
Bedford West Sub Area 10

Traffic Impact Study

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Clayton Developments

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1.0 Introduction

Harbourside Transportation Consultants (HTC) was retained to prepare a traffic impact study (TIS) to quantify the transportation impacts of the proposed Bedford West Sub Area 10 development. The proposed development includes higher density residential, neighbourhood type commercial and institutional land uses.

The TIS was completed in accordance with Halifax Regional Municipality's (HRM) *Guidelines for the Preparation of Transportation Impact Studies (8th revision)*. The TIS addresses the items identified in the Transportation Impact Studies Checklist found in Appendix A of the Guidelines. The checklist includes the following items:

- Description of the development proposal and the study area;
- Establishing a transportation context for the analysis horizon year and the time periods for analysis;
- Estimation of travel that will be generated by the development proposal and development of a transportation demand management plan;
- Evaluation of transportation impacts and identification of transportation system changes needed to mitigate these impacts; and
- Documentation and reporting.

A scoping document was prepared as a result of a discussion held with HRM and the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) on April 16th, 2018. The scoping document outlines the proposed methodology and approved assumptions for the Bedford West Sub Area 10 Traffic Impact Study. The scoping document was issued to both approval agencies on April 17th, 2018. The scoping document can be found in Appendix A.

2.0 Context

2.1 Study Area

The proposed development is located in Bedford, NS on Kearney Lake Road west of the Highway 102 interchange. The development site is generally bounded by Highway 102 to the north and east, Kearney Lake Road to the south and Larry Uteck Boulevard to the west.

Kearney Lake Road is a major collector roadway that runs northwest-southeast and connects to Larry Uteck Boulevard, Highway 102, Dunbrack Street and the Bedford Highway. West of the Highway 102 interchange, Kearney Lake Road has one travel lane in each direction and a posted speed limit varying between 50-60 km/h.

Larry Uteck Boulevard is an arterial roadway that runs east-west and connects to Hammonds Plains Road, Highway 102 and the Bedford Highway. In the vicinity of the development, Larry Uteck Boulevard has one travel lane in each direction and a posted speed limit of 60 km/h.

Hamshaw Drive is a local roadway located off of Kearney Lake Road in the vicinity of the development. Hamshaw Drive is the only point of access to a residential area and Kearney Lake beach. Hamshaw Drive has one travel lane in each direction and a posted speed limit of 50 km/h.

The study area and the location of the four study intersections are shown in Figure 1. The study intersections include:

- Kearney Lake Road & Larry Uteck Boulevard
- Kearney Lake Road & Hamshaw Drive
- Kearney Lake Road & Highway 102 SB ramps
- Kearney Lake Road & Highway 102 NB ramps



Figure 1: Study area

2.1.1 Active Transportation

There are existing pedestrian and cycling facilities provided throughout the study area on Larry Uteck Boulevard and Kearney Lake Road. Sidewalks are provided on one side of Kearney Lake Road from Hamshaw Drive to the Highway 102 interchange and on-street bike lanes are provided along both sides of Kearney Lake Road from Larry Uteck Boulevard to the Highway 102 interchange. A multi-use trail is provided along one side of Larry Uteck Boulevard.

2.1.2 Transit

The study area is serviced by three Halifax Transit routes; two routes along Kearney Lake Road (Route 33 – Tantallon Express and Route 89 – Bedford) and one along Larry Uteck Boulevard (Route 194 – West Bedford Express)

2.2 Data Collection

Traffic counts were gathered at the four study intersections using Miovision Scout video data collection units. Traffic counts were collected in April 2018 during the AM (7:00am to 9:00am), midday (11:00am to 1:00pm) and PM (4:00pm to 6:00pm) peak hours. The traffic count data can be found in Appendix B.

The peak hours of 7:15-8:15 AM and 4:15-5:15 PM were used for the analysis. The volumes were adjusted using HRM's 2012 average annual weekday traffic (AAWT) adjustment factors to account for day of week and month of data collection.

2.3 Study Horizons and Background Traffic Forecasting

Two analysis horizons were included in this study: the full build out of the proposed development and a five-year timeframe after full build out of the development. Full build out of both the residential and commercial development in Sub Area 10 is anticipated for 2031. The study horizons years are 2031 and 2036.

A background traffic growth rate of 1.2 percent per year was applied to existing traffic volumes to reflect normal increases in traffic on the study area road network. The growth rate was derived from traffic on Kearney Lake Road from 2001 to 2012 in the *Bedford West Master Plan Transportation Study Update (2014)*.

2.4 Mode Split

A mode split of 7.5 percent was assumed for Bedford West Sub Area 10 to account for travel using sustainable transportation modes such as active transportation and transit. The mode split was developed through discussions with HRM and NSTIR.

3.0 Development Proposal

3.1 Development Assumptions from Previous Studies

The development assumptions for Bedford West Sub Area 10 from previous studies were reviewed. The studies include:

- *Bedford West Master Plan: Transportation Study (2004)*
- *Highway 102-Larry Uteck Interchange Traffic Impact Analysis (2008)*
- *Ravines of Bedford South Driveway Analysis (2008)*
- *Bedford West Master Plan Transportation Study Update (2014)*

The original 2004 study included a different study area for Bedford West, in which Bedford West was not subdivided into its current 12 sub areas. In the original study, Sub Area 10 formed part of the southeast portion of Area 3, which encompassed current sub area 9, 10 and 11. Dwelling unit assumptions for the area were developed based on the average density of 6 units per acre. The studies assumed a mixture of low, medium and high-density residential developments when quantifying the trip generation rates.

The study did not directly consider commercial development in the southeast portion of Area 3, however the potential for commercial development in the Cresco Lands (located in Sub Area 10) was included as part of the background growth assumptions. All other commercial development in the study was assumed to be a shopping centre (ITE LUC 820) when quantifying the trip generation rates.

Both 2008 studies included a total development area of 96 acres in Bedford West Sub Area 10; of the 96 acres, 76 acres were attributed for residential development and 24 acres for commercial development. The following assumptions were made:

- The residential development assumptions included 432 dwelling units, based on the average density of 6 units per acre recommended from the *Halifax Municipal Planning Strategy*. The studies assumed a mixture of low- and high-density residential developments when quantifying the trip generation rates.
- The commercial development assumptions included 4.8 acres of commercial space (approximately 209, 088 square feet) based on density of 20 percent lot coverage. The studies assumed the commercial development would be a shopping centre (ITE LUC 820) when quantifying the trip generation rates.

In the 2014 update to the Bedford West Master Plan Transportation Study, trips were generated using a regional Visum travel demand model. Visum takes into account factors such as population, employment, dwelling units and average household size to estimate trips. The study included the following land use assumptions for Bedford West Sub Area 10:

- 432 dwelling units
- Population of 1023
- Employment: 36 retail jobs, 213 service jobs and 47 other jobs

3.2 Updated Development Assumptions

The land use plan for the Bedford West Sub Area 10 development is shown in Figure 2. It should be noted that there are nine R1 properties located in Sub Area 10, these properties consist of existing single-family homes. There are no changes anticipated for these properties, therefore, these nine properties have been excluded from the analysis of future scenarios since their impact is taken into account in the existing traffic volumes.

The proposed development includes higher density residential, neighbourhood type commercial and institutional land uses. A total of 1,136 residential dwelling units, 15,000 square feet of commercial and 16,000 square feet of recreational community centre are proposed for Bedford West Sub Area 10.

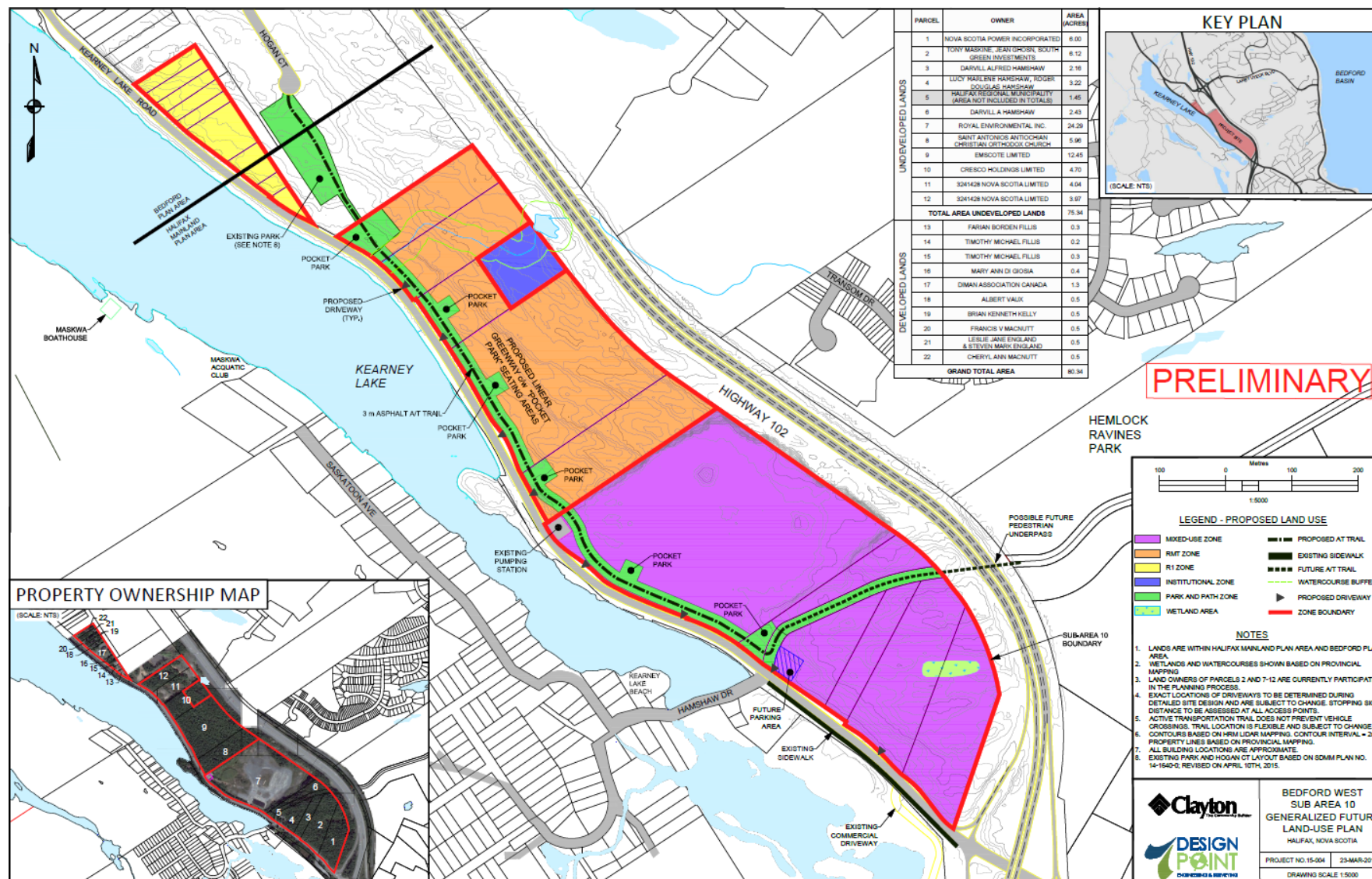


Figure 2: Bedford West Sub Area 10 land use plan

3.2.1 Commercial and Institutional Development Assumptions

The proposed development will include a total of 15,000 square feet for commercial development. The proposed commercial development will be located in two areas: approximately 5,000 square feet of commercial development will be located on the southeast lands on the property immediately west of the Kearney Lake Road and Highway 102 interchange, the remaining 10,000 square feet will be located on the northwest lands west of Hamshaw Drive.

There are no detailed plans available for the commercial developments at this time. In previous studies completed for Bedford West, where no development plans were available the commercial land uses were assumed to be a shopping centre. A shopping center is defined as an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. This land use code was used to represent both the larger commercial areas (Larry Uteck Boulevard commercial area) and the smaller commercial areas throughout Bedford West.

Discussions with property owners, HRM and NSTIR have clearly indicated that Sub Area 10 would only include neighbourhood type commercial development. Therefore, the previous assumption of a shopping centre does not apply to Bedford West Sub Area 10. A number of assumptions were made for neighbourhood type commercial land uses that could be included on these sites. Potential land uses include restaurants, a bank, a small office building, small retail stores and a day care centre.

The proposed development will also include a 16,000 square feet recreational community centre. The equivalent population was calculated for the commercial and industrial land uses based on the allowable commercial density; the calculations are summarized in Table 1.

Table 1: Population equivalent calculations for commercial and institutional land uses

Land Use	GFA (ft ²)	Land Area ¹ (ac.)	Population ² (persons)
Commercial	15,000.00	1.50	75
Institutional (Recreational Community Centre)	16,000.00	2.40	120
1. Commercial land area calculated based on 23 percent land coverage			
2. Population calculated based on allowable commercial density = 50 persons per acre			

3.2.2 Residential Development Assumptions

To date, there has been some ambiguity with respect to the acreage of Sub Area 10 and the associated density. The new residential development assumptions were developed based on the maximum population (2,151) and acreage (75.5) attributed to Sub Area 10 under the Capital Cost Contribution (CCC) model. In addition, Halifax Water has confirmed that the existing sanitary pumping station and associated infrastructure has been oversized to accommodate an additional 601 people. The proposed population transfer 601 people will be coming from sub areas 7 and 8.

The population density was allocated across the properties within Sub Area 10 using method used by Halifax Water to generate the aggregate projected population. The following formula was used:

$$\text{Population} = (72\% \text{ of land area} \times 20 \text{ persons per acre}) + (28\% \text{ of land area} \times 50 \text{ persons per acre})$$

The allowable population was assigned to the commercial, institutional and residential land uses. Once adjusted to reflect the commercial and institutional population equivalents, the remaining population was

used to calculate the equivalent number of dwelling units. The proposed residential development will consist of multifamily housing units; the equivalent number of dwelling units were calculated using an occupancy value of 2.25 persons per unit as per the Halifax Water *Design Specification for Water, Wastewater and Stormwater Systems* and the *Halifax Municipal Planning Strategy*. The calculations are summarized in Table 2.

Bedford West Sub Area 10 will include 869 dwelling units, plus an additional 267 dwelling units from the density transfer for a total of 1136 dwelling units. Since no detailed development plans are available at this time, the assumption was made that 20 percent of dwelling units will consist of low-rise residential (multi-unit buildings less than 3 storeys) and 80 percent of dwelling units will consist of mid-rise residential (multi-unit buildings with 3 to 10 storeys).

Table 2: Equivalent residential units based on population calculations

Sub Area	Population ¹ (persons)	Commercial Pop. Allocation (persons)	Institutional Pop. Allocation (persons)	Residential Pop. Allocation ² (persons)	Equivalent Residential Units ³
Sub Area 10	2151	75	120	1956	869
Density Transfer from Sub Area 7&8	601	0	0	601	267
Totals	2752	75	120	2557	1136
1. Maximum Population by Halifax Water					
2. Residential population allocation = Population - Commercial population allocation - Institutional population allocation					
3. Equivalent residential units calculated based on multiunit dwelling density of 2.25 persons per unit					

3.3 Access

The development plan proposes a number of independent access points along Kearney Lake Drive. Due to the topography in the area there is no practical solution to connect all properties in Sub Area 10 through an internal road network, therefore individual access points are required for each property.

For major collector roadways, the HRM *Municipal Design Guidelines* specifies that minimum centreline distance between intersections on the same or opposite side of the road is 150 metres. In addition, NSTIR requires a minimum 100 metres offset from the Highway 102 southbound ramp terminal to the first access point located west of the Highway 102 interchange.

Due to the number of access points, the turning volumes at individual access points may not be significant potentially reducing the likelihood that left turn lanes will be required. Left turn storage lanes may be required at higher volumes access points such as the access point to the commercial development on the property immediately west of the Kearney Lake Road and Highway 102 interchange. Further analysis will be required to determine the requirements for left-turn storage lanes at access points on Kearney Lake Road at the time of preliminary design.

In addition, the sight distance at each access point will need to be reviewed to ensure the required sight distance is available. For major collector roadways, the HRM *Municipal Design Guidelines (2013)* specifies the following sight distance requirements:

- Minimum stopping sight distance = turning sight distance
- Minimum turning sight distance = as defined by the TAC *Geometric Design Guide for Canadian Roads*

The TAC *Geometric Design Guide for Canadian Roads* specifies the following sight distance requirements for a design speed of 60 km/h:

- Minimum stopping sight distance = 85 metres
- Minimum turning sight distance – left-turn from stop = 130 metres
- Minimum turning sight distance – right-turn from stop = 110 metres

3.4 Active Transportation

The development plan proposes a future active transportation greenway (multi-use trail) through the development. The proposed trail will consist of a 3.0-metre-wide asphalt trail with “pocket park” seating areas. The proposed trail will run in the east-west direction parallel to Kearney Lake Road from the existing trail at the park located on Hogan Court to Hamshaw Drive. At Hamshaw Drive the trail will connect to the proposed parking area and the existing sidewalk on Kearney Lake Road east of Hamshaw Drive. From Hamshaw Drive, the trail will then run in north-south towards Highway 102. The plan includes a possible future pedestrian underpass at Highway 102 to provide a connection to the Hemlock Ravine Park and its existing trail system.

3.5 Transit

The proposed independent access points are not ideal for transit operations. It can be inefficient for transit vehicles to enter multiple sites, therefore future transit service to Sub Area 10 will have to be provided along Kearney Lake Road rather than within the development itself. Each site within Bedford West Sub Area 10 should be designed with adequate pedestrian facilities along internal roadways that would connect to the proposed active transportation trail and provide access to transit on Kearney Lake Road.

3.6 Parking Areas

The development plan proposes a future parking area on Kearney Lake Road. The proposed parking area will be located across from Hamshaw Drive and provide parking for users of Kearney Lake Beach and the future active transportation trail. The proposed parking area should be designed with a defined access point that will form the fourth leg to the Kearney Lake Road and Hamshaw Drive intersection. Proper separation should be provided between the parking lot area and Kearney Lake Road.

The proposed parking area will likely generate higher pedestrian volumes at the intersection of Kearney Lake Road and Hamshaw Drive. There are no existing pedestrian crossings at this location and sidewalk is only provided on the south side of Kearney Lake Road east of Hamshaw Drive. Adequate pedestrian facilities and crossing control should be provided at the intersection. In addition, existing and future bicycle facilities will connect to the proposed parking area, consideration should be given to providing bicycle parking at this location.

4.0 Trip Generation, Distribution and Assignment

4.1 Trip Generation

The trip generation rates for the proposed development were quantified using the 10th edition of the *Trip Generation Manual* published by the Institute of Transportation Engineers (ITE). Nine land use codes were used:

- LUC 220 – Multifamily Housing (Low-Rise)
- LUC 221 – Multifamily Housing (Mid-Rise)
- LUC 495 – Recreational Community Centre

- LUC 565 – Day Care Centre
- LUC 710 – General Office
- LUC 814 – Variety Store
- LUC 851 – Convenience Market
- LUC 912 – Drive-in Bank
- LUC 932 – High-Turnover (Sit Down) Restaurant

The trip generation rates for the proposed development are summarized in Table 3. Residential, institutional and commercial trips were reduced to reflect a mode split of 7.5 percent for sustainable transportation modes. Commercial trips were reduced to reflect on-site synergies, internal captures were calculated for each of the commercial sites using the National Cooperative Highway Research Program's (NCHRP) methodology outlined in *Report 684 Enhancing Internal Trip Capture Estimation for Mixed Use Developments*. This methodology is the recommended practice in the *ITE Trip Generation Handbook* (3rd edition). Commercial trips were also adjusted to reflect pass by trips, a reduction of 25 percent was applied.

Overall, Bedford West Sub Area 10 is expected to generate 526 new trips in the AM peak hour (174 trips in/352 trips out) and 605 new trips in the PM peak hour (361 trips in/244 trips out).

Table 3: Trip generation rates for the AM and PM peak hours

Land Use	Number	Unit	1000 sq. ft. GFA	ITE Code	AM Peak Rate	AM Peak Trip Gen	AM Peak In	AM Peak Out	PM Peak Rate	PM Peak Trip Gen	PM Peak In	PM Peak Out
Residential and Institutional Development												
Multifamily Housing (Low-Rise)	225	DU	-	220	0.46	104	24	80	0.56	126	79	47
Multifamily Housing (Mid-Rise)	911	DU	-	221	0.36	328	85	243	0.44	401	245	156
Recreational Community Centre	16,000	sq. ft.	16.00	495	1.76	29	19	10	2.31	37	17	20
Total Residential and Institutional Trips						461	128	333		564	341	223
Mode Split (7.5 percent sustainable transportation)						35	10	25		43	26	17
Adjusted Residential and Institutional Trips						426	118	308		521	315	206
Southeast Lands Commercial Development												
Day Care Centre	3,000	sq. ft.	3.00	565	11.00	33	17	16	11.12	34	16	18
High-Turnover (Sit Down) Restaurant	2,000	sq. ft.	2.00	932	9.94	20	11	9	9.77	20	13	7
Total Commercial Trips						53	28	25		54	29	25
Internal Trips (NCHRP Methodology)						4	2	2		6	3	3
Mode Split (7.5 percent sustainable transportation)						4	2	2		4	2	2
Commercial Pass-By Trips (25 percent)						11	6	5		11	6	5
Primary Trips (75 percent)						34	18	16		33	18	15
Northwest Lands Commercial Development												
General Office Building	3,000	sq. ft.	3.00	710	1.16	4	3	1	1.15	4	1	3
Variety Store	2,000	sq. ft.	2.00	814	3.18	7	4	3	6.84	14	7	7
Convenience Market	1,000	sq. ft.	1.00	851	62.54	63	32	31	49.11	50	26	24
Drive-in Bank	2,000	sq. ft.	2.00	912	9.50	19	12	7	20.45	41	21	20
High-Turnover (Sit Down) Restaurant	2,000	sq. ft.	2.00	932	9.94	20	11	9	9.77	20	13	7
Total Commercial Trips						113	62	51		129	68	61
Internal Trips (NCHRP Methodology)						16	8	8		54	27	27
Mode Split (7.5 percent sustainable transportation)						9	5	4		7	4	3
Commercial Pass-By Trips (25 percent)						22	11	11		17	9	8
Primary Trips (75 percent)						66	38	28		51	28	23
Vehicle Trips Added to Adjacent Streets						526	174	352		605	361	244

The trip generation for Bedford West Sub Area 10 is higher in this study than it was in previous studies due to the different assumptions used for the residential and commercial land uses. This study includes over double the amount of residential dwelling units and more detailed land use assumptions for commercial developments.

As discussed in Section 3.22, previous studies for Bedford West assumed the land use of a shopping centre for all commercial development which does not apply for the neighbourhood type commercial development in Sub Area 10. The shopping centre land use code has lower trip generation rates per 1,000 square feet of gross floor area than other codes such as restaurants and the convenience market which were included in this study. As a result, trips for Bedford West Sub Area 10 are higher than in previous studies. However, the trip distribution developed to distribute the commercial trips discussed in the following sections accounts for the neighbourhood type nature of the commercial development by assuming that a large proportion of these trips are internal to Sub Area 10 and that the commercial trips are not attracted from other areas of the Halifax Regional Municipality.

4.2 Residential Trip Distribution and Assignment

Trips associated with the residential development were distributed to the study area road network using the trip distribution shown in Figure 3. The distribution was derived based on the Home-to-Work trip distribution produced in 2014 *Bedford West Master Plan Transportation Study Update*. It should be noted that trips associated with the recreational community centre were included in the residential trip distribution.

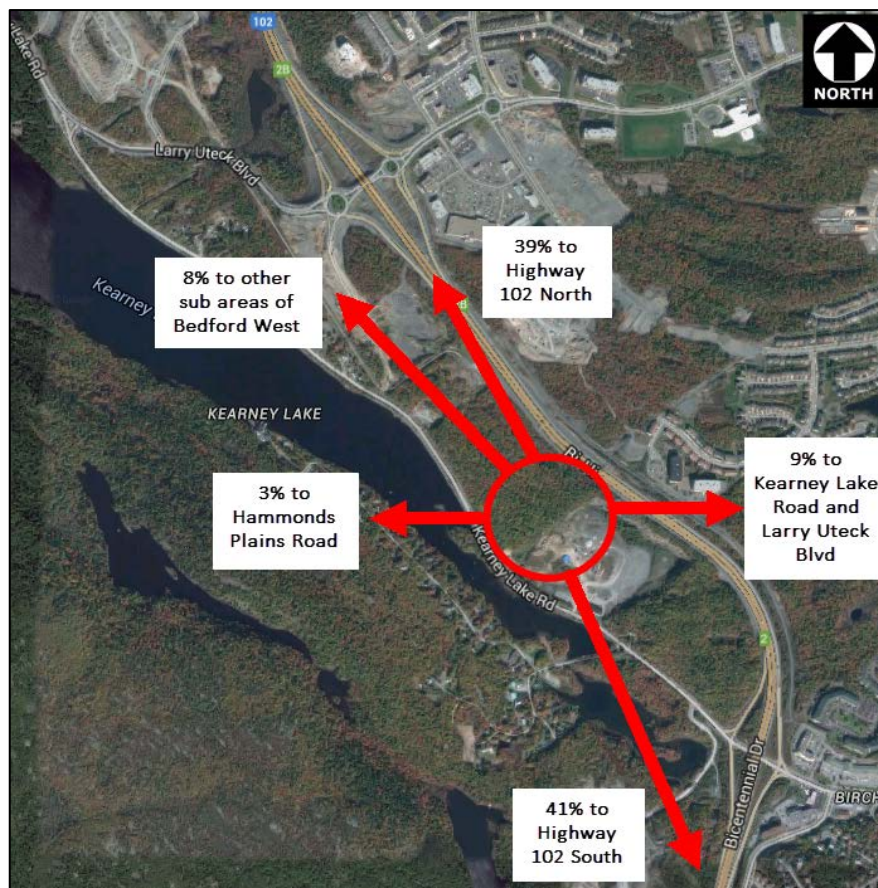


Figure 3: Residential trip distribution

The following trip assignment assumptions were made when distribution residential trips to the road network:

- 39 percent to/from Highway 102 North – approximately 77 percent of these trips were assigned to the Larry Uteck Boulevard interchange and 23 percent were assigned to the Kearney Lake Road interchange.
- 8 percent to/from other areas of Bedford West – approximately 63 percent of these trips were assigned to Kearney Lake Road and 37 percent were assigned to Highway 102 vis the Kearney Lake Road interchange.
- 3 percent to/from Hammonds Plains Road – 100 percent of these trips were assigned to Kearney Lake Road travelling to Larry Uteck Boulevard then Hammonds Plains Road.
- 41 percent to/from Highway 102 South – 100 percent of these trips were assigned to the Kearney Lake Road interchange.
- 9 percent to/from Kearney Lake Road and Larry Uteck Boulevard – 50 percent of these trips were assigned to Larry Uteck Boulevard and 50 percent were assigned to Kearney Lake Road.

The traffic volumes for the residential development at each study intersection can be found in Appendix C.

4.3 Commercial Trip Distribution and Assignment

Trips associated with the commercial developments were distributed to the study area road network using the following trip distribution:

- 75 percent primary trips
 - 60 percent internal to Bedford West Sub Area 10
 - 15 percent external to Bedford West Sub Area 10
- 25 percent pass by trips

The trip distribution is shown in Figure 4, the following trip assignment assumptions were made to distribute primary commercial trips to the road network:

- 60 percent internal to Bedford West Sub Area 10 – the trips were assigned to the various development access points on Kearney Lake Road based on the proportion of residential development on each property.
- 15 percent external to Bedford West Sub Area 10 – 33 percent of these trips were assigned to Larry Uteck Boulevard to/from areas to the west, 13 percent to/from Hamshaw Drive and 54 percent to Kearney Lake Road to/from areas to the east.

The traffic volumes for the commercial developments at each study intersection can be found in Appendix C. Separate sheets are provided for the internal commercial trips and the external commercial trips.

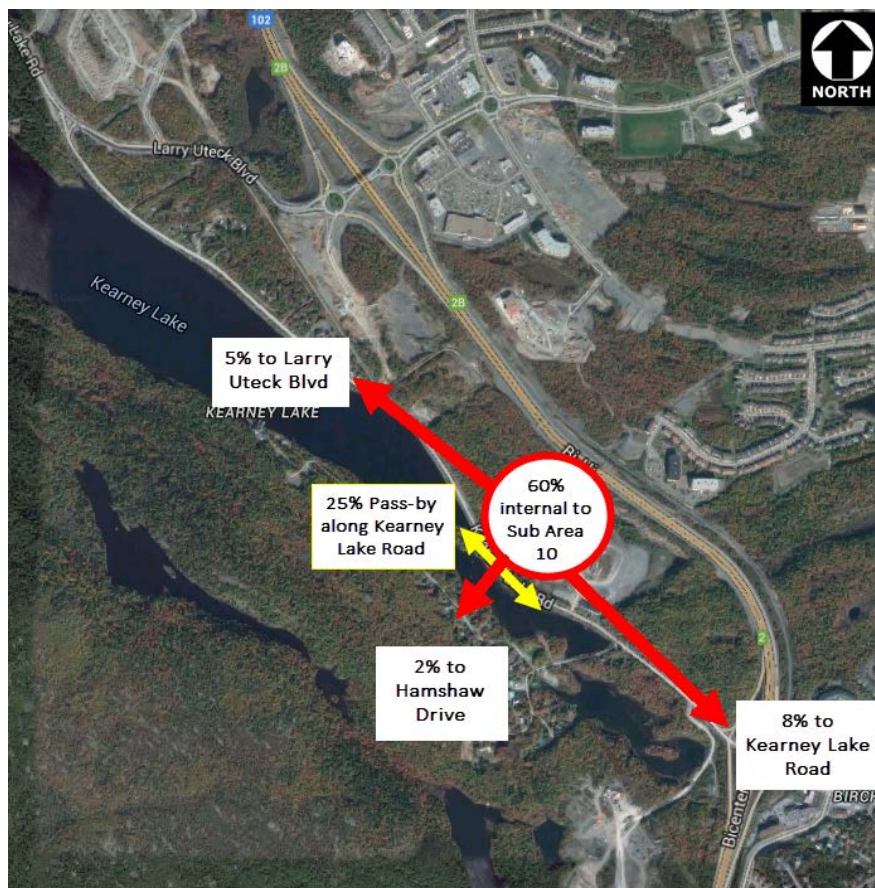


Figure 4: Commercial trip distribution

4.4 Summary of the Trip Distributions

The trip distributions for the residential and commercial trips associated with the Bedford West Sub Area 10 developments are summarized in Table 4. Please note that the commercial distribution shown is the distribution for primary trips only.

Table 4: Breakdown of the residential and commercial trip distributions

To/From	Street	Residential	Commercial (Primary Trips)
North	Highway 102 - Kearney Lake Road interchange	9.0%	0.0%
	Highway 102 - Larry Uteck Boulevard interchange	30.0%	0.0%
South	Highway 102 - Kearney Lake Road interchange	41.0%	0.0%
	Hamshaw Drive	0.0%	2.6%
East	Kearney Lake Road	4.5%	10.7%
	Larry Uteck Boulevard	4.5%	0.0%
West	Highway 102 - Kearney Lake Road interchange	3.0%	0.0%
	Larry Uteck Boulevard	8.0%	6.7%
Bedford West Sub Area 10	Kearney Lake Road	0.0%	80.0%
Total		100.0%	100.0%

5.0 Intersection Performance and Capacity Analysis

The performance of an intersection can be evaluated using a number of measures of effectiveness (MOE). Delay and level of service (LOS), volume-to-capacity ratio (v/c) and vehicle queuing are the primary measures of effectiveness used in traffic analyses.

Delay is defined in the Highway Capacity Manual as the additional travel time experienced by a motor vehicle, pedestrian or cyclist attributable to the presence of traffic control (unsignalized or signalized intersection) and conflicting traffic. Delay is used as the basis to calculate LOS, a qualitative measure used to describe operational conditions based on service measures such as freedom to maneuver, travel time, speed, and traffic interruptions. LOS is expressed as a scale from 'A' to 'F', where LOS A represents free flow conditions or very low delay and LOS F represents delay times that are unacceptable to motorists using the facility. The level of service criteria for unsignalized (stop/yield controlled and roundabouts) and signalized intersections are described in Table 5.

The volume-to-capacity ratio relates the estimated traffic volume (demand volume) to the theoretical maximum volume that could be accommodated (capacity volume/adjusted saturation flow rate). As the v/c ratio approaches 1.0, the movement has reduced ability to accommodate any additional volume of traffic.

Vehicle queuing at intersections is critical to the performance of the network. The 95th percentile queue length is typically used to determine if sufficient vehicle storage is available to maintain efficient traffic flow. The 95th percentile queue length is the length of queue which is exceeded only 5 percent of the time.

Table 5: LOS Criteria Signalized and Unsignalized Intersections

LOS	Level of Service (LOS) Description	Signalized Intersection Control Delay	Unsignalized Intersection Control Delay
A	Very low delay. Majority of through traffic on main street does not stop at all. (Excellent)	≤ 10 sec/veh	≤ 10 sec/veh
B	Somewhat higher delay. More vehicles have to stop for red lights. (Very Good)	10-20 sec/veh	10-15 sec/veh
C	Higher level of congestion and vehicles wait through more than one signal indication, occasionally backups may develop, however traffic flow is still stable and acceptable. (Good)	20-35 sec/veh	15-25 sec/veh
D	Congestion is noticeable and delays may become extensive. Most cars have to wait more than one red light to pass. This threshold is the upper limit for design. (Satisfactory)	35-55 sec/veh	25-35 sec/veh
E	Congested conditions. Traffic fills intersection capacity with long queues and delays. Many vehicles need to wait more than one green indication. The LOS is nearing capacity and is unsatisfactory. (Unsatisfactory)	55-80 sec/veh	35-50 sec/veh
F	Very congested conditions. Traffic demand exceeds capacity of the intersection with very long queues and delays. The LOS is generally considered to be unacceptable. (Unacceptable)	≥ 80 sec/veh	≥ 50 sec/veh

The Synchro Studio (Version 10) software package was used as the primary evaluation tool. Synchro, an analysis and optimization software package, was used to analyze network intersections based on the methodology of the *Highway Capacity Manual* 6th edition (2016) published by the Transportation Research Board. SimTraffic, the micro-simulation component of the software package, was also used in the course of the analysis to check delay, illustrate and identify interactions between individual driver types and to illustrate the effects of adjacent or closely spaced intersections.

The combination of the two components within the software allows the analyst to review the intersections using two different approaches. The Synchro software models each intersection in isolation, while the SimTraffic software analyzes the network as a whole. SimTraffic will identify external influences on intersections such as spillbacks from upstream and/or downstream intersections include in the model. Synchro Studio was used to analyze signalized and unsignalized intersections (stop controlled).

A number of assessment scenarios were evaluated to quantify the impact of the proposed development on the study area road network. The study included the assessment of four scenarios:

- Scenario 1 – Existing Conditions (2018)
- Scenario 2 – Background Traffic Growth (2031)
- Scenario 3 – Full Build Out of Development (2031)
- Scenario 4 – Five-Year Timeframe after Development (2036)

The traffic volumes for each scenario can be found in Appendix D.

5.1 Scenario 1 - Existing Conditions (2018)

Scenario 1 is an assessment of current operations in the study area. The 2018 traffic counts, existing lane configurations were used to reflect existing conditions. The existing signal timing plan was used at the intersection of Kearney Lake Road and Larry Uteck Boulevard. NSTIR is currently in the process of adjusting the signal timing plans at the Kearney Lake Road and Highway 102 interchange, therefore existing signal timings could not be provided for the intersections, the intersections were modelled using the optimized signal timings provided by the Synchro Studio software.

The delay, level of service, volume-to-capacity ratio and 95th percentile queues length results obtained for the AM and PM peak hours of Scenario 1 are summarized in Table 6. The detailed Synchro and SimTraffic reports are included in Appendix E.

Results of the analysis show operational problems at the Kearney Lake Road and Highway 102 interchange during both peak hours. Problems are observed at the Kearney Lake Road and Highway 102 Southbound Ramps intersection. During the AM peak hour, the eastbound through movement and the southbound left-turn and through movements (Highway 102 off-ramp) operate at LOS E. Overall, the signalized intersection operates at an acceptable level of service. During the PM peak hour, the southbound left-turn and through movements operate at LOS E, the traffic volumes are almost at the capacity of the approach. Overall, the signalized intersection operates at an acceptable level of service.

The signalized intersection of Kearney Lake Road and Larry Uteck Boulevard and the unsignalized intersection of Kearney Lake Road and Hamshaw Drive operate at acceptable levels of service during both peak hours.

5.1.1 Traffic Signal Warrant Analysis

The Transportation Association of Canada's (TAC) developed the Canadian Traffic Signal Warrant Matrix Procedure in 2005 to provide a basis for making rational, defensible decisions on the installation of traffic signals. The matrix uses a "cumulative factors methodology" to evaluate vehicle to vehicle and vehicle to pedestrian interactions while considering local factors such as demographics and roadway characteristics. The procedure also incorporates collision prediction theory which anticipates the amount of collisions based on traffic volume and intersection geometry. However, it should be noted that some of the data required for this warrant procedure is subjective in nature, such as the intersection being located "near a school". The matrix provides a final score for the intersection, and in order for traffic signals to be considered, an intersection must score 100 priority points or more. A traffic signal installation would be deemed unwarranted if the scoring is less than 100 points.

The matrix was used to evaluate if traffic signals should be considered for the unsignalized intersections of Kearney Lake Road and Hamshaw Drive under existing traffic volumes. The intersection scored 5 points, indicating that traffic signals are not warranted at this time. The traffic signal warrant worksheets can be found in Appendix F.

5.2 Scenario 2 – Background Traffic Growth (2031)

Scenario 2 is an assessment of future conditions in 2031 with normal background traffic growth only. The traffic signal timings at the Kearney Lake Road and Larry Uteck Boulevard intersection, and Kearney Lake Road Highway 102 interchange were optimized using the Synchro Studio software.

The delay, level of service, volume-to-capacity ratio and 95th percentile queues length results obtained for the AM and PM peak hours of Scenario 2 are summarized in Table 7. The detailed Synchro and SimTraffic reports are included in Appendix E.

Results of the analysis show that conditions at the Kearney Lake Road and Highway 102 interchange will deteriorate with background traffic growth. Problems are observed at the Kearney Lake Road and Highway 102 Southbound Ramps intersection. During the AM peak hour, the eastbound through movement will operate at LOS E, the traffic volumes will be approaching the capacity of the approach. The southbound left-turn and through movements (Highway 102 off-ramp) will operate at LOS F, the highway ramp will be over capacity. Overall, the signalized intersection will operate at LOS E. During the PM peak hour, the southbound left-turn and through movements will operate at LOS F, the highway ramp will be over capacity. Overall, the signalized intersection will operate at an acceptable level of service.

The signalized intersection of Kearney Lake Road and Larry Uteck Boulevard and the unsignalized intersection of Kearney Lake Road and Hamshaw Drive will continue to operate at acceptable levels of service during both peak hours.

Table 6: Scenario 1 – Existing Conditions (2018) MOE results - Synchro

S1 Existing Conditions 2018			AM Peak Hour							PM Peak Hour								
Intersection		Synchro					SimTraffic			Synchro					SimTraffic			
		Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)	Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)	
Street	Movement																	
Kearney Lake Road & Larry Uteck Boulevard		11.6	B				6.9	A		19.0	B				11.4	B		
Larry Uteck Boulevard	EB Left - Turn	7.0	A	A	0.00	1.0	10.3	B	1.6	7.0	A	A	0.01	1.0	22.0	C	1.3	
	EB Through	14.0		B	0.68	100.8	7.4	A	42.9	11.0		B	0.51	69.3	8.2	A	42.7	
	EB Right - Turn	2.1		A	0.39	11.0	3.7	A	0.0	1.7		A	0.22	7.8	2.6	A	0.0	
	WB Left - Turn	8.0	A	A	0.08	4.8	16.5	B	12.1	7.1	C	A	0.05	3.8	14.0	B	9.4	
	WB Through	9.8		A	0.44	51.7	5.4	A	37.8	21.9		C	0.85	147.3	11.5	B	80.1	
	WB Right - Turn						2.6	A							7.0	A		
Kearney Lake Road	NB Left - Turn	29.3	C	C	0.58	28.2	17.6	B	31.4	42.6	D	D	0.75	73.1	25.3	C	42.1	
	NB Through	13.9		B	0.03	2.7	3.9	A	12.2	11.3		D	B	0.07	6.7	3.3	A	42.4
	NB Right - Turn	8.1		A	10.2	B												
	SB Left - Turn	19.3	B	B	0.03	1.7	18.2	B	2.7	23.9	C					C	0.03	3.8
	SB Through	15.2		B	0.03	1.4	14.6	B	5.3	18.4		C	B	0.02	2.6	21.1	C	7.1
	SB Right - Turn						8.0	A								12.0	B	
Kearney Lake Road & Hamshaw Drive		1.2	A				1.6	A		1.2	A							
Kearney Lake Road	EB Through	0.0	A	A	-	-	1.4	A	-	0.0	A	A	-	-	1.1	A	-	
	EB Right - Turn	0.0		A	-	-	1.1	A	-	0.0		A	-	-	0.8	A	-	
	WB Left - Turn	8.3	A	A	0.02	0.7	3.8	A	7.6	7.8	A	A	0.02	0.7	3.4	A	12.1	
	WB Through	0.0		A	-	-	1.0	A		0.0		A	-	-	1.7	A		
Hamshaw Drive	NB Left - Turn	11.7	B	B	0.09	2.1	5.8	A	13.2	10.7	B	B	0.06	1.4	6.6	A	11.4	
	NB Right - Turn						3.9	A							2.5	A		
Kearney Lake Road & Highway 102 SB Ramps		46.6	D				39.8	D		41.5	D				41.1	D		
Kearney Lake Road	EB Through	60.6	D	E	0.89	127.5	45.1	D	123.5	38.4	C	D	0.47	66.4	34.5	C	63.3	
	EB Right - Turn	0.8		A	0.21	0.0	5.2	A	55.4	0.5		A	0.13	0.0	4.9	A	16.7	
	WB Left - Turn	11.3	A	B	0.22	4.4	14.5	B	10.3	19.9	A	B	0.30	13.3	18.7	B	16.5	
	WB Through	1.0		A	0.15	4.0	2.7	A	2.3	2.0		A	0.27	9.9	2.2	A	1.8	
Highway 102 SB Ramp	SB Left - Turn	61.4	E	E	0.96	192.9	55.2	E	183.4	71.7	E	E	0.99	203.4	70.7	E	205.4	
	SB Through			60.0	E	81.9	F											
	SB Right - Turn			0.1	A	0.03	0.0	26.0				C	30.6	0.1	A	0.02		0.0
Kearney Lake Road & Highway 102 NB Ramps		11.6	B				7.0	A		13.2	B				10.4	B		
Kearney Lake Road	EB Left - Turn	12.1	A	B	0.03	1.5	9.4	A	4.9	18.5	A	B	0.03	3.0	17.9	B	7.6	
	EB Through	6.0		A	0.70	0.0	2.7	A	7.9	1.9		A	0.54	0.0	2.6	A	4.1	
	WB Through	40.5	B	D	0.31	32.4	33.6	C	37.4	39.1	B	D	0.40	44.6	36.7	D	52.5	
	WB Right - Turn	9.6		A	0.69	23.0	2.5	A	7.5	11.4		B	0.83	47.1	4.8	A	23.2	
Highway 102 NB Ramp	NB Left - Turn	43.3	B	D	0.15	14.6	46.7	D	19.8	46.6	C	D	0.36	34.9	46.9	D	41.7	
	NB Through						40.1	D							71.1	E		
	NB Right - Turn	1.3					A	0.20				0.0	3.0	A	7.9	7.3		A

Table 7: Scenario 2 – Background Traffic Growth (2031) MOE results - Synchro

S2 Background Traffic Growth 2031			AM Peak Hour							PM Peak Hour								
Intersection			Synchro					SimTraffic			Synchro					SimTraffic		
			Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)	Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)
Street	Movement																	
Kearney Lake Road & Larry Uteck Boulevard		12.8	B				8.4	A		27.3	C				15.1	B		
Larry Uteck Boulevard	EB Left - Turn	7.7	B	A	0.01	1.3	11.1	B	1.2	9.0	A	A	0.03	1.5	30.5	C	2.3	
	EB Through	16.9		B	0.70	148.0	10.1	B	62.8	13.3		B	0.57	97.4	9.9	A	57.4	
	EB Right - Turn	2.3		A	0.41	12.8	4.2	A	0.0	1.8		A	0.24	9.2	2.8	A	0.0	
	WB Left - Turn	9.6	B	A	0.11	5.9	20.7	C	13.0	8.4	D	A	0.06	4.8	15.9	B	9.6	
	WB Through	10.7		B	0.46	62.7	5.9	A	40.5	35.6		D	0.95	251.3	16.3	B	120.5	
	WB Right - Turn						3.7	A							10.7	B		
Kearney Lake Road	NB Left - Turn	27.3	C	C	0.61	25.0	19.2	B	36.1	53.3	D	D	0.84	90.5	32.1	C	13.4	
	NB Through	10.9		B	0.04	2.6	6.0	A	17.7	10.6		B	0.08	7.6	6.5	A	72.8	
	NB Right - Turn						10.1	B							15.4	B		
	SB Left - Turn	15.5	B	B	0.03	1.6	18.1	B	4.2	25.0	C	C	0.04	4.7	24.3	C	6.3	
	SB Through	12.0		B	0.04	1.4	13.8	B	5.1	17.9		C	0.02	3.1	19.2	B	6.7	
	SB Right - Turn						4.9	A							16.9	B		
Kearney Lake Road & Hamshaw Drive		1.3	A				1.9	A		1.2	A				1.9	A		
Kearney Lake Road	EB Through	0.0	A	A	-	-	1.6	A	-	0.0	A	A	-	-	1.2	A	-	
	EB Right - Turn	0.0		A	-	-	1.2	A	-	0.0		A	-	-	0.7	A	-	
	WB Left - Turn	8.6	A	A	0.03	0.7	4.9	A	12.1	7.9	A	A	0.02	0.7	3.9	A	11.8	
	WB Through	0.0		A	-	-	1.6	A		0.0		A	-	-	2.0	A		
Hamshaw Drive	NB Left - Turn	12.6	B	B	0.12	2.8	7.1	A	13.7	11.3	B	B	0.08	2.1	8.1	A	11.6	
	NB Right - Turn						3.8	A							2.9	A		
Kearney Lake Road & Highway 102 SB Ramps		60.7	E				50.9	D		51.9	D				57.3	E		
Kearney Lake Road	EB Through	74.4	E	E	0.96	171.5	49.7	D	145.9	47.6	D	D	0.60	86.3	41.4	D	80.9	
	EB Right - Turn	3.3		A	0.24	4.7	6.3	A	72.9	0.7		A	0.16	0.0	5.5	A	18.6	
	WB Left - Turn	14.3	A	B	0.29	5.8	17.7	B	12.6	21.7	A	C	0.34	16.1	20.7	C	19.8	
	WB Through	1.3		A	0.18	7.3	2.8	A	3.2	2.5		A	0.33	14.2	2.3	A	1.6	
Highway 102 SB Ramp	SB Left - Turn	83.0	F	F	1.04	264.9	77.2	E	228.8	90.5	F	F	1.06	258.2	103.9	F	242.0	
	SB Through			A	0.03	0.0	97.8	F	29.6	0.1		A	0.03	0.0	106.5	F	32.5	
	SB Right - Turn	0.1					50.7	D							71.3	E		
Kearney Lake Road & Highway 102 NB Ramps		14.0	B				9.0	A		15.3	B				12.4	B		
Kearney Lake Road	EB Left - Turn	9.6	A	A	0.03	1.6	10.8	B	8.0	16.8	A	B	0.03	2.8	16.5	B	8.6	
	EB Through	5.3		A	0.75	0.0	3.0	A	9.9	3.1		A	0.61	0.0	2.8	A	2.0	
	WB Through	54.1	C	D	0.48	44.4	45.2	D	50.1	42.7	C	D	0.45	55.4	41.2	D	70.4	
	WB Right - Turn	12.9		B	0.79	26.4	3.0	A	13.0	12.8		B	0.87	72.2	6.5	A	39.9	
Highway 102 NB Ramp	NB Left - Turn	54.4	B	D	0.20	20.0	55.4	E	24.8	54.0	C	D	0.45	43.7	55.1	E	58.1	
	NB Through			A	0.27	0.0	57.6	E	12.1	11.4		B	0.52	21.9	62.9	E	34.5	
	NB Right - Turn	2.0					3.8	A							6.6	A		

5.3 Scenario 3 – Full Build Out of Development (2031)

Scenario 3 is an assessment of future conditions in 2031 with normal background traffic growth and full-build out of the Bedford West Sub Area 10 development. The traffic signal timings at Kearney Lake Road and Larry Uteck Boulevard and the Kearney Lake Road and Highway 102 interchange were optimized using the Synchro Studio software.

The delay, level of service, volume-to-capacity ratio and 95th percentile queues length results obtained for the AM and PM peak hours of Scenario 3 are summarized in Table 8. The detailed Synchro and SimTraffic reports are included in Appendix E.

Results of the analysis show that conditions at the Kearney Lake Road and Highway 102 interchange will deteriorate with the additional traffic generated by the development. Problems will be observed at both intersections.

During the AM peak hour, conditions will remain similar to Scenario 2 (without development) at the intersection of Kearney Lake Road and Highway 102 Southbound Ramps, the Highway 102 off ramp will be over capacity. Conditions will deteriorate at the intersection of Kearney Lake Road and Highway 102 Northbound Ramps, the westbound through and northbound left-turn and through movements (Highway 102 off-ramp) will operate at LOS E.

During the PM peak hour, conditions will remain similar to Scenario 2 (without development) at the intersection of Kearney Lake Road and Highway 102 Southbound Ramps, the Highway 102 off ramp will be over capacity. Conditions will deteriorate at the intersection of Kearney Lake Road and Highway 102 Northbound Ramps, the northbound left-turn and through movements will operate at LOS F.

The unsignalized intersection of Kearney Lake Road and Hamshaw Drive will continue to operate at acceptable levels of service during both peak hours. The signalized intersection of Kearney Lake Road and Larry Uteck Boulevard will also operate at acceptable levels of service during both peak hours; however, the northbound left turn movement will operate at LOS E during the PM peak hour.

5.4 Kearney Lake Road and Highway 102 Interchange Improvements

The Kearney Lake Road and Highway 102 interchange experiences operational problems under existing and background growth conditions, the southbound off-ramp will be over capacity during both peak hours. The additional traffic volumes associated with the Bedford West Sub Area 10 development will further deteriorate these issues leading to operational problems on the northbound off-ramp during both peak hours. Improvements are required at the interchange to accommodate background traffic growth and the proposed development. It is recommended that the two signalized intersections be converted to roundabouts. A concept plan for the interchange improvements is shown in Figure 5.

The roundabout intersection configurations were evaluated using the Arcady software package. The delay, level of service, volume-to-capacity ratio and 95th percentile queues length results obtained for the AM and PM peak hours are summarized in Table 9. The detailed Arcady reports are included in Appendix E. The interchange improvements will restore operations at both intersections to acceptable levels of service during both peak hours.

Table 8: Scenario 3 – Full Build Out of Development (2031) MOE results - Synchro

S3 Full Build Out of Development 2031			AM Peak Hour							PM Peak Hour							
Intersection		Synchro					SimTraffic			Synchro					SimTraffic		
		Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)	Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)
Street	Movement																
Kearney Lake Road & Larry Uteck Boulevard		16.7	B				12.2	B		26.2	C				17.8	B	
Larry Uteck Boulevard	EB Left - Turn	8.0	B	A	0.01	1.3	18.4	B	6.8	7.7	A	A	0.03	1.3	37.2	D	4.6
	EB Through	24.5		C	0.85	148.0	15.5	B	93.8	12.3		B	0.56	87.9	10.7	B	54.9
	EB Right - Turn	2.8		A	0.47	13.0	4.6	A	8.4	1.6		A	0.27	8.7	3.0	A	7.2
	WB Left - Turn	22.7	B	C	0.47	21.4	58.6	E	23.5	12.6	C	B	0.40	24.1	25.3	C	77.8
	WB Through	12.8		B	0.55	62.7	7.9	A	48.0	33.2		C	0.94	238.9	19.5	B	150.8
	WB Right - Turn						4.1	A							15.7	B	
Kearney Lake Road	NB Left - Turn	31.2	C	C	0.71	30.1	22.9	C	40.9	66.5	D	E	0.92	108.5	40.1	D	44.1
	NB Through	9.1		A	0.40	8.7	8.0	A	50.8	7.7		A	0.24	13.7	3.1	A	95.0
	NB Right - Turn						14.8	B							18.1	B	
	SB Left - Turn	15.5	B	B	0.04	1.6	19.4	B	4.3	27.3	C	C	0.04	4.9	24.5	C	5.3
	SB Through	11.7		B	0.04	1.4	21.6	C	6.1	19.6		B	0.02	3.3	30.7	C	7.8
	SB Right - Turn						9.0	A							20.4	C	
Kearney Lake Road & Hamshaw Drive		1.1	A				2.1	A		1.0	A				2.1	A	
Kearney Lake Road	EB Through	0.0	A	A	-	-	1.6	A	0.0	0.0	A	A	-	-	1.5	A	0.7
	EB Right - Turn	0.0		A	-	-	1.2	A		0.0		A	-	-	0.9	A	
	WB Left - Turn	9.2	A	A	0.03	0.7	6.4	A	22.8	8.4	A	A	0.03	0.7	4.4	A	21.7
	WB Through	0.0		A	-	-	2.1	A		0.0		A	-	-	2.2	A	
Hamshaw Drive	NB Left - Turn	15.7	C	C	0.16	4.2	12.8	B	14.5	14.4	B	B	0.12	2.8	11.3	B	12.0
	NB Right - Turn						5.4	A							3.6	A	
Kearney Lake Road & Highway 102 SB Ramps		58.0	E				54.0	D		48.5	D				55.6	E	
Kearney Lake Road	EB Through	77.6	D	E	0.96	212.7	54.4	D	174.9	43.5	C	D	0.64	91.0	36.0	D	79.8
	EB Right - Turn	5.6		A	0.42	12.2	8.9	A	134.7	5.0		A	0.32	12.7	6.7	A	27.5
	WB Left - Turn	33.9	B	C	0.33	13.9	34.7	C	20.2	32.4	B	C	0.37	21.6	29.4	C	25.2
	WB Through	1.7		A	0.25	13.4	2.9	A	3.8	4.2		A	0.49	15.2	2.4	A	4.2
Highway 102 SB Ramp	SB Left - Turn	87.3	F	F	1.03	297.9	89.9	F	234.2	100.5	F	F	1.10	245.3	119.6	F	207.3
	SB Through			103.4	F	A	0.10	0.0				120.3	F				
	SB Right - Turn	0.2		A	0.06	0.0	62.2	E	41.0	0.4		A	0.10	0.0	89.8	F	59.0
Kearney Lake Road & Highway 102 NB Ramps		18.1	B				12.8	B		20.5	C				30.8	C	
Kearney Lake Road	EB Left - Turn	8.1	A	A	0.07	4.0	9.8	A	16.0	16.5	A	B	0.07	5.3	19.4	B	13.3
	EB Through	5.9		A	0.75	0.0	3.3	A	13.8	3.0		A	0.65	0.0	2.8	A	4.4
	WB Through	66.1	C	E	0.56	53.8	61.0	E	65.9	43.2	C	D	0.54	56.1	47.7	D	96.1
	WB Right - Turn	14.3		B	0.81	27.4	3.4	A	23.4	14.0		B	0.89	86.7	8.1	A	68.0
Highway 102 NB Ramp	NB Left - Turn	74.6	D	E	0.54	46.5	70.2	E	58.7	82.5	D	F	0.91	104.4	142.2	F	250.9
	NB Through			52.2	D	A	0.49	21.6				201.9	F				
	NB Right - Turn	2.7		A	0.29	0.0	8.2	A	28.9	10.7		B	0.49	21.6	91.2	F	45.0

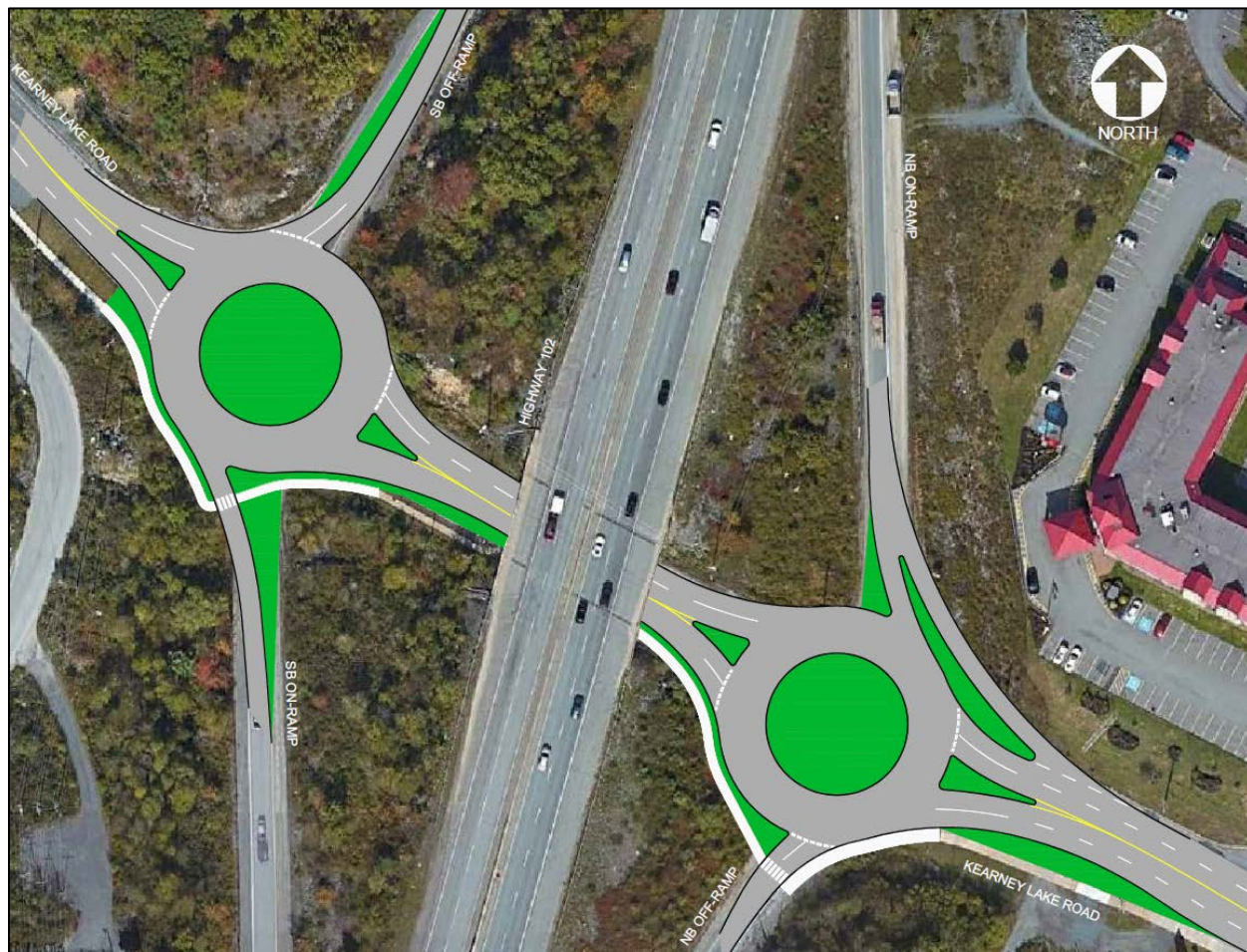


Figure 5: Kearney Lake Road and Highway 102 interchange improvements

Table 9: Kearney Lake Road and Highway 102 interchange MOE results - Arcady

Scenario 3 Full Build Out with Improvements 2031 - Arcady									
Intersection		AM Peak Hour				PM Peak Hour			
		Delay/ Veh (s)	App. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	App. LOS	v/c Ratio	95th%ile Queue (m)
Street	Movement								
Kearney Lake Road & Highway 102 SB Ramps		6.3	A			5.3	A		
Kearney Lake Road	EB Through	9.1	A	0.66	7.0	5.4	A	0.42	7.0
	EB Right - Turn								
	WB Left - Turn	2.8	A	0.20	7.0	3.6	A	0.39	7.0
	WB Through								
Highway 102 SB Ramp	SB Left - Turn								
	SB Through	5.0	A	0.50	7.0	6.8	A	0.58	7.0
	SB Right - Turn								
Kearney Lake Road & Highway 102 NB Ramps		5.8	A			4.4	A		
Kearney Lake Road	EB Left - Turn								
	EB Through	8.0	A	0.73	28.0	5.3	A	0.58	7.0
	WB Through								
	WB Right - Turn	2.8	A	0.16	7.0	3.4	A	0.27	7.0
Highway 102 NB Ramp	NB Left - Turn								
	NB Through	4.8	A	0.19	7.0	5.9	A	0.42	7.0
	NB Right - Turn								

5.5 Scenario 4 – Five-Year Timeframe after Development (2036)

Scenario 4 is an assessment of future conditions in 2036, five years after full build-out of Bedford West Sub Area 10. The scenario includes the Scenario 3 volumes factored to reflect normal growth over the 5-year timeframe. The scenario reflects the interchange improvements and the traffic signal timings at Kearney Lake Road and Larry Uteck Boulevard were optimized using the Synchro Studio software.

The delay, level of service, volume-to-capacity ratio and 95th percentile queues length results obtained for the AM and PM peak hours of Scenario 4 are summarized in Table 10 and Table 11. The detailed Synchro, SimTraffic and Arcady reports are included in Appendix E.

Results of the analysis shows that the two roundabouts at the Kearney Lake Road and Highway 102 interchange and the unsignalized intersection of Kearney Lake Road and Hamshaw Drive will operate at acceptable levels of service during both peak hours. The signalized intersection of Kearney Lake Road and Larry Uteck Boulevard will also operate at acceptable levels of service during both peak hours; however, the northbound left turn movement will operate at LOS E during the PM peak hour.

Table 10: Scenario 4 – Five-Year Timeframe after Development (2036) MOE results - Arcady

Scenario 4 Five-Year Timeframe after Development 2036 - Arcady									
Intersection		AM Peak Hour				PM Peak Hour			
		Delay/ Veh (s)	App. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	App. LOS	v/c Ratio	95th%ile Queue (m)
Street	Movement								
Kearney Lake Road & Highway 102 SB Ramps		7.5	A			5.9	A		
Kearney Lake Road	EB Through	11.4	B	0.73	35.0	5.9	A	0.45	7.0
	EB Right - Turn								
	WB Left - Turn	2.8	A	0.22	7.0	3.7	A	0.41	7.0
	WB Through								
Highway 102 SB Ramp	SB Left - Turn	5.4	A	0.53	7.0	7.9	A	0.63	7.0
	SB Through								
	SB Right - Turn								
Kearney Lake Road & Highway 102 NB Ramps		6.8	A			4.8	A		
Kearney Lake Road	EB Left - Turn	9.6	A	0.77	49.0	5.8	A	0.62	14.0
	EB Through								
	WB Through	2.8	A	0.17	7.0	3.5	A	0.29	7.0
	WB Right - Turn								
Highway 102 NB Ramp	NB Left - Turn	5.2	A	0.21	7.0	6.6	A	0.47	7.0
	NB Through								
	NB Right - Turn								

Table 11: Scenario 4 – Five-Year Timeframe after Development (2036) MOE results - Synchro

S4 Five-Year Timeframe after Dev. 2036			AM Peak Hour							PM Peak Hour								
Intersection			Synchro					SimTraffic			Synchro					SimTraffic		
			Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)	Delay/ Veh (s)	App. LOS	Mvt. LOS	v/c Ratio	95th%ile Queue (m)	Delay/ Veh (s)	Mvt. LOS	95th%ile Queue (m)
Street	Movement																	
Kearney Lake Road & Larry Uteck Boulevard		18.3	B				13.5	B		32.5	C				20.6	C		
Larry Uteck Boulevard	EB Left - Turn	7.5	B	A	0.01	1.4	27.8	C	6.9	10.2	B	B	0.05	2.0	44.2	D	3.1	
	EB Through	26.2		C	0.88	162.4	16.8	B	94.9	14.8		B	0.59	114.0	12.1	B	70.1	
	EB Right - Turn	2.6		A	0.49	12.6	4.7	A	0.0	1.8		A	0.28	10.1	3.0	A	0.0	
	WB Left - Turn	32.6	B	C	0.58	26.0	36.1	D	26.1	16.6	D	B	0.47	32.4	33.2	C	100.2	
	WB Through	12.9		B	0.57	66.3	7.6	A	47.7	46.1		D	0.99	297.6	24.5	C	181.7	
	WB Right - Turn						5.0	A							19.1	B		
Kearney Lake Road	NB Left - Turn	37.3	C	D	0.75	35.6	25.7	C	39.2	67.4	D	E	0.92	116.8	42.0	D	42.9	
	NB Through	10.3		B	0.42	10.1	7.8	A	56.5	7.2		A	0.24	14.2	3.3	A	99.1	
	NB Right - Turn						18.7	B							20.1	C		
	SB Left - Turn	17.8	B	B	0.04	2.0	20.5	C	4.0	27.6	C	C	0.05	5.5	27.7	C	6.0	
	SB Through	13.0		B	0.05	1.8	18.3	B	6.4	19.3		B	0.03	3.9	30.6	C	7.5	
	SB Right - Turn						5.7	A							17.5	B		
Kearney Lake Road & Hamshaw Drive		1.2	A				1.9	A		1.1	A				1.7	A		
Kearney Lake Road	EB Through	0.0	A	A	-	-	1.7	A	1.0	0.0	A	A	-	-	1.6	A	0.0	
	EB Right - Turn	0.0		A	-	-	1.3	A		0.0		A	-	-	1.0	A		
	WB Left - Turn	9.4	A	A	0.04	0.7	5.7	A	18.5	8.5	A	A	0.03	0.7	4.9	A	22.0	
	WB Through	0.0		A	-	-	0.9	A		0.0		A	-	-	1.2	A		
Hamshaw Drive	NB Left - Turn	16.9	C	C	0.19	4.9	13.0	B	16.0	15.3	C	C	0.14	3.5	10.2	B	11.8	
	NB Right - Turn						6.6	A							4.1	A		

6.0 Kearney Lake Road Classification Review

Kearney Lake Road is currently classified as a major collector, according to the street classification map from the 2014 HRM Regional Plan. Based on the characteristics of streets outlined in HRM's *Municipal Design Guidelines*, major collectors are primarily intended for traffic movement with land access being a secondary consideration. Average daily volumes on major collector streets in HRM range from 12,000 to 20,000 vehicles per day.

The street classification map developed in 2014, does not show a connection between Kearney Lake Road and Larry Uteck Boulevard. Larry Uteck Boulevard was extended to Kearney Lake Road in the fall of 2014. It is likely that Kearney Lake Road was classified as a major collector based on volumes and function observed prior to the connection to the Larry Uteck Boulevard interchange. In 2011, according to HRM's *24-hour Automated Traffic Recorder Studies* the estimated AAWT on Kearney Lake Road between Hamshaw Drive and Highway 102 was 12,650 vehicles per day.

The new connection created a more direct route to Highway 102 for a large portion of commuters travelling along Kearney Lake Road to/from the west. The *Highway 102-Larry Uteck Interchange Traffic Impact Analysis* (2008) estimated that as high as 50 percent of traffic travelling to the Kearney Lake Road interchange would potentially divert to the Larry Uteck Boulevard interchange.

As a result of the Larry Uteck Boulevard interchange, it is likely that the function of Kearney Lake Road has changed. AAWT estimates on Kearney Lake Road between Hamshaw Drive and Highway 102 from HRM's *24-hour Automated Traffic Recorder Studies* indicated 10,600 vehicles per day in 2014 and 7,760 vehicles per day in 2015. These estimates suggest diversion rates of 15 to 30 percent to the Larry Uteck Boulevard interchange.

Daily traffic volumes on Kearney Lake Road were not collected as part of this study. A general rule of thumb to approximate daily volumes is that PM peak hour volumes on a roadway typically represent approximately 10 percent of daily traffic volumes. This rule was applied to two-way volumes on Kearney Lake Road at the intersection with Larry Uteck Boulevard and west of the Highway 102 interchange obtained from turning movement counts in May 2015 and April 2018. Daily traffic volumes on Kearney Lake Road were estimated to range between 5,940 to 7,050 vehicles per day in 2015, and 4,410 to 5,120 vehicles per day in 2018.

It should be noted that in the fall of 2015, HRM completed improvements at the intersection of Kearney Lake Road and Larry Uteck Boulevard. Modifications were made to the channelized right-turn at the eastbound approach (Larry Uteck Boulevard turning right onto Kearney Lake Road) in order to reduce the right-turn volumes heading towards the Kearney Lake Road interchange and direct traffic towards the Larry Uteck Boulevard interchange.

Turning movements counts collected during the AM peak hour in 2015 prior to the improvements were compared to 2018 counts. In 2015, approximately 55 percent of volumes on the eastbound approach turned right onto Kearney Lake Road while in 2018 only 37 percent of volumes on the approach turned right. Conclusions cannot be drawn from the comparison of only two observations due to normal fluctuations in traffic volumes. However, this comparison suggests that the improvements may have had the desired effect to reduce the proportion of traffic volumes travelling to the Kearney Lake Road interchange.

Based on the characteristics of streets outlined in HRM's *Municipal Design Guidelines*, Kearney Lake Road should classify as a minor collector street. Minor collector streets are intended to equally serve the functions of moving traffic and providing land access. Average daily volumes on minor collector streets range from 3,000 to 12,000 vehicles per day.

7.0 Conclusions and Recommendations

Harbourside Transportation Consultants was retained to prepare a traffic impact study to quantify the transportation impacts of the proposed Bedford West Sub Area 10 development. The proposed development is located in Bedford, NS on Kearney Lake Road west of the Highway 102 interchange.

The proposed development includes higher density residential, neighbourhood type commercial and institutional land uses. A total of 1,136 residential dwelling units, 15,000 square feet of commercial and 16,000 square feet of recreational community centre are proposed for Bedford West Sub Area 10. The development plan includes a future active transportation greenway (multi-use trail) through the development.

The trip generation rates for the proposed development were quantified using the 10th edition of the ITE *Trip Generation Manual*. Commercial trips were reduced to reflect internal captures and pass-by trips, and both residential and commercial trips were reduced to reflect a mode split of 7.5 percent for sustainable transportation modes. Overall, Bedford West Sub Area 10 is expected to generate 526 new trips in the AM peak hour (174 trips in/352 trips out) and 605 new trips in the PM peak hour (361 trips in/244 trips out).

Trips associated with the residential development were distributed to the study area road network using a trip distribution derived from on the Home-to-Work trip distribution produced in 2014 *Bedford West Master Plan Transportation Study Update*. Commercial trips were distributed to reflect the neighbourhood commercial nature of the proposed commercial development, where the majority of trips to the commercial development would be attracted from Sub Area 10 and from adjacent residential areas.

A number of assessment scenarios were evaluated to quantify the impact of the proposed development on the study area road network. The study included the assessment of four scenarios:

- Scenario 1 – Existing Conditions (2018)
- Scenario 2 – Background Traffic Growth (2031)
- Scenario 3 – Full Build Out of Development (2031)
- Scenario 4 – Five-Year Timeframe after Development (2036)

Scenario 1 Existing Conditions (2018) shows operational problems at the Kearney Lake Road and Highway 102 Interchange, problems are observed at the Kearney Lake Road and Highway 102 Southbound Ramps intersection during both peak hours. Conditions at the Kearney Lake Road and Highway 102 interchange will deteriorate with background traffic growth; the Highway 102 southbound off-ramp will be over capacity during both peak hours. The additional traffic volumes associated with the Bedford West Sub Area 10 development will further deteriorate these issues leading to operational problems on the northbound off-ramp during both peak hours.

Improvements are required at the interchange to accommodate background traffic growth and the proposed development. It is recommended that the two signalized intersections be converted to

roundabouts. The interchange improvements will restore operations at both intersections to acceptable levels of service during both peak hours.

The analysis shows that the additional volumes generated by the Bedford West Sub Area 10 development will have a minor impact on the poor conditions already observed at the interchange. The Bedford West Sub Area 10 development does not have a significant impact on the intersections of Kearney Lake Road and Larry Uteck Boulevard and Kearney Lake Road and Hamshaw Drive.



Appendix A

Scoping Document



17 April 2018

HTC Project: 15318

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Bedford, NS B4A 4J4

T. 902.832.5597 x1117
E. evan.teasdale@designpoint.ca

ATTENTION: EVAN TEASDALE, P.ENG.
PROJECT ENGINEER, PRINCIPAL

RE: SCOPING DOCUMENT FOR THE BEDFORD WEST SUB AREA 10 TRAFFIC IMPACT STUDY

Mr. Teasdale,

This Scoping Document was prepared as a result of the discussion held with the Halifax Regional Municipality (HRM) and the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) on April 16th, 2017. The following sections outline the proposed methodology for the Bedford West Sub Area 10 Traffic Impact Study.

The TIS will be completed in accordance with HRM's *Guidelines for the Preparation of Transportation Impact Studies (8th revision)*. The TIS will address the items identified in the Transportation Impact Studies Checklist in Appendix A of the Guidelines. The checklist includes the following items:

- Description of the development proposal and the study area;
- Establishing a transportation context for the analysis horizon year and the time periods for analysis;
- Estimation of travel that will be generated by the development proposal and development of a transportation demand management plan;
- Evaluation of transportation impacts and identification of transportation system changes needed to mitigate these impacts; and
- Documentation and reporting.

Study Area and Intersections

The study area is located on Kearney Lake Road in Bedford West. The study intersections will include:

- Kearney Lake Road/Highway 102 NB Ramps (Exit 2)
- Kearney Lake Road/Highway 102 SB Ramps (Exit 2)
- Kearney Lake Road/Larry Uteck Boulevard
- Kearney Lake Road/Hamshaw Drive

Traffic counts were collected at the four study intersections on April 10th and 11th, 2018. The traffic counts will be factored using HRM's adjustment factors to account for day of week and month of data collection.

Background Growth

The study will include 1.2% background traffic growth per year on Kearney Lake Road. This value is based on traffic counts from 2001 to 2012.

Mode Split

A mode split reduction of 7.5% will be applied to reflect sustainable modes including active transportation and transit.

Trip Generation

Trip generations rates will be developed for the proposed development using the 10th edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*.

- 220 – Multifamily Housing (Low-Rise): 1 to 2 storeys multi-unit buildings
- 221 – Multifamily Housing (Mid-Rise): 3 to 10 storeys multi-unit buildings

Additional conversations will be held with the land owner of the parcel that includes the institutional land use to identify if the land use code 560 – Church, or 495 – Recreational Community Centre is more suitable based on the type of activities planned for the facility.

There are no detailed plans available for the commercial portion of the development. A mixture of neighbourhood type commercial land uses will be assumed. These could include land uses such as:

- 712 – Small Office Building
- 814 – Variety Store
- 911 – Walk-In Bank
- 934 – Fast Food Restaurant with Drive-Through Window
- 937 – Coffee/Donut Shop with Drive-Through Window

Reductions to reflect on-site synergies will be calculated based on the methodology outlined in NCHRP Report 684 *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. This methodology is the recommended practice in ITE's *Trip Generation Handbook* (3rd edition).

Reductions will be applied to commercial trips to reflect pass-by trips. The reduction will be applied based on the land use and pass-by trip percentages available in *Trip Generation Handbook*.

Trip Distribution

The trip distribution for residential trips will be derived based on the Home-to-Work 2031 trip distribution from the Bedford West Master Plan Transportation Study Update (Burgess, 2014) shown in Figure 1.

For the purpose of this document only, 5% internal trips were assumed to create the residential trip distribution/trip assignment diagram in Figure 2. The actual trip distribution used in the study will reflect the internal capture trips calculated based on the NCHRP method.

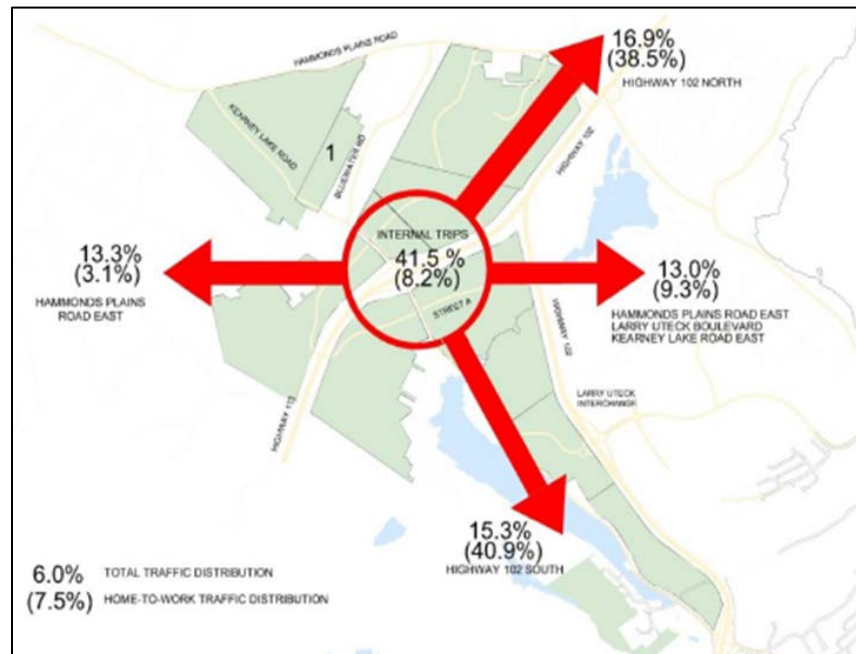


Figure 1: 2031 Trip Distribution from the Bedford West Master Plan Transportation Study Update

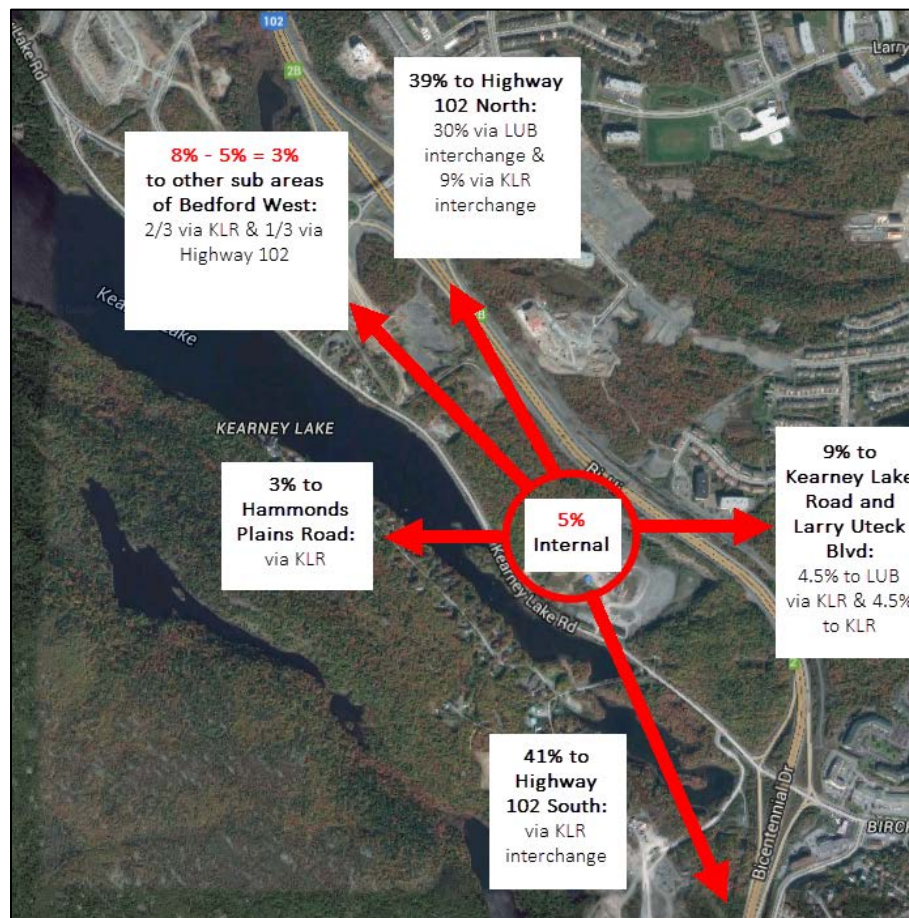


Figure 2: Residential Trip Distribution for Bedford West Sub Area 10



Commercial trips will be distributed using a separate trip distribution. Distribution will be provided for the following types of trips:

- Pass-by trips – pass-by trips will be distributed based on the existing EB/WB traffic split on Kearney Lake Road
- Primary trips internal to Sub Area 10 – trips will be distributed to/from the various development access points
- Primary trips external to Sub Area 10 – trips will be distributed to/from the intersection

It should be noted that since the commercial development will be a neighbourhood type commercial development, the majority of primary trips generated by the commercial development will be internal to Sub Area 10. Some primary trips will be attracted from adjacent residential areas; however, the development will not generate trips from other areas of HRM.

Analysis Scenarios

The TIS will include an analysis of the following scenarios:

- Scenario 1 – Existing Conditions (2018)
- Scenario 2 – Background Traffic Growth (2031)
- Scenario 3 – Full Build Out of Bedford West Sub Area 10 (2031)
- Scenario 4 – Five-year Timeframe after Development (2036)

Please feel free to circulate this document to all meeting participants to confirm agreement with the items discussed. If you have any further questions or comments or would like to discuss any aspect of this document, please feel free to contact the undersigned at your convenience.

Regards,

Harbourside Transportation Consultants

Original Signed

Michael MacDonald, P. Eng.
Senior Transportation Engineer
P: 902.405.4655
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Appendix B

Traffic Counts



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 709.579.6435 falla@harboursideengineering.ca

Count Name: Kearney Lake Road & Hamshaw Drive
 Site Code:
 Start Date: 04/10/2018
 Page No: 1

Turning Movement Data

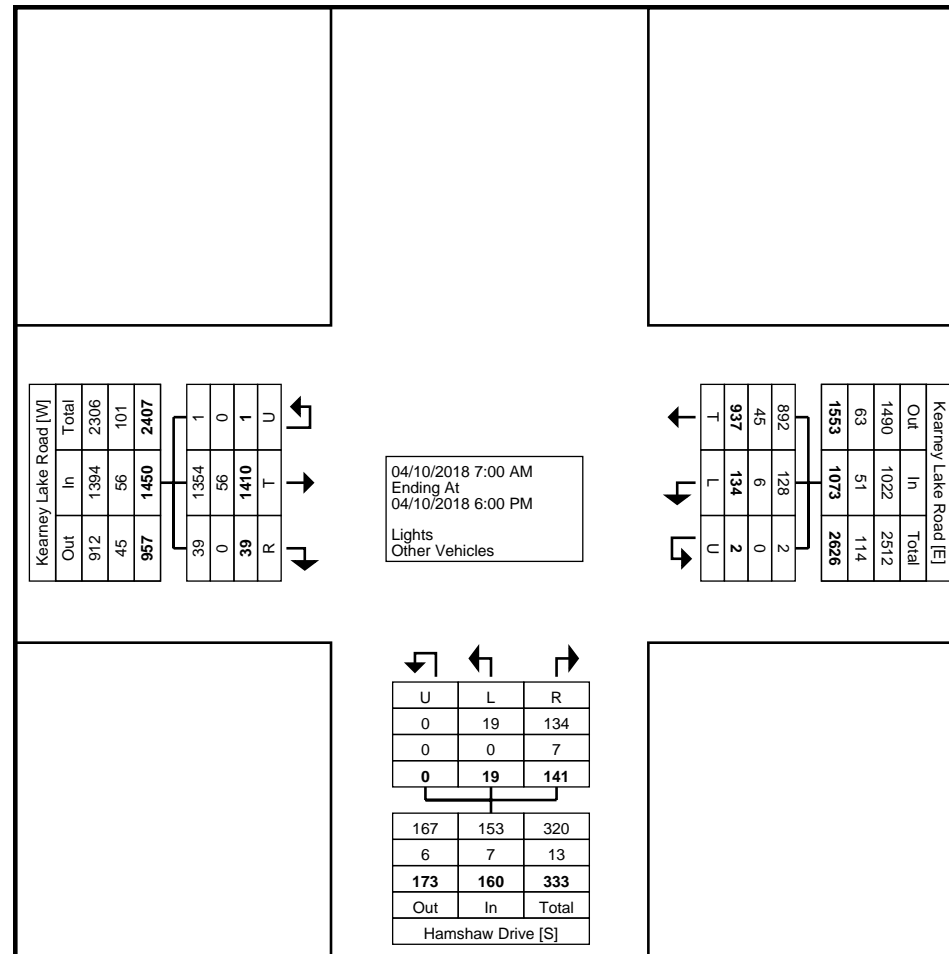
Start Time	Kearney Lake Road Westbound				Hamshaw Drive Northbound				Kearney Lake Road Eastbound				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
7:00 AM	15	3	0	18	2	2	0	4	0	81	0	81	103
7:15 AM	31	0	0	31	7	0	0	7	0	105	0	105	143
7:30 AM	18	3	0	21	9	0	0	9	1	97	0	98	128
7:45 AM	37	7	0	44	7	2	0	9	0	104	0	104	157
Hourly Total	101	13	0	114	25	4	0	29	1	387	0	388	531
8:00 AM	26	6	0	32	12	0	0	12	1	90	0	91	135
8:15 AM	30	3	1	34	2	0	0	2	0	85	0	85	121
8:30 AM	21	6	0	27	11	1	0	12	1	86	0	87	126
8:45 AM	29	15	0	44	6	0	0	6	5	58	0	63	113
Hourly Total	106	30	1	137	31	1	0	32	7	319	0	326	495
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	17	4	0	21	3	0	0	3	0	46	0	46	70
11:15 AM	30	1	0	31	4	0	0	4	2	44	0	46	81
11:30 AM	39	3	0	42	2	0	0	2	1	41	0	42	86
11:45 AM	35	4	0	39	5	0	0	5	1	42	0	43	87
Hourly Total	121	12	0	133	14	0	0	14	4	173	0	177	324
12:00 PM	36	3	0	39	5	0	0	5	2	37	0	39	83
12:15 PM	44	6	0	50	5	0	0	5	1	40	0	41	96
12:30 PM	39	6	0	45	4	0	0	4	3	34	0	37	86
12:45 PM	40	5	0	45	6	0	0	6	2	43	0	45	96
Hourly Total	159	20	0	179	20	0	0	20	8	154	0	162	361
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	64	12	0	76	8	2	0	10	1	56	0	57	143
4:15 PM	69	4	0	73	2	2	0	4	3	46	0	49	126
4:30 PM	60	6	1	67	9	2	0	11	2	58	0	60	138
4:45 PM	63	6	0	69	4	1	0	5	1	47	1	49	123
Hourly Total	256	28	1	285	23	7	0	30	7	207	1	215	530
5:00 PM	53	7	0	60	5	2	0	7	1	44	0	45	112
5:15 PM	37	9	0	46	3	1	0	4	2	39	0	41	91
5:30 PM	47	8	0	55	10	0	0	10	2	48	0	50	115
5:45 PM	57	7	0	64	10	4	0	14	7	39	0	46	124
Hourly Total	194	31	0	225	28	7	0	35	12	170	0	182	442
Grand Total	937	134	2	1073	141	19	0	160	39	1410	1	1450	2683
Approach %	87.3	12.5	0.2	-	88.1	11.9	0.0	-	2.7	97.2	0.1	-	-
Total %	34.9	5.0	0.1	40.0	5.3	0.7	0.0	6.0	1.5	52.6	0.0	54.0	-
Lights	892	128	2	1022	134	19	0	153	39	1354	1	1394	2569
% Lights	95.2	95.5	100.0	95.2	95.0	100.0	-	95.6	100.0	96.0	100.0	96.1	95.8
Other Vehicles	45	6	0	51	7	0	0	7	0	56	0	56	114

% Other Vehicles	4.8	4.5	0.0	4.8	5.0	0.0	-	4.4	0.0	4.0	0.0	3.9	4.2
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Count Name: Kearney Lake Road & Hamshaw
Drive
Site Code:
Start Date: 04/10/2018
Page No: 3



Turning Movement Data Plot



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Count Name: Kearney Lake Road & Hamshaw Drive
 Site Code:
 Start Date: 04/10/2018
 Page No: 4

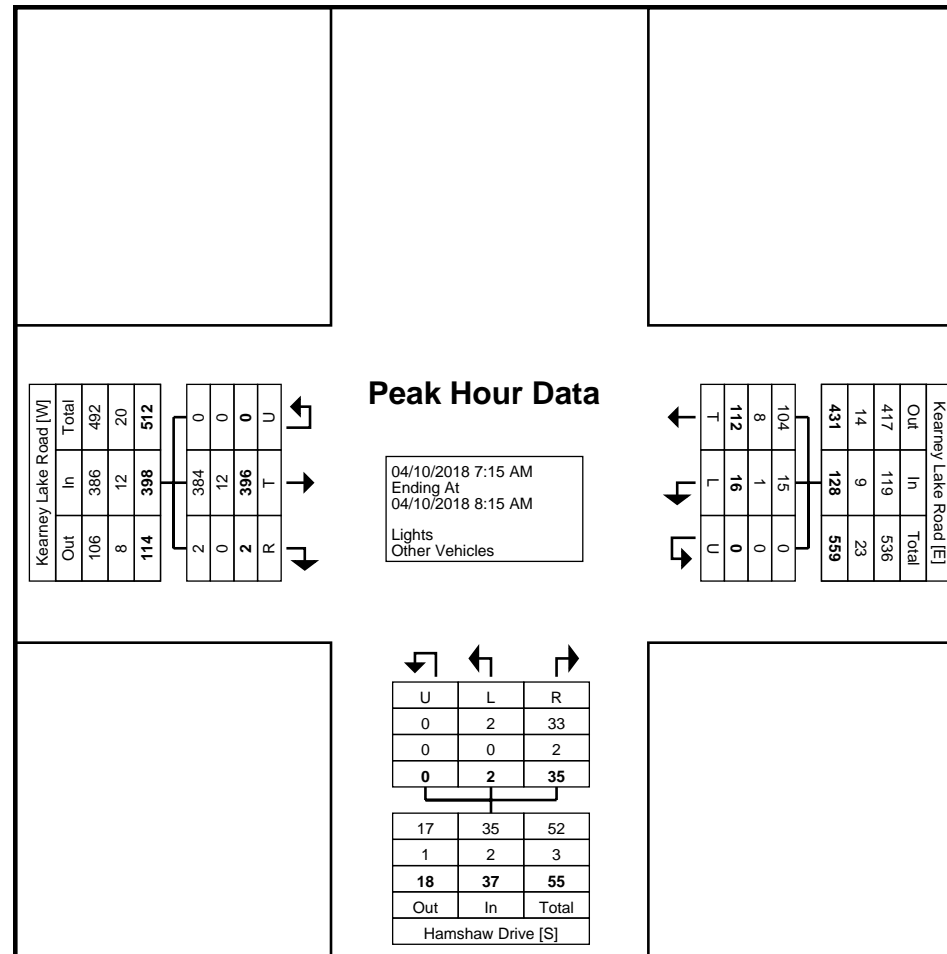
Turning Movement Peak Hour Data (7:15 AM)

Start Time	Kearney Lake Road Westbound				Hamshaw Drive Northbound				Kearney Lake Road Eastbound				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
7:15 AM	31	0	0	31	7	0	0	7	0	105	0	105	143
7:30 AM	18	3	0	21	9	0	0	9	1	97	0	98	128
7:45 AM	37	7	0	44	7	2	0	9	0	104	0	104	157
8:00 AM	26	6	0	32	12	0	0	12	1	90	0	91	135
Total	112	16	0	128	35	2	0	37	2	396	0	398	563
Approach %	87.5	12.5	0.0	-	94.6	5.4	0.0	-	0.5	99.5	0.0	-	-
Total %	19.9	2.8	0.0	22.7	6.2	0.4	0.0	6.6	0.4	70.3	0.0	70.7	-
PHF	0.757	0.571	0.000	0.727	0.729	0.250	0.000	0.771	0.500	0.943	0.000	0.948	0.896
Lights	104	15	0	119	33	2	0	35	2	384	0	386	540
% Lights	92.9	93.8	-	93.0	94.3	100.0	-	94.6	100.0	97.0	-	97.0	95.9
Other Vehicles	8	1	0	9	2	0	0	2	0	12	0	12	23
% Other Vehicles	7.1	6.3	-	7.0	5.7	0.0	-	5.4	0.0	3.0	-	3.0	4.1



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Count Name: Kearney Lake Road & Hamshaw
Drive
Site Code:
Start Date: 04/10/2018
Page No: 5



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



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Count Name: Kearney Lake Road & Hamshaw Drive
 Site Code:
 Start Date: 04/10/2018
 Page No: 6

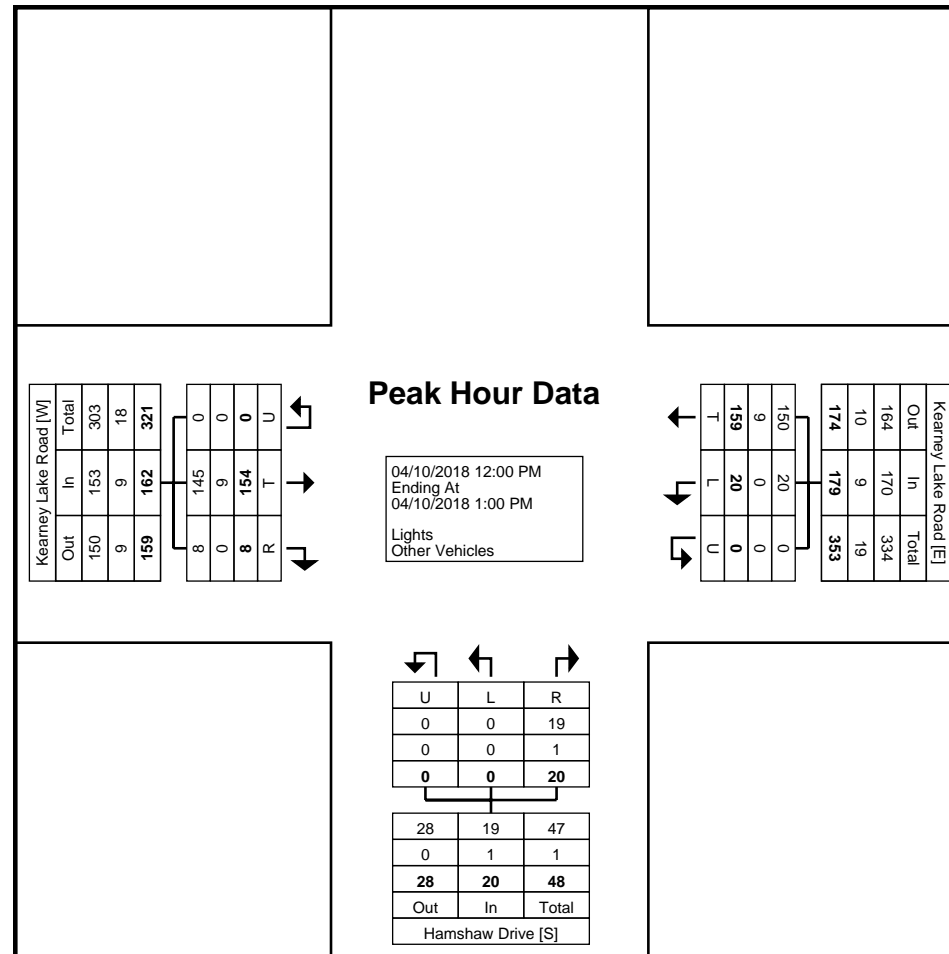
Turning Movement Peak Hour Data (12:00 PM)

Start Time	Kearney Lake Road Westbound				Hamshaw Drive Northbound				Kearney Lake Road Eastbound				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
12:00 PM	36	3	0	39	5	0	0	5	2	37	0	39	83
12:15 PM	44	6	0	50	5	0	0	5	1	40	0	41	96
12:30 PM	39	6	0	45	4	0	0	4	3	34	0	37	86
12:45 PM	40	5	0	45	6	0	0	6	2	43	0	45	96
Total	159	20	0	179	20	0	0	20	8	154	0	162	361
Approach %	88.8	11.2	0.0	-	100.0	0.0	0.0	-	4.9	95.1	0.0	-	-
Total %	44.0	5.5	0.0	49.6	5.5	0.0	0.0	5.5	2.2	42.7	0.0	44.9	-
PHF	0.903	0.833	0.000	0.895	0.833	0.000	0.000	0.833	0.667	0.895	0.000	0.900	0.940
Lights	150	20	0	170	19	0	0	19	8	145	0	153	342
% Lights	94.3	100.0	-	95.0	95.0	-	-	95.0	100.0	94.2	-	94.4	94.7
Other Vehicles	9	0	0	9	1	0	0	1	0	9	0	9	19
% Other Vehicles	5.7	0.0	-	5.0	5.0	-	-	5.0	0.0	5.8	-	5.6	5.3



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Count Name: Kearney Lake Road & Hamshaw
 Drive
 Site Code:
 Start Date: 04/10/2018
 Page No: 7



Turning Movement Peak Hour Data Plot (12:00 PM)



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Count Name: Kearney Lake Road & Hamshaw Drive
 Site Code:
 Start Date: 04/10/2018
 Page No: 8

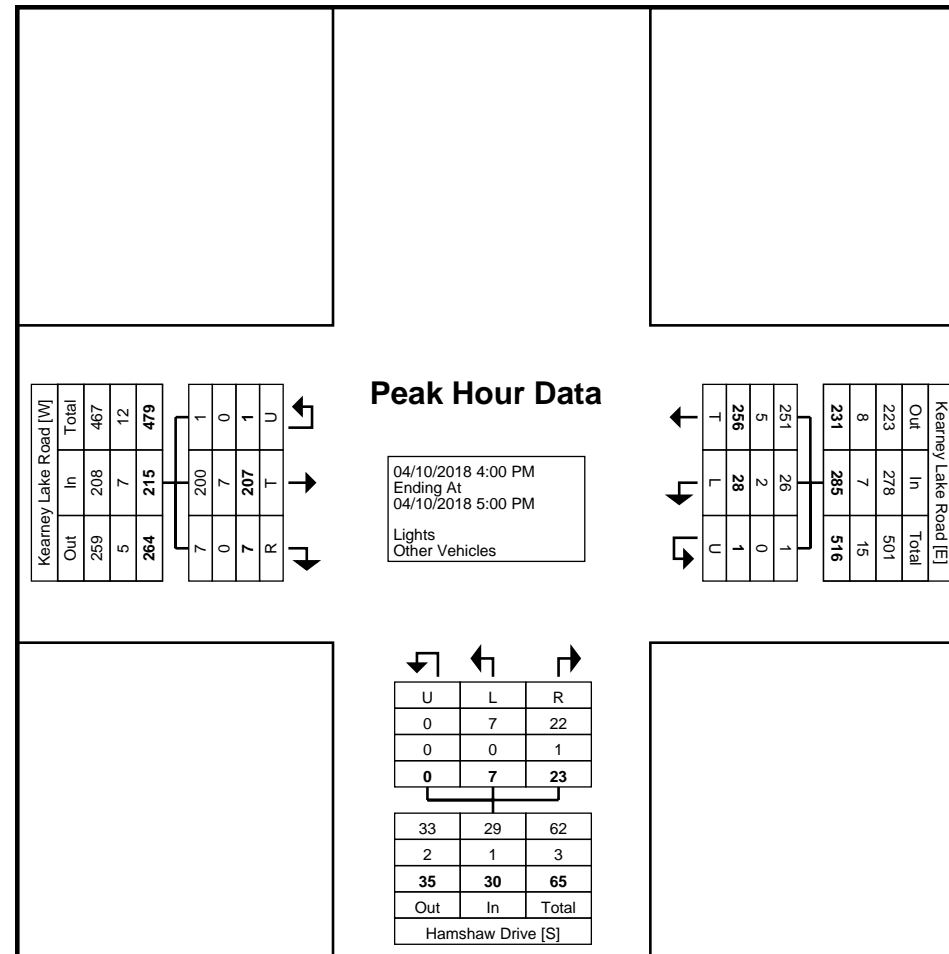
Turning Movement Peak Hour Data (4:00 PM)

Start Time	Kearney Lake Road Westbound				Hamshaw Drive Northbound				Kearney Lake Road Eastbound				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
4:00 PM	64	12	0	76	8	2	0	10	1	56	0	57	143
4:15 PM	69	4	0	73	2	2	0	4	3	46	0	49	126
4:30 PM	60	6	1	67	9	2	0	11	2	58	0	60	138
4:45 PM	63	6	0	69	4	1	0	5	1	47	1	49	123
Total	256	28	1	285	23	7	0	30	7	207	1	215	530
Approach %	89.8	9.8	0.4	-	76.7	23.3	0.0	-	3.3	96.3	0.5	-	-
Total %	48.3	5.3	0.2	53.8	4.3	1.3	0.0	5.7	1.3	39.1	0.2	40.6	-
PHF	0.928	0.583	0.250	0.938	0.639	0.875	0.000	0.682	0.583	0.892	0.250	0.896	0.927
Lights	251	26	1	278	22	7	0	29	7	200	1	208	515
% Lights	98.0	92.9	100.0	97.5	95.7	100.0	-	96.7	100.0	96.6	100.0	96.7	97.2
Other Vehicles	5	2	0	7	1	0	0	1	0	7	0	7	15
% Other Vehicles	2.0	7.1	0.0	2.5	4.3	0.0	-	3.3	0.0	3.4	0.0	3.3	2.8



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Count Name: Kearney Lake Road & Hamshaw
Drive
Site Code:
Start Date: 04/10/2018
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Turning Movement Peak Hour Data Plot (4:00 PM)



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Count Name: Kearney Lake Road & Highway
 102 NB Ramps
 Site Code:
 Start Date: 04/11/2018
 Page No: 1

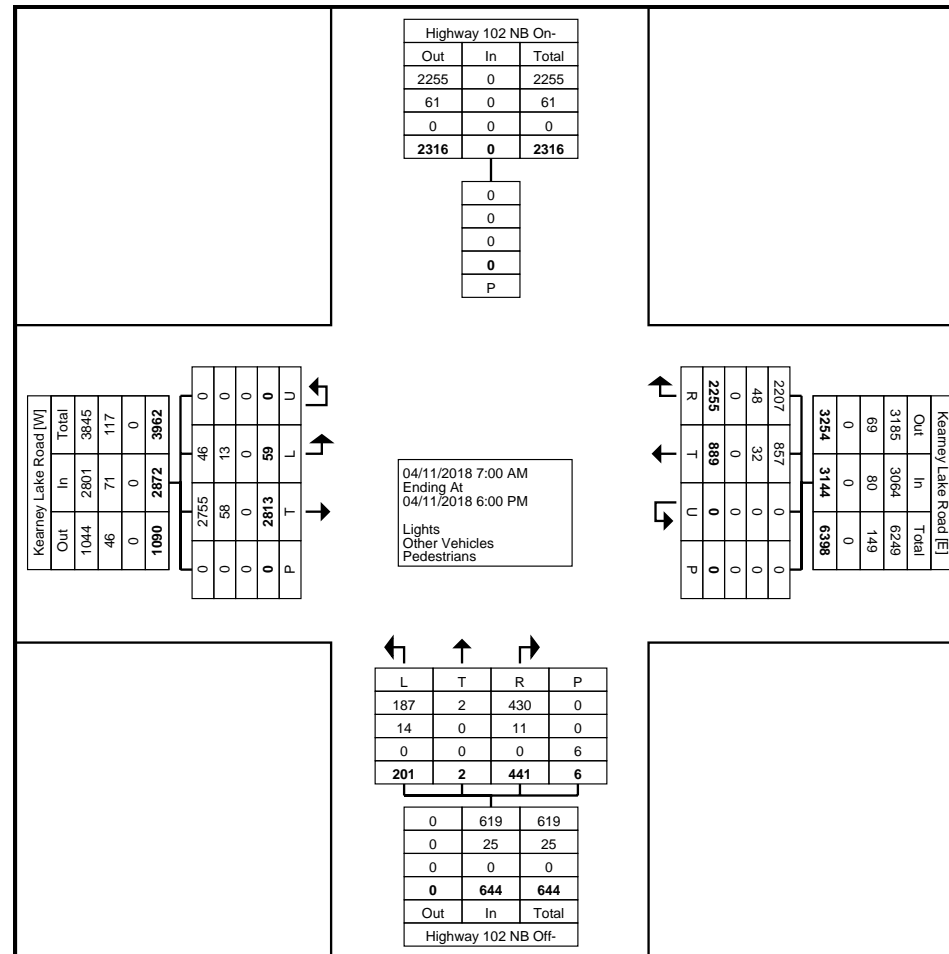
Turning Movement Data

Start Time	Highway 102 NB On-Ramp Southbound		Kearney Lake Road Westbound					Highway 102 NB Off-Ramp Northbound					Kearney Lake Road Eastbound					Int. Total
	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	
7:00 AM	0	0	79	24	0	0	103	6	0	1	0	7	139	3	0	0	142	252
7:15 AM	0	0	89	49	0	0	138	14	0	3	1	17	188	3	0	0	191	346
7:30 AM	0	0	108	43	0	0	151	13	0	5	0	18	193	8	0	0	201	370
7:45 AM	0	0	119	50	0	0	169	14	0	8	1	22	229	5	0	0	234	425
Hourly Total	0	0	395	166	0	0	561	47	0	17	2	64	749	19	0	0	768	1393
8:00 AM	0	0	91	35	0	0	126	21	0	8	0	29	236	1	0	0	237	392
8:15 AM	0	0	136	46	0	0	182	21	1	7	0	29	193	0	0	0	193	404
8:30 AM	0	0	105	31	0	0	136	19	0	8	0	27	184	2	0	0	186	349
8:45 AM	0	0	112	50	0	0	162	20	0	12	0	32	168	2	0	0	170	364
Hourly Total	0	0	444	162	0	0	606	81	1	35	0	117	781	5	0	0	786	1509
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	0	193	62	0	0	255	37	0	18	0	55	154	3	0	0	157	467
4:15 PM	0	0	195	71	0	0	266	33	0	19	1	52	185	6	0	0	191	509
4:30 PM	0	0	195	79	0	0	274	40	0	24	1	64	149	5	0	0	154	492
4:45 PM	0	0	193	67	0	0	260	42	0	13	0	55	174	6	0	0	180	495
Hourly Total	0	0	776	279	0	0	1055	152	0	74	2	226	662	20	0	0	682	1963
5:00 PM	0	0	183	66	0	0	249	37	1	24	1	62	171	4	0	0	175	486
5:15 PM	0	0	159	74	0	0	233	49	0	22	0	71	163	5	0	0	168	472
5:30 PM	0	0	164	77	0	0	241	36	0	18	1	54	139	5	0	0	144	439
5:45 PM	0	0	134	65	0	0	199	39	0	11	0	50	148	1	0	0	149	398
Hourly Total	0	0	640	282	0	0	922	161	1	75	2	237	621	15	0	0	636	1795
Grand Total	0	0	2255	889	0	0	3144	441	2	201	6	644	2813	59	0	0	2872	6660
Approach %	-	-	71.7	28.3	0.0	-	-	68.5	0.3	31.2	-	-	97.9	2.1	0.0	-	-	-
Total %	-	0.0	33.9	13.3	0.0	-	47.2	6.6	0.0	3.0	-	9.7	42.2	0.9	0.0	-	43.1	-
Lights	-	0	2207	857	0	-	3064	430	2	187	-	619	2755	46	0	-	2801	6484
% Lights	-	-	97.9	96.4	-	-	97.5	97.5	100.0	93.0	-	96.1	97.9	78.0	-	-	97.5	97.4
Other Vehicles	-	0	48	32	0	-	80	11	0	14	-	25	58	13	0	-	71	176
% Other Vehicles	-	-	2.1	3.6	-	-	2.5	2.5	0.0	7.0	-	3.9	2.1	22.0	-	-	2.5	2.6
Pedestrians	0	-	-	-	-	0	-	-	-	-	6	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Kearney Lake Road & Highway
102 NB Ramps
Site Code:
Start Date: 04/11/2018
Page No: 2



Turning Movement Data Plot

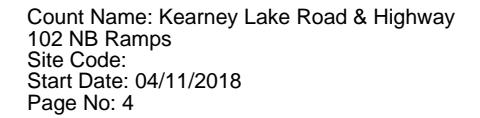


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 102 NB Ramps
 Site Code:
 Start Date: 04/11/2018
 Page No: 3

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Highway 102 NB On-Ramp Southbound		Kearney Lake Road Westbound					Highway 102 NB Off-Ramp Northbound					Kearney Lake Road Eastbound					Int. Total
	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	
7:30 AM	0	0	108	43	0	0	151	13	0	5	0	18	193	8	0	0	201	370
7:45 AM	0	0	119	50	0	0	169	14	0	8	1	22	229	5	0	0	234	425
8:00 AM	0	0	91	35	0	0	126	21	0	8	0	29	236	1	0	0	237	392
8:15 AM	0	0	136	46	0	0	182	21	1	7	0	29	193	0	0	0	193	404
Total	0	0	454	174	0	0	628	69	1	28	1	98	851	14	0	0	865	1591
Approach %	-	-	72.3	27.7	0.0	-	-	70.4	1.0	28.6	-	-	98.4	1.6	0.0	-	-	-
Total %	-	0.0	28.5	10.9	0.0	-	39.5	4.3	0.1	1.8	-	6.2	53.5	0.9	0.0	-	54.4	-
PHF	-	0.000	0.835	0.870	0.000	-	0.863	0.821	0.250	0.875	-	0.845	0.901	0.438	0.000	-	0.912	0.936
Lights	-	0	445	165	0	-	610	65	1	24	-	90	831	10	0	-	841	1541
% Lights	-	-	98.0	94.8	-	-	97.1	94.2	100.0	85.7	-	91.8	97.6	71.4	-	-	97.2	96.9
Other Vehicles	-	0	9	9	0	-	18	4	0	4	-	8	20	4	0	-	24	50
% Other Vehicles	-	-	2.0	5.2	-	-	2.9	5.8	0.0	14.3	-	8.2	2.4	28.6	-	-	2.8	3.1
Pedestrians	0	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



Peak Hour Data

04/11/2018 7:30 AM
Ending At
04/11/2018 8:30 AM

Lights
Other Vehicles
Pedestrians

Highway 102 NB On-

Out	In	Total
456	0	456
13	0	13
0	0	0
469	0	469

Kearney Lake Road [E]

Out	In	Total
896	610	1506
24	18	42
0	0	0
920	628	1548

Highway 102 NB Off-

Out	In	Total
0	90	90
0	8	8
0	0	0
0	98	98
Out	In	Total

Kearney Lake Road [W]

Out	In	Total
189	841	1030
13	24	37
0	0	0
202	865	1067

Intersection Data

L	T	R	P
24	1	65	0
4	0	4	0
0	0	0	1
28	1	69	1

Intersection Data

L	T	R	P
0	90	90	
0	8	8	
0	0	0	
0	98	98	
Out	In	Total	



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Count Name: Kearney Lake Road & Highway
 102 NB Ramps
 Site Code:
 Start Date: 04/11/2018
 Page No: 5

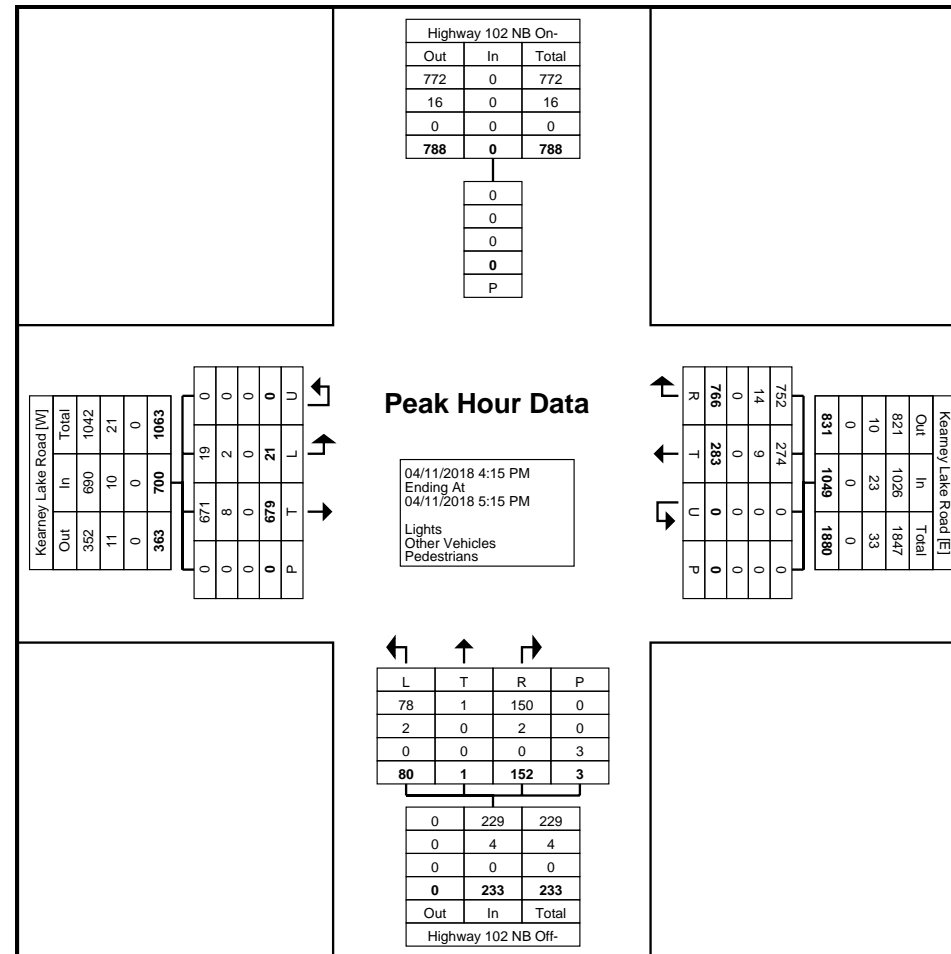
Turning Movement Peak Hour Data (4:15 PM)

Start Time	Highway 102 NB On-Ramp Southbound		Kearney Lake Road Westbound					Highway 102 NB Off-Ramp Northbound					Kearney Lake Road Eastbound					Int. Total
	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	
4:15 PM	0	0	195	71	0	0	266	33	0	19	1	52	185	6	0	0	191	509
4:30 PM	0	0	195	79	0	0	274	40	0	24	1	64	149	5	0	0	154	492
4:45 PM	0	0	193	67	0	0	260	42	0	13	0	55	174	6	0	0	180	495
5:00 PM	0	0	183	66	0	0	249	37	1	24	1	62	171	4	0	0	175	486
Total	0	0	766	283	0	0	1049	152	1	80	3	233	679	21	0	0	700	1982
Approach %	-	-	73.0	27.0	0.0	-	-	65.2	0.4	34.3	-	-	97.0	3.0	0.0	-	-	-
Total %	-	0.0	38.6	14.3	0.0	-	52.9	7.7	0.1	4.0	-	11.8	34.3	1.1	0.0	-	35.3	-
PHF	-	0.000	0.982	0.896	0.000	-	0.957	0.905	0.250	0.833	-	0.910	0.918	0.875	0.000	-	0.916	0.973
Lights	-	0	752	274	0	-	1026	150	1	78	-	229	671	19	0	-	690	1945
% Lights	-	-	98.2	96.8	-	-	97.8	98.7	100.0	97.5	-	98.3	98.8	90.5	-	-	98.6	98.1
Other Vehicles	-	0	14	9	0	-	23	2	0	2	-	4	8	2	0	-	10	37
% Other Vehicles	-	-	1.8	3.2	-	-	2.2	1.3	0.0	2.5	-	1.7	1.2	9.5	-	-	1.4	1.9
Pedestrians	0	-	-	-	-	0	-	-	-	-	3	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Kearney Lake Road & Highway
102 NB Ramps
Site Code:
Start Date: 04/11/2018
Page No: 6



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



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Count Name: Kearney Lake Road & Highway
 102 SB Ramps
 Site Code:
 Start Date: 04/11/2018
 Page No: 1

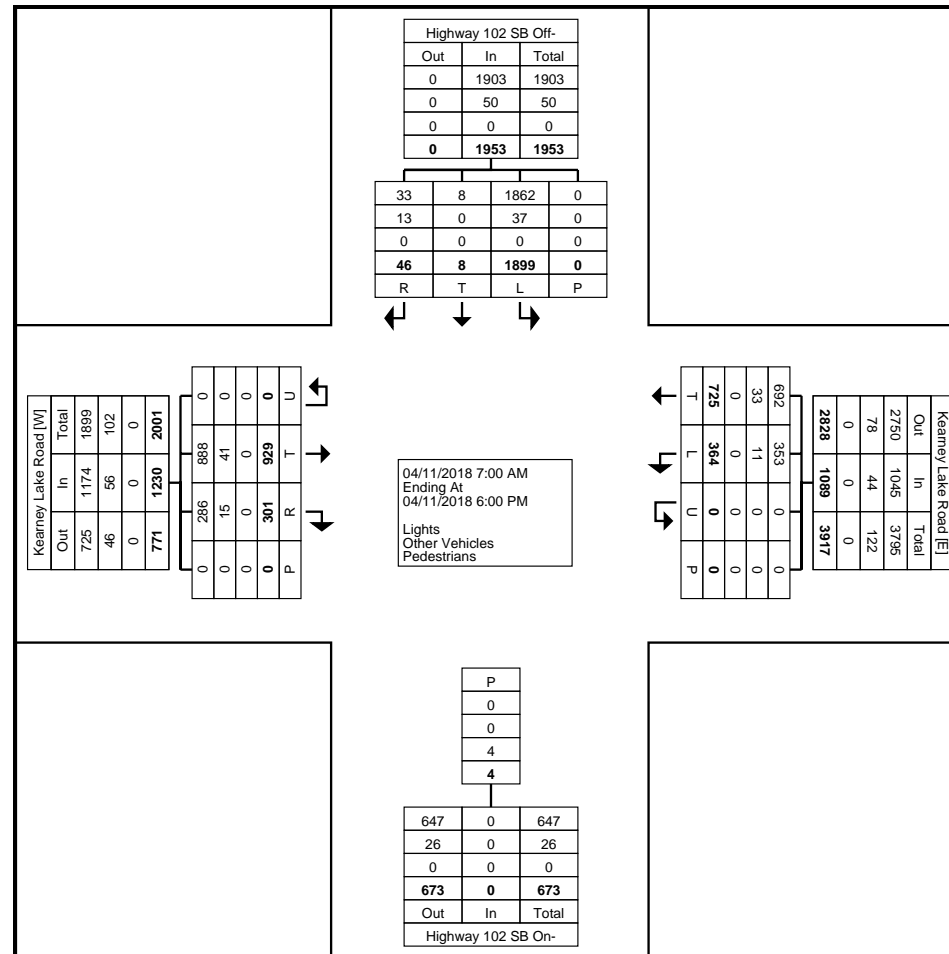
Turning Movement Data

Start Time	Highway 102 SB Off-Ramp Southbound					Kearney Lake Road Westbound					Highway 102 SB On-Ramp Northbound		Kearney Lake Road Eastbound					Int. Total
	Right	Thru	Left	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	
7:00 AM	1	0	49	0	50	14	6	0	0	20	0	0	13	50	0	0	63	133
7:15 AM	3	1	126	0	130	35	17	0	0	52	1	0	22	76	0	0	98	280
7:30 AM	4	1	109	0	114	31	23	0	0	54	0	0	22	82	0	0	104	272
7:45 AM	0	0	132	0	132	34	18	0	0	52	1	0	30	107	0	0	137	321
Hourly Total	8	2	416	0	426	114	64	0	0	178	2	0	87	315	0	0	402	1006
8:00 AM	5	0	150	0	155	30	16	0	0	46	0	0	17	85	0	0	102	303
8:15 AM	2	0	118	0	120	30	20	0	0	50	0	0	17	77	0	0	94	264
8:30 AM	2	0	141	0	143	27	22	0	0	49	0	0	29	50	0	0	79	271
8:45 AM	7	0	110	0	117	36	19	0	0	55	0	0	21	58	0	0	79	251
Hourly Total	16	0	519	0	535	123	77	0	0	200	0	0	84	270	0	0	354	1089
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	2	1	106	0	109	62	25	0	0	87	0	0	22	46	0	0	68	264
4:15 PM	5	1	135	0	141	54	30	0	0	84	0	0	12	59	0	0	71	296
4:30 PM	2	1	114	0	117	70	30	0	0	100	1	0	22	46	0	0	68	285
4:45 PM	1	2	117	0	120	52	30	0	0	82	0	0	10	48	0	0	58	260
Hourly Total	10	5	472	0	487	238	115	0	0	353	1	0	66	199	0	0	265	1105
5:00 PM	3	0	144	0	147	67	26	0	0	93	1	0	17	44	0	0	61	301
5:15 PM	4	0	120	0	124	70	22	0	0	92	0	0	16	39	0	0	55	271
5:30 PM	1	0	121	0	122	60	33	0	0	93	0	0	16	28	0	0	44	259
5:45 PM	4	1	107	0	112	53	27	0	0	80	0	0	15	34	0	0	49	241
Hourly Total	12	1	492	0	505	250	108	0	0	358	1	0	64	145	0	0	209	1072
Grand Total	46	8	1899	0	1953	725	364	0	0	1089	4	0	301	929	0	0	1230	4272
Approach %	2.4	0.4	97.2	-	-	66.6	33.4	0.0	-	-	-	-	24.5	75.5	0.0	-	-	-
Total %	1.1	0.2	44.5	-	45.7	17.0	8.5	0.0	-	25.5	-	0.0	7.0	21.7	0.0	-	28.8	-
Lights	33	8	1862	-	1903	692	353	0	-	1045	-	0	286	888	0	-	1174	4122
% Lights	71.7	100.0	98.1	-	97.4	95.4	97.0	-	-	96.0	-	-	95.0	95.6	-	-	95.4	96.5
Other Vehicles	13	0	37	-	50	33	11	0	-	44	-	0	15	41	0	-	56	150
% Other Vehicles	28.3	0.0	1.9	-	2.6	4.6	3.0	-	-	4.0	-	-	5.0	4.4	-	-	4.6	3.5
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Kearney Lake Road & Highway
102 SB Ramps
Site Code:
Start Date: 04/11/2018
Page No: 2



Turning Movement Data Plot



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 102 SB Ramps
 Site Code:
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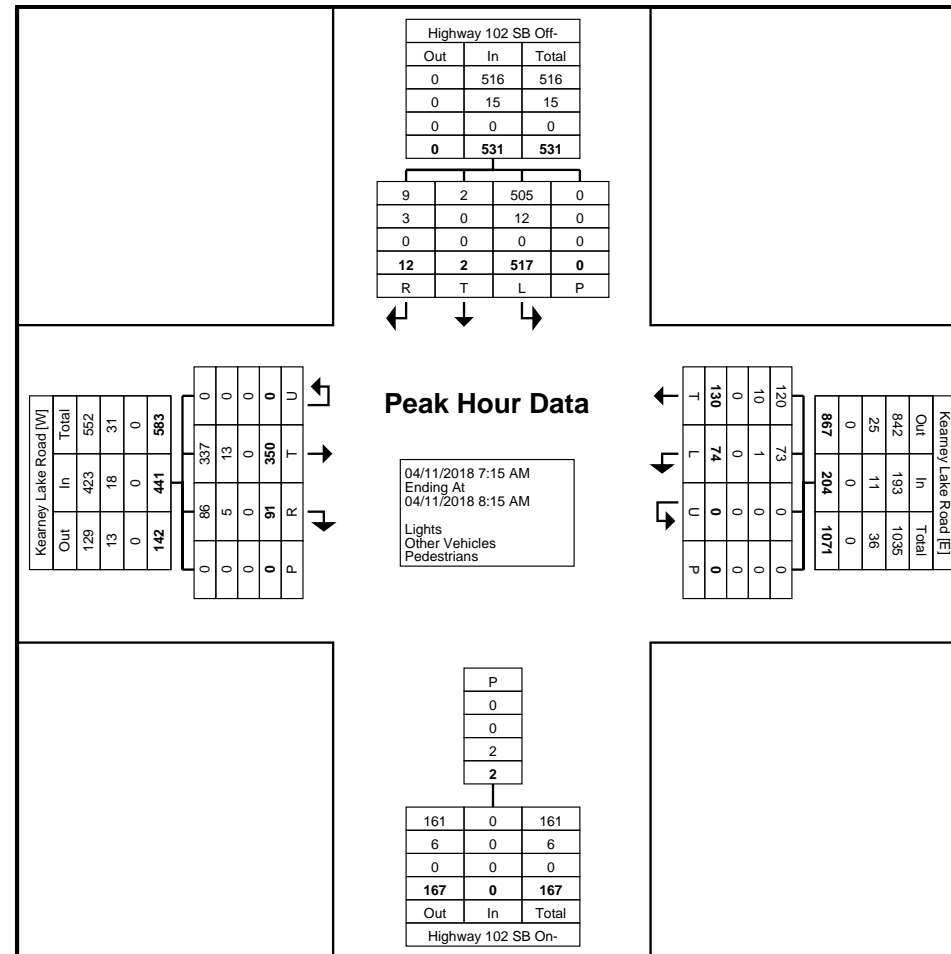
Turning Movement Peak Hour Data (7:15 AM)

Start Time	Highway 102 SB Off-Ramp Southbound					Kearney Lake Road Westbound					Highway 102 SB On-Ramp Northbound		Kearney Lake Road Eastbound					Int. Total
	Right	Thru	Left	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	
7:15 AM	3	1	126	0	130	35	17	0	0	52	1	0	22	76	0	0	98	280
7:30 AM	4	1	109	0	114	31	23	0	0	54	0	0	22	82	0	0	104	272
7:45 AM	0	0	132	0	132	34	18	0	0	52	1	0	30	107	0	0	137	321
8:00 AM	5	0	150	0	155	30	16	0	0	46	0	0	17	85	0	0	102	303
Total	12	2	517	0	531	130	74	0	0	204	2	0	91	350	0	0	441	1176
Approach %	2.3	0.4	97.4	-	-	63.7	36.3	0.0	-	-	-	-	20.6	79.4	0.0	-	-	-
Total %	1.0	0.2	44.0	-	45.2	11.1	6.3	0.0	-	17.3	-	0.0	7.7	29.8	0.0	-	37.5	-
PHF	0.600	0.500	0.862	-	0.856	0.929	0.804	0.000	-	0.944	-	0.000	0.758	0.818	0.000	-	0.805	0.916
Lights	9	2	505	-	516	120	73	0	-	193	-	0	86	337	0	-	423	1132
% Lights	75.0	100.0	97.7	-	97.2	92.3	98.6	-	-	94.6	-	-	94.5	96.3	-	-	95.9	96.3
Other Vehicles	3	0	12	-	15	10	1	0	-	11	-	0	5	13	0	-	18	44
% Other Vehicles	25.0	0.0	2.3	-	2.8	7.7	1.4	-	-	5.4	-	-	5.5	3.7	-	-	4.1	3.7
Pedestrians	-	-	-	0	-	-	-	-	0	-	2	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Kearney Lake Road & Highway
102 SB Ramps
Site Code:
Start Date: 04/11/2018
Page No: 4



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



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Count Name: Kearney Lake Road & Highway
 102 SB Ramps
 Site Code:
 Start Date: 04/11/2018
 Page No: 5

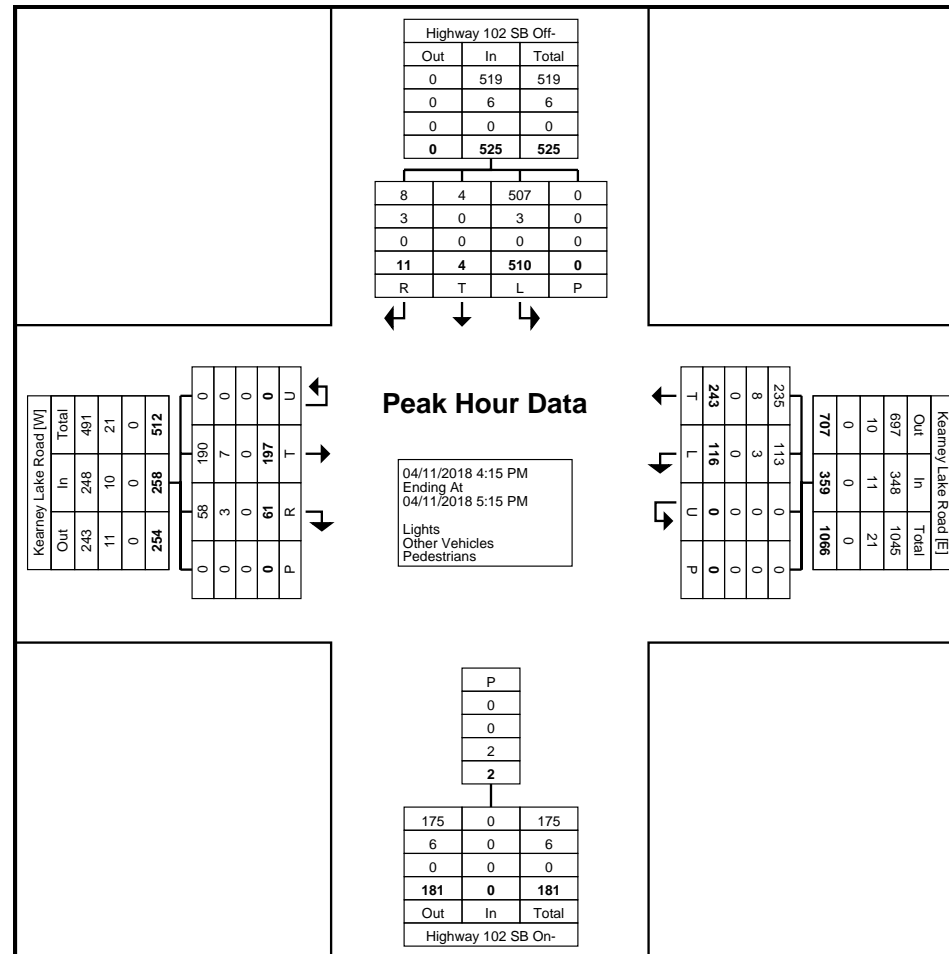
Turning Movement Peak Hour Data (4:15 PM)

Start Time	Highway 102 SB Off-Ramp Southbound					Kearney Lake Road Westbound					Highway 102 SB On-Ramp Northbound		Kearney Lake Road Eastbound					Int. Total
	Right	Thru	Left	Peds	App. Total	Thru	Left	U-Turn	Peds	App. Total	Peds	App. Total	Right	Thru	U-Turn	Peds	App. Total	
4:15 PM	5	1	135	0	141	54	30	0	0	84	0	0	12	59	0	0	71	296
4:30 PM	2	1	114	0	117	70	30	0	0	100	1	0	22	46	0	0	68	285
4:45 PM	1	2	117	0	120	52	30	0	0	82	0	0	10	48	0	0	58	260
5:00 PM	3	0	144	0	147	67	26	0	0	93	1	0	17	44	0	0	61	301
Total	11	4	510	0	525	243	116	0	0	359	2	0	61	197	0	0	258	1142
Approach %	2.1	0.8	97.1	-	-	67.7	32.3	0.0	-	-	-	-	23.6	76.4	0.0	-	-	-
Total %	1.0	0.4	44.7	-	46.0	21.3	10.2	0.0	-	31.4	-	0.0	5.3	17.3	0.0	-	22.6	-
PHF	0.550	0.500	0.885	-	0.893	0.868	0.967	0.000	-	0.898	-	0.000	0.693	0.835	0.000	-	0.908	0.949
Lights	8	4	507	-	519	235	113	0	-	348	-	0	58	190	0	-	248	1115
% Lights	72.7	100.0	99.4	-	98.9	96.7	97.4	-	-	96.9	-	-	95.1	96.4	-	-	96.1	97.6
Other Vehicles	3	0	3	-	6	8	3	0	-	11	-	0	3	7	0	-	10	27
% Other Vehicles	27.3	0.0	0.6	-	1.1	3.3	2.6	-	-	3.1	-	-	4.9	3.6	-	-	3.9	2.4
Pedestrians	-	-	-	0	-	-	-	-	0	-	2	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Kearney Lake Road & Highway
 102 SB Ramps
 Site Code:
 Start Date: 04/11/2018
 Page No: 6



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



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Count Name: Kearney Lake Road & Larry Uteck
 Boulevard
 Site Code:
 Start Date: 04/10/2018
 Page No: 1

Turning Movement Data

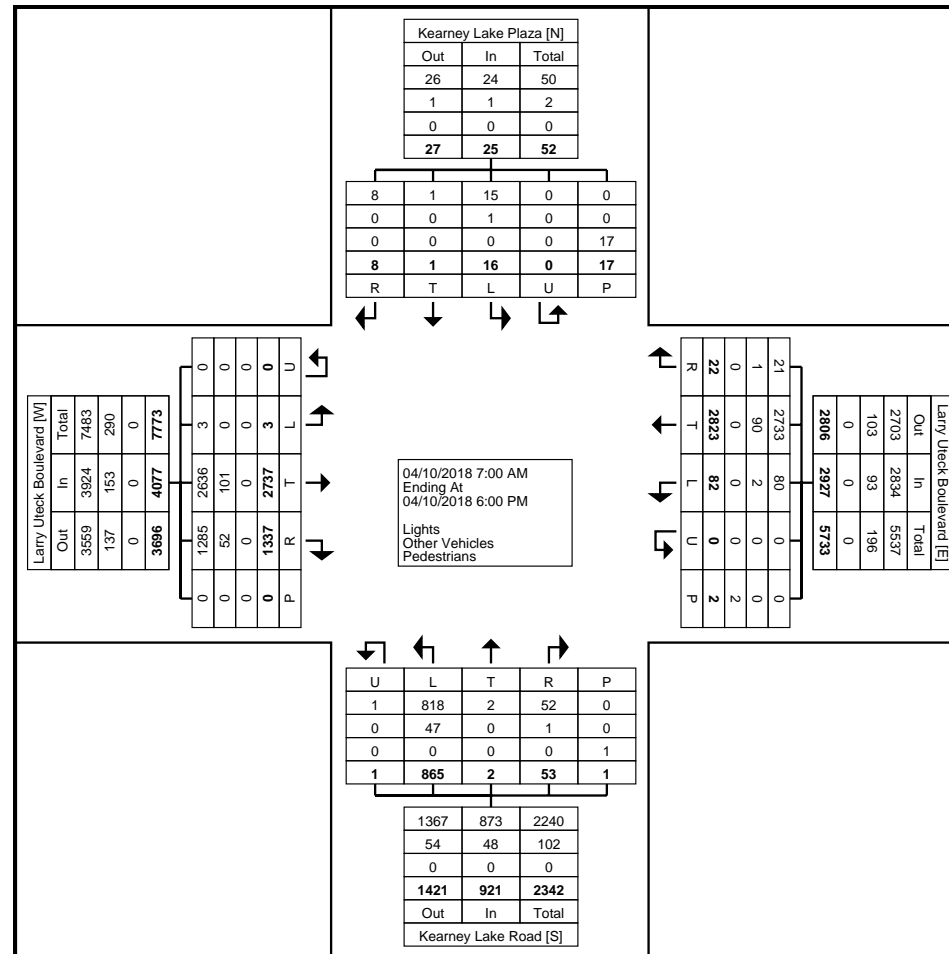
Start Time	Kearney Lake Plaza Southbound						Larry Uteck Boulevard Westbound						Kearney Lake Road Northbound						Larry Uteck Boulevard Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:00 AM	0	0	0	0	0	0	0	59	0	0	0	59	0	0	11	0	0	11	81	143	0	0	0	224	294
7:15 AM	0	0	0	0	0	0	2	86	5	0	0	93	0	0	27	0	0	27	98	156	0	0	0	254	374
7:30 AM	0	0	1	0	0	1	1	86	3	0	0	90	2	0	16	0	0	18	96	165	1	0	0	262	371
7:45 AM	1	0	1	0	3	2	1	104	5	0	0	110	0	0	42	0	0	42	96	160	0	0	0	256	410
Hourly Total	1	0	2	0	3	3	4	335	13	0	0	352	2	0	96	0	0	98	371	624	1	0	0	996	1449
8:00 AM	0	0	0	0	0	0	1	84	7	0	0	92	2	1	23	0	0	26	87	156	0	0	0	243	361
8:15 AM	0	0	0	0	1	0	0	79	3	0	0	82	2	0	25	0	0	27	81	154	0	0	0	235	344
8:30 AM	0	0	1	0	0	1	1	84	4	0	0	89	1	0	14	0	0	15	82	175	0	0	0	257	362
8:45 AM	0	0	1	0	1	1	2	88	3	0	0	93	1	0	28	0	0	29	59	137	0	0	0	196	319
Hourly Total	0	0	2	0	2	2	4	335	17	0	0	356	6	1	90	0	0	97	309	622	0	0	0	931	1386
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	0	0	0	0	0	0	1	60	2	0	0	63	2	0	22	0	0	24	42	73	0	0	0	115	202
11:15 AM	1	0	0	0	0	1	1	72	3	0	0	76	0	0	20	0	0	20	41	60	1	0	0	102	199
11:30 AM	1	0	0	0	0	1	0	72	4	0	0	76	0	0	37	1	0	38	34	83	0	0	0	117	232
11:45 AM	0	0	0	0	0	0	0	79	3	0	0	82	0	0	30	0	0	30	39	83	0	0	0	122	234
Hourly Total	2	0	0	0	0	2	2	283	12	0	0	297	2	0	109	1	0	112	156	299	1	0	0	456	867
12:00 PM	1	0	0	0	1	1	2	86	2	0	0	90	2	0	36	0	0	38	31	103	0	0	0	134	263
12:15 PM	0	0	1	0	0	1	0	107	2	0	0	109	4	0	32	0	0	36	36	74	0	0	0	110	256
12:30 PM	0	0	1	0	2	1	1	119	3	0	0	123	1	0	41	0	0	42	31	86	0	0	0	117	283
12:45 PM	0	0	0	0	0	0	1	89	3	0	0	93	1	0	33	0	0	34	43	74	0	0	0	117	244
Hourly Total	1	0	2	0	3	3	4	401	10	0	0	415	8	0	142	0	0	150	141	337	0	0	0	478	1046
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	1	1	1	0	0	3	2	152	3	0	0	157	4	0	55	0	0	59	52	95	0	0	0	147	366
4:15 PM	1	0	0	0	1	1	0	174	5	0	0	179	8	0	58	0	0	66	44	109	0	0	0	153	399
4:30 PM	0	0	3	0	0	3	2	177	5	0	0	184	5	0	59	0	0	64	57	125	0	0	0	182	433
4:45 PM	0	0	1	0	2	1	1	221	2	0	0	224	3	0	55	0	0	58	47	107	0	0	0	154	437
Hourly Total	2	1	5	0	3	8	5	724	15	0	0	744	20	0	227	0	0	247	200	436	0	0	0	636	1635
5:00 PM	1	0	2	0	0	3	0	175	4	0	0	179	7	0	46	0	0	53	36	128	0	0	0	164	399
5:15 PM	1	0	0	0	2	1	3	195	2	0	1	200	2	0	46	0	0	48	41	106	0	0	0	147	396
5:30 PM	0	0	2	0	3	2	0	202	7	0	1	209	1	0	51	0	1	52	41	110	1	0	0	152	415
5:45 PM	0	0	1	0	1	1	0	173	2	0	0	175	5	1	58	0	0	64	42	75	0	0	0	117	357
Hourly Total	2	0	5	0	6	7	3	745	15	0	2	763	15	1	201	0	1	217	160	419	1	0	0	580	1567
Grand Total	8	1	16	0	17	25	22	2823	82	0	2	2927	53	2	865	1	1	921	1337	2737	3	0	0	4077	7950
Approach %	32.0	4.0	64.0	0.0	-	-	0.8	96.4	2.8	0.0	-	-	5.8	0.2	93.9	0.1	-	-	32.8	67.1	0.1	0.0	-	-	-
Total %	0.1	0.0	0.2	0.0	-	0.3	0.3	35.5	1.0	0.0	-	36.8	0.7	0.0	10.9	0.0	-	11.6	16.8	34.4	0.0	0.0	-	51.3	-
Lights	8	1	15	0	-	24	21	2733	80	0	-	2834	52	2	818	1	-	873	1285	2636	3	0	-	3924	7655
% Lights	100.0	100.0	93.8	-	-	96.0	95.5	96.8	97.6	-	-	96.8	98.1	100.0	94.6	100.0	-	94.8	96.1	96.3	100.0	-	-	96.2	96.3

Other Vehicles	0	0	1	0	-	1	1	90	2	0	-	93	1	0	47	0	-	48	52	101	0	0	-	153	295
% Other Vehicles	0.0	0.0	6.3	-	-	4.0	4.5	3.2	2.4	-	-	3.2	1.9	0.0	5.4	0.0	-	5.2	3.9	3.7	0.0	-	-	3.8	3.7
Pedestrians	-	-	-	-	17	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

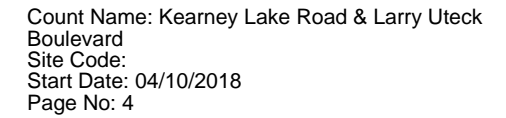


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Count Name: Kearney Lake Road & Larry Uteck
 Boulevard
 Site Code:
 Start Date: 04/10/2018
 Page No: 3



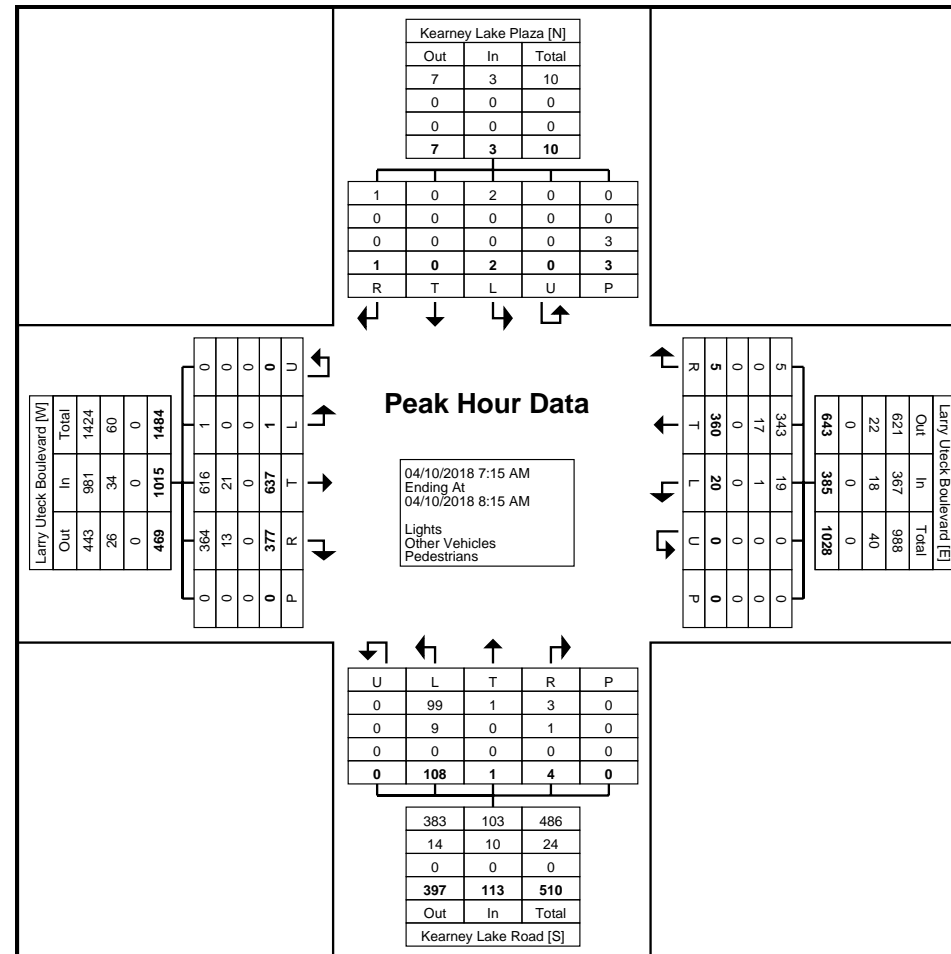
Turning Movement Data Plot

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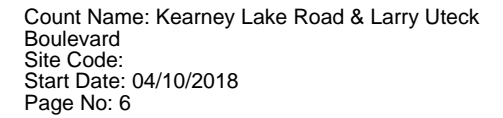


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Count Name: Kearney Lake Road & Larry Uteck
Boulevard
Site Code:
Start Date: 04/10/2018
Page No: 5



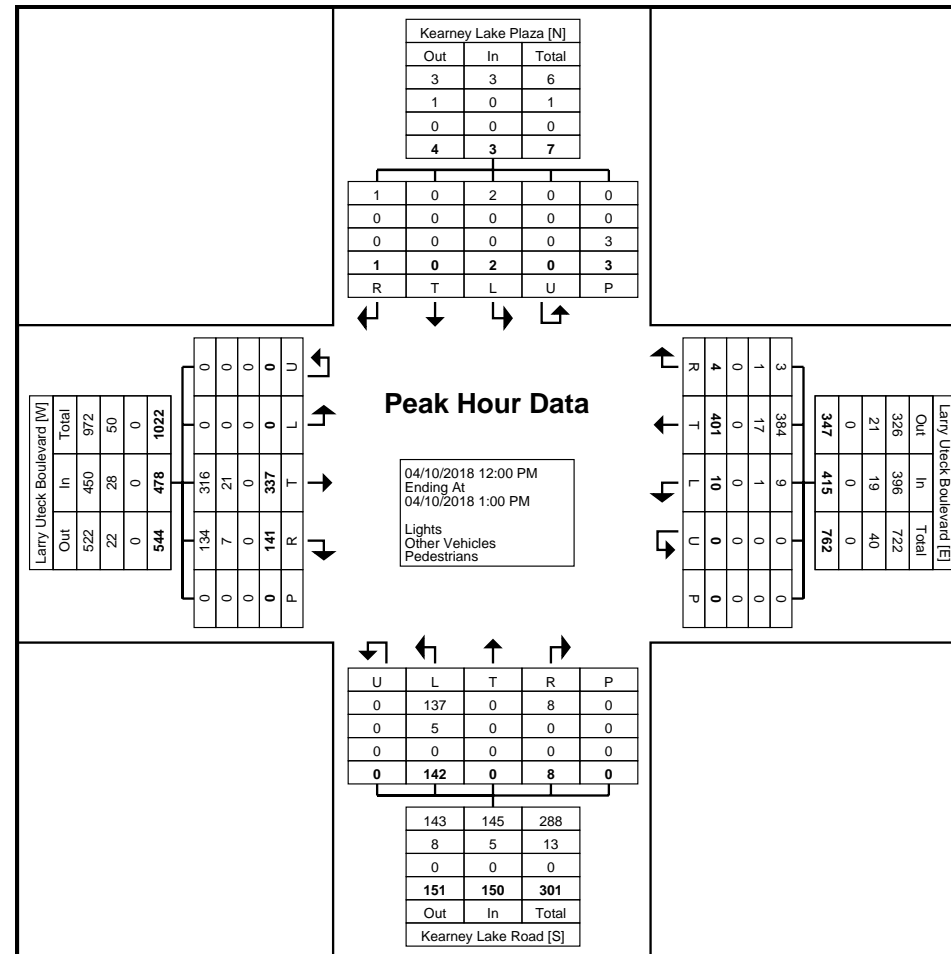
Turning Movement Peak Hour Data Plot (7:15 AM)

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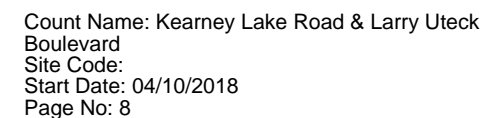


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Count Name: Kearney Lake Road & Larry Uteck
Boulevard
Site Code:
Start Date: 04/10/2018
Page No: 7



Turning Movement Peak Hour Data Plot (12:00 PM)

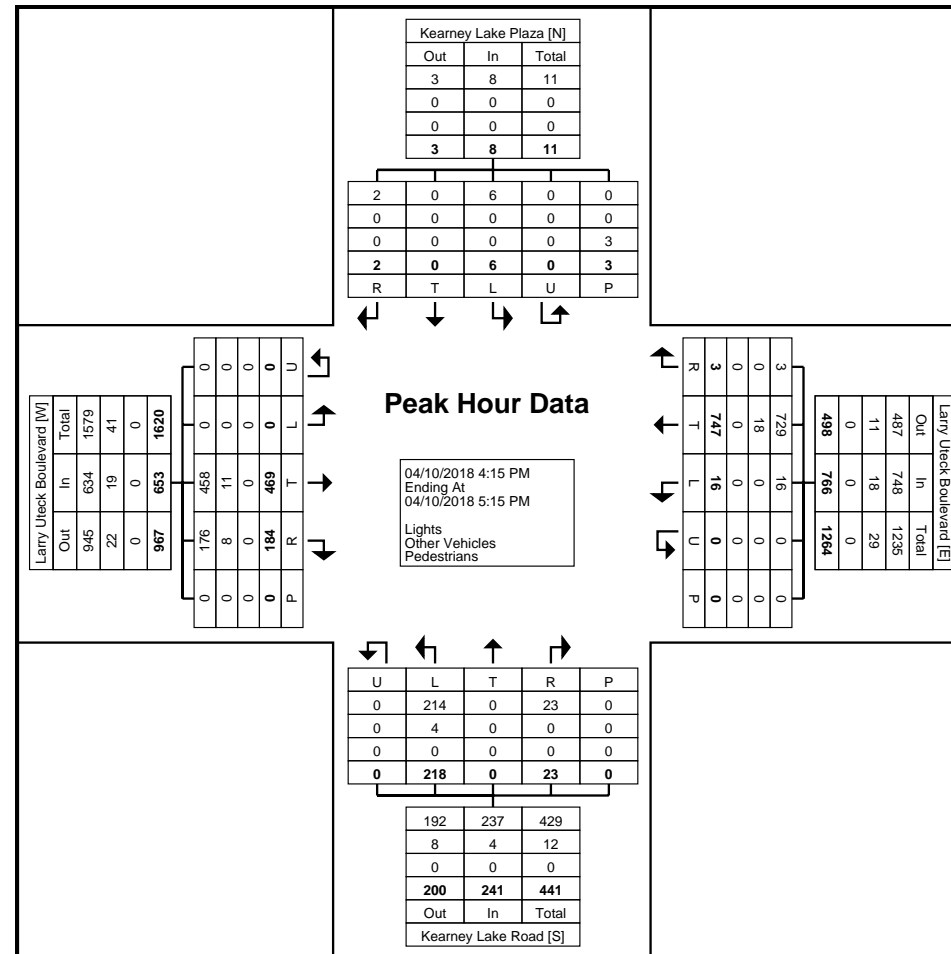


Start Time	Kearney Lake Plaza Southbound						Larry Uteck Boulevard Westbound						Kearney Lake Road Northbound						Larry Uteck Boulevard Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:15 PM	1	0	0	0	1	1	0	174	5	0	0	179	8	0	58	0	0	66	44	109	0	0	0	153	399
4:30 PM	0	0	3	0	0	3	2	177	5	0	0	184	5	0	59	0	0	64	57	125	0	0	0	182	433
4:45 PM	0	0	1	0	2	1	1	221	2	0	0	224	3	0	55	0	0	58	47	107	0	0	0	154	437
5:00 PM	1	0	2	0	0	3	0	175	4	0	0	179	7	0	46	0	0	53	36	128	0	0	0	164	399
Total	2	0	6	0	3	8	3	747	16	0	0	766	23	0	218	0	0	241	184	469	0	0	0	653	1668
Approach %	25.0	0.0	75.0	0.0	-	-	0.4	97.5	2.1	0.0	-	-	9.5	0.0	90.5	0.0	-	-	28.2	71.8	0.0	0.0	-	-	-
Total	0.1	0.0	0.4	0.0	-	0.5	0.2	44.8	1.0	0.0	-	45.9	1.4	0.0	13.1	0.0	-	14.4	11.0	28.1	0.0	0.0	-	39.1	-
PHF	0.500	0.000	0.500	0.000	-	0.667	0.375	0.845	0.800	0.000	-	0.855	0.719	0.000	0.924	0.000	-	0.913	0.807	0.916	0.000	0.000	-	0.897	0.954
Lights	2	0	6	0	-	8	3	729	16	0	-	748	23	0	214	0	-	237	176	458	0	0	-	634	1627
% Lights	100.0	-	100.0	-	-	100.0	100.0	97.6	100.0	-	-	97.7	100.0	-	98.2	-	-	98.3	95.7	97.7	-	-	-	97.1	97.5
Other Vehicles	0	0	0	0	-	0	0	18	0	0	-	18	0	0	4	0	-	4	8	11	0	0	-	19	41
% Other Vehicles	0.0	-	0.0	-	-	0.0	0.0	2.4	0.0	-	-	2.3	0.0	-	1.8	-	-	1.7	4.3	2.3	-	-	-	2.9	2.5
Pedestrians	-	-	-	-	3	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Count Name: Kearney Lake Road & Larry Uteck
 Boulevard
 Site Code:
 Start Date: 04/10/2018
 Page No: 9



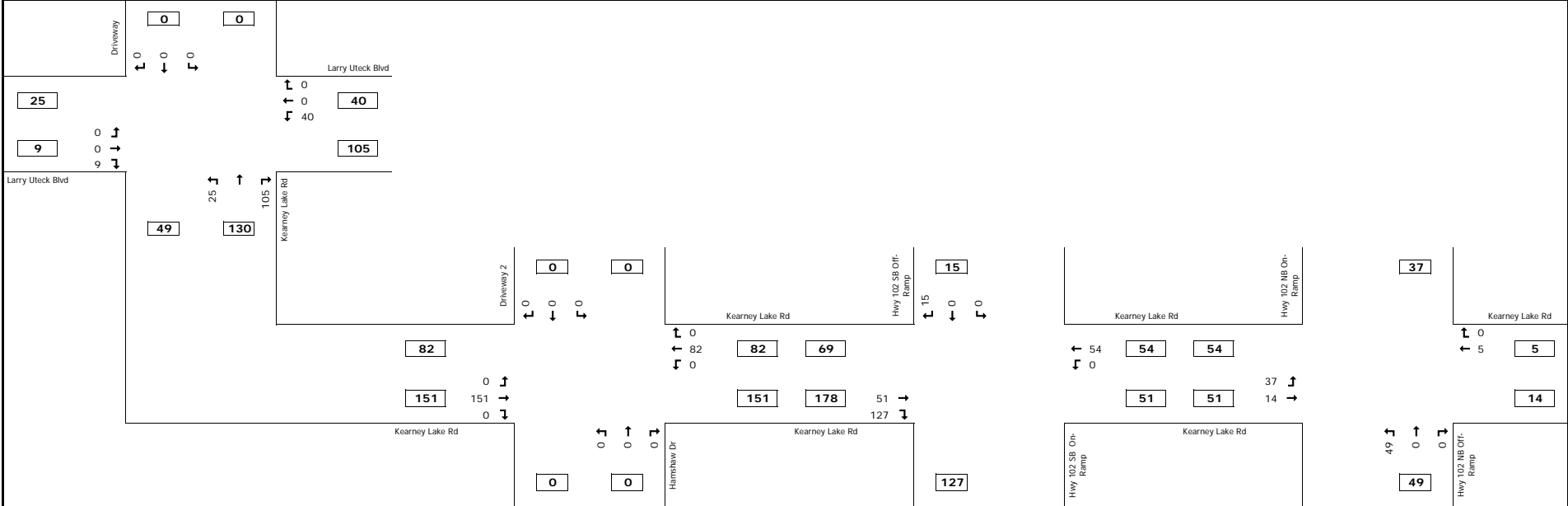
Turning Movement Peak Hour Data Plot (4:15 PM)



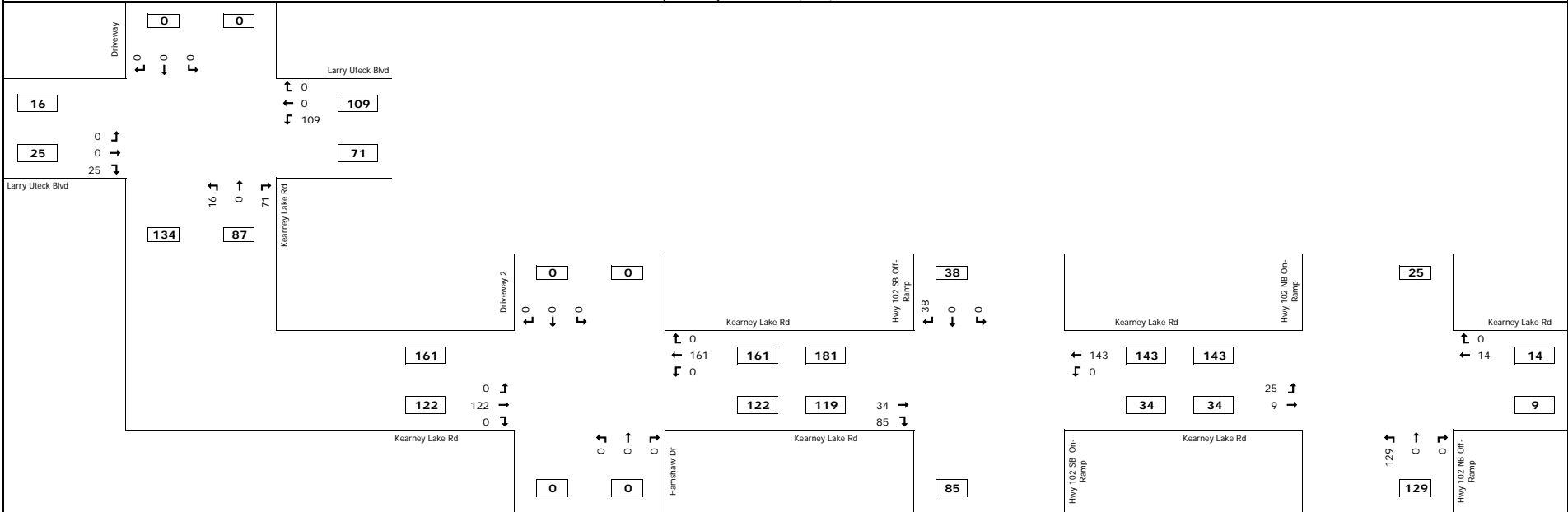
Appendix C

Trip Distribution

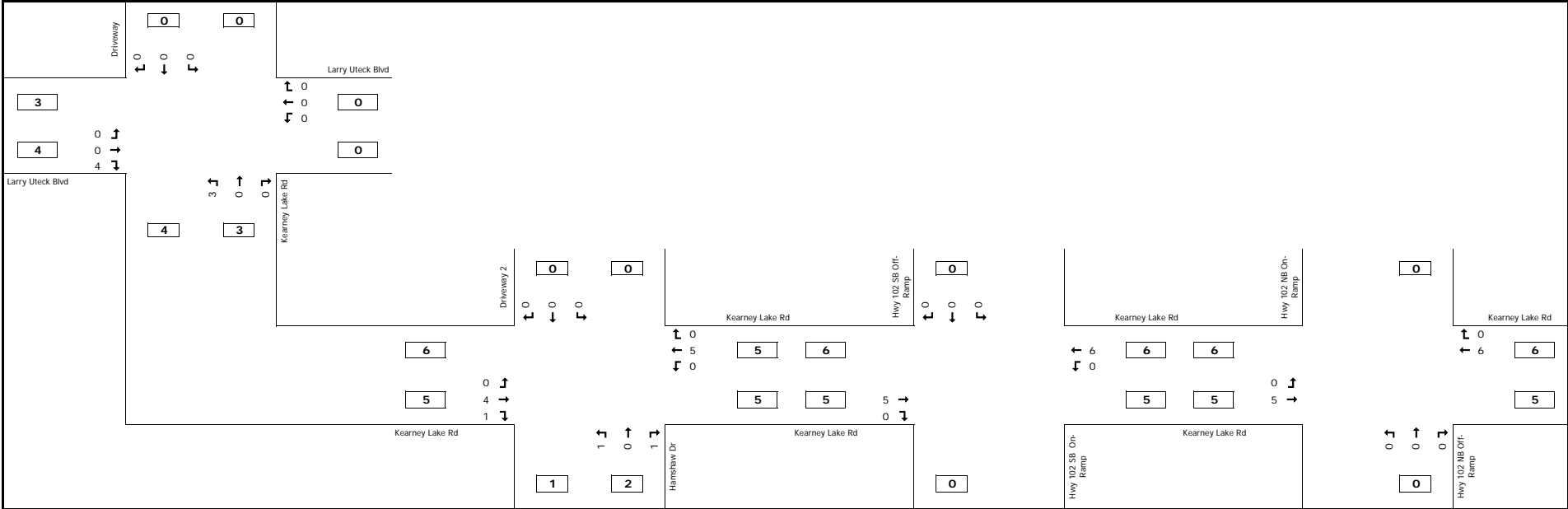
Residential Development Trip Distribution (2031) - AM Peak Hour Traffic Volumes									
---	--	--	--	--	--	--	--	--	--



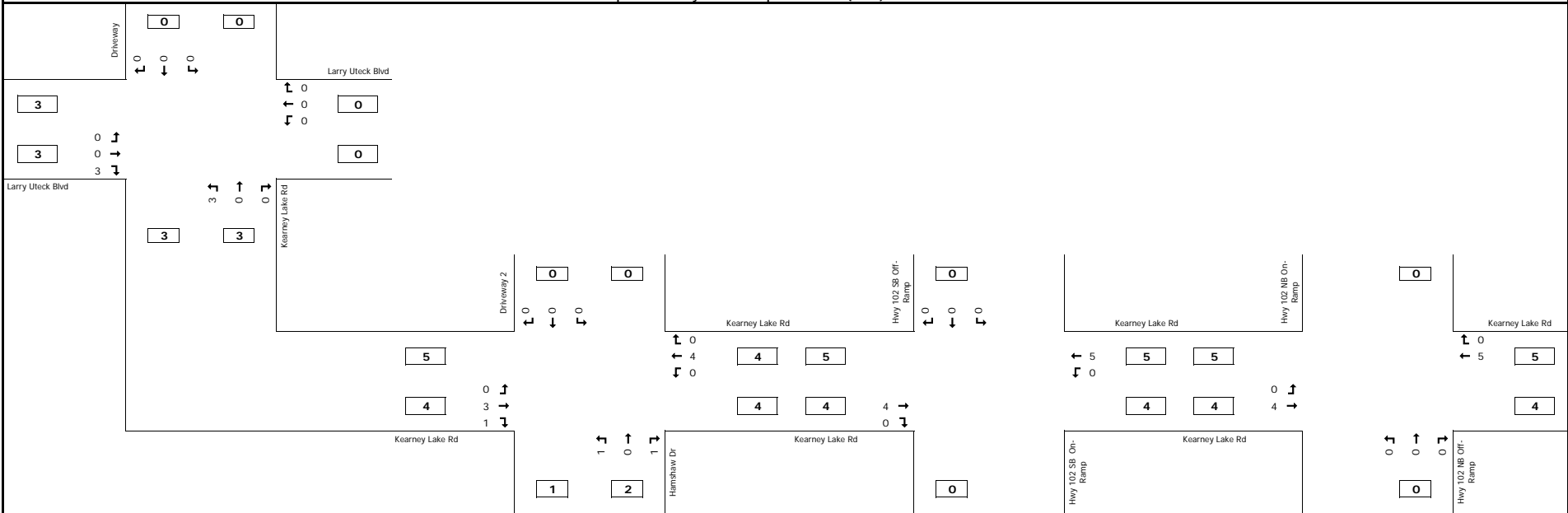
Residential Development Trip Distribution (2031) - PM Peak Hour Traffic Volumes									
---	--	--	--	--	--	--	--	--	--



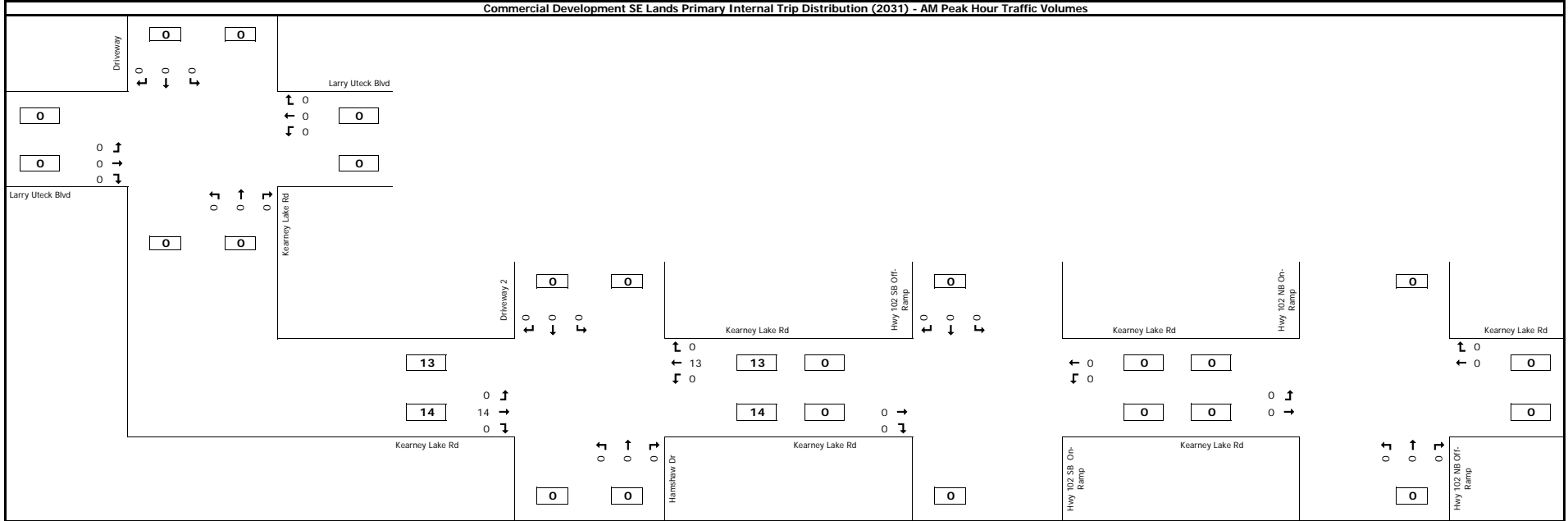
Commercial Development Primary External Trip Distribution (2031) - AM Peak Hour Traffic Volumes									
---	--	--	--	--	--	--	--	--	--



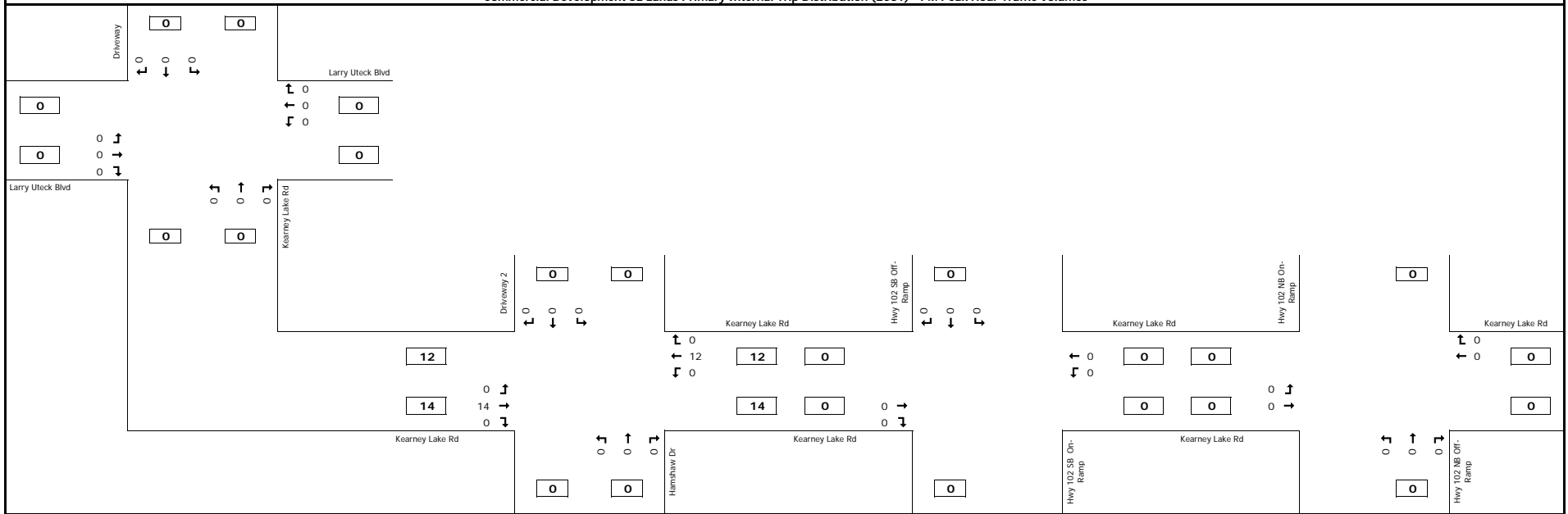
Commercial Development Primary External Trip Distribution (2031) - PM Peak Hour Traffic Volumes



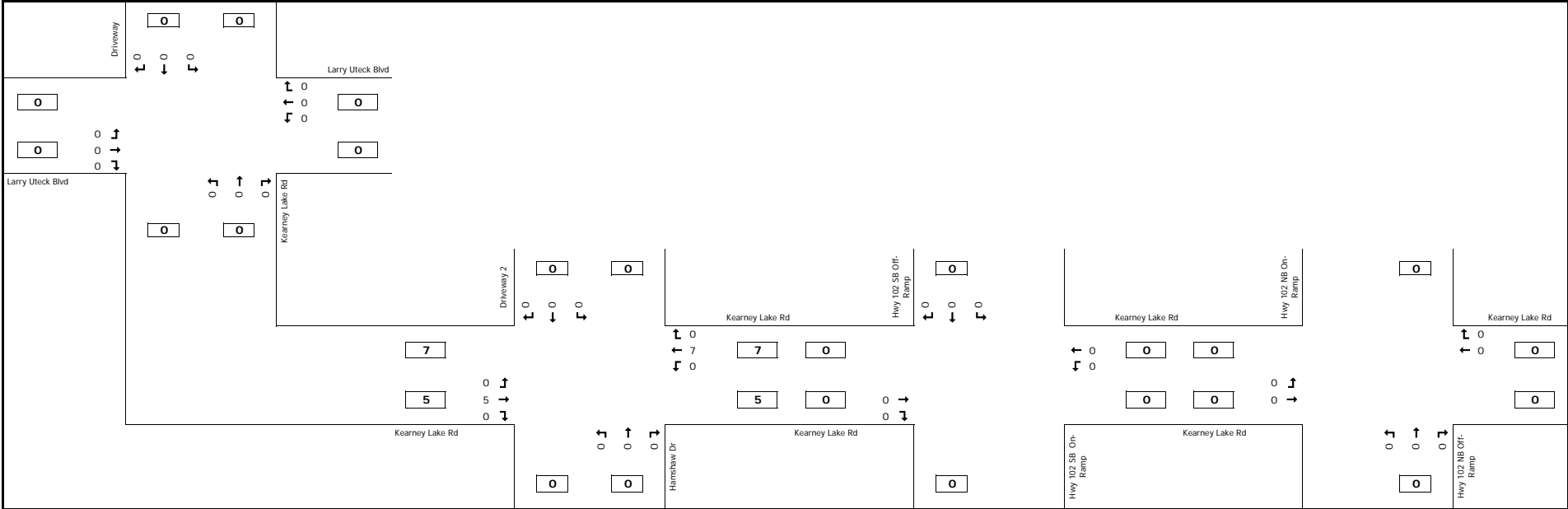
Commercial Development SE Lands Primary Internal Trip Distribution (2031) - AM Peak Hour Traffic Volumes



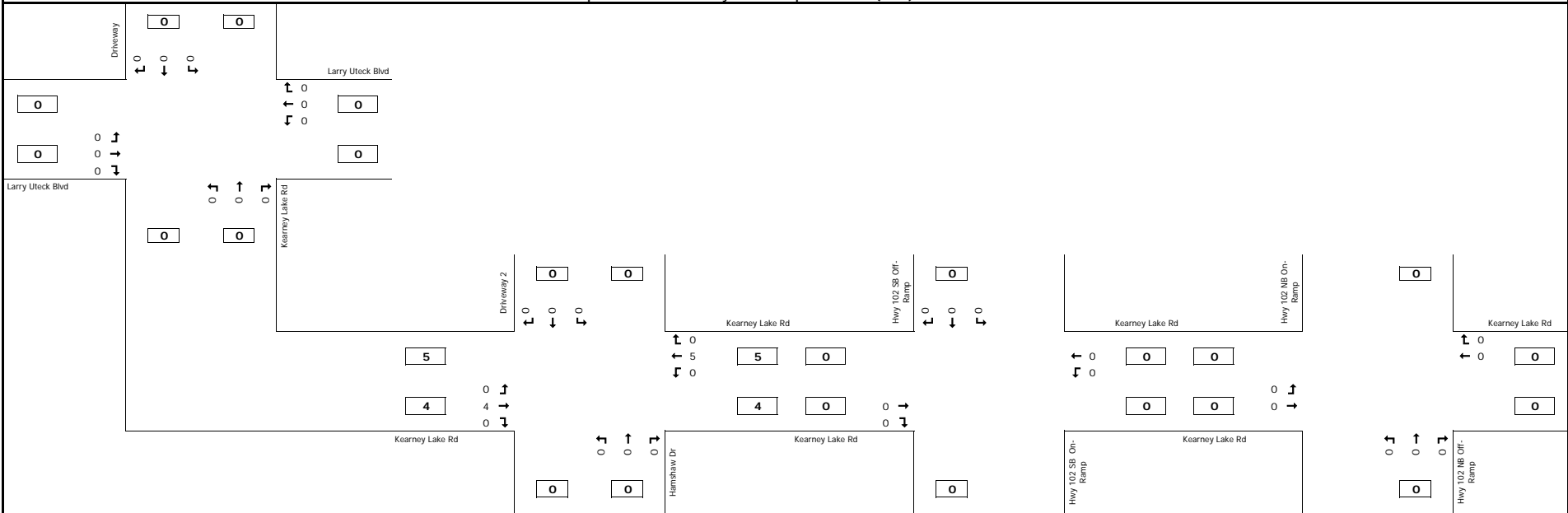
Commercial Development SE Lands Primary Internal Trip Distribution (2031) - PM Peak Hour Traffic Volumes



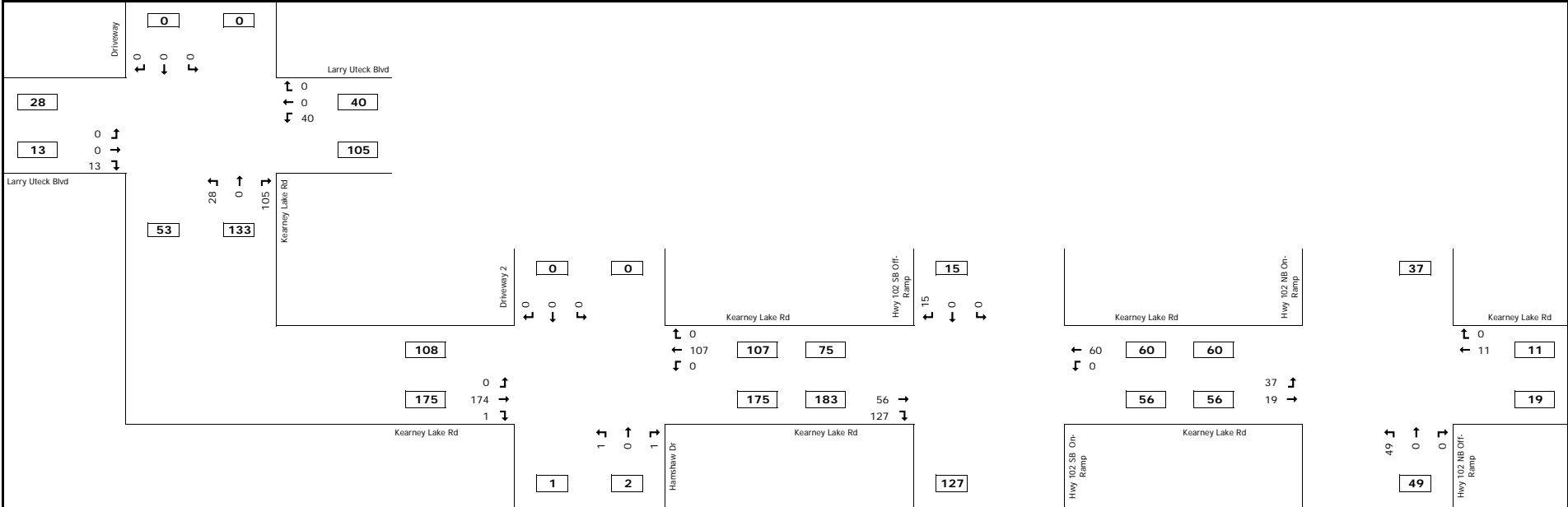
Commercial Development NW Lands Primary Internal Trip Distribution (2031) - AM Peak Hour Traffic Volumes									
--	--	--	--	--	--	--	--	--	--



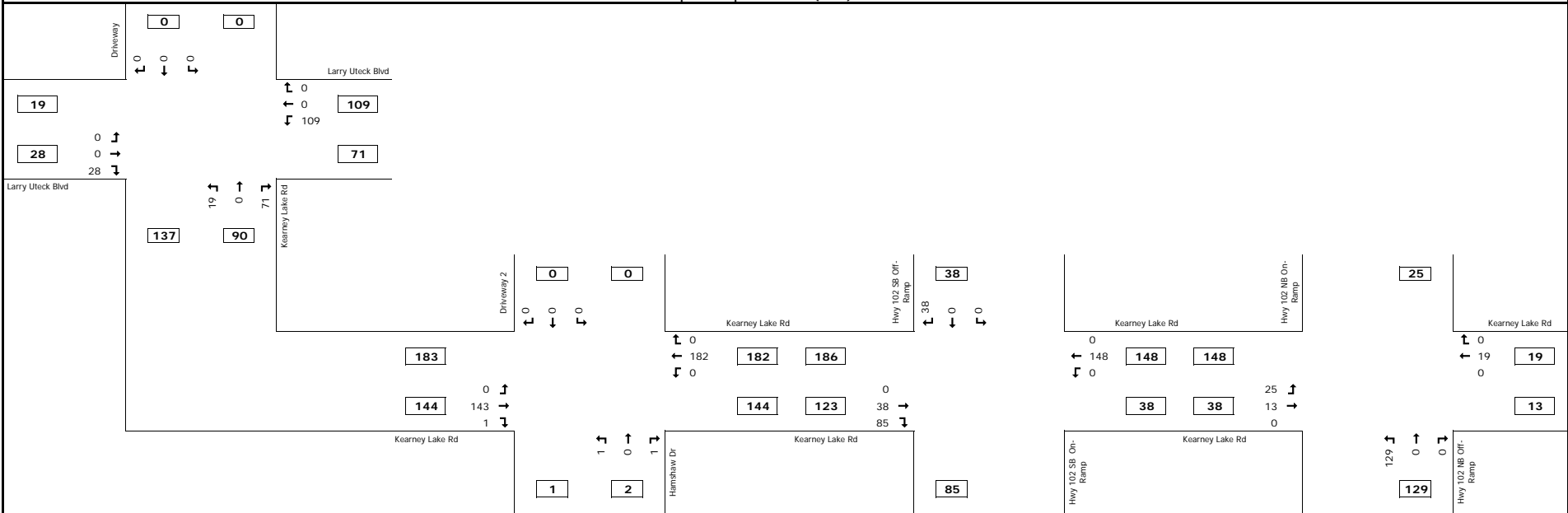
Commercial Development NW Lands Primary Internal Trip Distribution (2031) - PM Peak Hour Traffic Volumes



Total Commercial Development Trip Distribution (2031) - AM Peak Hour Traffic Volumes									
--	--	--	--	--	--	--	--	--	--



Total Commercial Development Trip Distribution (2031) - PM Peak Hour Traffic Volumes									
--	--	--	--	--	--	--	--	--	--

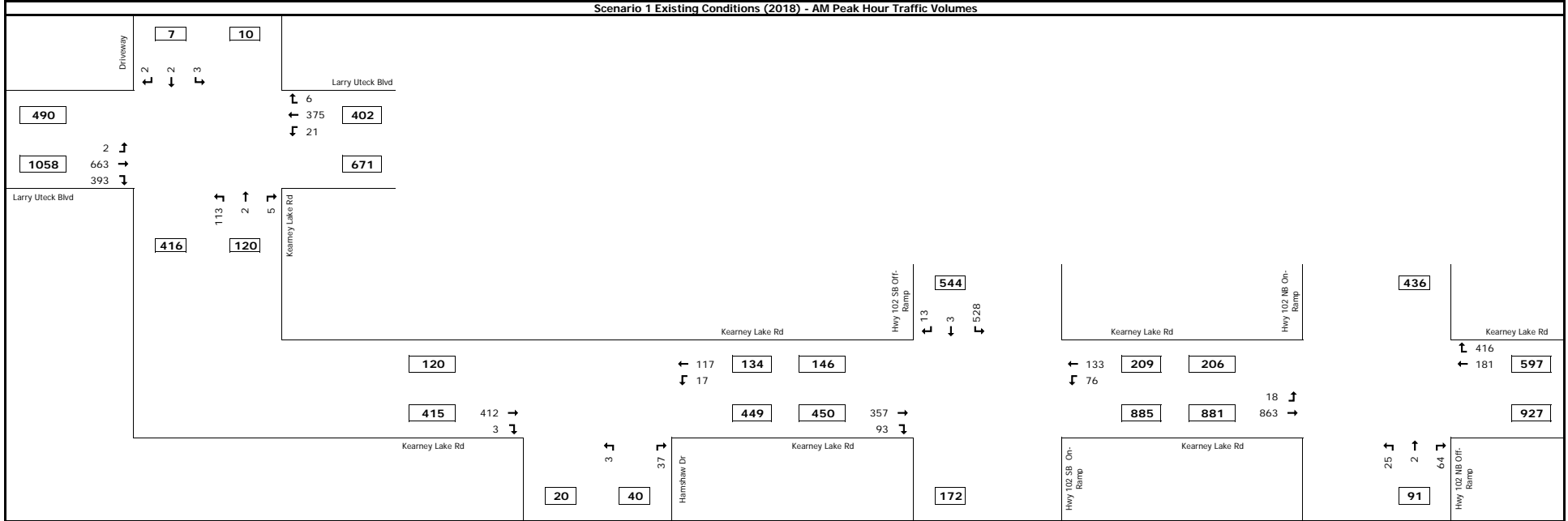




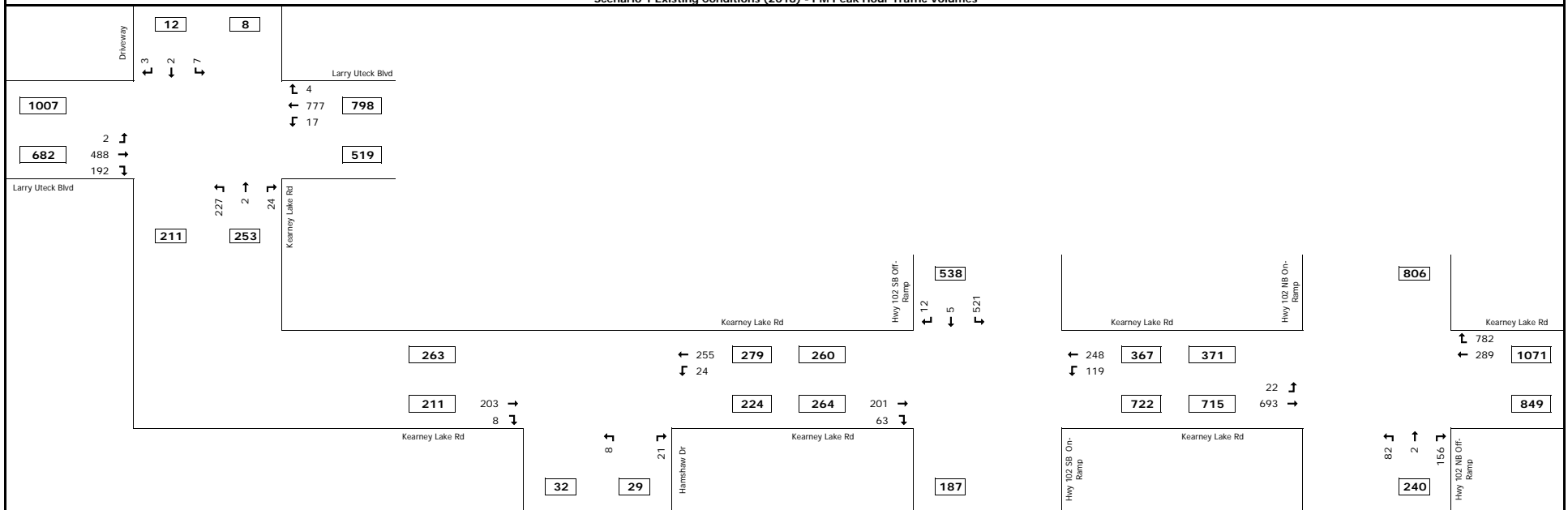
Appendix D

Traffic Design Volumes

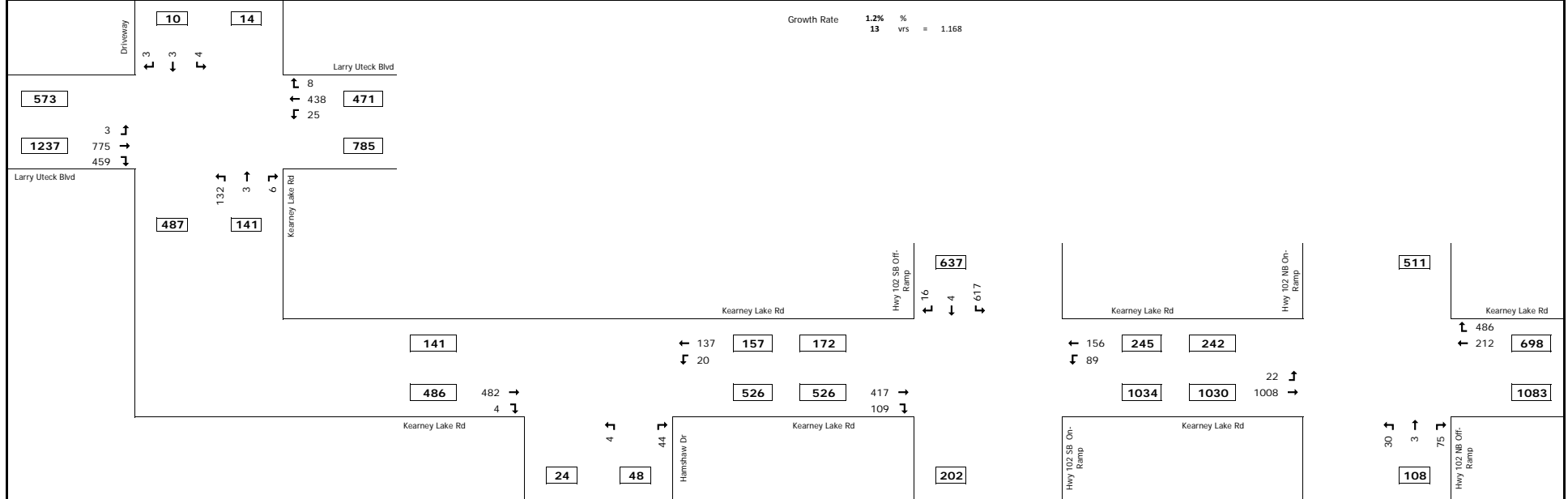
Scenario 1 Existing Conditions (2018) - AM Peak Hour Traffic Volumes



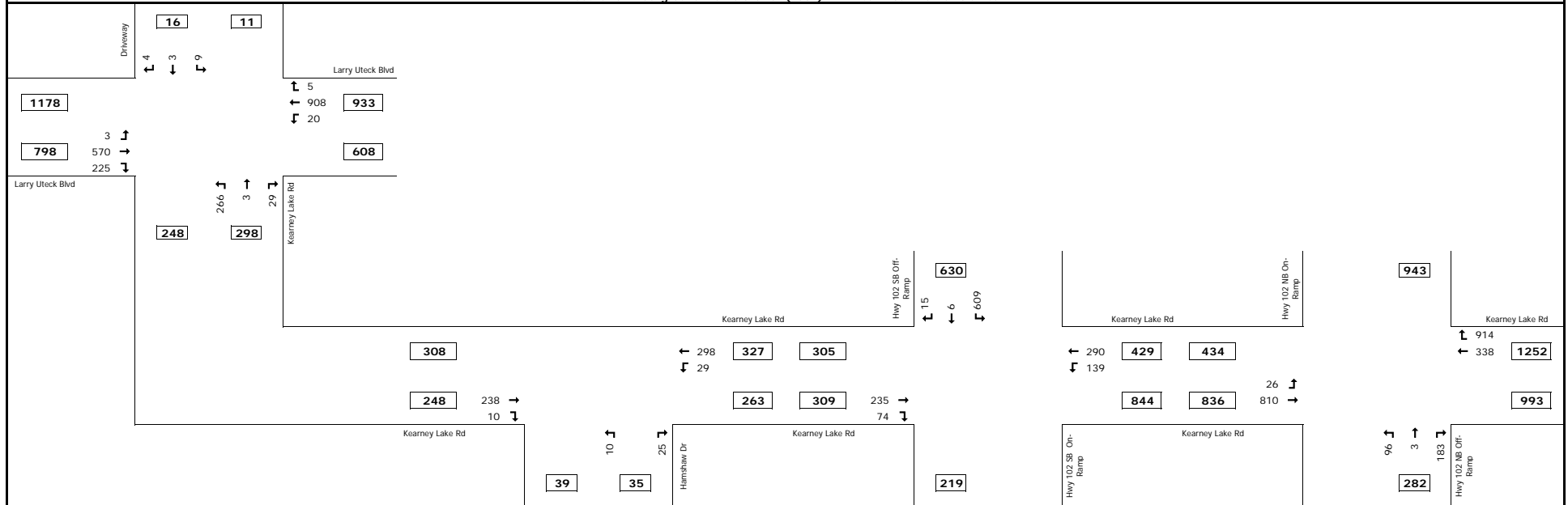
Scenario 1 Existing Conditions (2018) - PM Peak Hour Traffic Volumes



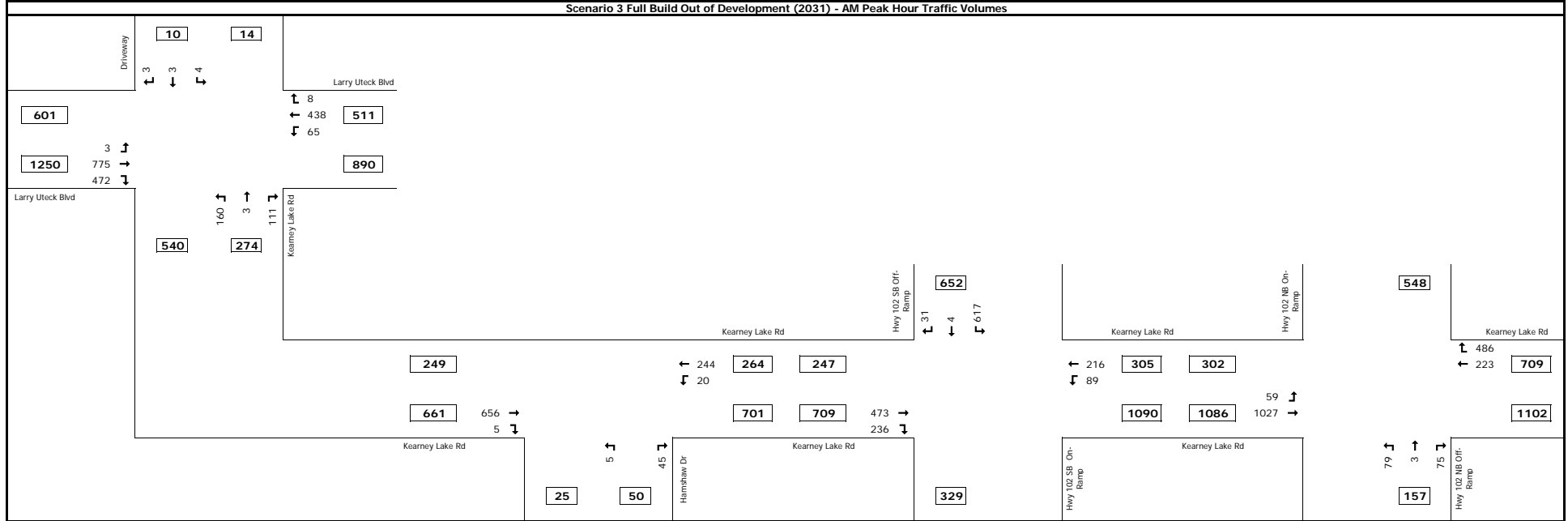
Scenario 2 Background Traffic Growth (2031) - AM Peak Hour Traffic Volumes



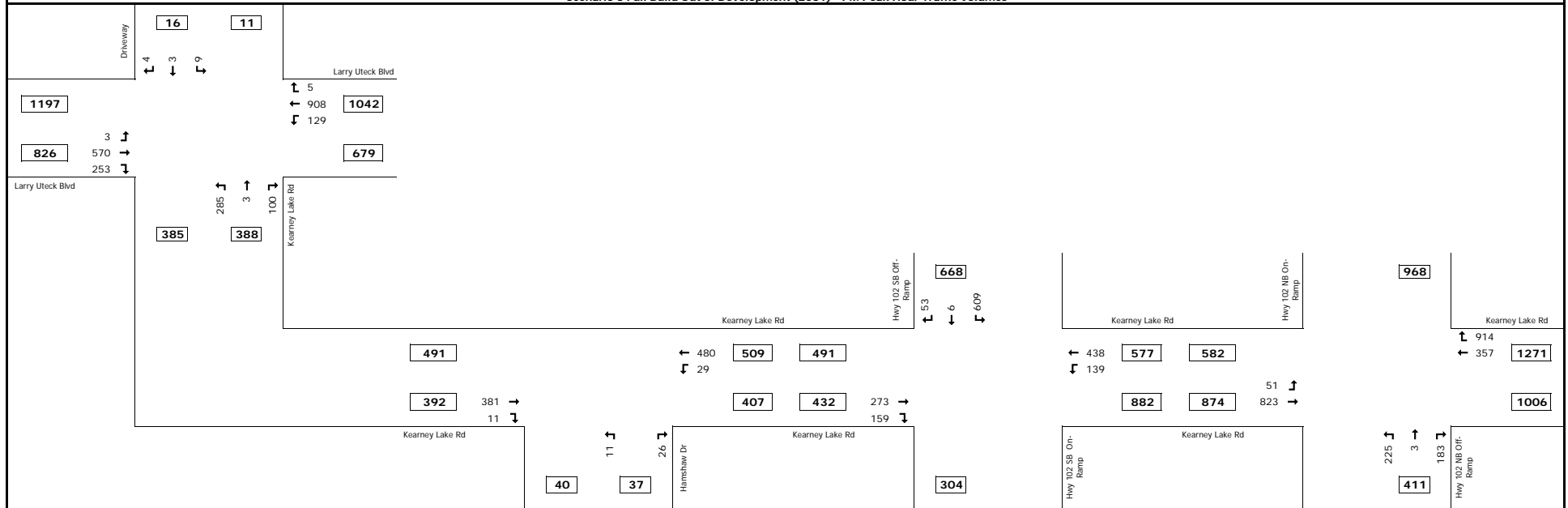
Scenario 2 Background Traffic Growth (2031) - PM Peak Hour Traffic Volumes



Scenario 3 Full Build Out of Development (2031) - AM Peak Hour Traffic Volumes



Scenario 3 Full Build Out of Development (2031) - PM Peak Hour Traffic Volumes





Appendix E

Synchro/SimTraffic Reports

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:45	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	2857	2770	2842	2855	2746	2721	2775
Vehs Exited	2859	2784	2860	2840	2736	2712	2807
Starting Vehs	79	95	97	81	78	84	100
Ending Vehs	77	81	79	96	88	93	68
Travel Distance (km)	3572	3514	3487	3555	3406	3422	3409
Travel Time (hr)	93.3	91.6	94.4	91.9	86.5	87.9	91.2
Total Delay (hr)	26.5	25.9	29.5	25.5	22.9	23.9	27.5
Total Stops	1688	1641	1721	1663	1454	1549	1632
Fuel Used (l)	279.5	278.6	278.5	279.8	265.8	269.0	270.9

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	2805	2803	2897	2809
Vehs Exited	2797	2812	2926	2816
Starting Vehs	78	88	105	86
Ending Vehs	86	79	76	79
Travel Distance (km)	3463	3597	3635	3506
Travel Time (hr)	88.2	93.9	100.1	91.9
Total Delay (hr)	23.4	27.0	32.3	26.4
Total Stops	1576	1658	1751	1635
Fuel Used (l)	271.4	283.1	290.4	276.7

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	773	780	822	796	795	752	775
Vehs Exited	745	747	815	759	768	723	763
Starting Vehs	79	95	97	81	78	84	100
Ending Vehs	107	128	104	118	105	113	112
Travel Distance (km)	964	977	1009	950	927	907	924
Travel Time (hr)	25.2	26.7	28.1	25.6	24.4	24.6	26.4
Total Delay (hr)	7.1	8.5	9.3	7.8	7.2	7.5	9.2
Total Stops	499	545	533	501	454	492	515
Fuel Used (l)	76.2	79.1	81.3	76.7	74.0	72.9	76.0

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	804	802	827	794
Vehs Exited	768	783	818	768
Starting Vehs	78	88	105	86
Ending Vehs	114	107	114	110
Travel Distance (km)	934	1043	1034	967
Travel Time (hr)	24.2	29.4	31.9	26.7
Total Delay (hr)	6.6	10.0	12.6	8.6
Total Stops	450	586	625	519
Fuel Used (l)	74.0	84.7	86.0	78.1

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	686	686	621	663	624	673	671
Vehs Exited	710	717	648	671	644	688	686
Starting Vehs	107	128	104	118	105	113	112
Ending Vehs	83	97	77	110	85	98	97
Travel Distance (km)	899	876	757	894	797	841	864
Travel Time (hr)	23.5	23.8	22.6	22.9	20.5	22.9	22.7
Total Delay (hr)	6.8	7.4	8.4	6.3	5.6	7.2	6.7
Total Stops	400	431	421	379	323	421	392
Fuel Used (l)	69.7	70.8	62.9	70.2	61.6	67.7	67.3

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	653	686	704	667
Vehs Exited	674	694	732	686
Starting Vehs	114	107	114	110
Ending Vehs	93	99	86	92
Travel Distance (km)	867	895	894	858
Travel Time (hr)	22.1	23.1	25.9	23.0
Total Delay (hr)	5.9	6.5	9.2	7.0
Total Stops	379	391	462	398
Fuel Used (l)	67.2	69.2	72.5	67.9

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	722	639	677	668	668	631	664
Vehs Exited	713	652	662	694	683	655	705
Starting Vehs	83	97	77	110	85	98	97
Ending Vehs	92	84	92	84	70	74	56
Travel Distance (km)	887	804	839	846	908	829	834
Travel Time (hr)	24.1	19.9	21.2	21.2	22.3	20.0	21.4
Total Delay (hr)	7.4	4.8	5.5	5.5	5.4	4.6	5.9
Total Stops	455	306	352	379	378	319	365
Fuel Used (l)	69.5	61.3	65.4	65.6	70.5	63.0	65.0

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	7	8	9	Avg
Vehs Entered	620	631	721	661
Vehs Exited	638	654	728	678
Starting Vehs	93	99	86	92
Ending Vehs	75	76	79	76
Travel Distance (km)	785	807	924	846
Travel Time (hr)	19.9	20.4	23.6	21.4
Total Delay (hr)	5.2	5.3	6.4	5.6
Total Stops	390	348	396	369
Fuel Used (l)	62.3	63.6	71.8	65.8

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	676	665	722	728	659	665	665
Vehs Exited	691	668	735	716	641	646	653
Starting Vehs	92	84	92	84	70	74	56
Ending Vehs	77	81	79	96	88	93	68
Travel Distance (km)	822	858	881	866	774	845	787
Travel Time (hr)	20.5	21.1	22.6	22.2	19.3	20.5	20.6
Total Delay (hr)	5.2	5.1	6.4	5.9	4.7	4.7	5.8
Total Stops	334	359	415	404	299	317	360
Fuel Used (l)	64.1	67.4	68.8	67.2	59.6	65.3	62.7

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	728	684	645	684
Vehs Exited	717	681	648	681
Starting Vehs	75	76	79	76
Ending Vehs	86	79	76	79
Travel Distance (km)	877	852	783	834
Travel Time (hr)	21.9	21.0	18.7	20.9
Total Delay (hr)	5.7	5.2	4.2	5.3
Total Stops	357	333	268	343
Fuel Used (l)	67.8	65.6	60.1	64.9

2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	All
Denied Delay (hr)	0.4	0.1	0.0	0.0	0.3	0.0	0.0	0.7
Denied Del/Veh (s)	3.5	2.7	0.0	0.0	1.7	2.4	4.3	2.0
Total Delay (hr)	4.7	0.1	0.3	0.1	8.3	0.1	0.1	13.7
Total Del/Veh (s)	45.1	5.2	14.5	2.7	55.2	60.0	26.0	39.8
Stop Delay (hr)	3.9	0.1	0.2	0.0	6.6	0.0	0.1	11.0
Stop Del/Veh (s)	38.0	4.0	12.2	0.6	44.0	44.1	16.7	32.1

3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.5
Denied Del/Veh (s)	0.1	0.0	0.8	3.3	0.3	0.2	4.0	1.2
Total Delay (hr)	0.0	0.7	1.7	0.3	0.3	0.0	0.1	3.1
Total Del/Veh (s)	9.4	2.7	33.6	2.5	46.7	40.1	3.0	7.0
Stop Delay (hr)	0.0	0.1	1.5	0.0	0.3	0.0	0.0	1.9
Stop Del/Veh (s)	7.0	0.2	29.5	0.0	43.7	34.8	0.1	4.3

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.3
Total Del/Veh (s)	1.4	1.1	3.8	1.0	5.8	3.9	1.6
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Stop Del/Veh (s)	0.0	0.0	0.9	0.0	4.2	4.0	0.3

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	2.2	1.6	3.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.1	0.1
Total Delay (hr)	0.0	1.4	0.4	0.1	0.6	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.3	7.4	3.7	16.5	5.4	2.6	17.6	3.9	8.1	18.2	14.6	8.0
Stop Delay (hr)	0.0	0.5	0.0	0.1	0.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	7.5	2.5	0.0	14.8	2.4	1.4	13.3	1.8	6.5	16.8	11.8	7.8

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	0.6
Denied Del/Veh (s)	1.4
Total Delay (hr)	3.1
Total Del/Veh (s)	6.9
Stop Delay (hr)	1.3
Stop Del/Veh (s)	2.9

Total Network Performance

Denied Delay (hr)	1.9
Denied Del/Veh (s)	2.4
Total Delay (hr)	24.6
Total Del/Veh (s)	30.5
Stop Delay (hr)	14.5
Stop Del/Veh (s)	18.1

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Movement	EB	EB	B1	WB	WB	SB	SB
Directions Served	T	R	T	L	T	LT	R
Maximum Queue (m)	123.9	48.8	6.7	13.7	4.3	195.6	57.4
Average Queue (m)	70.9	14.0	0.6	3.2	0.3	108.9	4.7
95th Queue (m)	123.5	55.4	7.7	10.3	2.3	183.4	30.6
Link Distance (m)	149.6		240.0	137.1	137.1	192.0	
Upstream Blk Time (%)	1	0				4	
Queuing Penalty (veh)	6	0				0	
Storage Bay Dist (m)		150.0					50.0
Storage Blk Time (%)	1	0				39	0
Queuing Penalty (veh)	1	0				5	0

Intersection: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	R	LT	R
Maximum Queue (m)	8.3	15.4	35.0	47.5	12.3	26.9	11.3
Average Queue (m)	0.9	1.6	11.4	18.7	1.0	8.1	0.7
95th Queue (m)	4.9	7.9	26.2	37.4	7.5	19.8	7.9
Link Distance (m)		137.1	137.2	137.2		232.5	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	35.0				80.0		25.0
Storage Blk Time (%)						1	0
Queuing Penalty (veh)						0	0

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	14.3	19.2
Average Queue (m)	1.3	5.8
95th Queue (m)	7.6	13.2
Link Distance (m)	240.0	70.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	L	TR	L	TR	L	TR
Maximum Queue (m)	3.5	53.0	16.9	50.5	35.1	24.6	4.9	7.2
Average Queue (m)	0.2	21.5	4.0	17.7	16.2	2.3	0.4	1.0
95th Queue (m)	1.6	42.9	12.1	37.8	31.4	12.2	2.7	5.3
Link Distance (m)		357.9		169.9		608.5	30.6	30.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	35.0		160.0		30.0			
Storage Blk Time (%)		1			1			
Queuing Penalty (veh)		5			0			

Network Summary

Network wide Queuing Penalty: 18

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Phase	1	2	4	5	6	8	12	16
Movement(s) Served	WBTL	EBWB	SBTL	EBTL	EBWB	NBTL	SBTL	NBTL
Maximum Green (s)	23.4	29.8	31.2	56.5	19.1	7.0	3.0	4.8
Minimum Green (s)	7.0	12.0	10.0	7.0	7.0	7.0	3.0	3.0
Recall	Max	C-Max	None	Max	Max	None	None	None
Avg. Green (s)	25.7	29.8	31.2	66.2	25.8	7.0	3.0	3.3
g/C Ratio	NA	NA	NA	NA	NA	-0.01	-0.01	-0.01
Cycles Skipped (%)	0	0	0	0	0	48	23	90
Cycles @ Minimum (%)	0	0	0	0	0	52	77	7
Cycles Maxed Out (%)	100	100	100	100	100	52	77	0
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0




Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	50.0	20.0	50.0	20.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	41.4	9.2	41.4	9.2
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	39	0	39
Cycles Maxed Out (%)	28	0	28	0
Cycles with Peds (%)	0	0	0	0

Controller Summary

Average Cycle Length (s): NA



















Number of Complete Cycles : 0

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	412	3	17	117	3	37
Future Vol, veh/h	412	3	17	117	3	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	73	73	77	77
Heavy Vehicles, %	3	2	6	7	2	6
Mvmt Flow	434	3	23	160	4	48
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	437	0	642	436
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	206	-
Critical Hdwy	-	-	4.16	-	6.42	6.26
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.354
Pot Cap-1 Maneuver	-	-	1102	-	438	612
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	829	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1102	-	428	612
Mov Cap-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	637	-
Stage 2	-	-	-	-	829	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.1		11.7	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	593	-	-	1102	-	
HCM Lane V/C Ratio	0.088	-	-	0.021	-	
HCM Control Delay (s)	11.7	-	-	8.3	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	

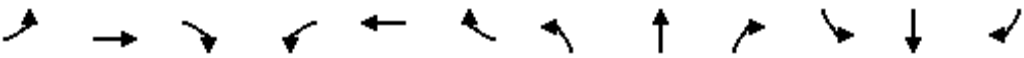
15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 NB

S1 Existing AM 2018

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	863	0	0	181	416	25	2	64	0	0	0
Future Volume (vph)	18	863	0	0	181	416	25	2	64	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		80.0	0.0		25.0	0.0		0.0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected	0.950							0.955				
Satd. Flow (prot)	1399	1863	0	0	3438	1583	0	1603	1524	0	0	0
Flt Permitted	0.950							0.955				
Satd. Flow (perm)	1399	1863	0	0	3438	1583	0	1603	1524	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						484			197			
Link Speed (k/h)		50			50			60			80	
Link Distance (m)		156.7			145.9			242.8			253.4	
Travel Time (s)		11.3			10.5			14.6			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.86	0.86	0.86	0.85	0.85	0.85	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	29%	2%	2%	2%	5%	2%	14%	2%	6%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	20	948	0	0	210	484	29	2	75	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	948	0	0	210	484	0	31	75	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5 6			6			8 16				
Permitted Phases						6	8 16		8 16			
Total Split (s)	62.0				24.6	24.6						
Total Lost Time (s)	5.5				5.5	5.5						
Act Effect Green (s)	52.9	80.1			21.7	21.7		14.0	14.0			
Actuated g/C Ratio	0.48	0.73			0.20	0.20		0.13	0.13			
v/c Ratio	0.03	0.70			0.31	0.69		0.15	0.20			
Control Delay	12.1	3.1			40.5	9.6		43.3	1.3			
Queue Delay	0.0	2.9			0.0	0.0		0.0	0.0			
Total Delay	12.1	6.0			40.5	9.6		43.3	1.3			
LOS	B	A			D	A		D	A			
Approach Delay		6.1			18.9			13.5				
Approach LOS		A			B			B				
Stops (vph)	5	119			154	46		23	0			
Fuel Used(l)	1	18			12	10		2	1			
CO Emissions (g/hr)	10	327			216	183		40	26			

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	1	2	4	8	12	16
Permitted Phases						
Total Split (s)	28.6	35.6	37.0	12.8	8.8	10.6
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	2	63			42	35		8	5			
VOC Emissions (g/hr)	2	75			50	42		9	6			
Dilemma Vehicles (#)	0	0			0	0		1	0			
Queue Length 50th (m)	1.4	0.0			22.2	0.0		6.2	0.0			
Queue Length 95th (m)	m1.5	m0.0			32.4	23.0		14.6	0.0			
Internal Link Dist (m)		132.7			121.9			218.8			229.4	
Turn Bay Length (m)	35.0					80.0			25.0			
Base Capacity (vph)	736	1356			676	700		256	409			
Starvation Cap Reductn	0	291			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.03	0.89			0.31	0.69		0.12	0.18			

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 11.6

Intersection LOS: B

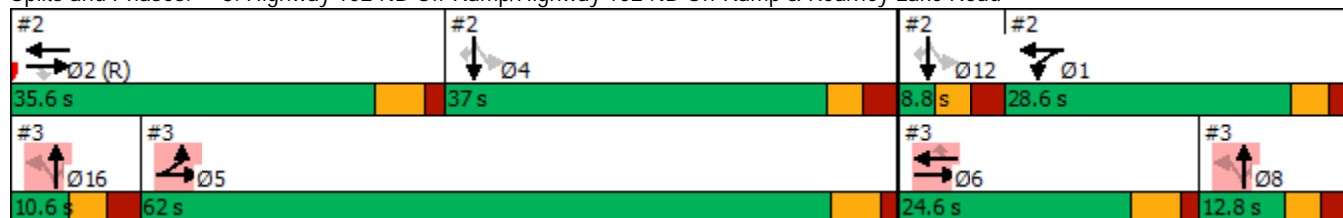
Intersection Capacity Utilization 88.2%

ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road





















Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 SB

S1 Existing AM 2018

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	357	93	76	133	0	0	0	0	528	3	13
Future Volume (vph)	0	357	93	76	133	0	0	0	0	528	3	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		150.0	0.0		0.0	0.0		0.0	0.0		50.0
Storage Lanes	0		1	1		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1827	1524	1770	1759	0	0	0	0	0	1775	1292
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	1827	1524	1770	1759	0	0	0	0	0	1775	1292
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			197									197
Link Speed (k/h)		50			50			80			60	
Link Distance (m)		168.4			156.7			263.6			205.3	
Travel Time (s)		12.1			11.3			11.9			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.92	0.92	0.92	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	6%	2%	8%	2%	2%	2%	2%	2%	2%	25%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	441	115	81	141	0	0	0	0	614	3	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	441	115	81	141	0	0	0	0	0	617	15
Turn Type		NA	Perm	Prot	NA					Perm	NA	Perm
Protected Phases		2		1	2 1						4 12	
Permitted Phases			2							4 12		4 12
Total Split (s)		35.6	35.6	28.6								
Total Lost Time (s)		5.8	5.8	5.2								
Act Effect Green (s)		29.8	29.8	23.4	58.4						40.0	40.0
Actuated g/C Ratio		0.27	0.27	0.21	0.53						0.36	0.36
v/c Ratio		0.89	0.21	0.22	0.15						0.96	0.03
Control Delay		60.6	0.8	11.3	1.0						61.4	0.1
Queue Delay		0.0	0.0	0.0	0.0						0.0	0.0
Total Delay		60.6	0.8	11.3	1.0						61.4	0.1
LOS		E	A	B	A						E	A
Approach Delay		48.2			4.8						59.9	
Approach LOS		D			A						E	
Stops (vph)		317	0	10	13						460	0
Fuel Used(l)		38	4	2	2						49	0
CO Emissions (g/hr)		708	71	37	44						919	4

Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	4	5	6	8	12	16
Permitted Phases						
Total Split (s)	37.0	62.0	24.6	12.8	8.8	10.6
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)		137	14	7	9						177	1
VOC Emissions (g/hr)		163	16	9	10						212	1
Dilemma Vehicles (#)		0	0	0	0						23	0
Queue Length 50th (m)		95.9	0.0	2.4	0.0						134.6	0.0
Queue Length 95th (m)		#127.5	0.0	4.4	4.0						#192.9	0.0
Internal Link Dist (m)		144.4			132.7			239.6			181.3	
Turn Bay Length (m)			150.0									50.0
Base Capacity (vph)		494	556	376	933						645	595
Starvation Cap Reductn		0	0	0	0						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.89	0.21	0.22	0.15						0.96	0.03

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 46.6

Intersection LOS: D

Intersection Capacity Utilization 88.2%

ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

























Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S1 Existing AM 2018

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	663	393	21	375	6	113	2	5	3	2	2
Future Volume (vph)	2	663	393	21	375	6	113	2	5	3	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.998			0.895			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1845	1568	1719	1807	0	1671	1440	0	1770	1723	0
Flt Permitted	0.490			0.291			0.751			0.751		
Satd. Flow (perm)	913	1845	1568	527	1807	0	1321	1440	0	1399	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			405		2			7			5	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			2.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.97	0.97	0.97	0.88	0.88	0.88	0.67	0.67	0.67	0.38	0.38	0.38
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	3%	3%	5%	5%	2%	8%	2%	25%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	2	684	405	24	426	7	169	3	7	8	5	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	684	405	24	433	0	169	10	0	8	10	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	56.8	56.8	56.8	56.8	56.8		26.0	26.0		26.0	26.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	31.3	31.3	31.3	31.3	31.3		12.7	12.7		12.7	12.7	
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55		0.22	0.22		0.22	0.22	
v/c Ratio	0.00	0.68	0.39	0.08	0.44		0.58	0.03		0.03	0.03	
Control Delay	7.0	14.0	2.1	8.0	9.8		29.3	13.9		19.3	15.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.0	14.0	2.1	8.0	9.8		29.3	13.9		19.3	15.2	
LOS	A	B	A	A	A		C	B		B	B	
Approach Delay		9.6			9.7			28.4			17.1	
Approach LOS		A			A			C			B	
Stops (vph)	2	441	25	11	203		93	4		3	4	
Fuel Used(l)	0	43	14	2	34		28	2		0	0	
CO Emissions (g/hr)	3	800	265	34	623		520	30		3	4	

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S1 Existing AM 2018
11-27-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	154	51	6	120		100	6		1	1	
VOC Emissions (g/hr)	1	184	61	8	144		120	7		1	1	
Dilemma Vehicles (#)	0	57	0	0	32		0	0		0	0	
Queue Length 50th (m)	0.1	44.9	0.0	1.1	23.4		13.8	0.3		0.6	0.4	
Queue Length 95th (m)	1.0	100.8	11.0	4.8	51.7		28.2	2.7		1.7	1.4	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	819	1654	1448	472	1621		475	523		503	623	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.00	0.41	0.28	0.05	0.27		0.36	0.02		0.02	0.02	

Intersection Summary

Area Type: Other

Cycle Length: 82.8

Actuated Cycle Length: 57.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 11.6





Intersection LOS: B

Intersection Capacity Utilization 58.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

 Ø2	 Ø4
56.8 s	26 s
 Ø6	 Ø8
56.8 s	26 s

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	3:45	3:45	3:45	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3382	3490	3384	3386	3400	3321	3477
Vehs Exited	3406	3515	3408	3383	3418	3323	3480
Starting Vehs	108	110	105	110	105	106	91
Ending Vehs	84	85	81	113	87	104	88
Travel Distance (km)	3686	3885	3719	3683	3730	3684	3786
Travel Time (hr)	99.9	108.0	98.2	101.8	98.5	97.2	103.0
Total Delay (hr)	30.9	35.1	28.1	32.6	28.4	28.1	31.9
Total Stops	1996	2230	1970	2009	1903	1925	2094
Fuel Used (l)	301.0	320.0	302.2	303.6	301.9	300.2	310.0

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3397	3469	3481	3418
Vehs Exited	3389	3452	3455	3422
Starting Vehs	88	86	99	100
Ending Vehs	96	103	125	97
Travel Distance (km)	3727	3761	3717	3738
Travel Time (hr)	102.6	114.3	105.6	102.9
Total Delay (hr)	32.3	43.6	35.4	32.6
Total Stops	2086	2158	2265	2065
Fuel Used (l)	306.3	318.2	307.2	307.1

Interval #0 Information Seeding

Start Time	3:45
End Time	4:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	916	958	942	911	958	883	944
Vehs Exited	926	949	924	904	946	885	930
Starting Vehs	108	110	105	110	105	106	91
Ending Vehs	98	119	123	117	117	104	105
Travel Distance (km)	1042	1059	1002	1011	1023	1023	983
Travel Time (hr)	28.4	29.6	26.2	30.5	28.0	27.6	26.8
Total Delay (hr)	8.8	9.8	7.4	11.6	8.7	8.6	8.2
Total Stops	597	648	505	616	571	575	567
Fuel Used (l)	85.8	86.7	81.3	85.9	83.2	82.0	80.3

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	950	932	931	933
Vehs Exited	917	894	897	916
Starting Vehs	88	86	99	100
Ending Vehs	121	124	133	114
Travel Distance (km)	1043	1006	1007	1020
Travel Time (hr)	30.7	31.4	27.5	28.7
Total Delay (hr)	11.0	12.7	8.7	9.6
Total Stops	668	619	581	594
Fuel Used (l)	88.2	85.1	82.5	84.1

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	874	839	802	785	791	821	869
Vehs Exited	872	846	837	804	834	823	874
Starting Vehs	98	119	123	117	117	104	105
Ending Vehs	100	112	88	98	74	102	100
Travel Distance (km)	933	911	889	873	923	905	954
Travel Time (hr)	27.6	26.5	24.0	23.9	24.0	23.3	27.3
Total Delay (hr)	10.1	9.4	7.1	7.2	6.7	6.2	9.4
Total Stops	562	546	500	470	439	445	542
Fuel Used (l)	77.8	76.0	72.5	71.3	74.4	74.0	79.2

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	824	874	812	829
Vehs Exited	858	878	841	846
Starting Vehs	121	124	133	114
Ending Vehs	87	120	104	98
Travel Distance (km)	922	993	859	916
Travel Time (hr)	25.1	34.1	24.1	26.0
Total Delay (hr)	7.9	15.5	7.6	8.7
Total Stops	482	594	506	512
Fuel Used (l)	75.2	88.0	70.6	75.9

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	799	845	822	812	834	796	829
Vehs Exited	810	844	830	814	810	814	857
Starting Vehs	100	112	88	98	74	102	100
Ending Vehs	89	113	80	96	98	84	72
Travel Distance (km)	847	949	920	872	863	871	929
Travel Time (hr)	21.8	26.2	24.6	22.3	22.2	23.0	24.9
Total Delay (hr)	6.0	8.5	7.2	6.0	6.0	6.8	7.5
Total Stops	419	536	493	412	409	470	488
Fuel Used (l)	67.8	78.3	74.6	70.4	69.6	71.6	75.8

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	7	8	9	Avg
Vehs Entered	802	819	859	821
Vehs Exited	790	840	862	827
Starting Vehs	87	120	104	98
Ending Vehs	99	99	101	91
Travel Distance (km)	860	875	907	889
Travel Time (hr)	22.0	24.3	26.9	23.8
Total Delay (hr)	5.7	7.8	9.8	7.1
Total Stops	394	465	573	465
Fuel Used (l)	69.0	72.6	75.3	72.5

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	793	848	818	878	817	821	835
Vehs Exited	798	876	817	861	828	801	819
Starting Vehs	89	113	80	96	98	84	72
Ending Vehs	84	85	81	113	87	104	88
Travel Distance (km)	863	966	908	926	921	885	920
Travel Time (hr)	22.1	25.7	23.3	25.1	24.4	23.3	24.0
Total Delay (hr)	5.9	7.5	6.4	7.7	6.9	6.5	6.8
Total Stops	418	500	472	511	484	435	497
Fuel Used (l)	69.7	79.0	73.8	76.0	74.7	72.7	74.6

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	7	8	9	Avg
Vehs Entered	821	844	879	836
Vehs Exited	824	840	855	831
Starting Vehs	99	99	101	91
Ending Vehs	96	103	125	97
Travel Distance (km)	902	887	943	912
Travel Time (hr)	24.8	24.5	27.1	24.4
Total Delay (hr)	7.7	7.6	9.2	7.2
Total Stops	542	480	605	497
Fuel Used (l)	73.9	72.5	78.8	74.6

2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.9
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	5.6	2.4	9.2	2.6
Total Delay (hr)	2.0	0.1	0.6	0.2	10.5	0.1	0.1	13.6
Total Del/Veh (s)	34.5	4.9	18.7	2.2	70.7	81.9	36.2	41.1
Stop Delay (hr)	1.8	0.1	0.5	0.0	8.6	0.1	0.1	11.1
Stop Del/Veh (s)	29.7	4.5	16.1	0.3	58.0	66.0	25.7	33.7

3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.1	0.7	0.0	0.0	0.2	1.0
Denied Del/Veh (s)	0.0	0.0	1.4	3.2	0.4	0.5	3.8	1.7
Total Delay (hr)	0.1	0.5	2.9	1.0	1.1	0.0	0.2	5.9
Total Del/Veh (s)	17.9	2.6	36.7	4.8	46.9	71.1	4.4	10.4
Stop Delay (hr)	0.1	0.0	2.5	0.0	1.0	0.0	0.0	3.7
Stop Del/Veh (s)	15.5	0.2	31.2	0.1	42.6	64.0	0.6	6.5

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.1	0.0	0.0	0.1	0.0	0.0	0.2
Total Del/Veh (s)	1.1	0.8	3.4	1.7	6.6	2.5	1.6
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	0.0	0.0	0.7	0.0	4.8	2.7	0.2

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	2.1	0.8	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1
Total Delay (hr)	0.0	1.1	0.1	0.1	2.5	0.0	1.6	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	22.0	8.2	2.6	14.0	11.5	7.0	25.3	3.3	10.2	15.2	21.1	12.0
Stop Delay (hr)	0.0	0.5	0.0	0.1	1.1	0.0	1.2	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	19.5	3.7	0.0	11.7	4.9	3.7	18.2	0.8	5.8	14.0	18.0	11.8

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	0.3
Denied Del/Veh (s)	0.6
Total Delay (hr)	5.6
Total Del/Veh (s)	11.4
Stop Delay (hr)	2.9
Stop Del/Veh (s)	5.9

Total Network Performance

Denied Delay (hr)	2.3
Denied Del/Veh (s)	2.4
Total Delay (hr)	30.4
Total Del/Veh (s)	31.1
Stop Delay (hr)	18.1
Stop Del/Veh (s)	18.5

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	SB	SB
Directions Served	T	R	L	T	LT	R
Maximum Queue (m)	71.8	20.1	20.3	3.3	195.0	45.9
Average Queue (m)	36.2	7.5	6.6	0.2	125.6	3.3
95th Queue (m)	63.3	16.7	16.5	1.8	205.4	25.2
Link Distance (m)	149.6		137.1	137.1	192.0	
Upstream Blk Time (%)					8	
Queuing Penalty (veh)					0	
Storage Bay Dist (m)		150.0				50.0
Storage Blk Time (%)					48	0
Queuing Penalty (veh)					6	0

Intersection: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	R	LT	R
Maximum Queue (m)	10.8	7.1	52.8	59.9	36.8	55.2	32.5
Average Queue (m)	2.2	0.4	19.1	29.9	5.7	20.4	5.1
95th Queue (m)	7.6	4.1	38.1	52.5	23.2	41.7	24.3
Link Distance (m)		137.1	137.2	137.2		232.5	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	35.0				80.0		25.0
Storage Blk Time (%)				0		6	0
Queuing Penalty (veh)				0		10	0

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	B10	WB	B1	NB
Directions Served	T	LT	T	LR
Maximum Queue (m)	62.0	18.2	29.2	16.6
Average Queue (m)	2.2	2.3	1.0	4.4
95th Queue (m)	63.2	12.1	21.4	11.4
Link Distance (m)	608.5	240.0	149.6	70.2
Upstream Blk Time (%)	0		0	
Queuing Penalty (veh)	0		0	
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	L	TR	L	TR	L	TR
Maximum Queue (m)	2.2	53.7	13.2	104.9	37.3	66.8	7.0	8.7
Average Queue (m)	0.1	20.7	2.8	45.3	27.3	11.2	1.1	1.7
95th Queue (m)	1.3	42.7	9.4	80.1	42.1	42.4	5.1	7.1
Link Distance (m)		357.9		169.9		608.5	30.6	30.6
Upstream Blk Time (%)				0				
Queuing Penalty (veh)				0				
Storage Bay Dist (m)	35.0		160.0		30.0			
Storage Blk Time (%)		1		0	10			
Queuing Penalty (veh)		3		0	3			

Network Summary

Network wide Queuing Penalty: 21

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Phase	1	2	4	5	6	8	12	16
Movement(s) Served	WBTL	EBWB	SBTL	EBTL	EBWB	NBTL	SBTL	NBTL
Maximum Green (s)	27.8	28.4	28.2	52.5	23.5	7.0	3.0	4.4
Minimum Green (s)	7.0	12.0	10.0	7.0	7.0	7.0	3.0	3.0
Recall	Max	C-Max	None	Max	Max	None	None	None
Avg. Green (s)	29.7	28.4	28.2	60.3	25.3	7.1	3.0	3.2
g/C Ratio	NA	NA	NA	NA	NA	-0.01	-0.01	-0.01
Cycles Skipped (%)	0	0	0	0	0	13	19	62
Cycles @ Minimum (%)	0	0	0	0	0	88	81	34
Cycles Maxed Out (%)	100	100	100	100	100	88	81	0
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary




Average Cycle Length (s): NA
Number of Complete Cycles : 0

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	50.0	20.0	50.0	20.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	34.6	12.3	34.6	12.3
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	19	0	19
Cycles Maxed Out (%)	19	14	19	14
Cycles with Peds (%)	0	0	0	0

Controller Summary



















Average Cycle Length (s): NA
Number of Complete Cycles : 0

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	203	8	24	255	8	21
Future Vol, veh/h	203	8	24	255	8	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	94	94	68	68
Heavy Vehicles, %	3	2	7	2	2	4
Mvmt Flow	226	9	26	271	12	31
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	235	0	554	231
Stage 1	-	-	-	-	231	-
Stage 2	-	-	-	-	323	-
Critical Hdwy	-	-	4.17	-	6.42	6.24
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.263	-	3.518	3.336
Pot Cap-1 Maneuver	-	-	1303	-	493	803
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	734	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1303	-	482	803
Mov Cap-2 Maneuver	-	-	-	-	482	-
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	734	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		10.7	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	678	-	-	1303	-	
HCM Lane V/C Ratio	0.063	-	-	0.02	-	
HCM Control Delay (s)	10.7	-	-	7.8	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	


15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 NB

S1 Existing PM 2018

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	693	0	0	289	782	82	2	156	0	0	0
Future Volume (vph)	22	693	0	0	289	782	82	2	156	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		80.0	0.0		25.0	0.0		0.0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1641	1863	0	0	3505	1583	0	1758	1583	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1641	1863	0	0	3505	1583	0	1758	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						815			197			
Link Speed (k/h)		50			50			60			80	
Link Distance (m)		156.7			145.9			242.8			253.4	
Travel Time (s)		11.3			10.5			14.6			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.91	0.91	0.91	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	10%	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	24	753	0	0	301	815	90	2	171	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	753	0	0	301	815	0	92	171	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5 6			6			8 16				
Permitted Phases						6	8 16		8 16			
Total Split (s)	58.0				29.0	29.0						
Total Lost Time (s)	5.5				5.5	5.5						
Act Effect Green (s)	53.6	82.6			23.5	23.5		16.1	16.1			
Actuated g/C Ratio	0.49	0.75			0.21	0.21		0.15	0.15			
v/c Ratio	0.03	0.54			0.40	0.83		0.36	0.43			
Control Delay	18.5	1.2			39.1	11.4		46.6	7.3			
Queue Delay	0.0	0.7			0.0	0.0		0.0	0.0			
Total Delay	18.5	1.9			39.1	11.4		46.6	7.3			
LOS	B	A			D	B		D	A			
Approach Delay		2.4			18.9			21.0				
Approach LOS		A			B			C				
Stops (vph)	10	17			243	76		75	14			
Fuel Used(l)	1	11			18	19		7	5			
CO Emissions (g/hr)	16	210			338	361		134	86			

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	1	2	4	8	12	16
Permitted Phases						
Total Split (s)	33.0	34.2	34.0	12.8	8.8	10.2
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	3	41			65	70		26	17			
VOC Emissions (g/hr)	4	49			78	83		31	20			
Dilemma Vehicles (#)	0	0			0	0		4	0			
Queue Length 50th (m)	2.2	0.0			31.0	0.0		19.1	0.0			
Queue Length 95th (m)	m3.0	m0.0			44.6	47.1		34.9	13.7			
Internal Link Dist (m)		132.7			121.9			218.8			229.4	
Turn Bay Length (m)	35.0					80.0			25.0			
Base Capacity (vph)	799	1398			748	979		274	413			
Starvation Cap Reductn	0	325			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.03	0.70			0.40	0.83		0.34	0.41			

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 13.2

Intersection LOS: B

Intersection Capacity Utilization 102.4%

ICU Level of Service G

Analysis Period (min) 15

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

Splits and Phases: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road





















Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 SB

S1 Existing PM 2018

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	201	63	119	248	0	0	0	0	521	5	12
Future Volume (vph)	0	201	63	119	248	0	0	0	0	521	5	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		150.0	0.0		0.0	0.0		0.0	0.0		50.0
Storage Lanes	0		1	1		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1827	1538	1752	1845	0	0	0	0	0	1775	1272
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	1827	1538	1752	1845	0	0	0	0	0	1775	1272
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			197									197
Link Speed (k/h)		50			50			80			60	
Link Distance (m)		168.4			156.7			263.6			205.3	
Travel Time (s)		12.1			11.3			11.9			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.90	0.90	0.90	0.92	0.92	0.92	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	4%	5%	3%	3%	2%	2%	2%	2%	2%	2%	27%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	221	69	132	276	0	0	0	0	585	6	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	221	69	132	276	0	0	0	0	0	591	13
Turn Type		NA	Perm	Prot	NA					Perm	NA	Perm
Protected Phases		2		1	2 1						4 12	
Permitted Phases			2							4 12		4 12
Total Split (s)		34.2	34.2	33.0								
Total Lost Time (s)		5.8	5.8	5.2								
Act Effect Green (s)		28.4	28.4	27.8	61.4						37.0	37.0
Actuated g/C Ratio		0.26	0.26	0.25	0.56						0.34	0.34
v/c Ratio		0.47	0.13	0.30	0.27						0.99	0.02
Control Delay		38.4	0.5	19.9	2.0						71.7	0.1
Queue Delay		0.0	0.0	0.0	0.0						0.0	0.0
Total Delay		38.4	0.5	19.9	2.0						71.7	0.1
LOS		D	A	B	A						E	A
Approach Delay		29.3			7.8						70.2	
Approach LOS		C			A						E	
Stops (vph)		167	0	32	36						457	0
Fuel Used(l)		18	3	4	5						53	0
CO Emissions (g/hr)		330	47	80	91						989	4

Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	4	5	6	8	12	16
Permitted Phases						
Total Split (s)	34.0	58.0	29.0	12.8	8.8	10.2
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)		64	9	15	18						191	1
VOC Emissions (g/hr)		76	11	18	21						228	1
Dilemma Vehicles (#)		0	0	0	0						22	0
Queue Length 50th (m)		42.3	0.0	8.2	3.7						131.9	0.0
Queue Length 95th (m)		66.4	0.0	13.3	9.9						#203.4	0.0
Internal Link Dist (m)		144.4			132.7			239.6			181.3	
Turn Bay Length (m)			150.0									50.0
Base Capacity (vph)		471	543	442	1029						597	558
Starvation Cap Reductn		0	0	0	0						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.47	0.13	0.30	0.27						0.99	0.02

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 41.5

Intersection LOS: D

Intersection Capacity Utilization 102.4%

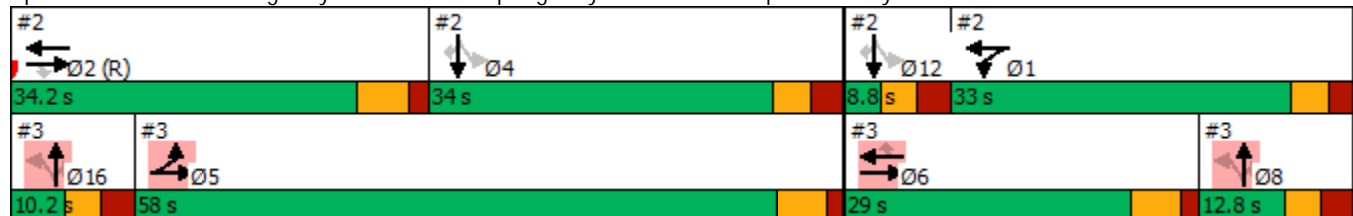
ICU Level of Service G

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

























Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S1 Existing PM 2018

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	488	192	17	777	4	227	2	24	7	2	3
Future Volume (vph)	2	488	192	17	777	4	227	2	24	7	2	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.999			0.861			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1553	1770	1861	0	1770	1604	0	1770	1703	0
Flt Permitted	0.139			0.395			0.753			0.739		
Satd. Flow (perm)	259	1863	1553	736	1861	0	1403	1604	0	1377	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213		1			26			4	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			3.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.91	0.91	0.91	0.67	0.67	0.67
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	2	542	213	20	903	5	249	2	26	10	3	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	542	213	20	908	0	249	28	0	10	7	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	56.8	56.8	56.8	56.8	56.8		26.0	26.0		26.0	26.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	40.0	40.0	40.0	40.0	40.0		16.5	16.5		16.5	16.5	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57		0.24	0.24		0.24	0.24	
v/c Ratio	0.01	0.51	0.22	0.05	0.85		0.75	0.07		0.03	0.02	
Control Delay	7.0	11.0	1.7	7.1	21.9		42.6	11.3		23.9	18.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.0	11.0	1.7	7.1	21.9		42.6	11.3		23.9	18.4	
LOS	A	B	A	A	C		D	B		C	B	
Approach Delay		8.4			21.6			39.4			21.6	
Approach LOS		A			C			D			C	
Stops (vph)	2	263	13	9	591		191	9		6	4	
Fuel Used(l)	0	29	7	1	82		59	5		0	0	
CO Emissions (g/hr)	3	531	129	27	1518		1090	102		5	3	

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S1 Existing PM 2018
11-27-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	102	25	5	293		210	20		1	1	
VOC Emissions (g/hr)	1	122	30	6	350		251	23		1	1	
Dilemma Vehicles (#)	0	34	0	0	55		0	2		0	0	
Queue Length 50th (m)	0.1	42.9	0.0	1.2	99.3		32.1	0.2		1.1	0.4	
Queue Length 95th (m)	1.0	69.3	7.8	3.8	147.3		#73.1	6.7		3.8	2.6	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	192	1381	1206	545	1380		416	494		408	508	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.39	0.18	0.04	0.66		0.60	0.06		0.02	0.01	

Intersection Summary

Area Type: Other

Cycle Length: 82.8

Actuated Cycle Length: 69.7

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 19.0

Intersection LOS: B

Intersection Capacity Utilization 71.0%





ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

 Ø2	 Ø4
56.8 s	26 s
 Ø6	 Ø8
56.8 s	26 s

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:45	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3292	3227	3297	3334	3306	3119	3217
Vehs Exited	3280	3255	3314	3363	3287	3136	3244
Starting Vehs	102	124	117	133	95	117	114
Ending Vehs	114	96	100	104	114	100	87
Travel Distance (km)	4088	4036	4001	4226	4156	4002	4061
Travel Time (hr)	133.2	118.1	109.0	125.8	114.7	105.5	113.8
Total Delay (hr)	57.2	42.6	34.2	46.9	37.0	30.8	37.7
Total Stops	2197	1886	1927	2082	2053	1791	1945
Fuel Used (l)	345.2	331.3	326.3	349.3	335.2	317.1	330.7

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3242	3260	3372	3265
Vehs Exited	3256	3273	3375	3278
Starting Vehs	109	114	113	113
Ending Vehs	95	101	110	98
Travel Distance (km)	4138	4089	4197	4099
Travel Time (hr)	115.8	111.7	136.5	118.4
Total Delay (hr)	38.7	35.3	57.6	41.8
Total Stops	2047	2037	2328	2034
Fuel Used (l)	335.1	329.9	356.0	335.6

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	911	892	940	949	907	853	867
Vehs Exited	893	907	932	949	860	832	859
Starting Vehs	102	124	117	133	95	117	114
Ending Vehs	120	109	125	133	142	138	122
Travel Distance (km)	1081	1072	1132	1156	1107	1067	1061
Travel Time (hr)	34.3	33.6	33.5	35.8	31.5	29.4	30.8
Total Delay (hr)	14.0	13.6	12.3	14.3	10.8	9.3	11.0
Total Stops	688	579	690	636	599	543	573
Fuel Used (l)	92.8	90.9	95.7	97.7	90.2	86.6	88.0

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	7	8	9	Avg
Vehs Entered	900	937	920	905
Vehs Exited	866	910	894	888
Starting Vehs	109	114	113	113
Ending Vehs	143	141	139	129
Travel Distance (km)	1128	1137	1163	1110
Travel Time (hr)	34.2	33.8	39.7	33.7
Total Delay (hr)	13.0	12.5	17.8	12.9
Total Stops	643	694	750	638
Fuel Used (l)	93.8	94.8	100.6	93.1

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	784	765	768	775	787	763	793
Vehs Exited	792	757	808	783	827	790	788
Starting Vehs	120	109	125	133	142	138	122
Ending Vehs	112	117	85	125	102	111	127
Travel Distance (km)	1017	948	949	991	1024	1010	981
Travel Time (hr)	36.4	31.8	24.9	32.9	28.4	27.7	28.1
Total Delay (hr)	17.6	13.9	7.2	14.4	9.3	8.9	9.9
Total Stops	577	453	411	489	469	489	498
Fuel Used (l)	88.5	80.8	77.0	84.2	82.5	81.1	80.5

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	783	773	844	782
Vehs Exited	807	817	882	806
Starting Vehs	143	141	139	129
Ending Vehs	119	97	101	108
Travel Distance (km)	1036	1007	1059	1002
Travel Time (hr)	30.1	27.3	41.5	30.9
Total Delay (hr)	10.9	8.6	21.5	12.2
Total Stops	516	500	635	502
Fuel Used (l)	84.7	81.1	96.6	83.7

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	815	793	772	824	811	752	772
Vehs Exited	810	817	760	810	813	762	809
Starting Vehs	112	117	85	125	102	111	127
Ending Vehs	117	93	97	139	100	101	90
Travel Distance (km)	958	1003	935	1022	1034	976	1024
Travel Time (hr)	33.0	26.9	24.3	28.5	28.0	25.0	29.1
Total Delay (hr)	15.1	8.0	6.8	9.5	8.5	6.8	9.8
Total Stops	456	418	393	468	509	400	468
Fuel Used (l)	81.8	79.8	74.3	82.5	83.2	76.4	82.7

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	7	8	9	Avg
Vehs Entered	765	796	816	790
Vehs Exited	799	797	800	797
Starting Vehs	119	97	101	108
Ending Vehs	85	96	117	101
Travel Distance (km)	967	1041	1001	996
Travel Time (hr)	25.5	27.0	29.9	27.7
Total Delay (hr)	7.5	7.5	11.1	9.1
Total Stops	465	429	510	447
Fuel Used (l)	77.5	82.0	81.9	80.2

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	782	777	817	786	801	751	785
Vehs Exited	785	774	814	821	787	752	788
Starting Vehs	117	93	97	139	100	101	90
Ending Vehs	114	96	100	104	114	100	87
Travel Distance (km)	1031	1013	985	1058	990	949	994
Travel Time (hr)	29.6	25.9	26.3	28.6	26.8	23.4	25.8
Total Delay (hr)	10.4	7.0	7.9	8.7	8.3	5.8	7.1
Total Stops	476	436	433	489	476	359	406
Fuel Used (l)	82.1	79.7	79.2	84.8	79.2	73.1	79.5

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	794	754	792	782
Vehs Exited	784	749	799	785
Starting Vehs	85	96	117	101
Ending Vehs	95	101	110	98
Travel Distance (km)	1007	903	975	991
Travel Time (hr)	26.0	23.6	25.5	26.2
Total Delay (hr)	7.3	6.7	7.2	7.7
Total Stops	423	414	433	433
Fuel Used (l)	79.2	72.1	76.9	78.6

2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	All
Denied Delay (hr)	0.4	0.0	0.0	0.0	3.9	0.0	0.1	4.5
Denied Del/Veh (s)	3.1	1.6	0.0	0.0	23.0	17.9	31.9	11.3
Total Delay (hr)	6.1	0.2	0.5	0.1	13.4	0.1	0.2	20.6
Total Del/Veh (s)	49.7	6.3	17.7	2.8	77.2	97.8	50.7	50.9
Stop Delay (hr)	5.1	0.2	0.4	0.0	10.8	0.1	0.2	16.7
Stop Del/Veh (s)	41.8	4.9	15.0	0.6	62.0	79.8	37.5	41.3

3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.1	0.4	0.0	0.0	0.1	0.6
Denied Del/Veh (s)	0.0	0.0	0.9	3.3	0.4	0.3	4.0	1.2
Total Delay (hr)	0.1	0.9	2.8	0.4	0.5	0.0	0.1	4.7
Total Del/Veh (s)	10.8	3.0	45.2	3.0	55.4	57.6	3.8	9.0
Stop Delay (hr)	0.0	0.1	2.5	0.0	0.4	0.0	0.0	3.1
Stop Del/Veh (s)	8.1	0.3	40.2	0.0	51.8	51.9	0.4	5.9

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.2	0.0	0.0	0.1	0.0	0.0	0.4
Total Del/Veh (s)	1.6	1.2	4.9	1.6	7.1	3.8	1.9
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Stop Del/Veh (s)	0.0	0.0	1.9	0.1	5.4	3.9	0.4

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.4	2.2	3.2	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.1	0.1
Total Delay (hr)	0.0	2.2	0.5	0.1	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.1	10.1	4.2	20.7	5.9	3.7	19.2	6.0	10.1	18.1	13.8	4.9
Stop Delay (hr)	0.0	0.8	0.0	0.1	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	6.3	3.5	0.0	19.0	2.6	2.5	13.7	2.9	7.5	16.8	10.6	4.6

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	0.9
Denied Del/Veh (s)	1.7
Total Delay (hr)	4.3
Total Del/Veh (s)	8.4
Stop Delay (hr)	1.8
Stop Del/Veh (s)	3.4

Total Network Performance

Denied Delay (hr)	6.0
Denied Del/Veh (s)	6.7
Total Delay (hr)	35.8
Total Del/Veh (s)	38.1
Stop Delay (hr)	22.0
Stop Del/Veh (s)	23.5

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Movement	EB	EB	B1	WB	WB	SB	SB
Directions Served	T	R	T	L	T	LT	R
Maximum Queue (m)	152.8	85.7	13.5	16.4	5.9	202.3	57.4
Average Queue (m)	85.6	19.2	1.3	4.6	0.5	156.7	4.4
95th Queue (m)	145.9	72.9	16.4	12.6	3.2	228.8	29.6
Link Distance (m)	149.6		240.0	137.1	137.1	192.0	
Upstream Blk Time (%)	2	0				22	
Queuing Penalty (veh)	10	0				0	
Storage Bay Dist (m)		150.0					50.0
Storage Blk Time (%)	2	0				51	0
Queuing Penalty (veh)	2	0				8	0

Intersection: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	R	LT	R
Maximum Queue (m)	14.8	15.8	45.6	60.5	24.8	34.6	24.2
Average Queue (m)	1.6	2.5	17.3	26.8	1.7	10.9	1.4
95th Queue (m)	8.0	9.9	36.3	50.1	13.0	24.8	12.1
Link Distance (m)		137.1	137.2	137.2		232.5	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	35.0				80.0		25.0
Storage Blk Time (%)				0	0	1	0
Queuing Penalty (veh)				0	0	1	0

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	23.6	17.6
Average Queue (m)	2.5	6.3
95th Queue (m)	12.1	13.7
Link Distance (m)	240.0	70.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	L	TR	L	TR	L	TR
Maximum Queue (m)	2.3	80.5	19.3	49.7	36.7	43.2	8.1	8.6
Average Queue (m)	0.1	32.0	4.2	20.8	20.1	3.1	0.6	0.9
95th Queue (m)	1.2	62.8	13.0	40.5	36.1	17.7	4.2	5.1
Link Distance (m)		357.9		169.9		608.5	30.6	30.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	35.0		160.0		30.0			
Storage Blk Time (%)		4			3			
Queuing Penalty (veh)		20			0			

Network Summary

Network wide Queuing Penalty: 41

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Phase	1	2	4	5	6	8	12	16
Movement(s) Served	WBTL	EBWB	SBTL	EBTL	EBWB	NBTL	SBTL	NBTL
Maximum Green (s)	23.8	38.4	42.2	76.1	19.5	7.0	3.0	4.8
Minimum Green (s)	7.0	12.0	10.0	7.0	7.0	7.0	3.0	3.0
Recall	Max	C-Max	None	Max	Max	None	None	None
Avg. Green (s)	26.0	38.4	42.2	85.2	23.8	7.2	3.0	3.4
g/C Ratio	NA	NA	NA	NA	NA	-0.01	-0.01	-0.01
Cycles Skipped (%)	0	0	0	0	0	28	15	83
Cycles @ Minimum (%)	0	0	0	0	0	72	85	13
Cycles Maxed Out (%)	100	100	100	100	100	72	85	0
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0




Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	29.2	18.0	29.2	18.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	41.0	9.8	41.0	9.8
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	35	0	35
Cycles Maxed Out (%)	65	5	65	5
Cycles with Peds (%)	0	0	0	0

Controller Summary

Average Cycle Length (s): NA



















Number of Complete Cycles : 0

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	482	4	20	137	4	44
Future Vol, veh/h	482	4	20	137	4	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	73	73	77	77
Heavy Vehicles, %	3	2	6	7	2	6
Mvmt Flow	507	4	27	188	5	57
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	511	0	751	509
Stage 1	-	-	-	-	509	-
Stage 2	-	-	-	-	242	-
Critical Hdwy	-	-	4.16	-	6.42	6.26
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.354
Pot Cap-1 Maneuver	-	-	1034	-	378	556
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	798	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1034	-	367	556
Mov Cap-2 Maneuver	-	-	-	-	367	-
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	798	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.1		12.6	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	533	-	-	1034	-	
HCM Lane V/C Ratio	0.117	-	-	0.026	-	
HCM Control Delay (s)	12.6	-	-	8.6	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	













15318 Bedford West Sub Area 10
Kearney Lake Road & Highway 102 NB

S2 Future Background AM 2031

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	1008	0	0	212	486	30	3	75	0	0	0
Future Volume (vph)	22	1008	0	0	212	486	30	3	75	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		80.0	0.0		25.0	0.0		0.0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected	0.950							0.957				
Satd. Flow (prot)	1399	1863	0	0	3438	1583	0	1612	1524	0	0	0
Flt Permitted	0.950							0.957				
Satd. Flow (perm)	1399	1863	0	0	3438	1583	0	1612	1524	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						565			167			
Link Speed (k/h)		50			50			60			80	
Link Distance (m)		156.7			145.9			242.8			253.4	
Travel Time (s)		11.3			10.5			14.6			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.86	0.86	0.86	0.85	0.85	0.85	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	29%	2%	2%	2%	5%	2%	14%	2%	6%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	24	1108	0	0	247	565	35	4	88	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	1108	0	0	247	565	0	39	88	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5 6			6			8 16				
Permitted Phases						6	8 16		8 16			
Total Split (s)	81.6				25.0	25.0						
Total Lost Time (s)	5.5				5.5	5.5						
Act Effct Green (s)	77.9	102.9			19.5	19.5		15.8	15.8			
Actuated g/C Ratio	0.60	0.79			0.15	0.15		0.12	0.12			
v/c Ratio	0.03	0.75			0.48	0.79		0.20	0.27			
Control Delay	9.6	0.6			54.1	12.9		54.4	2.0			
Queue Delay	0.0	4.7			0.0	0.0		0.0	0.0			
Total Delay	9.6	5.3			54.1	12.9		54.4	2.0			
LOS	A	A			D	B		D	A			
Approach Delay		5.4			25.4			18.1				
Approach LOS		A			C			B				
Stops (vph)	6	10			190	50		30	0			
Fuel Used(l)	1	16			16	13		3	2			
CO Emissions (g/hr)	12	292			298	236		57	32			

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	1	2	4	8	12	16
Permitted Phases						
Total Split (s)	29.0	44.2	48.0	12.8	8.8	10.6
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	2	56			58	45		11	6			
VOC Emissions (g/hr)	3	67			69	54		13	7			
Dilemma Vehicles (#)	0	0			0	0		1	0			
Queue Length 50th (m)	1.6	0.0			32.5	0.0		9.6	0.0			
Queue Length 95th (m)	m1.6	m0.0			44.4	26.4		20.0	0.0			
Internal Link Dist (m)		132.7			121.9			218.8			229.4	
Turn Bay Length (m)	35.0					80.0			25.0			
Base Capacity (vph)	838	1474			515	717		218	350			
Starvation Cap Reductn	0	294			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.03	0.94			0.48	0.79		0.18	0.25			

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 14.0

Intersection LOS: B



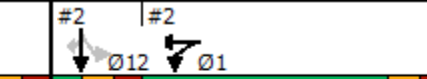
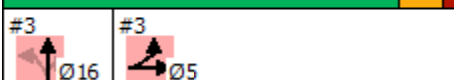


Intersection Capacity Utilization 100.7%

ICU Level of Service G

Analysis Period (min) 15

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

Splits and Phases: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road



















					
44.2 s		48 s		8.8 s	
					
10.6 s		81.6 s		25 s	
				12.8 s	

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10
Kearney Lake Road & Highway 102 SB

S2 Future Background AM 2031

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	417	109	89	156	0	0	0	0	617	4	16
Future Volume (vph)	0	417	109	89	156	0	0	0	0	617	4	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		150.0	0.0		0.0	0.0		0.0	0.0		50.0
Storage Lanes	0		1	1		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1827	1524	1770	1759	0	0	0	0	0	1775	1292
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	1827	1524	1770	1759	0	0	0	0	0	1775	1292
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			167									167
Link Speed (k/h)		50			50			80			60	
Link Distance (m)		168.4			156.7			263.6			205.3	
Travel Time (s)		12.1			11.3			11.9			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.92	0.92	0.92	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	6%	2%	8%	2%	2%	2%	2%	2%	2%	25%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	515	135	95	166	0	0	0	0	717	5	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	515	135	95	166	0	0	0	0	0	722	19
Turn Type		NA	Perm	Prot	NA					Perm	NA	Perm
Protected Phases		2		1	2 1						4 12	
Permitted Phases			2							4 12		4 12
Total Split (s)		44.2	44.2	29.0								
Total Lost Time (s)		5.8	5.8	5.2								
Act Effect Green (s)		38.4	38.4	23.8	67.4						51.0	51.0
Actuated g/C Ratio		0.30	0.30	0.18	0.52						0.39	0.39
v/c Ratio		0.96	0.24	0.29	0.18						1.04	0.03
Control Delay		74.4	3.3	14.3	1.3						83.0	0.1
Queue Delay		0.0	0.0	0.0	0.0						0.0	0.0
Total Delay		74.4	3.3	14.3	1.3						83.0	0.1
LOS		E	A	B	A						F	A
Approach Delay		59.6			6.0						80.9	
Approach LOS		E			A						F	
Stops (vph)		369	6	11	17						536	0
Fuel Used(l)		49	5	3	3						68	0
CO Emissions (g/hr)		909	89	47	53						1266	5

Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	4	5	6	8	12	16
Permitted Phases						
Total Split (s)	48.0	81.6	25.0	12.8	8.8	10.6
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)		175	17	9	10						244	1
VOC Emissions (g/hr)		210	21	11	12						292	1
Dilemma Vehicles (#)		0	0	0	0						22	0
Queue Length 50th (m)		136.5	0.0	3.5	1.9						~209.4	0.0
Queue Length 95th (m)		#171.5	4.7	5.8	7.3						#264.9	0.0
Internal Link Dist (m)		144.4			132.7			239.6			181.3	
Turn Bay Length (m)			150.0									50.0
Base Capacity (vph)		539	567	324	911						696	608
Starvation Cap Reductn		0	0	0	0						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.96	0.24	0.29	0.18						1.04	0.03

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 60.7

Intersection LOS: E

Intersection Capacity Utilization 100.7%

ICU Level of Service G

Analysis Period (min) 15

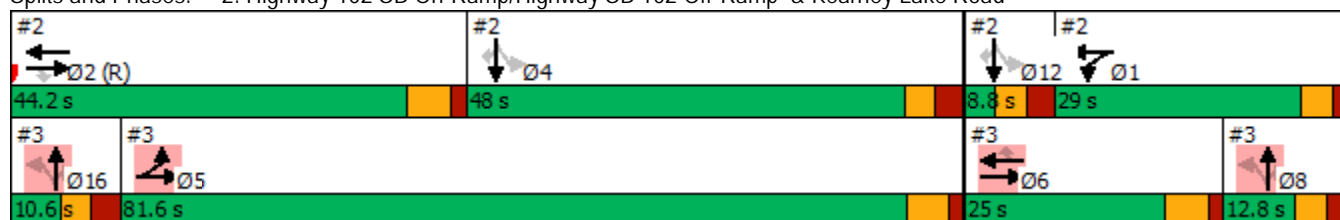
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

























Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10
Kearney Lake Road & Larry Uteck Boulevard

S2 Future Background AM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	775	459	25	438	8	132	3	6	4	3	3
Future Volume (vph)	3	775	459	25	438	8	132	3	6	4	3	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.997			0.896			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1845	1568	1719	1805	0	1671	1444	0	1770	1723	0
Flt Permitted	0.439			0.220			0.747			0.749		
Satd. Flow (perm)	818	1845	1568	398	1805	0	1314	1444	0	1395	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			473		2			9			8	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			2.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.97	0.97	0.97	0.88	0.88	0.88	0.67	0.67	0.67	0.38	0.38	0.38
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	3%	3%	5%	5%	2%	8%	2%	25%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	799	473	28	498	9	197	4	9	11	8	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	799	473	28	507	0	197	13	0	11	16	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	36.0	36.0	36.0	36.0	36.0		24.0	24.0		24.0	24.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	32.5	32.5	32.5	32.5	32.5		13.0	13.0		12.9	12.9	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62		0.25	0.25		0.24	0.24	
v/c Ratio	0.01	0.70	0.41	0.11	0.46		0.61	0.04		0.03	0.04	
Control Delay	7.7	16.9	2.3	9.6	10.7		27.3	10.9		15.5	12.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.7	16.9	2.3	9.6	10.7		27.3	10.9		15.5	12.0	
LOS	A	B	A	A	B		C	B		B	B	
Approach Delay		11.5			10.6			26.3			13.4	
Approach LOS		B			B			C			B	
Stops (vph)	3	513	37	15	260		109	6		4	4	
Fuel Used(l)	0	52	17	2	40		32	2		0	0	
CO Emissions (g/hr)	4	966	316	42	749		604	38		4	4	

15318 Bedford West Sub Area 10
Kearney Lake Road & Larry Uteck Boulevard

S2 Future Background AM 2031

11-27-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	186	61	8	144		117	7		1	1	
VOC Emissions (g/hr)	1	223	73	10	173		139	9		1	1	
Dilemma Vehicles (#)	0	57	0	0	35		0	1		0	1	
Queue Length 50th (m)	0.2	63.1	0.0	1.4	31.4		18.6	0.3		0.9	0.7	
Queue Length 95th (m)	1.3	#148.0	12.8	5.9	62.7		25.0	2.6		1.6	1.4	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	475	1072	1109	231	1050		466	517		494	616	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.75	0.43	0.12	0.48		0.42	0.03		0.02	0.03	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 52.7

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 12.8

Intersection LOS: B

Intersection Capacity Utilization 65.4%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard



Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	3:45	3:45	3:45	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4034	4012	4088	4011	4006	3933	4115
Vehs Exited	4048	4010	4099	3998	4040	3956	4135
Starting Vehs	132	120	132	135	129	138	139
Ending Vehs	118	122	121	148	95	115	119
Travel Distance (km)	4410	4331	4380	4392	4450	4384	4470
Travel Time (hr)	166.3	164.5	164.2	154.9	129.2	126.7	133.6
Total Delay (hr)	83.4	83.1	81.7	72.2	45.4	44.3	49.5
Total Stops	2681	2848	2782	2769	2575	2568	2659
Fuel Used (l)	400.2	394.9	398.8	392.0	370.7	367.8	378.5

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	4060	3926	4107	4029
Vehs Exited	4058	3917	4098	4035
Starting Vehs	133	100	138	129
Ending Vehs	135	109	147	121
Travel Distance (km)	4477	4367	4489	4415
Travel Time (hr)	177.0	120.2	174.4	151.1
Total Delay (hr)	93.0	38.2	90.1	68.1
Total Stops	2805	2368	2814	2691
Fuel Used (l)	415.5	358.2	411.6	388.8

Interval #0 Information Seeding

Start Time	3:45
End Time	4:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	1101	1109	1121	1078	1096	1052	1105
Vehs Exited	1086	1063	1106	1084	1070	1034	1080
Starting Vehs	132	120	132	135	129	138	139
Ending Vehs	147	166	147	129	155	156	164
Travel Distance (km)	1229	1172	1187	1228	1189	1119	1203
Travel Time (hr)	48.9	44.3	38.8	39.9	35.3	31.3	38.2
Total Delay (hr)	25.8	22.5	16.4	16.9	13.0	10.2	15.6
Total Stops	810	900	795	793	793	618	808
Fuel Used (l)	112.9	106.0	104.3	106.1	99.8	92.0	102.7

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	7	8	9	Avg
Vehs Entered	1151	1072	1094	1098
Vehs Exited	1113	1039	1073	1076
Starting Vehs	133	100	138	129
Ending Vehs	171	133	159	152
Travel Distance (km)	1288	1155	1229	1200
Travel Time (hr)	43.5	32.7	42.6	39.5
Total Delay (hr)	19.4	11.1	19.7	17.1
Total Stops	839	657	778	778
Fuel Used (l)	112.6	95.7	108.4	104.0

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	989	967	990	942	925	972	1031
Vehs Exited	1032	1007	1007	955	970	983	1067
Starting Vehs	147	166	147	129	155	156	164
Ending Vehs	104	126	130	116	110	145	128
Travel Distance (km)	1110	1074	1041	1036	1090	1141	1136
Travel Time (hr)	46.1	43.5	40.2	40.9	35.2	35.5	35.9
Total Delay (hr)	25.3	23.4	20.5	21.3	14.7	13.9	14.5
Total Stops	684	687	658	620	647	688	655
Fuel Used (l)	105.5	101.2	95.8	96.1	93.3	97.6	98.5

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	974	961	953	970
Vehs Exited	1014	980	987	998
Starting Vehs	171	133	159	152
Ending Vehs	131	114	125	120
Travel Distance (km)	1122	1131	1044	1092
Travel Time (hr)	44.3	30.5	41.7	39.4
Total Delay (hr)	23.2	9.4	21.8	18.8
Total Stops	691	580	684	659
Fuel Used (l)	103.8	91.6	97.7	98.1

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	979	970	965	981	1025	960	969
Vehs Exited	958	960	970	947	1014	976	987
Starting Vehs	104	126	130	116	110	145	128
Ending Vehs	125	136	125	150	121	129	110
Travel Distance (km)	1038	1023	1053	1034	1110	1075	1026
Travel Time (hr)	37.0	39.9	41.2	37.4	30.1	30.6	28.7
Total Delay (hr)	17.5	20.6	21.4	18.0	9.3	10.5	9.2
Total Stops	612	644	640	709	578	672	580
Fuel Used (l)	92.7	93.8	96.9	93.7	90.5	89.8	85.6

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	952	932	1038	979
Vehs Exited	959	921	1041	973
Starting Vehs	131	114	125	120
Ending Vehs	124	125	122	121
Travel Distance (km)	1021	1028	1100	1051
Travel Time (hr)	42.6	27.3	43.3	35.8
Total Delay (hr)	23.4	7.9	22.7	16.1
Total Stops	629	513	706	627
Fuel Used (l)	97.6	83.9	100.5	92.5

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	965	966	1012	1010	960	949	1010
Vehs Exited	972	980	1016	1012	986	963	1001
Starting Vehs	125	136	125	150	121	129	110
Ending Vehs	118	122	121	148	95	115	119
Travel Distance (km)	1033	1062	1099	1094	1062	1050	1105
Travel Time (hr)	34.2	36.8	44.0	36.6	28.6	29.4	30.8
Total Delay (hr)	14.8	16.7	23.4	16.1	8.5	9.6	10.2
Total Stops	575	617	689	647	557	590	616
Fuel Used (l)	89.1	94.0	101.8	96.2	87.2	88.3	91.7

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	7	8	9	Avg
Vehs Entered	983	961	1022	985
Vehs Exited	972	977	997	987
Starting Vehs	124	125	122	121
Ending Vehs	135	109	147	121
Travel Distance (km)	1046	1053	1116	1072
Travel Time (hr)	46.7	29.7	46.9	36.4
Total Delay (hr)	26.9	9.8	25.9	16.2
Total Stops	646	618	646	620
Fuel Used (l)	101.6	87.0	105.0	94.2

2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	19.0	0.2	0.4	19.6
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	109.0	109.1	101.0	50.3
Total Delay (hr)	2.8	0.1	0.8	0.2	18.0	0.2	0.3	22.3
Total Del/Veh (s)	41.4	5.5	20.7	2.3	103.9	106.5	71.3	57.3
Stop Delay (hr)	2.4	0.1	0.7	0.0	15.0	0.1	0.3	18.6
Stop Del/Veh (s)	36.0	4.8	17.9	0.2	86.6	87.8	56.6	47.7

3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.2	0.9	0.0	0.0	0.2	1.2
Denied Del/Veh (s)	0.0	0.0	1.8	3.4	0.7	0.7	3.7	1.9
Total Delay (hr)	0.1	0.6	4.0	1.7	1.5	0.1	0.3	8.3
Total Del/Veh (s)	16.5	2.8	41.2	6.5	55.1	62.9	6.6	12.4
Stop Delay (hr)	0.1	0.0	3.4	0.1	1.4	0.1	0.1	5.1
Stop Del/Veh (s)	14.0	0.1	34.9	0.3	50.0	56.7	2.3	7.6

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay (hr)	0.1	0.0	0.0	0.2	0.0	0.0	0.3
Total Del/Veh (s)	1.2	0.7	3.9	2.0	8.1	2.9	1.9
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	0.0	0.0	0.6	0.0	6.4	2.9	0.3

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.7	1.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Total Delay (hr)	0.0	1.6	0.2	0.1	4.1	0.0	2.4	0.0	0.1	0.1	0.0	0.0
Total Del/Veh (s)	30.5	9.9	2.8	15.9	16.3	10.7	32.1	6.5	15.4	24.3	19.2	16.9
Stop Delay (hr)	0.0	0.8	0.0	0.1	1.8	0.0	1.8	0.0	0.1	0.1	0.0	0.0
Stop Del/Veh (s)	28.4	4.7	0.0	13.3	7.3	4.8	24.1	3.4	10.2	23.2	16.9	16.8

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	0.4
Denied Del/Veh (s)	0.6
Total Delay (hr)	8.7
Total Del/Veh (s)	15.1
Stop Delay (hr)	4.7
Stop Del/Veh (s)	8.2

Total Network Performance

Denied Delay (hr)	21.4
Denied Del/Veh (s)	19.1
Total Delay (hr)	46.7
Total Del/Veh (s)	40.4
Stop Delay (hr)	29.1
Stop Del/Veh (s)	25.2

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	SB	SB
Directions Served	T	R	L	T	LT	R
Maximum Queue (m)	89.1	24.3	26.6	2.1	207.1	57.3
Average Queue (m)	48.6	9.3	8.4	0.2	178.1	5.3
95th Queue (m)	80.9	18.6	19.8	1.6	242.0	32.5
Link Distance (m)	149.6		137.1	137.1	192.0	
Upstream Blk Time (%)					49	
Queuing Penalty (veh)					0	
Storage Bay Dist (m)		150.0				50.0
Storage Blk Time (%)					59	0
Queuing Penalty (veh)					9	0

Intersection: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	R	LT	R
Maximum Queue (m)	14.6	3.4	58.4	94.0	54.7	78.3	32.5
Average Queue (m)	2.3	0.1	24.3	39.4	11.8	28.3	10.1
95th Queue (m)	8.6	2.0	46.4	70.4	39.9	58.1	34.5
Link Distance (m)		137.1	137.2	137.2		232.5	
Upstream Blk Time (%)				0			
Queuing Penalty (veh)				0			
Storage Bay Dist (m)	35.0				80.0		25.0
Storage Blk Time (%)				0	0	13	0
Queuing Penalty (veh)				1	0	24	0

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	WB	B1	NB
Directions Served	LT	T	LR
Maximum Queue (m)	23.9	15.1	15.4
Average Queue (m)	2.2	0.5	4.9
95th Queue (m)	11.8	15.4	11.6
Link Distance (m)	240.0	149.6	70.2
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	WB	WB	B13	NB	NB	SB	SB
Directions Served	L	T	L	TR	T	L	TR	L	TR
Maximum Queue (m)	4.4	74.1	13.3	137.6	11.6	37.4	85.5	8.2	8.7
Average Queue (m)	0.4	28.7	3.0	65.6	0.9	31.1	25.2	1.7	1.6
95th Queue (m)	2.3	57.4	9.6	120.5	15.7	43.4	72.8	6.3	6.7
Link Distance (m)		357.9		169.9	270.3		608.5	30.6	30.6
Upstream Blk Time (%)				0					
Queuing Penalty (veh)				0					
Storage Bay Dist (m)	35.0		160.0			30.0			
Storage Blk Time (%)		4		1		17	0		
Queuing Penalty (veh)		9		0		6	0		

Network Summary

Network wide Queuing Penalty: 49

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Phase	1	2	4	5	6	8	12	16
Movement(s) Served	WBTL	EBWB	SBTL	EBTL	EBWB	NBTL	SBTL	NBTL
Maximum Green (s)	30.9	28.3	35.2	59.5	26.5	7.1	3.0	4.3
Minimum Green (s)	7.0	12.0	10.0	7.0	7.0	7.0	3.0	3.0
Recall	Max	C-Max	None	Max	Max	None	None	None
Avg. Green (s)	31.8	28.3	35.2	67.1	26.9	7.1	3.1	3.1
g/C Ratio	NA	NA	NA	NA	NA	NA	-0.01	-0.01
Cycles Skipped (%)	0	0	0	0	0	0	7	46
Cycles @ Minimum (%)	0	0	0	0	0	0	93	50
Cycles Maxed Out (%)	100	100	100	100	100	100	93	0
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary




Average Cycle Length (s): NA
Number of Complete Cycles : 0

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	53.2	24.0	53.2	24.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	42.6	15.5	42.6	15.5
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	10	0	10
Cycles Maxed Out (%)	38	18	38	18
Cycles with Peds (%)	0	0	0	0

Controller Summary



















Average Cycle Length (s): NA
Number of Complete Cycles : 0

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	238	10	29	298	10	25
Future Vol, veh/h	238	10	29	298	10	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	94	94	68	68
Heavy Vehicles, %	3	2	7	2	2	4
Mvmt Flow	264	11	31	317	15	37
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	275	0	649	270
Stage 1	-	-	-	-	270	-
Stage 2	-	-	-	-	379	-
Critical Hdwy	-	-	4.17	-	6.42	6.24
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.263	-	3.518	3.336
Pot Cap-1 Maneuver	-	-	1260	-	434	764
Stage 1	-	-	-	-	775	-
Stage 2	-	-	-	-	692	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1260	-	421	764
Mov Cap-2 Maneuver	-	-	-	-	421	-
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	692	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		11.3	
HCM LOS	B					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	620	-	-	1260	-	
HCM Lane V/C Ratio	0.083	-	-	0.024	-	
HCM Control Delay (s)	11.3	-	-	7.9	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	













15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 NB

S2 Future Background PM 2031

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	810	0	0	338	914	96	3	183	0	0	0
Future Volume (vph)	26	810	0	0	338	914	96	3	183	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		80.0	0.0		25.0	0.0		0.0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1641	1863	0	0	3505	1583	0	1760	1583	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1641	1863	0	0	3505	1583	0	1760	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						952			201			
Link Speed (k/h)		50			50			60			80	
Link Distance (m)		156.7			145.9			242.8			253.4	
Travel Time (s)		11.3			10.5			14.6			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.91	0.91	0.91	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	10%	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	28	880	0	0	352	952	105	3	201	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	880	0	0	352	952	0	108	201	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5 6			6			8 16				
Permitted Phases						6	8 16		8 16			
Total Split (s)	65.0				32.0	32.0						
Total Lost Time (s)	5.5				5.5	5.5						
Act Effct Green (s)	60.3	92.3			26.5	26.5		16.4	16.4			
Actuated g/C Ratio	0.50	0.77			0.22	0.22		0.14	0.14			
v/c Ratio	0.03	0.61			0.45	0.87		0.45	0.52			
Control Delay	16.8	1.5			42.7	12.8		54.0	11.4			
Queue Delay	0.0	1.6			0.0	0.0		0.0	0.0			
Total Delay	16.8	3.1			42.7	12.8		54.0	11.4			
LOS	B	A			D	B		D	B			
Approach Delay		3.5			20.9			26.3				
Approach LOS		A			C			C				
Stops (vph)	9	28			285	80		89	24			
Fuel Used(l)	1	14			22	23		9	6			
CO Emissions (g/hr)	17	253			413	437		168	116			

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	1	2	4	8	12	16
Permitted Phases						
Total Split (s)	36.1	34.1	41.0	12.9	8.8	10.1
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	3	49			80	84		32	22			
VOC Emissions (g/hr)	4	58			95	101		39	27			
Dilemma Vehicles (#)	0	0			0	0		4	0			
Queue Length 50th (m)	2.5	0.0			40.0	0.0		25.1	0.0			
Queue Length 95th (m)	m2.8	m0.0			55.4	#72.2		43.7	21.9			
Internal Link Dist (m)		132.7			121.9			218.8			229.4	
Turn Bay Length (m)	35.0					80.0			25.0			
Base Capacity (vph)	824	1432			774	1091		252	399			
Starvation Cap Reductn	0	357			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.03	0.82			0.45	0.87		0.43	0.50			

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 15.3

Intersection LOS: B

Intersection Capacity Utilization 117.3%

ICU Level of Service H

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road


 #2  Ø2 (R) 34.1 s		 #2  Ø4 41 s		 #2  Ø12 8.8 s		 #2  Ø1 36.1 s	
 #3  Ø16 10.1 s		 #3  Ø5 65 s		 #3  Ø6 32 s		 #3  Ø8 12.9 s	

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						













15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 SB

S2 Future Background PM 2031

11-26-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↗	↖	↑						↖	↗
Traffic Volume (vph)	0	235	74	139	290	0	0	0	0	609	6	15
Future Volume (vph)	0	235	74	139	290	0	0	0	0	609	6	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		150.0	0.0		0.0	0.0		0.0	0.0		50.0
Storage Lanes	0		1	1		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1827	1538	1752	1845	0	0	0	0	0	1775	1272
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	1827	1538	1752	1845	0	0	0	0	0	1775	1272
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			181									181
Link Speed (k/h)		50			50			80				60
Link Distance (m)		168.4			156.7			263.6				205.3
Travel Time (s)		12.1			11.3			11.9				12.3
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.90	0.90	0.90	0.92	0.92	0.92	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	4%	5%	3%	3%	2%	2%	2%	2%	2%	2%	27%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	258	81	154	322	0	0	0	0	684	7	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	258	81	154	322	0	0	0	0	0	691	17
Turn Type		NA	Perm	Prot	NA					Perm	NA	Perm
Protected Phases		2		1	2 1						4 12	
Permitted Phases			2							4 12		4 12
Total Split (s)		34.1	34.1	36.1								
Total Lost Time (s)		5.8	5.8	5.2								
Act Effect Green (s)		28.3	28.3	30.9	64.4						44.0	44.0
Actuated g/C Ratio		0.24	0.24	0.26	0.54						0.37	0.37
v/c Ratio		0.60	0.16	0.34	0.33						1.06	0.03
Control Delay		47.6	0.7	21.7	2.5						90.5	0.1
Queue Delay		0.0	0.0	0.0	0.0						0.0	0.0
Total Delay		47.6	0.7	21.7	2.5						90.5	0.1
LOS		D	A	C	A						F	A
Approach Delay		36.4			8.7						88.3	
Approach LOS		D			A						F	
Stops (vph)		206	0	37	48						525	0
Fuel Used(l)		23	3	5	6						71	0
CO Emissions (g/hr)		421	56	97	111						1316	5

Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	4	5	6	8	12	16
Permitted Phases						
Total Split (s)	41.0	65.0	32.0	12.9	8.8	10.1
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)		81	11	19	21						254	1
VOC Emissions (g/hr)		97	13	22	26						303	1
Dilemma Vehicles (#)		0	0	0	0						23	0
Queue Length 50th (m)		57.2	0.0	10.3	7.8						~188.6	0.0
Queue Length 95th (m)		86.3	0.0	16.1	14.2						#258.2	0.0
Internal Link Dist (m)		144.4			132.7			239.6			181.3	
Turn Bay Length (m)			150.0									50.0
Base Capacity (vph)		430	501	451	990						650	581
Starvation Cap Reductn		0	0	0	0						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.60	0.16	0.34	0.33						1.06	0.03

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 51.9

Intersection LOS: D

Intersection Capacity Utilization 117.3%

ICU Level of Service H

Analysis Period (min) 15

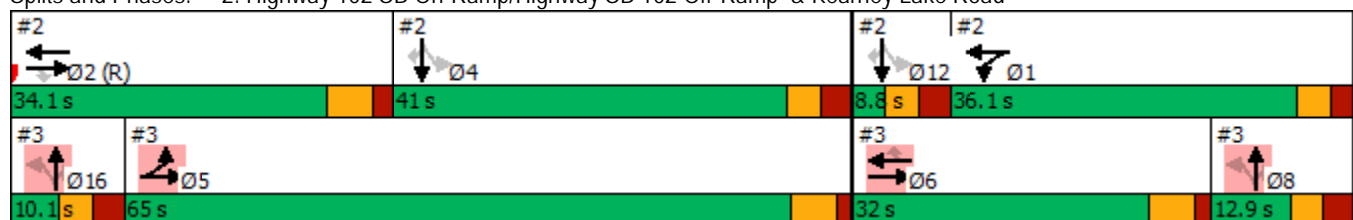
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

























Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S2 Future Background PM 2031













11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	570	225	20	908	5	266	3	29	9	3	4
Future Volume (vph)	3	570	225	20	908	5	266	3	29	9	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.999			0.863			0.910	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1553	1770	1861	0	1770	1608	0	1770	1695	0
Flt Permitted	0.078			0.328			0.751			0.734		
Satd. Flow (perm)	145	1863	1553	611	1861	0	1399	1608	0	1367	1695	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			250		1			32			6	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			3.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.91	0.91	0.91	0.67	0.67	0.67
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	633	250	23	1056	6	292	3	32	13	4	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	633	250	23	1062	0	292	35	0	13	10	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	60.0	60.0	60.0	60.0	60.0		30.0	30.0		30.0	30.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	51.3	51.3	51.3	51.3	51.3		21.2	21.2		21.2	21.2	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60		0.25	0.25		0.25	0.25	
v/c Ratio	0.03	0.57	0.24	0.06	0.95		0.84	0.08		0.04	0.02	
Control Delay	9.0	13.3	1.8	8.4	35.6		53.3	10.6		25.0	17.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	9.0	13.3	1.8	8.4	35.6		53.3	10.6		25.0	17.9	
LOS	A	B	A	A	D		D	B		C	B	
Approach Delay		10.0			35.0			48.7			21.9	
Approach LOS		A			D			D			C	
Stops (vph)	2	329	14	9	712		231	9		8	5	
Fuel Used(l)	0	35	8	2	106		71	7		0	0	
CO Emissions (g/hr)	3	651	151	31	1966		1322	129		7	4	

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S2 Future Background PM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	126	29	6	379		255	25		1	1	
VOC Emissions (g/hr)	1	150	35	7	453		305	30		2	1	
Dilemma Vehicles (#)	0	33	0	0	50		0	2		0	0	
Queue Length 50th (m)	0.2	65.6	0.0	1.6	169.3		49.2	0.4		1.8	0.5	
Queue Length 95th (m)	1.5	97.4	9.2	4.8	#251.3		#90.5	7.6		4.7	3.1	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	91	1171	1069	384	1170		397	479		387	485	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.03	0.54	0.23	0.06	0.91		0.74	0.07		0.03	0.02	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 85.4

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 27.3

Intersection LOS: C

Intersection Capacity Utilization 80.2%





ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

 Ø2	 Ø4
60 s	30 s
 Ø6	 Ø8
60 s	30 s

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:45	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3657	3579	3658	3690	3560	3565	3549
Vehs Exited	3711	3590	3667	3692	3575	3555	3562
Starting Vehs	173	133	122	143	154	121	126
Ending Vehs	119	122	113	141	139	131	113
Travel Distance (km)	4966	4771	4914	4865	4708	4822	4904
Travel Time (hr)	177.5	145.6	137.0	157.0	142.5	137.3	141.6
Total Delay (hr)	84.5	56.0	44.9	66.0	54.6	46.7	49.8
Total Stops	2784	2485	2751	2730	2650	2571	2654
Fuel Used (l)	436.1	399.1	401.8	415.1	390.6	393.9	404.2

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3594	3689	3608	3613
Vehs Exited	3628	3692	3629	3630
Starting Vehs	145	114	130	136
Ending Vehs	111	111	109	119
Travel Distance (km)	4844	4934	4776	4850
Travel Time (hr)	155.3	143.7	159.6	149.7
Total Delay (hr)	64.1	51.5	69.9	58.8
Total Stops	2748	2820	2691	2689
Fuel Used (l)	411.0	404.1	412.4	406.8

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1041	1010	1060	1005	1011	981	1014
Vehs Exited	1034	981	1019	989	980	964	966
Starting Vehs	173	133	122	143	154	121	126
Ending Vehs	180	162	163	159	185	138	174
Travel Distance (km)	1340	1314	1375	1356	1263	1244	1308
Travel Time (hr)	50.7	40.9	39.2	44.5	42.5	38.5	37.2
Total Delay (hr)	25.6	16.2	13.6	19.0	18.8	14.9	12.7
Total Stops	873	763	827	822	895	752	747
Fuel Used (l)	120.3	111.3	114.0	116.3	108.3	106.2	107.7

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	991	1079	1018	1022
Vehs Exited	980	987	991	990
Starting Vehs	145	114	130	136
Ending Vehs	156	206	157	167
Travel Distance (km)	1311	1330	1331	1317
Travel Time (hr)	42.0	41.5	46.6	42.4
Total Delay (hr)	17.4	16.7	21.4	17.6
Total Stops	827	834	818	815
Fuel Used (l)	112.3	111.7	116.5	112.4

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	882	859	848	860	810	888	856
Vehs Exited	909	892	890	893	871	892	900
Starting Vehs	180	162	163	159	185	138	174
Ending Vehs	153	129	121	126	124	134	130
Travel Distance (km)	1277	1107	1160	1146	1145	1242	1257
Travel Time (hr)	46.6	37.6	33.2	39.8	36.0	34.4	39.5
Total Delay (hr)	22.9	16.7	11.3	18.3	14.7	11.2	15.9
Total Stops	695	606	703	652	615	643	695
Fuel Used (l)	113.4	96.1	95.7	100.6	96.6	100.5	105.7

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	867	870	843	857
Vehs Exited	899	975	875	900
Starting Vehs	156	206	157	167
Ending Vehs	124	101	125	126
Travel Distance (km)	1184	1274	1168	1196
Travel Time (hr)	41.3	39.6	44.2	39.2
Total Delay (hr)	19.1	15.8	22.2	16.8
Total Stops	670	872	648	681
Fuel Used (l)	103.7	107.2	104.2	102.4

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	894	844	845	951	847	845	837
Vehs Exited	908	840	861	919	839	861	835
Starting Vehs	153	129	121	126	124	134	130
Ending Vehs	139	133	105	158	132	118	132
Travel Distance (km)	1202	1165	1168	1197	1151	1137	1166
Travel Time (hr)	41.7	35.7	31.4	36.3	32.2	32.3	32.8
Total Delay (hr)	19.1	13.8	9.6	14.0	10.8	10.9	10.9
Total Stops	654	572	579	642	563	617	631
Fuel Used (l)	104.9	96.9	94.8	100.9	93.6	92.1	95.6

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	866	843	887	866
Vehs Exited	831	835	877	859
Starting Vehs	124	101	125	126
Ending Vehs	159	109	135	130
Travel Distance (km)	1188	1139	1160	1167
Travel Time (hr)	38.7	29.9	36.2	34.7
Total Delay (hr)	16.3	8.6	14.5	12.9
Total Stops	635	490	596	596
Fuel Used (l)	100.2	89.7	98.2	96.7

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	840	866	905	874	892	851	842
Vehs Exited	860	877	897	891	885	838	861
Starting Vehs	139	133	105	158	132	118	132
Ending Vehs	119	122	113	141	139	131	113
Travel Distance (km)	1146	1184	1210	1164	1149	1199	1174
Travel Time (hr)	38.5	31.5	33.1	36.5	31.8	32.1	32.1
Total Delay (hr)	16.9	9.3	10.4	14.7	10.3	9.7	10.3
Total Stops	562	544	642	614	577	559	581
Fuel Used (l)	97.5	94.8	97.3	97.4	92.1	95.1	95.3

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	870	897	860	869
Vehs Exited	918	895	886	881
Starting Vehs	159	109	135	130
Ending Vehs	111	111	109	119
Travel Distance (km)	1161	1190	1117	1170
Travel Time (hr)	33.3	32.7	32.6	33.4
Total Delay (hr)	11.3	10.3	11.7	11.5
Total Stops	616	624	629	593
Fuel Used (l)	94.8	95.4	93.5	95.3

2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	All
Denied Delay (hr)	0.6	0.1	0.0	0.0	7.5	0.1	0.4	8.7
Denied Del/Veh (s)	4.0	2.1	0.0	0.0	43.4	50.8	44.3	18.2
Total Delay (hr)	8.0	0.6	0.9	0.2	15.9	0.1	0.6	26.3
Total Del/Veh (s)	54.4	8.9	34.7	2.9	89.9	103.4	62.2	54.0
Stop Delay (hr)	6.7	0.4	0.8	0.0	12.9	0.1	0.4	21.5
Stop Del/Veh (s)	45.6	6.6	31.6	0.6	73.2	82.6	47.7	44.2

3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.1	0.4	0.0	0.0	0.1	0.6
Denied Del/Veh (s)	0.8	0.1	1.0	3.3	0.5	0.4	3.9	1.2
Total Delay (hr)	0.2	1.0	3.7	0.5	1.6	0.0	0.2	7.1
Total Del/Veh (s)	9.8	3.3	61.0	3.4	70.2	52.2	8.2	12.8
Stop Delay (hr)	0.1	0.1	3.4	0.0	1.4	0.0	0.1	5.2
Stop Del/Veh (s)	7.1	0.3	55.3	0.1	64.7	44.5	3.8	9.3

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.3	0.2	0.0	0.0	0.0	0.0	0.2
Total Delay (hr)	0.3	0.0	0.0	0.1	0.0	0.1	0.6
Total Del/Veh (s)	1.6	1.2	6.4	2.1	12.8	5.4	2.1
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	0.0	0.0	3.2	0.3	10.9	5.5	0.5

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.6	2.4	3.5	0.0	0.0	0.0	0.4	0.0	0.1	0.1	0.1	0.2
Total Delay (hr)	0.0	3.4	0.6	0.5	1.0	0.0	1.1	0.0	0.5	0.0	0.0	0.0
Total Del/Veh (s)	18.4	15.5	4.6	28.6	7.9	4.1	22.9	8.0	14.8	19.4	21.6	9.0
Stop Delay (hr)	0.0	1.5	0.0	0.5	0.5	0.0	0.7	0.0	0.3	0.0	0.0	0.0
Stop Del/Veh (s)	12.5	6.7	0.0	26.5	3.8	2.8	15.5	3.5	10.0	18.1	18.4	8.8

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	1.0
Denied Del/Veh (s)	1.8
Total Delay (hr)	7.1
Total Del/Veh (s)	12.2
Stop Delay (hr)	3.5
Stop Del/Veh (s)	6.1

Total Network Performance

Denied Delay (hr)	10.4
Denied Del/Veh (s)	10.4
Total Delay (hr)	48.4
Total Del/Veh (s)	46.4
Stop Delay (hr)	31.0
Stop Del/Veh (s)	29.7

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Movement	EB	EB	B1	WB	WB	SB	SB
Directions Served	T	R	T	L	T	LT	R
Maximum Queue (m)	167.1	138.6	56.4	23.9	7.7	204.6	57.4
Average Queue (m)	112.5	45.7	5.2	8.1	0.6	176.3	8.1
95th Queue (m)	174.9	134.7	33.3	20.2	3.8	234.2	41.0
Link Distance (m)	149.6		240.0	137.1	137.1	192.0	
Upstream Blk Time (%)	4	0				35	
Queuing Penalty (veh)	32	0				0	
Storage Bay Dist (m)		150.0					50.0
Storage Blk Time (%)	4	0				55	0
Queuing Penalty (veh)	11	2				17	0

Intersection: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	R	LT	R
Maximum Queue (m)	24.9	21.2	48.8	73.4	37.4	77.0	32.5
Average Queue (m)	4.3	3.1	16.2	35.9	4.8	27.8	7.1
95th Queue (m)	16.0	13.8	36.8	65.9	23.4	58.7	28.9
Link Distance (m)		137.1	137.2	137.2		232.5	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	35.0				80.0		25.0
Storage Blk Time (%)	0			0		16	0
Queuing Penalty (veh)	1			1		13	0

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	B10	WB	NB
Directions Served	T	LT	LR
Maximum Queue (m)	63.0	39.4	18.3
Average Queue (m)	2.2	5.2	6.7
95th Queue (m)	64.2	22.8	14.5
Link Distance (m)	608.5	240.0	70.2
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	12.0	114.8	13.5	28.2	55.6	37.1	72.1	7.5	9.9
Average Queue (m)	0.7	45.1	0.5	11.3	24.8	22.5	21.4	0.7	1.2
95th Queue (m)	6.8	93.8	8.4	23.5	48.0	40.9	50.8	4.3	6.1
Link Distance (m)		357.9			169.9		608.5	30.6	30.6
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	35.0		250.0	160.0		30.0			
Storage Blk Time (%)		10				5	2		
Queuing Penalty (veh)		49				7	3		

Network Summary

Network wide Queuing Penalty: 135

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Phase	1	2	4	5	6	8	12	16
Movement(s) Served	WBTL	EBWB	SBTL	EBTL	EBWB	NBTL	SBTL	NBTL
Maximum Green (s)	24.4	49.8	50.2	95.5	20.1	7.0	3.0	4.8
Minimum Green (s)	7.0	12.0	10.0	7.0	7.0	7.0	3.0	3.0
Recall	Max	C-Max	None	Max	Max	None	None	None
Avg. Green (s)	26.1	49.8	50.2	102.8	20.7	7.3	3.0	3.3
g/C Ratio	NA	NA	NA	NA	NA	-0.01	-0.01	-0.01
Cycles Skipped (%)	0	0	0	0	0	4	17	42
Cycles @ Minimum (%)	0	0	0	0	0	96	83	42
Cycles Maxed Out (%)	100	100	100	100	100	96	83	0
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	29.2	18.0	29.2	18.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	31.9	11.7	31.9	11.7
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	24	0	24
Cycles Maxed Out (%)	69	18	69	18
Cycles with Peds (%)	0	0	0	0




Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Intersection

Int Delay, s/veh 1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	656	5	20	244	5	45
Future Vol, veh/h	656	5	20	244	5	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	73	73	77	77
Heavy Vehicles, %	3	2	6	7	2	6
Mvmt Flow	691	5	27	334	6	58

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	696
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.16
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.254
Pot Cap-1 Maneuver	-	-	882
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	882
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-



















Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	15.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	401	-	-	882	-
HCM Lane V/C Ratio	0.162	-	-	0.031	-
HCM Control Delay (s)	15.7	-	-	9.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.1	-













15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 NB

S3 Future Development AM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1027	0	0	223	486	79	3	75	0	0	0
Future Volume (vph)	59	1027	0	0	223	486	79	3	75	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		80.0	0.0		25.0	0.0		0.0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected	0.950							0.954				
Satd. Flow (prot)	1399	1863	0	0	3438	1583	0	1597	1524	0	0	0
Flt Permitted	0.950							0.954				
Satd. Flow (perm)	1399	1863	0	0	3438	1583	0	1597	1524	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						565			145			
Link Speed (k/h)		50			50			60			80	
Link Distance (m)		156.7			145.9			242.8			253.4	
Travel Time (s)		11.3			10.5			14.6			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.86	0.86	0.86	0.85	0.85	0.85	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	29%	2%	2%	2%	5%	2%	14%	2%	6%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	65	1129	0	0	259	565	93	4	88	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	1129	0	0	259	565	0	97	88	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5 6			6			8 16				
Permitted Phases						6	8 16		8 16			
Total Split (s)	101.0				25.6	25.6						
Total Lost Time (s)	5.5				5.5	5.5						
Act Effect Green (s)	96.2	121.8			20.1	20.1		16.9	16.9			
Actuated g/C Ratio	0.64	0.81			0.13	0.13		0.11	0.11			
v/c Ratio	0.07	0.75			0.56	0.81		0.54	0.29			
Control Delay	8.1	0.4			66.1	14.3		74.6	2.7			
Queue Delay	0.0	5.5			0.0	0.0		0.0	0.0			
Total Delay	8.1	5.9			66.1	14.3		74.6	2.7			
LOS	A	A			E	B		E	A			
Approach Delay		6.0			30.6			40.4				
Approach LOS		A			C			D				
Stops (vph)	10	1			205	46		76	0			
Fuel Used(l)	1	16			19	13		9	2			
CO Emissions (g/hr)	27	290			354	244		165	32			

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	1	2	4	8	12	16
Permitted Phases						
Total Split (s)	29.6	55.6	56.0	12.8	8.8	10.6
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	5	56			68	47		32	6			
VOC Emissions (g/hr)	6	67			82	56		38	7			
Dilemma Vehicles (#)	0	0			0	0		3	0			
Queue Length 50th (m)	4.0	0.0			40.5	0.0		29.0	0.0			
Queue Length 95th (m)	m4.0	m0.0			53.8	27.4		46.5	0.0			
Internal Link Dist (m)		132.7			121.9			218.8			229.4	
Turn Bay Length (m)	35.0					80.0			25.0			
Base Capacity (vph)	897	1513			460	701		187	306			
Starvation Cap Reductn	0	323			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.07	0.95			0.56	0.81		0.52	0.29			

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 18.1

Intersection LOS: B

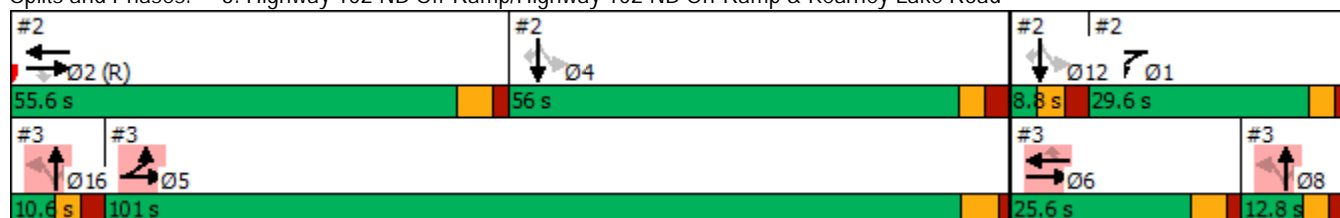
Intersection Capacity Utilization 103.6%

ICU Level of Service G

Analysis Period (min) 15

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

Splits and Phases: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road





















Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						













15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 SB

S3 Future Development AM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	473	236	89	216	0	0	0	0	617	4	31
Future Volume (vph)	0	473	236	89	216	0	0	0	0	617	4	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		150.0	0.0		0.0	0.0		0.0	0.0		50.0
Storage Lanes	0		1	1		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1827	1524	1770	1759	0	0	0	0	0	1775	1292
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	1827	1524	1770	1759	0	0	0	0	0	1775	1292
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			291									145
Link Speed (k/h)		50			50			80			60	
Link Distance (m)		168.4			156.7			263.6			205.3	
Travel Time (s)		12.1			11.3			11.9			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.92	0.92	0.92	0.86	0.86	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	4%	6%	2%	8%	2%	2%	2%	2%	2%	2%	25%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	584	291	95	230	0	0	0	0	717	5	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	584	291	95	230	0	0	0	0	0	722	36
Turn Type		NA	Perm	Prot	NA					Perm	NA	Perm
Protected Phases		2		1	2 1						4 12	
Permitted Phases			2							4 12		4 12
Total Split (s)		55.6	55.6	29.6								
Total Lost Time (s)		5.8	5.8	5.2								
Act Effect Green (s)		49.8	49.8	24.4	79.4						59.0	59.0
Actuated g/C Ratio		0.33	0.33	0.16	0.53						0.39	0.39
v/c Ratio		0.96	0.42	0.33	0.25						1.03	0.06
Control Delay		77.6	5.6	33.9	1.7						87.3	0.2
Queue Delay		0.0	0.0	0.0	0.0						0.0	0.0
Total Delay		77.6	5.6	33.9	1.7						87.3	0.2
LOS		E	A	C	A						F	A
Approach Delay		53.6			11.1						83.1	
Approach LOS		D			B						F	
Stops (vph)		421	19	28	32						541	0
Fuel Used(l)		57	11	4	4						70	1
CO Emissions (g/hr)		1054	203	79	79						1306	10

Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	4	5	6	8	12	16
Permitted Phases						
Total Split (s)	56.0	101.0	25.6	12.8	8.8	10.6
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)		203	39	15	15						252	2
VOC Emissions (g/hr)		243	47	18	18						301	2
Dilemma Vehicles (#)		0	0	0	0						19	0
Queue Length 50th (m)		179.7	0.0	8.4	7.1						~242.1	0.0
Queue Length 95th (m)		#212.7	12.2	13.9	13.4						#297.9	0.0
Internal Link Dist (m)		144.4			132.7			239.6			181.3	
Turn Bay Length (m)			150.0									50.0
Base Capacity (vph)		606	700	287	931						698	596
Starvation Cap Reductn		0	0	0	0						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.96	0.42	0.33	0.25						1.03	0.06

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 58.0

Intersection LOS: E

Intersection Capacity Utilization 103.6%

ICU Level of Service G

Analysis Period (min) 15

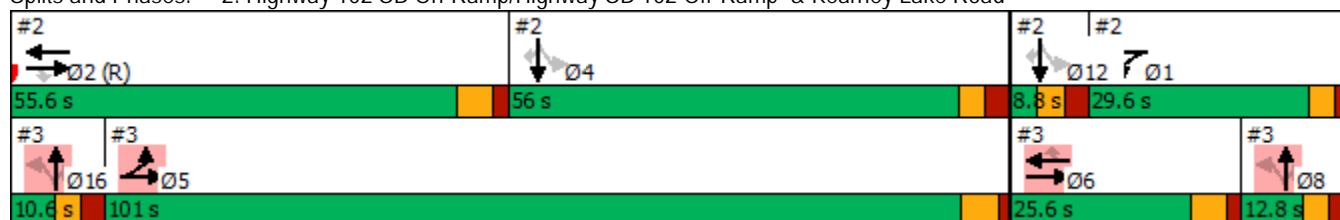
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

























Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S3 Future Development AM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	775	472	65	438	8	160	3	111	4	3	3
Future Volume (vph)	3	775	472	65	438	8	160	3	111	4	3	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.997			0.854			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1845	1568	1719	1805	0	1671	1304	0	1770	1723	0
Flt Permitted	0.413			0.173			0.747			0.650		
Satd. Flow (perm)	769	1845	1568	313	1805	0	1314	1304	0	1211	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			487		2			125			8	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			2.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.97	0.97	0.97	0.88	0.88	0.88	0.67	0.67	0.67	0.38	0.38	0.38
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	3%	3%	5%	5%	2%	8%	2%	25%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	799	487	74	498	9	239	4	166	11	8	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	799	487	74	507	0	239	170	0	11	16	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	36.0	36.0	36.0	36.0	36.0		24.0	24.0		24.0	24.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	28.1	28.1	28.1	28.1	28.1		14.2	14.2		14.2	14.2	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.26	0.26		0.26	0.26	
v/c Ratio	0.01	0.85	0.47	0.47	0.55		0.71	0.40		0.04	0.04	
Control Delay	8.0	24.5	2.8	22.7	12.8		31.2	9.1		15.5	11.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	8.0	24.5	2.8	22.7	12.8		31.2	9.1		15.5	11.7	
LOS	A	C	A	C	B		C	A		B	B	
Approach Delay		16.3			14.1			22.0			13.2	
Approach LOS		B			B			C			B	
Stops (vph)	3	579	40	50	289		137	32		4	4	
Fuel Used(l)	0	59	18	7	42		40	24		0	0	
CO Emissions (g/hr)	4	1090	329	128	780		743	456		4	4	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	210	63	25	150		143	88		1	1	
VOC Emissions (g/hr)	1	251	76	29	180		171	105		1	1	
Dilemma Vehicles (#)	0	66	0	0	39		0	10		0	1	
Queue Length 50th (m)	0.2	69.4	0.0	4.8	34.5		23.4	3.7		0.9	0.7	
Queue Length 95th (m)	1.3	#148.0	13.0	#21.4	62.7		30.1	8.7		1.6	1.4	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	410	984	1064	167	964		432	512		398	572	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.81	0.46	0.44	0.53		0.55	0.33		0.03	0.03	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 55.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 16.7

Intersection LOS: B

Intersection Capacity Utilization 78.5%


ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

 Ø2	 Ø4
36 s	24 s
 Ø6	 Ø8
36 s	24 s

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	3:45	3:45	3:45	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4325	4288	4422	4403	4333	4288	4357
Vehs Exited	4343	4297	4419	4381	4341	4302	4362
Starting Vehs	168	179	153	151	162	182	177
Ending Vehs	150	170	156	173	154	168	172
Travel Distance (km)	5563	5478	5635	5509	5538	5421	5514
Travel Time (hr)	212.5	237.2	219.8	207.2	194.6	207.0	179.0
Total Delay (hr)	108.3	134.5	114.3	104.1	91.0	105.4	75.8
Total Stops	3810	3577	4150	3945	3864	3728	3570
Fuel Used (l)	503.8	516.5	514.5	498.7	489.1	492.7	473.3

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	4438	4207	4374	4342
Vehs Exited	4426	4226	4336	4343
Starting Vehs	135	147	149	160
Ending Vehs	147	128	187	160
Travel Distance (km)	5553	5235	5496	5494
Travel Time (hr)	216.7	169.2	196.3	203.9
Total Delay (hr)	112.6	71.1	93.4	101.1
Total Stops	3903	3465	3933	3795
Fuel Used (l)	508.8	451.9	487.8	493.7

Interval #0 Information Seeding

Start Time	3:45
End Time	4:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	1169	1154	1222	1220	1210	1094	1139
Vehs Exited	1151	1119	1151	1159	1164	1111	1132
Starting Vehs	168	179	153	151	162	182	177
Ending Vehs	186	214	224	212	208	165	184
Travel Distance (km)	1454	1520	1537	1508	1501	1385	1451
Travel Time (hr)	52.5	66.1	56.6	51.5	56.1	50.5	48.4
Total Delay (hr)	25.4	37.7	27.9	23.3	28.1	24.5	21.2
Total Stops	1039	996	1251	1112	1081	1021	1015
Fuel Used (l)	128.6	142.4	136.3	131.2	134.9	124.0	125.5

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	7	8	9	Avg
Vehs Entered	1245	1126	1202	1176
Vehs Exited	1168	1106	1153	1140
Starting Vehs	135	147	149	160
Ending Vehs	212	167	198	196
Travel Distance (km)	1518	1382	1504	1476
Travel Time (hr)	54.2	46.5	53.5	53.6
Total Delay (hr)	25.7	20.9	25.4	26.0
Total Stops	1191	945	1230	1089
Fuel Used (l)	134.1	120.8	133.5	131.1

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1064	1055	1045	1044	995	1085	1064
Vehs Exited	1063	1087	1108	1095	1059	1070	1106
Starting Vehs	186	214	224	212	208	165	184
Ending Vehs	187	182	161	161	144	180	142
Travel Distance (km)	1443	1389	1370	1298	1316	1342	1306
Travel Time (hr)	57.7	63.4	54.2	53.8	49.5	52.3	44.8
Total Delay (hr)	30.7	37.2	28.5	29.3	24.8	27.1	20.3
Total Stops	970	866	984	955	915	904	894
Fuel Used (l)	132.5	133.6	127.2	123.1	119.7	122.1	113.7

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1114	1045	1003	1052
Vehs Exited	1156	1059	1027	1082
Starting Vehs	212	167	198	196
Ending Vehs	170	153	174	167
Travel Distance (km)	1450	1301	1291	1351
Travel Time (hr)	61.8	45.1	45.0	52.7
Total Delay (hr)	34.6	20.7	20.7	27.4
Total Stops	1130	872	816	931
Fuel Used (l)	137.9	115.1	113.8	123.9

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1084	1056	1066	1071	1115	1031	1044
Vehs Exited	1093	1051	1052	1083	1068	1045	1020
Starting Vehs	187	182	161	161	144	180	142
Ending Vehs	178	187	175	149	191	166	166
Travel Distance (km)	1365	1332	1333	1389	1389	1390	1320
Travel Time (hr)	54.8	55.6	50.8	51.5	46.5	55.1	43.0
Total Delay (hr)	29.2	30.8	25.8	25.6	20.5	29.2	18.3
Total Stops	925	871	906	957	973	904	823
Fuel Used (l)	125.3	123.9	121.1	124.9	120.5	128.4	114.1

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1021	975	1090	1056
Vehs Exited	1023	965	1100	1050
Starting Vehs	170	153	174	167
Ending Vehs	168	163	164	172
Travel Distance (km)	1287	1255	1359	1342
Travel Time (hr)	51.1	38.8	46.6	49.4
Total Delay (hr)	26.9	15.2	21.2	24.3
Total Stops	767	800	938	886
Fuel Used (l)	118.3	106.3	118.3	120.1

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1008	1023	1089	1068	1013	1078	1110
Vehs Exited	1036	1040	1108	1044	1050	1076	1104
Starting Vehs	178	187	175	149	191	166	166
Ending Vehs	150	170	156	173	154	168	172
Travel Distance (km)	1302	1237	1394	1313	1331	1304	1437
Travel Time (hr)	47.5	52.1	58.2	50.4	42.6	49.1	42.8
Total Delay (hr)	23.0	28.8	32.2	25.8	17.6	24.6	16.0
Total Stops	876	844	1009	921	895	899	838
Fuel Used (l)	117.3	116.5	129.8	119.5	114.0	118.2	120.0

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1058	1061	1079	1057
Vehs Exited	1079	1096	1056	1069
Starting Vehs	168	163	164	172
Ending Vehs	147	128	187	160
Travel Distance (km)	1298	1297	1340	1325
Travel Time (hr)	49.7	38.8	51.2	48.2
Total Delay (hr)	25.4	14.4	26.1	23.4
Total Stops	815	848	949	890
Fuel Used (l)	118.4	109.7	122.2	118.6

2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	23.5	0.2	2.1	25.9
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	138.1	148.0	145.1	55.3
Total Delay (hr)	2.8	0.3	1.1	0.3	20.1	0.2	1.3	26.1
Total Del/Veh (s)	36.0	6.7	29.4	2.4	119.6	120.3	89.8	55.6
Stop Delay (hr)	2.3	0.3	1.0	0.0	17.0	0.2	1.0	21.9
Stop Del/Veh (s)	30.5	5.6	26.5	0.2	101.1	100.0	72.8	46.5

3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.3	1.1	1.6	0.0	1.4	4.4
Denied Del/Veh (s)	0.0	0.0	2.7	4.3	25.8	28.7	27.0	6.2
Total Delay (hr)	0.3	0.6	4.8	2.1	9.4	0.1	4.8	22.1
Total Del/Veh (s)	19.4	2.8	47.7	8.1	142.2	201.9	91.2	30.8
Stop Delay (hr)	0.2	0.0	4.0	0.2	8.6	0.1	4.2	17.4
Stop Del/Veh (s)	16.5	0.2	40.3	0.9	129.6	183.8	79.5	24.3

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Delay (hr)	0.2	0.0	0.0	0.3	0.0	0.0	0.6
Total Del/Veh (s)	1.5	0.9	4.4	2.2	11.3	3.6	2.1
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Stop Del/Veh (s)	0.0	0.0	1.3	0.1	9.4	3.8	0.3

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	2.2	1.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Total Delay (hr)	0.0	1.7	0.2	0.9	5.0	0.0	3.4	0.1	0.5	0.1	0.0	0.0
Total Del/Veh (s)	37.2	10.7	3.0	25.3	19.5	15.7	40.1	3.1	18.1	24.5	30.7	20.4
Stop Delay (hr)	0.0	0.8	0.0	0.8	2.4	0.0	2.6	0.0	0.3	0.1	0.0	0.0
Stop Del/Veh (s)	34.1	5.2	0.0	21.3	9.4	7.7	31.1	0.7	11.9	23.4	28.0	20.2

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	0.4
Denied Del/Veh (s)	0.6
Total Delay (hr)	11.9
Total Del/Veh (s)	17.8
Stop Delay (hr)	7.1
Stop Del/Veh (s)	10.6

Total Network Performance

Denied Delay (hr)	31.1
Denied Del/Veh (s)	25.6
Total Delay (hr)	70.0
Total Del/Veh (s)	56.0
Stop Delay (hr)	47.4
Stop Del/Veh (s)	37.9

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	SB	SB
Directions Served	T	R	L	T	LT	R
Maximum Queue (m)	91.9	34.7	32.1	8.5	208.6	57.5
Average Queue (m)	47.2	14.9	13.0	0.5	198.7	16.3
95th Queue (m)	79.8	27.5	25.2	4.2	207.3	59.0
Link Distance (m)	149.6		137.1	137.1	192.0	
Upstream Blk Time (%)					67	
Queuing Penalty (veh)					0	
Storage Bay Dist (m)		150.0				50.0
Storage Blk Time (%)					64	0
Queuing Penalty (veh)					34	1

Intersection: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road

Movement	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	R	LT	R
Maximum Queue (m)	18.8	8.9	76.5	112.3	79.8	221.4	32.5
Average Queue (m)	4.4	0.8	27.7	51.5	23.4	138.2	27.5
95th Queue (m)	13.3	4.4	60.9	96.1	68.0	250.9	45.0
Link Distance (m)		137.1	137.2	137.2		232.5	
Upstream Blk Time (%)			0	1		13	
Queuing Penalty (veh)			0	0		0	
Storage Bay Dist (m)	35.0				80.0		25.0
Storage Blk Time (%)				1	0	66	1
Queuing Penalty (veh)				12	0	121	2

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	EB	B10	WB	B1	NB
Directions Served	TR	T	LT	T	LR
Maximum Queue (m)	0.6	435.7	38.2	15.0	14.9
Average Queue (m)	0.0	19.9	4.3	0.5	5.3
95th Queue (m)	0.7	200.4	21.7	15.3	12.0
Link Distance (m)	191.8	608.5	240.0	149.6	70.2
Upstream Blk Time (%)		0		0	
Queuing Penalty (veh)		0		0	
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	EB	WB	WB	B13	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T	L	TR	L	TR
Maximum Queue (m)	8.0	65.4	7.1	100.8	171.9	42.9	37.3	100.6	7.5	10.0
Average Queue (m)	0.4	29.3	0.3	24.0	76.9	3.5	32.5	43.0	1.2	2.0
95th Queue (m)	4.6	54.9	7.2	77.8	150.8	32.3	44.1	95.0	5.3	7.8
Link Distance (m)	357.9				169.9	270.3		608.5	30.6	30.6
Upstream Blk Time (%)				0	2					
Queuing Penalty (veh)				0	0					
Storage Bay Dist (m)	35.0		250.0	160.0			30.0			
Storage Blk Time (%)					2		26	0		
Queuing Penalty (veh)				10	3		27	1		

Network Summary

Network wide Queuing Penalty: 212

Intersection: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

Phase	1	2	4	5	6	8	12	16
Movement(s) Served	WBTL	EBWB	SBTL	EBTL	EBWB	NBTL	SBTL	NBTL
Maximum Green (s)	25.9	28.3	30.2	54.5	21.5	7.1	3.0	4.3
Minimum Green (s)	7.0	12.0	10.0	7.0	7.0	7.0	3.0	3.0
Recall	Max	C-Max	None	Max	Max	None	None	None
Avg. Green (s)	26.9	28.3	30.2	56.0	21.5	7.3	3.0	3.4
g/C Ratio	NA	NA	NA	NA	NA	NA	-0.01	-0.01
Cycles Skipped (%)	0	0	0	0	0	0	10	3
Cycles @ Minimum (%)	0	0	0	0	0	0	90	48
Cycles Maxed Out (%)	100	100	100	100	100	100	90	10
Cycles with Peds (%)	0	0	0	0	0	0	0	0

Controller Summary

Average Cycle Length (s): NA
Number of Complete Cycles : 0

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard




Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	56.2	21.0	56.2	21.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	46.3	16.9	46.3	16.9
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	4	0	4
Cycles Maxed Out (%)	41	47	41	47
Cycles with Peds (%)	0	0	0	0

Controller Summary

Average Cycle Length (s): NA
Number of Complete Cycles : 0

Intersection

Int Delay, s/veh 1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	381	11	29	480	11	26
Future Vol, veh/h	381	11	29	480	11	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	94	94	68	68
Heavy Vehicles, %	3	2	7	2	2	4
Mvmt Flow	423	12	31	511	16	38

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	435
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.17
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.263
Pot Cap-1 Maneuver	-	-	1099
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1099
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-



















Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	439	-	-	1099	-
HCM Lane V/C Ratio	0.124	-	-	0.028	-
HCM Control Delay (s)	14.4	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-













15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 NB

S3 Future Development PM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	823	0	0	357	914	225	3	183	0	0	0
Future Volume (vph)	51	823	0	0	357	914	225	3	183	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		0.0	0.0		80.0	0.0		25.0	0.0		0.0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1641	1863	0	0	3505	1583	0	1758	1583	0	0	0
Flt Permitted	0.950							0.953				
Satd. Flow (perm)	1641	1863	0	0	3505	1583	0	1758	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						952			197			
Link Speed (k/h)		50			50			60			80	
Link Distance (m)		156.7			145.9			242.8			253.4	
Travel Time (s)		11.3			10.5			14.6			11.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.96	0.96	0.96	0.91	0.91	0.91	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	10%	2%	2%	2%	3%	2%	3%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	55	895	0	0	372	952	247	3	201	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	895	0	0	372	952	0	250	201	0	0	0
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	5 6			6			8 16				
Permitted Phases						6	8 16		8 16			
Total Split (s)	60.0				27.0	27.0						
Total Lost Time (s)	5.5				5.5	5.5						
Act Effect Green (s)	54.5	81.5			21.5	21.5		17.2	17.2			
Actuated g/C Ratio	0.50	0.74			0.20	0.20		0.16	0.16			
v/c Ratio	0.07	0.65			0.54	0.89		0.91	0.49			
Control Delay	16.5	1.5			43.2	14.0		82.5	10.7			
Queue Delay	0.0	1.6			0.0	0.0		0.0	0.0			
Total Delay	16.5	3.0			43.2	14.0		82.5	10.7			
LOS	B	A			D	B		F	B			
Approach Delay		3.8			22.2			50.5				
Approach LOS		A			C			D				
Stops (vph)	19	29			313	75		201	27			
Fuel Used(l)	2	14			24	24		26	6			
CO Emissions (g/hr)	34	257			443	450		479	116			

Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	1	2	4	8	12	16
Permitted Phases						
Total Split (s)	31.1	34.1	36.0	12.9	8.8	10.1
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	7	50			86	87		93	22			
VOC Emissions (g/hr)	8	59			102	104		111	27			
Dilemma Vehicles (#)	0	0			0	0		9	0			
Queue Length 50th (m)	4.8	0.0			40.2	0.0		56.2	0.8			
Queue Length 95th (m)	m5.3	m0.0			56.1	#86.7		#104.4	21.6			
Internal Link Dist (m)		132.7			121.9			218.8			229.4	
Turn Bay Length (m)	35.0					80.0			25.0			
Base Capacity (vph)	813	1380			685	1075		274	413			
Starvation Cap Reductn	0	295			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.07	0.82			0.54	0.89		0.91	0.49			

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 20.5

Intersection LOS: C

Intersection Capacity Utilization 119.3%

ICU Level of Service H

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 3: Highway 102 NB Off-Ramp/Highway 102 NB On-Ramp & Kearney Lake Road





















Lane Group	Ø1	Ø2	Ø4	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Highway 102 SB

S3 Future Development PM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	273	159	139	438	0	0	0	0	609	6	53
Future Volume (vph)	0	273	159	139	438	0	0	0	0	609	6	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		150.0	0.0		0.0	0.0		0.0	0.0		50.0
Storage Lanes	0		1	1		0	0		0	0		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1827	1538	1752	1845	0	0	0	0	0	1775	1272
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	1827	1538	1752	1845	0	0	0	0	0	1775	1272
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			197									197
Link Speed (k/h)		50			50			80			60	
Link Distance (m)		168.4			156.7			263.6			205.3	
Travel Time (s)		12.1			11.3			11.9			12.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.90	0.90	0.90	0.92	0.92	0.92	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	4%	5%	3%	3%	2%	2%	2%	2%	2%	2%	27%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	0	300	175	154	487	0	0	0	0	684	7	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	300	175	154	487	0	0	0	0	0	691	60
Turn Type		NA	Perm	Prot	NA					Perm	NA	Perm
Protected Phases		2		1	2 1						4 12	
Permitted Phases			2							4 12		4 12
Total Split (s)		34.1	34.1	31.1								
Total Lost Time (s)		5.8	5.8	5.2								
Act Effect Green (s)		28.3	28.3	25.9	59.4						39.0	39.0
Actuated g/C Ratio		0.26	0.26	0.24	0.54						0.35	0.35
v/c Ratio		0.64	0.32	0.37	0.49						1.10	0.10
Control Delay		43.5	5.0	32.4	3.1						100.5	0.4
Queue Delay		0.0	0.0	0.0	1.1						0.0	0.0
Total Delay		43.5	5.0	32.4	4.2						100.5	0.4
LOS		D	A	C	A						F	A
Approach Delay		29.3			11.0						92.5	
Approach LOS		C			B						F	
Stops (vph)		238	14	65	82						520	0
Fuel Used(l)		25	7	7	9						75	1
CO Emissions (g/hr)		473	136	130	175						1401	18

Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
Lane Configurations						
Traffic Volume (vph)						
Future Volume (vph)						
Ideal Flow (vphpl)						
Lane Width (m)						
Grade (%)						
Storage Length (m)						
Storage Lanes						
Taper Length (m)						
Lane Util. Factor						
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Right Turn on Red						
Satd. Flow (RTOR)						
Link Speed (k/h)						
Link Distance (m)						
Travel Time (s)						
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor						
Growth Factor						
Heavy Vehicles (%)						
Bus Blockages (#/hr)						
Parking (#/hr)						
Mid-Block Traffic (%)						
Adj. Flow (vph)						
Shared Lane Traffic (%)						
Lane Group Flow (vph)						
Turn Type						
Protected Phases	4	5	6	8	12	16
Permitted Phases						
Total Split (s)	36.0	60.0	27.0	12.9	8.8	10.1
Total Lost Time (s)						
Act Effect Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
Stops (vph)						
Fuel Used(l)						
CO Emissions (g/hr)						



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)		91	26	25	34						270	3
VOC Emissions (g/hr)		109	31	30	40						323	4
Dilemma Vehicles (#)		0	0	0	0						25	0
Queue Length 50th (m)		60.4	0.0	15.5	15.6						~177.4	0.0
Queue Length 95th (m)		91.0	12.7	m21.6	m15.2						#245.3	0.0
Internal Link Dist (m)		144.4			132.7			239.6			181.3	
Turn Bay Length (m)			150.0									50.0
Base Capacity (vph)		470	542	412	996						629	578
Starvation Cap Reductn		0	0	0	287						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.64	0.32	0.37	0.69						1.10	0.10

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 48.5

Intersection LOS: D

Intersection Capacity Utilization 119.3%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 2: Highway 102 SB On-Ramp/Highway SB 102 Off-Ramp & Kearney Lake Road

























Lane Group	Ø4	Ø5	Ø6	Ø8	Ø12	Ø16
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (m)						
Queue Length 95th (m)						
Internal Link Dist (m)						
Turn Bay Length (m)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						
Intersection Summary						

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S3 Future Development PM 2031













11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	570	253	129	908	5	285	3	100	9	3	4
Future Volume (vph)	3	570	253	129	908	5	285	3	100	9	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.999			0.854			0.910	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1553	1770	1861	0	1770	1591	0	1770	1695	0
Flt Permitted	0.078			0.330			0.751			0.684		
Satd. Flow (perm)	145	1863	1553	615	1861	0	1399	1591	0	1274	1695	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			281		1			110			6	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			3.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.91	0.91	0.91	0.67	0.67	0.67
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	3	633	281	150	1056	6	313	3	110	13	4	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	3	633	281	150	1062	0	313	113	0	13	10	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	63.0	63.0	63.0	63.0	63.0		27.0	27.0		27.0	27.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	51.4	51.4	51.4	51.4	51.4		20.8	20.8		20.8	20.8	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60		0.24	0.24		0.24	0.24	
v/c Ratio	0.03	0.56	0.27	0.40	0.94		0.92	0.24		0.04	0.02	
Control Delay	7.7	12.3	1.6	12.6	33.2		66.5	7.7		27.3	19.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.7	12.3	1.6	12.6	33.2		66.5	7.7		27.3	19.6	
LOS	A	B	A	B	C		E	A		C	B	
Approach Delay		9.0			30.6			50.9			24.0	
Approach LOS		A			C			D			C	
Stops (vph)	2	315	14	64	733		234	18		8	5	
Fuel Used(l)	0	34	9	11	105		79	22		0	0	
CO Emissions (g/hr)	3	635	168	213	1946		1462	403		8	5	

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S3 Future Development PM 2031

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	123	32	41	376		282	78		1	1	
VOC Emissions (g/hr)	1	146	39	49	449		337	93		2	1	
Dilemma Vehicles (#)	0	32	0	0	51		0	6		0	0	
Queue Length 50th (m)	0.2	59.3	0.0	12.3	152.8		56.5	0.4		1.9	0.6	
Queue Length 95th (m)	1.3	87.9	8.7	24.1	#238.9		#108.5	13.7		4.9	3.3	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	96	1239	1127	409	1238		347	478		316	426	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.03	0.51	0.25	0.37	0.86		0.90	0.24		0.04	0.02	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 85.2

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 26.2

Intersection LOS: C

Intersection Capacity Utilization 92.7%





ICU Level of Service F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

 Ø2	 Ø4
63 s	27 s
 Ø6	 Ø8
63 s	27 s

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.4.487 [15039,24/03/2014] © Copyright TRL Limited, 2019
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Filename: 15318_Hwy 102 NB-Kearney Lake Road-East Roundabout-2031.arc8

Path: Z:\Harbourside Transportation Consultants\Projects\15318 Bedford West Sub Area 10 - 2018 Revision\Project Files\02 Analysis\05 Arcady

Report generation date: 27/11/2019 1:49:23 PM

Summary of intersection performance

	AM							PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031													
Kearney Lake Road (West Leg)	2.62	4.00	7.99	0.73	A	5.83	A	1.40	1.00	5.27	0.58	A	4.42	A
Hwy 102 NB Off-Ramp	0.23	~1	4.79	0.19	A			0.73	1.00	5.87	0.42	A		
Kearney Lake Road (East Leg)	0.19	~1	2.75	0.16	A			0.37	~1	3.37	0.27	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2031, AM " model duration: 8:00 AM - 9:30 AM

"D2 - 2031, PM" model duration: 5:00 PM - 6:30 PM

Run using Junctions 8.0.4.487 at 27/11/2019 1:49:22 PM

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.00	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2031, AM	2031	AM		ONE HOUR	08:00	09:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-East	Roundabout	1,2,3,4			5.83	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 NB Off-Ramp	2	Hwy 102 NB Off-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 NB On-Ramp	4	Hwy 102 NB On-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 NB Off-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 NB On-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓

Bypass

Name	Leg Has Bypass	Bypass Utilisation (%)
Kearney Lake Road (West Leg)		
Hwy 102 NB Off-Ramp		
Kearney Lake Road (East Leg)	✓	100
Hwy 102 NB On-Ramp		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB Off-Ramp		(calculated)	(calculated)	0.603	1645.706
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	1086.00	100.000
Hwy 102 NB Off-Ramp	ONE HOUR	✓	157.00	100.000
Kearney Lake Road (East Leg)	ONE HOUR	✓	709.00	100.000
Hwy 102 NB On-Ramp	Exit-only	✓	Exit-only	Exit-only

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
08:00-08:15	Kearney Lake Road (West Leg)	817.60	817.60		
08:15-08:30	Kearney Lake Road (West Leg)	976.29	976.29		
08:30-08:45	Kearney Lake Road (West Leg)	1195.71	1195.71		
08:45-09:00	Kearney Lake Road (West Leg)	1195.71	1195.71		
09:00-09:15	Kearney Lake Road (West Leg)	976.29	976.29		
09:15-09:30	Kearney Lake Road (West Leg)	817.60	817.60		
08:00-08:15	Hwy 102 NB Off-Ramp	118.20	118.20		

08:15-08:30	Hwy 102 NB Off-Ramp	141.14	141.14		
08:30-08:45	Hwy 102 NB Off-Ramp	172.86	172.86		
08:45-09:00	Hwy 102 NB Off-Ramp	172.86	172.86		
09:00-09:15	Hwy 102 NB Off-Ramp	141.14	141.14		
09:15-09:30	Hwy 102 NB Off-Ramp	118.20	118.20		
08:00-08:15	Kearney Lake Road (East Leg)	533.77	533.77		
08:15-08:30	Kearney Lake Road (East Leg)	637.38	637.38		
08:30-08:45	Kearney Lake Road (East Leg)	780.62	780.62		
08:45-09:00	Kearney Lake Road (East Leg)	780.62	780.62		
09:00-09:15	Kearney Lake Road (East Leg)	637.38	637.38		
09:15-09:30	Kearney Lake Road (East Leg)	533.77	533.77		
08:00-08:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
08:15-08:30	Hwy 102 NB On-Ramp	Exit-only	0.00		
08:30-08:45	Hwy 102 NB On-Ramp	Exit-only	0.00		
08:45-09:00	Hwy 102 NB On-Ramp	Exit-only	0.00		
09:00-09:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
09:15-09:30	Hwy 102 NB On-Ramp	Exit-only	0.00		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
From	Kearney Lake Road (West Leg)	0.000	0.000	1027.000	59.000
	Hwy 102 NB Off-Ramp	79.000	0.000	75.000	3.000
	Kearney Lake Road (East Leg)	223.000	0.000	0.000	486.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
From	Kearney Lake Road (West Leg)	0.00	0.00	0.95	0.05
	Hwy 102 NB Off-Ramp	0.50	0.00	0.48	0.02
	Kearney Lake Road (East Leg)	0.31	0.00	0.00	0.69
	Hwy 102 NB On-Ramp	0.25	0.25	0.25	0.25

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB Off-Ramp	1.000	1.000	1.000	1.000
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB Off-Ramp	0.0	0.0	0.0	0.0
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.73	7.99	2.62	4.00	A
Hwy 102 NB Off-Ramp	0.19	4.79	0.23	~1	A
Kearney Lake Road (East Leg)	0.16	2.75	0.19	~1	A
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only

(Default Analysis Set) - 2031, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2031, PM	2031	PM		ONE HOUR	17:00	18:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-East	Roundabout	1,2,3,4			4.42	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 NB Off-Ramp	2	Hwy 102 NB Off-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 NB On-Ramp	4	Hwy 102 NB On-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 NB Off-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 NB On-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓

Bypass

Name	Leg Has Bypass	Bypass Utilisation (%)
Kearney Lake Road (West Leg)		
Hwy 102 NB Off-Ramp		
Kearney Lake Road (East Leg)	✓	100
Hwy 102 NB On-Ramp		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB Off-Ramp		(calculated)	(calculated)	0.603	1645.706
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	874.00	100.000
Hwy 102 NB Off-Ramp	ONE HOUR	✓	411.00	100.000
Kearney Lake Road (East Leg)	ONE HOUR	✓	1271.00	100.000
Hwy 102 NB On-Ramp	Exit-only	✓	Exit-only	Exit-only

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-17:15	Kearney Lake Road (West Leg)	657.99	657.99		
17:15-17:30	Kearney Lake Road (West Leg)	785.71	785.71		
17:30-17:45	Kearney Lake Road (West Leg)	962.29	962.29		
17:45-18:00	Kearney Lake Road (West Leg)	962.29	962.29		
18:00-18:15	Kearney Lake Road (West Leg)	785.71	785.71		
18:15-18:30	Kearney Lake Road (West Leg)	657.99	657.99		
17:00-17:15	Hwy 102 NB Off-Ramp	309.42	309.42		

17:15-17:30	Hwy 102 NB Off-Ramp	369.48	369.48		
17:30-17:45	Hwy 102 NB Off-Ramp	452.52	452.52		
17:45-18:00	Hwy 102 NB Off-Ramp	452.52	452.52		
18:00-18:15	Hwy 102 NB Off-Ramp	369.48	369.48		
18:15-18:30	Hwy 102 NB Off-Ramp	309.42	309.42		
17:00-17:15	Kearney Lake Road (East Leg)	956.88	956.88		
17:15-17:30	Kearney Lake Road (East Leg)	1142.60	1142.60		
17:30-17:45	Kearney Lake Road (East Leg)	1399.40	1399.40		
17:45-18:00	Kearney Lake Road (East Leg)	1399.40	1399.40		
18:00-18:15	Kearney Lake Road (East Leg)	1142.60	1142.60		
18:15-18:30	Kearney Lake Road (East Leg)	956.88	956.88		
17:00-17:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
17:15-17:30	Hwy 102 NB On-Ramp	Exit-only	0.00		
17:30-17:45	Hwy 102 NB On-Ramp	Exit-only	0.00		
17:45-18:00	Hwy 102 NB On-Ramp	Exit-only	0.00		
18:00-18:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
18:15-18:30	Hwy 102 NB On-Ramp	Exit-only	0.00		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.000	0.000	823.000	51.000
	Hwy 102 NB Off-Ramp	225.000	0.000	183.000	3.000
	Kearney Lake Road (East Leg)	357.000	0.000	0.000	914.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.00	0.00	0.94	0.06
	Hwy 102 NB Off-Ramp	0.55	0.00	0.45	0.01
	Kearney Lake Road (East Leg)	0.28	0.00	0.00	0.72
	Hwy 102 NB On-Ramp	0.25	0.25	0.25	0.25

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB Off-Ramp	1.000	1.000	1.000	1.000
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB Off-Ramp	0.0	0.0	0.0	0.0
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.58	5.27	1.40	1.00	A
Hwy 102 NB Off-Ramp	0.42	5.87	0.73	1.00	A
Kearney Lake Road (East Leg)	0.27	3.37	0.37	~1	A
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only

Junctions 8													
ARCADY 8 - Roundabout Module													
Version: 8.0.4.487 [15039,24/03/2014] © Copyright TRL Limited, 2019													
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk													
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution													

Filename: 15318_Hwy 102 SB-Kearney Lake Road-West Roundabout-2031.arc8

Path: Z:\Harbourside Transportation Consultants\Projects\15318 Bedford West Sub Area 10 - 2018 Revision\Project Files\02 Analysis\05 Arcady

Report generation date: 27/11/2019 1:50:39 PM

Summary of intersection performance

	AM							PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2031													
Kearney Lake Road (West Leg)	1.95	2.00	9.13	0.66	A	6.33	A	0.71	1.00	5.38	0.42	A	5.33	A
Kearney Lake Road (East Leg)	0.26	~1	2.75	0.20	A			0.63	1.00	3.56	0.39	A		
Hwy 102 SB Off-Ramp	0.98	~1	4.96	0.50	A			1.38	1.00	6.83	0.58	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2031, AM " model duration: 8:00 AM - 9:30 AM

"D2 - 2031, PM" model duration: 5:00 PM - 6:30 PM

Run using Junctions 8.0.4.487 at 27/11/2019 1:50:38 PM

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.00	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2031, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2031, AM	2031	AM		ONE HOUR	08:00	09:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-West	Roundabout	1,2,3,4			6.33	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 SB On-Ramp	2	Hwy 102 SB On-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 SB Off-Ramp	4	Hwy 102 SB Off-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 SB On-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 SB Off-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB Off-Ramp		(calculated)	(calculated)	0.603	1645.706

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	709.00	100.000
Hwy 102 SB On-Ramp	Exit-only	✓	Exit-only	Exit-only
Kearney Lake Road (East Leg)	ONE HOUR	✓	305.00	100.000
Hwy 102 SB Off-Ramp	ONE HOUR	✓	652.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
08:00-08:15	Kearney Lake Road (West Leg)	533.77	533.77		

08:15-08:30	Kearney Lake Road (West Leg)	637.38	637.38		
08:30-08:45	Kearney Lake Road (West Leg)	780.62	780.62		
08:45-09:00	Kearney Lake Road (West Leg)	780.62	780.62		
09:00-09:15	Kearney Lake Road (West Leg)	637.38	637.38		
09:15-09:30	Kearney Lake Road (West Leg)	533.77	533.77		
08:00-08:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:15-08:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:30-08:45	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:45-09:00	Hwy 102 SB On-Ramp	Exit-only	0.00		
09:00-09:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
09:15-09:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:00-08:15	Kearney Lake Road (East Leg)	229.62	229.62		
08:15-08:30	Kearney Lake Road (East Leg)	274.19	274.19		
08:30-08:45	Kearney Lake Road (East Leg)	335.81	335.81		
08:45-09:00	Kearney Lake Road (East Leg)	335.81	335.81		

09:00-09:15	Kearney Lake Road (East Leg)	274.19	274.19		
09:15-09:30	Kearney Lake Road (East Leg)	229.62	229.62		
08:00-08:15	Hwy 102 SB Off-Ramp	490.86	490.86		
08:15-08:30	Hwy 102 SB Off-Ramp	586.13	586.13		
08:30-08:45	Hwy 102 SB Off-Ramp	717.87	717.87		
08:45-09:00	Hwy 102 SB Off-Ramp	717.87	717.87		
09:00-09:15	Hwy 102 SB Off-Ramp	586.13	586.13		
09:15-09:30	Hwy 102 SB Off-Ramp	490.86	490.86		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
From	Kearney Lake Road (West Leg)	0.000	236.000	473.000	0.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	216.000	89.000	0.000	0.000
	Hwy 102 SB Off-Ramp	31.000	4.000	617.000	0.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.00	0.33	0.67	0.00
	Hwy 102 SB On-Ramp	0.25	0.25	0.25	0.25
	Kearney Lake Road (East Leg)	0.71	0.29	0.00	0.00
	Hwy 102 SB Off-Ramp	0.05	0.01	0.95	0.00

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB Off-Ramp	1.000	1.000	1.000	1.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB Off-Ramp	0.0	0.0	0.0	0.0

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.66	9.13	1.95	2.00	A
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
Kearney Lake Road (East Leg)	0.20	2.75	0.26	~1	A
Hwy 102 SB Off-Ramp	0.50	4.96	0.98	~1	A

(Default Analysis Set) - 2031, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2031, PM	2031	PM		ONE HOUR	17:00	18:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-West	Roundabout	1,2,3,4			5.33	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 SB On-Ramp	2	Hwy 102 SB On-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 SB Off-Ramp	4	Hwy 102 SB Off-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 SB On-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 SB Off-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB Off-Ramp		(calculated)	(calculated)	0.603	1645.706

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	432.00	100.000
Hwy 102 SB On-Ramp	Exit-only	✓	Exit-only	Exit-only
Kearney Lake Road (East Leg)	ONE HOUR	✓	577.00	100.000
Hwy 102 SB Off-Ramp	ONE HOUR	✓	668.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-17:15	Kearney Lake Road (West Leg)	325.23	325.23		

17:15-17:30	Kearney Lake Road (West Leg)	388.36	388.36		
17:30-17:45	Kearney Lake Road (West Leg)	475.64	475.64		
17:45-18:00	Kearney Lake Road (West Leg)	475.64	475.64		
18:00-18:15	Kearney Lake Road (West Leg)	388.36	388.36		
18:15-18:30	Kearney Lake Road (West Leg)	325.23	325.23		
17:00-17:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:15-17:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:30-17:45	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:45-18:00	Hwy 102 SB On-Ramp	Exit-only	0.00		
18:00-18:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
18:15-18:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:00-17:15	Kearney Lake Road (East Leg)	434.40	434.40		
17:15-17:30	Kearney Lake Road (East Leg)	518.71	518.71		
17:30-17:45	Kearney Lake Road (East Leg)	635.29	635.29		
17:45-18:00	Kearney Lake Road (East Leg)	635.29	635.29		

18:00-18:15	Kearney Lake Road (East Leg)	518.71	518.71		
18:15-18:30	Kearney Lake Road (East Leg)	434.40	434.40		
17:00-17:15	Hwy 102 SB Off-Ramp	502.91	502.91		
17:15-17:30	Hwy 102 SB Off-Ramp	600.52	600.52		
17:30-17:45	Hwy 102 SB Off-Ramp	735.48	735.48		
17:45-18:00	Hwy 102 SB Off-Ramp	735.48	735.48		
18:00-18:15	Hwy 102 SB Off-Ramp	600.52	600.52		
18:15-18:30	Hwy 102 SB Off-Ramp	502.91	502.91		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
From	Kearney Lake Road (West Leg)	0.000	159.000	273.000	0.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	438.000	139.000	0.000	0.000
	Hwy 102 SB Off-Ramp	53.000	6.000	609.000	0.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.00	0.37	0.63	0.00
	Hwy 102 SB On-Ramp	0.25	0.25	0.25	0.25
	Kearney Lake Road (East Leg)	0.76	0.24	0.00	0.00
	Hwy 102 SB Off-Ramp	0.08	0.01	0.91	0.00

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB Off-Ramp	1.000	1.000	1.000	1.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB Off-Ramp	0.0	0.0	0.0	0.0

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.42	5.38	0.71	1.00	A
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
Kearney Lake Road (East Leg)	0.39	3.56	0.63	1.00	A
Hwy 102 SB Off-Ramp	0.58	6.83	1.38	1.00	A

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	6:45	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	2455	2348	2427	2319	2388	2374	2364
Vehs Exited	2428	2349	2419	2335	2388	2367	2387
Starting Vehs	71	78	94	95	70	80	102
Ending Vehs	98	77	102	79	70	87	79
Travel Distance (km)	4067	3964	4134	3893	3980	3998	4054
Travel Time (hr)	88.8	85.8	89.6	84.1	86.2	87.4	89.2
Total Delay (hr)	16.4	15.1	15.7	15.0	15.5	16.1	17.2
Total Stops	1091	1007	1012	1040	1048	1112	1192
Fuel Used (l)	295.6	288.1	297.9	282.5	287.8	291.2	295.7

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	2366	2396	2328	2376
Vehs Exited	2380	2383	2343	2378
Starting Vehs	93	83	84	85
Ending Vehs	79	96	69	83
Travel Distance (km)	4037	4013	3929	4007
Travel Time (hr)	87.8	87.2	84.8	87.1
Total Delay (hr)	15.9	15.9	15.0	15.8
Total Stops	1054	1084	1004	1066
Fuel Used (l)	292.5	290.0	283.5	290.5

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	680	666	673	659	663	663	670
Vehs Exited	658	632	662	644	633	659	678
Starting Vehs	71	78	94	95	70	80	102
Ending Vehs	93	112	105	110	100	84	94
Travel Distance (km)	1138	1105	1153	1127	1089	1139	1139
Travel Time (hr)	25.2	24.3	24.9	24.7	23.7	25.8	27.1
Total Delay (hr)	4.9	4.6	4.3	4.6	4.3	5.4	7.0
Total Stops	322	353	290	310	313	393	484
Fuel Used (l)	84.4	80.7	83.5	81.4	78.4	83.6	85.8

Interval #1 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	7	8	9	Avg
Vehs Entered	668	647	648	662
Vehs Exited	667	647	650	652
Starting Vehs	93	83	84	85
Ending Vehs	94	83	82	94
Travel Distance (km)	1135	1083	1098	1121
Travel Time (hr)	25.6	23.4	24.1	24.9
Total Delay (hr)	5.4	4.1	4.7	4.9
Total Stops	353	311	335	345
Fuel Used (l)	83.5	78.8	80.7	82.1

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	639	587	589	539	548	620	551
Vehs Exited	631	610	602	573	568	606	572
Starting Vehs	93	112	105	110	100	84	94
Ending Vehs	101	89	92	76	80	98	73
Travel Distance (km)	1067	1028	987	925	944	1004	964
Travel Time (hr)	23.2	22.6	21.6	20.1	20.3	22.4	20.5
Total Delay (hr)	4.2	4.2	4.0	3.6	3.5	4.6	3.4
Total Stops	272	258	264	256	216	302	237
Fuel Used (l)	76.4	75.8	71.6	68.1	68.7	74.1	69.7

Interval #2 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	7	8	9	Avg
Vehs Entered	588	579	578	582
Vehs Exited	602	565	584	591
Starting Vehs	94	83	82	94
Ending Vehs	80	97	76	86
Travel Distance (km)	1002	933	968	982
Travel Time (hr)	21.9	20.4	20.8	21.4
Total Delay (hr)	4.1	3.7	3.4	3.9
Total Stops	274	275	206	256
Fuel Used (l)	71.9	67.2	70.1	71.4

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	570	553	580	564	590	525	588
Vehs Exited	589	564	582	570	599	551	577
Starting Vehs	101	89	92	76	80	98	73
Ending Vehs	82	78	90	70	71	72	84
Travel Distance (km)	943	912	999	929	995	896	1012
Travel Time (hr)	20.5	19.5	21.7	19.6	21.5	18.8	21.6
Total Delay (hr)	3.8	3.3	3.7	3.3	3.9	2.9	3.6
Total Stops	247	191	220	223	255	202	233
Fuel Used (l)	68.4	65.8	70.6	65.7	72.3	64.1	71.9

Interval #3 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	558	562	536	562
Vehs Exited	552	585	551	573
Starting Vehs	80	97	76	86
Ending Vehs	86	74	61	77
Travel Distance (km)	958	971	919	954
Travel Time (hr)	20.3	21.1	19.4	20.4
Total Delay (hr)	3.2	3.9	3.2	3.5
Total Stops	215	229	228	225
Fuel Used (l)	68.6	69.1	64.7	68.1

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	10	2	3	4	5	6
Vehs Entered	566	542	585	557	587	566	555
Vehs Exited	550	543	573	548	588	551	560
Starting Vehs	82	78	90	70	71	72	84
Ending Vehs	98	77	102	79	70	87	79
Travel Distance (km)	918	919	994	912	952	959	939
Travel Time (hr)	19.8	19.4	21.4	19.7	20.7	20.4	19.9
Total Delay (hr)	3.5	3.1	3.7	3.5	3.8	3.2	3.3
Total Stops	250	205	238	251	264	215	238
Fuel Used (l)	66.4	65.8	72.2	67.3	68.4	69.4	68.3

Interval #4 Information Recording

Start Time	8:00
End Time	8:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	7	8	9	Avg
Vehs Entered	552	608	566	567
Vehs Exited	559	586	558	561
Starting Vehs	86	74	61	77
Ending Vehs	79	96	69	83
Travel Distance (km)	943	1026	944	951
Travel Time (hr)	19.9	22.3	20.5	20.4
Total Delay (hr)	3.1	4.1	3.8	3.5
Total Stops	212	269	235	235
Fuel Used (l)	68.4	74.9	68.0	68.9

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.3	0.1	0.2	0.3	0.0	0.0	0.2
Total Delay (hr)	0.3	0.0	0.0	0.1	0.0	0.1	0.5
Total Del/Veh (s)	1.7	1.3	5.7	0.9	13.0	6.6	1.9
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Stop Del/Veh (s)	0.0	0.0	3.3	0.2	11.5	6.7	0.5

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	4.5	2.6	3.4	0.0	0.0	0.0	0.3	0.0	0.1	0.1	0.2	0.1
Total Delay (hr)	0.0	3.9	0.6	0.7	1.0	0.0	1.3	0.0	0.6	0.0	0.0	0.0
Total Del/Veh (s)	27.8	16.8	4.7	36.1	7.6	5.0	25.7	7.8	18.7	20.5	18.3	5.7
Stop Delay (hr)	0.0	1.6	0.0	0.6	0.5	0.0	0.9	0.0	0.5	0.0	0.0	0.0
Stop Del/Veh (s)	17.8	7.0	0.0	33.8	3.7	3.2	19.3	4.4	14.5	19.2	15.2	5.5

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	1.1
Denied Del/Veh (s)	1.8
Total Delay (hr)	8.2
Total Del/Veh (s)	13.5
Stop Delay (hr)	4.3
Stop Del/Veh (s)	7.0

Total Network Performance

Denied Delay (hr)	1.2
Denied Del/Veh (s)	1.8
Total Delay (hr)	14.6
Total Del/Veh (s)	21.3
Stop Delay (hr)	4.7
Stop Del/Veh (s)	6.8

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	EB	B10	WB	NB
Directions Served	TR	T	LT	LR
Maximum Queue (m)	1.3	62.0	34.0	24.8
Average Queue (m)	0.0	2.2	4.5	7.0
95th Queue (m)	1.0	63.2	18.5	16.0
Link Distance (m)	191.8	608.5	248.5	70.2
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	L	TR	L	TR	L	TR
Maximum Queue (m)	12.7	104.8	33.4	62.2	37.3	78.6	6.9	8.8
Average Queue (m)	0.7	50.9	13.5	25.5	22.4	24.6	0.7	1.4
95th Queue (m)	6.9	94.9	26.1	47.7	39.2	56.5	4.0	6.4
Link Distance (m)	357.9		169.9		608.5		30.6	30.6
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	35.0		160.0		30.0			
Storage Blk Time (%)	13				4	3		
Queuing Penalty (veh)	65				6	6		

Network Summary

Network wide Queuing Penalty: 78

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	34.2	18.0	34.2	18.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	32.3	11.6	32.3	11.6
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	17	0	17
Cycles Maxed Out (%)	64	16	64	16
Cycles with Peds (%)	0	0	0	0




Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Intersection

Int Delay, s/veh 1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	697	6	22	259	6	48
Future Vol, veh/h	697	6	22	259	6	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	73	73	77	77
Heavy Vehicles, %	3	2	6	7	2	6
Mvmt Flow	734	6	30	355	8	62

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	740
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.16
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.254
Pot Cap-1 Maneuver	-	-	849
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	849
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-























Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	16.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	372	-	-	849	-
HCM Lane V/C Ratio	0.189	-	-	0.035	-
HCM Control Delay (s)	16.9	-	-	9.4	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S4 Five-Year AM 2036

11-27-2019

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	823	502	69	465	9	170	4	118	5	4	4
Future Volume (vph)	4	823	502	69	465	9	170	4	118	5	4	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.997			0.855			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1845	1568	1719	1805	0	1671	1308	0	1770	1723	0
Flt Permitted	0.386			0.143			0.743			0.643		
Satd. Flow (perm)	719	1845	1568	259	1805	0	1307	1308	0	1198	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			518		2			130			11	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			2.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.97	0.97	0.97	0.88	0.88	0.88	0.67	0.67	0.67	0.38	0.38	0.38
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	3%	3%	5%	5%	2%	8%	2%	25%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	4	848	518	78	528	10	254	6	176	13	11	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	848	518	78	538	0	254	182	0	13	22	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	41.0	41.0	41.0	41.0	41.0		24.0	24.0		24.0	24.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	31.1	31.1	31.1	31.1	31.1		15.4	15.4		15.4	15.4	
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.26	0.26		0.26	0.26	
v/c Ratio	0.01	0.88	0.49	0.58	0.57		0.75	0.42		0.04	0.05	
Control Delay	7.5	26.2	2.6	32.6	12.9		37.3	10.3		17.8	13.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.5	26.2	2.6	32.6	12.9		37.3	10.3		17.8	13.0	
LOS	A	C	A	C	B		D	B		B	B	
Approach Delay		17.2			15.4			26.1			14.8	
Approach LOS		B			B			C			B	
Stops (vph)	3	634	37	50	296		142	36		5	5	
Fuel Used(l)	0	64	19	8	44		43	26		0	0	
CO Emissions (g/hr)	5	1188	346	143	821		803	491		5	5	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	229	67	28	158		155	95		1	1	
VOC Emissions (g/hr)	1	274	80	33	189		185	113		1	1	
Dilemma Vehicles (#)	0	66	0	0	39		0	10		0	1	
Queue Length 50th (m)	0.2	86.6	0.0	6.2	42.1		28.8	4.9		1.2	1.0	
Queue Length 95th (m)	1.4	#162.4	12.6	#26.0	66.3		35.6	10.1		2.0	1.8	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	421	1080	1132	151	1057		402	493		368	538	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.01	0.79	0.46	0.52	0.51		0.63	0.37		0.04	0.04	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 59.5

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 18.3

Intersection LOS: B

Intersection Capacity Utilization 81.6%

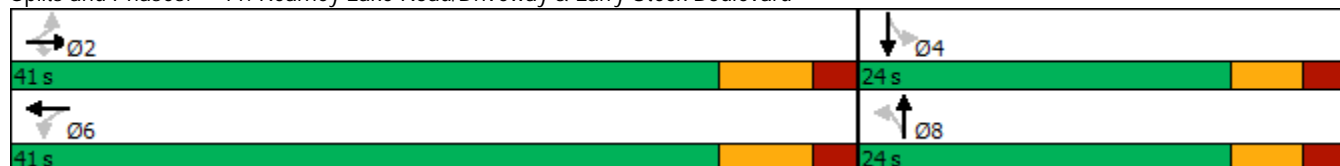
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard



Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	3:45	3:45	3:45	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	2640	2575	2611	2612	2586	2554	2659
Vehs Exited	2650	2590	2595	2596	2574	2568	2641
Starting Vehs	106	98	93	80	91	104	94
Ending Vehs	96	83	109	96	103	90	112
Travel Distance (km)	4642	4458	4378	4517	4467	4439	4564
Travel Time (hr)	104.8	100.1	103.4	106.6	99.7	98.8	104.9
Total Delay (hr)	22.8	21.6	26.3	27.3	20.9	20.8	24.7
Total Stops	1393	1347	1620	1684	1277	1287	1554
Fuel Used (l)	338.3	325.7	325.1	334.3	325.8	322.9	333.8

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	3:45	3:45	3:45	3:45
End Time	5:15	5:15	5:15	5:15
Total Time (min)	90	90	90	90
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	2557	2664	2544	2599
Vehs Exited	2561	2693	2564	2603
Starting Vehs	103	123	106	101
Ending Vehs	99	94	86	96
Travel Distance (km)	4476	4650	4365	4496
Travel Time (hr)	106.8	108.0	99.6	103.3
Total Delay (hr)	27.9	25.9	22.6	24.1
Total Stops	1731	1574	1371	1483
Fuel Used (l)	329.1	343.3	320.6	329.9

Interval #0 Information Seeding

Start Time	3:45
End Time	4:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	721	697	739	758	721	722	703
Vehs Exited	706	682	692	689	711	715	682
Starting Vehs	106	98	93	80	91	104	94
Ending Vehs	121	113	140	149	101	111	115
Travel Distance (km)	1233	1199	1191	1236	1214	1223	1142
Travel Time (hr)	28.3	27.4	29.0	30.6	28.7	28.6	28.3
Total Delay (hr)	6.6	6.3	8.2	8.8	7.4	7.1	8.5
Total Stops	382	392	490	525	432	409	529
Fuel Used (l)	91.4	87.4	88.7	91.9	90.0	90.2	84.6

Interval #1 Information Recording

Start Time	4:15
End Time	4:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	731	739	756	728
Vehs Exited	710	726	715	702
Starting Vehs	103	123	106	101
Ending Vehs	124	136	147	125
Travel Distance (km)	1244	1288	1258	1223
Travel Time (hr)	31.7	31.6	30.8	29.5
Total Delay (hr)	9.8	8.9	8.6	8.0
Total Stops	599	500	475	474
Fuel Used (l)	93.3	96.2	94.3	90.8

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	644	623	601	576	599	607	665
Vehs Exited	667	651	657	635	606	638	680
Starting Vehs	121	113	140	149	101	111	115
Ending Vehs	98	85	84	90	94	80	100
Travel Distance (km)	1150	1129	1102	1080	1048	1062	1157
Travel Time (hr)	26.5	25.0	28.5	27.2	22.6	23.6	26.9
Total Delay (hr)	6.1	5.1	9.1	8.2	4.1	5.0	6.5
Total Stops	379	319	543	502	272	312	422
Fuel Used (l)	83.6	83.4	84.8	82.6	75.4	77.3	85.5

Interval #2 Information Recording

Start Time	4:30
End Time	4:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	619	621	609	616
Vehs Exited	662	653	659	650
Starting Vehs	124	136	147	125
Ending Vehs	81	104	97	92
Travel Distance (km)	1126	1116	1077	1105
Travel Time (hr)	29.4	25.6	25.3	26.1
Total Delay (hr)	9.4	5.8	6.3	6.6
Total Stops	577	364	372	405
Fuel Used (l)	84.9	81.5	80.2	81.9

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	625	642	604	635	626	613	639
Vehs Exited	637	625	613	637	609	606	639
Starting Vehs	98	85	84	90	94	80	100
Ending Vehs	86	102	75	88	111	87	100
Travel Distance (km)	1137	1112	993	1108	1072	1071	1133
Travel Time (hr)	25.3	25.0	21.3	24.5	23.6	23.2	24.6
Total Delay (hr)	5.1	5.4	3.9	5.2	4.6	4.4	4.5
Total Stops	313	337	258	320	263	289	289
Fuel Used (l)	81.8	80.7	71.3	80.7	78.4	77.5	81.1

Interval #3 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	604	643	567	620
Vehs Exited	591	634	584	618
Starting Vehs	81	104	97	92
Ending Vehs	94	113	80	91
Travel Distance (km)	1018	1097	997	1074
Travel Time (hr)	22.3	24.2	21.4	23.6
Total Delay (hr)	4.2	5.0	3.9	4.6
Total Stops	286	314	251	291
Fuel Used (l)	73.2	80.4	71.6	77.7

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	650	613	667	643	640	612	652
Vehs Exited	640	632	633	635	648	609	640
Starting Vehs	86	102	75	88	111	87	100
Ending Vehs	96	83	109	96	103	90	112
Travel Distance (km)	1123	1019	1092	1092	1133	1083	1131
Travel Time (hr)	24.6	22.7	24.5	24.3	24.8	23.4	25.1
Total Delay (hr)	5.0	4.8	5.2	5.1	4.8	4.4	5.1
Total Stops	319	299	329	337	310	277	314
Fuel Used (l)	81.4	74.2	80.2	79.1	82.0	78.0	82.6

Interval #4 Information Recording

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	603	661	612	637
Vehs Exited	598	680	606	631
Starting Vehs	94	113	80	91
Ending Vehs	99	94	86	96
Travel Distance (km)	1087	1149	1032	1094
Travel Time (hr)	23.5	26.6	22.1	24.1
Total Delay (hr)	4.4	6.2	3.8	4.9
Total Stops	269	396	273	313
Fuel Used (l)	77.7	85.1	74.5	79.5

6: Hamshaw Drive & Kearney Lake Road Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.0	0.5	0.4	0.0	0.0	0.2
Total Delay (hr)	0.2	0.0	0.0	0.2	0.0	0.0	0.5
Total Del/Veh (s)	1.6	1.0	4.9	1.2	10.2	4.1	1.7
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Stop Del/Veh (s)	0.0	0.0	2.2	0.1	8.5	4.3	0.3

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	3.3	1.3	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Total Delay (hr)	0.0	2.1	0.2	1.2	6.6	0.0	3.5	0.1	0.6	0.1	0.0	0.0
Total Del/Veh (s)	44.2	12.1	3.0	33.2	24.5	19.1	42.0	3.3	20.1	27.7	30.6	17.5
Stop Delay (hr)	0.0	1.0	0.0	1.1	3.4	0.0	2.8	0.0	0.4	0.1	0.0	0.0
Stop Del/Veh (s)	40.1	6.1	0.0	28.5	12.7	11.1	33.2	1.1	14.0	26.6	27.8	17.4

11: Kearney Lake Road/Driveway & Larry Uteck Boulevard Performance by movement

Movement	All
Denied Delay (hr)	0.5
Denied Del/Veh (s)	0.7
Total Delay (hr)	14.6
Total Del/Veh (s)	20.6
Stop Delay (hr)	9.0
Stop Del/Veh (s)	12.7

Total Network Performance

Denied Delay (hr)	0.9
Denied Del/Veh (s)	1.2
Total Delay (hr)	23.2
Total Del/Veh (s)	30.9
Stop Delay (hr)	9.8
Stop Del/Veh (s)	13.0

Intersection: 6: Hamshaw Drive & Kearney Lake Road

Movement	B10	WB	NB
Directions Served	T	LT	LR
Maximum Queue (m)	309.0	35.1	15.2
Average Queue (m)	13.2	5.7	5.3
95th Queue (m)	160.6	22.0	11.8
Link Distance (m)	608.5	248.5	70.2
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Movement	EB	EB	WB	WB	B13	NB	NB	SB	SB
Directions Served	L	T	L	TR	T	L	TR	L	TR
Maximum Queue (m)	5.0	83.0	157.1	192.1	108.8	37.3	112.5	8.7	8.6
Average Queue (m)	0.6	36.7	32.7	97.5	12.8	33.8	44.9	1.5	1.9
95th Queue (m)	3.1	70.1	100.2	181.7	80.4	42.9	99.1	6.0	7.5
Link Distance (m)		357.9		169.9	270.3		608.5	30.6	30.6
Upstream Blk Time (%)			0	4					
Queuing Penalty (veh)			0	0					
Storage Bay Dist (m)	35.0		160.0			30.0			
Storage Blk Time (%)		7	0	5		28	0		
Queuing Penalty (veh)		19	0	7		32	1		

Network Summary

Network wide Queuing Penalty: 59

Intersection: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard

Phase	2	4	6	8
Movement(s) Served	EBTL	SBTL	WBTL	NBTL
Maximum Green (s)	60.2	27.0	60.2	27.0
Minimum Green (s)	7.0	7.0	7.0	7.0
Recall	Min	None	Min	None
Avg. Green (s)	53.3	20.1	53.3	20.1
g/C Ratio	NA	NA	NA	NA
Cycles Skipped (%)	0	0	0	0
Cycles @ Minimum (%)	0	2	0	2
Cycles Maxed Out (%)	56	29	56	29
Cycles with Peds (%)	0	0	0	0




Controller Summary

Average Cycle Length (s): NA

Number of Complete Cycles : 0

Intersection

Int Delay, s/veh 1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	405	12	31	510	12	28
Future Vol, veh/h	405	12	31	510	12	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	94	94	68	68
Heavy Vehicles, %	3	2	7	2	2	4
Mvmt Flow	450	13	33	543	18	41

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	463
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.17
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.263
Pot Cap-1 Maneuver	-	-	1072
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1072
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-























Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	15.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	409	-	-	1072	-
HCM Lane V/C Ratio	0.144	-	-	0.031	-
HCM Control Delay (s)	15.3	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	606	269	137	964	6	303	4	107	10	4	5
Future Volume (vph)	4	606	269	137	964	6	303	4	107	10	4	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	35.0		250.0	160.0		0.0	30.0		30.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. 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
Ped Bike Factor												
Frt			0.850		0.999			0.855			0.919	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1553	1770	1861	0	1770	1593	0	1770	1712	0
Flt Permitted	0.066			0.299			0.749			0.679		
Satd. Flow (perm)	123	1863	1553	557	1861	0	1395	1593	0	1265	1712	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			299		1			118			7	
Link Speed (k/h)		60			60			60			50	
Link Distance (m)		375.6			193.1			630.1			47.6	
Travel Time (s)		22.5			11.6			37.8			3.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.91	0.91	0.91	0.67	0.67	0.67
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	4	673	299	159	1121	7	333	4	118	15	6	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	673	299	159	1128	0	333	122	0	15	13	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		
Total Split (s)	67.0	67.0	67.0	67.0	67.0		33.0	33.0		33.0	33.0	
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8		6.0	6.0		6.0	6.0	
Act Effect Green (s)	60.2	60.2	60.2	60.2	60.2		25.7	25.7		25.7	25.7	
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61		0.26	0.26		0.26	0.26	
v/c Ratio	0.05	0.59	0.28	0.47	0.99		0.92	0.24		0.05	0.03	
Control Delay	10.2	14.8	1.8	16.6	46.1		67.4	7.2		27.6	19.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.2	14.8	1.8	16.6	46.1		67.4	7.2		27.6	19.3	
LOS	B	B	A	B	D		E	A		C	B	
Approach Delay		10.8			42.5			51.3			23.8	
Approach LOS		B			D			D			C	
Stops (vph)	3	359	14	77	781		264	19		9	6	
Fuel Used(l)	0	38	10	13	121		84	23		0	0	
CO Emissions (g/hr)	5	711	178	240	2249		1568	434		9	6	

15318 Bedford West Sub Area 10 TIS
Kearney Lake Road & Larry Uteck Boulevard

S4 Five-Year PM 2036

11-27-2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
NOx Emissions (g/hr)	1	137	34	46	434		303	84		2	1	
VOC Emissions (g/hr)	1	164	41	55	519		362	100		2	1	
Dilemma Vehicles (#)	0	30	0	0	46		0	5		0	0	
Queue Length 50th (m)	0.3	79.2	0.0	16.7	~219.2		65.1	0.6		2.3	0.9	
Queue Length 95th (m)	2.0	114.0	10.1	32.4	#297.6		#116.8	14.2		5.5	3.9	
Internal Link Dist (m)		351.6			169.1			606.1			23.6	
Turn Bay Length (m)	35.0		250.0	160.0			30.0					
Base Capacity (vph)	75	1136	1063	339	1135		381	521		346	473	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.59	0.28	0.47	0.99		0.87	0.23		0.04	0.03	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 98.7

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 32.5

Intersection LOS: C

Intersection Capacity Utilization 96.7%

ICU Level of Service F

Analysis Period (min) 15

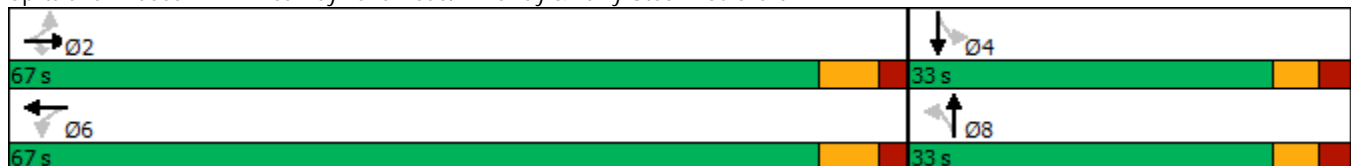
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 11: Kearney Lake Road/Driveway & Larry Uteck Boulevard



Junctions 8													
ARCADY 8 - Roundabout Module													
Version: 8.0.4.487 [15039,24/03/2014] © Copyright TRL Limited, 2019													
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk													
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution													

Filename: 15318_Hwy 102 NB-Kearney Lake Road-East Roundabout-2036.arc8

Path: Z:\Harbourside Transportation Consultants\Projects\15318 Bedford West Sub Area 10 - 2018 Revision\Project Files\02 Analysis\05 Arcady

Report generation date: 27/11/2019 1:45:00 PM

Summary of intersection performance

	AM							PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2036													
Kearney Lake Road (West Leg)	3.31	7.00	9.57	0.77	A	6.76	A	1.63	2.00	5.78	0.62	A	4.77	A
Hwy 102 NB Off-Ramp	0.27	~1	5.18	0.21	A			0.88	1.00	6.58	0.47	A		
Kearney Lake Road (East Leg)	0.20	~1	2.80	0.17	A			0.40	~1	3.49	0.29	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2036, AM" model duration: 8:00 AM - 9:30 AM

"D2 - 2036, PM" model duration: 5:00 PM - 6:30 PM

Run using Junctions 8.0.4.487 at 27/11/2019 1:44:59 PM

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.00	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2036, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2036, AM	2036	AM		ONE HOUR	08:00	09:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-East	Roundabout	1,2,3,4			6.76	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 NB Off-Ramp	2	Hwy 102 NB Off-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 NB On-Ramp	4	Hwy 102 NB On-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 NB Off-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 NB On-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓

Bypass

Name	Leg Has Bypass	Bypass Utilisation (%)
Kearney Lake Road (West Leg)		
Hwy 102 NB Off-Ramp		
Kearney Lake Road (East Leg)	✓	100
Hwy 102 NB On-Ramp		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB Off-Ramp		(calculated)	(calculated)	0.603	1645.706
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	1154.00	100.000
Hwy 102 NB Off-Ramp	ONE HOUR	✓	168.00	100.000
Kearney Lake Road (East Leg)	ONE HOUR	✓	753.00	100.000
Hwy 102 NB On-Ramp	Exit-only	✓	Exit-only	Exit-only

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
08:00-08:15	Kearney Lake Road (West Leg)	868.79	868.79		
08:15-08:30	Kearney Lake Road (West Leg)	1037.42	1037.42		
08:30-08:45	Kearney Lake Road (West Leg)	1270.58	1270.58		
08:45-09:00	Kearney Lake Road (West Leg)	1270.58	1270.58		
09:00-09:15	Kearney Lake Road (West Leg)	1037.42	1037.42		
09:15-09:30	Kearney Lake Road (West Leg)	868.79	868.79		
08:00-08:15	Hwy 102 NB Off-Ramp	126.48	126.48		

08:15-08:30	Hwy 102 NB Off-Ramp	151.03	151.03		
08:30-08:45	Hwy 102 NB Off-Ramp	184.97	184.97		
08:45-09:00	Hwy 102 NB Off-Ramp	184.97	184.97		
09:00-09:15	Hwy 102 NB Off-Ramp	151.03	151.03		
09:15-09:30	Hwy 102 NB Off-Ramp	126.48	126.48		
08:00-08:15	Kearney Lake Road (East Leg)	566.90	566.90		
08:15-08:30	Kearney Lake Road (East Leg)	676.93	676.93		
08:30-08:45	Kearney Lake Road (East Leg)	829.07	829.07		
08:45-09:00	Kearney Lake Road (East Leg)	829.07	829.07		
09:00-09:15	Kearney Lake Road (East Leg)	676.93	676.93		
09:15-09:30	Kearney Lake Road (East Leg)	566.90	566.90		
08:00-08:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
08:15-08:30	Hwy 102 NB On-Ramp	Exit-only	0.00		
08:30-08:45	Hwy 102 NB On-Ramp	Exit-only	0.00		
08:45-09:00	Hwy 102 NB On-Ramp	Exit-only	0.00		
09:00-09:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
09:15-09:30	Hwy 102 NB On-Ramp	Exit-only	0.00		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.000	0.000	1091.000	63.000
	Hwy 102 NB Off-Ramp	84.000	0.000	80.000	4.000
	Kearney Lake Road (East Leg)	237.000	0.000	0.000	516.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.00	0.00	0.95	0.05
	Hwy 102 NB Off-Ramp	0.50	0.00	0.48	0.02
	Kearney Lake Road (East Leg)	0.31	0.00	0.00	0.69
	Hwy 102 NB On-Ramp	0.25	0.25	0.25	0.25

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB Off-Ramp	1.000	1.000	1.000	1.000
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB Off-Ramp	0.0	0.0	0.0	0.0
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.77	9.57	3.31	7.00	A
Hwy 102 NB Off-Ramp	0.21	5.18	0.27	~1	A
Kearney Lake Road (East Leg)	0.17	2.80	0.20	~1	A
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only

(Default Analysis Set) - 2036, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2036, PM	2036	PM		ONE HOUR	17:00	18:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-East	Roundabout	1,2,3,4			4.77	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 NB Off-Ramp	2	Hwy 102 NB Off-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 NB On-Ramp	4	Hwy 102 NB On-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 NB Off-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 NB On-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓

Bypass

Name	Leg Has Bypass	Bypass Utilisation (%)
Kearney Lake Road (West Leg)		
Hwy 102 NB Off-Ramp		
Kearney Lake Road (East Leg)	✓	100
Hwy 102 NB On-Ramp		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB Off-Ramp		(calculated)	(calculated)	0.603	1645.706
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 NB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	929.00	100.000
Hwy 102 NB Off-Ramp	ONE HOUR	✓	438.00	100.000

Kearney Lake Road (East Leg)	ONE HOUR	✓	1350.00	100.000
Hwy 102 NB On-Ramp	Exit-only	✓	Exit-only	Exit-only

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-17:15	Kearney Lake Road (West Leg)	699.40	699.40		
17:15-17:30	Kearney Lake Road (West Leg)	835.15	835.15		
17:30-17:45	Kearney Lake Road (West Leg)	1022.85	1022.85		
17:45-18:00	Kearney Lake Road (West Leg)	1022.85	1022.85		
18:00-18:15	Kearney Lake Road (West Leg)	835.15	835.15		
18:15-18:30	Kearney Lake Road (West Leg)	699.40	699.40		
17:00-17:15	Hwy 102 NB Off-Ramp	329.75	329.75		
17:15-17:30	Hwy 102 NB Off-Ramp	393.75	393.75		
17:30-17:45	Hwy 102 NB Off-Ramp	482.25	482.25		
17:45-18:00	Hwy 102 NB Off-Ramp	482.25	482.25		

18:00-18:15	Hwy 102 NB Off-Ramp	393.75	393.75		
18:15-18:30	Hwy 102 NB Off-Ramp	329.75	329.75		
17:00-17:15	Kearney Lake Road (East Leg)	1016.35	1016.35		
17:15-17:30	Kearney Lake Road (East Leg)	1213.62	1213.62		
17:30-17:45	Kearney Lake Road (East Leg)	1486.38	1486.38		
17:45-18:00	Kearney Lake Road (East Leg)	1486.38	1486.38		
18:00-18:15	Kearney Lake Road (East Leg)	1213.62	1213.62		
18:15-18:30	Kearney Lake Road (East Leg)	1016.35	1016.35		
17:00-17:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
17:15-17:30	Hwy 102 NB On-Ramp	Exit-only	0.00		
17:30-17:45	Hwy 102 NB On-Ramp	Exit-only	0.00		
17:45-18:00	Hwy 102 NB On-Ramp	Exit-only	0.00		
18:00-18:15	Hwy 102 NB On-Ramp	Exit-only	0.00		
18:15-18:30	Hwy 102 NB On-Ramp	Exit-only	0.00		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.000	0.000	874.000	55.000
	Hwy 102 NB Off-Ramp	239.000	0.000	195.000	4.000
	Kearney Lake Road (East Leg)	379.000	0.000	0.000	971.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.00	0.00	0.94	0.06
	Hwy 102 NB Off-Ramp	0.55	0.00	0.45	0.01
	Kearney Lake Road (East Leg)	0.28	0.00	0.00	0.72
	Hwy 102 NB On-Ramp	0.25	0.25	0.25	0.25

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB Off-Ramp	1.000	1.000	1.000	1.000
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- East (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 NB Off-Ramp	Kearney Lake Road (East Leg)	Hwy 102 NB On-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB Off-Ramp	0.0	0.0	0.0	0.0
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only

Leg 4 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.62	5.78	1.63	2.00	A
Hwy 102 NB Off-Ramp	0.47	6.58	0.88	1.00	A
Kearney Lake Road (East Leg)	0.29	3.49	0.40	~1	A
Hwy 102 NB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only

Junctions 8													
ARCADY 8 - Roundabout Module													
Version: 8.0.4.487 [15039,24/03/2014] © Copyright TRL Limited, 2019													
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk													
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution													

Filename: 15318_Hwy 102 SB-Kearney Lake Road-West Roundabout-2036.arc8

Path: Z:\Harbourside Transportation Consultants\Projects\15318 Bedford West Sub Area 10 - 2018 Revision\Project Files\02 Analysis\05 Arcady

Report generation date: 27/11/2019 1:47:34 PM

Summary of intersection performance

	AM							PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - 2036													
Kearney Lake Road (West Leg)	2.58	5.00	11.42	0.73	B	7.48	A	0.83	1.00	5.92	0.45	A	5.94	A
Kearney Lake Road (East Leg)	0.28	~1	2.79	0.22	A			0.69	1.00	3.71	0.41	A		
Hwy 102 SB Off-Ramp	1.14	?	5.40	0.53	A			1.70	1.00	7.89	0.63	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - 2036, AM " model duration: 8:00 AM - 9:30 AM

"D2 - 2036, PM" model duration: 5:00 PM - 6:30 PM

Run using Junctions 8.0.4.487 at 27/11/2019 1:47:33 PM

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.00	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - 2036, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2036, AM	2036	AM		ONE HOUR	08:00	09:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-West	Roundabout	1,2,3,4			7.48	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 SB On-Ramp	2	Hwy 102 SB On-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 SB Off-Ramp	4	Hwy 102 SB Off-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 SB On-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 SB Off-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB Off-Ramp		(calculated)	(calculated)	0.603	1645.706

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	754.00	100.000
Hwy 102 SB On-Ramp	Exit-only	✓	Exit-only	Exit-only
Kearney Lake Road (East Leg)	ONE HOUR	✓	325.00	100.000
Hwy 102 SB Off-Ramp	ONE HOUR	✓	693.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
08:00-08:15	Kearney Lake Road (West Leg)	567.65	567.65		

08:15-08:30	Kearney Lake Road (West Leg)	677.83	677.83		
08:30-08:45	Kearney Lake Road (West Leg)	830.17	830.17		
08:45-09:00	Kearney Lake Road (West Leg)	830.17	830.17		
09:00-09:15	Kearney Lake Road (West Leg)	677.83	677.83		
09:15-09:30	Kearney Lake Road (West Leg)	567.65	567.65		
08:00-08:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:15-08:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:30-08:45	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:45-09:00	Hwy 102 SB On-Ramp	Exit-only	0.00		
09:00-09:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
09:15-09:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
08:00-08:15	Kearney Lake Road (East Leg)	244.68	244.68		
08:15-08:30	Kearney Lake Road (East Leg)	292.17	292.17		
08:30-08:45	Kearney Lake Road (East Leg)	357.83	357.83		
08:45-09:00	Kearney Lake Road (East Leg)	357.83	357.83		

09:00-09:15	Kearney Lake Road (East Leg)	292.17	292.17		
09:15-09:30	Kearney Lake Road (East Leg)	244.68	244.68		
08:00-08:15	Hwy 102 SB Off-Ramp	521.73	521.73		
08:15-08:30	Hwy 102 SB Off-Ramp	622.99	622.99		
08:30-08:45	Hwy 102 SB Off-Ramp	763.01	763.01		
08:45-09:00	Hwy 102 SB Off-Ramp	763.01	763.01		
09:00-09:15	Hwy 102 SB Off-Ramp	622.99	622.99		
09:15-09:30	Hwy 102 SB Off-Ramp	521.73	521.73		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
From	Kearney Lake Road (West Leg)	0.000	251.000	503.000	0.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	230.000	95.000	0.000	0.000
	Hwy 102 SB Off-Ramp	33.000	5.000	655.000	0.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.00	0.33	0.67	0.00
	Hwy 102 SB On-Ramp	0.25	0.25	0.25	0.25
	Kearney Lake Road (East Leg)	0.71	0.29	0.00	0.00
	Hwy 102 SB Off-Ramp	0.05	0.01	0.95	0.00

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB Off-Ramp	1.000	1.000	1.000	1.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB Off-Ramp	0.0	0.0	0.0	0.0

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.73	11.42	2.58	5.00	B
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
Kearney Lake Road (East Leg)	0.22	2.79	0.28	~1	A
Hwy 102 SB Off-Ramp	0.53	5.40	1.14	?	A

(Default Analysis Set) - 2036, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2036, PM	2036	PM		ONE HOUR	17:00	18:30	90	15		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Intersection Delay (s)	Intersection LOS
1	Hwy 102 Kearney Lake Rd-West	Roundabout	1,2,3,4			5.94	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Name	Leg	Name	Description
Kearney Lake Road (West Leg)	1	Kearney Lake Road (West Leg)	
Hwy 102 SB On-Ramp	2	Hwy 102 SB On-Ramp	
Kearney Lake Road (East Leg)	3	Kearney Lake Road (East Leg)	
Hwy 102 SB Off-Ramp	4	Hwy 102 SB Off-Ramp	

Capacity Options

Name	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)
Kearney Lake Road (West Leg)	0.00	99999.00
Hwy 102 SB On-Ramp	0.00	99999.00
Kearney Lake Road (East Leg)	0.00	99999.00
Hwy 102 SB Off-Ramp	0.00	99999.00

Roundabout Geometry

Name	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
Kearney Lake Road (West Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only	✓
Kearney Lake Road (East Leg)	3.50	8.00	10.00	30.00	50.00	30.00	
Hwy 102 SB Off-Ramp	3.50	8.00	10.00	30.00	50.00	30.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Name	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
Kearney Lake Road (West Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB On-Ramp		(calculated)	(calculated)	Exit-only	Exit-only
Kearney Lake Road (East Leg)		(calculated)	(calculated)	0.603	1645.706
Hwy 102 SB Off-Ramp		(calculated)	(calculated)	0.603	1645.706

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Name	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
Kearney Lake Road (West Leg)	ONE HOUR	✓	459.00	100.000
Hwy 102 SB On-Ramp	Exit-only	✓	Exit-only	Exit-only
Kearney Lake Road (East Leg)	ONE HOUR	✓	613.00	100.000
Hwy 102 SB Off-Ramp	ONE HOUR	✓	711.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Name	Direct Demand Entry Flow (PCE/hr)	DirectDemandEntryFlowInPCE (PCE/hr)	Direct Demand Exit Flow (PCE/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-17:15	Kearney Lake Road (West Leg)	345.56	345.56		

17:15-17:30	Kearney Lake Road (West Leg)	412.63	412.63		
17:30-17:45	Kearney Lake Road (West Leg)	505.37	505.37		
17:45-18:00	Kearney Lake Road (West Leg)	505.37	505.37		
18:00-18:15	Kearney Lake Road (West Leg)	412.63	412.63		
18:15-18:30	Kearney Lake Road (West Leg)	345.56	345.56		
17:00-17:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:15-17:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:30-17:45	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:45-18:00	Hwy 102 SB On-Ramp	Exit-only	0.00		
18:00-18:15	Hwy 102 SB On-Ramp	Exit-only	0.00		
18:15-18:30	Hwy 102 SB On-Ramp	Exit-only	0.00		
17:00-17:15	Kearney Lake Road (East Leg)	461.50	461.50		
17:15-17:30	Kearney Lake Road (East Leg)	551.07	551.07		
17:30-17:45	Kearney Lake Road (East Leg)	674.93	674.93		
17:45-18:00	Kearney Lake Road (East Leg)	674.93	674.93		

18:00-18:15	Kearney Lake Road (East Leg)	551.07	551.07		
18:15-18:30	Kearney Lake Road (East Leg)	461.50	461.50		
17:00-17:15	Hwy 102 SB Off-Ramp	535.28	535.28		
17:15-17:30	Hwy 102 SB Off-Ramp	639.17	639.17		
17:30-17:45	Hwy 102 SB Off-Ramp	782.83	782.83		
17:45-18:00	Hwy 102 SB Off-Ramp	782.83	782.83		
18:00-18:15	Hwy 102 SB Off-Ramp	639.17	639.17		
18:15-18:30	Hwy 102 SB Off-Ramp	535.28	535.28		

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
From	Kearney Lake Road (West Leg)	0.000	169.000	290.000	0.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	465.000	148.000	0.000	0.000
	Hwy 102 SB Off-Ramp	57.000	7.000	647.000	0.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Turning Proportions (PCE) - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.00	0.37	0.63	0.00
	Hwy 102 SB On-Ramp	0.25	0.25	0.25	0.25
	Kearney Lake Road (East Leg)	0.76	0.24	0.00	0.00
	Hwy 102 SB Off-Ramp	0.08	0.01	0.91	0.00

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Vehicle Mix

Average PCE Per Vehicle - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	1.000	1.000	1.000	1.000
	Hwy 102 SB Off-Ramp	1.000	1.000	1.000	1.000

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Truck Percentages - Hwy 102 Kearney Lake Rd- West (for whole period)

	To				
From		Kearney Lake Road (West Leg)	Hwy 102 SB On-Ramp	Kearney Lake Road (East Leg)	Hwy 102 SB Off-Ramp
	Kearney Lake Road (West Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only
	Kearney Lake Road (East Leg)	0.0	0.0	0.0	0.0
	Hwy 102 SB Off-Ramp	0.0	0.0	0.0	0.0

Leg 2 is exit only and so the above grid should be ignored for this Leg.

Results

Results Summary for whole modelled period

Name	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS
Kearney Lake Road (West Leg)	0.45	5.92	0.83	1.00	A
Hwy 102 SB On-Ramp	Exit-only	Exit-only	Exit-only	Exit-only	Exit-only
Kearney Lake Road (East Leg)	0.41	3.71	0.69	1.00	A
Hwy 102 SB Off-Ramp	0.63	7.89	1.70	1.00	A

Appendix F

Traffic Signal Warrants Analyses

2005 Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Kearney Lake Road	Direction (EW or NS)	EW
Side Street (name)	Hamshaw Drive	Direction (EW or NS)	NS
Quadrant (if appl)			

Date:	Apr 10, 2018
City:	Bedford, NS

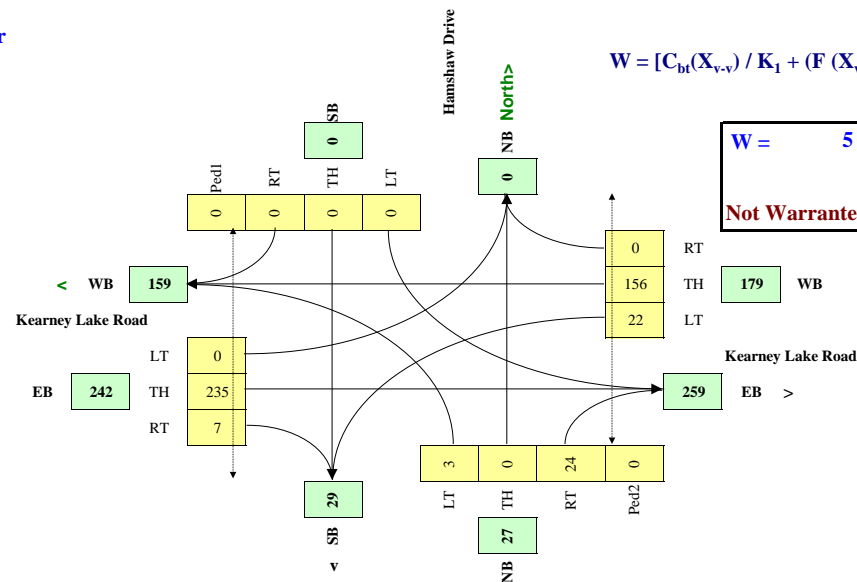
Lane Configuration		Excl LT	Th & LT	Through or Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes	
Kearney Lake Road	WB		1					1	
Kearney Lake Road	EB				1			1	
Hamshaw Drive	NB			1					
Hamshaw Drive	SB								

Demographics		
Elementary School	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	403390
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Trucks % (y/n)	Bus Rt (y/n)	Median (m)
Kearney Lake Road	EW	50	4.0%	y	0.0
Hamshaw Drive	NS		4.0%	n	

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S side
7:00 - 8:00	4	0	25	0	0	0	13	101	0	0	387	1	0	0	0	0
8:00 - 9:00	1	0	31	0	0	0	30	106	0	0	319	7	0	0	0	0
11:00 - 12:00	0	0	14	0	0	0	12	121	0	0	173	4	0	0	0	0
12:00 - 13:00	0	0	20	0	0	0	20	159	0	0	154	8	0	0	0	0
16:00 - 17:00	7	0	23	0	0	0	28	256	0	0	207	7	0	0	0	0
17:00 - 18:00	7	0	28	0	0	0	31	194	0	0	170	12	0	0	0	0
Total (6-hour peak)	19	0	141	0	0	0	134	937	0	0	1410	39	0	0	0	0
Average (6-hour peak)	3	0	24	0	0	0	22	156	0	0	235	7	0	0	0	0

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v,v}) / K_1 + (F(X_{v,p}) L) / K_2] \times C_i$$

$$W = 5 \quad 5 \quad 0$$

Veh Ped

Not Warranted - Vs<75

219 Waverley Rd, Suite 200
Dartmouth, NS, Canada B2X 2C3
Tel: 902-405-4696
Fax: 902-405-4693
www.harboursidetransportation.com



March 12, 2020

Reference No. 15318

Kevin Neatt
Clayton Developments Limited
100C – 255 Lacewood Drive
Halifax, NS, B3M 4G2

Re: Bedford West Sub Area 10 - Additional Analysis

Mr. Neatt,

The Bedford West Sub Area 10 traffic impact study concluded that improvements were required at the Highway 102 and Kearney Lake Road interchange to accommodate background traffic growth and full build out of the development in 2031. This technical memorandum documents the additional analysis complete to determine how many units can be developed in Bedford West Sub Area 10 before improvements are required at the Kearney Lake Road interchange. A diagram of the study area is shown in Figure 1.

1 Traffic Data Collection

Weekday traffic data was collected at the Larry Uteck Boulevard interchange roundabouts using Miovision 'Scout' video data collection devices. Turning movement counts were collected during the morning (7:00am to 9:00am) and afternoon (4:00pm to 6:00pm) peak periods of traffic on a typical weekday in February, 2020. Traffic volumes (categorized as 'light' and 'other' vehicles) and pedestrians were recorded in 15-minute intervals.

Traffic data collected in 2018 at the Kearney Lake Road interchange was available from the Bedford West Sub Area 10 traffic impact study. To approximate 2020 traffic volumes, the data was factored using a background growth rate of 1.2 percent per year (background growth rate from the Bedford West Sub Area 10 traffic impact study).

2 Development Projections

Development projections for Sub Area 10 include 1,136 units and 15,000 square feet of commercial development. The following assumptions were used to project traffic volumes at the Kearney Lake Road and Larry Uteck Boulevard interchanges:

- 1.2 percent background traffic growth per year
- 115 units per year (20 percent low rise/80 percent mid-rise)
- 5,000 square feet of commercial space in year 4

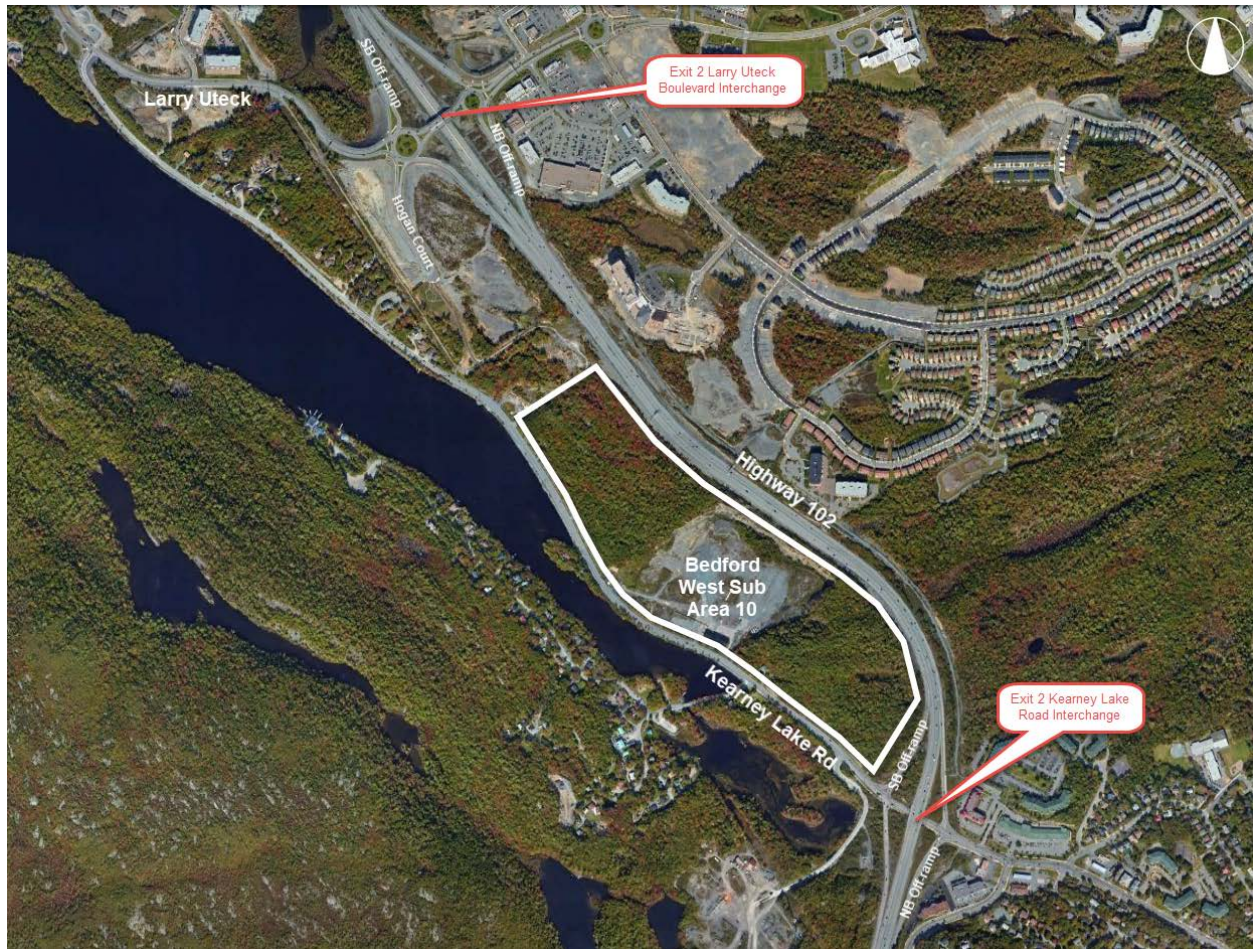


Figure 1: Study Area

The development traffic volumes were distributed using the trip distribution from the Bedford West Sub Area 10 traffic impact study, summarized in Table 1. The distribution was derived based on the Home-to-Work trip distribution produced in 2014 *Bedford West Master Plan Transportation Study Update (Burgess)*. The intersections were analyzed until operational issues (LOS F, $v/c > 1.0$) were observed at the Kearney Lake Road interchange. Traffic volumes projections were developed for 2020, 2022, 2024 and 2026; the morning and afternoon peak hour traffic volumes at the interchanges are illustrated diagrammatically in Appendix A.

Table 1: Trip Distribution (from Bedford West Sub Area 10 TIS)

To/From	Gateway	Distribution
North	Kearney Lake Road Interchange	12.0%
	Larry Uteck Boulevard Interchange	30.0%
South	Kearney Lake Road Interchange	41.0%
	Larry Uteck Boulevard Interchange	0.0%
East	Kearney Lake Road	4.5%
	Larry Uteck Boulevard	4.5%
West	Larry Uteck Boulevard	8.0%

3 Traffic Operations Analysis

The Synchro Studio 10 software package was used to evaluate the signalized intersections at the Kearney Lake Road interchange. The software package includes two modelling applications: Synchro, a macroscopic analysis and optimization application, and SimTraffic, a microsimulation and animation application. Synchro is used to analyze network intersections based on the methodology of the *Highway Capacity Manual* (6th edition) published by the Transportation Research Board. Synchro analyzes each intersection in isolation, while SimTraffic analyzes the network as a whole by simulating individual vehicles traversing the network. SimTraffic identifies interactions between adjacent intersections such as spillbacks from upstream and/or downstream intersections.

The Junctions 8 ARCADY software was used to evaluate the roundabouts at the Larry Uteck Boulevard interchange. ARCADY uses an empirical model based on the application of statistical regression of a large data set of observed roundabout operations in the United Kingdom.

The performance of an intersection can be evaluated using a number of measures of effectiveness (MOEs), including level of service (LOS), delay, volume-to-capacity ratio (v/c) and vehicle queuing.

Level of service is a qualitative measure used to describe the level of performance of an intersection in terms of traffic movement. Level of service is a measure of driver discomfort, frustration and increased travel time. The quality of traffic movement is divided into six levels ranging from A to F, where level of service A represents the best quality of traffic where the driver has the freedom to drive with free flow speed and level of service F represents the worst quality of traffic where the level of congestion is considered unacceptable to most drivers. The level of service criteria for intersections (Table 2) are stated in terms of average control delay per vehicle.

Table 2: Level of Service Criteria

Level of Service	Description	Signalized Control Delay	Unsignalized Control Delay
A	No congestion; most vehicles do not stop. (Excellent)	≤ 10 sec/veh	≤ 10 sec/veh
B	Very light congestion; some vehicles stop. (Very Good)	10-20 sec/veh	10-15 sec/veh
C	Light congestion; most vehicles stop. (Good)	20-35 sec/veh	15-25 sec/veh
D	Noticeable congestion; vehicles must sometimes wait through more than one red light. No long-standing queues. (Satisfactory)	35-55 sec/veh	25-35 sec/veh
E	Congestion; vehicles must often wait through more than one red light. Long-standing queues are formed. (Unsatisfactory)	55-80 sec/veh	35-50 sec/veh
F	Severe congestion; demand exceeds the capacity of the intersection. (Unacceptable)	≥ 80 sec/veh	≥ 50 sec/veh

The volume-to-capacity (v/c) ratio is a measure of how the peak hour traffic volume on an approach to an intersection compares to the theoretical maximum volume that could be accommodated on that intersection approach. As the v/c ratio approaches 1.0, the movement has reduced ability to accommodate any additional volume of traffic.

The 95th percentile queue (95th% queue) is the estimated length in metres of a queue of vehicles stopped on an intersection approach which is only exceeded five percent of the time. Since a stopped vehicle occupies approximately seven metres of queue length, a 95th% queue of 14 metres indicates that less than five times of out 100 the queue may exceed two vehicles on the approach. The 95th% queue is typically used to determine if sufficient vehicle storage is available to maintain efficient traffic flow.

3.1 Current State 2020 – No Development

The weekday peak hour traffic volumes were used to analyze existing conditions at the Kearney Lake Road and Larry Uteck Boulevard interchanges. The MOE results including delay, level of service, volume-to-capacity ratio and 95th percentile queue lengths are summarized in Table 3 for the Kearney Lake Road interchange and Table 4 for the Larry Uteck Boulevard interchange. The detailed Synchro/SimTraffic and Arcady reports can be found in Appendix B.

At the Kearney Lake Road interchange there are operational problems at the intersection with the southbound ramps. The eastbound through movement (Kearney Lake Road) operates at LOS E during the morning peak hour and the southbound left and through movements (Highway 102 Off-Ramp) operate at LOS E during both the morning and afternoon peak hours.

There are no operational problems at the Larry Uteck Boulevard interchange during peak hours; both roundabouts operate at acceptable levels of service. It should be noted that the yield control right turn by-passes on the Highway 102 off ramps were modelled as a third entry lanes to the roundabout. Arcady does not include by-pass traffic volumes when computing the delay for an approach. The by-passes were modelled as a third lane entry to reflect the right turn volumes in the analysis results. The results obtained were considered more reflective of observed field conditions.

Table 3: Kearney Lake Road Interchange - 2020 Traffic Operations

2020 - No Development		Weekday AM Peak Hour							Weekday PM Peak Hour						
Intersection		Synchro				SimTraffic			Synchro				SimTraffic		
		Delay (s/veh)	LOS	v/c	95th Queue (m)	Delay (s/veh)	LOS	95th Queue (m)	Delay (s/veh)	LOS	v/c	95th Queue (m)	Delay (s/veh)	LOS	95th Queue (m)
Kearney Lake Road & Highway 102 SB Ramps		45.4	D			36.8	D		39.7	D			38.4	D	
Kearney Lake Road	EB-T	57.7	E	0.86	129.0	46.2	D	128.4	44.0	D	0.51	74.5	39.1	D	69.0
	EB-R	1.5	A	0.21	0.0	4.9	A	43.6	0.6	A	0.14	0.0	5.0	A	17.1
	WB-L	1.3	A	0.19	0.0	6.8	A	10.2	1.4	A	0.20	1.3	4.7	A	15.3
	WB-T	1.0	A	0.16	4.8	2.8	A	3.2	2.3	A	0.28	11.4	2.4	A	3.0
Southbound Off-Ramp	SB-L	61.8	E	0.95	209.5	49.4	D	168.7	69.8	E	0.98	219.9	66.5	E	202.6
	SB-T					52.3	D						67.9	E	
	SB-R					0.1	A						0.03	0.0	
Kearney Lake Road & Highway 102 NB Ramps		12.8	B			7.7	A		13.7	B			10.9	B	
Kearney Lake Road	EB-L	0.2	A	0.02	0.0	3.8	A	5.3	0.3	A	0.02	0.0	4.3	A	5.4
	EB-T	6.6	A	0.71	0.0	2.7	A	6.6	2.0	A	0.54	0.0	2.6	A	1.4
	WB-T	45.9	D	0.35	36.7	38.6	D	42.4	40.8	D	0.38	48.1	37.9	D	58.3
	WB-R	10.5	B	0.72	24.3	2.6	A	7.5	11.1	B	0.83	47.6	5.3	A	31.6
Northbound Off-Ramp	NB-L	48.9	D	0.18	16.5	54.7	D	23.3	53.3	D	0.40	39.2	52.4	D	44.5
	NB-T					78.3	E						38.2	D	
	NB-R					1.6	A						0.23	0.0	

Table 4: Larry Uteck Boulevard Interchange - 2020 Traffic Operations

2020 - No Development		Weekday AM Peak Hour				Weekday PM Peak Hour			
Intersection		Delay (s/veh)	LOS	v/c	Avg. Queue (m)	Delay (s/veh)	LOS	v/c	Avg. Queue (m)
Larry Uteck Blvd & Highway 102 SB Ramps		3.1	A			3.7	A		
Larry Uteck Boulevard (West)	EB-LTR	2.8	A	0.39	4.5	2.5	A	0.29	2.9
Larry Uteck Boulevard (East)	WB-LTR	3.0	A	0.50	7.1	3.4	A	0.54	8.5
Hogan Court (South)	NB-LTR	4.3	A	0.03	0.2	3.9	A	0.03	0.2
Highway 102 SB Off-Ramp	SB-LTR	3.8	A	0.26	2.5	5.7	A	0.48	6.6
Larry Uteck Blvd & Highway 102 NB Ramps		3.0	A			9.2	A		
Larry Uteck Boulevard (West)	EB-LTR	2.0	A	0.25	2.4	2.4	A	0.36	4.0
Larry Uteck Boulevard (East)	WB-LTR	3.1	A	0.47	6.2	3.2	A	0.43	5.3
Highway 102 NB Off-Ramp	NB-LTR	3.7	A	0.37	4.1	19.8	C	0.87	44.7

3.2 2022 – 230 Units

The MOE results including delay, level of service, volume-to-capacity ratio and 95th percentile queue lengths are summarized in Table 5 for the Kearney Lake Road interchange and Table 6 for the Larry Uteck Boulevard interchange. The detailed Synchro/SimTraffic and Arcady reports can be found in Appendix B.

Traffic growth and the development of 230 units over a two-year period will have a minimal impact on operations at both interchanges.

Table 5: Kearney Lake Road Interchange - 2022 Traffic Operations

2022 - 230 Units				Weekday AM Peak Hour						Weekday PM Peak Hour					
Intersection		Synchro				SimTraffic		Synchro				SimTraffic			
		Delay (s/veh)	LOS	v/c	95th% Queue (m)	Delay (s/veh)	LOS	95th% Queue (m)	Delay (s/veh)	LOS	v/c	95th% Queue (m)	Delay (s/veh)	LOS	95th% Queue (m)
Kearney Lake Road & Highway 102 SB Ramps		48.2	D			38.6	D		38.4	D			37.1	D	
Kearney Lake Road	EB-T	63.2	E	0.90	144.7	47.1	D	128.4	46.1	D	0.55	79.5	39.6	D	71.5
	EB-R	3.7	A	0.27	5.6	5.4	A	48.4	0.8	A	0.18	0.0	4.8	A	18.3
	WB-L	1.7	A	0.21	0.3	7.3	A	11.1	1.4	A	0.21	1.1	5.2	A	16.0
	WB-T	1.2	A	0.17	5.6	2.6	A	1.8	3.1	A	0.32	13.2	2.3	A	2.5
Southbound Off-Ramp	SB-L					54.5	D						65.5	E	
	SB-T	66.4	E	0.97	216.7	61.8	E	184.3	69.0	E	0.98	224.4	67.2	E	205.4
	SB-R	0.1	A	0.03	0.0	24.4	C	35.0	0.1	A	0.04	0.0	40.2	D	37.7
Kearney Lake Road & Highway 102 NB Ramps		13.7	B			8.1	A		14.6	B			12.1	B	
Kearney Lake Road	EB-L	0.2	A	0.03	0.0	4.0	A	6.3	0.3	A	0.03	0.0	4.8	A	6.1
	EB-T	7.8	A	0.73	0.0	2.8	A	9.3	2.2	A	0.56	0.0	2.6	A	2.1
	WB-T	46.1	D	0.36	37.7	40.8	D	42.0	41.0	D	0.40	49.8	38.9	D	59.5
	WB-R	10.6	B	0.72	24.7	2.7	A	10.2	11.3	B	0.84	48.3	5.5	A	34.3
Northbound Off-Ramp	NB-L	50.0	D	0.23	20.1	51.2	D	28.3	57.5	E	0.53	49.7	56.4	E	
	NB-T					56.1	E						45.3	D	62.6
	NB-R	1.6	A	0.24	0.0	3.9	A	10.3	11.6	B	0.49	20.8	7.6	A	36.2

Table 6: Larry Uteck Boulevard Interchange - 2022 Traffic Operations

2022 - 230 Units		Weekday AM Peak Hour				Weekday PM Peak Hour			
Intersection		Delay (s/veh)	LOS	v/c	Avg. Queue (m)	Delay (s/veh)	LOS	v/c	Avg. Queue (m)
Larry Uteck Blvd & Highway 102 SB Ramps		3.2	A			3.9	A		
Larry Uteck Boulevard (West)	EB-LTR	3.0	A	0.42	5.0	2.5	A	0.31	3.2
Larry Uteck Boulevard (East)	WB-LTR	3.1	A	0.51	7.4	3.5	A	0.56	9.0
Hogan Court (South)	NB-LTR	4.5	A	0.03	0.2	4.0	A	0.03	0.2
Highway 102 SB Off-Ramp	SB-LTR	3.9	A	0.28	2.7	6.2	A	0.52	7.6
Larry Uteck Blvd & Highway 102 NB Ramps		3.1	A			11.5	B		
Larry Uteck Boulevard (West)	EB-LTR	2.1	A	0.27	2.6	2.4	A	0.37	4.2
Larry Uteck Boulevard (East)	WB-LTR	3.2	A	0.49	6.6	3.3	A	0.44	5.5
Highway 102 NB Off-Ramp	NB-LTR	3.8	A	0.38	4.3	25.8	D	0.91	58.9

3.3 2024 – 460 Units + 5,000 sq. ft. commercial

The MOE results including delay, level of service, volume-to-capacity ratio and 95th percentile queue lengths are summarized in Table 7 for the Kearney Lake Road interchange and Table 8 for the Larry Uteck Boulevard interchange. The detailed Synchro/SimTraffic and Arcady reports can be found in Appendix B.

Traffic growth and the development of 460 units and 5,000 square feet of commercial over a four-year period will cause the Highway 102 Southbound Off-Ramp at the Kearney Lake Road interchange to reach capacity during the afternoon peak hour.

The roundabouts at the Larry Uteck Boulevard interchange will continue to operate acceptable levels of service during peak hours. The Highway 102 Northbound Off-Ramp will operate at LOS E during the afternoon peak hour due to high right turn volumes; the development does not contribute to the northbound right turn volumes.

Table 7: Kearney Lake Road Interchange - 2024 Traffic Operations

2024 - 460 Units + 5,000 sq. ft.		Weekday AM Peak Hour							Weekday PM Peak Hour						
Intersection		Synchro				SimTraffic			Synchro				SimTraffic		
		Delay (s/veh)	LOS	v/c	95th% Queue (m)	Delay (s/veh)	LOS	95th% Queue (m)	Delay (s/veh)	LOS	v/c	95th% Queue (m)	Delay (s/veh)	LOS	95th% Queue (m)
Kearney Lake Road & Highway 102 SB Ramps		48.5	D			38.5	D		39.5	D			41.1	D	
Kearney Lake Road	EB-T	65.6	E	0.91	160.5	46.4	D	129.6	47.1	D	0.59	84.2	41.1	D	74.6
	EB-R	6.1	A	0.31	11.8	5.7	A	55.5	1.1	A	0.22	0.4	4.8	A	19.6
	WB-L	1.9	A	0.22	1.7	8.2	A	12.1	1.4	A	0.22	1.1	6.3	A	18.9
	WB-T	1.2	A	0.19	7.1	2.8	A	3.1	3.4	A	0.36	15.3	2.3	A	2.1
Southbound Off-Ramp	SB-L					57.3	E						76.2	E	
	SB-T	67.6	E	0.97	235.1	67.8	E	192.9	74.3	E	1.00	231.6	80.3	F	224.2
	SB-R	0.1	A	0.04	0.0	26.9	C	33.3	0.2	A	0.05	0.0	48.2	D	43.8
Kearney Lake Road & Highway 102 NB Ramps		13.0	B			9.3	A		15.8	B			13.4	B	
Kearney Lake Road	EB-L	0.2	A	0.04	0.0	3.7	A	7.9	0.3	A	0.04	0.0	4.6	A	6.7
	EB-T	3.3	A	0.70	0.0	2.8	A	8.5	2.4	A	0.57	0.0	2.6	A	2.2
	WB-T	53.4	D	0.45	42.4	44.6	D	48.9	41.2	D	0.41	51.6	39.6	D	65.4
	WB-R	12.4	B	0.76	25.5	2.9	A	12.9	11.5	B	0.84	50.8	5.8	A	41.6
Northbound Off-Ramp	NB-L					59.2	E						60.7	E	
	NB-T	56.1	E	0.27	25.4	72.7	E	33.0	64.3	E	0.66	63.2	56.6	E	83.7
	NB-R	1.8	A	0.24	0.0	3.9	A	13.5	12.5	B	0.51	22.4	11.9	B	42.4

Table 8: Larry Uteck Boulevard Interchange - 2024 Traffic Operations

2024 - 460 Units + 5,000 sq. ft.		Weekday AM Peak Hour				Weekday PM Peak Hour			
Intersection		Delay (s/veh)	LOS	v/c	Avg. Queue (m)	Delay (s/veh)	LOS	v/c	Avg. Queue (m)
Larry Uteck Blvd & Highway 102 SB Ramps		3.3	A			4.2	A		
Larry Uteck Boulevard (West)	EB-LTR	3.1	A	0.44	5.5	2.6	A	0.33	3.4
Larry Uteck Boulevard (East)	WB-LTR	3.2	A	0.53	7.8	3.6	A	0.57	9.6
Hogan Court (South)	NB-LTR	4.7	A	0.03	0.2	4.2	A	0.03	0.3
Highway 102 SB Off-Ramp	SB-LTR	4.1	A	0.29	2.9	6.9	A	0.56	8.8
Larry Uteck Blvd & Highway 102 NB Ramps		3.2	A			15.6	C		
Larry Uteck Boulevard (West)	EB-LTR	2.1	A	0.29	2.8	2.5	A	0.39	4.5
Larry Uteck Boulevard (East)	WB-LTR	3.4	A	0.50	7.1	3.4	A	0.46	5.9
Highway 102 NB Off-Ramp	NB-LTR	4.0	A	0.40	4.6	37.0	E	0.94	86.1

3.4 2026 - 690 Units + 5,000 sq. ft. commercial

The MOE results including delay, level of service, volume-to-capacity ratio and 95th percentile queue lengths are summarized in Table 9 for the Kearney Lake Road interchange and Table 10 for the Larry Uteck Boulevard interchange. The detailed Synchro/SimTraffic and Arcady reports can be found in Appendix B.

Traffic growth and the development of 690 units and 5,000 square feet of commercial over a six-year period will cause the Highway 102 Southbound Off-Ramp at the Kearney Lake Road interchange to reach capacity during the morning peak hour. The Southbound Off-Ramp at the Kearney Lake Road interchange will be at or over capacity during both peak hours which would indicate that improvements are required at the intersection.

The roundabouts at the Larry Uteck Boulevard interchange will continue to operate acceptable levels of service during peak hours. The Highway 102 Northbound Off-Ramp will operate at LOS F during the afternoon peak hour.

Table 9:Kearney Lake Road Interchange - 2026 Traffic Operations

2026 - 690 Units + 5,000 sq. ft.		Weekday AM Peak Hour							Weekday PM Peak Hour						
Intersection		Synchro				SimTraffic			Synchro				SimTraffic		
		Delay (s/veh)	LOS	v/c	95th Queue (m)	Delay (s/veh)	LOS	95th Queue (m)	Delay (s/veh)	LOS	v/c	95th Queue (m)	Delay (s/veh)	LOS	95th Queue (m)
Kearney Lake Road & Highway 102 SB Ramps		52.2	D			46.1	D		41.2	D			47.2	D	
Kearney Lake Road	EB-T	72.7	E	0.95	172.9	55.2	E	152.4	48.2	D	0.62	88.7	43.2	D	81.7
	EB-R	6.0	A	0.36	12.2	7.3	A	89.2	2.6	A	0.25	4.8	5.3	A	19.8
	WB-L	2.5	A	0.23	2.7	9.8	A	13.7	1.4	A	0.23	1.1	6.6	A	19.5
	WB-T	1.2	A	0.20	7.9	2.6	A	2.7	3.8	A	0.40	16.9	2.3	A	2.9
Southbound Off-Ramp	SB-L					70.1	E						93.1	F	
	SB-T	73.5	E	1.00	244.6	63.5	E	219.3	80.3	F	1.02	240.3	93.4	F	241.1
	SB-R	0.1	A	0.04	0.0	39.8	D	35.3	0.2	A	0.07	0.0	60.1	E	43.7
Kearney Lake Road & Highway 102 NB Ramps		13.7	B			9.7	A		17.3	B			16.1	B	
Kearney Lake Road	EB-L	0.2	A	0.05	0.0	3.8	A	7.9	0.3	A	0.04	0.0	5.7	A	10.4
	EB-T	4.1	A	0.72	0.0	2.9	A	10.8	2.6	A	0.59	0.0	2.7	A	1.3
	WB-T	53.6	D	0.46	43.5	45.3	D	49.3	41.5	D	0.43	53.3	40.7	D	81.4
	WB-R	12.5	B	0.77	25.7	3.0	A	14.3	11.8	B	0.85	52.1	6.6	A	54.6
Northbound Off-Ramp	NB-L					61.3	E						72.7	E	
	NB-T	57.6	E	0.33	29.3	63.7	E	39.0	74.4	E	0.79	81.8	75.3	E	113.9
	NB-R	1.8	A	0.25	0.0	5.4	A	18.7	13.3	B	0.52	23.8	21.3	C	44.4

Table 10: Larry Uteck Boulevard Interchange - 2026 Traffic Operations

2026 - 690 Units + 5,000 sq. ft.		Weekday AM Peak Hour				Weekday PM Peak Hour			
Intersection		Delay (s/veh)	LOS	v/c	Avg. Queue (m)	Delay (s/veh)	LOS	v/c	Avg. Queue (m)
Larry Uteck Blvd & Highway 102 SB Ramps		3.4	A			4.4	A		
Larry Uteck Boulevard (West)	EB-LTR	3.3	A	0.47	6.1	2.7	A	0.34	3.7
Larry Uteck Boulevard (East)	WB-LTR	3.3	A	0.54	8.3	3.7	A	0.59	10.2
Hogan Court (South)	NB-LTR	4.9	A	0.03	0.2	4.3	A	0.04	0.3
Highway 102 SB Off-Ramp	SB-LTR	4.2	A	0.31	3.2	7.6	A	0.59	10.2
Larry Uteck Blvd & Highway 102 NB Ramps		3.3	A			22.9	C		
Larry Uteck Boulevard (West)	EB-LTR	2.2	A	0.30	3.0	2.6	A	0.40	4.8
Larry Uteck Boulevard (East)	WB-LTR	3.5	A	0.52	7.6	3.5	A	0.47	6.3
Highway 102 NB Off-Ramp	NB-LTR	4.2	A	0.42	5.0	56.8	F	0.98	140.3

3.5 2026 – Redistribution of Development Traffic

Congestion at the Kearney Lake Road interchange will cause development traffic to redistribute to the Larry Uteck Boulevard interchange where there is excess capacity. The development projections were redistributed to assign more traffic to Larry Uteck Boulevard. The redistribution, summarized in Table 11, assumes that 80 percent of the development traffic will use the Larry Uteck Boulevard interchange.

Table 11: Trip Redistribution

To/From	Gateway	Distribution	Redistribution
North	Kearney Lake Road Interchange	12.0%	8.0%
	Larry Uteck Boulevard Interchange	30.0%	34.0%
South	Kearney Lake Road Interchange	41.0%	8.0%
	Larry Uteck Boulevard Interchange	0.0%	33.0%
East	Kearney Lake Road	4.5%	4.5%
	Larry Uteck Boulevard	4.5%	4.5%
West	Larry Uteck Boulevard	8.0%	8.0%

The MOE results including delay, level of service, volume-to-capacity ratio and 95th percentile queue lengths are summarized in Table 12 for the Kearney Lake Road interchange and Table 13 for the Larry Uteck Boulevard interchange. The detailed Synchro/SimTraffic and Arcady reports can be found in Appendix B.

The redistribution of traffic volumes will improve traffic operations on the Northbound Off-Ramp at the Kearney Lake Road interchange; however, the Southbound Off-Ramp will remain over capacity during both peak hours due to the high left-turn volumes. It should be noted that the development does not contribute to the southbound left turn volumes.

Table 12: Kearney Lake Road Interchange - 2026 Traffic Operations

2026 - 690 Units Redistributed				Weekday AM Peak Hour						Weekday PM Peak Hour					
Intersection		Synchro				SimTraffic		Synchro				SimTraffic			
		Delay (s/veh)	LOS	v/c	95th% Queue (m)	Delay (s/veh)	LOS	95th% Queue (m)	Delay (s/veh)	LOS	v/c	95th% Queue (m)	Delay (s/veh)	LOS	95th% Queue (m)
Kearney Lake Road & Highway 102 SB Ramps		53.8	D			43.3	D		43.7	D			45.9	D	
Kearney Lake Road	EB-T	69.7	E	0.93	167.8	54.5	D	152.7	47.6	D	0.60	86.6	41.8	D	80.1
	EB-R	4.1	A	0.25	6.4	6.5	A	93.9	0.8	A	0.17	0.0	4.8	A	17.3
	WB-L	1.9	A	0.23	0.4	7.2	A	10.4	1.5	A	0.23	1.3	5.4	A	15.8
	WB-T	1.3	A	0.18	7.1	2.8	A	2.2	3.4	A	0.33	15.2	2.5	A	3.3
Southbound Off-Ramp	SB-L					59.9	E						83.9	F	
	SB-T	73.5	E	1.00	244.6	60.6	E	200.3	80.3	F	1.02	240.3	92.4	F	232.2
	SB-R	0.1	A	0.04	0.0	29.5	C	32.7	0.2	A	0.05	0.0	51.3	D	42.7
Kearney Lake Road & Highway 102 NB Ramps		13.1	B			8.7	A		14.8	B			12.2	B	
Kearney Lake Road	EB-L	0.2	A	0.04	0.0	3.8	A	5.3	0.3	A	0.04	0.0	5.1	A	7.6
	EB-T	4.0	A	0.72	0.0	2.9	A	8.6	2.6	A	0.59	0.0	2.7	A	2.2
	WB-T	53.6	D	0.46	43.5	44.0	D	48.5	41.5	D	0.43	53.3	38.8	D	64.3
	WB-R	12.5	B	0.77	25.7	2.9	A	11.8	11.8	B	0.85	52.1	6.3	A	47.8
Northbound Off-Ramp	NB-L					57.3	E						55.6	E	
	NB-T	54.6	D	0.21	20.8	39.0	D	26.9	56.7	E	0.50	47.3	50.7	D	57.3
	NB-R	1.8	A	0.25	0.0	3.5	A	10.9	11.8	B	0.51	21.6	6.9	A	34.3

Table 13: Larry Uteck Boulevard Interchange - 2026 Traffic Operations

2026 - Redistributed		Weekday AM Peak Hour				Weekday PM Peak Hour			
Intersection		Delay (s/veh)	LOS	v/c	Avg. Queue (m)	Delay (s/veh)	LOS	v/c	Avg. Queue (m)
Larry Uteck Blvd & Highway 102 SB Ramps		4.0	A			4.7	A		
Larry Uteck Boulevard (West)	EB-LTR	3.9	A	0.52	7.7	2.8	A	0.37	4.1
Larry Uteck Boulevard (East)	WB-LTR	3.8	A	0.61	10.7	4.0	A	0.62	11.4
Hogan Court (South)	NB-LTR	5.7	A	0.04	2.8	4.4	A	0.04	0.3
Highway 102 SB Off-Ramp	SB-LTR	4.7	A	0.33	3.5	8.3	A	0.62	11.3
Larry Uteck Blvd & Highway 102 NB Ramps		3.4	A			39.2	E		
Larry Uteck Boulevard (West)	EB-LTR	2.2	A	0.31	3.1	2.6	A	0.41	4.8
Larry Uteck Boulevard (East)	WB-LTR	3.6	A	0.53	7.7	3.6	A	0.48	6.5
Highway 102 NB Off-Ramp	NB-LTR	4.3	A	0.43	5.3	97.8	F	1.03	278.4

4 Traffic Volume Contribution

The vehicular impacts of the development were originally evaluated in the *Highway 102-Larry Uteck Interchange Traffic Impact Analysis (June 2008)*. In the original study, the Sub Area 10 development included 72 acres of residential land and 24 acres of commercial land for the Bedford West Sub Area 10. The development assumptions included 432 dwelling units, based on an average density of 6 units per acre and 4.8 acres of commercial space (approximately 209, 088 square feet) based on density of 20 percent lot coverage.

The external trips generated by the current development proposal was compared to the original trip generation estimates to determine if the impact of the development will be similar. The review of peak hour traffic volumes is detailed in Table 14. The changes in land uses mix at the site include the reallocation of the commercial density to residential density. The increase in residential density results in an additional 140 trips during the morning peak hour (-1 entering / 141 trips exiting), which relates to less than three additional trips per minute. During the afternoon peak hour, the reduction in commercial density results in 158 fewer trips (-39 entering / 119 trips exiting).

Table 14: Comparison of Trip Generation Estimates

Trip Generation Estimates (vph)		Weekday AM Peak Hour			Weekday PM Peak Hour		
		Total	In	Out	Total	In	Out
Bedford West Sub Area 10 TIS	External Trips	446	129	317	538	324	214
Original Assumptions	External Trips	306	130	176	696	363	333
Difference		140	-1	141	-158	-39	-119

The traffic volumes at the Kearney Lake Road interchange in 2026 (timeframe for improvements) and 2031 (full build out) were reviewed to identify the traffic volume contribution of the Sub Area 10 development. The breakdown of background, development and total traffic volumes at the interchange are summarized in Table 15.

In 2026, the Sub Area 10 development will contribute 142 vehicles during the morning peak hour and 173 vehicles during the afternoon peak hour, which will represent approximately 7 percent of total traffic volumes. At full build in 2031, the Sub Area 10 development will contribute 258 vehicles during the

morning peak hour and 309 vehicles during the afternoon peak hour, which will represent approximately 11.6 percent of total traffic volumes in the morning peak hour and 11.1 percent of total traffic volumes in the afternoon peak hour.

Table 15: Traffic Volume Contribution - Kearney Lake Road Interchange

Time frame	Traffic Volumes	Weekday AM Peak Hour	Weekday PM Peak Hour
2026	Background Growth	1854	2325
	Development (690 units + 5,000 sq. ft.)	142	173
	Total	1996	2498
	Development Contribution	7.1%	6.9%
2031	Background Growth	1969	2473
	Development (Full Build Out)	258	309
	Total	2227	2782
	Development Contribution	11.6%	11.1%

5 Summary and Conclusions

The Bedford West Sub Area 10 traffic impact study concluded that improvements were required at the Highway 102 and Kearney Lake Road interchange to accommodate background traffic growth and full build out of the development in 2031. Harbourside Transportation Consultants completed an additional traffic analysis to determine at which stage of the Bedford West Sub Area 10 development the improvements will be required.

Approximately 690 units and 5,000 square feet of commercial can be developed over a six-year period (2026) before improvements are required at the Kearney Lake Road interchange. In 2026, the Sub Area 10 development will contribute 142 vehicles during the morning peak hour and 173 vehicles during the afternoon peak hour, which will represent approximately 7 percent of total traffic volumes. At full build in 2031, the Sub Area 10 development will contribute 258 vehicles during the morning peak hour and 309 vehicles during the afternoon peak hour, which will represent approximately 11.6 percent of total traffic volumes in the morning peak hour and 11.1 percent of total traffic volumes in the afternoon peak hour.

If you have any questions or additional discussion, please feel free to contact the undersigned.

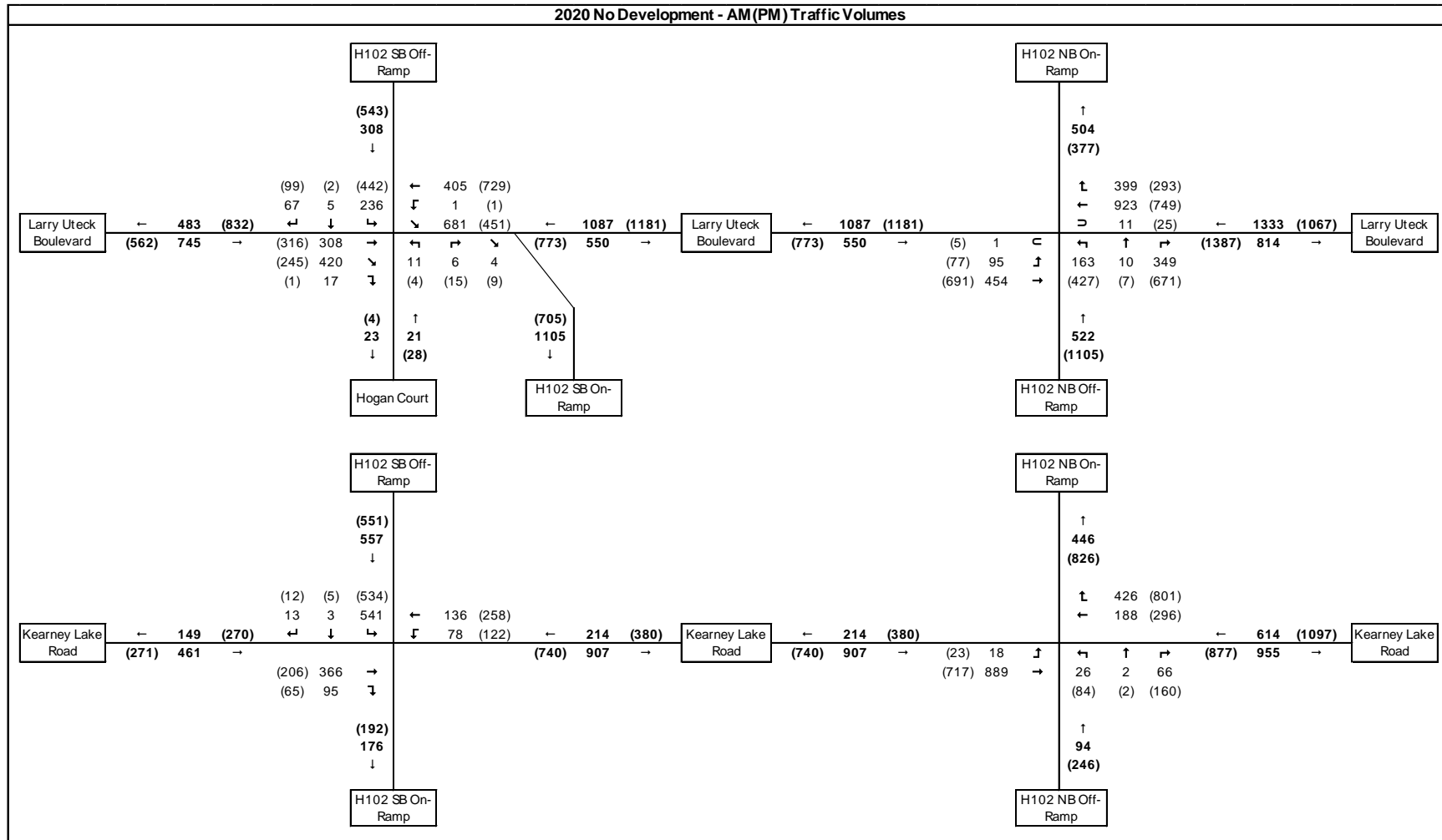
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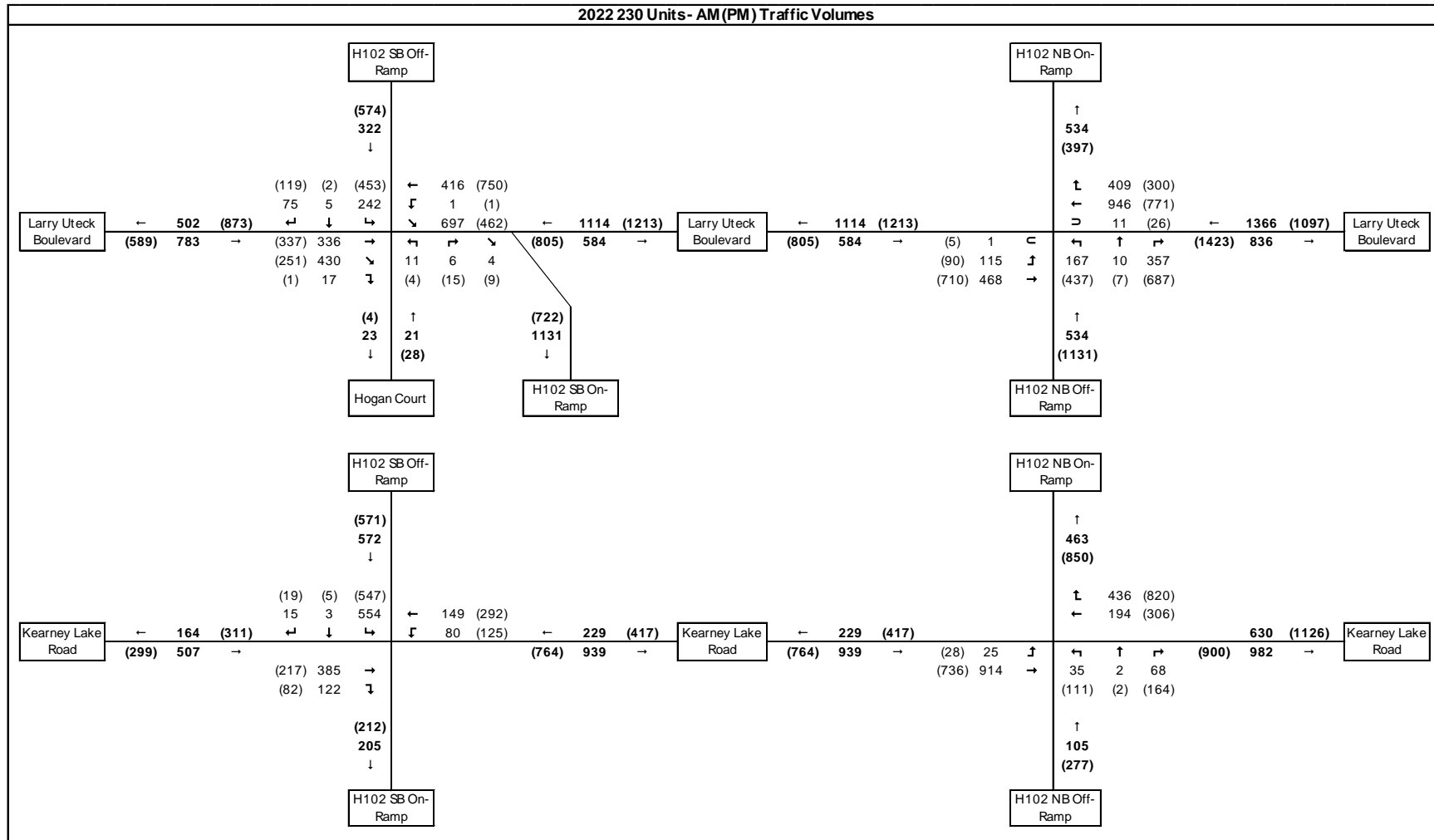
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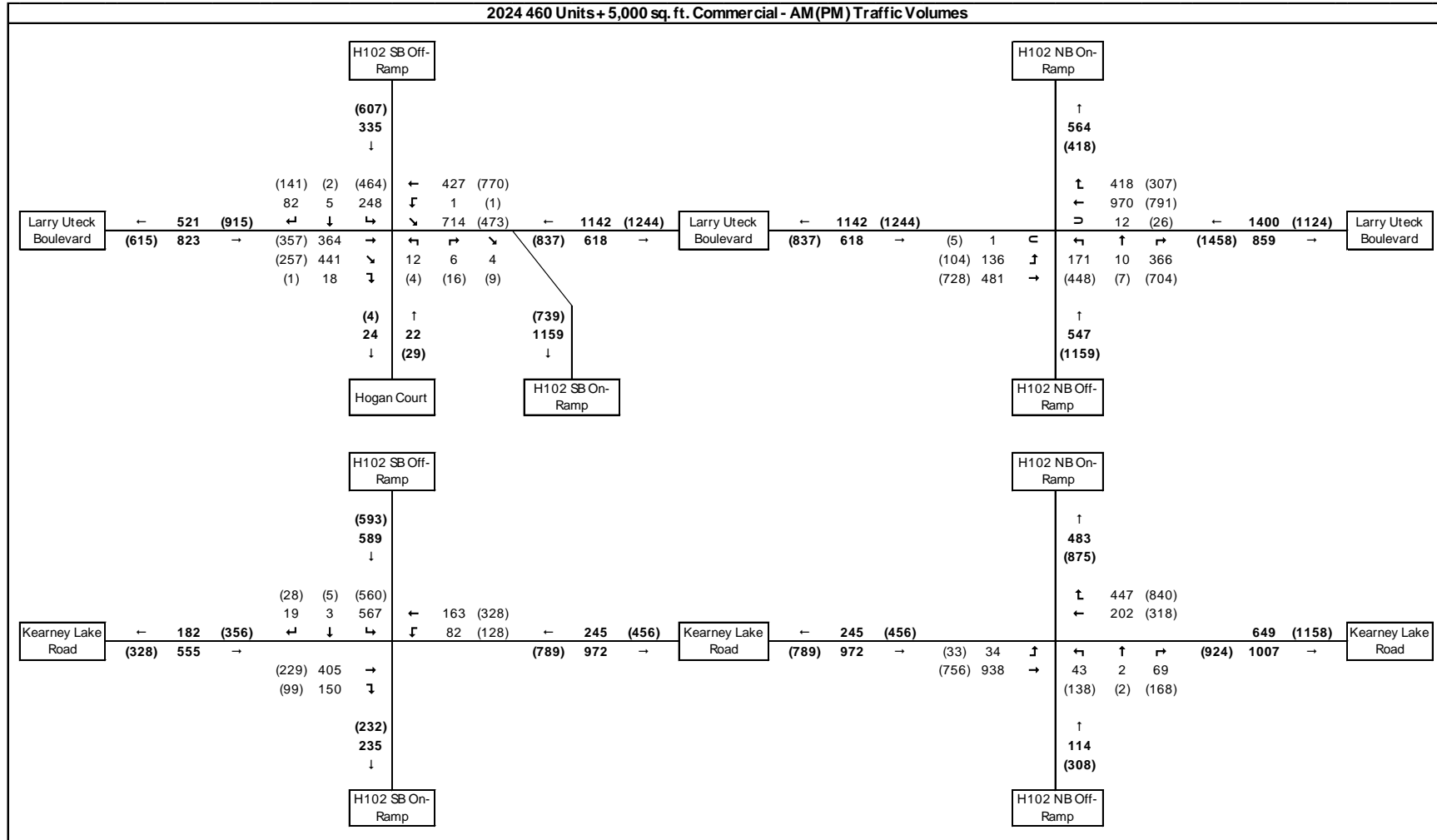


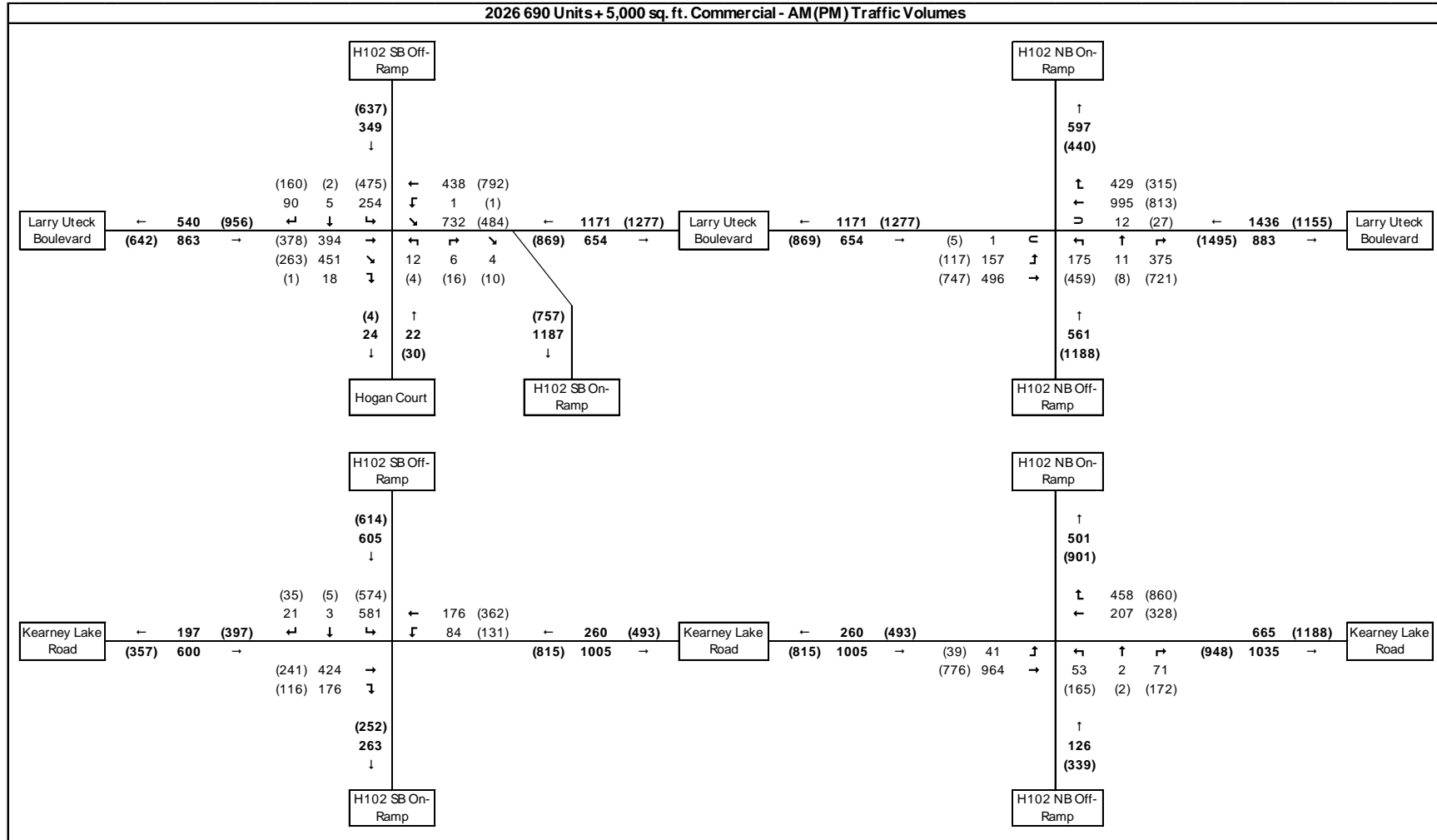
Appendix A

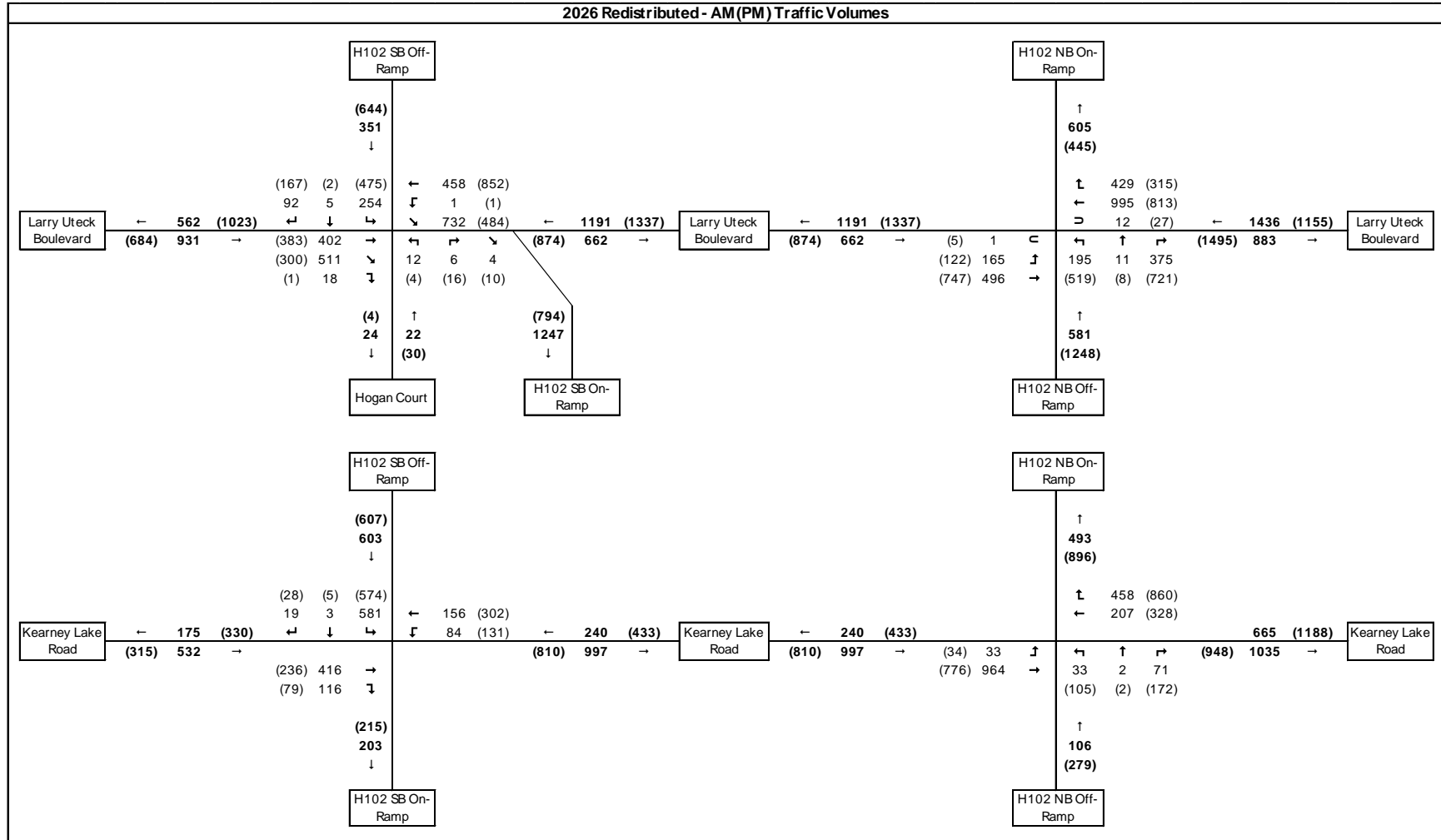
Traffic Volumes













Appendix B

Analysis Reports