

APPENDIX Q

Highway 6 Traffic Operations Review

MEMO



TO: File

FROM: Brent Hooton

DATE: April 20, 2009

SUBJECT: **New East-West Road Class EA**
Traffic Operations Assessment of Alternatives East/West Road Intersections with Highway 6

OUR FILE: 08-9020

1.0 Introduction

As part of the Waterdown / Aldershot Transportation Master Plan (WATMP), a new east/west arterial road has been recommended north of Parkside Drive to provide additional capacity for planned development in Waterdown North. A municipal Class Environmental Assessment for this new roadway is currently underway and the alignment is being finalized. An evaluation package was prepared and submitted to the Ministry of Transportation of Ontario (MTO) on March 9, 2009, outlining the preferred overall alignment for the new East/West Road in the vicinity of Highway 6. In their response MTO had requested that additional traffic operations documentation be provided for the Highway 6 corridor. This memorandum has been prepared to address this request and to provide background information on the anticipated traffic operations along Highway 6 to assist in the evaluation of the alternative intersection locations. It should be read in conjunction with the overall evaluation package dated March 5, 2009 which considered all the environmental factors.

2.0 Existing Conditions

2.1 Existing Road Network

The study area consists of Highway 6 and its intersections with Parkside Drive and with the 4th Concession, northwest of the existing developed area of Waterdown. The general Highway 6 study area is illustrated in *Figure 1*. **Highway 6** is a provincial highway extending between Highway 403 west of Burlington and Highway 401 near Guelph. (Separate sections of Highway 6 continue north to the Bruce Peninsula and south to Lake Erie.) The majority of this section of Highway 6 is a four-lane highway with a posted speed limit of 80 km/h. It is designated by the Ministry of Transportation of Ontario (MTO) as a Class 2B Arterial Highway north of Dundas Street, and a freeway south of Dundas Street to Highway 403. There are traffic signals at the following intersections in the study area and beyond:

- Millgrove Sideroad / 6th Concession (3.1 km north of 4th Concession)
- Parkside Drive (435 m south of 4th Concession)
- Dundas Street (1.2 km south of Parkside Drive)

Figure 1 — Highway 6 Study Area



Other concession grid roads intersect with Highway 6 at unsignalized intersections. While the concession roads are generally spaced at 1.75 to 2.0 km intervals, the grids west and east of Highway 6 are not aligned and therefore the actual intersection spacing is lower and varies throughout the Highway 6 corridor. There are also a number of low-volume private driveways in the area, particularly in the vicinity of Millgrove.

The section of Highway 6 south of Dundas Street to Highway 403 is currently being reconstructed as a fully controlled-access facility, including a new interchange at York Road (1.6 km south of Dundas Street) with the closure of all intermediate intersections and driveways. As a subsequent construction phase, MTO plans to build a grade separation and full interchange at Dundas Street. This construction is not on MTO's current 5-year program. Once this construction is in place, Parkside Drive (1.2 km north of Dundas Street) will be the first signalized intersection encountered by northbound traffic.

Parkside Drive is a two-lane arterial road under the jurisdiction of the City of Hamilton. It extends easterly from Highway 6 through Waterdown along the current northern limits of development; at Evans Road it turns to the north as a local road, connecting to Millborough Line (1st Sideroad in Burlington). In most sections it has a rural cross-section, with a sidewalk along the south side through most of the developed / urbanized area. In addition to providing an access route to development on the north side of Waterdown, it also serves as a bypass of Dundas Street, which experiences peak period congestion due to limited capacity through the central business district (CBD). It is currently classified by the City of Hamilton as a truck route.

The **4th Concession** is a two-lane rural collector roadway that formed part of the original concession road network parallel to Dundas Street (Highway 5) and continues to serve local traffic demands. It has a

lower design standard consistent with its roadway classification, including narrower shoulders. It intersects with Highway 6 approximately 440 m north of Parkside Drive at an angle of approximately 60 degrees.

2.2 Existing Traffic Volumes

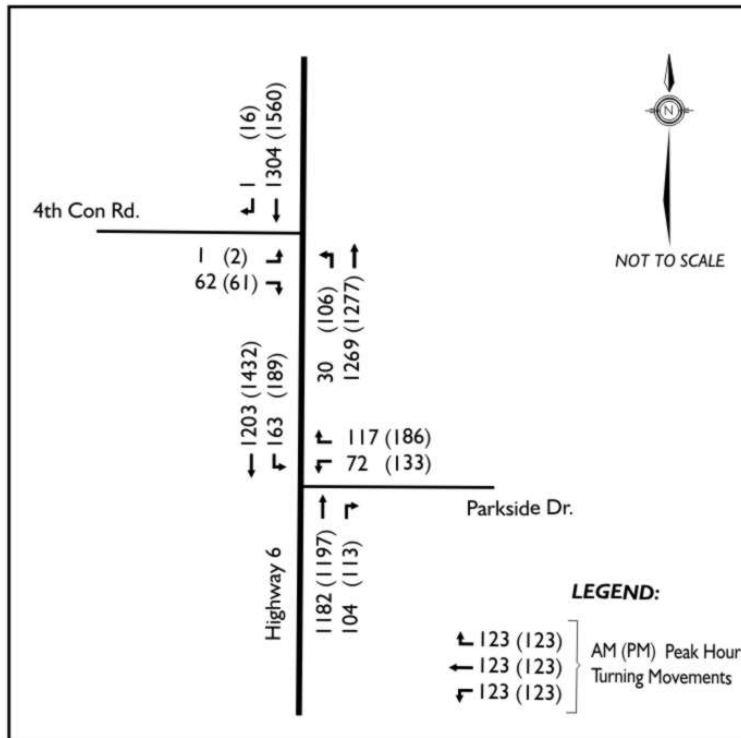
Existing traffic volumes at the study area intersections were obtained from the MTO and from the City of Hamilton. The survey details are shown in *Table 1*.

Table 1 — Traffic Survey Dates

Highway 6 at:	Survey Date	Source
4 th Concession	Thursday, July 7, 2005	MTO
Parkside Drive	Tuesday, May 6, 2008	City

These volumes were balanced based on the volumes surveyed north of the Parkside Drive intersection, since that survey is more up-to-date. The existing traffic volumes are illustrated in *Figure 2*.

Figure 2 — Existing Traffic Volumes



2.3 Existing Intersection Operations

The operations of the two existing intersections were assessed based on the methodology prescribed in the Highway Capacity Manual (HCM), 2000 edition. The analyses were facilitated using the Synchro software package (version 6), which is based on the HCM methodology. Operations at Parkside Drive are based on existing signal timings obtained from MTO.

For each intersection, the intersection level of service (LOS), average vehicle delay, and volume to capacity (v/c) ratio were noted. For the signalized Parkside Drive intersection, these measures relate to the intersection as a whole, whereas for the unsignalized 4th Concession intersection, they relate to the minor approach movements.

The signalized Parkside Drive intersection was also monitored for any critical movements (i.e., movements with a v/c ratio greater than 0.85). No critical movements were identified under existing conditions.

Table 2 — Existing Intersection Operations

Highway 6 at:	Peak Hour	Movement	LOS	Delay (sec/veh)	v/c
Parkside Drive	AM	<i>(overall intersection)</i>	B	10.1	0.57
	PM		B	14.7	0.73
4 th Concession	AM	EB Left	F	105	0.03
		EB Right	C	16.6	0.18
	PM	EB Left	F	>200	0.16
		EB Right	C	20.1	0.22

The intersection with Parkside Drive is currently operating at a good overall level of service, with no critical movements identified.

The 4th Concession intersection is currently operating at a poor level of service for the eastbound left turn movement; however, this movement experiences negligible volumes (less than five vehicles per hour). The eastbound right turn movement is operating at a reasonable level of service (LOS C) and well under capacity.

3.0 Future Traffic Projections

During Phases 1 and 2 of the WATMP, the City’s EMME/2 long-range transportation model was used to project traffic volumes on the existing and proposed future road network. The future volumes were based on the land use (population and employment) projected at the 2021 horizon, and included planned development areas in Waterdown. A model of 2006 volumes was also generated for a check of baseline conditions.

A review of the EMME/2 model results suggested that they may not be appropriate for use in this present analysis. The model generated link volumes at a high level; when focusing on specific intersections it appears to have understated existing and future traffic both on Highway 6 and on Parkside Drive, and overstated traffic on the 4th Concession. In addition, the EMME/2 future conditions modeling did not

include a scenario in which both Parkside Drive and the new East/West Road were open. As a result, a second set of future traffic volumes was generated from first principles, based on traffic projections for various development proposals near the study area, and with some existing and future development traffic on Parkside Drive diverted to the new East/West Road.

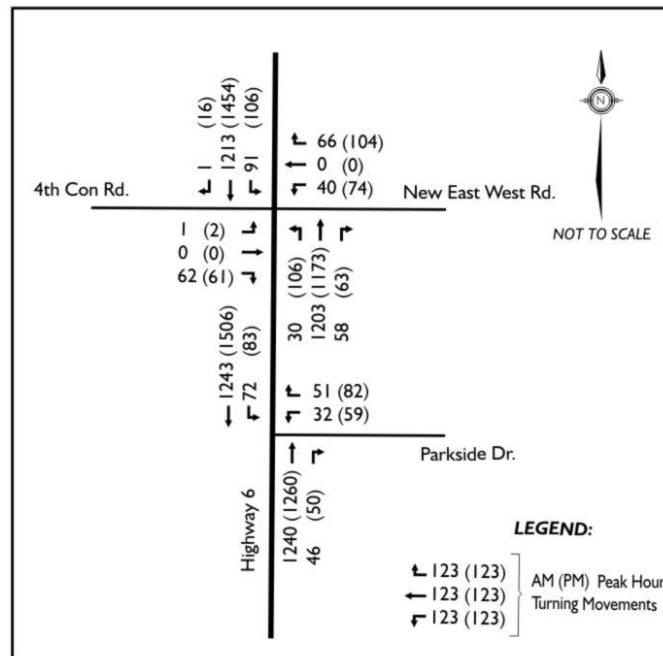
The new traffic projections include the following components:

3.1 Reassignment of Existing Traffic to Future Network

The new East/West Road will provide an alternate route across Waterdown for some traffic currently using Parkside Drive. Existing traffic on Parkside Drive consists of two components. Locally-generated traffic (i.e., traffic turning at intersections west of Hamilton Street) comprises approximately 30% of the traffic turning to/from Highway 6, and is unlikely to be attracted to the new East/West Road, since Parkside Drive will provide a more direct route. However, some of the remaining “through” traffic (i.e., vehicles traveling the full distance between Highway 6 and Hamilton Street) may be attracted to the new East/West Road.

It has been assumed that 80% of the through traffic on Parkside Drive east of Highway 6 will be attracted to the new East/West Road, and that Parkside Drive will serve the remaining through traffic along with all local traffic. There would be no change to existing turning movements to/from the 4th Concession. **Figure 3** illustrates the reassignment of existing traffic on the new road network.

Figure 3 — Reassignment of Existing Traffic on New Network



3.2 Through Traffic Growth

A background traffic growth rate of 1.5% per year, over a 15-year period, was applied to through traffic on Highway 6 to account for general growth in traffic due to external development. This equates to a 25% increase over existing through volumes. When combined with traffic generated by specific developments explicitly included in the total traffic projections, the effective growth on Highway 6 is estimated at 52% to 55% south of Parkside Drive, or approximately 3% per year (over a 15-year period).

3.3 Background Development Traffic

A number of significant developments are planned in the Waterdown area, and traffic from these developments will impact volumes both on Highway 6 and on the intersecting roadways.

3.3.1 Waterdown North

Approximately 2,000 residential units are planned in the area bounded approximately by Highway 6, Hamilton Street / Centre Road, Parkside Drive, and the new East/West Road. Two traffic impact studies have been prepared to date for development applications in this area:

- MC2 Homes, consisting of 206 units north of Parkside Drive and west of Centre Street. A traffic study was prepared in June 2005 by Read, Voorhees & Associates.
- Parkside Hills, consisting of 185 units north of Parkside Drive and west of Centre Street. A traffic study was prepared in October 2006 by Delcan Consulting.

Both of these studies assigned site trips to the Highway 6 / Parkside Drive intersection. However, these studies only account for 391 residential units, or approximately 20% of the ultimate planned development yield for Waterdown North. As a result, the combined site traffic projected in the two studies was expanded proportionally to the anticipated level of additional development.

The two studies assigned traffic to the existing road network only. However, the overall development area is situated between Parkside Drive and the new East/West Road and will have access to both roads, and therefore it is reasonable to assume some level of Waterdown North traffic will divert to the new East/West Road. The exact split will depend on factors such as the number and location of site accesses, the internal street network, and perceived travel time and congestion on the two routes to Highway 6; for analysis purposes, it was assumed that 70% of site traffic would use the new East/West Road, and the remaining 30% would use Parkside Drive.

3.3.2 Waterdown Bay

Waterdown Bay is a residential subdivision planned on the south side of Dundas Street east of the Waterdown CBD, generally south of the existing subdivision accessed via Burke Street and Pamela Street. Read, Voorhees & Associates (RVA) prepared a traffic impact study (May 2005) documenting the trips generated by 1,058 residential units. The RVA study area did not address the Highway 6 / Parkside Drive intersection. It was assumed that trips to the north would use Parkside Drive to access Highway 6, and that all other trips (local trips; trips to the southwest, southeast, east and west) would use other routes outside of the study area. Traffic traveling to/from Highway 6 was then assigned to Parkside Drive and the new East/West Road in the same proportion as existing “through” trips (70% on the new East/West Road; 30% on Parkside Drive).

3.3.3 Upcountry Estates

Upcountry Estates is a planned residential subdivision located east of Waterdown’s current eastern limit of residential development between Dundas Street and Parkside Drive. There is a total of 619 units either approved or planned/submitted for future phases. Anticipated development-generated traffic was estimated using methodologies prescribed by the ITE publication, *Trip Generation* (7th edition, 2003), based on the published average rate for single-family homes (ITE Land Use Code 210).

Table 3 — Upcountry Estates Trip Generation

	AM Peak Hour			PM Peak Hour		
	<i>In</i>	<i>Out</i>	<i>Total</i>	<i>In</i>	<i>Out</i>	<i>Total</i>
Trip Generation Rate	0.19	0.56	0.75	0.64	0.37	1.01
Site Trips (619 units)	120	345	465	395	230	625

Traffic was assigned to the study area intersections similarly to the Waterdown Bay trips. North-oriented trips comprise 4% of total trips and were divided 70% via the new East/West Road to Highway 6, and 30% via Parkside Drive to Highway 6. The remainder of trips would use other routes and would not travel in the study area.

3.3.4 Parkside Drive Industrial Park

An industrial park is proposed in the southeast corner of the Highway 6 / Parkside Drive intersection, consisting of prestige employment space accommodating approximately 500 employees. Trips for this development were generated based on the published average rate for industrial parks (ITE Land Use Code 130); the total number of generated trips is outlined in **Table 4**. Trips were then distributed to the road network based on data from the *Transportation Tomorrow Survey* (TTS), as summarized in **Table 5**.

Table 4 — Industrial Park Trip Generation

	AM Peak Hour			PM Peak Hour		
	<i>In</i>	<i>Out</i>	<i>Total</i>	<i>In</i>	<i>Out</i>	<i>Total</i>
Trip Generation Rate	0.40	0.07	0.47	0.09	0.37	0.46
Site Trips (500 employees)	200	35	235	45	185	230

Table 5 — Industrial Park Trip Distribution

	AM In	AM Out	PM In	PM Out
Highway 6 North	2%	13%	3%	5%
Highway 6 South	69%	36%	41%	75%
Parkside Drive East	29%	51%	56%	20%

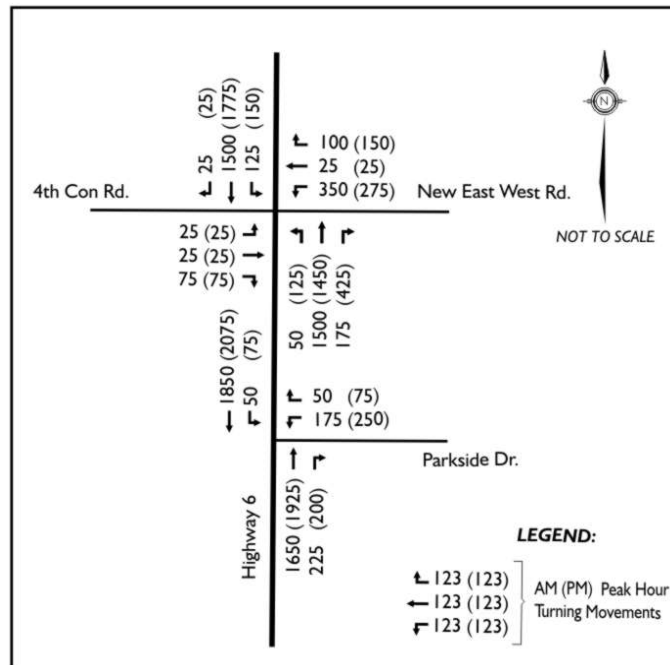
3.4 Total Future Traffic Volumes

The total future traffic volumes applied to the future intersection analyses consisted of all elements outlined above, including:

- Reassignment of existing traffic to new East/West Road, where appropriate;
- Through traffic growth of 1.5% per year on Highway 6; and
- Traffic generated by future development, including the Waterdown North, Waterdown Bay and Upcountry Estates residential developments, and the proposed industrial park south of Parkside Drive.

The resulting total future traffic volumes (rounded to the nearest 25 vehicles) are illustrated in **Figure** below.

Figure 4 — Total Future Traffic Volumes



4.0 Traffic Operations Assessment of Alternative Alignments

4.1 Alternatives Under Consideration

There are five alternate alignments for the East/West Road under consideration (illustrated in *Attachment I*). All five alignments would form a full (four-leg) intersection with Highway 6 opposite a realignment of the 4th Concession. From the perspective of the traffic assessment, the five alignments are primarily differentiated by their distance from Parkside Drive. Three of the alignments are generally in the vicinity of the existing intersection, while two of them would shift the 4th Concession intersection more significantly to the north. The five options under consideration are as follows:

- Option 1: 880 m north of Parkside Drive
- Option 2: 730 m north of Parkside Drive
- Option 3: 475 m north of Parkside Drive
- Option 4: 430 m north of Parkside Drive
- Option 5: 380 m north of Parkside Drive

The assessment of the five options is based on intersection spacing to Parkside Drive, and therefore assumes that Parkside Drive will remain open. If Parkside Drive is closed (including a sub-scenario in which an interchange is provided at the East-West Road), there is no difference between the five scenarios from a traffic perspective.

4.2 Signal Spacing – Ministry Policy

North of Dundas Street, Highway 6 is designated by MTO as a Class 2B Arterial. Based on the MTO's draft Access Management Guideline (July 2007), the preferred signal spacing for this type of facility is 1.6 km or greater, with a minimum spacing of 800 metres. Only Option 1 meets this criterion, being located 880 metres from the traffic signals at Parkside Drive. Option 2 falls slightly below this criterion, whereas Options 3 through 5 fall further below this criterion (signal spacing of approximately 400 to 500 metres). Note that the distance between 4th Concession Road and Dundas Street is approximately 1.6 km.

4.3 Signal Spacing – Left Turn Lane Requirements

The five alignments were also observed from the standpoint of whether the spacing is sufficient to accommodate left turn lanes in both directions along Highway 6. A northbound left turn lane will be required at the 4th Concession / East/West Road intersection, and a southbound left turn lane will be required at Parkside Drive. The spacing between the two intersections would need to accommodate the required storage, parallel (deceleration) lane, and taper requirements for these back-to-back left turn lanes.

Parallel lane and taper requirements were determined based on MTO standards for design speeds of 90 and 100 km/h. Left turn storage was calculated based on the MTO methodology, using the estimated left turn volumes, a 120-second cycle length, and an assumed standard of LOS A (i.e., storage to accommodate a 95th percentile queue). Under this methodology, 60 metres of northbound left turn storage would be required at the 4th Concession, and 37.5 metres of southbound left turn storage would be required at Parkside Drive.

Table 6 below summarizes the spacing that would be required to accommodate all intersection elements.

Table 6 — Minimum Intersection Spacing to Accommodate Left Turn Lanes

Item	Required Distance	
	90 km/h design speed	100 km/h design speed
Stop bar offset from 4 th Concession centre line	15 m	15 m
Storage length – northbound left turn	60 m	60 m
Parallel lane – northbound left turn	80 m	95 m
Taper (shared between northbound/southbound)	75 m	80 m
Parallel lane – southbound left turn	80 m	95 m
Storage length – southbound left turn	37.5 m	37.5 m
Stop bar offset from Parkside Drive centre line	15 m	15 m
Minimum intersection spacing:	362.5 m	397.5 m

As outlined in **Table 6** above, an intersection spacing of at least 400 metres would be required to accommodate full-standard back-to-back left turn lanes at a 100 km/h design speed. Option 5 (380-metre spacing) would therefore fall slightly below this level, meaning that either storage, taper, or parallel lane length would need to be reduced somewhat at one or both intersections.

All other options can accommodate the full storage and parallel lane / taper requirements.

4.4 Traffic Signal Progression

The Parkside Drive signal currently operates under fully-actuated control, resulting in a variable cycle length depending on traffic activity and green time demands on the side street. A new traffic signal installed at 4th Concession and the new East/West Road would be close enough to Parkside Drive that it would be desirable to operate the two signalized intersections together as a pair of co-ordinated signals, at least during peak times.

On this basis, the five options were reviewed to assess the potential for the intersection spacing to accommodate traffic progression. In the best case, a platoon of traffic leaving the upstream intersection would be able to proceed through the downstream intersection without stopping at a red signal. In the worst case, the platoon would arrive at a downstream traffic signal as it turns to red; this would result in increased delays and queues along the highway, and could potentially impact operations at the upstream intersection depending on intersection spacing and through volumes.

The feasibility of signal co-ordination was reviewed using the Synchro (version 6) traffic analysis software package. A network was set up consisting of the two subject intersections, and five versions of the network were assessed with intersection spacing corresponding to the five alignment options under consideration. (The next signalized intersection to the north is at Millgrove Sideroad, 3.1 km north of the 4th Concession, and is far enough away as to not impact progression. There will be no other signalized intersections to the south once the Dundas Street interchange has been completed.) A cycle length of 120 seconds was assumed based on individual intersection requirements, and intersection offsets were optimized. The progression assumes the existing posted speed limit of 80 km/h. The time-space diagrams are shown in **Attachment 2**, and indicate the quality of traffic progression through the two intersections.

During the AM peak hour, progression has been set up to favour southbound traffic. Option 1 (880-metre spacing) affords the best opportunity for signal progression in both directions. Options 3, 4, and 5 can provide good southbound progression but northbound platoons will be interrupted at 4th Concession. In Option 2 (730-metre spacing), traffic platoons would be disrupted in both directions (or, if progression is optimized for southbound traffic, the northbound platoon would reach 4th Concession at the start of the red signal).

During the PM peak hour, progression tends to favour northbound traffic, but otherwise similar patterns are evident. Option 1 (880-metre spacing) affords the best opportunity for signal progression in both directions. Options 3, 4, and 5 can provide good northbound progression but southbound platoons will be interrupted at Parkside Drive. In Option 2 (730-metre spacing), good progression can be provided northbound, but southbound traffic would be more significantly impacted.

These analyses indicate that traffic progression can be most easily accommodated in Option 1 (880-metre spacing). Options 3, 4, and 5 (ranging from 380 metres to 475 metres) can accommodate progression in the predominant direction but with moderate impacts in the opposite direction. Option 2 would provide longer intersection spacing than Options 3, 4 or 5, but would be the least suitable from the perspective of accommodating two-way traffic progression.

4.5 Intersection Level of Service

For each of the five alternatives, the level of service and average delay were noted for the intersection as a whole and for the northbound and southbound through movements. These measures are sensitive to the quality of signal co-ordination and traffic progression (e.g., if signals are perfectly co-ordinated, most traffic will not have to stop and the average delay will be low, whereas if signals are poorly co-ordinated, most traffic will have to stop at intermediate signals and consequently the average delay will be high). **Table 7** and **Table 8** compare the level of service and delays during the AM and PM peak hours, respectively, at both the East/West Road intersection and at the Parkside Drive intersection.

Table 7 — AM Peak Hour Intersection Operations

Hwy. 6 at:	Option	Overall Intersection Operations		Through Traffic Operations			
				Northbound		Southbound	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
4 th Concession / East/West Road	1 (880 m spacing)	D	35.7	C	30.1	D	37.1
	2 (730 m spacing)	D	38.2	C	34.5	D	38.1
	3 (475 m spacing)	D	38.2	C	34.5	D	38.1
	4 (430 m spacing)	D	37.8	C	33.7	D	38.0
	5 (380 m spacing)	D	37.7	C	33.6	D	38.0
Parkside Drive	1 (880 m spacing)	B	15.6	B	15.2	B	13.3
	2 (730 m spacing)	B	16.1	B	15.8	B	13.9
	3 (475 m spacing)	B	12.8	B	15.5	A	6.9
	4 (430 m spacing)	B	12.7	B	15.5	A	6.7
	5 (380 m spacing)	B	12.2	B	15.5	A	5.8

Table 8 — PM Peak Hour Intersection Operations

Hwy. 6 at:	Option	Overall Intersection Operations		Through Traffic Operations			
				Northbound		Southbound	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)
4 th Concession / East/West Road	1 (880 m spacing)	C	30.0	B	14.8	D	39.4
	2 (730 m spacing)	C	29.3	B	12.9	D	39.4
	3 (475 m spacing)	C	29.2	B	12.7	D	39.4
	4 (430 m spacing)	C	29.2	B	12.7	D	39.4
	5 (380 m spacing)	C	29.2	B	12.6	D	39.4
Parkside Drive	1 (880 m spacing)	C	25.6	C	27.5	B	19.8
	2 (730 m spacing)	C	28.4	C	27.5	C	26.2
	3 (475 m spacing)	C	24.4	C	27.5	B	17.2
	4 (430 m spacing)	C	23.7	C	27.5	B	15.6
	5 (380 m spacing)	C	23.1	C	27.5	B	14.1

In addition to intersection level of service, queues were reviewed along Highway 6 on the link between the two intersections. Queue length can be another indicator of the quality of progression, and also was noted to determine the potential for queues to impact traffic flow at the upstream intersection. Queues were obtained through simulation using the SimTraffic software package, to account for signal co-ordination, vehicle acceleration and deceleration, and traffic interaction between the two intersections. Traffic was simulated over a 30-minute period. **Table 9** indicates the simulated 95th percentile through queues between the two intersections (i.e., southbound queues at Parkside Drive; northbound queues at 4th Concession and the East/West Road) in comparison to the link distance (i.e., storage distance) between the two intersections.

Table 9 — Comparison of Simulated Queues

Option	Storage (m)*	95 th Percentile Through Queue (m)			
		Southbound at Parkside Dr.		Northbound at 4 th Concession	
		AM	PM	AM	PM
1	850	60	65	295	135
2	700	160	240	285	300
3	445	145	160	265	375
4	400	130	160	290	175
5	350	125	175	250	265

*Link distance between intersections, not including 15-metre centre-line offsets

The table above illustrates that, for southbound traffic, Option 1 results in the shortest queues (and, therefore, a lower number of stopped vehicles), while Option 2 results in the longest queues. This is generally consistent with the time-space diagrams, which found that Option 2 resulted in the poorest potential for signal co-ordination.

For northbound traffic, the five options are comparatively similar during the AM peak hour, with Option 5 resulting in slightly shorter queues, and are more variable during the PM peak hour, with Options 1 and 4 resulting in the shortest queues, and Options 2 and 4 resulting in the longest queues.

It should be noted that the side street green time demands are higher at the 4th Concession intersection than at Parkside Drive, and therefore southbound traffic may have a greater potential to be metered. This may account for some of the wider variability in projected southbound queues, particularly during the PM peak hour.

No queues were observed to block the upstream intersection. However, in the three options with spacing less than 500 metres, there is potential that some vehicles may need to decelerate through the upstream intersection during the AM and/or PM peak hours. (Outside of the peak hours, when volumes are lower, queues will be shorter and will be accommodated under all design options.)

4.6 Summary of Traffic Operations at Intersection Alternatives

There are five alternate alignments for the new East-West Road in the vicinity of Highway 6. The alignments would result in a range of intersection spacing, from 880 metres (Option 1) to 380 metres (Option 5).

The MTO typically requires a spacing of 800 metres between signalized intersections on its arterial highways. Only Option 1 exceeds this distance (Option 2 nearly meets it, at 730 metres). Notwithstanding, intersection traffic analyses were undertaken for each option to determine the potential for shorter intersection spacing to operate at an acceptable level.

All options have sufficient spacing to accommodate back-to-back left turn lanes at a design speed of 100 km/h, with the exception of Option 5, which is slightly shorter than the required distance (by approximately 20 metres). In that case, the storage, taper, or parallel lane length would need to be reduced somewhat at one or both intersections.

Time-space diagrams prepared using Synchro indicate that Option 1 has the best opportunity for signal co-ordination, followed by Options 3, 4 and 5. Option 2 results in the poorest opportunity for signal co-ordination.

The quality of signal progression has a corresponding impact on intersection performance (delays and queues). Option 2 generally results in the highest level of delay for the overall intersections and for the through movements on Highway 6. Options 3, 4, and 5 generally result in the lowest level of delay. The differential between the five options is comparatively low (approximately 5 seconds per vehicle or less for overall intersection delay). Option 2 also generally results in the longest queues, whereas for the most part Option 1 results in the shortest queues.

There is minimal difference between the five alternatives in terms of intersection capacity.

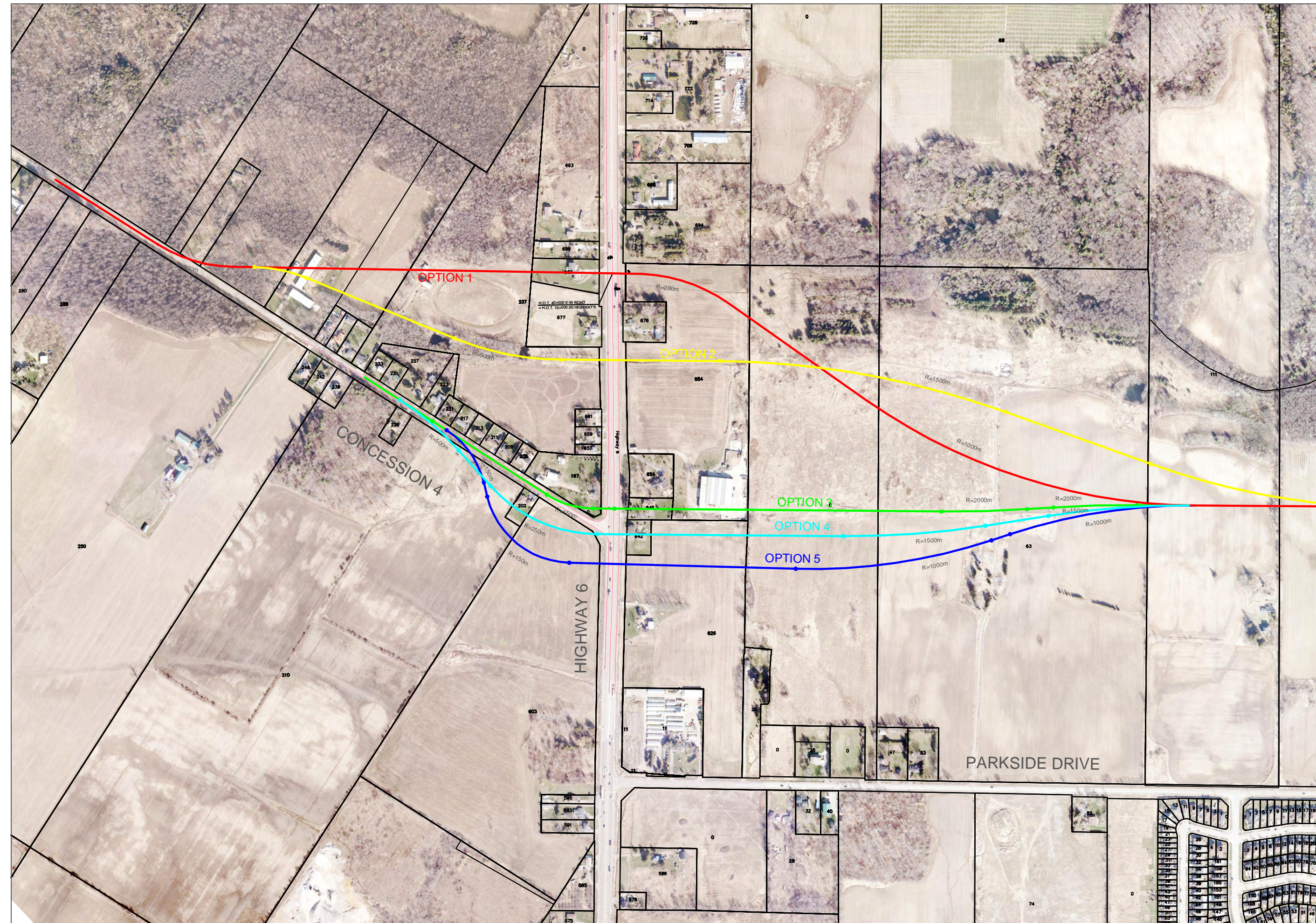
5.0 Conclusions

Based on the above, Option 1 (880-metre intersection spacing) is preferred from a traffic perspective; it meets typical MTO spacing standards, has the best opportunity for signal co-ordination, and therefore tends to result in the best intersection and corridor operations (LOS / delays; queues).

Options 3, 4 and 5 involve reduced intersection spacing (ranging from 380 to 475 metres), but can operate in a satisfactory manner from a signal co-ordination and intersection operations perspective. Option 5 would require a minor reduction in left turn lane geometry at one or both intersections to accommodate back-to-back left turn lanes.

Option 2 is least preferred from the perspective of signal co-ordination and traffic operations. The spacing of 730 metres is the least conducive to two-way traffic progression at the posted speed of 80 km/h.

Attachment 1
Alternative Alignments



PRELIMINARY



ALIGNMENT ALTERNATIVE AT
HIGHWAY 6 (WITH WEST
SIDE CONECTION)

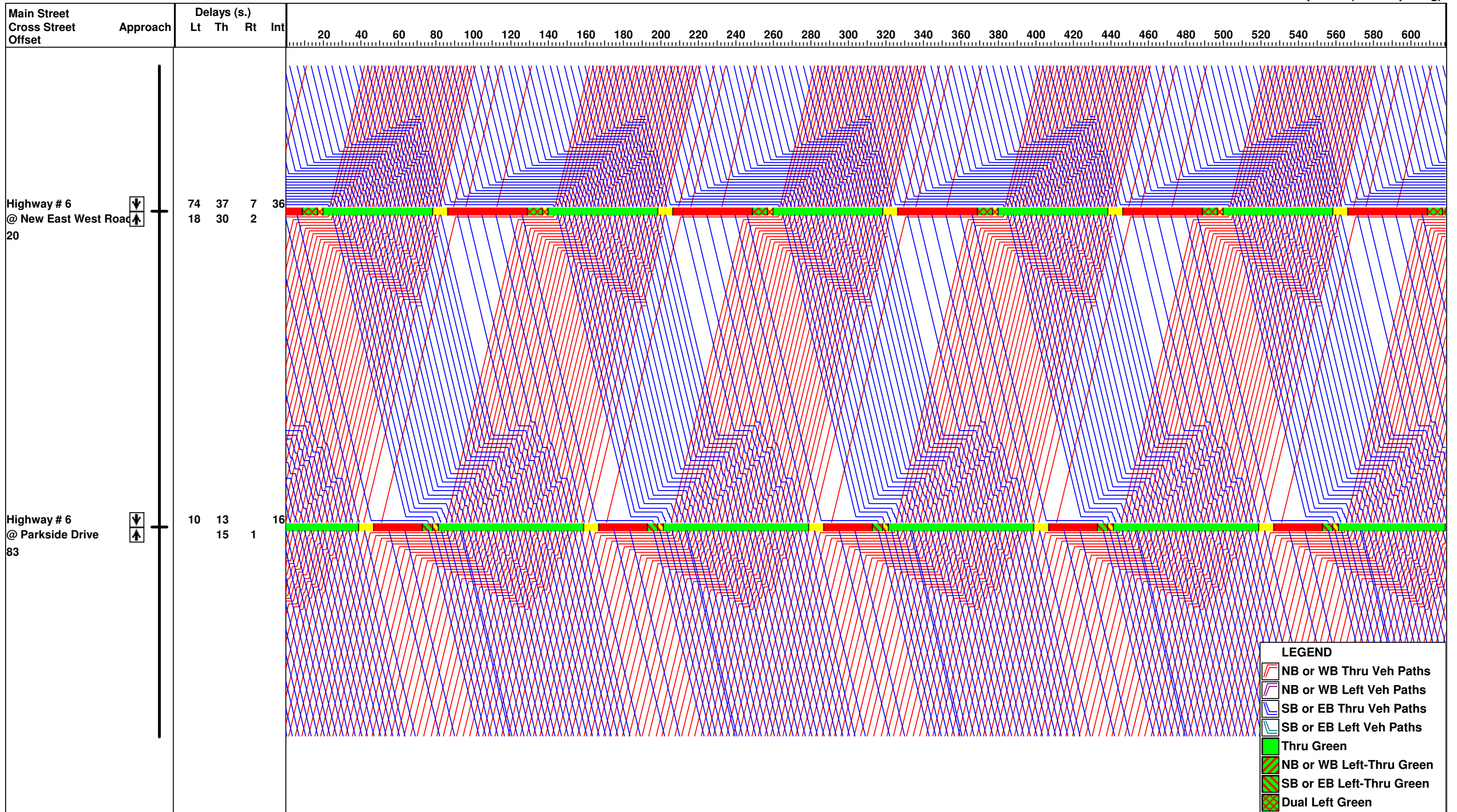


CHECKED BY: ---
DESIGN BY: ---
DRAWN BY: ---
SCALE: NTS
DATE: FEB. 5, 2009
PROJECT No. 08-020

NEW E-W ROAD
CLASS ENVIRONMENTAL ASSESSME
HWY 6 TO BRANT STREET

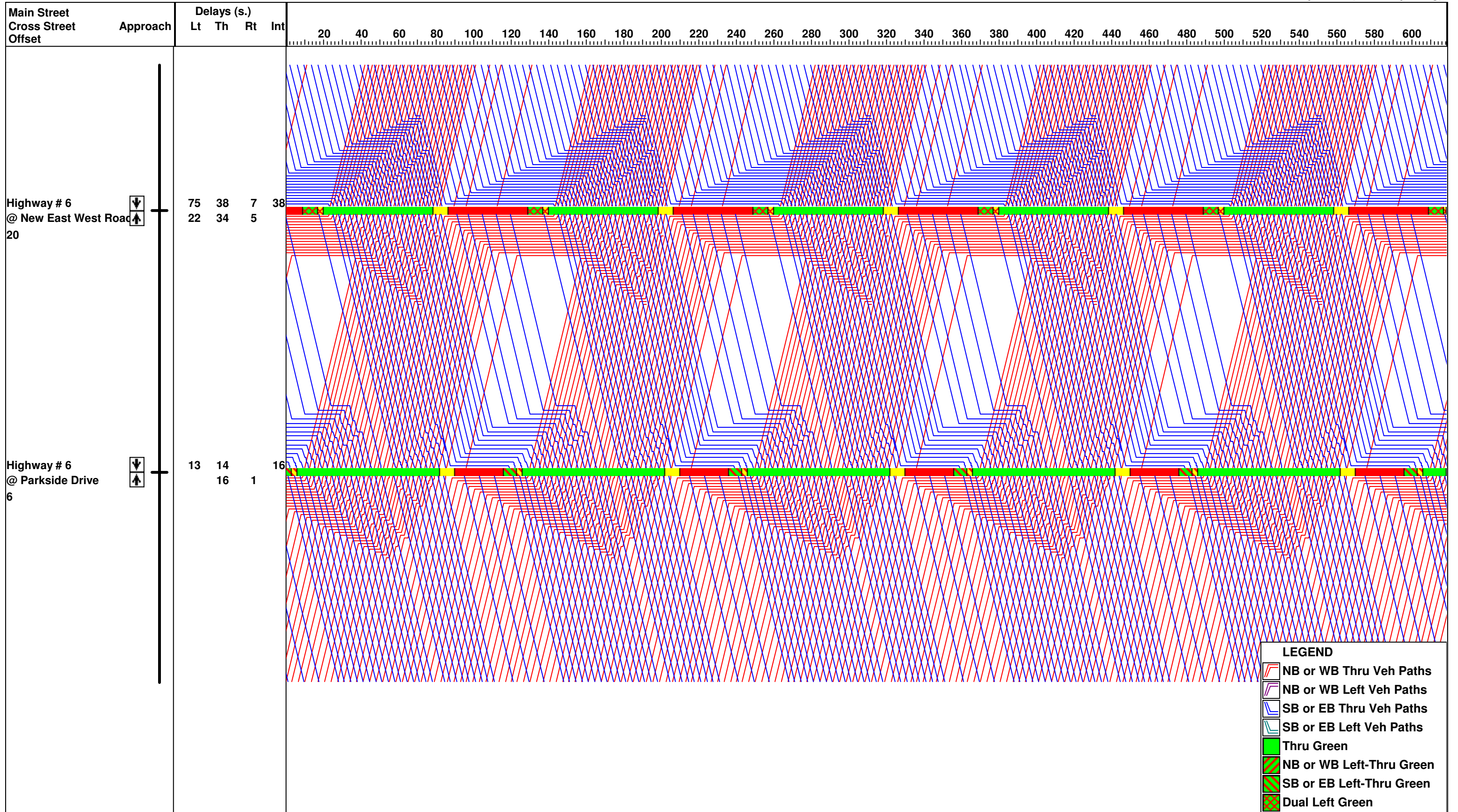
FIGURE 1

Attachment 2
Time-Space Diagrams



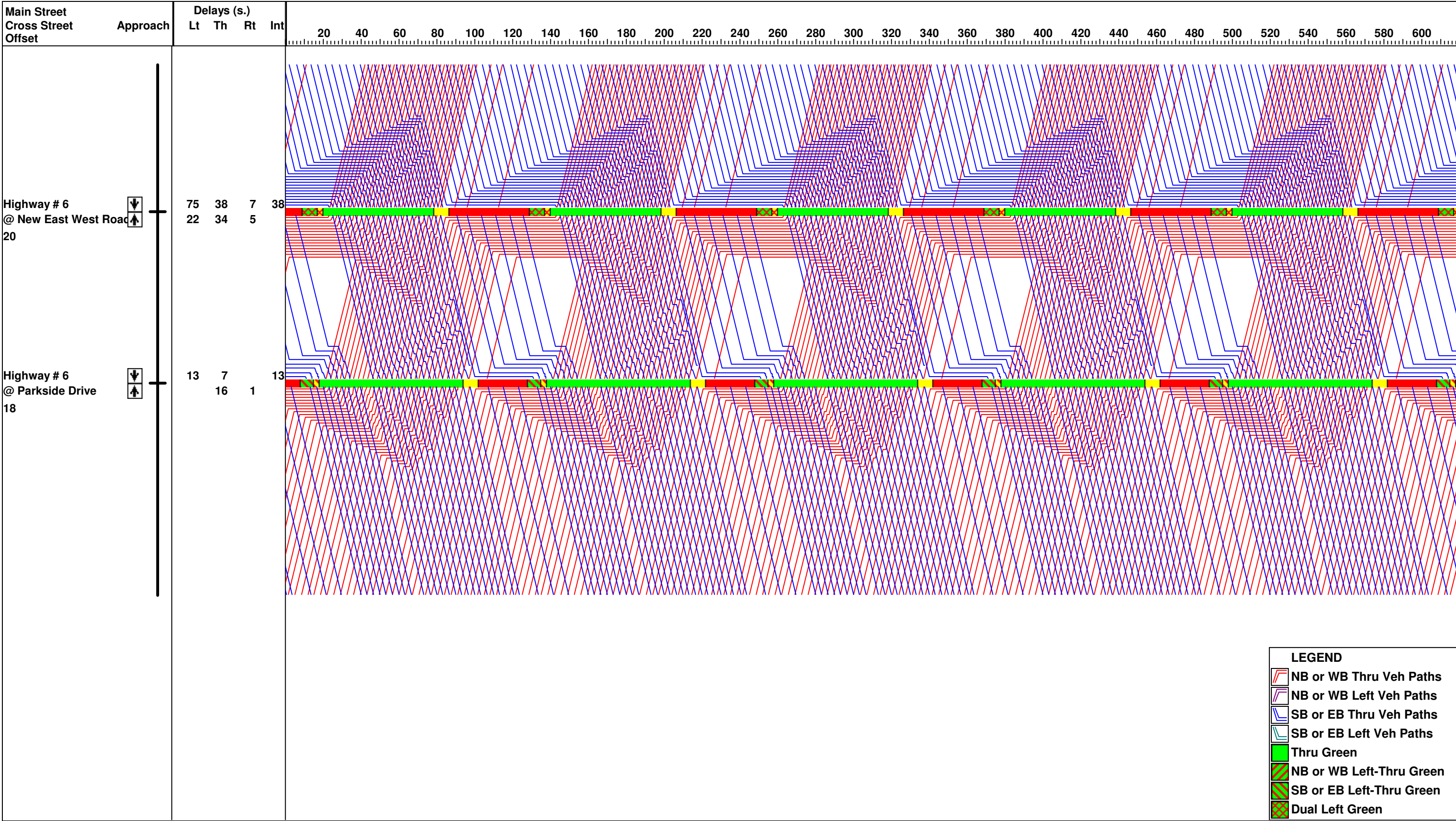
LEGEND

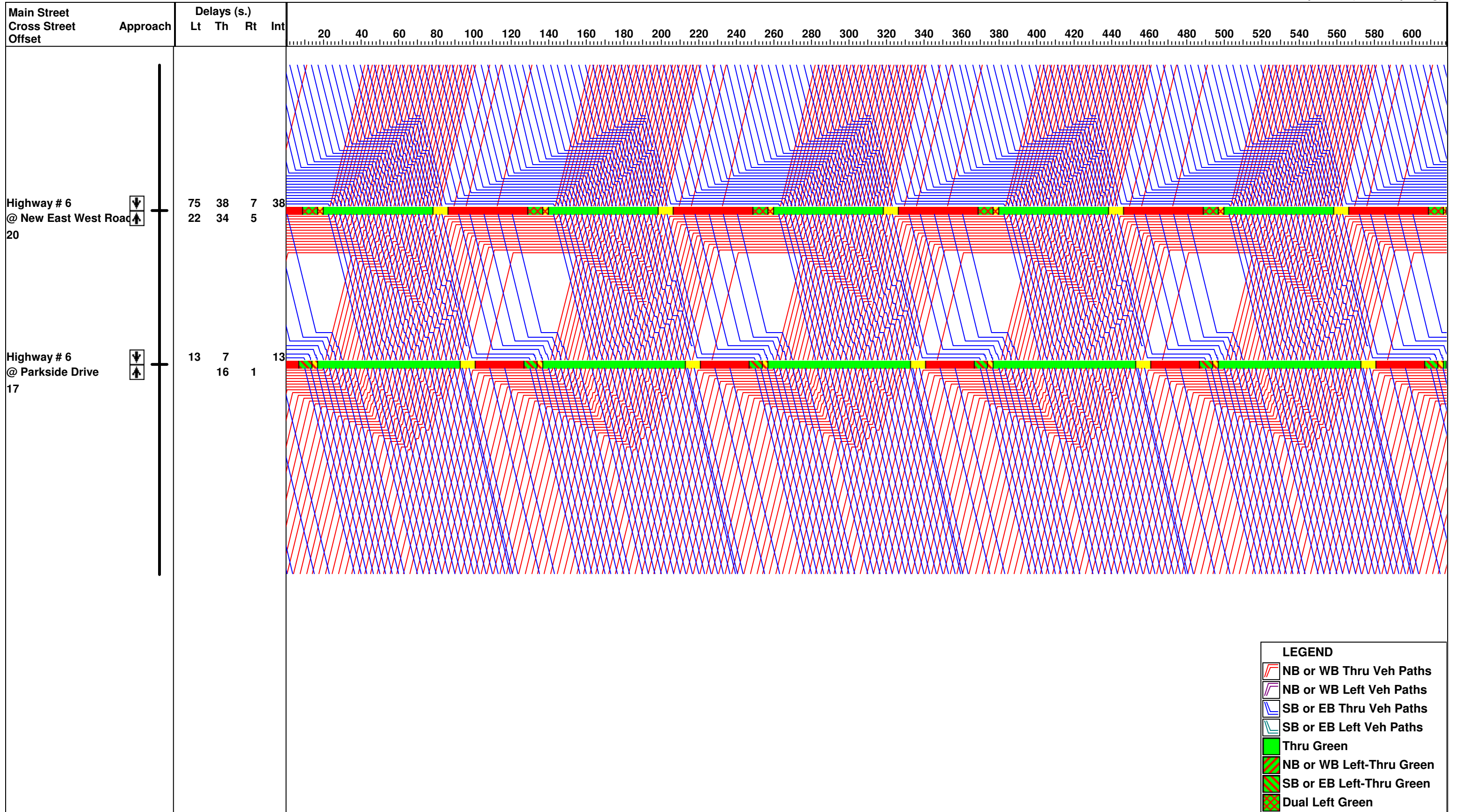
- NB or WB Thru Veh Paths
- NB or WB Left Veh Paths
- SB or EB Thru Veh Paths
- SB or EB Left Veh Paths
- Thru Green
- NB or WB Left-Thru Green
- SB or EB Left-Thru Green
- Dual Left Green



LEGEND

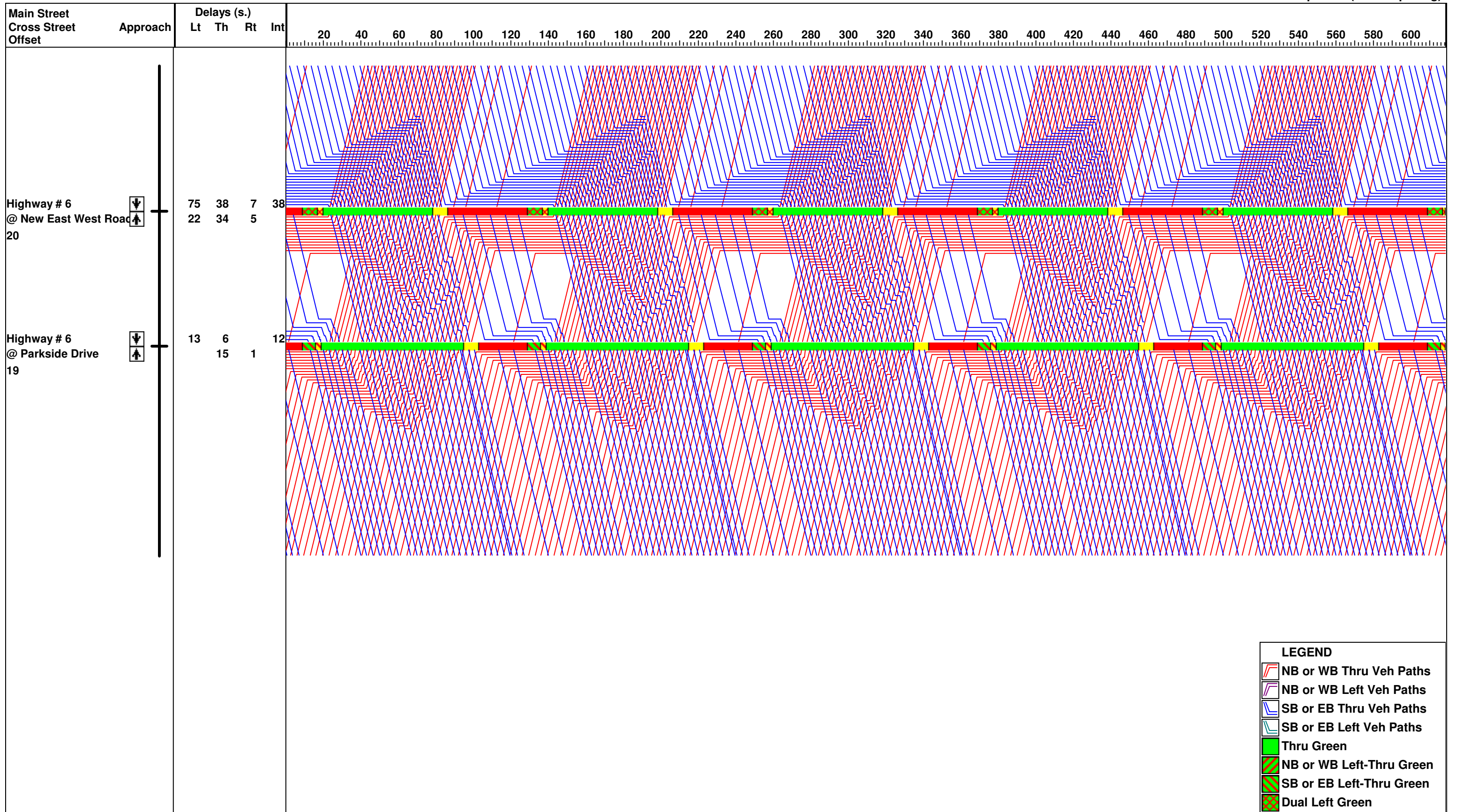
- NB or WB Thru Veh Paths
- NB or WB Left Veh Paths
- SB or EB Thru Veh Paths
- SB or EB Left Veh Paths
- Thru Green
- NB or WB Left-Thru Green
- SB or EB Left-Thru Green
- Dual Left Green





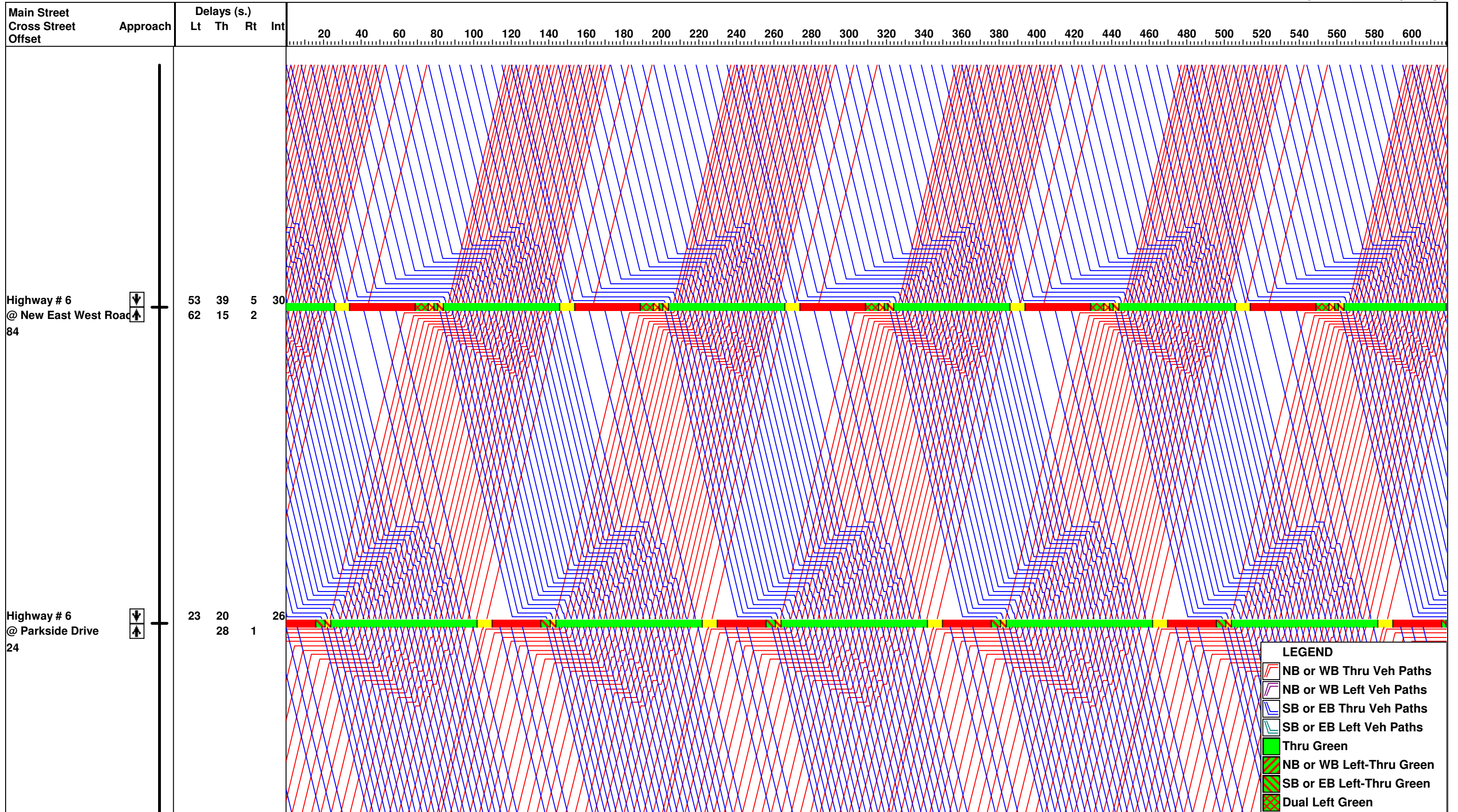
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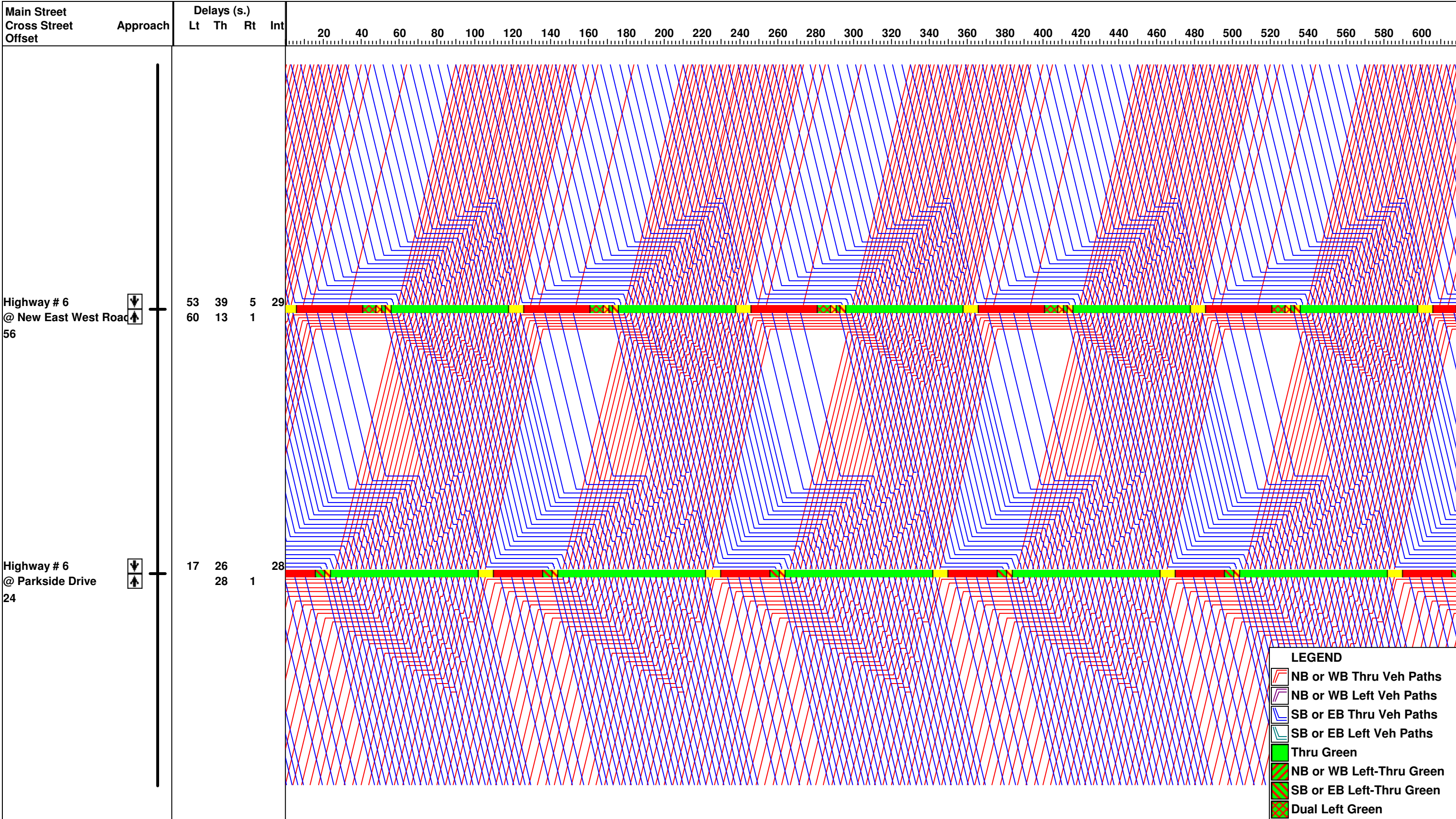
- NB or WB Thru Veh Paths
- NB or WB Left Veh Paths
- SB or EB Thru Veh Paths
- SB or EB Left Veh Paths
- Thru Green
- NB or WB Left-Thru Green
- SB or EB Left-Thru Green
- Dual Left Green

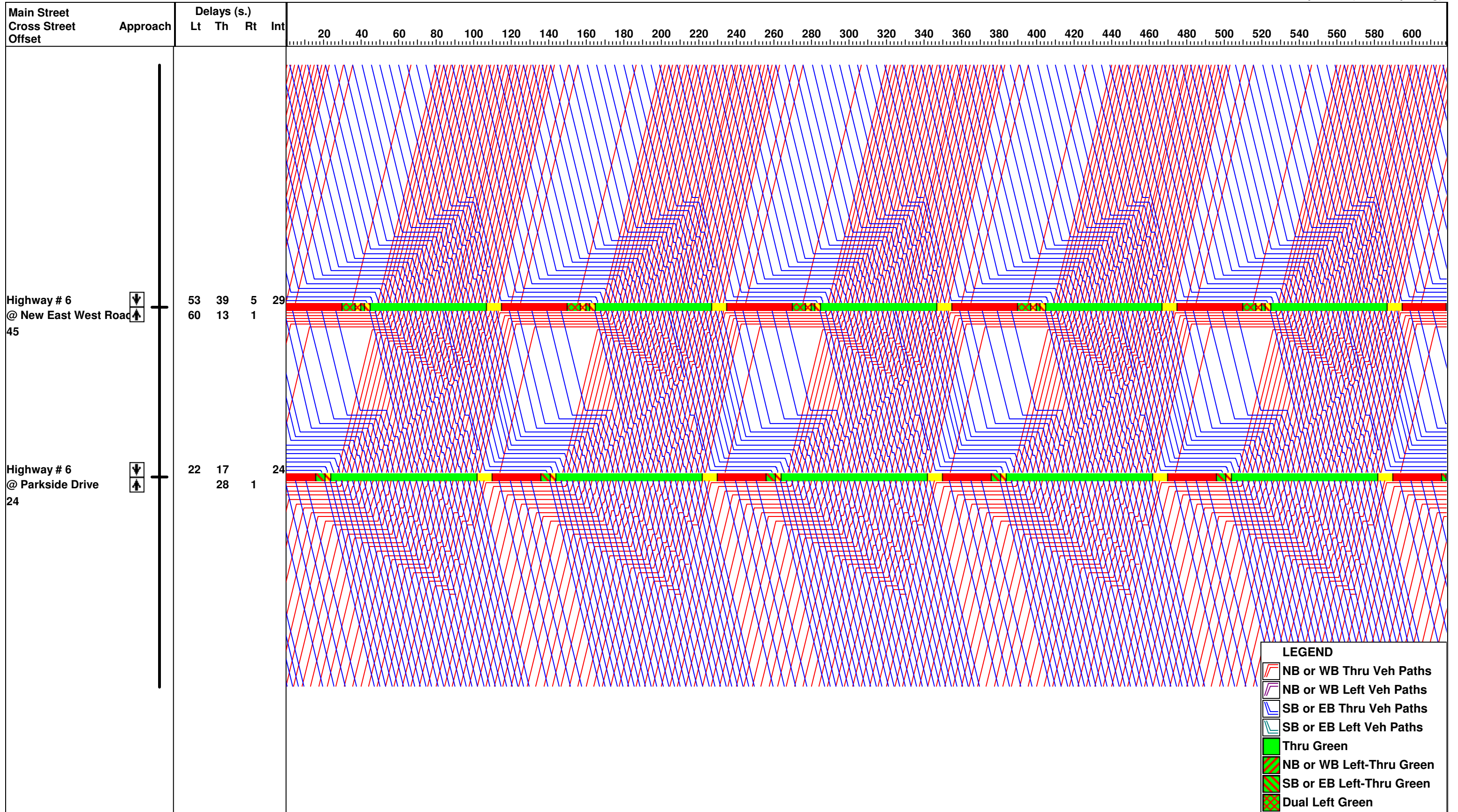


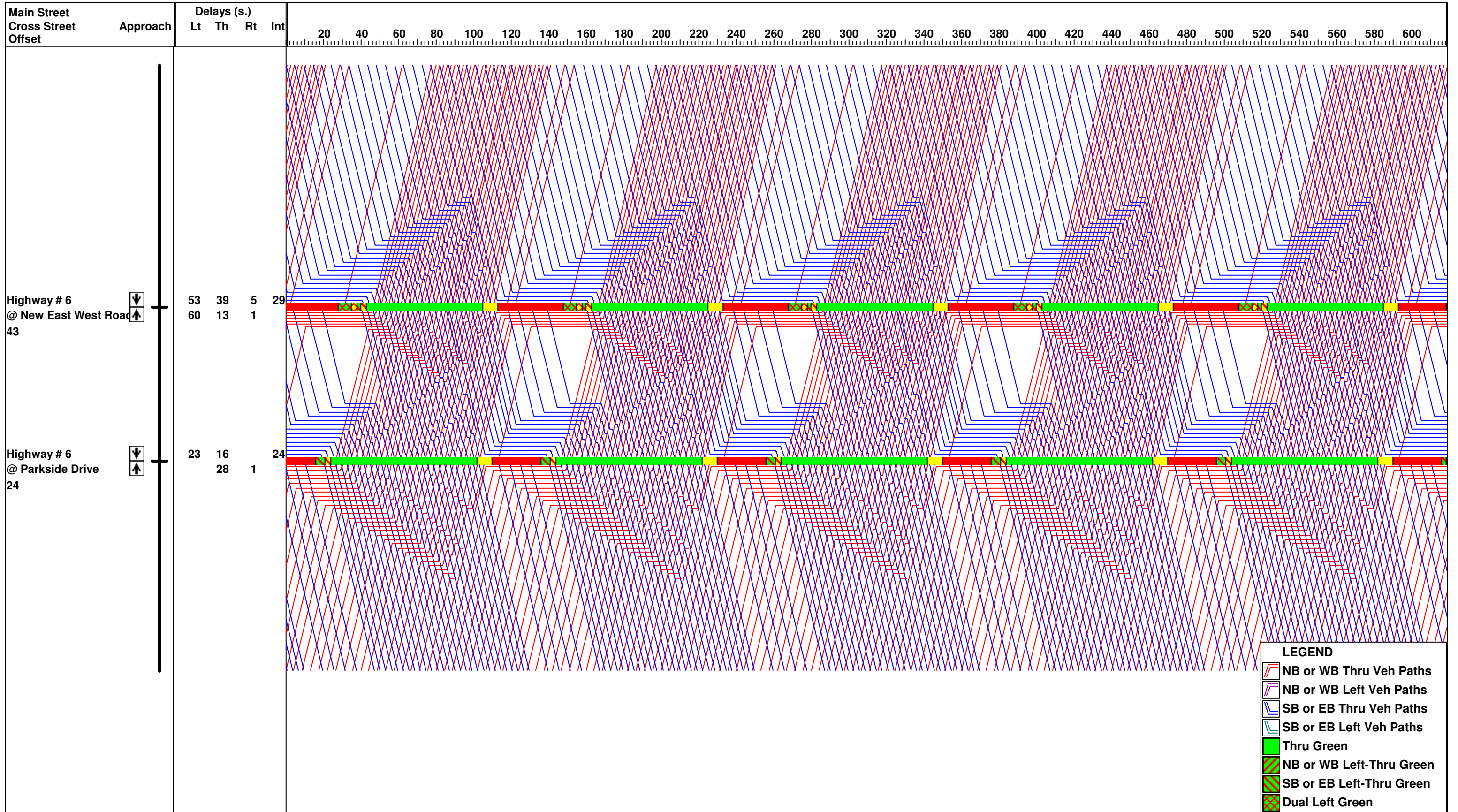
LEGEND

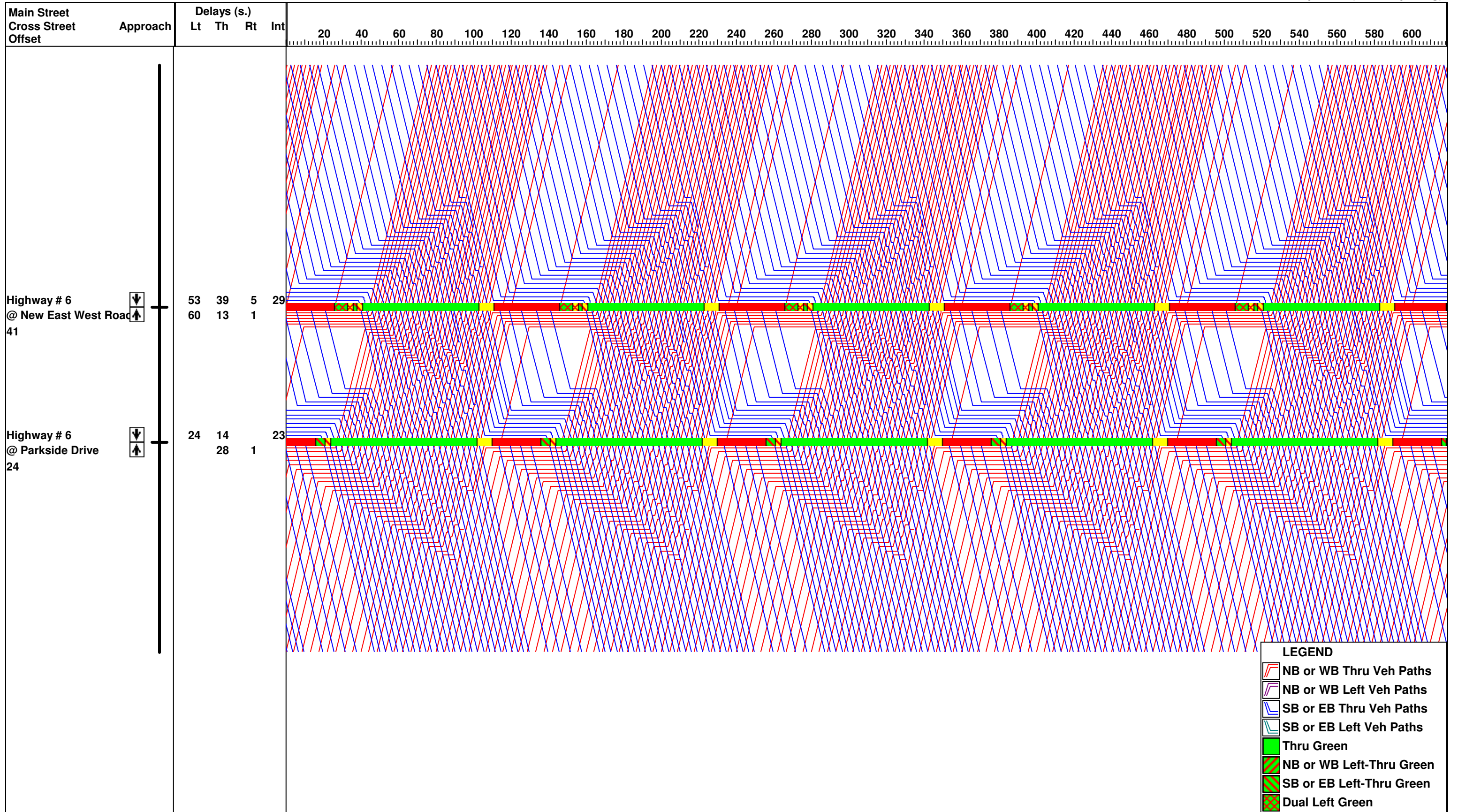
- NB or WB Thru Veh Paths
- NB or WB Left Veh Paths
- SB or EB Thru Veh Paths
- SB or EB Left Veh Paths
- Thru Green
- NB or WB Left-Thru Green
- SB or EB Left-Thru Green
- Dual Left Green

































LEGEND

-  NB or WB Thru Veh Paths
-  NB or WB Left Veh Paths
-  SB or EB Thru Veh Paths
-  SB or EB Left Veh Paths
-  Thru Green
-  NB or WB Left-Thru Green
-  SB or EB Left-Thru Green
-  Dual Left Green

Attachment 3
Synchro Analysis Worksheets















HCM Unsignalized Intersection Capacity Analysis
5: New East West Road & Highway # 6

AM Peak Hour
Existing Traffic Volumes

										
Movement	EBL	EBR	NBL	NBT	SBT	SBR				
Lane Configurations				 	 					
Sign Control	Stop			Free	Free					
Grade	0%			0%	0%					
Volume (veh/h)	1	62	30	1269	1304	1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				
Hourly flow rate (vph)	1	67	33	1379	1417	1				
Pedestrians										
Lane Width (m)										
Walking Speed (m/s)										
Percent Blockage										
Right turn flare (veh)										
Median type	None									
Median storage (veh)										
Upstream signal (m)										
pX, platoon unblocked										
vC, conflicting volume	2172	709	1418							
vC1, stage 1 conf vol										
vC2, stage 2 conf vol										
vCu, unblocked vol	2172	709	1418							
tC, single (s)	6.8	6.9	4.1							
tC, 2 stage (s)										
tF (s)	3.5	3.3	2.2							
p0 queue free %	97	82	93							
cM capacity (veh/h)	37	377	476							
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	1	67	33	690	690	709	709	1		
Volume Left	1	0	33	0	0	0	0	0		
Volume Right	0	67	0	0	0	0	0	1		
cSH	37	377	476	1700	1700	1700	1700	1700		
Volume to Capacity	0.03	0.18	0.07	0.41	0.41	0.42	0.42	0.00		
Queue Length 95th (m)	0.7	5.1	1.8	0.0	0.0	0.0	0.0	0.0		
Control Delay (s)	105.1	16.6	13.1	0.0	0.0	0.0	0.0	0.0		
Lane LOS	F	C	B							
Approach Delay (s)	18.0		0.3			0.0				
Approach LOS	C									
Intersection Summary										
Average Delay			0.6							
Intersection Capacity Utilization			48.2%	ICU Level of Service	A					
Analysis Period (min)			15							

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

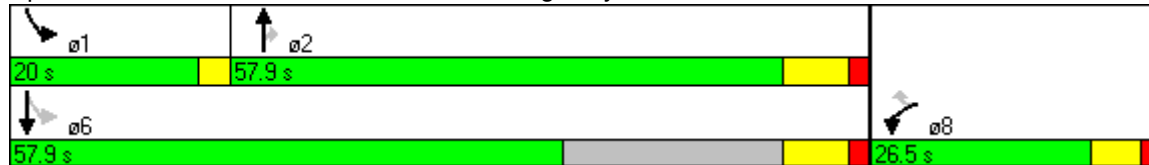
AM Peak Hour
Existing Traffic Volumes

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	180.0	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Fl _t Permitted	0.950				0.100	
Satd. Flow (perm)	1736	1568	3282	1538	184	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		127		113		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			437.1
Travel Time (s)	82.4		26.8			19.7
Volume (vph)	72	117	1182	104	163	1203
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Adj. Flow (vph)	78	127	1285	113	177	1308
Lane Group Flow (vph)	78	127	1285	113	177	1308
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.5	26.5	57.9	57.9	20.0	57.9
Total Split (%)	25.4%	25.4%	55.5%	55.5%	19.2%	55.5%
Maximum Green (s)	20.0	20.0	50.0	50.0	17.0	50.0
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	Min	Min	None	Min
Act Effct Green (s)	12.4	12.4	54.7	54.7	62.6	63.7
Actuated g/C Ratio	0.15	0.15	0.67	0.67	0.75	0.78
v/c Ratio	0.31	0.38	0.59	0.11	0.73	0.52
Control Delay	35.2	10.2	11.7	2.0	26.8	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	10.2	11.7	2.0	26.8	5.4
LOS	D	B	B	A	C	A
Approach Delay	19.7		10.9			8.0
Approach LOS	B		B			A

Intersection Summary















Area Type: Other	
Cycle Length: 104.4	
Actuated Cycle Length: 82	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 10.1	Intersection LOS: B
Intersection Capacity Utilization 62.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6

















HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

AM Peak Hour
 Existing Traffic Volumes

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.95	1.00	1.00	1.00	0.15	1.00
Satd. Flow (perm)	1736	1568	3282	1538	275	3252
Volume (vph)	72	117	1182	104	163	1203
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	127	1285	113	177	1308
RTOR Reduction (vph)	0	111	0	41	0	0
Lane Group Flow (vph)	78	16	1285	72	177	1308
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	8.9	8.9	50.8	50.8	60.4	60.4
Effective Green, g (s)	10.4	10.4	53.7	53.7	63.3	63.3
Actuated g/C Ratio	0.12	0.12	0.64	0.64	0.76	0.76
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	216	195	2106	987	289	2459
v/s Ratio Prot	c0.04		0.39		0.03	c0.40
v/s Ratio Perm		0.01		0.05	c0.43	
v/c Ratio	0.36	0.08	0.61	0.07	0.61	0.53
Uniform Delay, d1	33.6	32.4	8.8	5.6	6.3	4.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.2	0.8	0.1	2.7	0.4
Delay (s)	34.6	32.6	9.6	5.7	9.0	4.6
Level of Service	C	C	A	A	A	A
Approach Delay (s)	33.4		9.3			5.1
Approach LOS	C		A			A
Intersection Summary						
HCM Average Control Delay			8.9	HCM Level of Service		A
HCM Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			83.7	Sum of lost time (s)		10.0
Intersection Capacity Utilization			62.5%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						















HCM Unsignalized Intersection Capacity Analysis
5: New East West Road & Highway # 6

PM Peak Hour
Existing Traffic Volumes

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations				 	 			
Sign Control	Stop			Free		Free		
Grade	0%			0%		0%		
Volume (veh/h)	2	61	106	1277	1560	16		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	2	66	115	1388	1696	17		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	None							
Median storage (veh)								
Upstream signal (m)								
pX, platoon unblocked								
vC, conflicting volume	2620	848	1713					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	2620	848	1713					
tC, single (s)	6.8	6.9	4.1					
tC, 2 stage (s)								
tF (s)	3.5	3.3	2.2					
p0 queue free %	84	78	69					
cM capacity (veh/h)	13	305	366					
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	2	66	115	694	694	848	848	17
Volume Left	2	0	115	0	0	0	0	0
Volume Right	0	66	0	0	0	0	0	17
cSH	13	305	366	1700	1700	1700	1700	1700
Volume to Capacity	0.16	0.22	0.31	0.41	0.41	0.50	0.50	0.01
Queue Length 95th (m)	3.5	6.5	10.6	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	320.0	20.1	19.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	C	C					
Approach Delay (s)	29.6		1.5			0.0		
Approach LOS	D							
Intersection Summary								
Average Delay			1.3					
Intersection Capacity Utilization			62.3%	ICU Level of Service		B		
Analysis Period (min)			15					

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

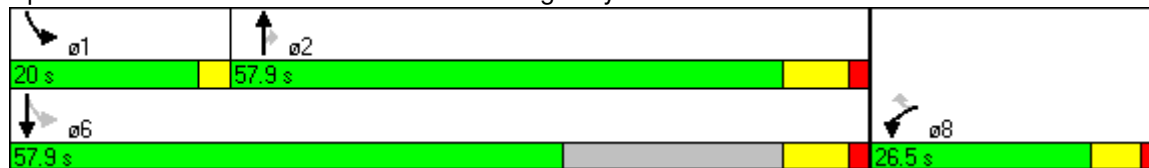
PM Peak Hour
Existing Traffic Volumes

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	180.0	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Fl _t Permitted	0.950				0.110	
Satd. Flow (perm)	1770	1495	3312	1583	203	3343
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		202		123		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			438.2
Travel Time (s)	82.4		26.8			19.7
Volume (vph)	133	186	1197	113	189	1432
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Adj. Flow (vph)	145	202	1301	123	205	1557
Lane Group Flow (vph)	145	202	1301	123	205	1557
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.5	26.5	57.9	57.9	20.0	57.9
Total Split (%)	25.4%	25.4%	55.5%	55.5%	19.2%	55.5%
Maximum Green (s)	20.0	20.0	50.0	50.0	17.0	50.0
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	Min	Min	None	Min
Act Effct Green (s)	14.0	14.0	42.2	42.2	58.5	53.4
Actuated g/C Ratio	0.17	0.17	0.53	0.53	0.73	0.67
v/c Ratio	0.47	0.47	0.75	0.14	0.63	0.70
Control Delay	38.5	9.3	18.6	2.8	18.6	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	9.3	18.6	2.8	18.6	10.4
LOS	D	A	B	A	B	B
Approach Delay	21.5		17.2			11.3
Approach LOS	C		B			B

Intersection Summary















Area Type: Other	
Cycle Length: 104.4	
Actuated Cycle Length: 80.3	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 14.7	Intersection LOS: B
Intersection Capacity Utilization 65.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
10: Parkside Drive & Highway # 6

PM Peak Hour
Existing Traffic Volumes

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.95	1.00	1.00	1.00	0.13	1.00
Satd. Flow (perm)	1770	1495	3312	1583	247	3343
Volume (vph)	133	186	1197	113	189	1432
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	202	1301	123	205	1557
RTOR Reduction (vph)	0	167	0	58	0	0
Lane Group Flow (vph)	145	35	1301	65	205	1557
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	13.0	13.0	41.3	41.3	52.4	52.4
Effective Green, g (s)	14.0	14.0	42.3	42.3	58.3	53.4
Actuated g/C Ratio	0.18	0.18	0.53	0.53	0.73	0.67
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	311	262	1756	839	352	2237
v/s Ratio Prot	c0.08		c0.39		0.07	c0.47
v/s Ratio Perm		0.02		0.04	0.36	
v/c Ratio	0.47	0.14	0.74	0.08	0.58	0.70
Uniform Delay, d1	29.5	27.8	14.5	9.2	7.6	8.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.2	2.1	0.1	1.6	1.2
Delay (s)	30.7	28.0	16.6	9.3	9.2	9.4
Level of Service	C	C	B	A	A	A
Approach Delay (s)	29.1		16.0			9.4
Approach LOS	C		B			A
Intersection Summary						
HCM Average Control Delay			14.0	HCM Level of Service		B
HCM Volume to Capacity ratio			0.73			
Actuated Cycle Length (s)			79.8	Sum of lost time (s)		19.3
Intersection Capacity Utilization			65.6%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 1)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1736	1626	0	1770	3282	1538	1752	3252	1583
Flt Permitted	0.639			0.681			0.065			0.065		
Satd. Flow (perm)	1190	1652	0	1244	1626	0	121	3282	1538	120	3252	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			109				158			22
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		469.5			1387.8			880.3			417.5	
Travel Time (s)		28.2			83.3			39.6			18.8	
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
Lane Group Flow (vph)	27	109	0	380	136	0	54	1630	190	136	1630	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	17.2	17.2		17.2	17.2		11.0	28.6	28.6	11.0	28.6	28.6
Total Split (s)	42.7	42.7	0.0	42.7	42.7	0.0	11.0	66.3	66.3	11.0	66.3	66.3
Total Split (%)	35.6%	35.6%	0.0%	35.6%	35.6%	0.0%	9.2%	55.3%	55.3%	9.2%	55.3%	55.3%
Maximum Green (s)	36.2	36.2		36.2	36.2		8.0	58.4	58.4	8.0	58.4	58.4
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	37.7	37.7		37.7	37.7		65.6	61.3	61.3	69.5	64.7	64.7
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.55	0.51	0.51	0.58	0.54	0.54
v/c Ratio	0.07	0.19		0.97	0.23		0.43	0.97	0.22	0.90	0.93	0.03
Control Delay	29.7	10.7		80.4	9.6		18.4	30.1	2.2	74.4	37.1	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	10.7		80.4	9.6		18.4	30.1	2.2	74.4	37.1	6.6
LOS	C	B		F	A		B	C	A	E	D	A
Approach Delay		14.5			61.8			27.0			39.4	
Approach LOS		B			E			C			D	

Intersection Summary























Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	20 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.97
Intersection Signal Delay:	35.9
Intersection LOS:	D
Intersection Capacity Utilization	86.9%
ICU Level of Service	E
Analysis Period (min)	15

Splits and Phases: 5: New East West Road & Highway # 6

 ø1	 ø2	 ø4
11 s	66.3 s	42.7 s
 ø5	 ø6	 ø8
11 s	66.3 s	42.7 s

HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















AM Peak Hour
Future Traffic Volumes (Option 1)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1736	1626		1770	3282	1538	1752	3252	1583
Flt Permitted	0.64	1.00		0.68	1.00		0.07	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1191	1653		1244	1626		122	3282	1538	115	3252	1583
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
RTOR Reduction (vph)	0	56	0	0	75	0	0	0	77	0	0	10
Lane Group Flow (vph)	27	53	0	380	61	0	54	1630	113	136	1630	17
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	36.2	36.2		36.2	36.2		63.6	58.4	58.4	69.2	61.2	61.2
Effective Green, g (s)	37.7	37.7		37.7	37.7		64.5	61.3	61.3	70.1	64.1	64.1
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.54	0.51	0.51	0.58	0.53	0.53
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	374	519		391	511		110	1677	786	149	1737	846
v/s Ratio Prot		0.03			0.04		0.01	0.50		c0.05	c0.50	
v/s Ratio Perm	0.02			c0.31			0.25		0.07	0.49		0.01
v/c Ratio	0.07	0.10		0.97	0.12		0.49	0.97	0.14	0.91	0.94	0.02
Uniform Delay, d1	28.9	29.2		40.6	29.3		22.2	28.5	15.5	29.9	26.1	13.2
Progression Factor	1.00	1.00		1.00	1.00		1.10	0.58	0.49	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1		37.9	0.1		2.2	12.3	0.2	48.4	11.2	0.0
Delay (s)	29.0	29.2		78.5	29.4		26.6	28.9	7.8	78.4	37.3	13.2
Level of Service	C	C		E	C		C	C	A	E	D	B
Approach Delay (s)		29.2			65.6			26.7			40.1	
Approach LOS		C			E			C			D	
Intersection Summary												
HCM Average Control Delay			37.0				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			15.0		
Intersection Capacity Utilization			86.9%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 1)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Fl _t Permitted	0.950				0.059	
Satd. Flow (perm)	1736	1568	3282	1538	109	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		54		245		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			880.3
Travel Time (s)	82.4		26.8			39.6
Volume (vph)	175	50	1650	225	50	1850
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Adj. Flow (vph)	190	54	1793	245	54	2011
Lane Group Flow (vph)	190	54	1793	245	54	2011
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	84.0	84.0	10.0	94.0
Total Split (%)	21.7%	21.7%	70.0%	70.0%	8.3%	78.3%
Maximum Green (s)	19.5	19.5	76.1	76.1	7.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	18.3	18.3	85.2	85.2	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.71	0.71	0.76	0.76
v/c Ratio	0.72	0.19	0.77	0.21	0.43	0.81
Control Delay	63.6	12.8	15.2	1.3	9.8	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.6	12.8	15.2	1.3	9.8	13.3
LOS	E	B	B	A	A	B
Approach Delay	52.4		13.5			13.2
Approach LOS	D		B			B

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 83 (69%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 15.6	Intersection LOS: B
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
10: Parkside Drive & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 1)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1736	1568	3282	1538	134	3252
Volume (vph)	175	50	1650	225	50	1850
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	54	1793	245	54	2011
RTOR Reduction (vph)	0	46	0	72	0	0
Lane Group Flow (vph)	190	8	1793	173	54	2011
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	16.8	16.8	81.7	81.7	88.8	88.8
Effective Green, g (s)	18.3	18.3	84.6	84.6	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.70	0.70	0.76	0.76
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	265	239	2314	1084	131	2485
v/s Ratio Prot	c0.11		0.55		0.01	c0.62
v/s Ratio Perm		0.01		0.11	0.31	
v/c Ratio	0.72	0.03	0.77	0.16	0.41	0.81
Uniform Delay, d1	48.4	43.3	11.5	5.9	11.7	8.7
Progression Factor	1.00	1.00	1.00	1.00	1.42	1.24
Incremental Delay, d2	8.9	0.1	2.6	0.3	0.3	1.2
Delay (s)	57.3	43.4	14.1	6.2	16.8	12.0
Level of Service	E	D	B	A	B	B
Approach Delay (s)	54.2		13.2			12.2
Approach LOS	D		B			B
Intersection Summary						
HCM Average Control Delay			15.0	HCM Level of Service		B
HCM Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			69.2%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 2)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1736	1626	0	1770	3282	1538	1752	3252	1583
Flt Permitted	0.639			0.681			0.065			0.065		
Satd. Flow (perm)	1190	1652	0	1244	1626	0	121	3282	1538	120	3252	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			109				158			22
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		469.5			1381.2			730.0			417.5	
Travel Time (s)		28.2			82.9			32.9			18.8	
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
Lane Group Flow (vph)	27	109	0	380	136	0	54	1630	190	136	1630	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	17.2	17.2		17.2	17.2		11.0	28.6	28.6	11.0	28.6	28.6
Total Split (s)	42.7	42.7	0.0	42.7	42.7	0.0	11.0	66.3	66.3	11.0	66.3	66.3
Total Split (%)	35.6%	35.6%	0.0%	35.6%	35.6%	0.0%	9.2%	55.3%	55.3%	9.2%	55.3%	55.3%
Maximum Green (s)	36.2	36.2		36.2	36.2		8.0	58.4	58.4	8.0	58.4	58.4
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	37.7	37.7		37.7	37.7		66.0	61.3	61.3	69.1	64.3	64.3
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.55	0.51	0.51	0.58	0.54	0.54
v/c Ratio	0.07	0.19		0.97	0.23		0.41	0.97	0.22	0.90	0.94	0.03
Control Delay	29.7	10.7		80.4	9.6		22.4	34.5	5.4	75.5	38.1	6.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	10.7		80.4	9.6		22.4	34.5	5.4	75.5	38.1	6.7
LOS	C	B		F	A		C	C	A	E	D	A
Approach Delay		14.5			61.8			31.2			40.5	
Approach LOS		B			E			C			D	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	20 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.97
Intersection Signal Delay:	38.2
Intersection LOS:	D
Intersection Capacity Utilization	86.9%
ICU Level of Service	E
Analysis Period (min)	15

Splits and Phases: 5: New East West Road & Highway # 6

 ø1	 ø2	 ø4
11 s	66.3 s	42.7 s
 ø5	 ø6	 ø8
11 s	66.3 s	42.7 s

HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 2)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1736	1626		1770	3282	1538	1752	3252	1583
Flt Permitted	0.64	1.00		0.68	1.00		0.07	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1191	1653		1244	1626		122	3282	1538	116	3252	1583
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
RTOR Reduction (vph)	0	56	0	0	75	0	0	0	77	0	0	10
Lane Group Flow (vph)	27	53	0	380	61	0	54	1630	113	136	1630	17
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	36.2	36.2		36.2	36.2		64.0	58.4	58.4	68.8	60.8	60.8
Effective Green, g (s)	37.7	37.7		37.7	37.7		64.9	61.3	61.3	69.7	63.7	63.7
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.54	0.51	0.51	0.58	0.53	0.53
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	374	519		391	511		115	1677	786	149	1726	840
v/s Ratio Prot		0.03			0.04		0.01	0.50		c0.05	c0.50	
v/s Ratio Perm	0.02			c0.31			0.24		0.07	0.48		0.01
v/c Ratio	0.07	0.10		0.97	0.12		0.47	0.97	0.14	0.91	0.94	0.02
Uniform Delay, d1	28.9	29.2		40.6	29.3		22.2	28.5	15.5	29.8	26.5	13.3
Progression Factor	1.00	1.00		1.00	1.00		1.57	0.75	1.32	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1		37.9	0.1		2.0	12.2	0.2	48.4	12.0	0.0
Delay (s)	29.0	29.2		78.5	29.4		36.8	33.5	20.7	78.2	38.5	13.4
Level of Service	C	C		E	C		D	C	C	E	D	B
Approach Delay (s)		29.2			65.6			32.3			41.1	
Approach LOS		C			E			C			D	















Intersection Summary

HCM Average Control Delay	39.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 2)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Flt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.950				0.059	
Satd. Flow (perm)	1736	1568	3282	1538	109	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		54		245		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			730.0
Travel Time (s)	82.4		26.8			32.9
Volume (vph)	175	50	1650	225	50	1850
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Adj. Flow (vph)	190	54	1793	245	54	2011
Lane Group Flow (vph)	190	54	1793	245	54	2011
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	84.0	84.0	10.0	94.0
Total Split (%)	21.7%	21.7%	70.0%	70.0%	8.3%	78.3%
Maximum Green (s)	19.5	19.5	76.1	76.1	7.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	18.3	18.3	84.6	84.6	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.70	0.70	0.76	0.76
v/c Ratio	0.72	0.19	0.77	0.21	0.41	0.81
Control Delay	63.6	12.8	15.8	1.4	12.8	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.6	12.8	15.8	1.4	12.8	13.9
LOS	E	B	B	A	B	B
Approach Delay	52.4		14.0			13.9
Approach LOS	D		B			B

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 6 (5%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 16.1	Intersection LOS: B
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

AM Peak Hour
 Future Traffic Volumes (Option 2)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1736	1568	3282	1538	131	3252
Volume (vph)	175	50	1650	225	50	1850
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	54	1793	245	54	2011
RTOR Reduction (vph)	0	46	0	74	0	0
Lane Group Flow (vph)	190	8	1793	172	54	2011
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	16.8	16.8	81.1	81.1	88.8	88.8
Effective Green, g (s)	18.3	18.3	84.0	84.0	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.70	0.70	0.76	0.76
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	265	239	2297	1077	137	2485
v/s Ratio Prot	c0.11		0.55		0.01	c0.62
v/s Ratio Perm		0.01		0.11	0.29	
v/c Ratio	0.72	0.03	0.78	0.16	0.39	0.81
Uniform Delay, d1	48.4	43.3	11.9	6.1	11.9	8.7
Progression Factor	1.00	1.00	1.00	1.00	2.33	1.30
Incremental Delay, d2	8.9	0.1	2.7	0.3	0.3	1.2
Delay (s)	57.3	43.4	14.6	6.4	28.1	12.6
Level of Service	E	D	B	A	C	B
Approach Delay (s)	54.2		13.6			13.0
Approach LOS	D		B			B
Intersection Summary						
HCM Average Control Delay			15.6	HCM Level of Service		B
HCM Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			69.2%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 3)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1736	1626	0	1770	3282	1538	1752	3252	1583
Flt Permitted	0.639			0.681			0.065			0.065		
Satd. Flow (perm)	1190	1652	0	1244	1626	0	121	3282	1538	120	3252	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			109				158			22
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		469.5			1373.9			474.0			417.5	
Travel Time (s)		28.2			82.4			21.3			18.8	
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
Lane Group Flow (vph)	27	109	0	380	136	0	54	1630	190	136	1630	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	17.2	17.2		17.2	17.2		11.0	28.6	28.6	11.0	28.6	28.6
Total Split (s)	42.7	42.7	0.0	42.7	42.7	0.0	11.0	66.3	66.3	11.0	66.3	66.3
Total Split (%)	35.6%	35.6%	0.0%	35.6%	35.6%	0.0%	9.2%	55.3%	55.3%	9.2%	55.3%	55.3%
Maximum Green (s)	36.2	36.2		36.2	36.2		8.0	58.4	58.4	8.0	58.4	58.4
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	37.7	37.7		37.7	37.7		66.0	61.3	61.3	69.1	64.3	64.3
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.55	0.51	0.51	0.58	0.54	0.54
v/c Ratio	0.07	0.19		0.97	0.23		0.41	0.97	0.22	0.90	0.94	0.03
Control Delay	29.7	10.7		80.4	9.6		22.3	34.5	5.3	75.5	38.1	6.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	10.7		80.4	9.6		22.3	34.5	5.3	75.5	38.1	6.7
LOS	C	B		F	A		C	C	A	E	D	A
Approach Delay		14.5			61.8			31.2			40.5	
Approach LOS		B			E			C			D	

Intersection Summary























Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 20 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 38.2	Intersection LOS: D
Intersection Capacity Utilization 86.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: New East West Road & Highway # 6

 ø1	 ø2	 ø4
11 s	66.3 s	42.7 s
 ø5	 ø6	 ø8
11 s	66.3 s	42.7 s

HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















AM Peak Hour
Future Traffic Volumes (Option 3)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1736	1626		1770	3282	1538	1752	3252	1583
Flt Permitted	0.64	1.00		0.68	1.00		0.07	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1191	1653		1244	1626		122	3282	1538	116	3252	1583
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
RTOR Reduction (vph)	0	56	0	0	75	0	0	0	77	0	0	10
Lane Group Flow (vph)	27	53	0	380	61	0	54	1630	113	136	1630	17
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	36.2	36.2		36.2	36.2		64.0	58.4	58.4	68.8	60.8	60.8
Effective Green, g (s)	37.7	37.7		37.7	37.7		64.9	61.3	61.3	69.7	63.7	63.7
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.54	0.51	0.51	0.58	0.53	0.53
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	374	519		391	511		115	1677	786	149	1726	840
v/s Ratio Prot		0.03			0.04		0.01	0.50		c0.05	c0.50	
v/s Ratio Perm	0.02			c0.31			0.24		0.07	0.48		0.01
v/c Ratio	0.07	0.10		0.97	0.12		0.47	0.97	0.14	0.91	0.94	0.02
Uniform Delay, d1	28.9	29.2		40.6	29.3		22.2	28.5	15.5	29.8	26.5	13.3
Progression Factor	1.00	1.00		1.00	1.00		1.56	0.75	1.31	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1		37.9	0.1		2.0	12.2	0.2	48.4	12.0	0.0
Delay (s)	29.0	29.2		78.5	29.4		36.7	33.5	20.6	78.2	38.5	13.4
Level of Service	C	C		E	C		D	C	C	E	D	B
Approach Delay (s)		29.2			65.6			32.3			41.1	
Approach LOS		C			E			C			D	
Intersection Summary												
HCM Average Control Delay			39.8			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			86.9%			ICU Level of Service			E			
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 3)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Fl _t Permitted	0.950				0.059	
Satd. Flow (perm)	1736	1568	3282	1538	109	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		54		245		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			474.0
Travel Time (s)	82.4		26.8			21.3
Volume (vph)	175	50	1650	225	50	1850
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Adj. Flow (vph)	190	54	1793	245	54	2011
Lane Group Flow (vph)	190	54	1793	245	54	2011
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	84.0	84.0	10.0	94.0
Total Split (%)	21.7%	21.7%	70.0%	70.0%	8.3%	78.3%
Maximum Green (s)	19.5	19.5	76.1	76.1	7.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	18.3	18.3	84.9	84.9	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.71	0.71	0.76	0.76
v/c Ratio	0.72	0.19	0.77	0.21	0.42	0.81
Control Delay	63.6	12.8	15.5	1.3	13.2	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.6	12.8	15.5	1.3	13.2	6.9
LOS	E	B	B	A	B	A
Approach Delay	52.4		13.8			7.1
Approach LOS	D		B			A

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 18 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 12.8	Intersection LOS: B
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

AM Peak Hour
 Future Traffic Volumes (Option 3)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1736	1568	3282	1538	133	3252
Volume (vph)	175	50	1650	225	50	1850
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	54	1793	245	54	2011
RTOR Reduction (vph)	0	46	0	73	0	0
Lane Group Flow (vph)	190	8	1793	172	54	2011
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Actuated Green, G (s)	16.8	16.8	81.4	81.4	88.8	88.8
Effective Green, g (s)	18.3	18.3	84.3	84.3	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.70	0.70	0.76	0.76
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	265	239	2306	1080	134	2485
v/s Ratio Prot	c0.11		0.55		0.01	c0.62
v/s Ratio Perm		0.01		0.11	0.30	
v/c Ratio	0.72	0.03	0.78	0.16	0.40	0.81
Uniform Delay, d1	48.4	43.3	11.7	6.0	11.8	8.7
Progression Factor	1.00	1.00	1.00	1.00	2.37	0.59
Incremental Delay, d2	8.9	0.1	2.7	0.3	0.3	1.2
Delay (s)	57.3	43.4	14.4	6.3	28.2	6.3
Level of Service	E	D	B	A	C	A
Approach Delay (s)	54.2		13.4			6.9
Approach LOS	D		B			A

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 4)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1736	1626	0	1770	3282	1538	1752	3252	1583
Flt Permitted	0.639			0.681			0.065			0.065		
Satd. Flow (perm)	1190	1652	0	1244	1626	0	121	3282	1538	120	3252	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			109				158			22
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		469.5			1373.0			430.1			417.5	
Travel Time (s)		28.2			82.4			19.4			18.8	
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
Lane Group Flow (vph)	27	109	0	380	136	0	54	1630	190	136	1630	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	17.2	17.2		17.2	17.2		11.0	28.6	28.6	11.0	28.6	28.6
Total Split (s)	42.7	42.7	0.0	42.7	42.7	0.0	11.0	66.3	66.3	11.0	66.3	66.3
Total Split (%)	35.6%	35.6%	0.0%	35.6%	35.6%	0.0%	9.2%	55.3%	55.3%	9.2%	55.3%	55.3%
Maximum Green (s)	36.2	36.2		36.2	36.2		8.0	58.4	58.4	8.0	58.4	58.4
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	37.7	37.7		37.7	37.7		66.0	61.3	61.3	69.1	64.3	64.3
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.55	0.51	0.51	0.58	0.54	0.54
v/c Ratio	0.07	0.19		0.97	0.23		0.41	0.97	0.22	0.90	0.94	0.03
Control Delay	29.7	10.7		80.4	9.6		22.2	33.7	4.7	75.2	38.0	6.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	10.7		80.4	9.6		22.2	33.7	4.7	75.2	38.0	6.7
LOS	C	B		F	A		C	C	A	E	D	A
Approach Delay		14.5			61.8			30.4			40.3	
Approach LOS		B			E			C			D	

Intersection Summary























Area Type:	Other	
Cycle Length:	120	
Actuated Cycle Length:	120	
Offset:	20 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle:	110	
Control Type:	Actuated-Coordinated	
Maximum v/c Ratio:	0.97	
Intersection Signal Delay:	37.8	Intersection LOS: D
Intersection Capacity Utilization	86.9%	ICU Level of Service E
Analysis Period (min)	15	

Splits and Phases: 5: New East West Road & Highway # 6

 ø1	 ø2	 ø4
11 s	66.3 s	42.7 s
 ø5	 ø6	 ø8
11 s	66.3 s	42.7 s

HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















AM Peak Hour
Future Traffic Volumes (Option 4)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1736	1626		1770	3282	1538	1752	3252	1583
Flt Permitted	0.64	1.00		0.68	1.00		0.07	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1191	1653		1244	1626		122	3282	1538	116	3252	1583
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
RTOR Reduction (vph)	0	56	0	0	75	0	0	0	77	0	0	10
Lane Group Flow (vph)	27	53	0	380	61	0	54	1630	113	136	1630	17
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	36.2	36.2		36.2	36.2		64.0	58.4	58.4	68.8	60.8	60.8
Effective Green, g (s)	37.7	37.7		37.7	37.7		64.9	61.3	61.3	69.7	63.7	63.7
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.54	0.51	0.51	0.58	0.53	0.53
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	374	519		391	511		115	1677	786	149	1726	840
v/s Ratio Prot		0.03			0.04		0.01	0.50		c0.05	c0.50	
v/s Ratio Perm	0.02			c0.31			0.24		0.07	0.48		0.01
v/c Ratio	0.07	0.10		0.97	0.12		0.47	0.97	0.14	0.91	0.94	0.02
Uniform Delay, d1	28.9	29.2		40.6	29.3		22.2	28.5	15.5	29.8	26.5	13.3
Progression Factor	1.00	1.00		1.00	1.00		1.54	0.72	1.13	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1		37.9	0.1		2.0	12.2	0.2	48.4	12.0	0.0
Delay (s)	29.0	29.2		78.5	29.4		36.1	32.7	17.7	78.2	38.5	13.4
Level of Service	C	C		E	C		D	C	B	E	D	B
Approach Delay (s)		29.2			65.6			31.3			41.1	
Approach LOS		C			E			C			D	
Intersection Summary												
HCM Average Control Delay			39.4				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			10.0		
Intersection Capacity Utilization			86.9%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 4)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Flt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.950				0.059	
Satd. Flow (perm)	1736	1568	3282	1538	109	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		54		245		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			430.1
Travel Time (s)	82.4		26.8			19.4
Volume (vph)	175	50	1650	225	50	1850
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Adj. Flow (vph)	190	54	1793	245	54	2011
Lane Group Flow (vph)	190	54	1793	245	54	2011
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	84.0	84.0	10.0	94.0
Total Split (%)	21.7%	21.7%	70.0%	70.0%	8.3%	78.3%
Maximum Green (s)	19.5	19.5	76.1	76.1	7.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	18.3	18.3	84.9	84.9	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.71	0.71	0.76	0.76
v/c Ratio	0.72	0.19	0.77	0.21	0.42	0.81
Control Delay	63.6	12.8	15.5	1.3	13.2	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.6	12.8	15.5	1.3	13.2	6.7
LOS	E	B	B	A	B	A
Approach Delay	52.4		13.8			6.8
Approach LOS	D		B			A

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 17 (14%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 12.7	Intersection LOS: B
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

AM Peak Hour
 Future Traffic Volumes (Option 4)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1736	1568	3282	1538	133	3252
Volume (vph)	175	50	1650	225	50	1850
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	54	1793	245	54	2011
RTOR Reduction (vph)	0	46	0	73	0	0
Lane Group Flow (vph)	190	8	1793	172	54	2011
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2 6			
Actuated Green, G (s)	16.8	16.8	81.4	81.4	88.8	88.8
Effective Green, g (s)	18.3	18.3	84.3	84.3	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.70	0.70	0.76	0.76
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	265	239	2306	1080	134	2485
v/s Ratio Prot	c0.11		0.55		0.01	c0.62
v/s Ratio Perm		0.01		0.11	0.30	
v/c Ratio	0.72	0.03	0.78	0.16	0.40	0.81
Uniform Delay, d1	48.4	43.3	11.7	6.0	11.8	8.7
Progression Factor	1.00	1.00	1.00	1.00	2.37	0.56
Incremental Delay, d2	8.9	0.1	2.7	0.3	0.3	1.2
Delay (s)	57.3	43.4	14.4	6.3	28.2	6.1
Level of Service	E	D	B	A	C	A
Approach Delay (s)	54.2		13.4			6.7
Approach LOS	D		B			A

Intersection Summary

HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 5)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.880				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1736	1626	0	1770	3282	1538	1752	3252	1583
Flt Permitted	0.639			0.681			0.065			0.065		
Satd. Flow (perm)	1190	1652	0	1244	1626	0	121	3282	1538	120	3252	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			109				158			22
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		469.5			1371.7			378.1			417.5	
Travel Time (s)		28.2			82.3			17.0			18.8	
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
Lane Group Flow (vph)	27	109	0	380	136	0	54	1630	190	136	1630	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	17.2	17.2		17.2	17.2		11.0	28.6	28.6	11.0	28.6	28.6
Total Split (s)	42.7	42.7	0.0	42.7	42.7	0.0	11.0	66.3	66.3	11.0	66.3	66.3
Total Split (%)	35.6%	35.6%	0.0%	35.6%	35.6%	0.0%	9.2%	55.3%	55.3%	9.2%	55.3%	55.3%
Maximum Green (s)	36.2	36.2		36.2	36.2		8.0	58.4	58.4	8.0	58.4	58.4
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	37.7	37.7		37.7	37.7		66.0	61.3	61.3	69.1	64.3	64.3
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.55	0.51	0.51	0.58	0.54	0.54
v/c Ratio	0.07	0.19		0.97	0.23		0.41	0.97	0.22	0.90	0.94	0.03
Control Delay	29.7	10.7		80.4	9.6		22.1	33.6	4.5	75.2	38.0	6.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	10.7		80.4	9.6		22.1	33.6	4.5	75.2	38.0	6.7
LOS	C	B		F	A		C	C	A	E	D	A
Approach Delay		14.5			61.8			30.3			40.3	
Approach LOS		B			E			C			D	

Intersection Summary























Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 20 (17%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 37.7	Intersection LOS: D
Intersection Capacity Utilization 86.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: New East West Road & Highway # 6

 ø1	 ø2	 ø4
11 s	66.3 s	42.7 s
 ø5	 ø6	 ø8
11 s	66.3 s	42.7 s

HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















AM Peak Hour
Future Traffic Volumes (Option 5)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1736	1626		1770	3282	1538	1752	3252	1583
Flt Permitted	0.64	1.00		0.68	1.00		0.07	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1191	1653		1244	1626		122	3282	1538	116	3252	1583
Volume (vph)	25	25	75	350	25	100	50	1500	175	125	1500	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	380	27	109	54	1630	190	136	1630	27
RTOR Reduction (vph)	0	56	0	0	75	0	0	0	77	0	0	10
Lane Group Flow (vph)	27	53	0	380	61	0	54	1630	113	136	1630	17
Heavy Vehicles (%)	2%	2%	2%	4%	2%	3%	2%	10%	5%	3%	11%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	36.2	36.2		36.2	36.2		64.0	58.4	58.4	68.8	60.8	60.8
Effective Green, g (s)	37.7	37.7		37.7	37.7		64.9	61.3	61.3	69.7	63.7	63.7
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.54	0.51	0.51	0.58	0.53	0.53
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	374	519		391	511		115	1677	786	149	1726	840
v/s Ratio Prot		0.03			0.04		0.01	0.50		c0.05	c0.50	
v/s Ratio Perm	0.02			c0.31			0.24		0.07	0.48		0.01
v/c Ratio	0.07	0.10		0.97	0.12		0.47	0.97	0.14	0.91	0.94	0.02
Uniform Delay, d1	28.9	29.2		40.6	29.3		22.2	28.5	15.5	29.8	26.5	13.3
Progression Factor	1.00	1.00		1.00	1.00		1.53	0.71	1.10	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1		37.9	0.1		2.0	12.2	0.2	48.4	12.0	0.0
Delay (s)	29.0	29.2		78.5	29.4		36.0	32.6	17.3	78.2	38.5	13.4
Level of Service	C	C		E	C		D	C	B	E	D	B
Approach Delay (s)		29.2			65.6			31.1			41.1	
Approach LOS		C			E			C			D	
Intersection Summary												
HCM Average Control Delay			39.3				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			10.0		
Intersection Capacity Utilization			86.9%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 5)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Fl _t Permitted	0.950				0.059	
Satd. Flow (perm)	1736	1568	3282	1538	109	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		54		245		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			378.1
Travel Time (s)	82.4		26.8			17.0
Volume (vph)	175	50	1650	225	50	1850
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Adj. Flow (vph)	190	54	1793	245	54	2011
Lane Group Flow (vph)	190	54	1793	245	54	2011
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	84.0	84.0	10.0	94.0
Total Split (%)	21.7%	21.7%	70.0%	70.0%	8.3%	78.3%
Maximum Green (s)	19.5	19.5	76.1	76.1	7.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	18.3	18.3	84.9	84.9	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.71	0.71	0.76	0.76
v/c Ratio	0.72	0.19	0.77	0.21	0.42	0.81
Control Delay	63.6	12.8	15.5	1.3	13.2	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.6	12.8	15.5	1.3	13.2	5.8
LOS	E	B	B	A	B	A
Approach Delay	52.4		13.8			6.0
Approach LOS	D		B			A

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 19 (16%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
10: Parkside Drive & Highway # 6

AM Peak Hour
Future Traffic Volumes (Option 5)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1736	1568	3282	1538	1752	3252
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1736	1568	3282	1538	133	3252
Volume (vph)	175	50	1650	225	50	1850
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	54	1793	245	54	2011
RTOR Reduction (vph)	0	46	0	73	0	0
Lane Group Flow (vph)	190	8	1793	172	54	2011
Heavy Vehicles (%)	4%	3%	10%	5%	3%	11%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.8	16.8	81.4	81.4	88.8	88.8
Effective Green, g (s)	18.3	18.3	84.3	84.3	91.7	91.7
Actuated g/C Ratio	0.15	0.15	0.70	0.70	0.76	0.76
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	265	239	2306	1080	134	2485
v/s Ratio Prot	c0.11		0.55		0.01	c0.62
v/s Ratio Perm		0.01		0.11	0.30	
v/c Ratio	0.72	0.03	0.78	0.16	0.40	0.81
Uniform Delay, d1	48.4	43.3	11.7	6.0	11.8	8.7
Progression Factor	1.00	1.00	1.00	1.00	2.35	0.47
Incremental Delay, d2	8.9	0.1	2.7	0.3	0.3	1.2
Delay (s)	57.3	43.4	14.4	6.3	28.0	5.3
Level of Service	E	D	B	A	C	A
Approach Delay (s)	54.2		13.4			5.9
Approach LOS	D		B			A
Intersection Summary						
HCM Average Control Delay			12.1	HCM Level of Service		B
HCM Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			69.2%	ICU Level of Service		C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 1)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.871				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1770	1545	0	1770	3312	1583	1752	3343	1583
Flt Permitted	0.504			0.648			0.061			0.057		
Satd. Flow (perm)	939	1652	0	1207	1545	0	114	3312	1583	105	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			158				432			23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		410.9			1387.5			880.2			684.6	
Travel Time (s)		24.7			83.3			39.6			30.8	
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
Lane Group Flow (vph)	27	109	0	299	190	0	136	1576	462	163	1929	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5		9.0	27.9	27.9	9.0	27.9	27.9
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	10.0	70.0	70.0	15.0	75.0	75.0
Total Split (%)	29.2%	29.2%	0.0%	29.2%	29.2%	0.0%	8.3%	58.3%	58.3%	12.5%	62.5%	62.5%
Maximum Green (s)	28.5	28.5		28.5	28.5		7.0	62.1	62.1	12.0	67.1	67.1
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.1	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
v/c Ratio	0.11	0.22		0.96	0.37		0.89	0.85	0.43	0.80	0.98	0.03
Control Delay	35.6	12.8		86.1	10.7		62.0	14.8	2.1	53.1	39.4	4.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	12.8		86.1	10.7		62.0	14.8	2.1	53.1	39.4	4.5
LOS	D	B		F	B		E	B	A	D	D	A
Approach Delay		17.3			56.8			15.0			40.0	
Approach LOS		B			E			B			D	

Intersection Summary























Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 84 (70%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 30.0	Intersection LOS: C
Intersection Capacity Utilization 87.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 5: New East West Road & Highway # 6

















HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 1)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1770	1545		1770	3312	1583	1752	3343	1583
Flt Permitted	0.50	1.00		0.65	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	939	1653		1207	1545		111	3312	1583	109	3343	1583
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
RTOR Reduction (vph)	0	61	0	0	117	0	0	0	190	0	0	9
Lane Group Flow (vph)	27	48	0	299	73	0	136	1576	272	163	1929	18
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	28.5	28.5		28.5	28.5		70.4	63.4	63.4	77.1	67.1	67.1
Effective Green, g (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.7	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	427		312	399		151	1857	888	206	1978	937
v/s Ratio Prot		0.03			0.05		0.05	0.48		c0.06	c0.58	
v/s Ratio Perm	0.03			c0.25			0.51		0.17	0.47		0.01
v/c Ratio	0.11	0.11		0.96	0.18		0.90	0.85	0.31	0.79	0.98	0.02
Uniform Delay, d1	34.0	34.0		43.9	34.6		31.4	22.1	14.0	31.5	23.7	10.1
Progression Factor	1.00	1.00		1.00	1.00		1.62	0.55	0.90	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		39.4	0.2		23.5	2.1	0.4	18.4	15.2	0.0
Delay (s)	34.2	34.1		83.2	34.9		74.5	14.2	13.0	50.0	38.8	10.2
Level of Service	C	C		F	C		E	B	B	D	D	B
Approach Delay (s)		34.1			64.4			17.7			39.3	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			32.1				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			87.9%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 1)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Flt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.950				0.047	
Satd. Flow (perm)	1770	1495	3312	1583	87	3343
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		79		217		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			880.2
Travel Time (s)	82.4		26.8			39.6
Volume (vph)	250	75	1925	200	75	2075
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Adj. Flow (vph)	272	82	2092	217	82	2255
Lane Group Flow (vph)	272	82	2092	217	82	2255
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	86.0	86.0	8.0	94.0
Total Split (%)	21.7%	21.7%	71.7%	71.7%	6.7%	78.3%
Maximum Green (s)	19.5	19.5	78.1	78.1	5.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	20.2	20.2	81.0	81.0	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.68	0.68	0.77	0.73
v/c Ratio	0.91	0.26	0.94	0.19	0.55	0.93
Control Delay	83.4	12.3	27.5	1.4	23.2	19.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	12.3	27.5	1.4	23.2	19.8
LOS	F	B	C	A	C	B
Approach Delay	66.9		25.1			19.9
Approach LOS	E		C			B

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 24 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 25.6	Intersection LOS: C
Intersection Capacity Utilization 84.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

PM Peak Hour
 Future Traffic Volumes (Option 1)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1770	1495	3312	1583	85	3343
Volume (vph)	250	75	1925	200	75	2075
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	82	2092	217	82	2255
RTOR Reduction (vph)	0	66	0	72	0	0
Lane Group Flow (vph)	272	16	2092	145	82	2255
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	19.2	19.2	79.4	79.4	86.4	86.4
Effective Green, g (s)	20.2	20.2	80.4	80.4	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.67	0.67	0.77	0.73
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	298	252	2219	1061	135	2435
v/s Ratio Prot	c0.15		0.63		0.03	c0.67
v/s Ratio Perm		0.01		0.09	0.44	
v/c Ratio	0.91	0.06	0.94	0.14	0.61	0.93
Uniform Delay, d1	49.0	42.0	17.7	7.2	23.9	13.6
Progression Factor	1.00	1.00	1.00	1.00	1.31	1.17
Incremental Delay, d2	30.5	0.1	9.7	0.3	1.9	3.0
Delay (s)	79.5	42.1	27.4	7.5	33.3	18.9
Level of Service	E	D	C	A	C	B
Approach Delay (s)	70.8		25.6			19.4
Approach LOS	E		C			B
Intersection Summary						
HCM Average Control Delay			25.9	HCM Level of Service		C
HCM Volume to Capacity ratio			0.92			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		12.4
Intersection Capacity Utilization			84.9%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 2)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.871				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1770	1545	0	1770	3312	1583	1752	3343	1583
Flt Permitted	0.504			0.648			0.061			0.057		
Satd. Flow (perm)	939	1652	0	1207	1545	0	114	3312	1583	105	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			158				432			23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		410.9			1378.0			730.2			684.6	
Travel Time (s)		24.7			82.7			32.9			30.8	
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
Lane Group Flow (vph)	27	109	0	299	190	0	136	1576	462	163	1929	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5		9.0	27.9	27.9	9.0	27.9	27.9
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	10.0	70.0	70.0	15.0	75.0	75.0
Total Split (%)	29.2%	29.2%	0.0%	29.2%	29.2%	0.0%	8.3%	58.3%	58.3%	12.5%	62.5%	62.5%
Maximum Green (s)	28.5	28.5		28.5	28.5		7.0	62.1	62.1	12.0	67.1	67.1
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.1	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
v/c Ratio	0.11	0.22		0.96	0.37		0.89	0.85	0.43	0.80	0.98	0.03
Control Delay	35.6	12.8		86.1	10.7		60.0	12.9	1.2	53.1	39.4	4.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	12.8		86.1	10.7		60.0	12.9	1.2	53.1	39.4	4.5
LOS	D	B		F	B		E	B	A	D	D	A
Approach Delay		17.3			56.8			13.4			40.0	
Approach LOS		B			E			B			D	

Intersection Summary























Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	56 (47%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	29.3
Intersection LOS:	C
Intersection Capacity Utilization	87.9%
ICU Level of Service	E
Analysis Period (min)	15

Splits and Phases: 5: New East West Road & Highway # 6



HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















PM Peak Hour
Future Traffic Volumes (Option 2)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1770	1545		1770	3312	1583	1752	3343	1583
Flt Permitted	0.50	1.00		0.65	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	939	1653		1207	1545		111	3312	1583	109	3343	1583
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
RTOR Reduction (vph)	0	61	0	0	117	0	0	0	190	0	0	9
Lane Group Flow (vph)	27	48	0	299	73	0	136	1576	272	163	1929	18
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	28.5	28.5		28.5	28.5		70.4	63.4	63.4	77.1	67.1	67.1
Effective Green, g (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.7	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	427		312	399		151	1857	888	206	1978	937
v/s Ratio Prot		0.03			0.05		0.05	0.48		c0.06	c0.58	
v/s Ratio Perm	0.03			c0.25			0.51		0.17	0.47		0.01
v/c Ratio	0.11	0.11		0.96	0.18		0.90	0.85	0.31	0.79	0.98	0.02
Uniform Delay, d1	34.0	34.0		43.9	34.6		31.4	22.1	14.0	31.5	23.7	10.1
Progression Factor	1.00	1.00		1.00	1.00		1.51	0.47	0.39	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		39.4	0.2		23.5	2.1	0.4	18.4	15.2	0.0
Delay (s)	34.2	34.1		83.2	34.9		71.1	12.4	5.8	50.0	38.8	10.2
Level of Service	C	C		F	C		E	B	A	D	D	B
Approach Delay (s)		34.1			64.4			14.6			39.3	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			30.8				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			87.9%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 2)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Fl _t Permitted	0.950				0.047	
Satd. Flow (perm)	1770	1495	3312	1583	87	3343
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		79		217		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			730.2
Travel Time (s)	82.4		26.8			32.9
Volume (vph)	250	75	1925	200	75	2075
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Adj. Flow (vph)	272	82	2092	217	82	2255
Lane Group Flow (vph)	272	82	2092	217	82	2255
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	86.0	86.0	8.0	94.0
Total Split (%)	21.7%	21.7%	71.7%	71.7%	6.7%	78.3%
Maximum Green (s)	19.5	19.5	78.1	78.1	5.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	20.2	20.2	81.0	81.0	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.68	0.68	0.77	0.73
v/c Ratio	0.91	0.26	0.94	0.19	0.55	0.93
Control Delay	83.4	12.3	27.5	1.4	16.7	26.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	12.3	27.5	1.4	16.7	26.2
LOS	F	B	C	A	B	C
Approach Delay	66.9		25.1			25.9
Approach LOS	E		C			C

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 24 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 28.4	Intersection LOS: C
Intersection Capacity Utilization 84.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

PM Peak Hour
 Future Traffic Volumes (Option 2)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1770	1495	3312	1583	85	3343
Volume (vph)	250	75	1925	200	75	2075
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	82	2092	217	82	2255
RTOR Reduction (vph)	0	66	0	72	0	0
Lane Group Flow (vph)	272	16	2092	145	82	2255
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	19.2	19.2	79.4	79.4	86.4	86.4
Effective Green, g (s)	20.2	20.2	80.4	80.4	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.67	0.67	0.77	0.73
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	298	252	2219	1061	135	2435
v/s Ratio Prot	c0.15		0.63		0.03	c0.67
v/s Ratio Perm		0.01		0.09	0.44	
v/c Ratio	0.91	0.06	0.94	0.14	0.61	0.93
Uniform Delay, d1	49.0	42.0	17.7	7.2	23.9	13.6
Progression Factor	1.00	1.00	1.00	1.00	0.85	1.64
Incremental Delay, d2	30.5	0.1	9.7	0.3	1.9	3.0
Delay (s)	79.5	42.1	27.4	7.5	22.2	25.3
Level of Service	E	D	C	A	C	C
Approach Delay (s)	70.8		25.6			25.2
Approach LOS	E		C			C

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 3)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.871				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1770	1545	0	1770	3312	1583	1752	3343	1583
Flt Permitted	0.504			0.648			0.061			0.057		
Satd. Flow (perm)	939	1652	0	1207	1545	0	114	3312	1583	105	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			158				432			23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		410.9			1370.8			474.0			684.6	
Travel Time (s)		24.7			82.2			21.3			30.8	
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
Lane Group Flow (vph)	27	109	0	299	190	0	136	1576	462	163	1929	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5		9.0	27.9	27.9	9.0	27.9	27.9
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	10.0	70.0	70.0	15.0	75.0	75.0
Total Split (%)	29.2%	29.2%	0.0%	29.2%	29.2%	0.0%	8.3%	58.3%	58.3%	12.5%	62.5%	62.5%
Maximum Green (s)	28.5	28.5		28.5	28.5		7.0	62.1	62.1	12.0	67.1	67.1
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.1	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
v/c Ratio	0.11	0.22		0.96	0.37		0.89	0.85	0.43	0.80	0.98	0.03
Control Delay	35.6	12.8		86.1	10.7		60.1	12.7	1.1	53.1	39.4	4.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	12.8		86.1	10.7		60.1	12.7	1.1	53.1	39.4	4.5
LOS	D	B		F	B		E	B	A	D	D	A
Approach Delay		17.3			56.8			13.2			40.0	
Approach LOS		B			E			B			D	

Intersection Summary























Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	45 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	29.2
Intersection LOS:	C
Intersection Capacity Utilization	87.9%
ICU Level of Service	E
Analysis Period (min)	15

Splits and Phases: 5: New East West Road & Highway # 6



HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















PM Peak Hour
Future Traffic Volumes (Option 3)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1770	1545		1770	3312	1583	1752	3343	1583
Flt Permitted	0.50	1.00		0.65	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	939	1653		1207	1545		111	3312	1583	109	3343	1583
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
RTOR Reduction (vph)	0	61	0	0	117	0	0	0	190	0	0	9
Lane Group Flow (vph)	27	48	0	299	73	0	136	1576	272	163	1929	18
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	28.5	28.5		28.5	28.5		70.4	63.4	63.4	77.1	67.1	67.1
Effective Green, g (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.7	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	427		312	399		151	1857	888	206	1978	937
v/s Ratio Prot		0.03			0.05		0.05	0.48		c0.06	c0.58	
v/s Ratio Perm	0.03			c0.25			0.51		0.17	0.47		0.01
v/c Ratio	0.11	0.11		0.96	0.18		0.90	0.85	0.31	0.79	0.98	0.02
Uniform Delay, d1	34.0	34.0		43.9	34.6		31.4	22.1	14.0	31.5	23.7	10.1
Progression Factor	1.00	1.00		1.00	1.00		1.52	0.46	0.35	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		39.4	0.2		23.5	2.1	0.4	18.4	15.2	0.0
Delay (s)	34.2	34.1		83.2	34.9		71.3	12.2	5.3	50.0	38.8	10.2
Level of Service	C	C		F	C		E	B	A	D	D	B
Approach Delay (s)		34.1			64.4			14.4			39.3	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			30.7				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			87.9%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 3)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Flt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.950				0.047	
Satd. Flow (perm)	1770	1495	3312	1583	87	3343
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		79		217		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			474.0
Travel Time (s)	82.4		26.8			21.3
Volume (vph)	250	75	1925	200	75	2075
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Adj. Flow (vph)	272	82	2092	217	82	2255
Lane Group Flow (vph)	272	82	2092	217	82	2255
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	86.0	86.0	8.0	94.0
Total Split (%)	21.7%	21.7%	71.7%	71.7%	6.7%	78.3%
Maximum Green (s)	19.5	19.5	78.1	78.1	5.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	20.2	20.2	81.0	81.0	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.68	0.68	0.77	0.73
v/c Ratio	0.91	0.26	0.94	0.19	0.55	0.93
Control Delay	83.4	12.3	27.5	1.4	21.8	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	12.3	27.5	1.4	21.8	17.2
LOS	F	B	C	A	C	B
Approach Delay	66.9		25.1			17.3
Approach LOS	E		C			B

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 24 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 24.4	Intersection LOS: C
Intersection Capacity Utilization 84.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

PM Peak Hour
 Future Traffic Volumes (Option 3)























						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1770	1495	3312	1583	85	3343
Volume (vph)	250	75	1925	200	75	2075
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	82	2092	217	82	2255
RTOR Reduction (vph)	0	66	0	72	0	0
Lane Group Flow (vph)	272	16	2092	145	82	2255
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Actuated Green, G (s)	19.2	19.2	79.4	79.4	86.4	86.4
Effective Green, g (s)	20.2	20.2	80.4	80.4	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.67	0.67	0.77	0.73
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	298	252	2219	1061	135	2435
v/s Ratio Prot	c0.15		0.63		0.03	c0.67
v/s Ratio Perm		0.01		0.09	0.44	
v/c Ratio	0.91	0.06	0.94	0.14	0.61	0.93
Uniform Delay, d1	49.0	42.0	17.7	7.2	23.9	13.6
Progression Factor	1.00	1.00	1.00	1.00	1.21	0.98
Incremental Delay, d2	30.5	0.1	9.7	0.3	1.9	3.0
Delay (s)	79.5	42.1	27.4	7.5	30.9	16.3
Level of Service	E	D	C	A	C	B
Approach Delay (s)	70.8		25.6			16.8
Approach LOS	E		C			B

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.4
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 4)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Fr _t		0.887			0.871				0.850			0.850
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1770	1545	0	1770	3312	1583	1752	3343	1583
Fl _t Permitted	0.504			0.648			0.061			0.057		
Satd. Flow (perm)	939	1652	0	1207	1545	0	114	3312	1583	105	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			158				432			23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		410.9			1372.8			430.1			684.6	
Travel Time (s)		24.7			82.4			19.4			30.8	
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
Lane Group Flow (vph)	27	109	0	299	190	0	136	1576	462	163	1929	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5		9.0	27.9	27.9	9.0	27.9	27.9
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	10.0	70.0	70.0	15.0	75.0	75.0
Total Split (%)	29.2%	29.2%	0.0%	29.2%	29.2%	0.0%	8.3%	58.3%	58.3%	12.5%	62.5%	62.5%
Maximum Green (s)	28.5	28.5		28.5	28.5		7.0	62.1	62.1	12.0	67.1	67.1
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.1	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
v/c Ratio	0.11	0.22		0.96	0.37		0.89	0.85	0.43	0.80	0.98	0.03
Control Delay	35.6	12.8		86.1	10.7		60.1	12.7	1.1	53.1	39.4	4.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	12.8		86.1	10.7		60.1	12.7	1.1	53.1	39.4	4.5
LOS	D	B		F	B		E	B	A	D	D	A
Approach Delay		17.3			56.8			13.2			40.0	
Approach LOS		B			E			B			D	

Intersection Summary

























Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	43 (36%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	29.2
Intersection LOS:	C
Intersection Capacity Utilization	87.9%
ICU Level of Service	E
Analysis Period (min)	15

Splits and Phases: 5: New East West Road & Highway # 6



HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















PM Peak Hour
Future Traffic Volumes (Option 4)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								 			 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1770	1545		1770	3312	1583	1752	3343	1583
Flt Permitted	0.50	1.00		0.65	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	939	1653		1207	1545		111	3312	1583	109	3343	1583
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
RTOR Reduction (vph)	0	61	0	0	117	0	0	0	190	0	0	9
Lane Group Flow (vph)	27	48	0	299	73	0	136	1576	272	163	1929	18
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	28.5	28.5		28.5	28.5		70.4	63.4	63.4	77.1	67.1	67.1
Effective Green, g (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.7	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	427		312	399		151	1857	888	206	1978	937
v/s Ratio Prot		0.03			0.05		0.05	0.48		c0.06	c0.58	
v/s Ratio Perm	0.03			c0.25			0.51		0.17	0.47		0.01
v/c Ratio	0.11	0.11		0.96	0.18		0.90	0.85	0.31	0.79	0.98	0.02
Uniform Delay, d1	34.0	34.0		43.9	34.6		31.4	22.1	14.0	31.5	23.7	10.1
Progression Factor	1.00	1.00		1.00	1.00		1.52	0.46	0.36	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		39.4	0.2		23.5	2.1	0.4	18.4	15.2	0.0
Delay (s)	34.2	34.1		83.2	34.9		71.2	12.2	5.4	50.0	38.8	10.2
Level of Service	C	C		F	C		E	B	A	D	D	B
Approach Delay (s)		34.1			64.4			14.4			39.3	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			30.7				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			87.9%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 4)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Fl _t Permitted	0.950				0.047	
Satd. Flow (perm)	1770	1495	3312	1583	87	3343
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		79		217		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			430.1
Travel Time (s)	82.4		26.8			19.4
Volume (vph)	250	75	1925	200	75	2075
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Adj. Flow (vph)	272	82	2092	217	82	2255
Lane Group Flow (vph)	272	82	2092	217	82	2255
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	86.0	86.0	8.0	94.0
Total Split (%)	21.7%	21.7%	71.7%	71.7%	6.7%	78.3%
Maximum Green (s)	19.5	19.5	78.1	78.1	5.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	20.2	20.2	81.0	81.0	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.68	0.68	0.77	0.73
v/c Ratio	0.91	0.26	0.94	0.19	0.55	0.93
Control Delay	83.4	12.3	27.5	1.4	22.8	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	12.3	27.5	1.4	22.8	15.6
LOS	F	B	C	A	C	B
Approach Delay	66.9		25.1			15.9
Approach LOS	E		C			B

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 24 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 23.7	Intersection LOS: C
Intersection Capacity Utilization 84.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

PM Peak Hour
 Future Traffic Volumes (Option 4)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1770	1495	3312	1583	85	3343
Volume (vph)	250	75	1925	200	75	2075
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	82	2092	217	82	2255
RTOR Reduction (vph)	0	66	0	72	0	0
Lane Group Flow (vph)	272	16	2092	145	82	2255
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	19.2	19.2	79.4	79.4	86.4	86.4
Effective Green, g (s)	20.2	20.2	80.4	80.4	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.67	0.67	0.77	0.73
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	298	252	2219	1061	135	2435
v/s Ratio Prot	c0.15		0.63		0.03	c0.67
v/s Ratio Perm		0.01		0.09	0.44	
v/c Ratio	0.91	0.06	0.94	0.14	0.61	0.93
Uniform Delay, d1	49.0	42.0	17.7	7.2	23.9	13.6
Progression Factor	1.00	1.00	1.00	1.00	1.29	0.86
Incremental Delay, d2	30.5	0.1	9.7	0.3	1.9	3.0
Delay (s)	79.5	42.1	27.4	7.5	32.6	14.7
Level of Service	E	D	C	A	C	B
Approach Delay (s)	70.8		25.6			15.3
Approach LOS	E		C			B
Intersection Summary						
HCM Average Control Delay			24.0	HCM Level of Service		C
HCM Volume to Capacity ratio			0.92			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		12.4
Intersection Capacity Utilization			84.9%	ICU Level of Service		E
Analysis Period (min)			15			

c Critical Lane Group

Lanes, Volumes, Timings
5: New East West Road & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 5)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	155.0		85.0	170.0		85.0
Storage Lanes	1		0	1		0	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (m)	15.0	15.0		15.0	15.0		15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.887			0.871				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1652	0	1770	1545	0	1770	3312	1583	1752	3343	1583
Flt Permitted	0.504			0.648			0.061			0.057		
Satd. Flow (perm)	939	1652	0	1207	1545	0	114	3312	1583	105	3343	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			158				432			23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)		60			60			80			80	
Link Distance (m)		410.9			1371.4			378.0			684.6	
Travel Time (s)		24.7			82.3			17.0			30.8	
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
Lane Group Flow (vph)	27	109	0	299	190	0	136	1576	462	163	1929	27
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phases	4	4		8	8		5	2	2	1	6	6
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	16.5	16.5		16.5	16.5		9.0	27.9	27.9	9.0	27.9	27.9
Total Split (s)	35.0	35.0	0.0	35.0	35.0	0.0	10.0	70.0	70.0	15.0	75.0	75.0
Total Split (%)	29.2%	29.2%	0.0%	29.2%	29.2%	0.0%	8.3%	58.3%	58.3%	12.5%	62.5%	62.5%
Maximum Green (s)	28.5	28.5		28.5	28.5		7.0	62.1	62.1	12.0	67.1	67.1
Yellow Time (s)	4.5	4.5		4.5	4.5		3.0	5.9	5.9	3.0	5.9	5.9
All-Red Time (s)	2.0	2.0		2.0	2.0		0.0	2.0	2.0	0.0	2.0	2.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.1	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
v/c Ratio	0.11	0.22		0.96	0.37		0.89	0.85	0.43	0.80	0.98	0.03
Control Delay	35.6	12.8		86.1	10.7		60.3	12.6	1.1	53.1	39.4	4.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.6	12.8		86.1	10.7		60.3	12.6	1.1	53.1	39.4	4.5
LOS	D	B		F	B		E	B	A	D	D	A
Approach Delay		17.3			56.8			13.1			40.0	
Approach LOS		B			E			B			D	

Intersection Summary























Area Type:	Other	
Cycle Length:	120	
Actuated Cycle Length:	120	
Offset:	41 (34%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle:	100	
Control Type:	Actuated-Coordinated	
Maximum v/c Ratio:	0.98	
Intersection Signal Delay:	29.2	Intersection LOS: C
Intersection Capacity Utilization	87.9%	ICU Level of Service E
Analysis Period (min)	15	

Splits and Phases: 5: New East West Road & Highway # 6



HCM Signalized Intersection Capacity Analysis
5: New East West Road & Highway # 6















PM Peak Hour
Future Traffic Volumes (Option 5)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.87		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1653		1770	1545		1770	3312	1583	1752	3343	1583
Flt Permitted	0.50	1.00		0.65	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	939	1653		1207	1545		111	3312	1583	109	3343	1583
Volume (vph)	25	25	75	275	25	150	125	1450	425	150	1775	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	82	299	27	163	136	1576	462	163	1929	27
RTOR Reduction (vph)	0	61	0	0	117	0	0	0	190	0	0	9
Lane Group Flow (vph)	27	48	0	299	73	0	136	1576	272	163	1929	18
Heavy Vehicles (%)	2%	2%	2%	2%	2%	8%	2%	9%	2%	3%	8%	2%
Turn Type	Perm			Perm			pm+pt		Perm	pm+pt		Perm
Protected Phases		4			8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	28.5	28.5		28.5	28.5		70.4	63.4	63.4	77.1	67.1	67.1
Effective Green, g (s)	31.0	31.0		31.0	31.0		73.3	67.3	67.3	80.7	71.0	71.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.61	0.56	0.56	0.67	0.59	0.59
Clearance Time (s)	6.5	6.5		6.5	6.5		3.0	7.9	7.9	3.0	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	427		312	399		151	1857	888	206	1978	937
v/s Ratio Prot		0.03			0.05		0.05	0.48		c0.06	c0.58	
v/s Ratio Perm	0.03			c0.25			0.51		0.17	0.47		0.01
v/c Ratio	0.11	0.11		0.96	0.18		0.90	0.85	0.31	0.79	0.98	0.02
Uniform Delay, d1	34.0	34.0		43.9	34.6		31.4	22.1	14.0	31.5	23.7	10.1
Progression Factor	1.00	1.00		1.00	1.00		1.53	0.45	0.34	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.1		39.4	0.2		23.5	2.1	0.4	18.4	15.2	0.0
Delay (s)	34.2	34.1		83.2	34.9		71.6	12.0	5.1	50.0	38.8	10.2
Level of Service	C	C		F	C		E	B	A	D	D	B
Approach Delay (s)		34.1			64.4			14.3			39.3	
Approach LOS		C			E			B			D	
Intersection Summary												
HCM Average Control Delay			30.6				HCM Level of Service			C		
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			87.9%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings
10: Parkside Drive & Highway # 6

PM Peak Hour
Future Traffic Volumes (Option 5)

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	115.0	0.0		105.0	132.5	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Leading Detector (m)	15.0	15.0	15.0	15.0	15.0	15.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turning Speed (k/h)	25	15		15	25	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t		0.850		0.850		
Fl _t Protected	0.950				0.950	
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Fl _t Permitted	0.950				0.047	
Satd. Flow (perm)	1770	1495	3312	1583	87	3343
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		79		217		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (k/h)	60		80			80
Link Distance (m)	1373.4		596.0			378.0
Travel Time (s)	82.4		26.8			17.0
Volume (vph)	250	75	1925	200	75	2075
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Adj. Flow (vph)	272	82	2092	217	82	2255
Lane Group Flow (vph)	272	82	2092	217	82	2255
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	20.0	20.0	5.0	20.0
Minimum Split (s)	16.5	16.5	27.9	27.9	8.0	27.9
Total Split (s)	26.0	26.0	86.0	86.0	8.0	94.0
Total Split (%)	21.7%	21.7%	71.7%	71.7%	6.7%	78.3%
Maximum Green (s)	19.5	19.5	78.1	78.1	5.0	86.1
Yellow Time (s)	4.5	4.5	5.9	5.9	3.0	5.9
All-Red Time (s)	2.0	2.0	2.0	2.0	0.0	2.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Recall Mode	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	20.2	20.2	81.0	81.0	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.68	0.68	0.77	0.73
v/c Ratio	0.91	0.26	0.94	0.19	0.55	0.93
Control Delay	83.4	12.3	27.5	1.4	23.9	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	12.3	27.5	1.4	23.9	14.1
LOS	F	B	C	A	C	B
Approach Delay	66.9		25.1			14.4
Approach LOS	E		C			B

Intersection Summary















Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 24 (20%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 100	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 23.1	Intersection LOS: C
Intersection Capacity Utilization 84.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 10: Parkside Drive & Highway # 6



HCM Signalized Intersection Capacity Analysis
 10: Parkside Drive & Highway # 6

PM Peak Hour
 Future Traffic Volumes (Option 5)

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	6.9	6.9	2.0	6.9
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1495	3312	1583	1752	3343
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1770	1495	3312	1583	85	3343
Volume (vph)	250	75	1925	200	75	2075
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	82	2092	217	82	2255
RTOR Reduction (vph)	0	66	0	72	0	0
Lane Group Flow (vph)	272	16	2092	145	82	2255
Heavy Vehicles (%)	2%	8%	9%	2%	3%	8%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	19.2	19.2	79.4	79.4	86.4	86.4
Effective Green, g (s)	20.2	20.2	80.4	80.4	92.3	87.4
Actuated g/C Ratio	0.17	0.17	0.67	0.67	0.77	0.73
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	298	252	2219	1061	135	2435
v/s Ratio Prot	c0.15		0.63		0.03	c0.67
v/s Ratio Perm		0.01		0.09	0.44	
v/c Ratio	0.91	0.06	0.94	0.14	0.61	0.93
Uniform Delay, d1	49.0	42.0	17.7	7.2	23.9	13.6
Progression Factor	1.00	1.00	1.00	1.00	1.36	0.75
Incremental Delay, d2	30.5	0.1	9.7	0.3	1.9	3.0
Delay (s)	79.5	42.1	27.4	7.5	34.5	13.2
Level of Service	E	D	C	A	C	B
Approach Delay (s)	70.8		25.6			13.9
Approach LOS	E		C			B
Intersection Summary						
HCM Average Control Delay			23.3	HCM Level of Service		C
HCM Volume to Capacity ratio			0.92			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		12.4
Intersection Capacity Utilization			84.9%	ICU Level of Service		E
Analysis Period (min)			15			

c Critical Lane Group

Attachment 4
SimTraffic Queue Reports

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	10.4	26.2	170.7	63.8	162.5	336.4	294.2	92.9	64.3	405.1	261.4	7.9
Average Queue (m)	2.0	9.9	121.3	19.1	23.0	159.6	156.2	32.3	34.7	159.2	151.2	2.5
95th Queue (m)	6.4	23.2	159.9	43.9	85.7	299.0	285.9	91.7	62.8	299.0	237.9	8.4
Link Distance (m)	441.7	441.7	1368.5	1368.5		857.0	857.0			394.7	394.7	
Upstream Blk Time (%)										0		
Queuing Penalty (veh)										0		
Storage Bay Dist (m)					155.0			85.0	170.0			85.0
Storage Blk Time (%)						7	18	0		4	20	
Queuing Penalty (veh)						4	35	0		5	5	

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	122.8	159.1	596.6	590.8	112.8	21.4	60.1	84.1
Average Queue (m)	55.4	34.0	321.0	99.2	16.5	10.7	28.2	33.9
95th Queue (m)	112.4	110.6	741.1	324.6	59.8	20.3	54.2	68.5
Link Distance (m)		1355.9	586.2	586.2			857.0	857.0
Upstream Blk Time (%)			2	0				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)	6			1				
Queuing Penalty (veh)	3			4				

Network Summary

Network wide Queuing Penalty: 57

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	10.4	25.2	181.7	147.0	162.5	350.5	317.7	98.5	64.5	405.2	252.4	8.2
Average Queue (m)	1.7	8.9	150.9	43.9	34.7	162.1	170.2	35.7	35.3	148.8	145.5	2.6
95th Queue (m)	6.1	22.1	187.6	125.0	117.9	286.5	281.6	94.4	63.4	278.9	228.5	8.7
Link Distance (m)	441.7	441.7	1362.6	1362.6		707.7	707.7			394.8	394.8	
Upstream Blk Time (%)										0		
Queuing Penalty (veh)										0		
Storage Bay Dist (m)					155.0			85.0	170.0			85.0
Storage Blk Time (%)						11	29	0		2	19	
Queuing Penalty (veh)						6	55	1		3	5	

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	82.5	24.5	596.6	590.8	110.2	140.2	157.7	177.5
Average Queue (m)	44.9	12.0	281.9	102.1	17.3	27.0	119.3	128.8
95th Queue (m)	80.1	21.4	700.2	321.4	59.5	100.7	157.8	166.7
Link Distance (m)		1355.9	586.2	586.2			707.7	707.7
Upstream Blk Time (%)			2	0				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)				1	0		3	
Queuing Penalty (veh)				3	0		2	

Network Summary

Network wide Queuing Penalty: 75

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	16.9	25.8	218.6	188.3	18.9	319.9	279.6	91.3	177.1	405.2	375.3	8.2
Average Queue (m)	2.2	8.7	189.8	99.7	10.2	144.2	132.1	25.5	45.1	198.1	188.5	3.0
95th Queue (m)	9.0	22.3	221.9	220.3	19.5	275.1	250.9	69.1	109.6	380.4	338.5	9.2
Link Distance (m)	441.7	441.7	1356.1	1356.1		453.4	453.4			394.9	394.9	
Upstream Blk Time (%)												0
Queuing Penalty (veh)												0
Storage Bay Dist (m)					155.0			85.0	170.0			85.0
Storage Blk Time (%)						6	24	0		12	27	
Queuing Penalty (veh)						3	45	0		17	7	

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	95.2	19.3	596.6	590.8	15.1	136.7	164.5	163.9
Average Queue (m)	58.6	11.8	269.4	154.6	9.4	19.9	84.7	82.1
95th Queue (m)	103.7	19.9	704.3	515.3	12.8	72.3	146.3	138.9
Link Distance (m)		1355.9	586.2	586.2			453.4	453.4
Upstream Blk Time (%)			1	1				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)						0	1	
Queuing Penalty (veh)						0	0	

Network Summary

Network wide Queuing Penalty: 73

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	16.9	20.2	206.2	189.5	161.7	329.9	303.6	92.6	177.4	405.3	360.9	8.2
Average Queue (m)	2.2	8.5	179.9	87.1	20.3	152.3	155.8	20.1	53.2	188.4	181.7	3.1
95th Queue (m)	9.0	21.5	215.5	205.2	83.4	287.1	297.2	53.4	137.7	363.8	325.2	9.4
Link Distance (m)	441.7	441.7	1355.4	1355.4		409.7	409.7			394.9	394.9	
Upstream Blk Time (%)												0
Queuing Penalty (veh)												0
Storage Bay Dist (m)					155.0			85.0	170.0			85.0
Storage Blk Time (%)						8	25	0		11	26	
Queuing Penalty (veh)						4	48	0		16	7	

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	95.2	25.3	596.6	590.8	14.8	22.0	147.3	151.4
Average Queue (m)	50.5	12.2	239.6	124.6	9.8	11.2	75.2	75.4
95th Queue (m)	90.4	21.6	651.7	428.5	13.7	22.1	130.4	129.8
Link Distance (m)		1355.9	586.2	586.2			409.7	409.7
Upstream Blk Time (%)			1	0				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)							0	
Queuing Penalty (veh)							0	

Network Summary

Network wide Queuing Penalty: 75

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	16.9	20.2	202.2	189.7	162.6	285.1	273.7	92.9	177.7	405.3	362.0	8.1
Average Queue (m)	2.2	8.3	176.2	95.9	20.9	134.3	133.9	28.8	42.9	209.5	187.5	3.0
95th Queue (m)	9.0	20.6	206.1	212.6	83.9	246.1	253.5	82.1	107.8	411.8	334.0	9.1
Link Distance (m)	441.7	441.7	1354.3	1354.3		357.9	357.9			394.9	394.9	
Upstream Blk Time (%)												0
Queuing Penalty (veh)												0
Storage Bay Dist (m)					155.0			85.0	170.0			85.0
Storage Blk Time (%)					0	5	26	0		13	26	
Queuing Penalty (veh)					0	3	50	0		17	7	

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	101.0	25.3	590.8	590.8	15.6	22.0	155.1	152.0
Average Queue (m)	55.8	12.2	233.9	129.4	10.5	11.7	63.2	63.5
95th Queue (m)	101.4	21.7	651.5	432.2	14.7	21.5	128.0	122.8
Link Distance (m)		1355.9	586.2	586.2			357.9	357.9
Upstream Blk Time (%)			1	0				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)				1			1	
Queuing Penalty (veh)				2			0	

Network Summary

Network wide Queuing Penalty: 79

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	17.8	34.7	278.4	264.6	51.2	143.2	181.3	92.9	177.5	492.6	481.5	92.8
Average Queue (m)	4.0	17.8	192.1	146.2	23.5	89.7	80.1	32.8	41.0	341.1	321.3	8.3
95th Queue (m)	12.8	32.6	313.5	309.8	41.1	138.2	130.9	82.0	131.3	538.8	501.7	46.0
Link Distance (m)	386.4	386.4	1368.2	1368.2		856.8	856.8		665.4	665.4		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)					155.0			85.0	170.0			85.0
Storage Blk Time (%)							3	0		25	34	
Queuing Penalty (veh)							12	0		41	9	

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	122.8	173.0	596.6	367.8	112.9	33.6	66.4	72.1
Average Queue (m)	119.0	82.7	343.1	217.5	36.1	17.0	34.4	36.8
95th Queue (m)	129.7	194.6	654.8	383.8	111.1	30.2	59.8	65.6
Link Distance (m)		1355.9	586.2	586.2		856.8	856.8	
Upstream Blk Time (%)			1					
Queuing Penalty (veh)			0					
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)	28			18	0			
Queuing Penalty (veh)	23			39	1			

Network Summary

Network wide Queuing Penalty: 125

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R	
Maximum Queue (m)	10.5	28.8	286.5	298.6	162.6	348.7	348.7	96.1	177.7	497.5	432.3	8.3	
Average Queue (m)	2.7	18.0	198.0	149.5	42.7	152.3	149.9	46.8	43.9	339.1	325.8	2.2	
95th Queue (m)	7.8	28.8	302.9	327.8	121.3	300.9	300.4	98.1	133.3	545.5	493.9	8.1	
Link Distance (m)	386.4	386.4	1359.4	1359.4		707.9	707.9			665.4	665.4		
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)					155.0				85.0		170.0		85.0
Storage Blk Time (%)							6		21		0		24
Queuing Penalty (veh)							8		97		1		38

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	122.8	166.4	590.8	326.3	112.8	140.1	224.5	220.8
Average Queue (m)	118.7	82.2	352.0	212.8	27.6	47.1	158.7	160.2
95th Queue (m)	129.4	189.0	640.9	352.6	97.0	140.1	243.5	234.5
Link Distance (m)	1355.9		586.2	586.2			707.9	707.9
Upstream Blk Time (%)			1					
Queuing Penalty (veh)			0					
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)	27				18	0	0	7
Queuing Penalty (veh)	22				39	0	0	6

Network Summary

Network wide Queuing Penalty: 221

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R	
Maximum Queue (m)	11.0	41.3	243.1	216.8	160.0	410.3	415.4	92.9	177.7	516.4	482.0	14.3	
Average Queue (m)	2.7	19.9	176.4	109.4	31.4	165.8	166.2	63.6	67.0	346.6	332.8	3.0	
95th Queue (m)	8.9	39.7	258.7	254.8	91.0	374.2	376.2	120.0	179.0	585.3	559.1	10.7	
Link Distance (m)	386.4	386.4	1353.0	1353.0		453.4	453.4			665.4	665.4		
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)					155.0				85.0		170.0		85.0
Storage Blk Time (%)							6		18		0		0
Queuing Penalty (veh)							8		82		1		0
									38		9		

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	122.6	49.2	596.6	590.8	112.8	33.8	149.7	159.5
Average Queue (m)	93.7	15.1	310.3	200.0	35.2	14.9	123.1	130.9
95th Queue (m)	122.5	34.3	641.2	390.9	111.5	27.2	156.0	165.2
Link Distance (m)	1355.9		586.2	586.2			453.4	453.4
Upstream Blk Time (%)			1	0				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)	4				12	0		3
Queuing Penalty (veh)	3				26	0		3

Network Summary

Network wide Queuing Penalty: 169

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R	
Maximum Queue (m)	11.0	41.2	236.3	217.4	38.0	209.7	180.8	92.8	177.8	522.2	491.6	14.2	
Average Queue (m)	2.3	19.6	171.8	108.1	20.0	101.8	97.2	40.7	50.0	334.5	315.4	2.6	
95th Queue (m)	8.5	39.2	247.8	250.2	32.3	181.8	165.5	94.2	136.8	556.6	528.6	10.1	
Link Distance (m)	386.4	386.4	1355.1	1355.1		409.6	409.6			665.5	665.5		
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (m)					155.0				85.0		170.0		85.0
Storage Blk Time (%)							1		13		0		22
Queuing Penalty (veh)							2		61		0		36

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	122.7	179.6	596.6	590.8	112.9	27.8	152.4	153.7
Average Queue (m)	116.8	73.2	343.6	226.3	36.3	14.9	110.2	108.7
95th Queue (m)	129.9	184.7	688.9	492.8	112.6	26.3	158.0	163.9
Link Distance (m)	1355.9		586.2	586.2			409.6	409.6
Upstream Blk Time (%)			2	0				
Queuing Penalty (veh)			0	0				
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)	23				13	0		1
Queuing Penalty (veh)	19				28	0		1

Network Summary

Network wide Queuing Penalty: 156

Intersection: 5: New East West Road & Highway # 6

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	11.0	53.4	263.4	235.7	50.7	316.5	369.5	92.8	177.7	540.0	524.2	14.4
Average Queue (m)	2.3	18.7	186.1	112.8	24.0	121.9	127.0	54.6	59.1	332.2	320.7	2.3
95th Queue (m)	8.5	44.8	279.0	265.0	45.2	248.0	283.6	107.6	159.1	577.6	555.6	9.3
Link Distance (m)	386.4	386.4	1353.9	1353.9		357.8	357.8			665.5	665.5	
Upstream Blk Time (%)							1					
Queuing Penalty (veh)							6					
Storage Bay Dist (m)					155.0			85.0	170.0			85.0
Storage Blk Time (%)						2	16	0		22	31	
Queuing Penalty (veh)						3	72	1		36	8	

Intersection: 10: Parkside Drive & Highway # 6

Movement	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	R	T	T	R	L	T	T
Maximum Queue (m)	104.1	49.2	596.6	333.5	112.8	27.2	202.9	216.7
Average Queue (m)	83.0	14.6	317.1	201.6	35.7	14.4	118.5	119.7
95th Queue (m)	109.3	33.6	604.5	315.4	110.9	23.4	170.4	179.8
Link Distance (m)		1355.9	586.2	586.2			357.8	357.8
Upstream Blk Time (%)			1					
Queuing Penalty (veh)			0					
Storage Bay Dist (m)	115.0				105.0	132.5		
Storage Blk Time (%)				15	0		2	
Queuing Penalty (veh)				33	0		2	

Network Summary

Network wide Queuing Penalty: 161