traffic Impact Study



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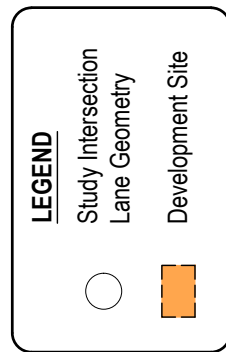
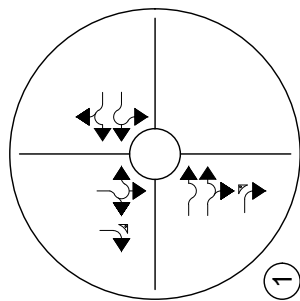
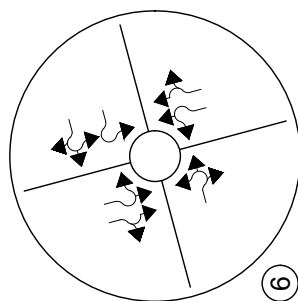
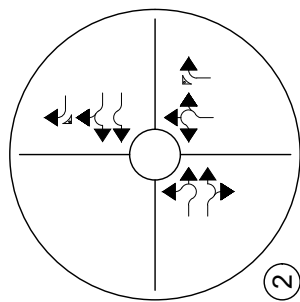
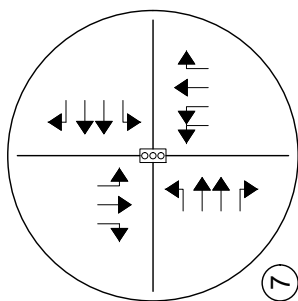
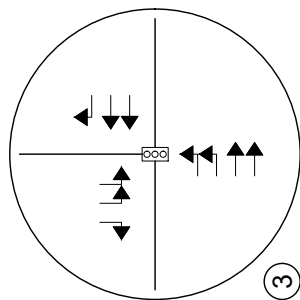
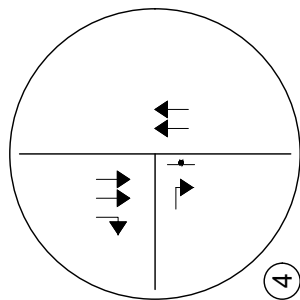
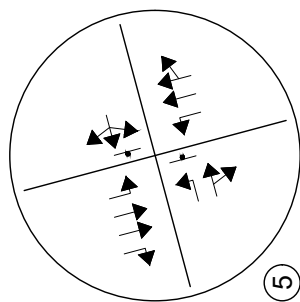
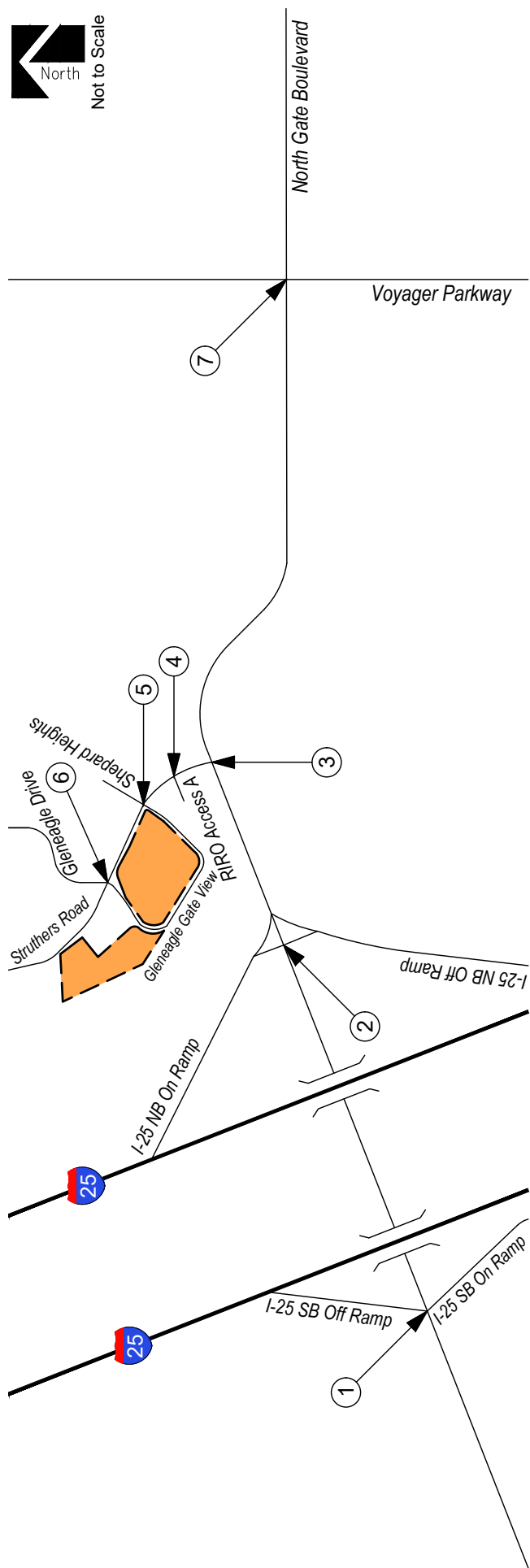


Figure 5a
BACKGROUND TRAFFIC - YEAR 2045
Intersection Geometry

Peak Hour Intersection Levels of Service – Background Traffic

As with existing traffic conditions, the operations of study intersections were analyzed under background conditions, without the proposed development, using the SYNCHRO computer program.

Background traffic level of service analysis results for Year 2026 are listed in Table 2. Year 2045 operational results are summarized in Table 3.

Definitions of levels of service are given in Appendix B. Intersection capacity worksheets are provided in Appendix C.

Table 2 – Intersection Capacity Analysis Summary – Background Traffic – Year 2026

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
North Gate Boulevard / Struthers Road (Signalized)	B (14.7)	B (14.2)
North Gate Boulevard / Voyager Parkway (Signalized)	B (12.4)	B (15.6)
Interstate 25 Southbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Through	A	A
Eastbound Through	A	A
Westbound Left and Through	A	A
Westbound Through	A	A
Southbound Left and Through	B	A
Interstate 25 Northbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through	A	A
Westbound Through	B	A
Westbound Through	B	A
Northbound Left and Through	A	A
Struthers Road / RIRO Access A (Stop-Controlled)		
Eastbound Right	B	B
Struthers Road / Shepard Heights / Gleneagle Gate View (Stop-Controlled)		
Eastbound Left	E	D
Eastbound Through and Right	B	B
Westbound Left, Through and Right	D	E
Northbound Left	A	A
Southbound Left	A	A
Struthers Road / Gleneagle Drive / Gleneagle Gate View (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left	A	A
Westbound Left, Through and Right	A	A
Northbound Left and Through	A	A
Northbound Through and Right	A	A
Southbound Left and Through	A	A
Southbound Through and Right	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)

Roundabout Intersection: Level of Service

Stop-Controlled Intersection: Level of Service

Background Traffic Analysis Results – Year 2026

Year 2026 background traffic analysis indicates that the signalized intersections within the study area continue to project overall operations at LOS B during the morning and afternoon peak traffic hours.

The roundabout-controlled intersection of Interstate 25 Southbound Ramp and North Gate Boulevard continues to project turning movement operations at LOS B or better during the morning peak traffic hour and LOS A during the afternoon peak traffic hour.

The roundabout-controlled intersection of Interstate 25 Northbound Ramp and North Gate Boulevard is expected to maintain turning movement operations at LOS B or better during the morning peak traffic hour and LOS A during the afternoon peak traffic hour.

The stop-controlled intersection of Struthers Road and RIRO Access A continues to anticipate turning movement operations at LOS B during the morning and afternoon peak traffic hours.

The stop-controlled intersection of Struthers Road and Shepard Heights has turning movement operations at LOS D or better during the morning and afternoon peak traffic hours. Exceptions continue to include the eastbound left turning movement, which operates at LOS E during the morning peak traffic hour, and the westbound turning movement, which operates at LOS E during the afternoon peak traffic hour. The LOS E operations continue to be attributed to the through traffic volumes along Struthers Road and the stop-controlled nature of the intersection. Similar to existing conditions, potential mitigations to the LOS E operations include restricting Shepard Heights and Gleneagle Gate View to three-quarter movements.

The roundabout-controlled intersection of Struthers Road and Gleneagle Drive continues to expect turning movement operations at LOS A during the morning and afternoon peak traffic hours.

Table 3 – Intersection Capacity Analysis Summary – Background Traffic – Year 2045

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
North Gate Boulevard / Struthers Road (Signalized)	C (25.8)	B (18.6)
North Gate Boulevard / Voyager Parkway (Signalized)	B (19.7)	C (23.0)
Interstate 25 Southbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Through	A	C
Westbound Left and Through	B	A
Westbound Through	B	A
Southbound Left and Through	E	B
Interstate 25 Northbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through	A	A
Westbound Through	E	A
Northbound Left and Through	B	A
Struthers Road / RIRO Access A (Stop-Controlled)		
Eastbound Right	B	B
Struthers Road / Shepard Heights / Gleneagle Gate View (Stop-Controlled)		
Eastbound Left	F	F
Eastbound Through and Right	B	C
Westbound Left, Through and Right	F	F
Northbound Left	A	B
Southbound Left	B	B
Struthers Road / Gleneagle Drive / Gleneagle Gate View (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left	A	A
Westbound Left, Through and Right	A	A
Northbound Left and Through	A	A
Northbound Through and Right	A	A
Southbound Left and Through	A	A
Southbound Through and Right	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)

Roundabout Intersection: Level of Service

Stop-Controlled Intersection: Level of Service

Background Traffic Analysis Results – Year 2045

By Year 2045 and without the proposed development, the signalized intersection of North Gate Boulevard has overall operations at LOS C during the morning peak traffic hour and LOS B during the afternoon peak traffic hour.

The signalized intersection of North Gate Boulevard and Voyager Parkway has overall operations at LOS B during the morning peak traffic hour and LOS C during the afternoon peak traffic hour.

The roundabout-controlled intersection of Interstate 25 Southbound Ramp and North Gate Boulevard has turning movement operations at LOS B or better during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hour. Exceptions include the southbound left and through turning movement which operates at LOS E during the morning peak traffic hour. The LOS E operation is attributed to conservatively applied regional growth projections and the resulting high number of vehicles traveling to and from the United States Airforce Academy. It is noted, however, that the latest HCM describes how intersections that experience LOS E operations are still within capacity but may experience extended delays. Therefore, no potential mitigations are provided at this time. It is recommended that CDOT and County Staff monitor this intersection further to determine if mitigation is necessary.

The roundabout-controlled intersection of Interstate 25 Northbound Ramp and North Gate Boulevard has turning movement operations at LOS B or better during the morning peak traffic hour and LOS A during the afternoon peak traffic hour. Exceptions include the westbound through movement which operates at LOS E during the morning peak traffic hour. The LOS E operation is attributed to conservatively applied regional growth projections and the resulting high number of vehicles traveling to and from the United States Airforce Academy. It is noted, however, that the latest HCM describes how intersections that experience LOS E operations are still within capacity but may experience extended delays. Therefore, no potential mitigations are provided at this time. It is recommended that CDOT and County Staff monitor this intersection further to determine if mitigation is necessary.

The stop-controlled intersection of Struthers Road intersection with RIRO Access A continues to project turning movement operations at LOS B during the morning and afternoon peak traffic hours.

The stop-controlled intersection of Struthers Road and Shepard Heights has turning movement operations at LOS B or better during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hours. Exceptions include the eastbound left turning movement and westbound turning movement which have operations at LOS F during the morning and afternoon peak traffic hours. The LOS F operations are attributed to regional growth projections along Struthers Road and the stop-controlled nature of the intersection. Potential mitigations to the LOS F operations projected include restricting Shepard Heights and Gleneagle Gate View to three-quarter movements.

The roundabout-controlled intersection of Struthers Road and Gleneagle Drive has turning movement operations at LOS A during the morning and afternoon peak traffic hours.

It is to be noted that it is not uncommon for unsignalized movements to or from an arterial roadway, in urban areas, to operate with noticeable delays during peak traffic hours. It is, however, likely that turn movements will operate better than the results obtained with this HCM Two-Way Stop-Control (TWSC) level of service analysis would indicate, as the HCM analysis may not accurately account for the effect of vehicle platooning and gaps caused by upstream signals. The upstream signal control at the intersection of North Gate Boulevard and Struthers Road will tend to create additional gaps in the traffic stream for turning movements at Shepard Heights and Gleneagle Gate View and will most likely provide mitigation to the LOS F operation projected during both peak traffic hours.

IV. Proposed Project Traffic

Trip Generation

Standard traffic generation characteristics compiled by the Institute of Transportation Engineers (ITE) in their report entitled Trip Generation Manual, 11th Edition, were applied to the proposed land use in order to estimate average daily traffic (ADT), AM Peak Hour, and PM Peak Hour vehicle trips. A vehicle trip is defined as a one-way vehicle movement from a point of origin to a point of destination.

The ITE land use code 840 (Automobile Sales (New)) was used for estimating trip generation because of its conservative rates and best fit to the proposed land use description.

Trip generation rates used in this study are presented in Table 4.

Table 4 – Trip Generation Rates

ITE CODELAND USEUNIT			TRIP GENERATION RATES						
			24 HOUR	AM PEAK HOUR			PM PEAK HOUR		
				ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
840	Automobile Sales (New)	KSF	27.84	1.36	0.50	1.86	0.97	1.45	2.42

Key: KSF = Thousand Square Feet Gross Floor Area.

Note: All data and calculations above are subject to being rounded to nearest value.

Table 5 illustrates projected ADT, AM Peak Hour, and PM Peak Hour traffic volumes likely generated by the proposed development upon build-out.

Table 5 – Trip Generation Summary

ITE CODELAND USESIZE				TOTAL TRIPS GENERATED						
				24 HOUR	AM PEAK HOUR			PM PEAK HOUR		
					ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
840	Automobile Sales (New)	64.0	KSF	1,782	87	32	119	62	93	155
Total:				1,782	87	32	119	62	93	155

Key: KSF = Thousand Square Feet Gross Floor Area.

Note: All data and calculations above are subject to being rounded to nearest value.

Upon build-out, Table 5 illustrates that the proposed development has the potential to generate approximately 1,782 daily vehicle trips with 119 of those occurring during the morning peak hour and 155 during the afternoon peak hour.

Adjustments to Trip Generation Rates

A development of this type is not likely to attract trips from within area land uses nor pass-by or diverted link trips from the adjacent roadway system, therefore no trip reduction was taken in this analysis.

Trip Distribution

The overall directional distribution of site-generated traffic was determined based on the location of development site within the County, proposed and existing area land uses, allowed turning movements, available roadway network, and in reference to historical traffic count data provided by CDOT's Traffic Count Database System (TCDS)⁵.

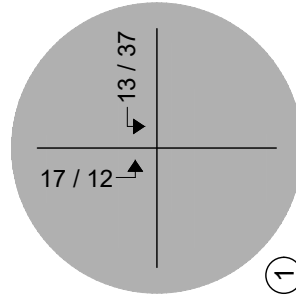
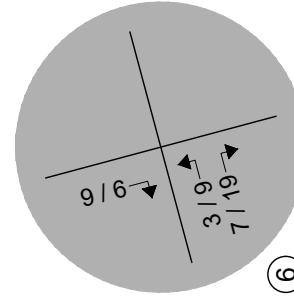
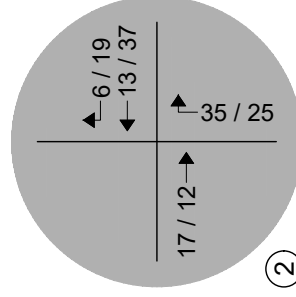
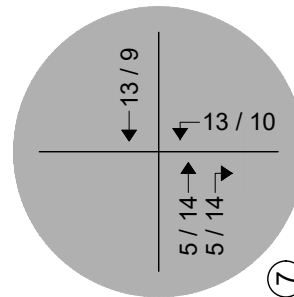
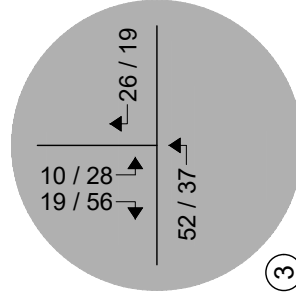
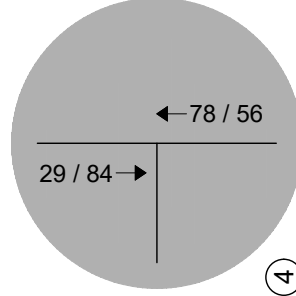
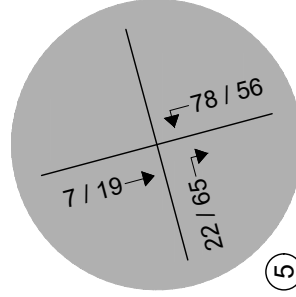
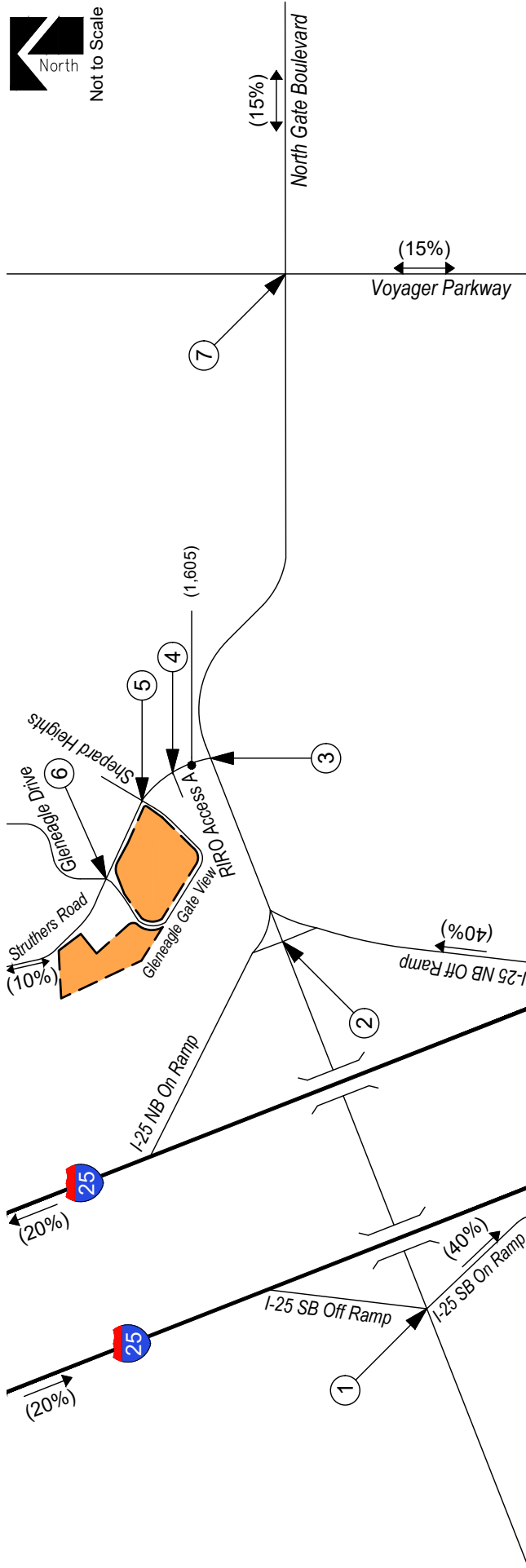
Overall trip distribution patterns for the development are shown on Figure 6.

Trip Assignment

Trip assignment is how generated and distributed vehicle trips are expected to be loaded onto the available roadway network.

Applying trip distribution patterns to site-generated traffic provides the overall site-generated trip assignments shown on Figure 6.

⁵ Transportation Data Management System, MS2, 2021.



LEGEND

- Study Intersection
- Volumes
- Development Site

Figure 6
SITE DEVELOPMENT DISTRIBUTION
 (%): Overall
SITE-GENERATED TRIPS
 AM / PM Peak Hour
 (ADT): Average Daily Traffic

V. Future Traffic Conditions With Proposed Developments

Total traffic is the traffic projected to be on area roadways with consideration of the proposed development. Total traffic includes background traffic projections for Years 2026 and 2045 with consideration of site-generated traffic. For analysis purposes, it was assumed that development construction would be completed by end of Year 2026.

Pursuant to area roadway improvement discussions provided in Section III, Year 2026 and Year 2045 total traffic conditions assume no roadway improvements to accommodate regional transportation demands. Roadway improvements associated with site development are expected to be limited to Site Access and frontage as required by the governing agency.

Projected Year 2026 total traffic volumes and intersection geometry are shown in Figure 7 and Figure 7a, respectively.

Figure 8 and Figure 8a shows projected total traffic volumes and intersection geometry for Year 2045, respectively.

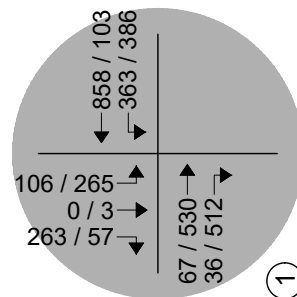
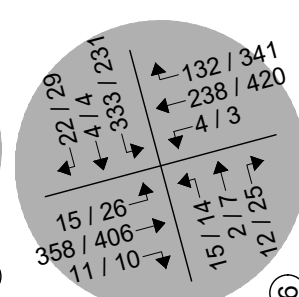
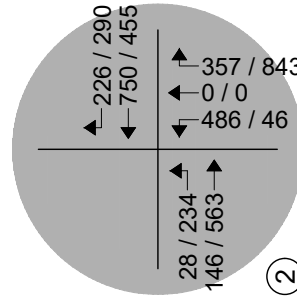
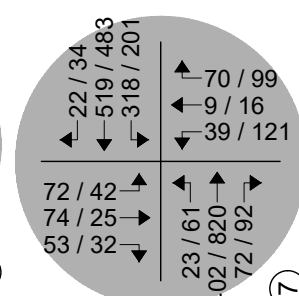
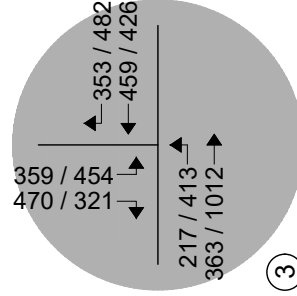
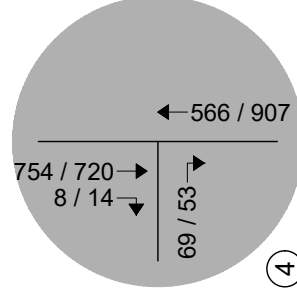
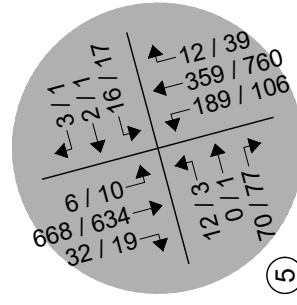
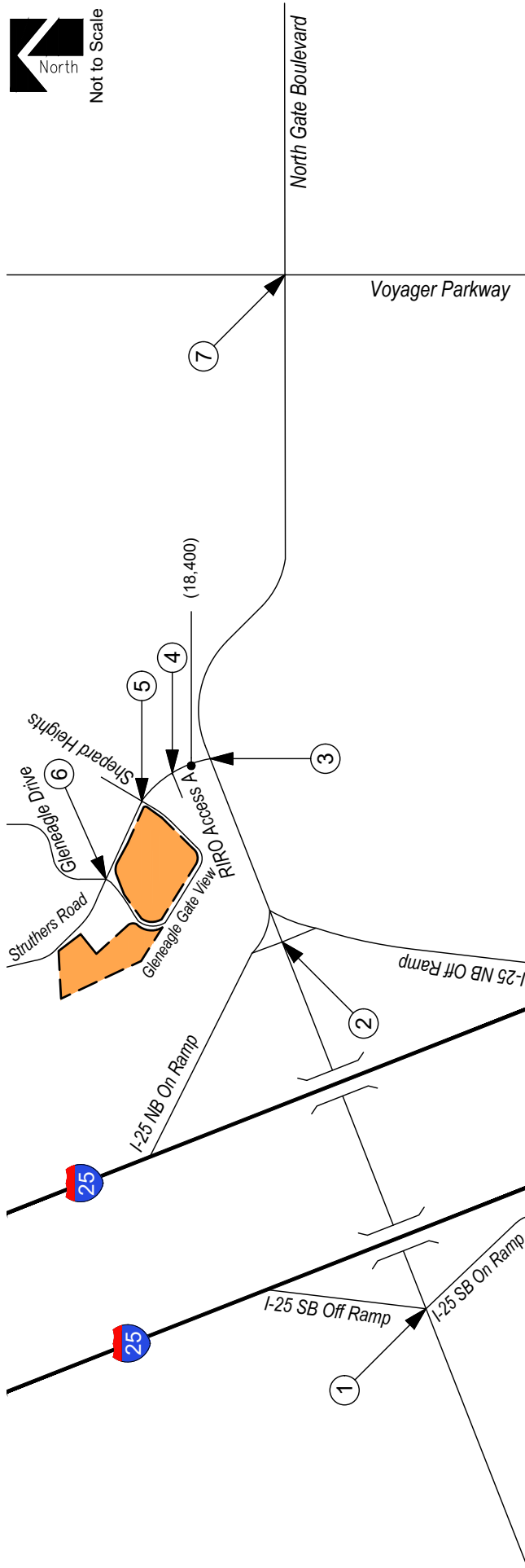
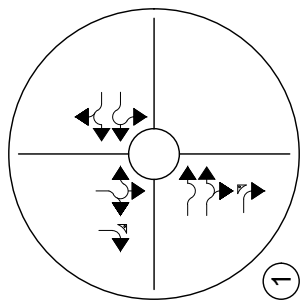
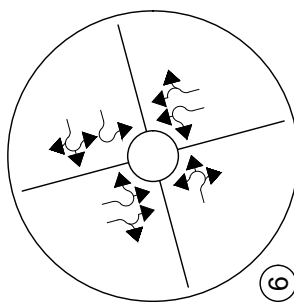
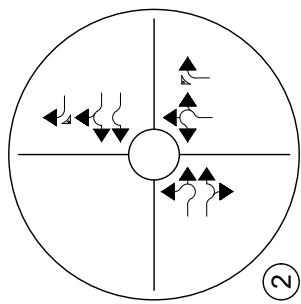
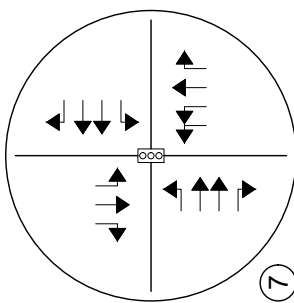
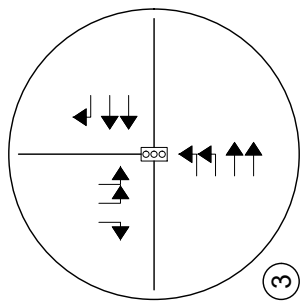
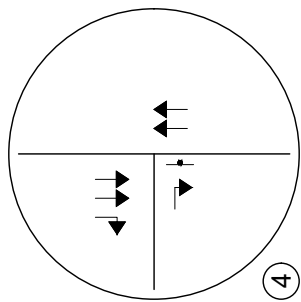
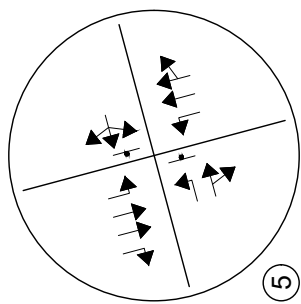
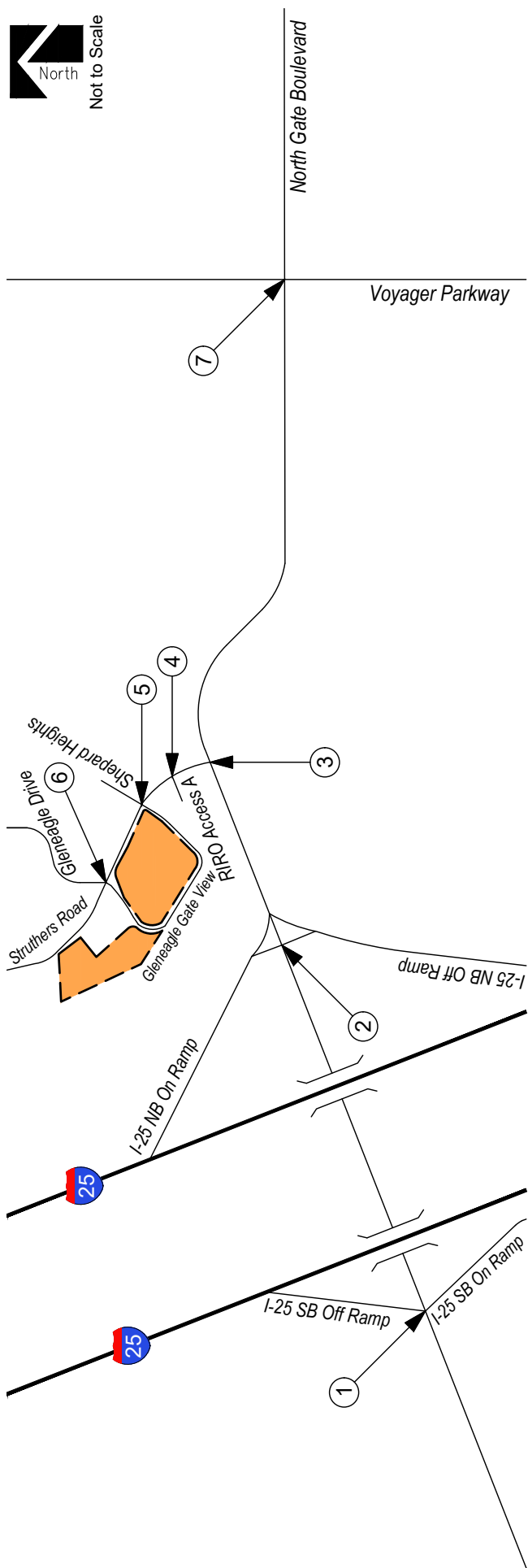


Figure 7
TOTAL TRAFFIC - YEAR 2026
Volumes
AM / PM Peak Hour
(ADT) : Average Daily Traffic



LEGEND

- Study Intersection Lane Geometry
- Development Site

Figure 7a
TOTAL TRAFFIC - YEAR 2026
Intersection Geometry

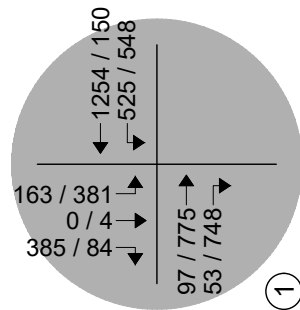
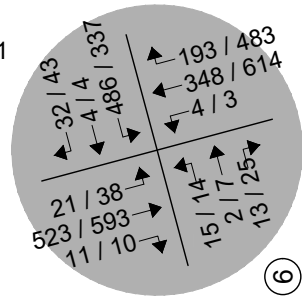
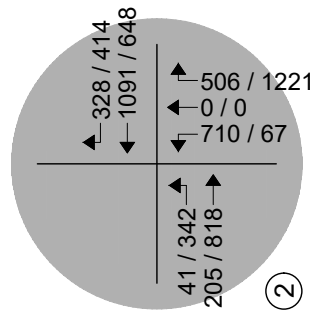
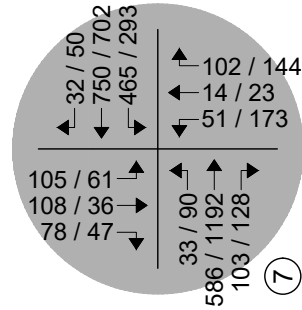
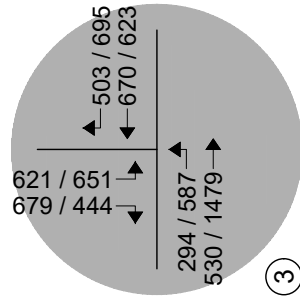
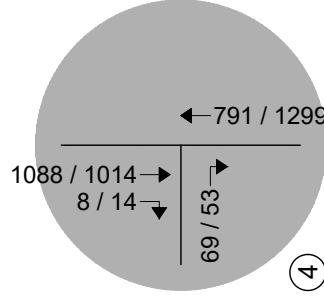
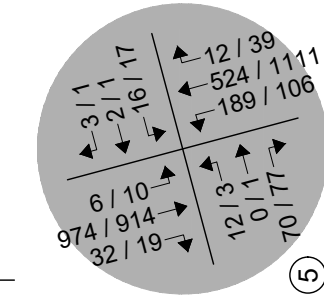
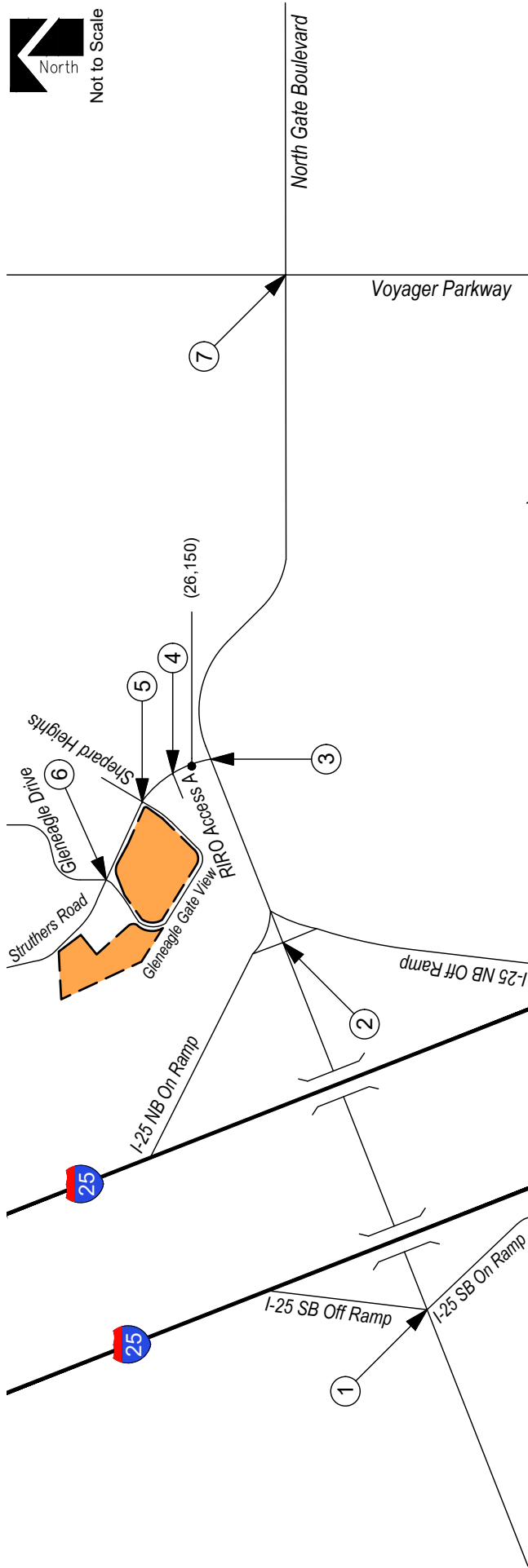


Figure 8
TOTAL TRAFFIC - YEAR 2045
 Volumes
 AM / PM Peak Hour
 (ADT) : Average Daily Traffic

NORTH GATE SUBARU
 Traffic Impact Study



SM ROCHA, LLC
 Traffic and Transportation Consultants

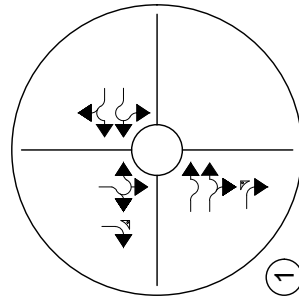
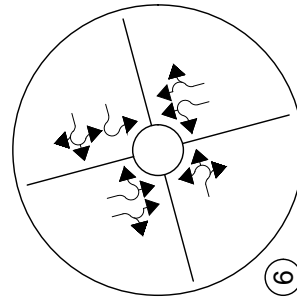
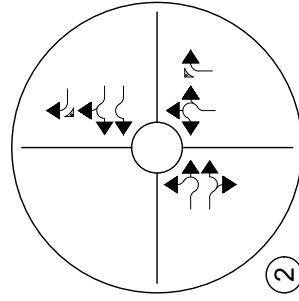
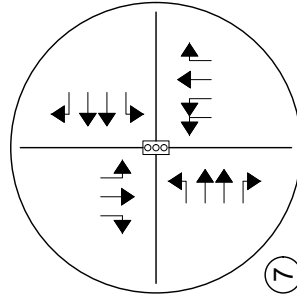
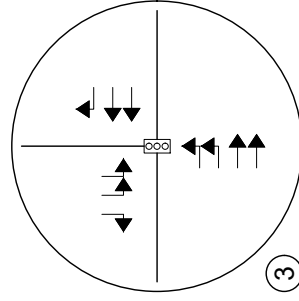
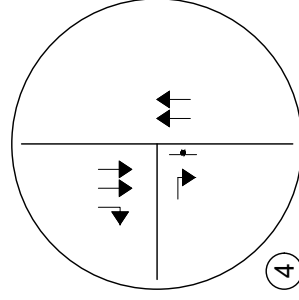
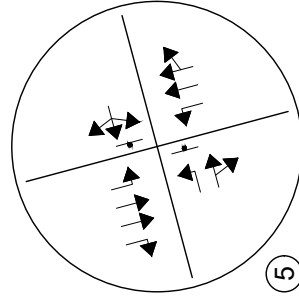
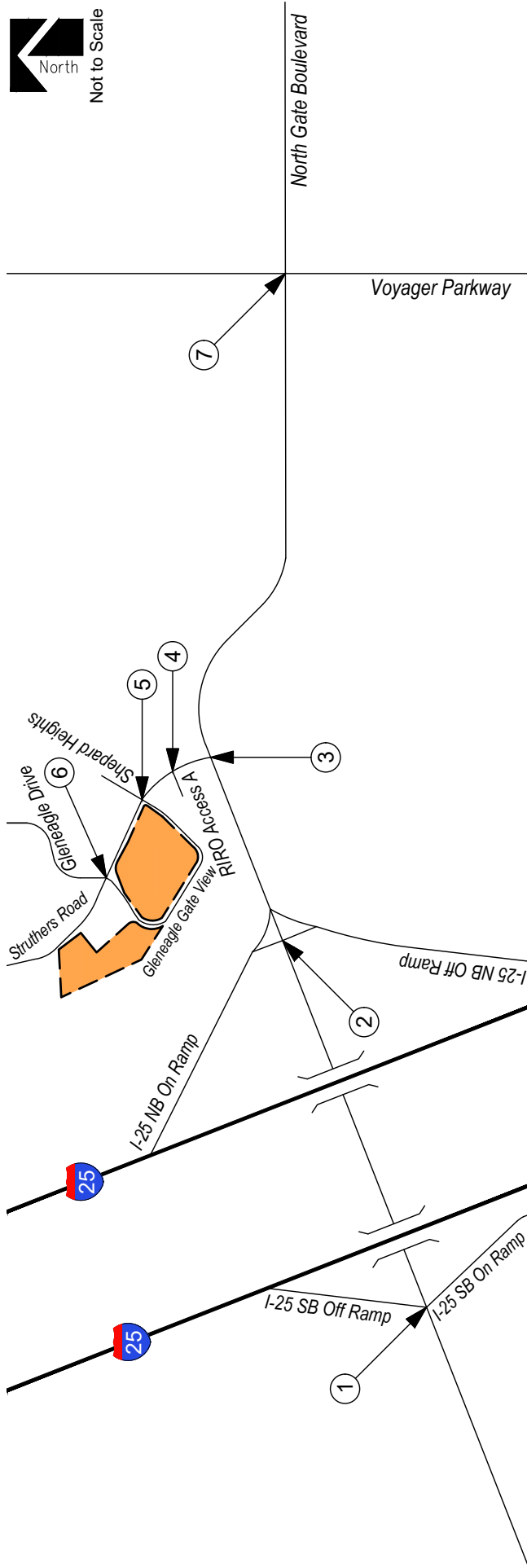


Figure 8a
TOTAL TRAFFIC - YEAR 2045
Intersection Geometry

VI. Project Impacts

The analyses and procedures described in this study were performed in accordance with the latest HCM and are based upon the worst-case conditions that occur during a typical weekday upon build-out of site development and analyzed land uses. Therefore, study intersections are likely to operate with traffic conditions better than those described within this study, which represent the peak hours of weekday operations only.

Peak Hour Intersection Levels of Service – Total Traffic

As with background traffic, the operations of the study intersections were analyzed under projected total traffic conditions using the SYNCHRO computer program. Total traffic level of service analysis results for Years 2026 and 2045 are summarized in Table 6 and Table 7, respectively.

Definitions of levels of service are given in Appendix B. Intersection capacity worksheets are provided in Appendix C.

Table 6 – Intersection Capacity Analysis Summary – Total Traffic – Year 2026

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
North Gate Boulevard / Struthers Road (Signalized)	B (14.6)	B (14.6)
North Gate Boulevard / Voyager Parkway (Signalized)	B (13.1)	B (16.4)
Interstate 25 Southbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Through	A	B
Westbound Left and Through	A	A
Westbound Through	A	A
Southbound Left and Through	B	A
Interstate 25 Northbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through	A	A
Westbound Through	B	A
Northbound Left and Through	A	A
Struthers Road / RIRO Access A (Stop-Controlled)		
Eastbound Right	B	B
Struthers Road / Shepard Heights / Gleneagle Gate View (Stop-Controlled)		
Eastbound Left	F	E
Eastbound Through and Right	B	B
Westbound Left, Through and Right	E	F
Northbound Left	A	A
Southbound Left	B	A
Struthers Road / Gleneagle Drive / Gleneagle Gate View (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left	A	A
Westbound Left, Through and Right	A	A
Northbound Left and Through	A	A
Northbound Through and Right	A	A
Southbound Left and Through	A	A
Southbound Through and Right	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)

Roundabout Intersection: Level of Service

Stop-Controlled Intersection: Level of Service

Table 7 – Intersection Capacity Analysis Summary – Total Traffic – Year 2045

INTERSECTION LANE GROUPS	LEVEL OF SERVICE	
	AM PEAK HOUR	PM PEAK HOUR
North Gate Boulevard / Struthers Road (Signalized)	C (26.7)	B (19.6)
North Gate Boulevard / Voyager Parkway (Signalized)	B (19.6)	C (23.0)
Interstate 25 Southbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Through	A	D
Westbound Left and Through	B	A
Westbound Through	B	A
Southbound Left and Through	E	B
Interstate 25 Northbound Ramp / North Gate Boulevard (Roundabout)		
Eastbound Left and Through	A	A
Eastbound Through	A	A
Westbound Through	E	A
Northbound Left and Through	B	A
Struthers Road / RIRO Access A (Stop-Controlled)		
Eastbound Right	B	B
Struthers Road / Shepard Heights / Gleneagle Gate View (Stop-Controlled)		
Eastbound Left	F	F
Eastbound Through and Right	B	C
Westbound Left, Through and Right	F	F
Northbound Left	A	B
Southbound Left	B	B
Struthers Road / Gleneagle Drive / Gleneagle Gate View (Roundabout)		
Eastbound Left, Through and Right	A	A
Westbound Left	A	A
Westbound Left, Through and Right	A	A
Northbound Left and Through	A	A
Northbound Through and Right	A	A
Southbound Left and Through	A	A
Southbound Through and Right	A	A

Key: Signalized Intersection: Level of Service (Control Delay in sec/veh)

Roundabout Intersection: Level of Service

Stop-Controlled Intersection: Level of Service

Total Traffic Analysis Results Upon Development Build-Out

Table 7 illustrates how, by Year 2045 and upon development build-out, the signalized intersection of North Gate Boulevard and Struthers Road has overall operations at LOS C during the morning peak traffic hour and LOS B during the afternoon peak traffic hour.

The signalized intersection of North Gate Boulevard and Voyager Parkway has overall operations at LOS B during the morning peak traffic hour and LOS C during the afternoon peak traffic hours.

The roundabout-controlled intersection of Interstate 25 Southbound Ramp and North Gate Boulevard has turning movement operations at LOS B or better during the morning peak traffic hour and LOS D or better during the afternoon peak traffic hours. Exceptions continue to include the southbound left and through turning movement which operates at LOS E during the morning peak traffic hour. As with background traffic conditions, the LOS E operation is attributed to conservatively applied regional growth projections and the resulting high number of vehicles traveling to and from the United States Airforce Academy. It is emphasized that the latest HCM describes how intersections that experience LOS E operations are still within capacity but may experience extended delays. Therefore, no potential mitigations are provided at this time. It is therefore recommended that CDOT and County Staff monitor this intersection further to determine if mitigation is necessary.

The roundabout-controlled intersection of Interstate 25 Northbound Ramp and North Gate Boulevard has turning movement operations at LOS B or better during the morning peak traffic hour and LOS A during the afternoon peak traffic hours. Exceptions continue to include the westbound through movement which operates at LOS E during the morning peak traffic hour. As with background traffic conditions, the LOS E operation is attributed to conservatively applied regional growth projections and the resulting high number of vehicles traveling to and from the United States Airforce Academy. It is emphasized that the latest HCM describes how intersections that experience LOS E operations are still within capacity but may experience extended delays. Therefore, no potential mitigations are provided at this time. It is therefore recommended that CDOT and County Staff monitor this intersection further to determine if mitigation is necessary.

The stop-controlled intersection of Struthers Road and RIRO Access A has turning movement operations at LOS B during the morning and afternoon peak traffic hours.

The stop-controlled intersection of Struthers Road and Shepard Heights has overall operations at LOS B or better during the morning and afternoon peak traffic hours. Exceptions continue to include the eastbound left turning movement and the westbound turning movement which have operations at LOS F during the morning and afternoon peak traffic hours. The LOS F operations are attributed to regional growth projections and the stop-controlled nature of the intersection. As with background traffic conditions, potential mitigations to the LOS F operations include restriction of Shepard Heights and Gleneagle Gate View to three-quarter movements.

The roundabout-controlled intersection of Struthers Road and Gleneagle Drive has turning movement operations at LOS A during the morning and afternoon peak traffic hours.

It is to be noted that it is not uncommon for unsignalized movements to or from an arterial roadway, in urban areas, to operate with noticeable delays during peak traffic hours. It is, however, likely that turn movements will operate better than the results obtained with this HCM Two-Way Stop-Control (TWSC) level of service analysis would indicate, as the HCM analysis may not accurately account for the effect of vehicle platooning and gaps caused by upstream signals. The upstream signal control at the intersection of North Gate Boulevard and Struthers Road will tend to create additional gaps in the traffic stream for turning movements at Shepard Heights and Gleneagle Gate View and will most likely provide mitigation to the LOS F operation projected during both peak traffic hours.

These intersection operations are similar to background conditions.

Queue Length Analysis

Queue lengths for the study intersections were analyzed using Year 2045 total traffic conditions. The analysis yields estimate of 95th percentile queue lengths, which have only a five percent probability of being exceeded during the analysis time period. An average vehicle length of 25 feet was assumed. Queue lengths were modeled and are included with the Synchro worksheets in Appendix C.

Table 8 summarizes the 95th percentile queue results in comparison to the projected storage requirements for turn movements within study area for Year 2045.

Table 8 – Turn Lane Queues and Storage Requirements – Total Traffic – Year 2045

Intersection	Turn Movement	Existing Turn Lane Length (feet)	AM Peak Hour		PM Peak Hour		Recommended Turn Lane Length (feet)	
			95th Percentile Queue Length (feet)	Vehicle Equivalent (vehicles)	95th Percentile Queue Length (feet)	Vehicle Equivalent (vehicles)		
Signalized Intersections								
North Gate Boulevard / Struthers Road	EB	L	185' x2	113'	5	133'	6	185' x2
		T	-	215'	9	506'	21	-
	WB	T	-	207'	9	196'	8	-
		R	125'	83'	4	70'	3	125'
	SB	L	200' x2	11'	1	333'	14	200' x2
		R	-	657'	27	214'	9	-
North Gate Boulevard / Voyager Parkway	EB	L	215'	26'	2	35'	2	215'
		T	-	306'	13	522'	21	-
		R	265'	25'	1	11'	1	265'
	WB	L	365'	224'	9	229'	10	365'
		T	-	198'	8	167'	7	-
		R	215'	0'	0	0'	0	215'
	NB	L	270' x2	44'	2	114'	5	270' x2
		T	-	33'	2	47'	2	-
		R	200'	9'	0	52'	3	200'
	SB	L	130'	129'	6	86'	4	130'
		T	-	148'	6	68'	3	-
		R	135'	0'	0	0'	0	135'
Roundabout Intersections								
Interstate 25 Southbound Ramp / Struthers Road	EB	T	-	0'	0	175'	7	-
		T,R	-	0'	0	175'	7	-
	WB	L,T	-	150'	6	50'	2	-
		T	-	175'	7	0'	0	-
	SB	L,T	-	100'	4	0'	0	-
		R	-	0'	0	100'	4	-
Interstate 25 Northbound Ramp / Struthers Road	EB	L,T	-	0'	0	50'	2	-
		T	-	0'	0	75'	3	-
	WB	T	-	275'	11	50'	2	-
		T,R	-	300'	12	50'	2	-
	NB	L,T	-	150'	6	0'	0	-
		R	-	0'	0	0'	0	-
Struthers Road / Gleneagle Drive / Gleneagle Gate View	EB	L,T,R	-	0'	0	0'	0	-
		L	200'	25'	1	25'	1	200'
	WB	L,T,R	-	25'	1	25'	1	-
		L,T	-	25'	1	50'	2	-
	NB	T,R	-	25'	1	75'	3	-
		L,T	-	50'	2	50'	2	-
SB	T,R	-	50'	2	50'	2	-	

Note: Turn Lane Length does not include taper length.
x2 = Dual Turn Lanes.

Table 8 (Cont.) – Turn Lane Queues and Storage Requirements – Total Traffic – Year 2045

Intersection	Turn Movement		Existing Turn Lane Length (feet)	AM Peak Hour		PM Peak Hour		Recommended Turn Lane Length (feet)
				95th Percentile Queue Length (feet)	Vehicle Equivalent (vehicles)	95th Percentile Queue Length (feet)	Vehicle Equivalent (vehicles)	
Stop-Controlled Intersections								
Struthers Road / RIRO Access A	EB	R	-	15'	1	10'	1	-
	NB	T	-	0'	0	0'	0	-
	SB	T	-	0'	0	0'	0	-
		R	115'	0'	0	0'	0	115'
Struthers Road / Shepard Heights / Glineagle Gate View	EB	L	75'	33'	2	8'	1	75'
		T,R	-	13'	1	20'	1	-
	WB	L,T,R	-	43'	2	63'	3	-
	NB	L	125'	35'	2	15'	1	125'
		T,R	-	0'	0	0'	0	-
	SB	L	210'	0'	0	3'	1	210'
		T	-	0'	0	0'	0	-
		R	165'	0'	0	0'	0	165'

Note: Turn Lane Length does not include taper length.
x2 = Dual Turn Lanes.

As Table 8 shows, all turn lane lengths have sufficient storage to accommodate future traffic volumes.

Recommended Improvements

No public improvements associated with this development are recommended. If the County desires to maintain their design objective of LOS D or better, then restricting the Struthers Road intersection with Shepard Heights and Gleneagle Gate View to three-quarter movement is recommended. Additionally, considering that the LOS E operations are attributed to the conservatively applied regional growth projections and the resulting high volumes traveling to and from the United States Airforce Academy, no improvements to the North Gate Boulevard intersections with the Interstate 25 Northbound Ramps and Southbound Ramps are expected to be needed. These intersections should be monitored further by CDOT and County Staff as area development occurs to determine if mitigation is necessary.

It is emphasized that the poor operations occur without the development and are not further impacted with consideration of North Gate Subaru. It is emphasized that with the conservative regional growth applied throughout this analysis, the study intersections are likely to operate with traffic conditions better than those described within this report.

VII. Conclusion

This traffic impact study addressed the capacity, geometric, and control requirements associated with the development entitled North Gate Subaru. This proposed commercial development consists of a Subaru car dealership with a maximum gross floor area of approximately 64,000 square feet. The development is located near the northeast corner of Interstate 25 and North Gate Boulevard in El Paso County, Colorado.

The study area examined in this analysis encompassed the area bounded by Struthers Road from North Gate Boulevard north to Gleneagle Drive, and North Gate Boulevard from Voyager Parkway west to the Interstate 25 Interchange and includes proposed site accesses.

Analysis was conducted for critical AM Peak Hour and PM Peak Hour traffic operations for existing traffic conditions, Year 2026 and Year 2045 background traffic conditions, and Year 2026 and Year 2045 total traffic conditions.

Analysis of existing traffic conditions indicates that the signalized intersections within the study area have overall operations at LOS B during the morning and afternoon peak traffic hours. The roundabout-controlled intersections within the study area have turning movement operations at LOS B or better during the morning and afternoon peak traffic hours. The stop-controlled intersection of Struthers Road and RIRO Access A has turning movement operations at LOS B during the morning and afternoon peak traffic hours. The stop-controlled intersection of Struthers Road and Shepard Heights has turning movement operations at LOS D or better during the morning and afternoon peak traffic hours. Exceptions include the eastbound left turning movement, which operates at LOS E during the morning peak traffic hour, and the westbound turning movements, which operate at LOS E during the afternoon peak traffic hour. The LOS E operations are attributed to the through traffic volume along Struthers Road and the stop-controlled nature of the intersection. Potential mitigations to the LOS E operations include restricting Shepard Heights and Gleneagle Gate View to three-quarter movements.

Without the proposed development, Year 2026 background operational analysis shows that the signalized intersections within the study area have overall operations at LOS B during the morning and afternoon peak traffic hours. The roundabout-controlled intersections within the study area have turning movement operations at LOS B or better during the morning and afternoon peak traffic hours. The stop-controlled intersection of Struthers Road and RIRO Access A continues to anticipate turning movement operations at LOS B during the morning and afternoon peak traffic hours. The stop-controlled intersection of Struthers Road and Shepard Heights has turning movement operations at LOS D or better during the morning and afternoon peak traffic hours. Exceptions continue to include the eastbound left turning movement, which operates at LOS E during the morning peak traffic hour, and the westbound turning movement, which operates at LOS E during the afternoon peak traffic hour. The LOS E operations continue to be attributed to the through traffic volumes along Struthers Road and the stop-controlled nature of the intersection. Similar to existing conditions, potential mitigations to the LOS E operations include restricting Shepard Heights and Gleneagle Gate View to three-quarter movements.

By Year 2045 and without the proposed development, the signalized intersections within the study area have overall operations at LOS C or better during the morning and afternoon peak traffic hours. The roundabout-controlled intersections within the study area have turning movement operations at LOS B or better during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hour. Exceptions include the southbound turning movement at the North Gate Boulevard intersection with Interstate 25 Southbound Ramp and the westbound through movement at the Northgate Boulevard Intersection with Interstate 25 Northbound Ramp. The LOS E operations are attributed to conservatively applied regional growth projections and the resulting high number of vehicles traveling to and from the United States Airforce Academy. It is noted, however, that the latest HCM describes how intersections that experience LOS E operations are still within capacity but may experience extended delays. Therefore, no potential mitigations are provided at this time. It is recommended that CDOT and County Staff monitor this intersection further as area development occurs to determine if mitigation is necessary. The stop-controlled intersection of Stuthers Road intersection with RIRO Access A continues to project turning movement operations at LOS B during the morning and afternoon peak traffic hours. The stop-controlled intersection of Struthers Road and Shepard Heights has turning movement operations at LOS B or better during the morning peak traffic hour and LOS C or better during the afternoon peak traffic hour. Exceptions include the eastbound left turning movement and westbound turning movement which have operations at LOS F during the morning and afternoon peak traffic hours. The LOS F operations are attributed to regional growth projections along Struthers Road and the stop-controlled nature of the intersection. Potential mitigations to the LOS F operations projected include restricting Shepard Heights and Gleneagle Gate View to three-quarter movements.

Analysis of future traffic conditions indicates that the addition of site-generated traffic is expected to create no negative impact to traffic operations for the existing and surrounding roadway system upon roadway and intersection control improvements assumed within this analysis. With all conservative assumptions defined in this analysis, the study intersections are projected to operate at future levels of service comparable to Year 2045 background traffic conditions. Proposed site accesses have long-term operations at LOS B or better during peak traffic periods and upon build-out. Exceptions include the eastbound turning movement at the intersection of Struthers Road and Gleneagle Gate View which operates at LOS F during the morning and afternoon peak traffic hours. The LOS F operations occur onsite, and are attributed to regional growth projections and the stop-controlled nature of the intersection.

This site is subject to the El Paso County Road Impact Fee Program (Resolution 24-377), as amended. An option for payment will be selected at the final land use approval stage.

APPENDIX A

**Traffic Count Data
Signal Timing Information**



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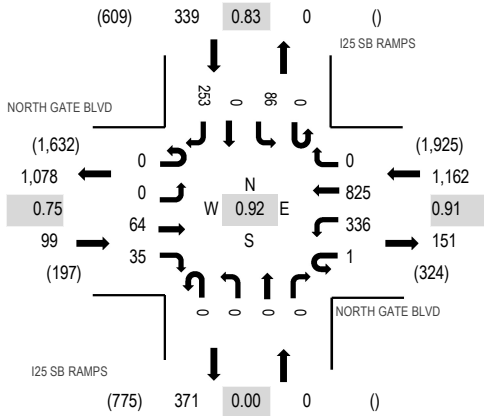
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Date: Tuesday, August 27, 2024

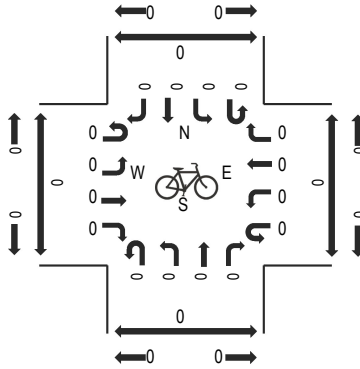
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Peak 15-Minutes: 07:00 AM - 07:15 AM

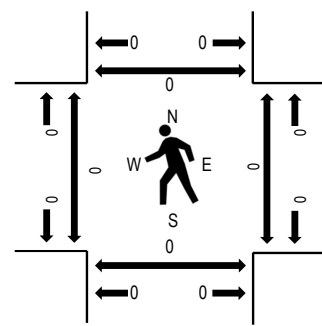
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	NORTH GATE BLVD				NORTH GATE BLVD				I25 SB RAMPS				I25 SB RAMPS				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound				Southbound						West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right						
7:00 AM	0	0	8	8	0	80	238	0	0	0	0	0	0	15	0	87	436	1,600	0	0	0	0
7:15 AM	0	0	14	5	0	47	230	0	0	0	0	0	0	17	0	73	386	1,470	0	0	0	0
7:30 AM	0	0	21	13	0	99	210	0	0	0	0	0	0	27	0	48	418	1,352	0	0	0	0
7:45 AM	0	0	21	9	1	110	147	0	0	0	0	0	0	27	0	45	360	1,195	0	0	0	0
8:00 AM	1	0	12	5	0	100	126	0	0	0	0	0	0	19	0	43	306	1,131	0	0	0	0
8:15 AM	0	0	13	7	0	81	100	0	0	0	0	0	0	23	0	44	268		0	0	0	0
8:30 AM	1	0	16	12	0	96	79	0	0	0	0	0	0	29	0	28	261		0	0	0	0
8:45 AM	0	0	19	12	0	88	93	0	0	0	0	0	0	42	3	39	296		0	0	0	0
Count Total	2	0	124	71	1	701	1,223	0	0	0	0	0	0	199	3	407	2,731		0	0	0	0
Peak Hour	0	0	64	35	1	336	825	0	0	0	0	0	0	86	0	253	1,600		0	0	0	0



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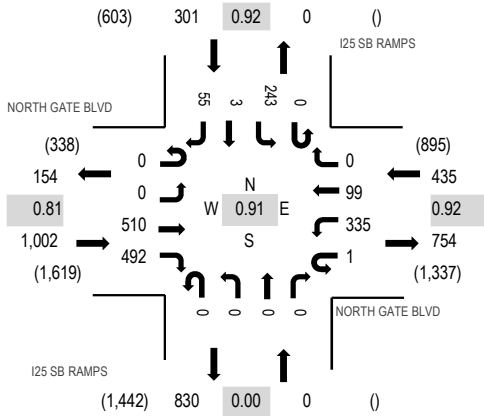
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Date: Tuesday, August 27, 2024

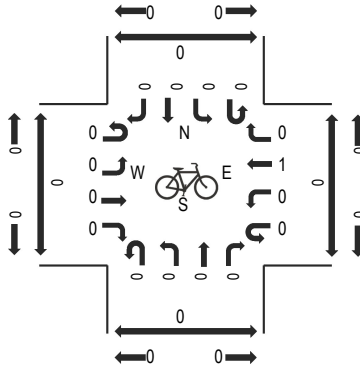
Peak Hour: 04:15 PM - 05:15 PM

Peak 15-Minutes: 04:30 PM - 04:45 PM

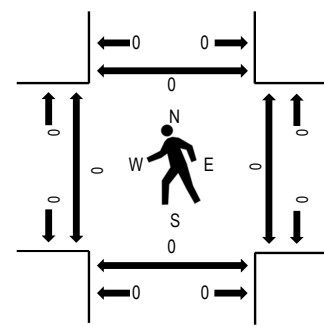
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	NORTH GATE BLVD Eastbound				NORTH GATE BLVD Westbound				I25 SB RAMPS Northbound				I25 SB RAMPS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	111	98	1	75	32	0	0	0	0	0	0	52	1	12	382	1,730	0	0	0	0
4:15 PM	0	0	118	127	0	87	27	0	0	0	0	0	0	51	0	16	426	1,738	0	0	0	0
4:30 PM	0	0	150	162	0	78	21	0	0	0	0	0	0	52	0	16	479	1,689	0	0	0	0
4:45 PM	0	0	127	116	1	83	28	0	0	0	0	0	0	74	1	13	443	1,540	0	0	0	0
5:00 PM	0	0	115	87	0	87	23	0	0	0	0	0	0	66	2	10	390	1,387	0	0	0	0
5:15 PM	0	0	108	70	1	101	20	0	0	0	0	0	0	59	2	16	377		0	0	0	0
5:30 PM	0	0	66	55	0	104	24	0	0	0	0	0	0	64	0	17	330		0	0	0	0
5:45 PM	0	0	64	45	0	61	41	0	0	0	0	0	0	57	0	22	290		0	0	0	0
Count Total	0	0	859	760	3	676	216	0	0	0	0	0	0	475	6	122	3,117		0	0	0	0
Peak Hour	0	0	510	492	1	335	99	0	0	0	0	0	0	243	3	55	1,738		0	0	0	0



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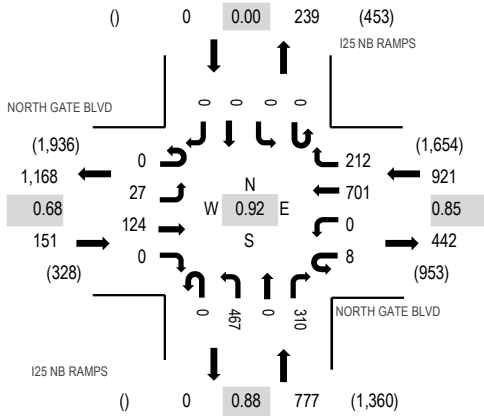
Location: 2 I25 NB RAMPS & NORTH GATE BLVD AM

Date: Tuesday, August 27, 2024

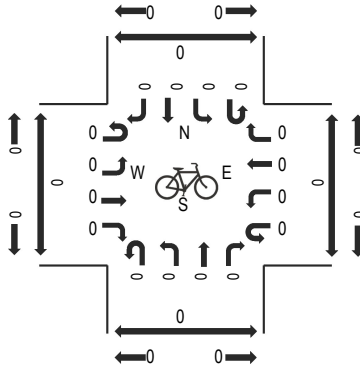
Peak Hour: 07:00 AM - 08:00 AM

Peak 15-Minutes: 07:00 AM - 07:15 AM

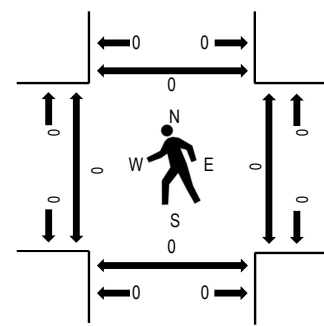
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	NORTH GATE BLVD Eastbound				NORTH GATE BLVD Westbound				I25 NB RAMPS Northbound				I25 NB RAMPS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	3	15	0	0	0	225	46	0	168	0	47	0	0	0	0	504	1,849	0	0	0	0
7:15 AM	0	7	31	0	6	0	146	58	0	136	0	86	0	0	0	0	470	1,759	0	0	0	0
7:30 AM	0	8	40	0	2	0	160	59	0	83	0	77	0	0	0	0	429	1,660	0	0	0	0
7:45 AM	0	9	38	0	0	0	170	49	0	80	0	100	0	0	0	0	446	1,556	0	0	0	0
8:00 AM	0	7	26	0	0	0	155	60	0	74	0	92	0	0	0	0	414	1,493	0	0	0	0
8:15 AM	0	1	37	0	1	0	124	41	0	57	0	110	0	0	0	0	371		0	0	0	0
8:30 AM	1	7	33	0	0	0	133	42	0	42	0	67	0	0	0	0	325		0	0	0	0
8:45 AM	1	13	51	0	0	0	134	43	0	47	0	94	0	0	0	0	383		0	0	0	0
Count Total	2	55	271	0	9	0	1,247	398	0	687	0	673	0	0	0	0	3,342		0	0	0	0
Peak Hour	0	27	124	0	8	0	701	212	0	467	0	310	0	0	0	0	1,849		0	0	0	0



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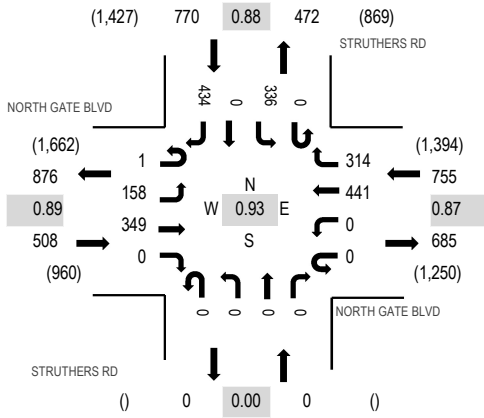
Location: 3 STRUTHERS RD & NORTH GATE BLVD AM

Date: Tuesday, August 27, 2024

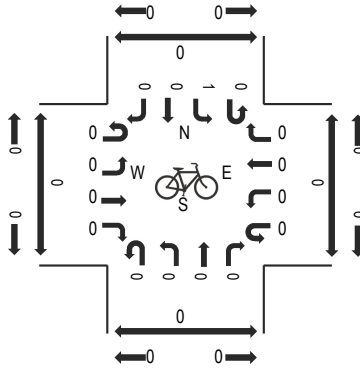
Peak Hour: 07:15 AM - 08:15 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

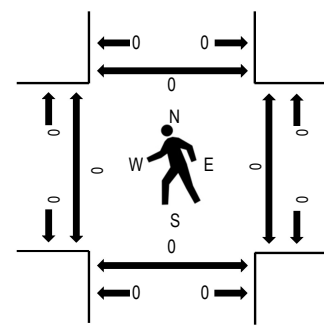
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	NORTH GATE BLVD				NORTH GATE BLVD				STRUTHERS RD				STRUTHERS RD				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound				Southbound						West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right						
7:00 AM	0	21	42	0	0	0	152	29	0	0	0	0	1	64	0	119	428	1,974	0	0	0	0
7:15 AM	0	33	103	0	0	0	114	51	0	0	0	0	0	121	0	109	531	2,033	0	0	0	0
7:30 AM	1	28	88	0	0	0	106	65	0	0	0	0	0	65	0	116	469	1,949	0	0	0	0
7:45 AM	0	55	83	0	0	0	105	93	0	0	0	0	0	102	0	108	546	1,883	0	0	0	0
8:00 AM	0	42	75	0	0	0	116	105	0	0	0	0	0	48	0	101	487	1,807	0	0	0	0
8:15 AM	0	52	94	0	1	0	90	84	0	0	0	0	0	51	0	75	447		0	0	0	0
8:30 AM	0	25	77	0	0	0	73	64	0	0	0	0	0	67	0	97	403		0	0	0	0
8:45 AM	0	52	89	0	0	0	79	67	0	0	0	0	2	80	0	101	470		0	0	0	0
Count Total	1	308	651	0	1	0	835	558	0	0	0	0	3	598	0	826	3,781		0	0	0	0
Peak Hour	1	158	349	0	0	0	441	314	0	0	0	0	0	336	0	434	2,033		0	0	0	0



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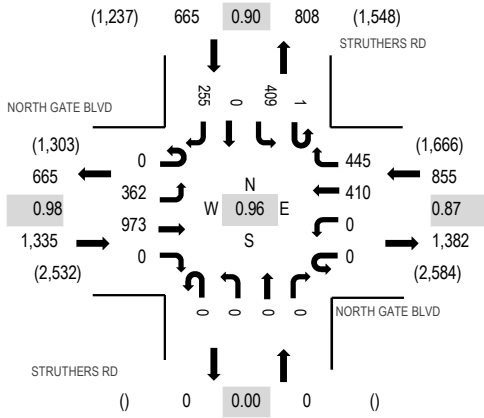
Location: 3 STRUTHERS RD & NORTH GATE BLVD PM

Date: Tuesday, August 27, 2024

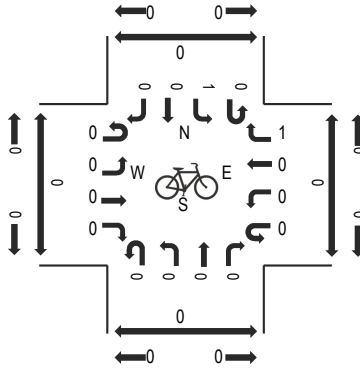
Peak Hour: 04:30 PM - 05:30 PM

Peak 15-Minutes: 05:00 PM - 05:15 PM

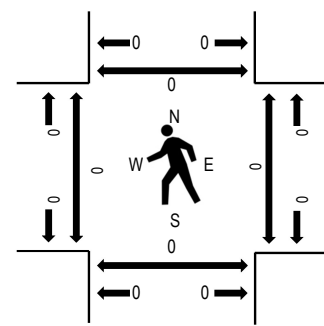
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	NORTH GATE BLVD				NORTH GATE BLVD				STRUTHERS RD				STRUTHERS RD				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound				Southbound						West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right						
4:00 PM	0	84	192	0	0	0	120	132	0	0	0	0	1	85	0	48	662	2,767	0	0	0	0
4:15 PM	0	97	226	0	0	0	99	97	0	0	0	0	3	93	0	62	677	2,852	0	0	0	0
4:30 PM	0	100	233	0	0	0	112	116	0	0	0	0	0	94	0	49	704	2,855	0	0	0	0
4:45 PM	0	90	250	0	0	0	87	109	0	0	0	0	0	118	0	70	724	2,771	0	0	0	0
5:00 PM	0	82	246	0	0	0	121	120	0	0	0	0	1	108	0	69	747	2,668	0	0	0	0
5:15 PM	0	90	244	0	0	0	90	100	0	0	0	0	0	89	0	67	680		0	0	0	0
5:30 PM	0	76	220	0	0	0	98	74	0	0	0	0	1	82	0	69	620		0	0	0	0
5:45 PM	1	85	216	0	0	0	101	90	0	0	0	0	0	88	0	40	621		0	0	0	0
Count Total	1	704	1,827	0	0	0	828	838	0	0	0	0	6	757	0	474	5,435		0	0	0	0
Peak Hour	0	362	973	0	0	0	410	445	0	0	0	0	1	409	0	255	2,855		0	0	0	0



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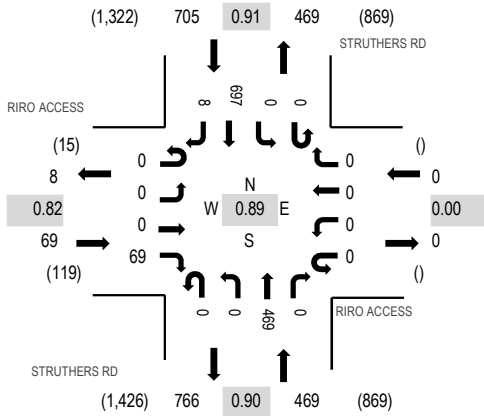
Location: 4 STRUTHERS RD & RIRO ACCESS AM

Date: Tuesday, August 27, 2024

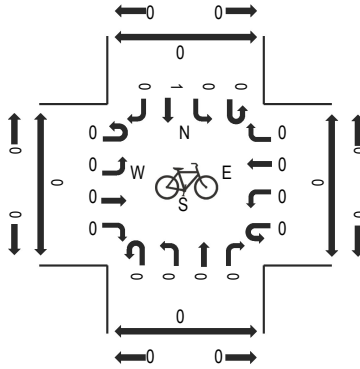
Peak Hour: 07:15 AM - 08:15 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

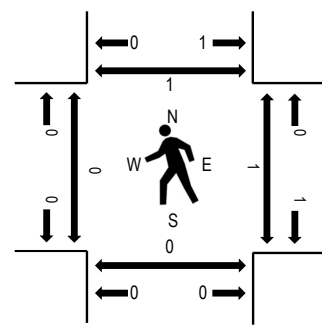
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	RIRO ACCESS Eastbound				RIRO ACCESS Westbound				STRUTHERS RD Northbound				STRUTHERS RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	0	10	0	0	0	0	0	0	50	0	0	0	178	1	239	1,183	0	0	0	0
7:15 AM	0	0	0	21	0	0	0	0	0	0	85	0	0	0	203	1	310	1,243	0	0	0	1
7:30 AM	0	0	0	18	0	0	0	0	0	0	93	0	0	0	169	3	283	1,200	0	0	0	0
7:45 AM	0	0	0	16	0	0	0	0	0	0	146	0	0	0	187	2	351	1,179	0	1	0	0
8:00 AM	0	0	0	14	0	0	0	0	0	0	145	0	0	0	138	2	299	1,127	0	0	0	0
8:15 AM	0	0	0	15	0	0	0	0	0	0	139	0	0	0	112	1	267		2	0	0	0
8:30 AM	0	0	0	8	0	0	0	0	0	0	91	0	0	0	161	2	262		0	1	0	0
8:45 AM	0	0	0	17	0	0	0	0	0	0	120	0	0	0	159	3	299		0	0	0	0
Count Total	0	0	0	119	0	0	0	0	0	0	869	0	0	0	1,307	15	2,310		2	2	0	1
Peak Hour	0	0	0	69	0	0	0	0	0	0	469	0	0	0	697	8	1,243		0	1	0	1



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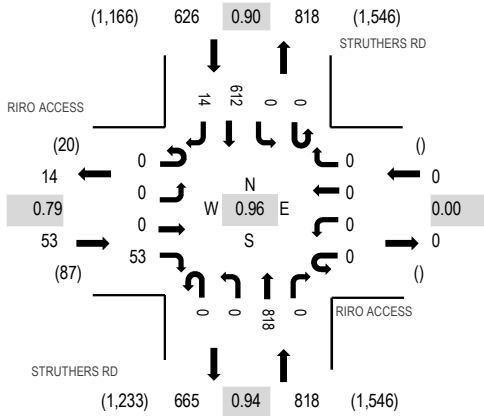
Location: 4 STRUTHERS RD & RIRO ACCESS PM

Date: Tuesday, August 27, 2024

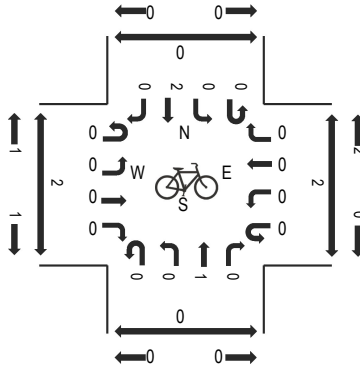
Peak Hour: 04:15 PM - 05:15 PM

Peak 15-Minutes: 04:45 PM - 05:00 PM

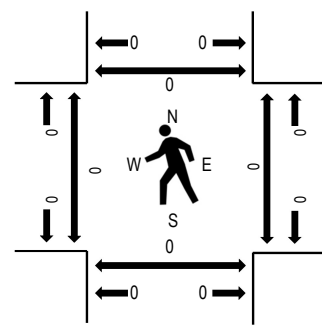
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	RIRO ACCESS Eastbound				RIRO ACCESS Westbound				STRUTHERS RD Northbound				STRUTHERS RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	1	0	0	11	0	0	0	0	0	0	216	0	0	0	126	0	354	1,467	0	0	0	0
4:15 PM	0	0	0	9	0	0	0	0	0	0	195	0	0	0	147	3	354	1,497	0	0	0	0
4:30 PM	0	0	0	13	0	0	0	0	0	0	221	0	0	0	135	2	371	1,489	0	0	0	0
4:45 PM	0	0	0	14	0	0	0	0	0	0	198	0	0	0	171	5	388	1,425	0	0	0	0
5:00 PM	0	0	0	17	0	0	0	0	0	0	204	0	0	0	159	4	384	1,332	0	0	0	0
5:15 PM	0	0	0	10	0	0	0	0	0	0	186	0	0	0	149	1	346		1	1	0	0
5:30 PM	0	0	0	7	0	0	0	0	0	0	155	0	0	0	143	2	307		1	0	0	0
5:45 PM	0	0	0	5	0	0	0	0	0	0	171	0	0	0	117	2	295		0	0	0	0
Count Total	1	0	0	86	0	0	0	0	0	0	1,546	0	0	0	1,147	19	2,799		2	1	0	0
Peak Hour	0	0	0	53	0	0	0	0	0	0	818	0	0	0	612	14	1,497		0	0	0	0



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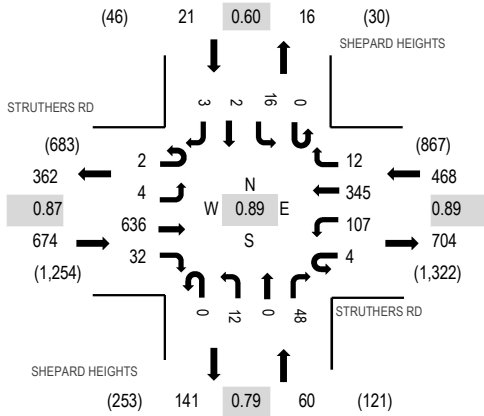
Location: 5 SHEPARD HEIGHTS & STRUTHERS RD AM

Date: Tuesday, August 27, 2024

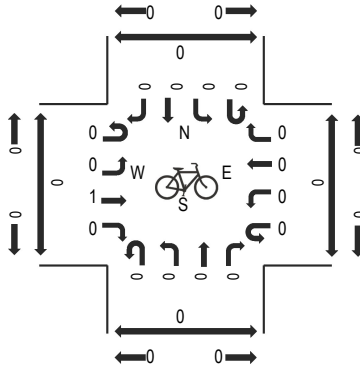
Peak Hour: 07:15 AM - 08:15 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

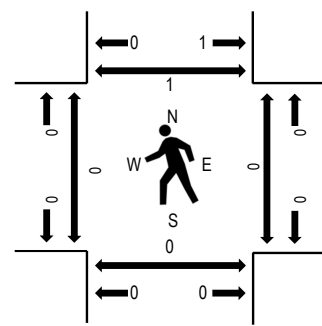
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	STRUTHERS RD Eastbound				STRUTHERS RD Westbound				SHEPARD HEIGHTS Northbound				SHEPARD HEIGHTS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	1	158	9	0	23	24	3	0	2	0	13	0	9	1	3	246	1,170	0	0	0	0
7:15 AM	2	1	187	13	1	26	55	2	0	1	0	14	0	1	1	0	304	1,223	0	0	0	0
7:30 AM	0	0	150	5	0	24	65	2	0	3	0	15	0	10	1	2	277	1,180	0	0	0	1
7:45 AM	0	1	171	8	1	29	115	2	0	3	0	10	0	3	0	0	343	1,171	0	0	0	0
8:00 AM	0	2	128	6	2	28	110	6	0	5	0	9	0	2	0	1	299	1,118	0	0	0	0
8:15 AM	0	0	102	3	0	33	104	1	0	4	0	12	0	1	0	1	261		1	2	2	3
8:30 AM	0	2	144	4	0	17	72	3	0	5	1	14	0	4	1	1	268		0	0	0	0
8:45 AM	1	1	148	7	2	14	101	2	0	2	0	8	0	3	0	1	290		0	1	0	0
Count Total	3	8	1,188	55	6	194	646	21	0	25	1	95	0	33	4	9	2,288		1	3	2	4
Peak Hour	2	4	636	32	4	107	345	12	0	12	0	48	0	16	2	3	1,223		0	0	0	1



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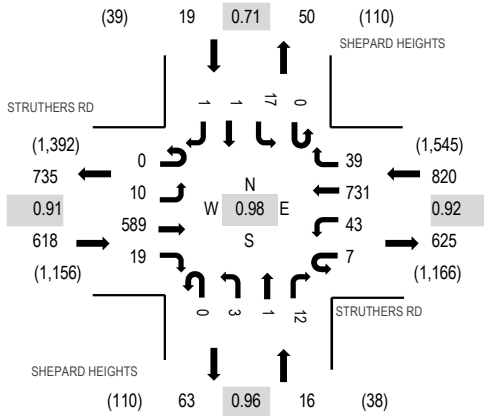
Location: 5 SHEPARD HEIGHTS & STRUTHERS RD PM

Date: Tuesday, August 27, 2024

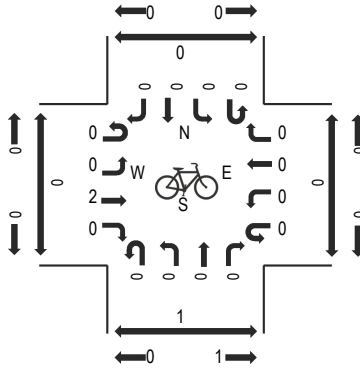
Peak Hour: 04:15 PM - 05:15 PM

Peak 15-Minutes: 05:00 PM - 05:15 PM

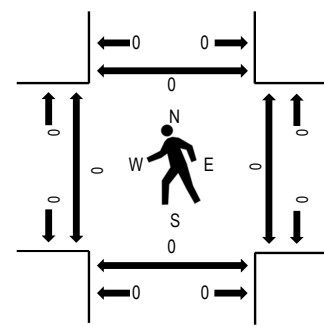
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	STRUTHERS RD Eastbound				STRUTHERS RD Westbound				SHEPARD HEIGHTS Northbound				SHEPARD HEIGHTS Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	4	120	2	0	8	192	15	0	1	1	3	0	4	0	1	351	1,449	0	0	0	0
4:15 PM	0	2	139	6	1	9	177	9	0	0	0	2	0	7	1	1	354	1,473	0	0	0	0
4:30 PM	0	1	138	1	0	12	202	11	0	1	0	3	0	2	0	0	371	1,462	0	0	0	0
4:45 PM	0	3	161	7	3	12	164	16	0	1	0	3	0	3	0	0	373	1,402	0	0	0	0
5:00 PM	0	4	151	5	3	10	188	3	0	1	1	4	0	5	0	0	375	1,329	0	0	0	0
5:15 PM	0	3	143	3	1	12	163	9	0	2	0	4	0	2	0	1	343		0	0	1	2
5:30 PM	0	3	137	4	1	4	141	10	0	0	2	4	0	3	0	2	311		0	0	1	0
5:45 PM	0	2	113	4	0	10	150	9	0	1	2	2	0	4	0	3	300		0	0	0	0
Count Total	0	22	1,102	32	9	77	1,377	82	0	7	6	25	0	30	1	8	2,778		0	0	2	2
Peak Hour	0	10	589	19	7	43	731	39	0	3	1	12	0	17	1	1	1,473		0	0	0	0



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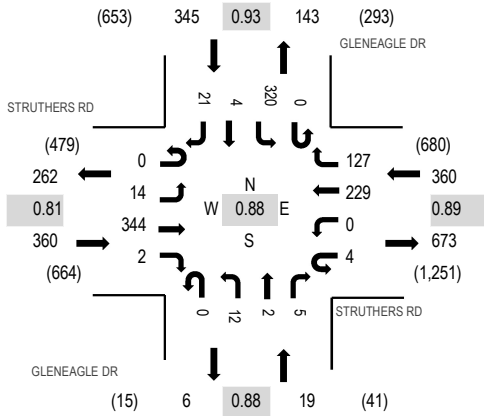
Location: 6 GLENEAGLE DR & STRUTHERS RD AM

Date: Tuesday, August 27, 2024

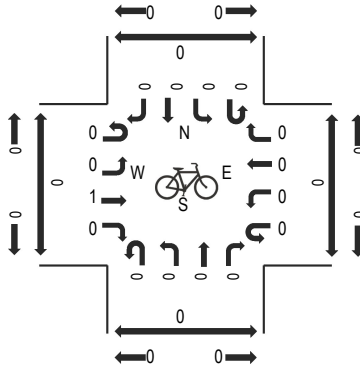
Peak Hour: 07:15 AM - 08:15 AM

Peak 15-Minutes: 07:45 AM - 08:00 AM

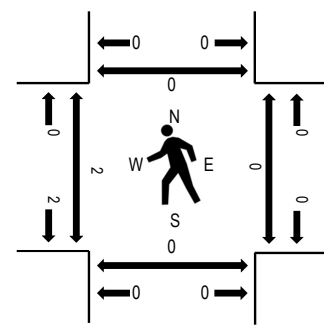
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	STRUTHERS RD Eastbound				STRUTHERS RD Westbound				GLENEAGLE DR Northbound				GLENEAGLE DR Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	6	77	1	3	0	15	9	0	3	1	1	0	86	1	2	205	1,024	2	0	0	0
7:15 AM	0	2	111	0	1	0	36	19	0	0	0	1	0	92	0	7	269	1,084	2	0	0	0
7:30 AM	0	2	84	1	0	0	44	27	0	2	0	1	0	73	2	7	243	1,046	0	0	0	0
7:45 AM	0	3	79	1	3	0	77	39	0	6	1	1	0	91	0	6	307	1,047	0	0	0	0
8:00 AM	0	7	70	0	0	0	72	42	0	4	1	2	0	64	2	1	265	1,014	0	0	0	0
8:15 AM	0	0	53	1	1	1	62	47	0	3	1	1	0	55	1	5	231		0	0	0	0
8:30 AM	0	3	75	0	1	1	52	24	0	5	2	1	0	71	2	7	244		0	0	0	0
8:45 AM	1	4	83	0	0	0	53	51	0	1	2	1	0	69	1	8	274		0	0	0	0
Count Total	1	27	632	4	9	2	411	258	0	24	8	9	0	601	9	43	2,038		4	0	0	0
Peak Hour	0	14	344	2	4	0	229	127	0	12	2	5	0	320	4	21	1,084		2	0	0	0



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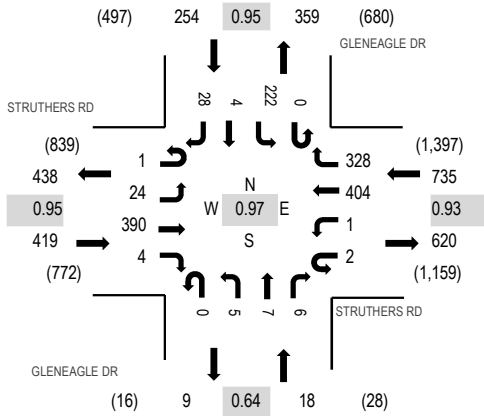
Location: 6 GLENEAGLE DR & STRUTHERS RD PM

Date: Tuesday, August 27, 2024

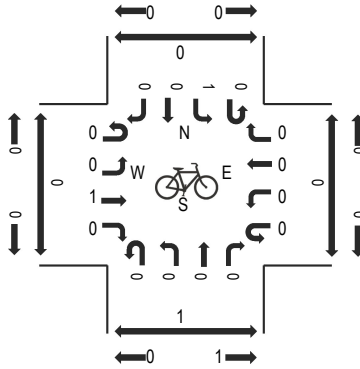
Peak Hour: 04:15 PM - 05:15 PM

Peak 15-Minutes: 05:00 PM - 05:15 PM

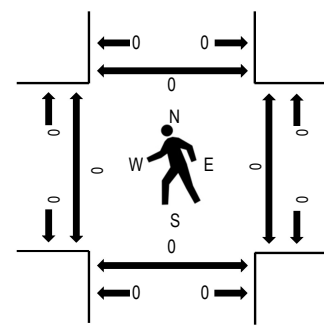
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	STRUTHERS RD Eastbound				STRUTHERS RD Westbound				GLENEAGLE DR Northbound				GLENEAGLE DR Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	5	80	0	0	0	107	89	0	1	1	0	0	48	0	18	349	1,408	0	0	0	0
4:15 PM	0	7	95	0	0	1	96	80	0	1	1	1	0	49	0	5	336	1,426	0	0	0	0
4:30 PM	1	6	89	2	0	0	112	89	0	0	1	1	0	56	1	7	365	1,422	0	0	0	0
4:45 PM	0	4	106	0	1	0	89	81	0	1	4	2	0	57	1	12	358	1,355	0	0	0	0
5:00 PM	0	7	100	2	1	0	107	78	0	3	1	2	0	60	2	4	367	1,286	0	0	0	0
5:15 PM	0	9	84	2	2	1	92	74	0	2	0	0	0	61	0	5	332		0	0	1	0
5:30 PM	0	4	91	0	0	3	71	69	0	1	0	2	0	49	1	7	298		0	0	0	0
5:45 PM	1	6	71	0	0	0	91	63	0	1	1	1	0	50	0	4	289		0	0	0	0
Count Total	2	48	716	6	4	5	765	623	0	10	9	9	0	430	5	62	2,694		0	0	1	0
Peak Hour	1	24	390	4	2	1	404	328	0	5	7	6	0	222	4	28	1,426		0	0	0	0



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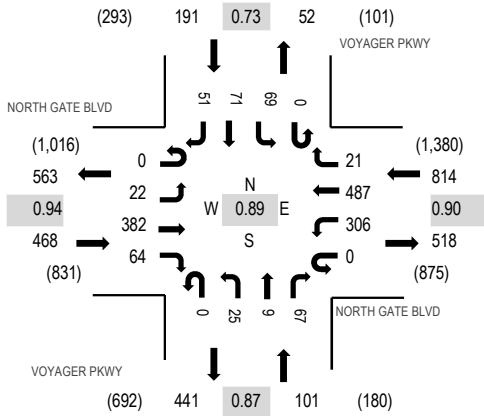
Location: 7 VOYAGER PKWY & NORTH GATE BLVD AM

Date: Tuesday, August 27, 2024

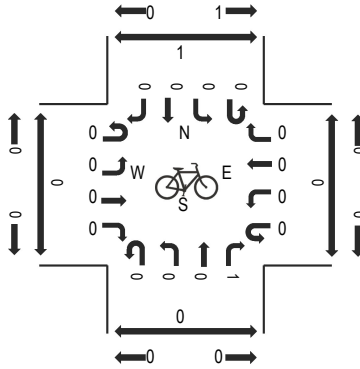
Peak Hour: 07:15 AM - 08:15 AM

Peak 15-Minutes: 07:15 AM - 07:30 AM

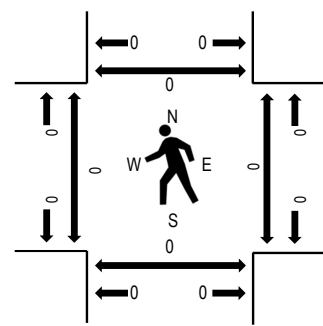
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	NORTH GATE BLVD Eastbound				NORTH GATE BLVD Westbound				VOYAGER PKWY Northbound				VOYAGER PKWY Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	4	66	6	0	57	111	3	0	6	2	4	0	10	11	11	291	1,513	0	0	1	0
7:15 AM	0	1	89	31	0	106	116	3	0	7	3	19	0	23	26	16	440	1,574	0	0	0	0
7:30 AM	0	4	106	14	0	74	105	4	0	6	2	19	0	12	20	13	379	1,455	0	0	0	0
7:45 AM	0	7	100	9	0	71	140	6	0	6	2	14	0	19	17	12	403	1,322	0	0	0	0
8:00 AM	0	10	87	10	0	55	126	8	0	6	2	15	0	15	8	10	352	1,171	0	0	0	0
8:15 AM	0	9	85	9	0	51	116	3	0	9	3	7	0	3	13	13	321		0	0	0	0
8:30 AM	0	8	83	10	0	30	74	2	0	9	0	11	0	6	6	7	246		0	0	0	0
8:45 AM	0	10	66	7	0	40	78	1	0	11	4	13	0	3	11	8	252		0	0	0	0
Count Total	0	53	682	96	0	484	866	30	0	60	18	102	0	91	112	90	2,684		0	0	1	0
Peak Hour	0	22	382	64	0	306	487	21	0	25	9	67	0	69	71	51	1,574		0	0	0	0



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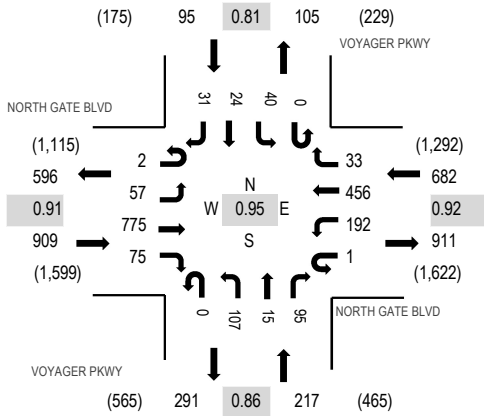
Location: 7 VOYAGER PKWY & NORTH GATE BLVD PM

Date: Tuesday, August 27, 2024

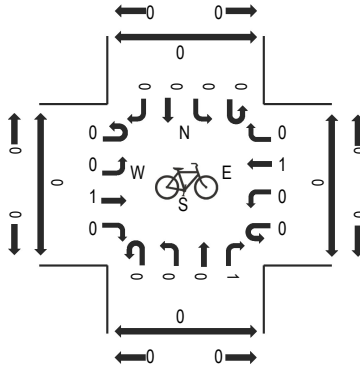
Peak Hour: 04:30 PM - 05:30 PM

Peak 15-Minutes: 04:45 PM - 05:00 PM

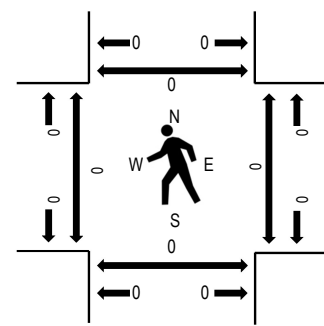
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

Interval Start Time	NORTH GATE BLVD Eastbound				NORTH GATE BLVD Westbound				VOYAGER PKWY Northbound				VOYAGER PKWY Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	21	162	8	1	38	90	9	0	31	7	39	0	4	6	7	423	1,777	0	0	0	0
4:15 PM	0	22	118	14	0	47	90	8	1	27	7	38	0	7	5	9	393	1,852	0	0	0	0
4:30 PM	0	12	210	14	0	31	106	13	0	30	2	23	0	7	4	7	459	1,903	0	0	0	0
4:45 PM	0	10	197	19	0	59	125	2	0	31	6	22	0	12	5	14	502	1,860	0	0	0	0
5:00 PM	1	19	209	22	0	39	124	10	0	24	1	26	0	12	6	5	498	1,754	0	0	0	0
5:15 PM	1	16	159	20	1	63	101	8	0	22	6	24	0	9	9	5	444		0	0	0	0
5:30 PM	1	12	161	17	0	47	100	9	1	20	4	20	0	8	6	10	416		0	0	0	0
5:45 PM	1	15	124	14	0	66	100	5	1	22	5	25	0	4	3	11	396		3	0	1	0
Count Total	4	127	1,340	128	2	390	836	64	3	207	38	217	0	63	44	68	3,531		3	0	1	0
Peak Hour	2	57	775	75	1	192	456	33	0	107	15	95	0	40	24	31	1,903		0	0	0	0

All Traffic Data Services

9660 W 44th Ave

Wheat Ridge, CO 80033

Site Code: 8
Station ID: 8
STRUTHERS RD N.O. NORTH GATE BLVD

Start Time	27-Aug-24 Tue	NB	SB	Total
12:00 AM		12	9	21
01:00		4	5	9
02:00		6	4	10
03:00		12	10	22
04:00		19	31	50
05:00		39	112	151
06:00		154	372	526
07:00		376	805	1181
08:00		493	622	1115
09:00		399	499	898
10:00		420	491	911
11:00		473	534	1007
12:00 PM		555	548	1103
01:00		560	500	1060
02:00		568	516	1084
03:00		769	552	1321
04:00		829	623	1452
05:00		719	614	1333
06:00		552	480	1032
07:00		440	282	722
08:00		382	186	568
09:00		173	112	285
10:00		153	52	205
11:00		56	28	84
Total		8163	7987	16150
Percent		50.5%	49.5%	
AM Peak	-	08:00	07:00	-
Vol.	-	493	805	-
PM Peak	-	16:00	16:00	-
Vol.	-	829	623	-
Grand Total		8163	7987	16150
Percent		50.5%	49.5%	
ADT		ADT 16,150	ADT 16,150	

Intersection 539 at North Gate Rd and Voyager Pkwy - Timing table, page 1

Page 1	Phases											
	1	2	3	4	5	6	7	8	9	10	11	12
Min Green	4	10	4	4	4	10	4	4	0	0	0	0
Passage Time I	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0	0.0	0.0	0.0	0.0
Passage Time II	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Green I	10	40	10	20	10	40	15	20	0	0	0	0
Max Green II	15	40	10	20	10	40	30	20	0	0	0	0
Yellow Clearance	3.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0	0.0	0.0	0.0	0.0
Red Clearance	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0
Added Initial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Added Initial	0	0	0	0	0	0	0	0	0	0	0	0
Time Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Cars Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0
Min Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Green Time	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert Time	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Advance Walk Time	0	0	0	0	0	0	0	0	0	0	0	0
Walk Time	0	7	0	7	0	7	0	7	0	0	0	0
Pedestrian Clearance	0	30	0	25	0	30	0	25	0	0	0	0
Handicap Walk	0	0	0	0	0	0	0	0	0	0	0	0
Handicap Ped Clearance	0	0	0	0	0	0	0	0	0	0	0	0
North Gate Rd	X	X			X	X						
Voyager Pkwy			X	X			X	X				
Compass Direction	W	E	S	N	E	W	N	S				
Through, Turn or XPed	Left,p/p	Thru	Left,p/p	Thru	Left,p/p	Thru	Left,p/p	Thru				

Intersection 539 at North Gate Rd and Voyager Pkwy - Sequence table, page 1

Page 1	Ring 1 Phases				Ring 2 Phases				Ring 3 Phases			
	1	2	3	4	5	6	7	8	9	10	11	12
State 1	Vehicle				Vehicle							
Barrier 1												
State 2			V & P			V & P						
Barrier 2	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
State 3			Vehicle				Vehicle					
Barrier 3												
State 4				V & P				V & P				
Barrier 4	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
State 5												
Barrier 5												
State 6												
Barrier 6												
State 7												
Barrier 7												
State 8												
Barrier 8												
State 9												
Barrier 9												
State 10												
Barrier 10												
State 11												
Barrier 11												
State 12												
Barrier 12												

Intersection 539 at North Gate Rd and Voyager Pkwy - Phases control table, page 1

Page 1	Vehicle Phases		Ped Phases
	111 123456789012		111 123456789012
Min Recalls		Ped Recalls	
Max Recalls	2 6	Handicap Ped Recalls	
Recall If Maxed		Soft Ped Recalls	
Dual Entry	4 8	Do Not Recall Ped	2 4 6 8
Do Not Skip		Allow Walk Reduction	
Simultaneous Gap Out		Hold In Walk	
Restricted Phases		Allow Ped Re-service	2 6
Sequential Initial Timing		Rest In Walk	No
Max Timer Starts For Call			
Reduction Starts For Call			
Red To Avoid Left Turn Trap	2 6		
Rest In Red	No		

Intersection 539 at North Gate Rd and Voyager Pkwy - Schedule table, events 1-25

Event Num	Enabled	Event Type	Event Parameters				Start			Duration			Stop		Repetition		Priority
			Param 1	Param 2	Mon	Day	Hour	Min	Sec	Minutes	Mon	Day	Repeat	Intervals			
1	Yes	Run Plan	Plan 1	Ofst #1	1	1	06	45	00	135	12	31	Weekly	MTWTF	Low		
2	Yes	Run Plan	Plan 2	Ofst #1	1	1	09	00	00	300	12	31	Weekly	MTWTF	Very Low		
3	Yes	Run Plan	Plan 1	Ofst #1	1	1	14	00	00	240	12	31	Weekly	MTWTF	Very Low		
4	Yes	Run Plan	Plan 2	Ofst #1	1	1	18	00	00	120	12	31	Weekly	MTWTF	Low		
5	Yes	Run Plan	Plan 2	Ofst #1	1	1	08	00	00	720	12	31	Weekly	S	Low		
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	

Intersection 649 at North Gate Blvd. and Struthers Rd - Timing table, page 1

Page 1	Phases											
	1	2	3	4	5	6	7	8	9	10	11	12
Min Green	0	4	0	0	4	4	0	4	0	0	0	0
Passage Time I	0.0	2.0	0.0	0.0	1.0	2.0	0.0	1.0	0.0	0.0	0.0	0.0
Passage Time II	0.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0	0.0
Max Green I	0	45	0	0	25	45	0	30	0	0	0	0
Max Green II	0	45	0	0	25	45	0	30	0	0	0	0
Yellow Clearance	0.0	5.0	0.0	0.0	3.0	5.0	0.0	4.0	0.0	0.0	0.0	0.0
Red Clearance	0.0	2.0	0.0	0.0	2.0	2.0	0.0	2.0	0.0	0.0	0.0	0.0
Added Initial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Added Initial	0	0	0	0	0	0	0	0	0	0	0	0
Time Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Cars Before Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Time To Reduce	0	0	0	0	0	0	0	0	0	0	0	0
Min Passage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Green Time	0	0	0	0	0	0	0	0	0	0	0	0
Red Revert Time	0.0	5.0	0.0	0.0	5.0	5.0	0.0	5.0	0.0	0.0	0.0	0.0
Advance Walk Time	0	0	0	0	0	0	0	0	0	0	0	0
Walk Time	0	0	0	0	0	7	0	0	0	0	0	0
Pedestrian Clearance	0	0	0	0	0	28	0	0	0	0	0	0
Handicap Walk	0	0	0	0	0	12	0	0	0	0	0	0
Handicap Ped Clearance	0	0	0	0	0	33	0	0	0	0	0	0
North Gate Blvd.		X			X	X						
Struthers Rd								X				
Compass Direction		E			E	W		S				
Through, Turn or XPed		Thru			Left.prt	Thru		Thru				

Intersection 649 at North Gate Blvd. and Struthers Rd - Sequence table, page 1

Page 1	Ring 1 Phases				Ring 2 Phases				Ring 3 Phases			
	1	2	3	4	5	6	7	8	9	10	11	12
State 1					Vehicle							
Barrier 1												
State 2			Vehicle			V & P						
Barrier 2	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX
State 3								Vehicle				
Barrier 3	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXX	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXX
State 4												
Barrier 4												
State 5												
Barrier 5												
State 6												
Barrier 6												
State 7												
Barrier 7												
State 8												
Barrier 8												
State 9												
Barrier 9												
State 10												
Barrier 10												
State 11												
Barrier 11												
State 12												
Barrier 12												

Intersection 649 at North Gate Blvd. and Struthers Rd - Phases control table, page 1

Page 1	Vehicle Phases		Ped Phases
	111 123456789012		111 123456789012
Min Recalls		Ped Recalls	
Max Recalls	2 6	Handicap Ped Recalls	
Recall If Maxed		Soft Ped Recalls	
Dual Entry	4 8	Do Not Recall Ped	2 4 6 8
Do Not Skip		Allow Walk Reduction	
Simultaneous Gap Out		Hold In Walk	
Restricted Phases		Allow Ped Re-service	6
Sequential Initial Timing		Rest In Walk	No
Max Timer Starts For Call			
Reduction Starts For Call			
Red To Avoid Left Turn Trap			
Rest In Red	No		

Intersection 649 at North Gate Blvd. and Struthers Rd - Spec signaling cntrl tbl, pg 1

Page 1									
Signaling Control 1					Signaling Control 2				
Function	Flashing permissive left turn	Timer 1	2.0		Function	None		Timer 1	0.0
Operand	0	Timer 2	0.0		Operand	0		Timer 2	0.0
Trigger	Always enabled	Timer 3	0.0		Trigger	Always enabled		Timer 3	0.0
	111	Output 1	25			111		Output 1	1
	123456789012	Output 2	34			123456789012		Output 2	1
Phases 1	5	Output 3	28		Phases 1			Output 3	1
Phases 2	2 6	Output 4	1		Phases 2			Output 4	1
Overlaps 1					Overlaps 1				
Overlaps 2					Overlaps 2				
Signaling Control 3					Signaling Control 4				
Function	None	Timer 1	0.0		Function	None		Timer 1	0.0
Operand	0	Timer 2	0.0		Operand	0		Timer 2	0.0
Trigger	Always enabled	Timer 3	0.0		Trigger	Always enabled		Timer 3	0.0
	111	Output 1	1			111		Output 1	1
	123456789012	Output 2	1			123456789012		Output 2	1
Phases 1		Output 3	1		Phases 1			Output 3	1
Phases 2		Output 4	1		Phases 2			Output 4	1
Overlaps 1					Overlaps 1				
Overlaps 2					Overlaps 2				

Intersection 649 at North Gate Blvd. and Struthers Rd - Schedule table, events 1-25

Event Num	Enabled	Event Type	Event Parameters			Start			Duration			Stop		Repetition		Priority
			Param 1	Param 2		Mon	Day	Hour	Min	Sec	Minutes	Mon	Day	Repeat	Intervals	
1	Yes	Run Plan	Plan 1	Ofst #1	1	1	06	45	00	135	12	31	Weekly	MTWTF	Low	
2	Yes	Run Plan	Plan 2	Ofst #1	1	1	09	00	00	300	12	31	Weekly	MTWTF	Very Low	
3	Yes	Run Plan	Plan 1	Ofst #1	1	1	14	00	00	240	12	31	Weekly	MTWTF	Very Low	
4	Yes	Run Plan	Plan 2	Ofst #1	1	1	18	00	00	120	12	31	Weekly	MTWTF	Low	
5	Yes	Run Plan	Plan 2	Ofst #1	1	1	08	00	00	720	12	31	Weekly	S	Low	
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																
21																
22																
23																
24																
25																

APPENDIX B

Level of Service Definitions

The following information is referenced from the Highway Capacity Manual: A Guide for Multimodal Mobility Analysis, 7th Edition, Transportation Research Board, 2016: Chapter 19 – Signalized Intersections.

Motorized Vehicle Level of Service (LOS) for Signalized Intersections

Levels of service are defined to represent reasonable ranges in control delay.

LOS A Describes operations with a control delay of 10 s/veh or less and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

LOS B Describes operations with control delay between 10 and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

LOS C Describes operations with control delay between 20 and 35 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D Describes operations with control delay between 35 and 55 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E Describes operations with control delay between 55 and 80 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F Describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio ^a	
	$v/c \leq 1.0$	$v/c > 1.0$
≤ 10	A	F
$> 10 - 20$	B	F
$> 20 - 35$	C	F
$> 35 - 55$	D	F
$> 55 - 80$	E	F
> 80	F	F

Note: ^a For approach-based and intersectionwide assessments, LOS is defined solely by control delay.

The following information is referenced from the Highway Capacity Manual: A Guide for Multimodal Mobility Analysis, 7th Edition, Transportation Research Board, 2016: Chapter 20 – Two-Way Stop-Controlled Intersections, Chapter 21 – All-Way Stop-Controlled Intersections, and Chapter 22 - Roundabouts.

Motorized Vehicle Level of Service (LOS) for Unsignalized & Roundabout Intersections

LOS is a quantitative stratification of performance measure(s) representing quality of service. Quality of service describes how well a transportation facility or service operates from a traveler's perspective. LOS is measured on an A – F scale, with LOS A representing the best operating conditions from a traveler's perspective.

Control Delay (s/veh)	<u>LOS by Volume-to-Capacity Ratio^a</u>	
	$v/c \leq 1.0$	$v/c > 1.0$
0 – 10	A	F
> 10 – 15	B	F
> 15 – 25	C	F
> 25 – 35	D	F
> 35 – 50	E	F
> 50	F	F

Note: The LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole.

^a For approaches and intersectionwide assessment, LOS is defined solely by control delay.

APPENDIX C

Capacity Worksheets

HCM 7th Roundabout

1: Interstate 25 Southbound Ramp & North Gate Boulevard

Existing Traffic Volumes
AM Peak Traffic Hour

Intersection						
Intersection Delay, s/veh	7.3					
Intersection LOS	A					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	108		1263		0	93
Demand Flow Rate, veh/h	110		1288		0	95
Vehicles Circulating, veh/h	468		0		166	1288
Vehicles Exiting, veh/h	915		166		412	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	4.6		7.3		0.0	10.7
Approach LOS	A		A		-	B
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	LT	TR	T	LT
RT Channelized						
Lane Util	0.473	0.527	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	52	58	605	683	0	95
Cap Entry Lane, veh/h	878	954	1350	1420	1233	475
Entry HV Adj Factor	0.973	0.983	0.981	0.980	1.000	0.979
Flow Entry, veh/h	51	57	594	669	0	93
Cap Entry, veh/h	854	938	1324	1392	1233	465
V/C Ratio	0.059	0.061	0.448	0.481	0.000	0.200
Control Delay, s/veh	4.8	4.4	7.1	7.4	2.9	10.7
LOS	A	A	A	A	A	B
95th %tile Queue, veh	0	0	2	3	0	1

HCM 7th Roundabout













2: Interstate 25 Northbound Ramp & North Gate Boulevard

Existing Traffic Volumes
AM Peak Traffic Hour

Intersection							
Intersection Delay, s/veh 8.4							
Intersection LOS A							
Approach	EB		WB		NB		SB
Entry Lanes	2		2		1		1
Conflicting Circle Lanes	2		2		2		2
Adj Approach Flow, veh/h	164		771		508		0
Demand Flow Rate, veh/h	168		786		518		0
Vehicles Circulating, veh/h	0		548		168		1304
Vehicles Exiting, veh/h	1304		138		0		30
Ped Vol Crossing Leg, #/h	0		0		0		0
Ped Cap Adj	1.000		1.000		1.000		1.000
Approach Delay, s/veh	3.1		10.2		7.2		0.0
Approach LOS	A		B		A		-
Lane	Left	Right	Left	Right	Left	Left	
Designated Moves	LT	TR	LT	TR	LT	T	
Assumed Moves	LT	TR	LT	TR	LT	T	
RT Channelized							
Lane Util	0.470	0.530	0.469	0.531	1.000	1.000	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4	
Entry Flow, veh/h	79	89	369	417	518	0	
Cap Entry Lane, veh/h	1350	1420	815	891	1231	469	
Entry HV Adj Factor	0.977	0.978	0.982	0.979	0.981	1.000	
Flow Entry, veh/h	77	87	362	408	508	0	
Cap Entry, veh/h	1319	1389	800	873	1207	469	
V/C Ratio	0.059	0.063	0.453	0.468	0.421	0.000	
Control Delay, s/veh	3.2	3.1	10.4	10.0	7.2	7.7	
LOS	A	A	B	B	A	A	
95th %tile Queue, veh	0	0	2	3	2	0	

Timings 3: North Gate Boulevard & Struthers Road

Existing Traffic Volumes
AM Peak Traffic Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	159	349	441	314	336	434
Future Volume (vph)	159	349	441	314	336	434
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.447				0.950	
Satd. Flow (perm)	1615	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				341		472
Lane Group Flow (vph)	173	379	479	341	365	472
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	30.0	82.0	52.0	52.0	38.0	38.0
Total Split (%)	25.0%	68.3%	43.3%	43.3%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	89.7	87.7	75.6	75.6	19.3	19.3
Actuated g/C Ratio	0.75	0.73	0.63	0.63	0.16	0.16
v/c Ratio	0.13	0.14	0.21	0.30	0.66	0.72
Control Delay (s/veh)	4.7	5.4	9.6	1.6	52.8	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	4.7	5.4	9.6	1.6	52.8	10.8
LOS	A	A	A	A	D	B
Approach Delay (s/veh)		5.2	6.3		29.2	
Approach LOS		A	A		C	
Queue Length 50th (ft)	15	40	66	0	139	0
Queue Length 95th (ft)	30	68	100	23	178	97
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1586	2587	2229	1123	915	768
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.15	0.21	0.30	0.40	0.61
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 55						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Existing Traffic Volumes

AM Peak Traffic Hour

Maximum v/c Ratio: 0.73	
Intersection Signal Delay (s/veh): 14.7	Intersection LOS: B
Intersection Capacity Utilization 49.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: North Gate Boulevard & Struthers Road



HCM 7th TWSC
4: Struthers Road & RIRO Access A

Existing Traffic Volumes
AM Peak Traffic Hour

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	69	0	469	697	8
Future Vol, veh/h	0	69	0	469	697	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	0	510	758	9









Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	-	379	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	619	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	619	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v11.62		0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	- 619	-	-
HCM Lane V/C Ratio	- 0.121	-	-
HCM Control Delay (s/veh)	- 11.6	-	-
HCM Lane LOS	- B	-	-
HCM 95th %tile Q(veh)	- 0.4	-	-

HCM 7th TWSC
5: Struthers Road & Shepard Heights

Existing Traffic Volumes
AM Peak Traffic Hour

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	636	32	111	345	12	12	0	48	16	2	3
Future Vol, veh/h	6	636	32	111	345	12	12	0	48	16	2	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	691	35	121	375	13	13	0	52	17	2	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	388	0	0	726	0	0	1134	1334	346	982	1362	194
Stage 1	-	-	-	-	-	-	704	704	-	623	623	-
Stage 2	-	-	-	-	-	-	430	629	-	359	739	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1167	-	-	873	-	-	157	153	650	204	147	815
Stage 1	-	-	-	-	-	-	394	438	-	440	477	-
Stage 2	-	-	-	-	-	-	574	473	-	632	422	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1167	-	-	873	-	-	132	131	650	160	126	815
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	131	-	160	126	-
Stage 1	-	-	-	-	-	-	391	435	-	380	411	-
Stage 2	-	-	-	-	-	-	490	408	-	578	419	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.07	2.32	15.85	28.47
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	132	650	1167	-	-	873	-	-	176
HCM Lane V/C Ratio	0.099	0.08	0.006	-	-	0.138	-	-	0.13
HCM Control Delay (s/veh)	35.2	11	8.1	-	-	9.8	-	-	28.5
HCM Lane LOS	E	B	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.3	0.3	0	-	-	0.5	-	-	0.4

























HCM 7th Roundabout
6: Gleneagle Drive & Struthers Road

Existing Traffic Volumes
AM Peak Traffic Hour

Intersection								
Intersection Delay, s/veh	4.8							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	391		391		20		375	
Demand Flow Rate, veh/h	398		399		20		382	
Vehicles Circulating, veh/h	363		30		751		271	
Vehicles Exiting, veh/h	290		741		10		158	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	5.5		3.9		5.1		5.0	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	1.000	0.529	0.471	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	187	211	188	211	20	202	180	
Cap Entry Lane, veh/h	967	1043	1313	1384	750	1052	1128	
Entry HV Adj Factor	0.982	0.981	0.978	0.982	0.998	0.984	0.979	
Flow Entry, veh/h	184	207	184	207	20	199	176	
Cap Entry, veh/h	949	1023	1284	1360	749	1035	1104	
V/C Ratio	0.193	0.202	0.143	0.152	0.027	0.192	0.160	
Control Delay, s/veh	5.7	5.4	4.0	3.9	5.1	5.3	4.7	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	1	1	0	1	0	1	1	

Timings
7: Voyager Parkway & North Gate Boulevard

Existing Traffic Volumes
AM Peak Traffic Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	382	64	306	487	21	25	9	67	69	71	51
Future Volume (vph)	22	382	64	306	487	21	25	9	67	69	71	51
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.456			0.472			0.950			0.480		
Satd. Flow (perm)	849	3539	1583	879	3539	1583	3433	1863	1583	894	1863	1583
Satd. Flow (RTOR)			218			173			173			218
Lane Group Flow (vph)	24	415	70	333	529	23	27	10	73	75	77	55
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	15.0	44.0	44.0	25.0	54.0	54.0	28.0	34.0	34.0	17.0	23.0	23.0
Total Split (%)	12.5%	36.7%	36.7%	20.8%	45.0%	45.0%	23.3%	28.3%	28.3%	14.2%	19.2%	19.2%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	79.1	71.1	71.1	91.2	83.8	83.8	6.5	7.1	7.1	20.5	12.3	12.3
Actuated g/C Ratio	0.66	0.59	0.59	0.76	0.70	0.70	0.05	0.06	0.06	0.17	0.10	0.10
v/c Ratio	0.03	0.19	0.06	0.43	0.21	0.01	0.14	0.09	0.28	0.33	0.40	0.15
Control Delay (s/veh)	3.5	6.9	0.1	7.7	9.6	0.0	55.5	54.0	2.7	43.8	56.5	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	3.5	6.9	0.1	7.7	9.6	0.0	55.5	54.0	2.7	43.8	56.5	0.9
LOS	A	A	A	A	A	A	E	D	A	D	E	A
Approach Delay (s/veh)		5.8			8.7			20.4			37.2	
Approach LOS		A			A			C			D	
Queue Length 50th (ft)	2	39	0	79	92	0	10	8	0	49	58	0
Queue Length 95th (ft)	m7	64	0	136	138	0	26	25	0	89	105	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	664	2097	1026	816	2470	1157	657	419	490	252	257	406
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.20	0.07	0.41	0.21	0.02	0.04	0.02	0.15	0.30	0.30	0.14

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Timings









7: Voyager Parkway & North Gate Boulevard

Existing Traffic Volumes

AM Peak Traffic Hour

Maximum v/c Ratio: 0.44	
Intersection Signal Delay (s/veh): 12.0	Intersection LOS: B
Intersection Capacity Utilization 53.8%	ICU Level of Service A
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard

 Ø1 25 s	 Ø2 (R) 44 s	 Ø3 17 s	 Ø4 34 s
 Ø5 15 s	 Ø6 (R) 54 s	 Ø7 28 s	 Ø8 23 s

HCM 7th Roundabout
1: Interstate 25 Southbound Ramp & North Gate Boulevard

Existing Traffic Volumes
PM Peak Traffic Hour

Intersection						
Intersection Delay, s/veh	7.0					
Intersection LOS	A					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	554		473		0	267
Demand Flow Rate, veh/h	565		482		0	272
Vehicles Circulating, veh/h	644		0		834	482
Vehicles Exiting, veh/h	110		834		375	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	9.1		4.7		0.0	6.9
Approach LOS	A		A		-	A
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	L	TR	T	LT
RT Channelized						
Lane Util	0.471	0.529	0.772	0.228	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	266	299	372	110	0	272
Cap Entry Lane, veh/h	746	821	1350	1420	699	943
Entry HV Adj Factor	0.979	0.982	0.981	0.980	1.000	0.981
Flow Entry, veh/h	260	294	365	108	0	267
Cap Entry, veh/h	731	807	1324	1392	699	925
V/C Ratio	0.356	0.364	0.276	0.077	0.000	0.289
Control Delay, s/veh	9.4	8.8	5.1	3.2	5.2	6.9
LOS	A	A	A	A	A	A
95th %tile Queue, veh	2	2	1	0	0	1

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard













Existing Traffic Volumes
PM Peak Traffic Hour

Intersection						
Intersection Delay, s/veh 5.4						
Intersection LOS A						
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	821		437		48	0
Demand Flow Rate, veh/h	838		446		49	0
Vehicles Circulating, veh/h	0		299		838	495
Vehicles Exiting, veh/h	495		588		0	250
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	5.3		5.4		6.0	0.0
Approach LOS	A		A		A	-
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.470	0.530	0.471	0.529	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	394	444	210	236	49	0
Cap Entry Lane, veh/h	1350	1420	1025	1101	697	932
Entry HV Adj Factor	0.980	0.981	0.979	0.982	0.980	1.000
Flow Entry, veh/h	386	435	206	232	48	0
Cap Entry, veh/h	1323	1393	1003	1082	682	932
V/C Ratio	0.292	0.313	0.205	0.214	0.070	0.000
Control Delay, s/veh	5.3	5.3	5.5	5.3	6.0	3.9
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	1	1	1	0	0

Timings

3: North Gate Boulevard & Struthers Road

Existing Traffic Volumes
PM Peak Traffic Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	362	973	410	445	410	255
Future Volume (vph)	362	973	410	445	410	255
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.459				0.950	
Satd. Flow (perm)	1659	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				484		277
Lane Group Flow (vph)	393	1058	446	484	446	277
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	30.0	82.0	52.0	52.0	38.0	38.0
Total Split (%)	25.0%	68.3%	43.3%	43.3%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	87.4	85.4	70.6	70.6	21.6	21.6
Actuated g/C Ratio	0.73	0.71	0.59	0.59	0.18	0.18
v/c Ratio	0.29	0.42	0.21	0.42	0.72	0.54
Control Delay (s/veh)	5.9	8.1	11.4	2.4	53.1	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.9	8.1	11.4	2.4	53.1	8.7
LOS	A	A	B	A	D	A
Approach Delay (s/veh)		7.6	6.8		36.1	
Approach LOS		A	A		D	
Queue Length 50th (ft)	42	158	83	7	169	0
Queue Length 95th (ft)	71	234	116	23	212	70
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1578	2519	2082	1130	915	625
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.42	0.21	0.43	0.49	0.44
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 45						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Existing Traffic Volumes

PM Peak Traffic Hour

Maximum v/c Ratio: 0.72	
Intersection Signal Delay (s/veh): 14.0	Intersection LOS: B
Intersection Capacity Utilization 49.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: North Gate Boulevard & Struthers Road



HCM 7th TWSC
4: Struthers Road & RIRO Access A

Existing Traffic Volumes
PM Peak Traffic Hour

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	53	0	818	612	14
Future Vol, veh/h	0	53	0	818	612	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	58	0	889	665	15









Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	- 333	- 0	- 0
Stage 1	- -	- -	- -
Stage 2	- -	- -	- -
Critical Hdwy	- 6.94	- -	- -
Critical Hdwy Stg 1	- -	- -	- -
Critical Hdwy Stg 2	- -	- -	- -
Follow-up Hdwy	- 3.32	- -	- -
Pot Cap-1 Maneuver	0 663	0 -	- -
Stage 1	0 -	0 -	- -
Stage 2	0 -	0 -	- -
Platoon blocked, %		- -	- -
Mov Cap-1 Maneuver	- 663	- -	- -
Mov Cap-2 Maneuver	- -	- -	- -
Stage 1	- -	- -	- -
Stage 2	- -	- -	- -

Approach	EB	NB	SB
HCM Control Delay, s/v10.94		0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	- 663	- -	- -
HCM Lane V/C Ratio	- 0.087	- -	- -
HCM Control Delay (s/veh)	- 10.9	- -	- -
HCM Lane LOS	- B	- -	- -
HCM 95th %tile Q(veh)	- 0.3	- -	- -

HCM 7th TWSC
5: Struthers Road & Shepard Heights

Existing Traffic Volumes
PM Peak Traffic Hour

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	589	19	50	731	39	3	1	12	17	1	1
Future Vol, veh/h	10	589	19	50	731	39	3	1	12	17	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	640	21	54	795	42	3	1	13	18	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	837	0	0	661	0	0	1168	1608	320	1267	1607	418
Stage 1	-	-	-	-	-	-	662	662	-	924	924	-
Stage 2	-	-	-	-	-	-	507	946	-	342	683	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	793	-	-	923	-	-	148	104	676	126	104	583
Stage 1	-	-	-	-	-	-	417	457	-	290	346	-
Stage 2	-	-	-	-	-	-	517	338	-	646	448	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	793	-	-	923	-	-	136	96	676	113	97	583
Mov Cap-2 Maneuver	-	-	-	-	-	-	136	96	-	113	97	-
Stage 1	-	-	-	-	-	-	412	451	-	273	326	-
Stage 2	-	-	-	-	-	-	484	318	-	623	441	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.16	0.56	16.61	42.23
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	136	462	793	-	-	923	-	-	117
HCM Lane V/C Ratio	0.024	0.031	0.014	-	-	0.059	-	-	0.176
HCM Control Delay (s/veh)	32.1	13	9.6	-	-	9.1	-	-	42.2
HCM Lane LOS	D	B	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.2	-	-	0.6

HCM 7th Roundabout

6: Gleneagle Drive & Struthers Road

























Existing Traffic Volumes
PM Peak Traffic Hour

Intersection								
Intersection Delay, s/veh	5.4							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	455		799		20		275	
Demand Flow Rate, veh/h	464		815		20		281	
Vehicles Circulating, veh/h	253		41		706		456	
Vehicles Exiting, veh/h	484		685		11		400	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	5.2		5.5		4.9		5.5	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	1.000	0.530	0.470	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	218	246	383	432	20	149	132	
Cap Entry Lane, veh/h	1070	1145	1300	1371	779	887	964	
Entry HV Adj Factor	0.980	0.979	0.981	0.981	0.992	0.978	0.979	
Flow Entry, veh/h	214	241	376	424	20	146	129	
Cap Entry, veh/h	1048	1122	1275	1345	773	868	943	
V/C Ratio	0.204	0.215	0.295	0.315	0.026	0.168	0.137	
Control Delay, s/veh	5.3	5.2	5.5	5.5	4.9	5.8	5.1	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	1	1	1	1	0	1	0	

Timings

7: Voyager Parkway & North Gate Boulevard

Existing Traffic Volumes
PM Peak Traffic Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	775	75	193	456	33	107	15	95	40	24	31
Future Volume (vph)	59	775	75	193	456	33	107	15	95	40	24	31
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.470			0.265			0.950			0.747		
Satd. Flow (perm)	875	3539	1583	494	3539	1583	3433	1863	1583	1391	1863	1583
Satd. Flow (RTOR)			218			173			173			218
Lane Group Flow (vph)	64	842	82	210	496	36	116	16	103	43	26	34
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	15.0	44.0	44.0	25.0	54.0	54.0	28.0	34.0	34.0	17.0	23.0	23.0
Total Split (%)	12.5%	36.7%	36.7%	20.8%	45.0%	45.0%	23.3%	28.3%	28.3%	14.2%	19.2%	19.2%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	77.8	69.1	69.1	88.4	77.0	77.0	9.6	8.5	8.5	15.6	7.2	7.2
Actuated g/C Ratio	0.65	0.58	0.58	0.74	0.64	0.64	0.08	0.07	0.07	0.13	0.06	0.06
v/c Ratio	0.10	0.41	0.08	0.42	0.21	0.03	0.42	0.12	0.37	0.20	0.23	0.11
Control Delay (s/veh)	6.3	14.1	0.3	8.2	10.8	0.0	57.0	53.2	4.0	40.8	58.0	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.3	14.1	0.3	8.2	10.8	0.0	57.0	53.2	4.0	40.8	58.0	0.7
LOS	A	B	A	A	B	A	E	D	A	D	E	A
Approach Delay (s/veh)		12.5			9.6			33.6			32.0	
Approach LOS		B			A			C			C	
Queue Length 50th (ft)	9	122	0	46	86	0	44	12	0	28	20	0
Queue Length 95th (ft)	32	241	3	84	132	0	74	35	1	58	49	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	665	2036	1003	577	2271	1078	657	419	490	266	248	400
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.41	0.08	0.36	0.22	0.03	0.18	0.04	0.21	0.16	0.10	0.09

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Timings

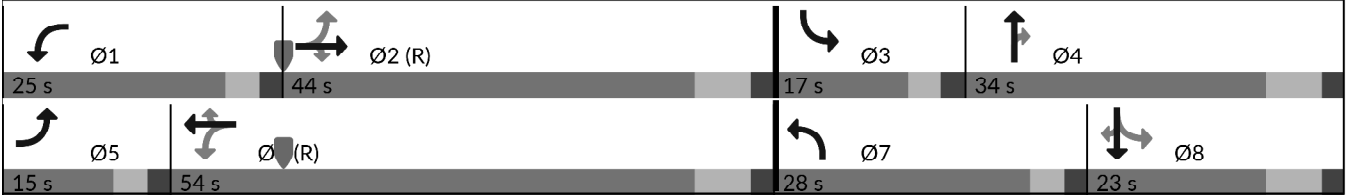
7: Voyager Parkway & North Gate Boulevard

Existing Traffic Volumes

PM Peak Traffic Hour

Maximum v/c Ratio: 0.42	
Intersection Signal Delay (s/veh): 14.8	Intersection LOS: B
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard



HCM 7th Roundabout

1: Interstate 25 Southbound Ramp & North Gate Boulevard

Background Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection						
Intersection Delay, s/veh	7.6					
Intersection LOS	A					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	73		1313		0	97
Demand Flow Rate, veh/h	74		1340		0	99
Vehicles Circulating, veh/h	487		0		173	1340
Vehicles Exiting, veh/h	952		173		388	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	4.5		7.5		0.0	11.4
Approach LOS	A		A		-	B
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	LT	TR	T	LT
RT Channelized						
Lane Util	0.473	0.527	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	35	39	630	710	0	99
Cap Entry Lane, veh/h	862	939	1350	1420	1226	455
Entry HV Adj Factor	0.974	0.986	0.980	0.980	1.000	0.980
Flow Entry, veh/h	34	38	617	696	0	97
Cap Entry, veh/h	840	925	1323	1392	1226	445
V/C Ratio	0.041	0.042	0.467	0.500	0.000	0.218
Control Delay, s/veh	4.7	4.3	7.4	7.6	2.9	11.4
LOS	A	A	A	A	A	B
95th %tile Queue, veh	0	0	3	3	0	1

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard

Background Traffic Volumes

















AM Peak Traffic Hour - Year 2026

Intersection						
Intersection Delay, s/veh 8.9						
Intersection LOS A						
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	170		801		528	0
Demand Flow Rate, veh/h	174		817		539	0
Vehicles Circulating, veh/h	0		570		174	1356
Vehicles Exiting, veh/h	1356		143		0	31
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	3.1		10.9		7.5	0.0
Approach LOS	A		B		A	-
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.471	0.529	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	82	92	384	433	539	0
Cap Entry Lane, veh/h	1350	1420	799	875	1225	448
Entry HV Adj Factor	0.976	0.980	0.980	0.980	0.980	1.000
Flow Entry, veh/h	80	90	376	425	528	0
Cap Entry, veh/h	1317	1392	783	858	1200	448
V/C Ratio	0.061	0.065	0.481	0.495	0.440	0.000
Control Delay, s/veh	3.2	3.1	11.2	10.7	7.5	8.0
LOS	A	A	B	B	A	A
95th %tile Queue, veh	0	0	3	3	2	0

Timings

3: North Gate Boulevard & Struthers Road

Background Traffic Volumes
AM Peak Traffic Hour - Year 2026

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	 	 	 		 	
Traffic Volume (vph)	165	363	459	327	349	451
Future Volume (vph)	165	363	459	327	349	451
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.436				0.950	
Satd. Flow (perm)	1576	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				355		490
Lane Group Flow (vph)	179	395	499	355	379	490
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	30.0	82.0	52.0	52.0	38.0	38.0
Total Split (%)	25.0%	68.3%	43.3%	43.3%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	89.2	87.2	75.0	75.0	19.8	19.8
Actuated g/C Ratio	0.74	0.73	0.63	0.63	0.17	0.17
v/c Ratio	0.13	0.15	0.22	0.31	0.67	0.73
Control Delay (s/veh)	4.9	5.6	9.8	1.6	52.6	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	4.9	5.6	9.8	1.6	52.6	10.7
LOS	A	A	A	A	D	B
Approach Delay (s/veh)		5.4	6.5		29.1	
Approach LOS		A	A		C	
Queue Length 50th (ft)	16	43	70	0	144	0
Queue Length 95th (ft)	32	72	104	24	184	98
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1558	2572	2211	1122	915	781
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.15	0.23	0.32	0.41	0.63
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 55						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Background Traffic Volumes

AM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.73	
Intersection Signal Delay (s/veh): 14.7	Intersection LOS: B
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: North Gate Boulevard & Struthers Road



HCM 7th TWSC
4: Struthers Road & RIRO Access A









Background Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	69	0	488	725	8
Future Vol, veh/h	0	69	0	488	725	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	0	530	788	9
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	394	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	605	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	605	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v11.79		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 605		-	-		
HCM Lane V/C Ratio	- 0.124		-	-		
HCM Control Delay (s/veh)	- 11.8		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.4		-	-		

HCM 7th TWSC

5: Struthers Road & Shepard Heights

Background Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	661	32	111	359	12	12	0	48	16	2	3
Future Vol, veh/h	6	661	32	111	359	12	12	0	48	16	2	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	718	35	121	390	13	13	0	52	17	2	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	403	0	0	753	0	0	1169	1376	359	1010	1404	202
Stage 1	-	-	-	-	-	-	732	732	-	638	638	-
Stage 2	-	-	-	-	-	-	438	645	-	372	766	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1152	-	-	853	-	-	148	144	637	194	138	806
Stage 1	-	-	-	-	-	-	379	425	-	431	469	-
Stage 2	-	-	-	-	-	-	568	466	-	620	410	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1152	-	-	853	-	-	124	123	637	152	118	806
Mov Cap-2 Maneuver	-	-	-	-	-	-	124	123	-	152	118	-
Stage 1	-	-	-	-	-	-	377	423	-	370	403	-
Stage 2	-	-	-	-	-	-	483	400	-	566	407	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.07	2.28	16.4	29.98
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	124	637	1152	-	-	853	-	-	167
HCM Lane V/C Ratio	0.105	0.082	0.006	-	-	0.142	-	-	0.137
HCM Control Delay (s/veh)	37.4	11.2	8.1	-	-	9.9	-	-	30
HCM Lane LOS	E	B	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.3	0.3	0	-	-	0.5	-	-	0.5

HCM 7th Roundabout
6: Gleneagle Drive & Struthers Road

Background Traffic Volumes
AM Peak Traffic Hour - Year 2026

























Intersection								
Intersection Delay, s/veh	4.9							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	407		406		20		390	
Demand Flow Rate, veh/h	415		414		20		397	
Vehicles Circulating, veh/h	377		31		782		281	
Vehicles Exiting, veh/h	301		771		10		164	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	5.7		4.0		5.2		5.1	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.471	0.529	1.000	0.529	0.471	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	195	220	195	219	20	210	187	
Cap Entry Lane, veh/h	954	1031	1312	1383	730	1042	1118	
Entry HV Adj Factor	0.981	0.981	0.978	0.982	0.998	0.984	0.980	
Flow Entry, veh/h	191	216	191	215	20	207	183	
Cap Entry, veh/h	937	1011	1283	1358	729	1026	1096	
V/C Ratio	0.204	0.213	0.149	0.158	0.027	0.201	0.167	
Control Delay, s/veh	5.8	5.6	4.0	3.9	5.2	5.4	4.8	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	1	1	1	1	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes

AM Peak Traffic Hour - Year 2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	397	67	318	506	22	26	9	70	72	74	53
Future Volume (vph)	23	397	67	318	506	22	26	9	70	72	74	53
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.446			0.459			0.950			0.505		
Satd. Flow (perm)	831	3539	1583	855	3539	1583	3433	1863	1583	941	1863	1583
Satd. Flow (RTOR)			218			173			173			218
Lane Group Flow (vph)	25	432	73	346	550	24	28	10	76	78	80	58
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	15.0	44.0	44.0	25.0	54.0	54.0	28.0	34.0	34.0	17.0	23.0	23.0
Total Split (%)	12.5%	36.7%	36.7%	20.8%	45.0%	45.0%	23.3%	28.3%	28.3%	14.2%	19.2%	19.2%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	75.5	67.5	67.5	88.3	79.5	79.5	6.5	7.4	7.4	21.1	12.5	12.5
Actuated g/C Ratio	0.63	0.56	0.56	0.74	0.66	0.66	0.05	0.06	0.06	0.18	0.10	0.10
v/c Ratio	0.04	0.21	0.07	0.47	0.23	0.02	0.15	0.08	0.29	0.33	0.41	0.16
Control Delay (s/veh)	3.6	7.4	0.1	8.3	10.1	0.0	55.5	53.6	2.8	43.5	56.6	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	3.6	7.4	0.1	8.3	10.1	0.0	55.5	53.6	2.8	43.5	56.6	0.9
LOS	A	A	A	A	B	A	E	D	A	D	E	A
Approach Delay (s/veh)		6.2			9.2			20.3			37.0	
Approach LOS		A			A			C			D	
Queue Length 50th (ft)	3	42	0	84	97	0	10	8	0	51	60	0
Queue Length 95th (ft)	m8	67	0	144	145	0	26	25	0	91	109	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	628	1990	985	781	2344	1107	657	419	490	257	257	407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.22	0.07	0.44	0.23	0.02	0.04	0.02	0.16	0.30	0.31	0.14

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Timings









7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes

AM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.47	
Intersection Signal Delay (s/veh): 12.4	Intersection LOS: B
Intersection Capacity Utilization 55.1%	ICU Level of Service B
Analysis Period (min) 15	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard

 Ø1 25 s	 Ø2 (R) 44 s	 Ø3 17 s	 Ø4 34 s
 Ø5 15 s	 Ø6 (R) 54 s	 Ø7 28 s	 Ø8 23 s

HCM 7th Roundabout

1: Interstate 25 Southbound Ramp & North Gate Boulevard

Background Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection						
Intersection Delay, s/veh	7.4					
Intersection LOS	A					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	576		491		0	278
Demand Flow Rate, veh/h	588		501		0	284
Vehicles Circulating, veh/h	670		0		868	501
Vehicles Exiting, veh/h	114		869		390	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	9.7		4.8		0.0	7.2
Approach LOS	A		A		-	A
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	L	TR	T	LT
RT Channelized						
Lane Util	0.469	0.531	0.772	0.228	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	276	312	387	114	0	284
Cap Entry Lane, veh/h	729	803	1350	1420	679	928
Entry HV Adj Factor	0.982	0.979	0.979	0.980	1.000	0.979
Flow Entry, veh/h	271	306	379	112	0	278
Cap Entry, veh/h	715	787	1322	1392	679	908
V/C Ratio	0.379	0.388	0.287	0.080	0.000	0.306
Control Delay, s/veh	10.0	9.4	5.2	3.2	5.3	7.2
LOS	A	A	A	A	A	A
95th %tile Queue, veh	2	2	1	0	0	1

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard

Background Traffic Volumes













PM Peak Traffic Hour - Year 2026

Intersection						
Intersection Delay, s/veh 5.5						
Intersection LOS A						
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	853		454		50	0
Demand Flow Rate, veh/h	870		463		51	0
Vehicles Circulating, veh/h	0		310		870	514
Vehicles Exiting, veh/h	514		611		0	259
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	5.4		5.6		6.2	0.0
Approach LOS	A		A		A	-
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.470	0.530	0.471	0.529	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	409	461	218	245	51	0
Cap Entry Lane, veh/h	1350	1420	1015	1091	678	917
Entry HV Adj Factor	0.980	0.981	0.979	0.982	0.980	1.000
Flow Entry, veh/h	401	452	213	241	50	0
Cap Entry, veh/h	1323	1393	993	1071	665	917
V/C Ratio	0.303	0.325	0.215	0.225	0.075	0.000
Control Delay, s/veh	5.4	5.4	5.7	5.5	6.2	3.9
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	1	1	1	0	0

Timings

3: North Gate Boulevard & Struthers Road

Background Traffic Volumes
PM Peak Traffic Hour - Year 2026

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	376	1012	426	463	426	265
Future Volume (vph)	376	1012	426	463	426	265
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.447				0.950	
Satd. Flow (perm)	1615	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				503		288
Lane Group Flow (vph)	409	1100	463	503	463	288
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	30.0	82.0	52.0	52.0	38.0	38.0
Total Split (%)	25.0%	68.3%	43.3%	43.3%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	86.7	84.7	69.6	69.6	22.3	22.3
Actuated g/C Ratio	0.72	0.71	0.58	0.58	0.19	0.19
v/c Ratio	0.30	0.44	0.22	0.44	0.72	0.54
Control Delay (s/veh)	6.2	8.6	11.9	2.6	52.6	8.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.2	8.6	11.9	2.6	52.6	8.5
LOS	A	A	B	A	D	A
Approach Delay (s/veh)		8.0	7.1		35.7	
Approach LOS		A	A		D	
Queue Length 50th (ft)	45	171	87	9	175	0
Queue Length 95th (ft)	74	251	121	26	219	71
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1546	2498	2053	1129	915	633
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.44	0.23	0.45	0.51	0.45
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 50						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Background Traffic Volumes

PM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.73	
Intersection Signal Delay (s/veh): 14.2	Intersection LOS: B
Intersection Capacity Utilization 51.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: North Gate Boulevard & Struthers Road



HCM 7th TWSC 4: Struthers Road & RIRO Access A









Background Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	53	0	851	636	14
Future Vol, veh/h	0	53	0	851	636	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	58	0	925	691	15
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	346	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	650	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	650	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v11.07		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 650		-	-		
HCM Lane V/C Ratio	- 0.089		-	-		
HCM Control Delay (s/veh)	- 11.1		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.3		-	-		

HCM 7th TWSC

5: Struthers Road & Shepard Heights

Background Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection												
Int Delay, s/veh	1.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	613	19	50	760	39	3	1	12	17	1	1
Future Vol, veh/h	10	613	19	50	760	39	3	1	12	17	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	666	21	54	826	42	3	1	13	18	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	868	0	0	687	0	0	1210	1665	333	1311	1665	434
Stage 1	-	-	-	-	-	-	688	688	-	956	956	-
Stage 2	-	-	-	-	-	-	522	977	-	355	709	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	771	-	-	903	-	-	138	96	663	116	96	570
Stage 1	-	-	-	-	-	-	403	445	-	277	335	-
Stage 2	-	-	-	-	-	-	506	327	-	635	436	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	771	-	-	903	-	-	126	89	663	105	89	570
Mov Cap-2 Maneuver	-	-	-	-	-	-	126	89	-	105	89	-
Stage 1	-	-	-	-	-	-	397	439	-	261	314	-
Stage 2	-	-	-	-	-	-	473	307	-	612	429	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.15	0.54	17.31	45.97
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	126	442	771	-	-	903	-	-	108
HCM Lane V/C Ratio	0.026	0.032	0.014	-	-	0.06	-	-	0.191
HCM Control Delay (s/veh)	34.2	13.4	9.7	-	-	9.2	-	-	46
HCM Lane LOS	D	B	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.2	-	-	0.7

HCM 7th Roundabout 6: Gleneagle Drive & Struthers Road

























Background Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection								
Intersection Delay, s/veh	5.6							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	477		831		20		287	
Demand Flow Rate, veh/h	487		847		20		293	
Vehicles Circulating, veh/h	263		46		739		474	
Vehicles Exiting, veh/h	504		713		11		419	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	5.4		5.6		5.1		5.7	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	1.000	0.529	0.471	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	229	258	398	449	20	155	138	
Cap Entry Lane, veh/h	1060	1136	1294	1366	758	873	949	
Entry HV Adj Factor	0.979	0.980	0.981	0.981	0.992	0.981	0.977	
Flow Entry, veh/h	224	253	391	440	20	152	135	
Cap Entry, veh/h	1038	1113	1270	1339	752	856	927	
V/C Ratio	0.216	0.227	0.308	0.329	0.026	0.178	0.145	
Control Delay, s/veh	5.5	5.3	5.6	5.6	5.1	6.0	5.3	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	1	1	1	1	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes
PM Peak Traffic Hour - Year 2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	806	78	201	474	34	111	16	99	42	25	32
Future Volume (vph)	61	806	78	201	474	34	111	16	99	42	25	32
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.462			0.249			0.950			0.746		
Satd. Flow (perm)	861	3539	1583	464	3539	1583	3433	1863	1583	1390	1863	1583
Satd. Flow (RTOR)			218			173			173			218
Lane Group Flow (vph)	66	876	85	218	515	37	121	17	108	46	27	35
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	15.0	44.0	44.0	25.0	54.0	54.0	28.0	34.0	34.0	17.0	23.0	23.0
Total Split (%)	12.5%	36.7%	36.7%	20.8%	45.0%	45.0%	23.3%	28.3%	28.3%	14.2%	19.2%	19.2%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	76.6	67.7	67.7	88.5	76.8	76.8	9.7	8.5	8.5	15.8	7.3	7.3
Actuated g/C Ratio	0.64	0.56	0.56	0.74	0.64	0.64	0.08	0.07	0.07	0.13	0.06	0.06
v/c Ratio	0.11	0.43	0.08	0.44	0.22	0.03	0.43	0.12	0.39	0.22	0.24	0.11
Control Delay (s/veh)	6.9	15.6	0.3	8.5	11.0	0.0	57.1	53.3	4.9	40.8	58.2	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.9	15.6	0.3	8.5	11.0	0.0	57.1	53.3	4.9	40.8	58.2	0.7
LOS	A	B	A	A	B	A	E	D	A	D	E	A
Approach Delay (s/veh)		13.9			9.8			34.0			32.2	
Approach LOS		B			A			C			C	
Queue Length 50th (ft)	9	133	0	48	91	0	46	13	0	30	20	0
Queue Length 95th (ft)	35	291	4	87	138	0	76	36	7	60	51	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	647	1997	988	561	2265	1075	657	419	490	266	248	400
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.44	0.09	0.39	0.23	0.03	0.18	0.04	0.22	0.17	0.11	0.09

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Timings

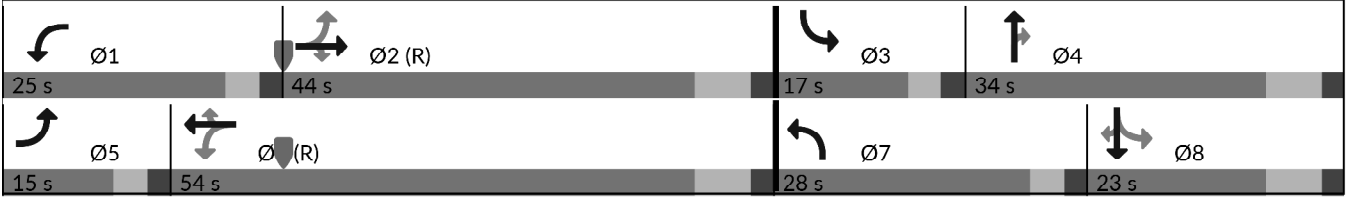
7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes

PM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.44	
Intersection Signal Delay (s/veh): 15.6	Intersection LOS: B
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard



HCM 7th Roundabout

1: Interstate 25 Southbound Ramp & North Gate Boulevard

Background Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection						
Intersection Delay, s/veh	13.7					
Intersection LOS	B					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	105		1920		0	159
Demand Flow Rate, veh/h	107		1958		0	162
Vehicles Circulating, veh/h	730		0		269	1958
Vehicles Exiting, veh/h	1390		269		568	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	5.8		12.3		0.0	35.4
Approach LOS	A		B		-	E
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	LT	TR	T	LT
RT Channelized						
Lane Util	0.467	0.533	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	50	57	920	1038	0	162
Cap Entry Lane, veh/h	690	763	1350	1420	1130	269
Entry HV Adj Factor	0.986	0.975	0.981	0.980	1.000	0.981
Flow Entry, veh/h	49	56	902	1017	0	159
Cap Entry, veh/h	680	745	1324	1392	1130	264
V/C Ratio	0.072	0.075	0.682	0.731	0.000	0.603
Control Delay, s/veh	6.1	5.6	11.7	12.9	3.2	35.4
LOS	A	A	B	B	A	E
95th %tile Queue, veh	0	0	6	7	0	4

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard

Background Traffic Volumes













AM Peak Traffic Hour - Year 2045

Intersection						
Intersection Delay, s/veh26.5						
Intersection LOS D						
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	249		1172		772	0
Demand Flow Rate, veh/h	254		1195		787	0
Vehicles Circulating, veh/h	0		833		254	1982
Vehicles Exiting, veh/h	1982		208		0	46
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	3.4		40.0		13.4	0.0
Approach LOS	A		E		B	-
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.469	0.531	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	119	135	562	633	787	0
Cap Entry Lane, veh/h	1350	1420	627	699	1144	263
Entry HV Adj Factor	0.983	0.977	0.980	0.981	0.981	1.000
Flow Entry, veh/h	117	132	551	621	772	0
Cap Entry, veh/h	1327	1388	615	686	1123	263
V/C Ratio	0.088	0.095	0.896	0.905	0.688	0.000
Control Delay, s/veh	3.4	3.3	40.8	39.3	13.4	13.7
LOS	A	A	E	E	B	B
95th %tile Queue, veh	0	0	11	12	6	0

Timings

3: North Gate Boulevard & Struthers Road

Background Traffic Volumes
AM Peak Traffic Hour - Year 2045

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	242	530	670	477	511	660
Future Volume (vph)	242	530	670	477	511	660
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.223				0.950	
Satd. Flow (perm)	806	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				368		171
Lane Group Flow (vph)	263	576	728	518	555	717
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	10.0	55.0	45.0	45.0	65.0	65.0
Total Split (%)	8.3%	45.8%	37.5%	37.5%	54.2%	54.2%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	56.2	54.2	42.1	42.1	52.8	52.8
Actuated g/C Ratio	0.47	0.45	0.35	0.35	0.44	0.44
v/c Ratio	0.49	0.36	0.58	0.65	0.36	0.90
Control Delay (s/veh)	24.1	23.6	29.0	9.4	22.4	39.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.1	23.6	29.0	9.4	22.4	39.0
LOS	C	C	C	A	C	D
Approach Delay (s/veh)		23.8	20.9		31.8	
Approach LOS		C	C		C	
Queue Length 50th (ft)	62	158	162	38	137	389
Queue Length 95th (ft)	94	215	205	82	170	564
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	532	1598	1242	794	1687	865
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.36	0.59	0.65	0.33	0.83
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 70						
Control Type: Actuated-Coordinated						

Timings

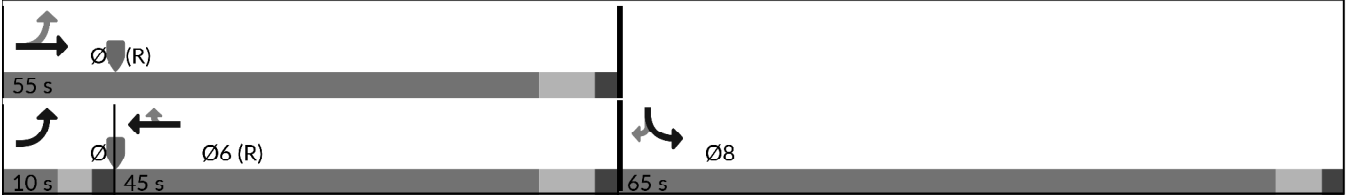
3: North Gate Boulevard & Struthers Road

Background Traffic Volumes

AM Peak Traffic Hour - Year 2045

Maximum v/c Ratio: 0.91	
Intersection Signal Delay (s/veh): 25.8	Intersection LOS: C
Intersection Capacity Utilization 70.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: North Gate Boulevard & Struthers Road



HCM 7th TWSC









4: Struthers Road & RIRO Access A

Background Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	69	0	713	1059	8
Future Vol, veh/h	0	69	0	713	1059	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	0	775	1151	9
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	576	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	461	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	461	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v14.33		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 461		-	-		
HCM Lane V/C Ratio	- 0.163		-	-		
HCM Control Delay (s/veh)	- 14.3		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.6		-	-		

HCM 7th TWSC
5: Struthers Road & Shepard Heights

Background Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	967	32	111	524	12	12	0	48	16	2	3
Future Vol, veh/h	6	967	32	111	524	12	12	0	48	16	2	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	1051	35	121	570	13	13	0	52	17	2	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	583	0	0	1086	0	0	1591	1888	526	1356	1916	291
Stage 1	-	-	-	-	-	-	1064	1064	-	817	817	-
Stage 2	-	-	-	-	-	-	527	824	-	539	1099	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	988	-	-	638	-	-	72	70	497	108	67	705
Stage 1	-	-	-	-	-	-	238	298	-	336	388	-
Stage 2	-	-	-	-	-	-	502	385	-	495	287	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	988	-	-	638	-	-	56	56	497	78	54	705
Mov Cap-2 Maneuver	-	-	-	-	-	-	56	56	-	78	54	-
Stage 1	-	-	-	-	-	-	237	296	-	273	315	-
Stage 2	-	-	-	-	-	-	403	313	-	440	285	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.05			2.05			28.1			62.25		
HCM LOS							D			F		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	56	497	988	-	-	638	-	-	85
HCM Lane V/C Ratio	0.234	0.105	0.007	-	-	0.189	-	-	0.269
HCM Control Delay (s/veh)	88.1	13.1	8.7	-	-	12	-	-	62.3
HCM Lane LOS	F	B	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.8	0.3	0	-	-	0.7	-	-	1

HCM 7th Roundabout 6: Gleneagle Drive & Struthers Road

























Background Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection								
Intersection Delay, s/veh	6.7							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	593		592		20		567	
Demand Flow Rate, veh/h	604		604		20		579	
Vehicles Circulating, veh/h	547		38		1141		403	
Vehicles Exiting, veh/h	435		1123		10		239	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	8.4		4.7		7.1		7.0	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	1.000	0.530	0.470	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	284	320	284	320	20	307	272	
Cap Entry Lane, veh/h	816	892	1303	1375	538	932	1008	
Entry HV Adj Factor	0.981	0.982	0.980	0.981	0.998	0.979	0.980	
Flow Entry, veh/h	279	314	278	314	20	300	266	
Cap Entry, veh/h	800	876	1278	1349	537	912	988	
V/C Ratio	0.348	0.359	0.218	0.233	0.037	0.329	0.270	
Control Delay, s/veh	8.6	8.2	4.7	4.6	7.1	7.5	6.3	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	2	2	1	1	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes
AM Peak Traffic Hour - Year 2045

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	581	97	465	740	32	38	14	102	105	108	78
Future Volume (vph)	33	581	97	465	740	32	38	14	102	105	108	78
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.348			0.326			0.950			0.477		
Satd. Flow (perm)	648	3539	1583	607	3539	1583	3433	1863	1583	889	1863	1583
Satd. Flow (RTOR)			173			127			173			173
Lane Group Flow (vph)	36	632	105	505	804	35	41	15	111	114	117	85
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	9.0	44.0	44.0	45.0	80.0	80.0	9.0	17.0	17.0	14.0	22.0	22.0
Total Split (%)	7.5%	36.7%	36.7%	37.5%	66.7%	66.7%	7.5%	14.2%	14.2%	11.7%	18.3%	18.3%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	63.7	56.5	56.5	86.5	78.6	78.6	4.0	7.8	7.8	23.5	14.3	14.3
Actuated g/C Ratio	0.53	0.47	0.47	0.72	0.66	0.66	0.03	0.07	0.07	0.20	0.12	0.12
v/c Ratio	0.09	0.37	0.12	0.76	0.34	0.03	0.35	0.12	0.42	0.47	0.52	0.24
Control Delay (s/veh)	10.1	27.0	5.3	16.0	10.5	0.0	65.6	53.9	5.9	47.9	59.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	10.1	27.0	5.3	16.0	10.5	0.0	65.6	53.9	5.9	47.9	59.1	1.7
LOS	B	C	A	B	B	A	E	D	A	D	E	A
Approach Delay (s/veh)		23.3			12.3			24.9			39.7	
Approach LOS		C			B			C			D	
Queue Length 50th (ft)	12	146	9	136	155	0	16	11	0	76	88	0
Queue Length 95th (ft)	28	307	28	222	195	0	36	33	9	129	148	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	391	1667	837	824	2317	1080	114	155	290	240	242	356
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.38	0.13	0.61	0.35	0.03	0.36	0.10	0.38	0.48	0.48	0.24

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Timings

7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes

AM Peak Traffic Hour - Year 2045

Maximum v/c Ratio: 0.77

Intersection Signal Delay (s/veh): 19.7

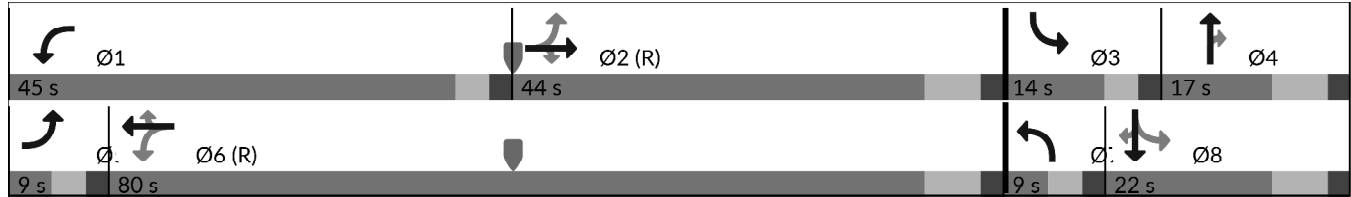
Intersection LOS: B

Intersection Capacity Utilization 70.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard



HCM 7th Roundabout

1: Interstate 25 Southbound Ramp & North Gate Boulevard

Background Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection						
Intersection Delay, s/veh	15.8					
Intersection LOS	C					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	842		718		0	405
Demand Flow Rate, veh/h	859		732		0	413
Vehicles Circulating, veh/h	979		0		1268	732
Vehicles Exiting, veh/h	166		1268		570	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	25.5		6.0		0.0	13.1
Approach LOS	D		A		-	B
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	L	TR	T	LT
RT Channelized						
Lane Util	0.470	0.530	0.773	0.227	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	404	455	566	166	0	413
Cap Entry Lane, veh/h	549	618	1350	1420	483	762
Entry HV Adj Factor	0.980	0.981	0.981	0.980	1.000	0.980
Flow Entry, veh/h	396	446	555	163	0	405
Cap Entry, veh/h	537	606	1324	1392	483	747
V/C Ratio	0.737	0.736	0.419	0.117	0.000	0.542
Control Delay, s/veh	26.8	24.4	6.8	3.5	7.4	13.1
LOS	D	C	A	A	A	B
95th %tile Queue, veh	6	6	2	0	0	3

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard

Background Traffic Volumes

PM Peak Traffic Hour - Year 2045













Intersection						
Intersection Delay, s/veh 7.5						
Intersection LOS A						
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	1248		664		67	0
Demand Flow Rate, veh/h	1273		677		68	0
Vehicles Circulating, veh/h	0		447		1273	745
Vehicles Exiting, veh/h	745		894		0	379
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	7.2		8.0		9.5	0.0
Approach LOS	A		A		A	-
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.470	0.530	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	598	675	318	359	68	0
Cap Entry Lane, veh/h	1350	1420	895	971	481	754
Entry HV Adj Factor	0.981	0.980	0.981	0.980	0.985	1.000
Flow Entry, veh/h	587	662	312	352	67	0
Cap Entry, veh/h	1325	1392	878	952	474	754
V/C Ratio	0.443	0.475	0.355	0.370	0.141	0.000
Control Delay, s/veh	7.1	7.3	8.1	7.8	9.5	4.8
LOS	A	A	A	A	A	A
95th %tile Queue, veh	2	3	2	2	0	0

Timings

3: North Gate Boulevard & Struthers Road

Background Traffic Volumes

PM Peak Traffic Hour - Year 2045

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	550	1479	623	676	623	388
Future Volume (vph)	550	1479	623	676	623	388
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.315				0.950	
Satd. Flow (perm)	1138	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				709		357
Lane Group Flow (vph)	598	1608	677	735	677	422
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	20.0	82.0	62.0	62.0	38.0	38.0
Total Split (%)	16.7%	68.3%	51.7%	51.7%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	79.8	77.8	59.3	59.3	29.2	29.2
Actuated g/C Ratio	0.67	0.65	0.49	0.49	0.24	0.24
v/c Ratio	0.59	0.70	0.38	0.64	0.80	0.64
Control Delay (s/veh)	11.1	16.2	17.8	4.5	50.9	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	11.1	16.2	17.8	4.5	50.9	11.9
LOS	B	B	B	A	D	B
Approach Delay (s/veh)		14.8	10.9		36.0	
Approach LOS		B	B		D	
Queue Length 50th (ft)	93	409	158	31	250	39
Queue Length 95th (ft)	124	506	196	68	316	142
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1043	2293	1750	1141	915	683
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.70	0.39	0.64	0.74	0.62
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 60						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Background Traffic Volumes

PM Peak Traffic Hour - Year 2045

Maximum v/c Ratio: 0.81	
Intersection Signal Delay (s/veh): 18.6	Intersection LOS: B
Intersection Capacity Utilization 69.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 3: North Gate Boulevard & Struthers Road



HCM 7th TWSC 4: Struthers Road & RIRO Access A

Background Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	53	0	1243	930	14
Future Vol, veh/h	0	53	0	1243	930	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	58	0	1351	1011	15
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	505	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	512	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	512	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v12.92		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 512		-	-		
HCM Lane V/C Ratio	- 0.113		-	-		
HCM Control Delay (s/veh)	- 12.9		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.4		-	-		

HCM 7th TWSC

5: Struthers Road & Shepard Heights

Background Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑		↰	↱			↕	
Traffic Vol, veh/h	10	895	19	50	1111	39	3	1	12	17	1	1
Future Vol, veh/h	10	895	19	50	1111	39	3	1	12	17	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	973	21	54	1208	42	3	1	13	18	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1250	0	0	993	0	0	1708	2353	486	1846	2353	625
Stage 1	-	-	-	-	-	-	995	995	-	1337	1337	-
Stage 2	-	-	-	-	-	-	713	1359	-	509	1015	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	553	-	-	692	-	-	59	35	527	46	35	428
Stage 1	-	-	-	-	-	-	263	321	-	161	220	-
Stage 2	-	-	-	-	-	-	389	215	-	515	314	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	553	-	-	692	-	-	51	32	527	39	32	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	51	32	-	39	32	-
Stage 1	-	-	-	-	-	-	257	315	-	149	203	-
Stage 2	-	-	-	-	-	-	356	198	-	491	308	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.13	0.44	31.96	161.55
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	51	240	553	-	-	692	-	-	41
HCM Lane V/C Ratio	0.063	0.059	0.02	-	-	0.079	-	-	0.505
HCM Control Delay (s/veh)	79.7	20.9	11.6	-	-	10.6	-	-	161.5
HCM Lane LOS	F	C	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.2	0.2	0.1	-	-	0.3	-	-	1.8

HCM 7th Roundabout 6: Gleneagle Drive & Struthers Road

























Background Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection								
Intersection Delay, s/veh	7.6							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	690		1195		20		417	
Demand Flow Rate, veh/h	704		1219		20		425	
Vehicles Circulating, veh/h	380		55		1073		688	
Vehicles Exiting, veh/h	733		1038		11		586	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	7.5		7.5		6.8		8.3	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	1.000	0.529	0.471	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	331	373	573	646	20	225	200	
Cap Entry Lane, veh/h	952	1028	1283	1355	570	717	791	
Entry HV Adj Factor	0.980	0.981	0.980	0.980	0.992	0.982	0.980	
Flow Entry, veh/h	324	366	561	633	20	221	196	
Cap Entry, veh/h	933	1008	1257	1328	566	704	775	
V/C Ratio	0.348	0.363	0.447	0.477	0.035	0.314	0.253	
Control Delay, s/veh	7.6	7.4	7.4	7.5	6.8	9.0	7.5	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	2	2	2	3	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes
PM Peak Traffic Hour - Year 2045

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1178	114	293	693	50	163	23	144	61	36	47
Future Volume (vph)	90	1178	114	293	693	50	163	23	144	61	36	47
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.366			0.116			0.950			0.833		
Satd. Flow (perm)	682	3539	1583	216	3539	1583	3433	1863	1583	1552	1863	1583
Satd. Flow (RTOR)			173			127			173			173
Lane Group Flow (vph)	98	1280	124	318	753	54	177	25	157	66	39	51
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	10.0	64.0	64.0	29.0	83.0	83.0	14.0	18.0	18.0	9.0	13.0	13.0
Total Split (%)	8.3%	53.3%	53.3%	24.2%	69.2%	69.2%	11.7%	15.0%	15.0%	7.5%	10.8%	10.8%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	72.1	64.9	64.9	90.7	78.6	78.6	8.9	10.1	10.1	10.4	5.9	5.9
Actuated g/C Ratio	0.60	0.54	0.54	0.76	0.66	0.66	0.07	0.08	0.08	0.09	0.05	0.05
v/c Ratio	0.21	0.66	0.13	0.78	0.32	0.05	0.69	0.16	0.53	0.46	0.42	0.21
Control Delay (s/veh)	8.1	24.1	2.5	33.1	10.0	0.0	69.3	52.8	13.0	55.7	69.8	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.1	24.1	2.5	33.1	10.0	0.0	69.3	52.8	13.0	55.7	69.8	1.9
LOS	A	C	A	C	B	A	E	D	B	E	E	A
Approach Delay (s/veh)		21.3			16.1			43.6			41.7	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	24	392	2	129	132	0	70	18	0	44	30	0
Queue Length 95th (ft)	m36	520	m12	229	167	0	#114	47	52	86	68	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	456	1915	935	474	2317	1080	257	170	302	141	93	243
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.67	0.13	0.67	0.32	0.05	0.69	0.15	0.52	0.47	0.42	0.21

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Timings 7: Voyager Parkway & North Gate Boulevard

Background Traffic Volumes
PM Peak Traffic Hour - Year 2045

Maximum v/c Ratio: 0.78

Intersection Signal Delay (s/veh): 23.0

Intersection LOS: C

Intersection Capacity Utilization 75.9%

ICU Level of Service D

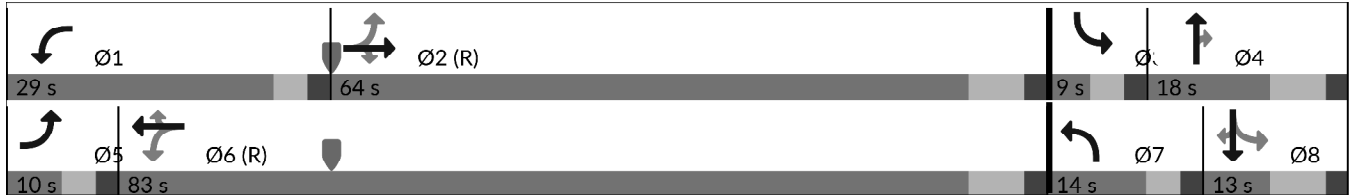
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard



HCM 7th Roundabout
1: Interstate 25 Southbound Ramp & North Gate Boulevard

Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection						
Intersection Delay, s/veh	7.8					
Intersection LOS	A					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	73		1328		0	115
Demand Flow Rate, veh/h	74		1355		0	117
Vehicles Circulating, veh/h	520		0		191	1355
Vehicles Exiting, veh/h	952		191		403	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	4.6		7.6		0.0	12.3
Approach LOS	A		A		-	B
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	LT	TR	T	LT
RT Channelized						
Lane Util	0.473	0.527	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	35	39	637	718	0	117
Cap Entry Lane, veh/h	837	913	1350	1420	1207	449
Entry HV Adj Factor	0.974	0.986	0.980	0.981	1.000	0.983
Flow Entry, veh/h	34	38	624	704	0	115
Cap Entry, veh/h	815	900	1323	1392	1207	441
V/C Ratio	0.042	0.043	0.472	0.506	0.000	0.261
Control Delay, s/veh	4.8	4.4	7.5	7.7	3.0	12.3
LOS	A	A	A	A	A	B
95th %tile Queue, veh	0	0	3	3	0	1

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard













Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection									
Intersection Delay, s/veh		9.0							
Intersection LOS		A							
Approach		EB		WB		NB		SB	
Entry Lanes		2		2		1		1	
Conflicting Circle Lanes		2		2		2		2	
Adj Approach Flow, veh/h		189		815		528		0	
Demand Flow Rate, veh/h		193		831		539		0	
Vehicles Circulating, veh/h		0		570		193		1370	
Vehicles Exiting, veh/h		1370		162		0		31	
Ped Vol Crossing Leg, #/h		0		0		0		0	
Ped Cap Adj		1.000		1.000		1.000		1.000	
Approach Delay, s/veh		3.2		11.1		7.7		0.0	
Approach LOS		A		B		A		-	
Lane		Left		Right		Left		Left	
Designated Moves		LT		TR		LT		T	
Assumed Moves		LT		TR		LT		T	
RT Channelized									
Lane Util		0.472		0.528		0.471		0.529	
Follow-Up Headway, s		2.667		2.535		2.667		2.535	
Critical Headway, s		4.645		4.328		4.645		4.328	
A (Intercept)		1350		1420		1350		1420	
B (Slope)		9.199e-4		8.501e-4		9.199e-4		8.501e-4	
Entry Flow, veh/h		91		102		391		440	
Cap Entry Lane, veh/h		1350		1420		799		875	
Entry HV Adj Factor		0.975		0.981		0.979		0.981	
Flow Entry, veh/h		89		100		383		432	
Cap Entry, veh/h		1316		1393		783		858	
V/C Ratio		0.067		0.072		0.489		0.503	
Control Delay, s/veh		3.3		3.1		11.4		10.9	
LOS		A		A		B		B	
95th %tile Queue, veh		0		0		3		3	
						2		0	

Timings

3: North Gate Boulevard & Struthers Road

Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	217	363	459	353	359	470
Future Volume (vph)	217	363	459	353	359	470
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.434				0.950	
Satd. Flow (perm)	1568	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				384		511
Lane Group Flow (vph)	236	395	499	384	390	511
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	30.0	82.0	52.0	52.0	38.0	38.0
Total Split (%)	25.0%	68.3%	43.3%	43.3%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	88.7	86.7	73.8	73.8	20.3	20.3
Actuated g/C Ratio	0.74	0.72	0.62	0.62	0.17	0.17
v/c Ratio	0.18	0.15	0.22	0.34	0.67	0.73
Control Delay (s/veh)	5.1	5.7	10.3	1.7	52.2	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	5.1	5.7	10.3	1.7	52.2	10.7
LOS	A	A	B	A	D	B
Approach Delay (s/veh)		5.6	6.6		28.7	
Approach LOS		A	A		C	
Queue Length 50th (ft)	23	45	80	2	146	0
Queue Length 95th (ft)	41	73	107	22	188	101
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1547	2556	2176	1121	915	796
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.15	0.23	0.34	0.43	0.64
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 55						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.74

Intersection Signal Delay (s/veh): 14.6

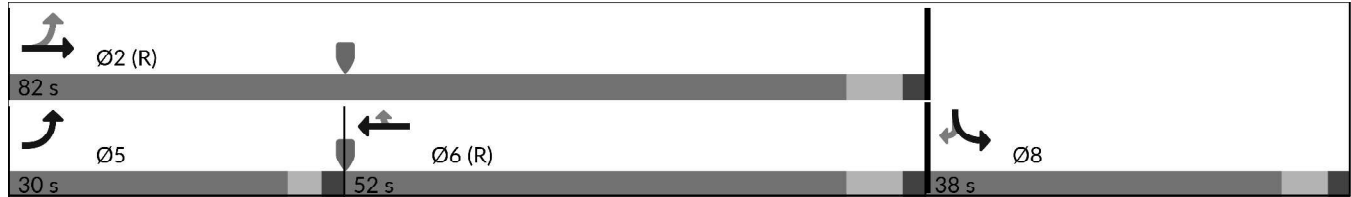
Intersection LOS: B

Intersection Capacity Utilization 52.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: North Gate Boulevard & Struthers Road











HCM 7th TWSC 4: Struthers Road & RIRO Access A

Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	69	0	566	754	8
Future Vol, veh/h	0	69	0	566	754	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	0	615	820	9
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	410	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	591	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	591	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v11.98		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 591		-	-		
HCM Lane V/C Ratio	- 0.127		-	-		
HCM Control Delay (s/veh)	- 12		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.4		-	-		

HCM 7th TWSC
5: Struthers Road & Shepard Heights

Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	668	32	189	359	12	12	0	70	16	2	3
Future Vol, veh/h	6	668	32	189	359	12	12	0	70	16	2	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	726	35	205	390	13	13	0	76	17	2	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	403	0	0	761	0	0	1346	1553	363	1184	1582	202
Stage 1	-	-	-	-	-	-	739	739	-	808	808	-
Stage 2	-	-	-	-	-	-	607	814	-	376	774	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1152	-	-	847	-	-	110	112	634	145	108	806
Stage 1	-	-	-	-	-	-	375	422	-	341	392	-
Stage 2	-	-	-	-	-	-	450	390	-	617	407	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1152	-	-	847	-	-	81	85	634	96	81	806
Mov Cap-2 Maneuver	-	-	-	-	-	-	81	85	-	96	81	-
Stage 1	-	-	-	-	-	-	373	419	-	258	297	-
Stage 2	-	-	-	-	-	-	337	295	-	540	404	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s/v	0.07			3.58			18.28			47.26		
HCM LOS							C			E		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	81	634	1152	-	-	847	-	-	108
HCM Lane V/C Ratio	0.162	0.12	0.006	-	-	0.243	-	-	0.212
HCM Control Delay (s/veh)	58.1	11.5	8.1	-	-	10.6	-	-	47.3
HCM Lane LOS	F	B	A	-	-	B	-	-	E
HCM 95th %tile Q(veh)	0.5	0.4	0	-	-	0.9	-	-	0.8

HCM 7th Roundabout
6: Gleneagle Drive & Struthers Road

























Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

Intersection								
Intersection Delay, s/veh	5.0							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	417		406		31		390	
Demand Flow Rate, veh/h	425		414		31		397	
Vehicles Circulating, veh/h	377		34		782		284	
Vehicles Exiting, veh/h	304		779		20		164	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	5.8		4.0		5.4		5.1	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.471	0.529	0.471	0.529	1.000	0.529	0.471	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	200	225	195	219	31	210	187	
Cap Entry Lane, veh/h	954	1031	1308	1380	730	1039	1115	
Entry HV Adj Factor	0.980	0.983	0.978	0.982	0.999	0.984	0.980	
Flow Entry, veh/h	196	221	191	215	31	207	183	
Cap Entry, veh/h	936	1013	1280	1355	730	1023	1093	
V/C Ratio	0.210	0.218	0.149	0.159	0.042	0.202	0.168	
Control Delay, s/veh	5.9	5.6	4.1	4.0	5.4	5.4	4.8	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	1	1	1	1	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	402	72	318	519	22	39	9	70	72	74	53
Future Volume (vph)	23	402	72	318	519	22	39	9	70	72	74	53
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.440			0.456			0.950			0.571		
Satd. Flow (perm)	820	3539	1583	849	3539	1583	3433	1863	1583	1064	1863	1583
Satd. Flow (RTOR)			218			173			173			218
Lane Group Flow (vph)	25	437	78	346	564	24	42	10	76	78	80	58
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	15.0	44.0	44.0	25.0	54.0	54.0	28.0	34.0	34.0	17.0	23.0	23.0
Total Split (%)	12.5%	36.7%	36.7%	20.8%	45.0%	45.0%	23.3%	28.3%	28.3%	14.2%	19.2%	19.2%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	74.8	66.8	66.8	87.8	78.9	78.9	6.9	7.9	7.9	20.8	10.4	10.4
Actuated g/C Ratio	0.62	0.56	0.56	0.73	0.66	0.66	0.06	0.07	0.07	0.17	0.09	0.09
v/c Ratio	0.04	0.22	0.07	0.47	0.24	0.02	0.21	0.08	0.28	0.32	0.49	0.17
Control Delay (s/veh)	3.6	7.5	0.1	8.6	10.4	0.0	56.0	52.8	2.7	42.6	62.0	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	3.6	7.5	0.1	8.6	10.4	0.0	56.0	52.8	2.7	42.6	62.0	1.1
LOS	A	A	A	A	B	A	E	D	A	D	E	A
Approach Delay (s/veh)		6.3			9.5			24.1			38.7	
Approach LOS		A			A			C			D	
Queue Length 50th (ft)	3	42	0	85	101	0	16	8	0	51	60	0
Queue Length 95th (ft)	m7	69	0	148	152	0	35	25	0	90	109	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	617	1969	977	774	2328	1100	657	419	490	270	248	400
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.22	0.08	0.45	0.24	0.02	0.06	0.02	0.16	0.29	0.32	0.15

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Timings

7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes
AM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.50

Intersection Signal Delay (s/veh): 13.1

Intersection LOS: B

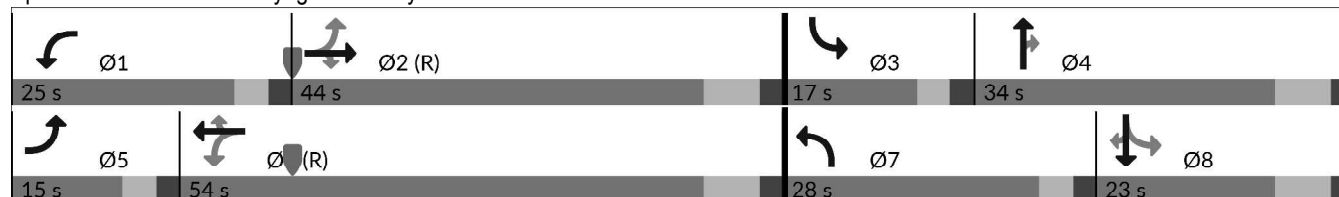
Intersection Capacity Utilization 55.2%

ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard



HCM 7th Roundabout
1: Interstate 25 Southbound Ramp & North Gate Boulevard

Total Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection						
Intersection Delay, s/veh	7.8					
Intersection LOS	A					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	576		532		0	291
Demand Flow Rate, veh/h	588		542		0	297
Vehicles Circulating, veh/h	725		0		882	542
Vehicles Exiting, veh/h	114		882		431	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	10.4		5.1		0.0	7.8
Approach LOS	B		A		-	A
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	L	TR	T	LT
RT Channelized						
Lane Util	0.469	0.531	0.790	0.210	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	276	312	428	114	0	297
Cap Entry Lane, veh/h	693	767	1350	1420	671	896
Entry HV Adj Factor	0.982	0.979	0.981	0.980	1.000	0.980
Flow Entry, veh/h	271	306	420	112	0	291
Cap Entry, veh/h	680	751	1325	1392	671	878
V/C Ratio	0.398	0.407	0.317	0.080	0.000	0.332
Control Delay, s/veh	10.7	10.1	5.6	3.2	5.4	7.8
LOS	B	B	A	A	A	A
95th %tile Queue, veh	2	2	1	0	0	1

HCM 7th Roundabout 2: Interstate 25 Northbound Ramp & North Gate Boulevard

Total Traffic Volumes
PM Peak Traffic Hour - Year 2026













Intersection						
Intersection Delay, s/veh 5.6						
Intersection LOS A						
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	866		495		50	0
Demand Flow Rate, veh/h	883		505		51	0
Vehicles Circulating, veh/h	0		310		883	556
Vehicles Exiting, veh/h	556		624		0	259
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	5.5		5.8		6.3	0.0
Approach LOS	A		A		A	-
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.470	0.530	0.469	0.531	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	415	468	237	268	51	0
Cap Entry Lane, veh/h	1350	1420	1015	1091	670	885
Entry HV Adj Factor	0.981	0.980	0.982	0.979	0.980	1.000
Flow Entry, veh/h	407	459	233	262	50	0
Cap Entry, veh/h	1324	1392	997	1068	657	885
V/C Ratio	0.307	0.330	0.234	0.246	0.076	0.000
Control Delay, s/veh	5.5	5.5	5.9	5.7	6.3	4.1
LOS	A	A	A	A	A	A
95th %tile Queue, veh	1	1	1	1	0	0

Timings

3: North Gate Boulevard & Struthers Road

Total Traffic Volumes

PM Peak Traffic Hour - Year 2026

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	413	1012	426	482	454	321
Future Volume (vph)	413	1012	426	482	454	321
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.444				0.950	
Satd. Flow (perm)	1604	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				524		349
Lane Group Flow (vph)	449	1100	463	524	493	349
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	30.0	82.0	52.0	52.0	38.0	38.0
Total Split (%)	25.0%	68.3%	43.3%	43.3%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	85.4	83.4	67.5	67.5	23.6	23.6
Actuated g/C Ratio	0.71	0.70	0.56	0.56	0.20	0.20
v/c Ratio	0.34	0.44	0.23	0.46	0.73	0.59
Control Delay (s/veh)	6.9	9.3	12.9	2.9	51.4	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	6.9	9.3	12.9	2.9	51.4	8.2
LOS	A	A	B	A	D	A
Approach Delay (s/veh)		8.7	7.7		33.6	
Approach LOS		A	A		C	
Queue Length 50th (ft)	52	177	90	11	186	0
Queue Length 95th (ft)	87	264	125	30	228	75
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1522	2458	1990	1119	915	678
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.45	0.23	0.47	0.54	0.51
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 50						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Total Traffic Volumes
PM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.73

Intersection Signal Delay (s/veh): 14.6

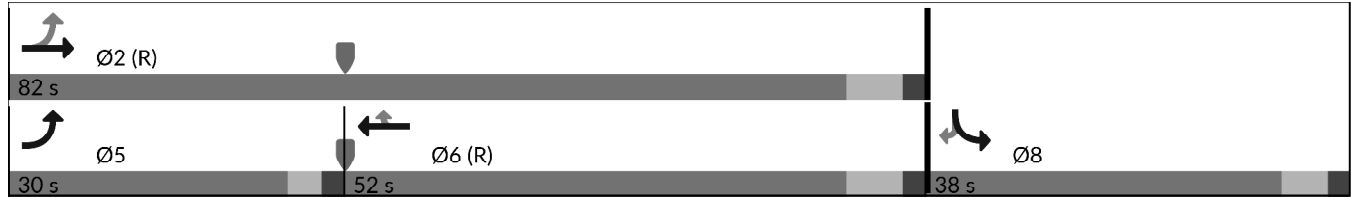
Intersection LOS: B

Intersection Capacity Utilization 51.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: North Gate Boulevard & Struthers Road











HCM 7th TWSC 4: Struthers Road & RIRO Access A

Total Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	53	0	907	720	14
Future Vol, veh/h	0	53	0	907	720	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	58	0	986	783	15
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	391	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	608	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	608	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v	11.55	0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 608		-	-		
HCM Lane V/C Ratio	- 0.095		-	-		
HCM Control Delay (s/veh)	- 11.5		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.3		-	-		

HCM 7th TWSC
5: Struthers Road & Shepard Heights

Total Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	634	19	106	760	39	3	1	77	17	1	1
Future Vol, veh/h	10	634	19	106	760	39	3	1	77	17	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	689	21	115	826	42	3	1	84	18	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	868	0	0	710	0	0	1355	1810	345	1445	1809	434
Stage 1	-	-	-	-	-	-	711	711	-	1078	1078	-
Stage 2	-	-	-	-	-	-	644	1099	-	367	732	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	771	-	-	885	-	-	108	78	651	93	78	570
Stage 1	-	-	-	-	-	-	390	435	-	234	293	-
Stage 2	-	-	-	-	-	-	428	287	-	625	425	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	771	-	-	885	-	-	91	67	651	68	67	570
Mov Cap-2 Maneuver	-	-	-	-	-	-	91	67	-	68	67	-
Stage 1	-	-	-	-	-	-	385	428	-	203	255	-
Stage 2	-	-	-	-	-	-	370	249	-	536	419	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.15	1.13	13.43	74.6
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	91	586	771	-	-	885	-	-	72
HCM Lane V/C Ratio	0.036	0.145	0.014	-	-	0.13	-	-	0.289
HCM Control Delay (s/veh)	45.9	12.2	9.7	-	-	9.7	-	-	74.6
HCM Lane LOS	E	B	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.1	0.5	0	-	-	0.4	-	-	1

HCM 7th Roundabout
6: Gleneagle Drive & Struthers Road

























Total Traffic Volumes
PM Peak Traffic Hour - Year 2026

Intersection								
Intersection Delay, s/veh	5.6							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	484		831		50		287	
Demand Flow Rate, veh/h	494		847		51		293	
Vehicles Circulating, veh/h	263		56		739		484	
Vehicles Exiting, veh/h	514		734		18		419	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	5.4		5.7		5.5		5.7	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	1.000	0.529	0.471	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	232	262	398	449	51	155	138	
Cap Entry Lane, veh/h	1060	1136	1282	1354	758	865	941	
Entry HV Adj Factor	0.981	0.979	0.981	0.981	0.977	0.981	0.977	
Flow Entry, veh/h	228	257	391	440	50	152	135	
Cap Entry, veh/h	1040	1112	1258	1328	740	848	920	
V/C Ratio	0.219	0.231	0.310	0.332	0.067	0.179	0.147	
Control Delay, s/veh	5.5	5.4	5.7	5.7	5.5	6.1	5.3	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	1	1	1	1	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes
PM Peak Traffic Hour - Year 2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	820	92	201	483	34	121	16	99	42	25	32
Future Volume (vph)	61	820	92	201	483	34	121	16	99	42	25	32
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.457			0.242			0.950			0.746		
Satd. Flow (perm)	851	3539	1583	451	3539	1583	3433	1863	1583	1390	1863	1583
Satd. Flow (RTOR)			218			173			173			218
Lane Group Flow (vph)	66	891	100	218	525	37	132	17	108	46	27	35
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	15.0	44.0	44.0	25.0	54.0	54.0	28.0	34.0	34.0	17.0	23.0	23.0
Total Split (%)	12.5%	36.7%	36.7%	20.8%	45.0%	45.0%	23.3%	28.3%	28.3%	14.2%	19.2%	19.2%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	75.9	67.1	67.1	88.2	76.4	76.4	10.0	8.9	8.9	15.8	7.3	7.3
Actuated g/C Ratio	0.63	0.56	0.56	0.74	0.64	0.64	0.08	0.07	0.07	0.13	0.06	0.06
v/c Ratio	0.11	0.45	0.10	0.44	0.23	0.03	0.45	0.12	0.38	0.22	0.24	0.11
Control Delay (s/veh)	7.5	17.1	0.7	8.8	11.3	0.0	57.2	52.6	4.8	40.5	58.2	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.5	17.1	0.7	8.8	11.3	0.0	57.2	52.6	4.8	40.5	58.2	0.7
LOS	A	B	A	A	B	A	E	D	A	D	E	A
Approach Delay (s/veh)		15.0			10.1			34.9			32.1	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	9	145	0	49	94	0	51	13	0	29	20	0
Queue Length 95th (ft)	m37	325	9	89	143	0	81	36	6	60	51	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	637	1977	980	553	2254	1071	657	419	490	266	248	400
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.45	0.10	0.39	0.23	0.03	0.20	0.04	0.22	0.17	0.11	0.09

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Timings 7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes
PM Peak Traffic Hour - Year 2026

Maximum v/c Ratio: 0.46

Intersection Signal Delay (s/veh): 16.4

Intersection LOS: B

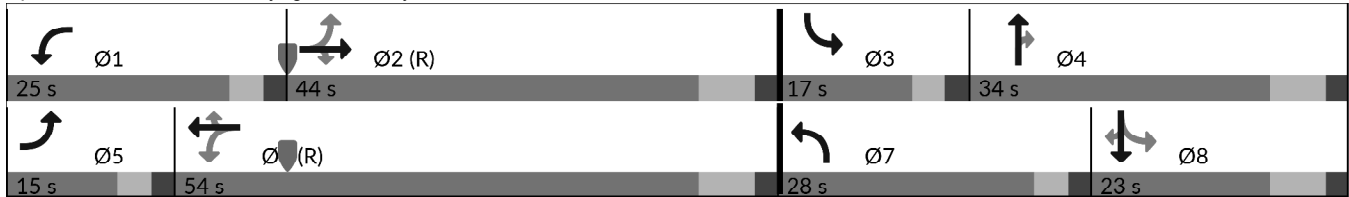
Intersection Capacity Utilization 59.8%

ICU Level of Service B

Analysis Period (min) 15

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard



HCM 7th Roundabout
1: Interstate 25 Southbound Ramp & North Gate Boulevard

Total Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection						
Intersection Delay, s/veh	14.6					
Intersection LOS	B					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	105		1934		0	177
Demand Flow Rate, veh/h	107		1972		0	181
Vehicles Circulating, veh/h	763		0		288	1972
Vehicles Exiting, veh/h	1390		288		582	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	6.0		12.5		0.0	42.5
Approach LOS	A		B		-	E
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	LT	TR	T	LT
RT Channelized						
Lane Util	0.467	0.533	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	50	57	927	1045	0	181
Cap Entry Lane, veh/h	669	742	1350	1420	1112	266
Entry HV Adj Factor	0.986	0.975	0.980	0.981	1.000	0.978
Flow Entry, veh/h	49	56	909	1025	0	177
Cap Entry, veh/h	660	724	1323	1393	1112	260
V/C Ratio	0.075	0.077	0.687	0.736	0.000	0.681
Control Delay, s/veh	6.3	5.8	11.9	13.1	3.2	42.5
LOS	A	A	B	B	A	E
95th %tile Queue, veh	0	0	6	7	0	4

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard













Total Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection						
Intersection Delay, s/veh27.6						
Intersection LOS D						
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	268		1186		772	0
Demand Flow Rate, veh/h	273		1210		787	0
Vehicles Circulating, veh/h	0		833		273	1997
Vehicles Exiting, veh/h	1997		227		0	46
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	3.4		41.9		13.9	0.0
Approach LOS	A		E		B	-
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.469	0.531	0.470	0.530	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	128	145	569	641	787	0
Cap Entry Lane, veh/h	1350	1420	627	699	1126	260
Entry HV Adj Factor	0.982	0.978	0.980	0.981	0.981	1.000
Flow Entry, veh/h	126	142	558	629	772	0
Cap Entry, veh/h	1326	1389	615	686	1105	260
V/C Ratio	0.095	0.102	0.907	0.916	0.699	0.000
Control Delay, s/veh	3.5	3.4	42.6	41.2	13.9	13.8
LOS	A	A	E	E	B	B
95th %tile Queue, veh	0	0	11	12	6	0

Timings

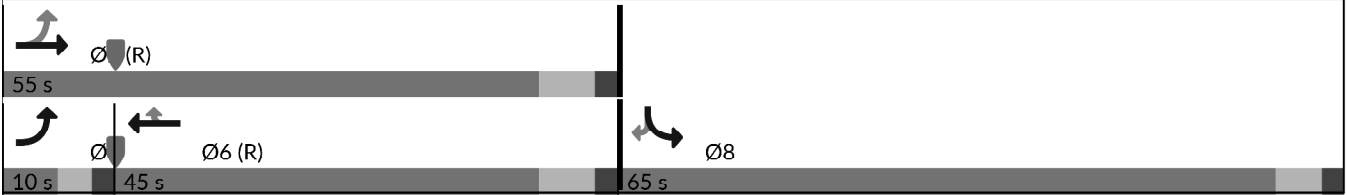
3: North Gate Boulevard & Struthers Road

Total Traffic Volumes
AM Peak Traffic Hour - Year 2045

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	294	530	670	503	621	679
Future Volume (vph)	294	530	670	503	621	679
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.215				0.950	
Satd. Flow (perm)	777	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				389		171
Lane Group Flow (vph)	320	576	728	547	675	738
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	10.0	55.0	45.0	45.0	65.0	65.0
Total Split (%)	8.3%	45.8%	37.5%	37.5%	54.2%	54.2%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	54.9	52.9	40.7	40.7	54.1	54.1
Actuated g/C Ratio	0.46	0.44	0.34	0.34	0.45	0.45
v/c Ratio	0.62	0.36	0.60	0.68	0.43	0.91
Control Delay (s/veh)	28.7	24.3	30.1	10.3	22.9	39.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.7	24.3	30.1	10.3	22.9	39.9
LOS	C	C	C	B	C	D
Approach Delay (s/veh)		25.9	21.7		31.8	
Approach LOS		C	C		C	
Queue Length 50th (ft)	79	162	164	39	169	402
Queue Length 95th (ft)	113	215	207	83	211	#657
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	516	1561	1199	794	1687	865
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.37	0.61	0.69	0.40	0.85
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 70						
Control Type: Actuated-Coordinated						

Maximum v/c Ratio: 0.91	
Intersection Signal Delay (s/veh): 26.7	Intersection LOS: C
Intersection Capacity Utilization 71.4%	ICU Level of Service C
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 3: North Gate Boulevard & Struthers Road











HCM 7th TWSC 4: Struthers Road & RIRO Access A

Total Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	69	0	791	1088	8
Future Vol, veh/h	0	69	0	791	1088	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	0	860	1183	9
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	-	591	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	450	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	450	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s/v14.59		0		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT EBLn1		SBT	SBR		
Capacity (veh/h)	- 450		-	-		
HCM Lane V/C Ratio	- 0.167		-	-		
HCM Control Delay (s/veh)	- 14.6		-	-		
HCM Lane LOS	- B		-	-		
HCM 95th %tile Q(veh)	- 0.6		-	-		

HCM 7th TWSC
5: Struthers Road & Shepard Heights

Total Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection												
Int Delay, s/veh	4.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	974	32	189	524	12	12	0	70	16	2	3
Future Vol, veh/h	6	974	32	189	524	12	12	0	70	16	2	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	1059	35	205	570	13	13	0	76	17	2	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	583	0	0	1093	0	0	1768	2065	529	1529	2093	291
Stage 1	-	-	-	-	-	-	1072	1072	-	987	987	-
Stage 2	-	-	-	-	-	-	697	993	-	542	1107	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	988	-	-	634	-	-	53	54	494	80	52	705
Stage 1	-	-	-	-	-	-	236	295	-	265	324	-
Stage 2	-	-	-	-	-	-	398	321	-	492	284	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	988	-	-	634	-	-	34	36	494	46	35	705
Mov Cap-2 Maneuver	-	-	-	-	-	-	34	36	-	46	35	-
Stage 1	-	-	-	-	-	-	234	293	-	179	219	-
Stage 2	-	-	-	-	-	-	265	217	-	413	282	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.05	3.49	36.02	124.31
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	34	494	988	-	-	634	-	-	51
HCM Lane V/C Ratio	0.385	0.154	0.007	-	-	0.324	-	-	0.449
HCM Control Delay (s/veh)	166.8	13.6	8.7	-	-	13.4	-	-	124.3
HCM Lane LOS	F	B	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1.3	0.5	0	-	-	1.4	-	-	1.7

HCM 7th Roundabout
6: Gleneagle Drive & Struthers Road

























Total Traffic Volumes
AM Peak Traffic Hour - Year 2045

Intersection								
Intersection Delay, s/veh	6.7							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	603		592		32		567	
Demand Flow Rate, veh/h	614		604		32		579	
Vehicles Circulating, veh/h	547		41		1141		406	
Vehicles Exiting, veh/h	438		1132		20		239	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	8.5		4.7		7.4		7.0	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.471	0.529	0.470	0.530	1.000	0.530	0.470	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	289	325	284	320	32	307	272	
Cap Entry Lane, veh/h	816	892	1300	1371	538	929	1006	
Entry HV Adj Factor	0.980	0.983	0.980	0.981	0.999	0.979	0.980	
Flow Entry, veh/h	283	319	278	314	32	300	266	
Cap Entry, veh/h	800	877	1274	1346	538	909	985	
V/C Ratio	0.354	0.364	0.218	0.233	0.059	0.330	0.270	
Control Delay, s/veh	8.7	8.3	4.7	4.7	7.4	7.6	6.4	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	2	2	1	1	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes
AM Peak Traffic Hour - Year 2045

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	586	103	465	750	32	51	14	102	105	108	78
Future Volume (vph)	33	586	103	465	750	32	51	14	102	105	108	78
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.344			0.324			0.950			0.477		
Satd. Flow (perm)	641	3539	1583	604	3539	1583	3433	1863	1583	889	1863	1583
Satd. Flow (RTOR)			173			127			173			173
Lane Group Flow (vph)	36	637	112	505	815	35	55	15	111	114	117	85
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	9.0	44.0	44.0	45.0	80.0	80.0	9.0	17.0	17.0	14.0	22.0	22.0
Total Split (%)	7.5%	36.7%	36.7%	37.5%	66.7%	66.7%	7.5%	14.2%	14.2%	11.7%	18.3%	18.3%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	63.6	56.4	56.4	86.5	78.6	78.6	4.0	7.8	7.8	23.5	14.3	14.3
Actuated g/C Ratio	0.53	0.47	0.47	0.72	0.66	0.66	0.03	0.07	0.07	0.20	0.12	0.12
v/c Ratio	0.09	0.38	0.13	0.76	0.35	0.03	0.48	0.12	0.42	0.47	0.52	0.24
Control Delay (s/veh)	9.3	25.3	4.4	16.0	10.6	0.0	71.2	53.9	5.9	47.9	59.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	9.3	25.3	4.4	16.0	10.6	0.0	71.2	53.9	5.9	47.9	59.1	1.7
LOS	A	C	A	B	B	A	E	D	A	D	E	A
Approach Delay (s/veh)		21.6			12.4			29.8			39.7	
Approach LOS		C			B			C			D	
Queue Length 50th (ft)	11	137	9	136	158	0	22	11	0	76	88	0
Queue Length 95th (ft)	26	306	25	224	198	0	44	33	9	129	148	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	387	1663	835	823	2317	1080	114	155	290	240	242	356
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.38	0.13	0.61	0.35	0.03	0.48	0.10	0.38	0.48	0.48	0.24

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Timings

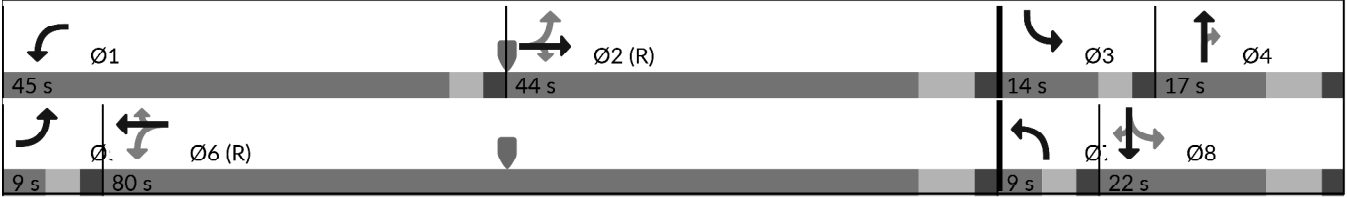
7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes

AM Peak Traffic Hour - Year 2045

Maximum v/c Ratio: 0.77	
Intersection Signal Delay (s/veh): 19.6	Intersection LOS: B
Intersection Capacity Utilization 70.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard



HCM 7th Roundabout
1: Interstate 25 Southbound Ramp & North Gate Boulevard

Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection						
Intersection Delay, s/veh	17.7					
Intersection LOS	C					
Approach	EB		WB		NB	SB
Entry Lanes	2		2		1	1
Conflicting Circle Lanes	2		2		2	2
Adj Approach Flow, veh/h	842		759		0	418
Demand Flow Rate, veh/h	859		774		0	426
Vehicles Circulating, veh/h	1034		0		1281	774
Vehicles Exiting, veh/h	166		1281		612	0
Ped Vol Crossing Leg, #/h	0		0		0	0
Ped Cap Adj	1.000		1.000		1.000	1.000
Approach Delay, s/veh	29.5		6.4		0.0	14.5
Approach LOS	D		A		-	B
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	T	LT
Assumed Moves	LT	TR	L	TR	T	LT
RT Channelized						
Lane Util	0.470	0.530	0.786	0.214	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	404	455	608	166	0	426
Cap Entry Lane, veh/h	521	590	1350	1420	478	735
Entry HV Adj Factor	0.980	0.981	0.980	0.980	1.000	0.981
Flow Entry, veh/h	396	446	596	163	0	418
Cap Entry, veh/h	511	578	1323	1392	478	722
V/C Ratio	0.775	0.772	0.450	0.117	0.000	0.579
Control Delay, s/veh	31.1	28.0	7.2	3.5	7.5	14.5
LOS	D	D	A	A	A	B
95th %tile Queue, veh	7	7	2	0	0	4

HCM 7th Roundabout

2: Interstate 25 Northbound Ramp & North Gate Boulevard













Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection						
Intersection Delay, s/veh 7.7						
Intersection LOS A						
Approach	EB		WB		NB	
Entry Lanes	2		2		1	
Conflicting Circle Lanes	2		2		2	
Adj Approach Flow, veh/h	1261		704		67	
Demand Flow Rate, veh/h	1286		718		68	
Vehicles Circulating, veh/h	0		447		1286	
Vehicles Exiting, veh/h	786		907		0	
Ped Vol Crossing Leg, #/h	0		0		0	
Ped Cap Adj	1.000		1.000		1.000	
Approach Delay, s/veh	7.3		8.3		9.7	
Approach LOS	A		A		A	
Lane	Left	Right	Left	Right	Left	Left
Designated Moves	LT	TR	LT	TR	LT	T
Assumed Moves	LT	TR	LT	TR	LT	T
RT Channelized						
Lane Util	0.470	0.530	0.469	0.531	1.000	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.328
A (Intercept)	1350	1420	1350	1420	1420	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	8.501e-4
Entry Flow, veh/h	604	682	337	381	68	0
Cap Entry Lane, veh/h	1350	1420	895	971	476	728
Entry HV Adj Factor	0.981	0.980	0.982	0.979	0.985	1.000
Flow Entry, veh/h	593	668	331	373	67	0
Cap Entry, veh/h	1325	1392	878	951	469	728
V/C Ratio	0.447	0.480	0.377	0.392	0.143	0.000
Control Delay, s/veh	7.1	7.4	8.4	8.2	9.7	4.9
LOS	A	A	A	A	A	A
95th %tile Queue, veh	2	3	2	2	0	0

Timings

3: North Gate Boulevard & Struthers Road

Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	587	1479	623	695	651	444
Future Volume (vph)	587	1479	623	695	651	444
Satd. Flow (prot)	3433	3539	3539	1583	3433	1583
Flt Permitted	0.312				0.950	
Satd. Flow (perm)	1127	3539	3539	1583	3433	1583
Satd. Flow (RTOR)				728		357
Lane Group Flow (vph)	638	1608	677	755	708	483
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phase	5	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	11.0	25.0	25.0	10.0	10.0
Total Split (s)	20.0	82.0	62.0	62.0	38.0	38.0
Total Split (%)	16.7%	68.3%	51.7%	51.7%	31.7%	31.7%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	79.2	77.2	58.3	58.3	29.8	29.8
Actuated g/C Ratio	0.66	0.64	0.49	0.49	0.25	0.25
v/c Ratio	0.63	0.70	0.39	0.66	0.83	0.73
Control Delay (s/veh)	11.9	16.6	18.4	4.8	51.8	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	11.9	16.6	18.4	4.8	51.8	17.6
LOS	B	B	B	A	D	B
Approach Delay (s/veh)		15.3	11.3		38.0	
Approach LOS		B	B		D	
Queue Length 50th (ft)	103	420	160	35	261	82
Queue Length 95th (ft)	133	506	196	70	333	214
Internal Link Dist (ft)		856	1745		216	
Turn Bay Length (ft)	185			130	200	
Base Capacity (vph)	1031	2275	1720	1143	915	683
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.71	0.39	0.66	0.77	0.71
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 50 (42%), Referenced to phase 2:EBTL and 6:WBT, Start of Green						
Natural Cycle: 60						
Control Type: Actuated-Coordinated						

Timings

3: North Gate Boulevard & Struthers Road

Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

Maximum v/c Ratio: 0.83

Intersection Signal Delay (s/veh): 19.6

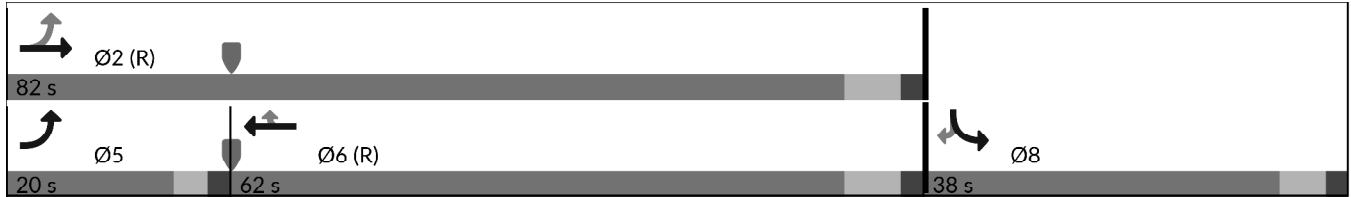
Intersection LOS: B

Intersection Capacity Utilization 70.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: North Gate Boulevard & Struthers Road



HCM 7th TWSC
4: Struthers Road & RIRO Access A

Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↑	↗
Traffic Vol, veh/h	0	53	0	1299	1014	14
Future Vol, veh/h	0	53	0	1299	1014	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	58	0	1412	1102	15









Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	-	551	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	478	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	478	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v13.56		0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	- 478	-	-
HCM Lane V/C Ratio	- 0.121	-	-
HCM Control Delay (s/veh)	- 13.6	-	-
HCM Lane LOS	- B	-	-
HCM 95th %tile Q(veh)	- 0.4	-	-

HCM 7th TWSC
5: Struthers Road & Shepard Heights

Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection												
Int Delay, s/veh	4.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	914	19	106	1111	39	3	1	77	17	1	1
Future Vol, veh/h	10	914	19	106	1111	39	3	1	77	17	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	215	-	175	125	-	-	75	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	993	21	115	1208	42	3	1	84	18	1	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1250	0	0	1014	0	0	1850	2496	497	1978	2495	625
Stage 1	-	-	-	-	-	-	1015	1015	-	1459	1459	-
Stage 2	-	-	-	-	-	-	835	1480	-	519	1036	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	553	-	-	680	-	-	46	29	519	37	29	428
Stage 1	-	-	-	-	-	-	255	314	-	136	192	-
Stage 2	-	-	-	-	-	-	328	188	-	508	307	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	553	-	-	680	-	-	36	23	519	24	23	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	36	23	-	24	23	-
Stage 1	-	-	-	-	-	-	250	308	-	113	160	-
Stage 2	-	-	-	-	-	-	270	156	-	416	301	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.12	0.96	19.81	\$ 338.21
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	36	407	553	-	-	680	-	-	25
HCM Lane V/C Ratio	0.091	0.208	0.02	-	-	0.17	-	-	0.816
HCM Control Delay (s/veh)	115.2	16.1	11.6	-	-	11.4	-	-	\$ 338.2
HCM Lane LOS	F	C	B	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.3	0.8	0.1	-	-	0.6	-	-	2.5

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

HCM 7th Roundabout
6: Gleneagle Drive & Struthers Road

























Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

Intersection								
Intersection Delay, s/veh	7.7							
Intersection LOS	A							
Approach	EB		WB		NB		SB	
Entry Lanes	2		2		1		2	
Conflicting Circle Lanes	2		2		2		2	
Adj Approach Flow, veh/h	697		1195		50		417	
Demand Flow Rate, veh/h	711		1219		51		425	
Vehicles Circulating, veh/h	380		65		1073		698	
Vehicles Exiting, veh/h	743		1059		18		586	
Ped Vol Crossing Leg, #/h	0		0		0		0	
Ped Cap Adj	1.000		1.000		1.000		1.000	
Approach Delay, s/veh	7.6		7.6		7.5		8.4	
Approach LOS	A		A		A		A	
Lane	Left	Right	Left	Right	Left	Left	Right	
Designated Moves	LT	TR	LT	TR	LTR	L	LTR	
Assumed Moves	LT	TR	LT	TR	LTR	L	LTR	
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	1.000	0.529	0.471	
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535	2.667	2.535	
Critical Headway, s	4.645	4.328	4.645	4.328	4.328	4.645	4.328	
A (Intercept)	1350	1420	1350	1420	1420	1350	1420	
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	8.501e-4	9.199e-4	8.501e-4	
Entry Flow, veh/h	334	377	573	646	51	225	200	
Cap Entry Lane, veh/h	952	1028	1271	1344	570	710	785	
Entry HV Adj Factor	0.981	0.980	0.980	0.980	0.977	0.982	0.980	
Flow Entry, veh/h	328	369	561	633	50	221	196	
Cap Entry, veh/h	934	1008	1246	1317	557	698	769	
V/C Ratio	0.351	0.367	0.451	0.481	0.089	0.317	0.255	
Control Delay, s/veh	7.7	7.5	7.5	7.6	7.5	9.1	7.6	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	2	2	2	3	0	1	1	

Timings

7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes
PM Peak Traffic Hour - Year 2045

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1178	114	293	693	50	163	23	144	61	36	47
Future Volume (vph)	90	1178	114	293	693	50	163	23	144	61	36	47
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1863	1583	1770	1863	1583
Flt Permitted	0.366			0.116			0.950			0.833		
Satd. Flow (perm)	682	3539	1583	216	3539	1583	3433	1863	1583	1552	1863	1583
Satd. Flow (RTOR)			173			127			173			173
Lane Group Flow (vph)	98	1280	124	318	753	54	177	25	157	66	39	51
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2		2	6		6			4	8		8
Detector Phase	5	2	2	1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0	10.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.0	17.0	17.0	9.0	17.0	17.0	9.0	11.0	11.0	9.0	11.0	11.0
Total Split (s)	10.0	64.0	64.0	29.0	83.0	83.0	14.0	18.0	18.0	9.0	13.0	13.0
Total Split (%)	8.3%	53.3%	53.3%	24.2%	69.2%	69.2%	11.7%	15.0%	15.0%	7.5%	10.8%	10.8%
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Act Effect Green (s)	72.1	64.9	64.9	90.7	78.6	78.6	8.9	10.1	10.1	10.4	5.9	5.9
Actuated g/C Ratio	0.60	0.54	0.54	0.76	0.66	0.66	0.07	0.08	0.08	0.09	0.05	0.05
v/c Ratio	0.21	0.66	0.13	0.78	0.32	0.05	0.69	0.16	0.53	0.46	0.42	0.21
Control Delay (s/veh)	8.0	24.0	2.4	33.1	10.0	0.0	69.3	52.8	13.0	55.7	69.8	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	8.0	24.0	2.4	33.1	10.0	0.0	69.3	52.8	13.0	55.7	69.8	1.9
LOS	A	C	A	C	B	A	E	D	B	E	E	A
Approach Delay (s/veh)		21.3			16.1			43.6			41.7	
Approach LOS		C			B			D			D	
Queue Length 50th (ft)	24	395	2	129	132	0	70	18	0	44	30	0
Queue Length 95th (ft)	m35	522	m11	229	167	0	#114	47	52	86	68	0
Internal Link Dist (ft)		1202			916			420			477	
Turn Bay Length (ft)	215		270	285		215	265		200	140		140
Base Capacity (vph)	456	1915	935	474	2317	1080	257	170	302	141	93	243
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.67	0.13	0.67	0.32	0.05	0.69	0.15	0.52	0.47	0.42	0.21

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Timings

7: Voyager Parkway & North Gate Boulevard

Total Traffic Volumes

PM Peak Traffic Hour - Year 2045

Maximum v/c Ratio: 0.78	
Intersection Signal Delay (s/veh): 23.0	Intersection LOS: C
Intersection Capacity Utilization 75.9%	ICU Level of Service D
Analysis Period (min) 15	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 7: Voyager Parkway & North Gate Boulevard

