



BA Group

RIVERSIDE SOUTH COMMERCIAL 1420 EARL ARMSTRONG ROAD TRANSPORTATION IMPACT STUDY

SE Corner of Limebank Road
& Earl Armstrong Road, City of Ottawa

Prepared For: Morguard Investments Limited

August, 2014



**MOVEMENT
IN URBAN
ENVIRONMENTS**

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1.0 INTRODUCTION

1.1 BACKGROUND

BA Consulting Group Ltd. (BA Group) is retained by Morguard Investments Limited (Morguard) to carry out a Transportation Impact Study (TIS) in support of the proposed Riverside South Commercial Development. The purpose of this study is to quantify the traffic impact of the subject development on the transportation network and to ensure that infrastructure is planned to mitigate potential development-related impacts.

The subject site is generally located south of the Ottawa International Airport as illustrated in **Figure 1**. The site is generally bounded by Limebank Road to the west, Earl Armstrong Road to the north, the proposed City of Ottawa transit corridor to the south and the proposed Collector Road 'D' to the east.

Figure 3 illustrates the site context.

A Community Design Plan (CDP) was prepared for the Riverside South Community. The CDP was approved in 2004 and updated in 2010. A Community Transportation Study was also prepared as supporting information for the original CDP. **Figure 2** illustrates the Riverside South CDP.

1.2 DEVELOPMENT PROPOSAL

The Riverside South Commercial Development encompasses an area of approximately 6.58 hectares (16.15 acres). The subject site is anticipated to be developed in two phases: Phase 1 and Phase 2 which are expected to be built and occupied by 2016 and potentially 2021, respectively consists of the following:

| | Ground Floor Gross Floor Area (GFA) | Second Floor Gross Floor Area (GFA) | Parking Provided |
|-----------------|---|---|-----------------------------|
| Phase 1: | 10,637.31 m ² (114,499 ft ²) | 464.52 m ² (5,000 ft ²) | 577 spaces |
| Phase 2 | 4,433.79 m ² (47,725 ft ²) | 3,783.48 m ² (40,725 ft ²) | 168 spaces |
| Totals | 15,071.10 m² (162,224 ft²) | 4,247.99 m² (45,725 ft²) | 745 spaces |

Vehicular access will be provided via a right in / right out access onto Earl Armstrong Road located approximately mid-block between Limebank Road and Collector Road D, a full movement access onto Limebank Road located approximately 213.7 metres south of Earl Armstrong Road and two full movement access driveways onto Collector Road 'D'.

Figure 4 illustrates the site plan for the subject site.



1.3 SCOPE OF ANALYSIS

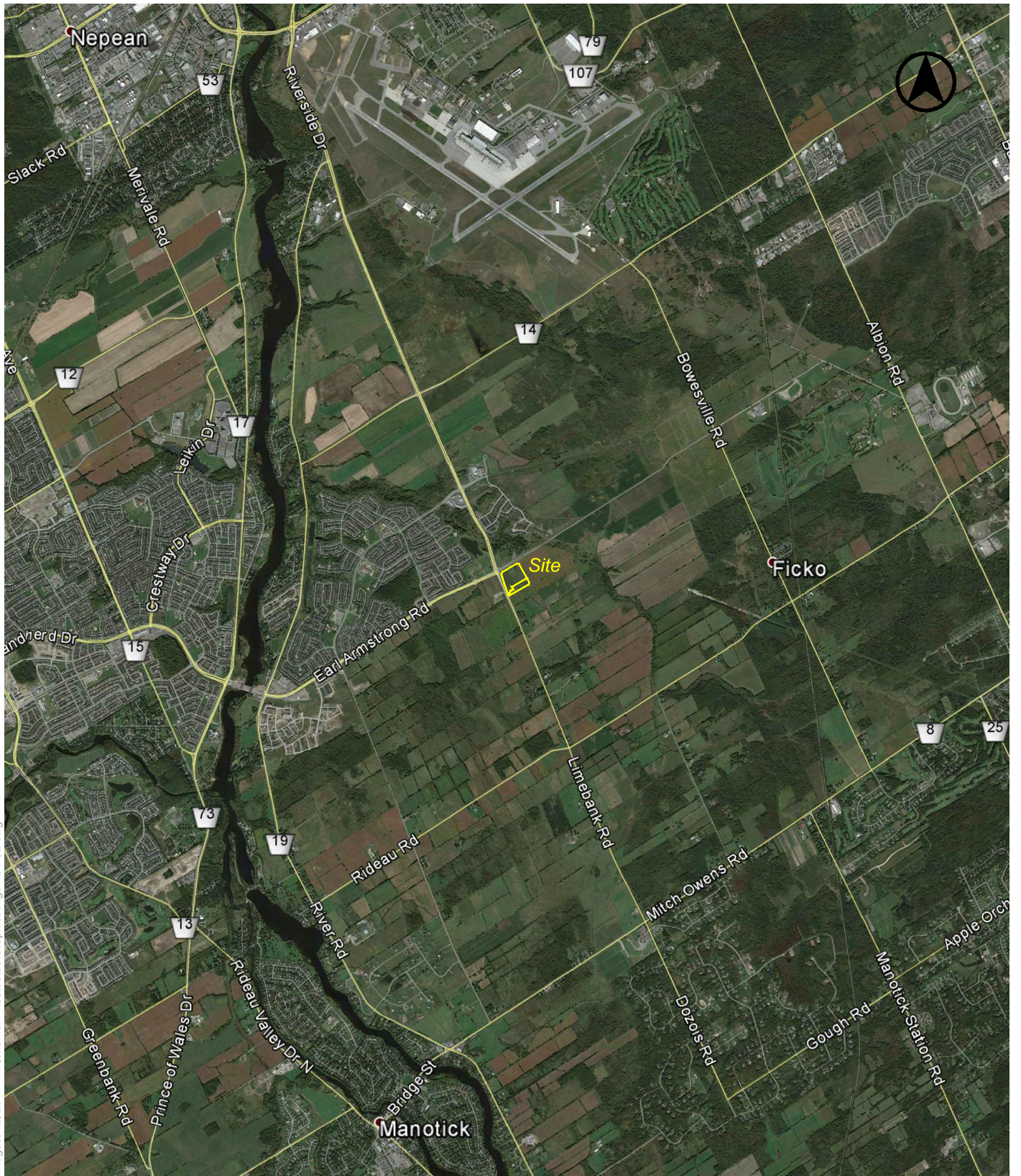
Phase 1 of the subject development is anticipated to be completed within the next two years. As such, this TIS evaluates future background and future total traffic conditions for the 2016 and 2021 horizons for the development phases. Analyses were conducted for AM and PM peak hours consistent with the Riverside South Phase 5 Transportation Impact Study report prepared by Dillon Consulting Limited and dated January 2011.

Through pre-consultation with City of Ottawa staff, it was agreed that the study area intersections for analyses include:

- Limebank Road and Earl Armstrong Road signalized intersection;
- Earl Armstrong Road / Collector Road 'D' signalized intersection;
- Earl Armstrong Road / Site Access unsignalized intersection; and
- Limebank Road / Site Access unsignalized intersection.

The Transportation Impact Study for the subject development was prepared in accordance with the City of Ottawa's Transportation Impact Assessment Guidelines, October 2006. Intersection operational level of service (LOS) analysis was completed using Trafficware's Synchro® software version 6.0. This software package, which uses the methodologies of the Highway Capacity Manual (HCM), produces results in terms of volume to capacity ratio (v/c). Intersections with an overall v/c ratio greater than 0.90 are regarded as critical, and therefore should be considered for further improvements.



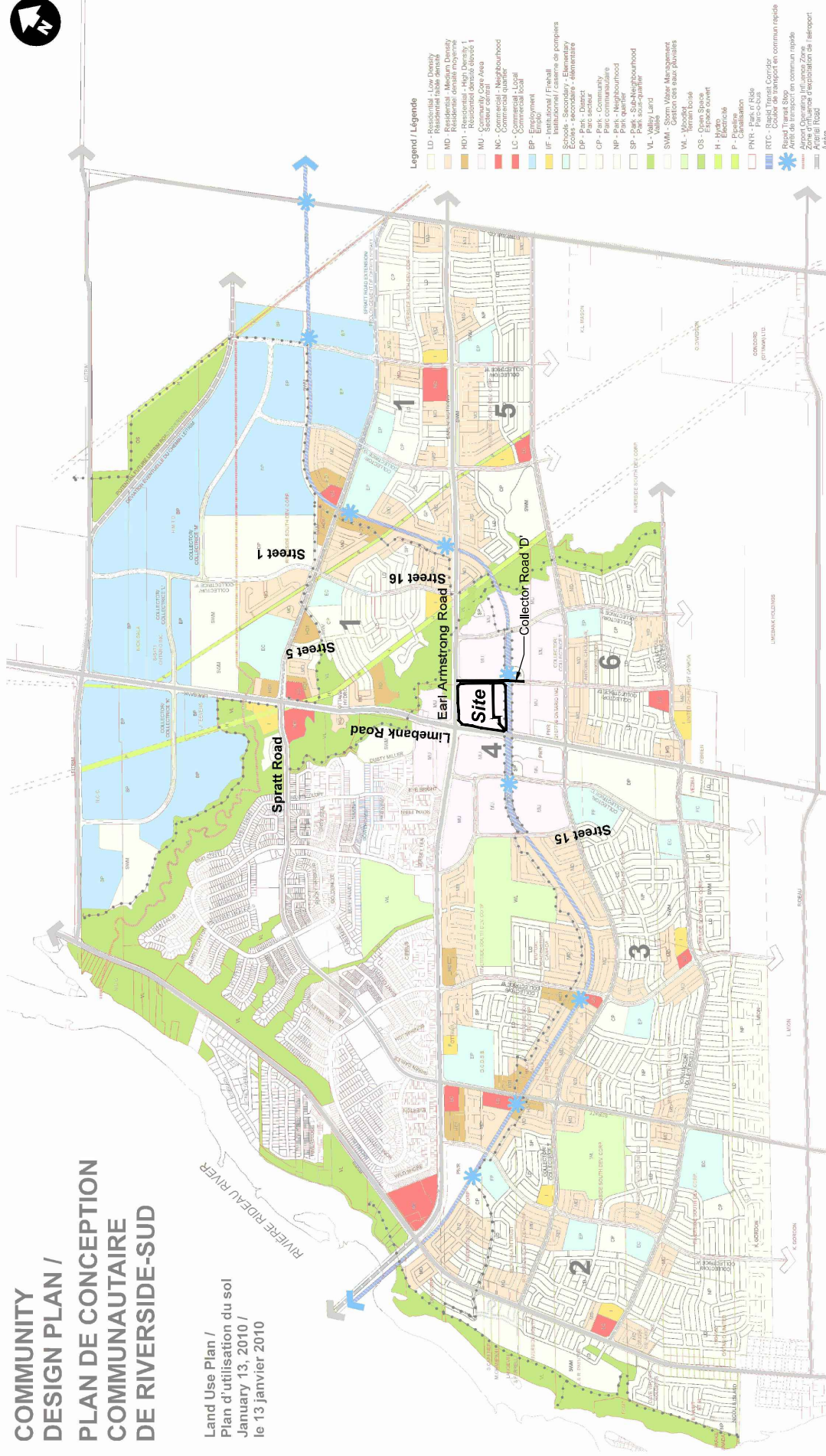


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SITE LOCATION

**COMMUNITY DESIGN PLAN /
PLAN DE CONCEPTION
COMMUNAUTAIRE
DE RIVERSIDE-SUD**

Land Use Plan /
Plan d'utilisation du sol
January 13, 2010 /
le 13 janvier 2010



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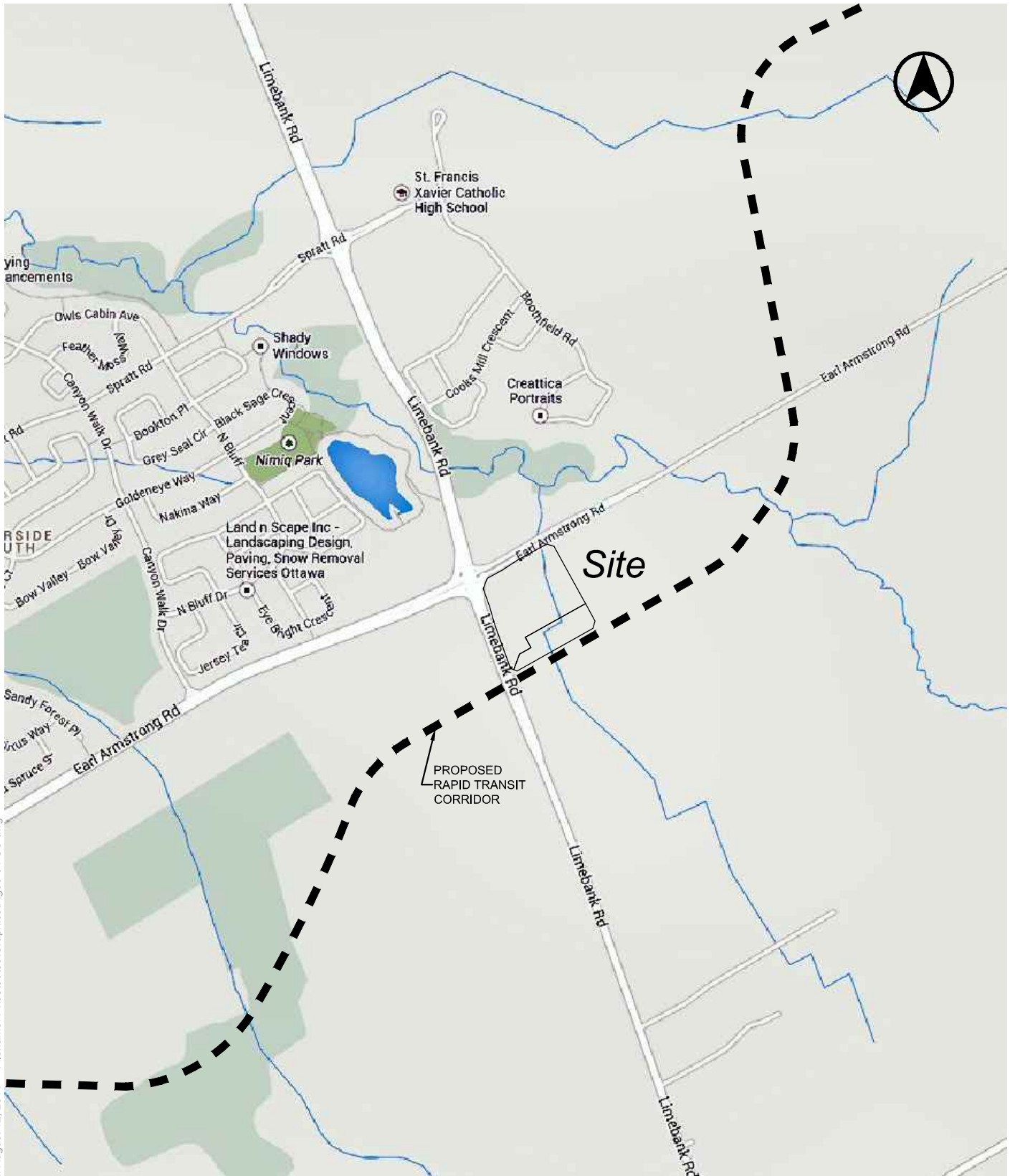
COMMUNITY DESIGN / LAND USE PLAN



BA Group

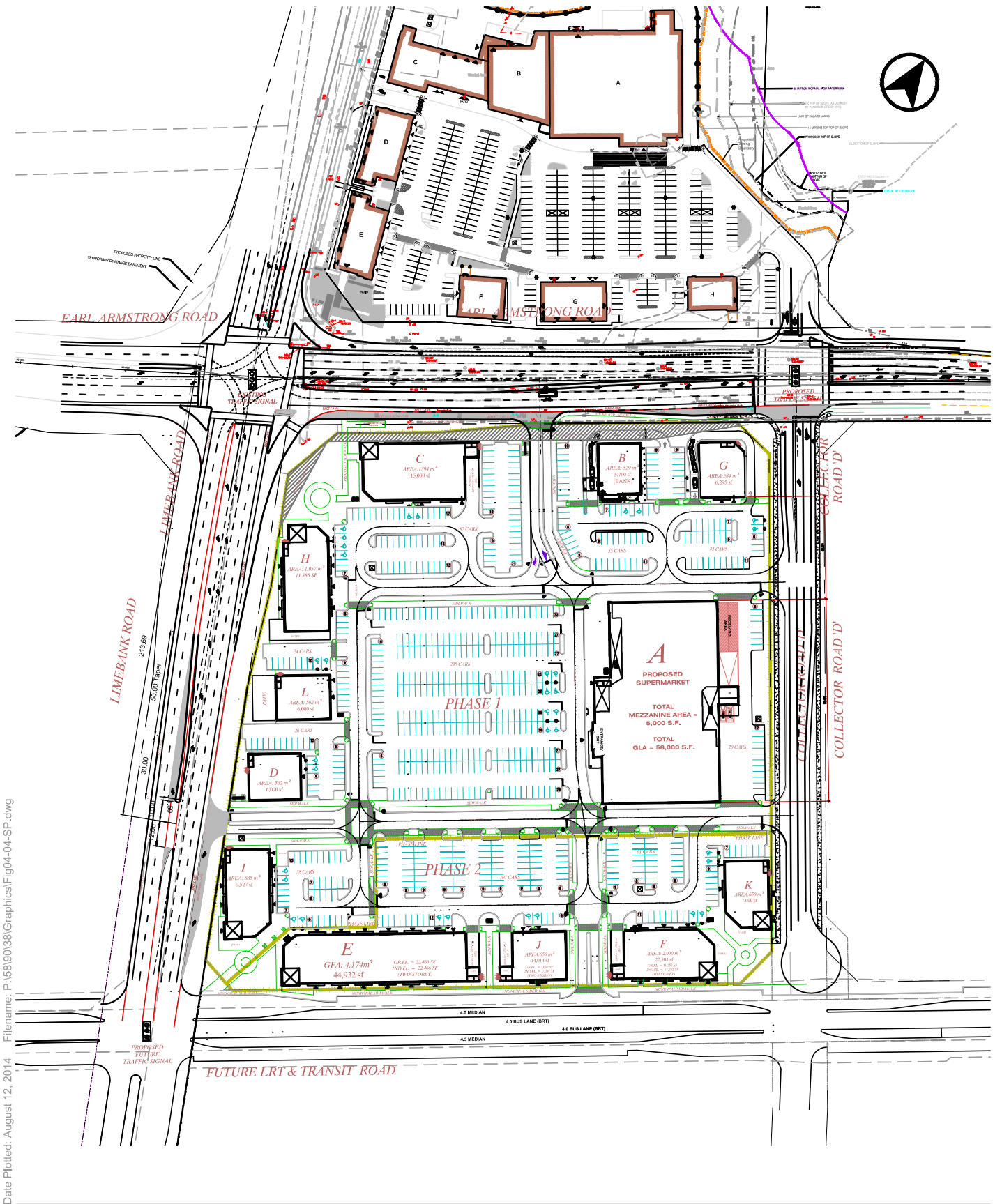
Riverside South Commercial Development
5890-38 August 2014

Figure 2



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SITE CONTEXT



SITE PLAN

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2.0 EXISTING CONDITIONS

2.1 EXISTING ROAD NETWORK

Limebank Road is designated as an arterial road in the City of Ottawa Official Plan. Limebank Road extends north/south from River Road in the north to Mitch Owens Road in the south. The City of Ottawa has recently completed widening Limebank Road to a four lane cross-section from River Road to just south of Earl Armstrong Road. The speed limit is posted at 80 km/h in sections that have been widened to a four lane cross-section.

Earl Armstrong Road is designated as an arterial road in the City of Ottawa Official Plan. Earl Armstrong Road extends east/west from River Road in the west to High Road in the east. The City of Ottawa has recently completed widening of Earl Armstrong Road to a four lane urban cross-section from River Road to just east of Limebank Road.

2.2 EXISTING TRANSIT SERVICE

The proposed development is located in close proximity to existing transit service and to the existing Riverview Park & Ride (PNR) lot south of Earl Armstrong and east of River Road. The PNR lot was expanded to 364 spaces in 2010 and will be operational in 2011. The proposed development is also in close proximity to the Leitrim PNR lot, which currently has 290 parking spaces.

Route #145 provides local transit; this route is classified as a regular route. Route #145 operates from 5:45 a.m. to 12:00 a.m. during weekdays with limited weekend service. Route #145 operates under 20 minute headways during peak commuter hours and 30 minute headways during regular hours. Route #145 currently runs along the Earl Armstrong Road, Spratt Road, Shoreline Drive, and Canyon Walk Drive to provide access to the Riverview PNR facility.

Route #99 provides rapid transit service to the Riverside South community from the Riverview PNR facility. Route #99 operates from 5:49 am to 12:00 a.m. during weekdays, and typically runs under 10 minute headways during peak commuter hours and 30 minute headways during regular hours. Route #99 currently runs along Spratt Road, and Leitrim Road connecting to the Leitrim PNR facility. Beyond the Leitrim PNR, Route #99 connects to the southeast Transitway via Albion Road and Lester Road.

Route #189 provides weekday peak hour transit service to the Riverside South community to Greenboro Station. Route #189 operates under 30 minute headways from and to the Riverview PNR facility during the AM and PM peak commuter hours. Route #189 currently runs along River Road.

Route #245 provides rural express transit service to the Riverview PNR facility from Manotick via River Road. Route #245 currently operates under a 20 minute headway schedule during weekday peak commuter hours for the peak direction. Route #245 does not currently operate outside of peak commuter hours or during weekends.

Figure 5 shows the existing transit network which serves the Riverside South Community.



2.3 PEDESTRIAN AND CYCLING FACILITIES

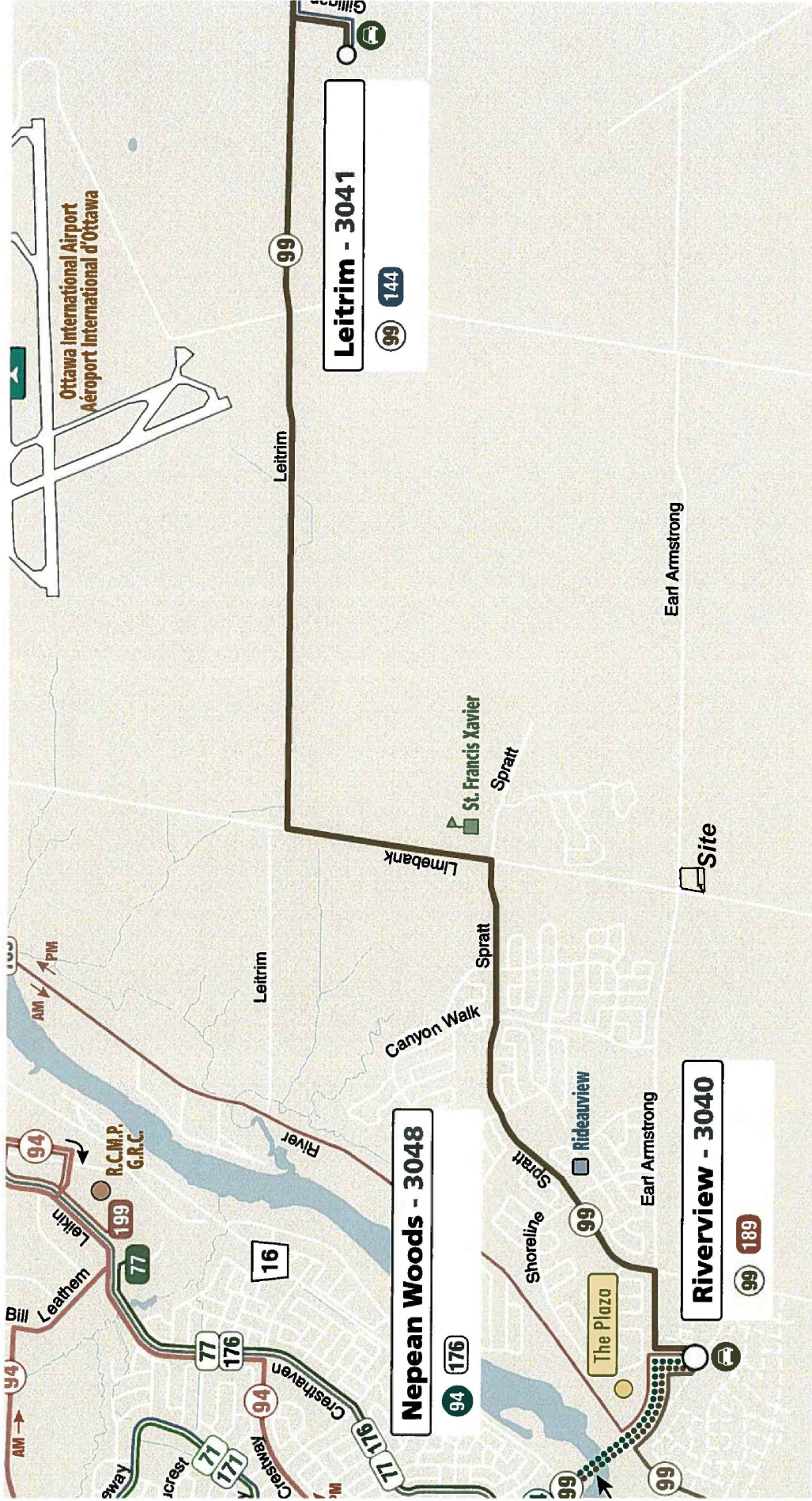
Dedicated cycling lanes are currently provided on both sides of Earl Armstrong Road and Limebank Road. Pedestrian sidewalks are provided on both sides of Earl Armstrong Road.

2.4 EXISTING TRAFFIC VOLUMES

Existing AM and PM peak hour traffic volumes for the Limebank / Earl Armstrong intersection were obtained from the City of Ottawa from turning movement counts conducted by in August 2012.

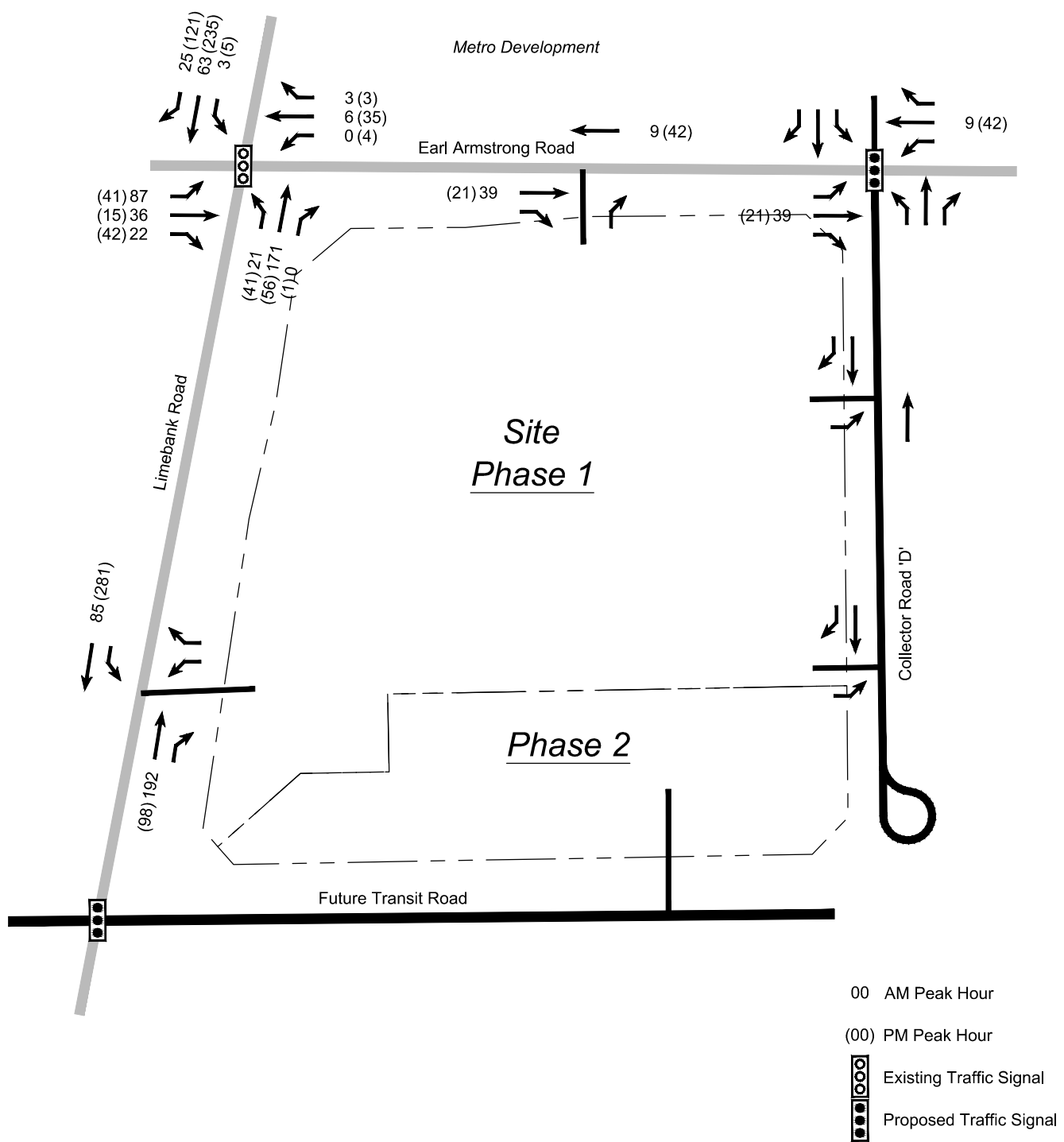
Figure 6 illustrates existing AM and PM peak hour traffic volumes.





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EXISTING TRANSIT SERVICE



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EXISTING TRAFFIC VOLUMES

3.0 ASSESSMENT SCENARIOS

3.1 ZERO & UNCONSTRAINED INTERACTION SCENARIOS

Construction of the Strandherd-Armstrong Bridge, which is scheduled for completion in September 2014, will create opportunities for residents of Barrhaven and South Nepean to change their travel patterns that may reduce overall travel time to / from their destinations.

Consistent with the Riverside South Phase 5 Transportation Impact Study report prepared by Dillon Consulting Limited and dated January 2011, two assessment scenarios were reviewed to test the potential magnitude of impact that the Strandherd-Armstrong Bridge will have on road network volumes in Riverside South and to test the sensitivity of road improvements which may be required a result of traffic interaction between areas east and west of the Rideau River from Barrhaven and South Nepean.

The following two assessment scenarios were considered: (1) Zero Interaction Scenario, and (2) Unconstrained Interaction Scenario. An explanation of both scenarios is provided below.

3.1.1 Zero Interaction Scenario

The Zero Interaction Scenario assumes that existing residents from Barrhaven and South Nepean will not utilize the Strandherd-Armstrong Bridge (and by extension, key arterial roads within Riverside South such as Earl Armstrong Road, River Road and Limebank Road) to infiltrate through the Riverside South community as part of a longer trip to areas north and east (i.e. the Downtown core). Similarly, this scenario also assumes that existing Riverside South residents will not use the bridge to infiltrate South Nepean and Barrhaven as part of a longer trip to areas to the west.

3.1.2 Unconstrained Interaction Scenario

The Unconstrained Interaction Scenario presents the opposite end of the spectrum to the Zero Interaction Scenario. It assumes that the level of interaction between South Nepean / Barrhaven and Riverside South (including both regional trips and local destination-based trips), will not be constrained by the physical capacity of transportation network elements on either side of the bridge (i.e. they would not be constrained by the residual capacity of controlling intersections, or the number of travel lanes, etc.).



4.0 FUTURE BACKGROUND CONDITIONS

Allowances were made for planned changes to the road network changes, including traffic redistribution that may result and for forecasted background traffic growth.

4.1 ANTICIPATED ROAD NETWORK CHANGES (2014 – 2021)

4.1.1 2014 Background Road Network

Construction of the Strandherd-Armstrong Bridge is slated to be completed in September 2014. As such, the analysis contained in this report assumes the bridge structure to be in place by the 2016 horizon.

The City of Ottawa has recently completed the widening of Limebank Road to a four lane cross-section from south of River Road to south of Earl Armstrong Road. Also, the City of Ottawa has recently completed the widening of Earl Armstrong Road to a four lane cross-section from River Road to just east of Limebank Road. Both roads feature four-lane urban cross-sections with auxiliary turn lanes and cycling facilities. The intersection of Earl Armstrong Road and Limebank Road is under traffic signal control.

The northerly section of Collector Road 'D', i.e., between Earl Armstrong Road and the Future Transitway, will be constructed within the next two years. As such, the analysis contained in this report assumes the Collector Road 'D' to be in place by the 2016 horizon. The intersection of Earl Armstrong Road and Collector Road 'D' is anticipated to be signalized.

There are no other significant background road network modifications anticipated during the 2018 - 2021 horizon years in the vicinity of the subject development site.

4.2 FORECASTED BACKGROUND GROWTH

There are two sources of growth in future background transportation demands:

- Explicit consideration of known / planned future developments; and
- Application of growth rates based on historical trends to account for growth in through volumes.

4.2.1 Future Background Traffic Volumes

For the purposes of this study, future (2013) Total Traffic Volumes from the Riverside South Phase 5 TIS report (Dillon January 2011) shown in Appendix A, were used as background traffic volumes.

As indicated in the Riverside South Phase 5 TIS report (Dillon January 2011), background developments assumed within the TIS are consistent with the Riverside South Community Design Plan. In total, other background developments within Riverside South are expected to generate over 7,000 residential units, in excess of 1.3 million square feet of commercial, retail and office space, business park land uses that generate approximately 3,000 employees as well as other ancillary land uses (i.e., institutional, schools, gas stations, park and ride expansion etc.). Additional information related to trip generation assumptions and trips generated by development block can be found in Appendix A.



We note that revisions were made to vehicle trips generated by the uses in Block 'P' on the Appendix Table. An equivalent GFA, i.e., 207,949 ft², representing the subject development were deducted from the future total traffic volumes shown in Appendix Figure (from the January 2011 TIS report).

Based upon traffic assignments provided by Novatech Engineering Consultants Ltd., allowances were also made for the proposed Limebank Metro development at 1423 Earl Armstrong Road, at the northeast corner of the Earl Armstrong Road / Limebank Road intersection. The proposed Limebank Metro development will include a total GFA of approximately 87,500 ft² of retail commercial uses several buildings.

In addition to explicitly accounting for planned developments within Riverside South, a 2.0% annual rate of growth (compounded) was applied to 2013 background traffic volumes to account for growth in through traffic volumes and other developments not explicitly accounted for in Appendix Table.

Appendix Figure 1 illustrates the location of background developments which are expected to be built during the horizon of the study. Appendix Table 1 provides a summary of the Riverside South background developments including additional information on the type of development expected.

Future background traffic volumes for horizon year 2016 are summarized in **Figures 7 and 8** for the zero interaction and unconstrained interaction scenarios, respectively.

Future background traffic volumes for horizon year 2021 are summarized in **Figures 13 and 14** for the zero interaction and unconstrained interaction scenarios, respectively.

4.3 BACKGROUND TRANSIT NETWORK

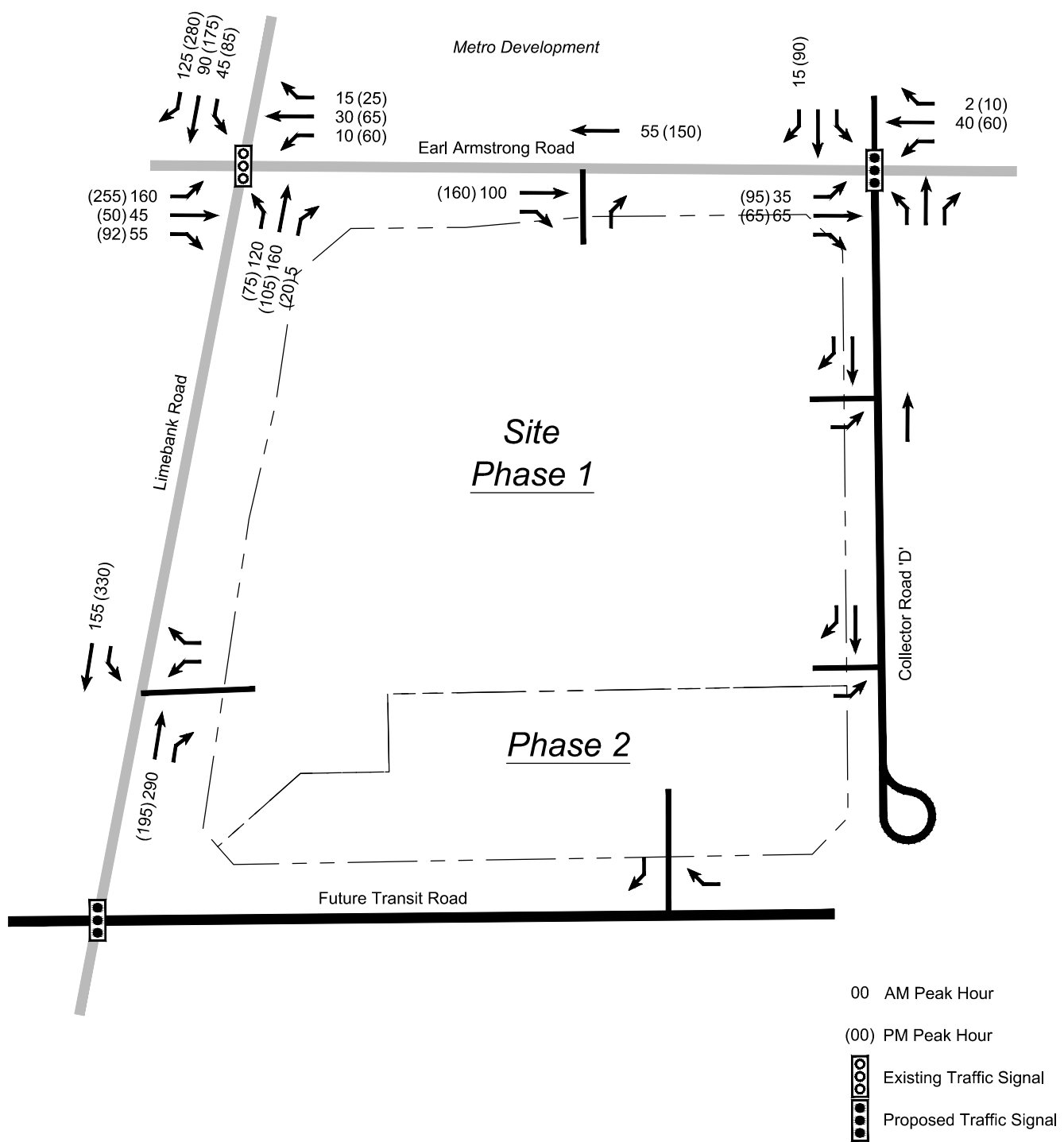
An extension of the Rapid Transit corridor into Riverside South is identified in the City of Ottawa's 2009 Transportation Master Plan (TMP). Rapid transit will extend from the South Keys Rapid Transit station to the Riverside South Town Centre. This corridor would pass along the eastern edge of the study area. This extension of the Rapid Transit corridor is assumed to occur beyond the 2021 horizon of this study.

Bus Rapid Transit (BRT) which is planned to extend from the Barrhaven Town Centre east to the Riverside South Town Centre is assumed to occur beyond the 2021 horizon.

Expectation in the TMP is that the transit mode split across the Leirtrim Screenline will grow from 5% to 25% by 2031, primarily as a result of the introduction of Rapid Transit from both the north and the west.

The Rapid Transit corridor extension to Riverside South was not anticipated within the time horizon of this study, given its anticipated timing.

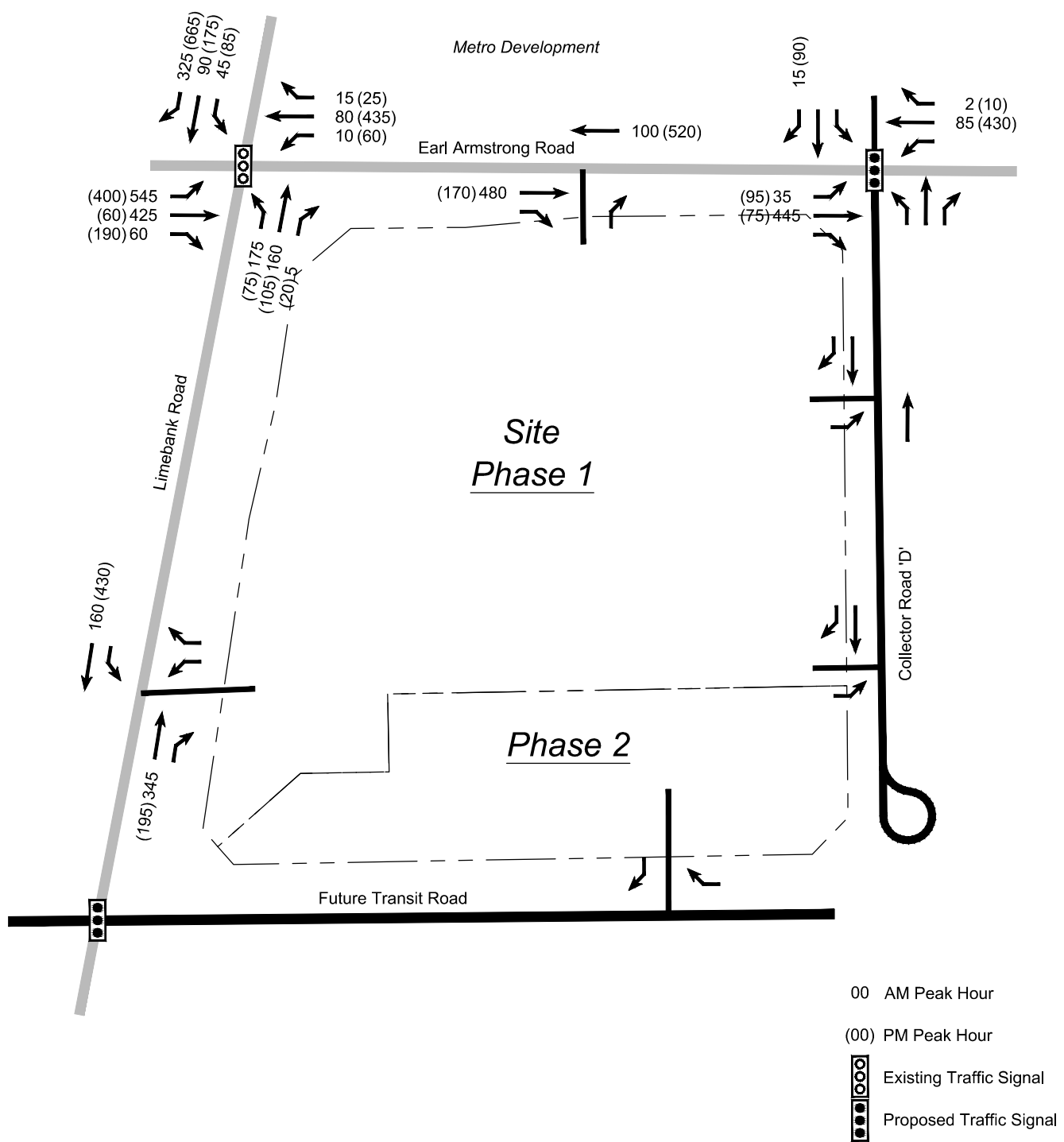




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FUTURE BACKGROUND 2016 TRAFFIC VOLUMES

Zero Interaction



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FUTURE BACKGROUND 2016 TRAFFIC VOLUMES

Unconstrained Interaction

5.0 TRAVEL DEMAND FORECASTS

5.1 TRANSIT MODAL SPLIT

Modal shares were determined based on the results of the 2011 TRANS O-D Survey Report for trips made within the Gloucester / Leitrim Area as well as the projected 2031 transit, walking and cycling mode shares for the Leitrim screenline as identified in the 2013 TMP. Modal share assumptions were as follows: 45% auto driver; 25% auto passenger; 5% transit; and 25% other.

5.2 SITE TRIP GENERATION

Trip generation estimates for the subject development were derived based on data extracted from the Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition). The data was drawn from ITE land use code 820 – Shopping Centres.

Allowances for pass-by traffic were incorporated at a rate of 35 percent during the weekday p.m. peak hour for Phase 1 and 30% pass-by for the Phase 2. Trip generation data for this site are outlined in **Table 1** below. Pass-by trips were estimated using rates identified in the ITE Trip Generation Handbook, 9th Edition. Pass-by trips will be estimated using rates identified in the ITE Trip Generation Handbook, 9th Edition.

Phase 1 retail development will generate approximately 180 and 675 vehicle trips during weekday am and pm hours, respectively. With allowances for pass-by traffic, net new trips for Phase 1 will be 180 and 435 trips for am and pm hours, respectively.

Net additional vehicle trips generated by Phase 2 retail / commercial development will be 75 and 290 trips during weekday am and pm hours, respectively.

TABLE 1 SITE TRAFFIC GENERATION

| Retail Commercial | AM Peak Hour | | | PM Peak Hour | | |
|--|--------------|------------|------------|--------------|------------|------------|
| | In | Out | 2-Way | In | Out | 2-Way |
| PHASE 1 | | | | | | |
| 119,499 ft ² ITE LUC 820 -Primary Trips | 110 | 70 | 180 | 205 | 230 | 435 |
| Pass-by Trips 35% | 0 | 0 | 0 | 120 | 120 | 240 |
| Phase 1 Gross Trips | 110 | 70 | 180 | 325 | 350 | 675 |
| PHASES 1 & 2 | | | | | | |
| 207,949 ft ² ITE LUC 820 - Primary Trips | 155 | 100 | 255 | 320 | 365 | 685 |
| Pass-by Trips – 30% | 0 | 0 | 0 | 145 | 145 | 290 |
| Phases 1 & 2 Gross Trips | 155 | 100 | 255 | 465 | 510 | 975 |
| Phase 2 Net Additional Trips | 45 | 30 | 75 | 145 | 145 | 290 |

5.3 TRIP DISTRIBUTION AND ASSIGNMENT

Trips generated by the subject development are expected to follow a local traffic distribution trip distribution assumption. Table 2 provides a summary of the distribution of site trips.

TABLE 2 SITE TRAFFIC DISTRIBUTION

| From / To | ROUTE | Weekday AM & PM Peak Hour |
|-----------|-------------------------|---------------------------|
| North | via Limebank Road | 40% |
| South | via Limebank Road | 30% |
| East | via Earl Armstrong Road | 5% |
| West | via Earl Armstrong Road | 25% |
| | | 100% |

Phase 1 net, site traffic assignments for horizon year 2016 are illustrated in **Figures 9 and 10** for zero interaction and unconstrained interaction, respectively.

Phase 2 net, additional site traffic assignments for horizon year 2021 are illustrated in **Figures 15 and 16** for zero interaction and unconstrained interaction, respectively.

5.4 FUTURE TOTAL TRAFFIC VOLUMES

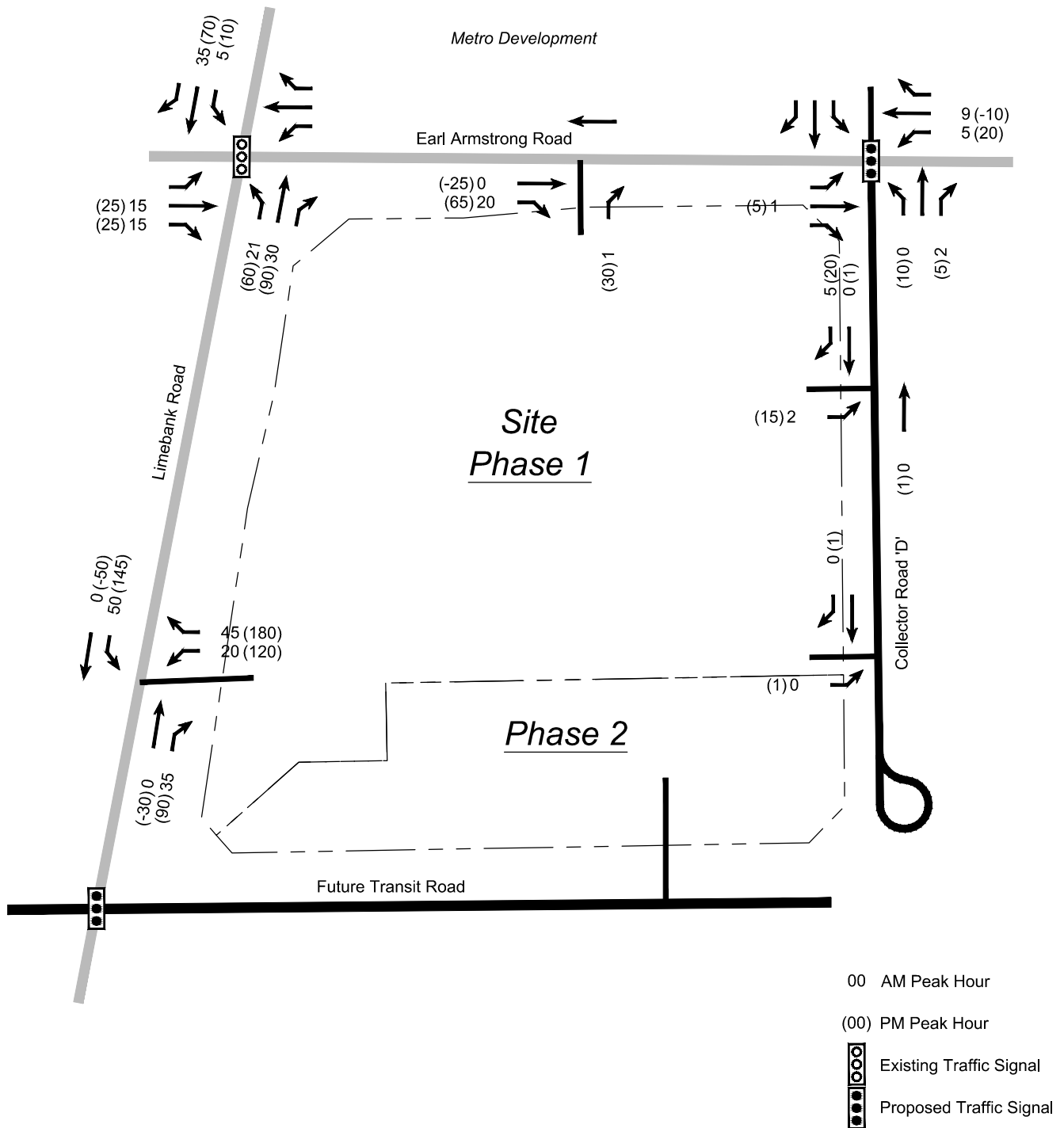
Future total traffic volumes at opening day (2016), zero interaction, shown on **Figure 11** represent the sum of traffic volumes shown on **Figures 7 and 9**. Future total traffic volumes at opening day (2016), unconstrained interaction, shown on **Figure 12** represent the sum of traffic volumes shown on **Figures 8 and 10**.

Future total traffic volumes at opening day (2021), zero interaction, shown on **Figure 17** represent the sum of traffic volumes shown on **Figures 13 and 15**. Future total traffic volumes at opening day (2021), unconstrained interaction, shown on **Figure 18** represent the sum of traffic volumes shown on **Figures 14 and 16**.





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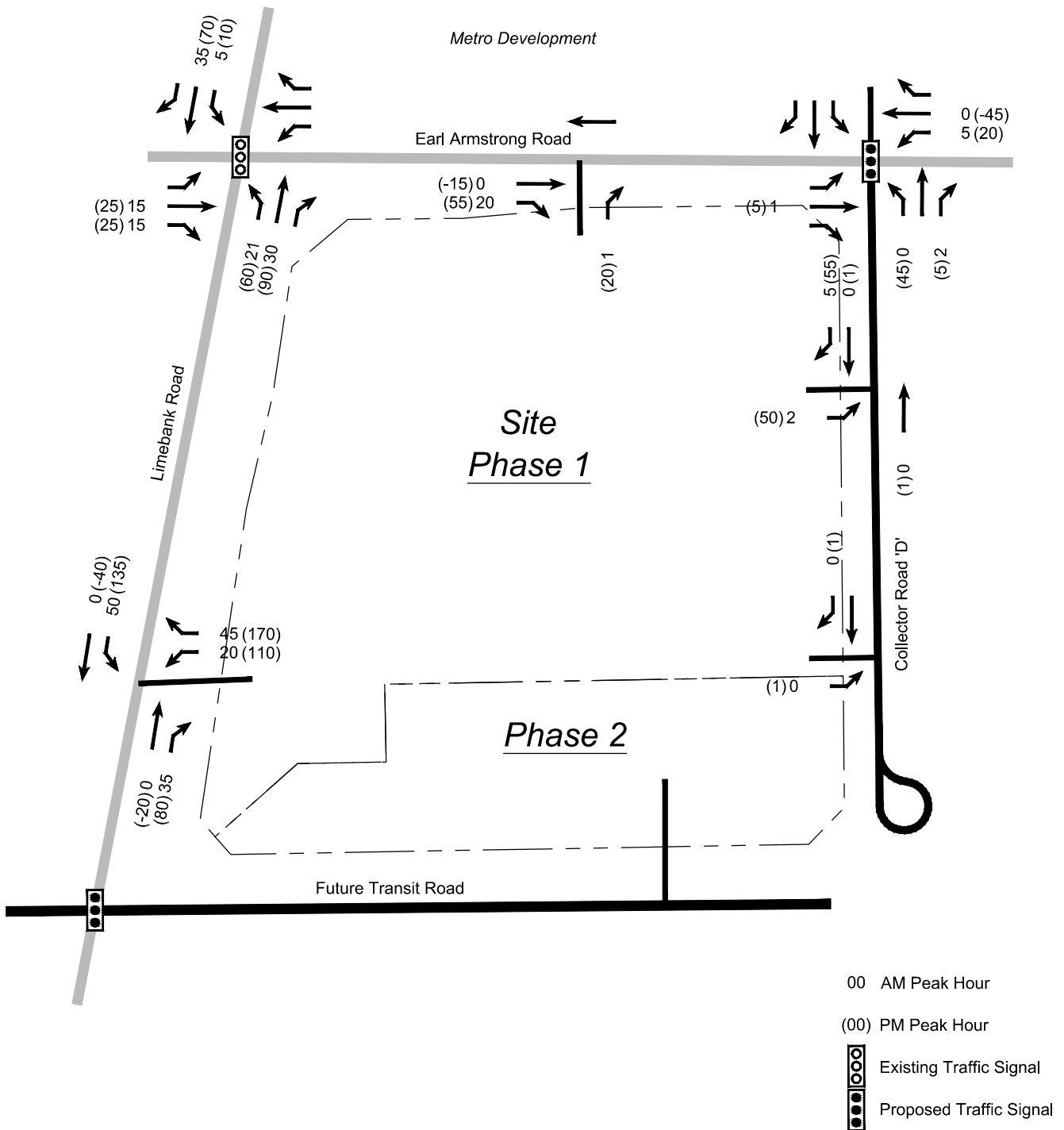


NET SITE 2016 TRAFFIC VOLUMES

Zero Interaction

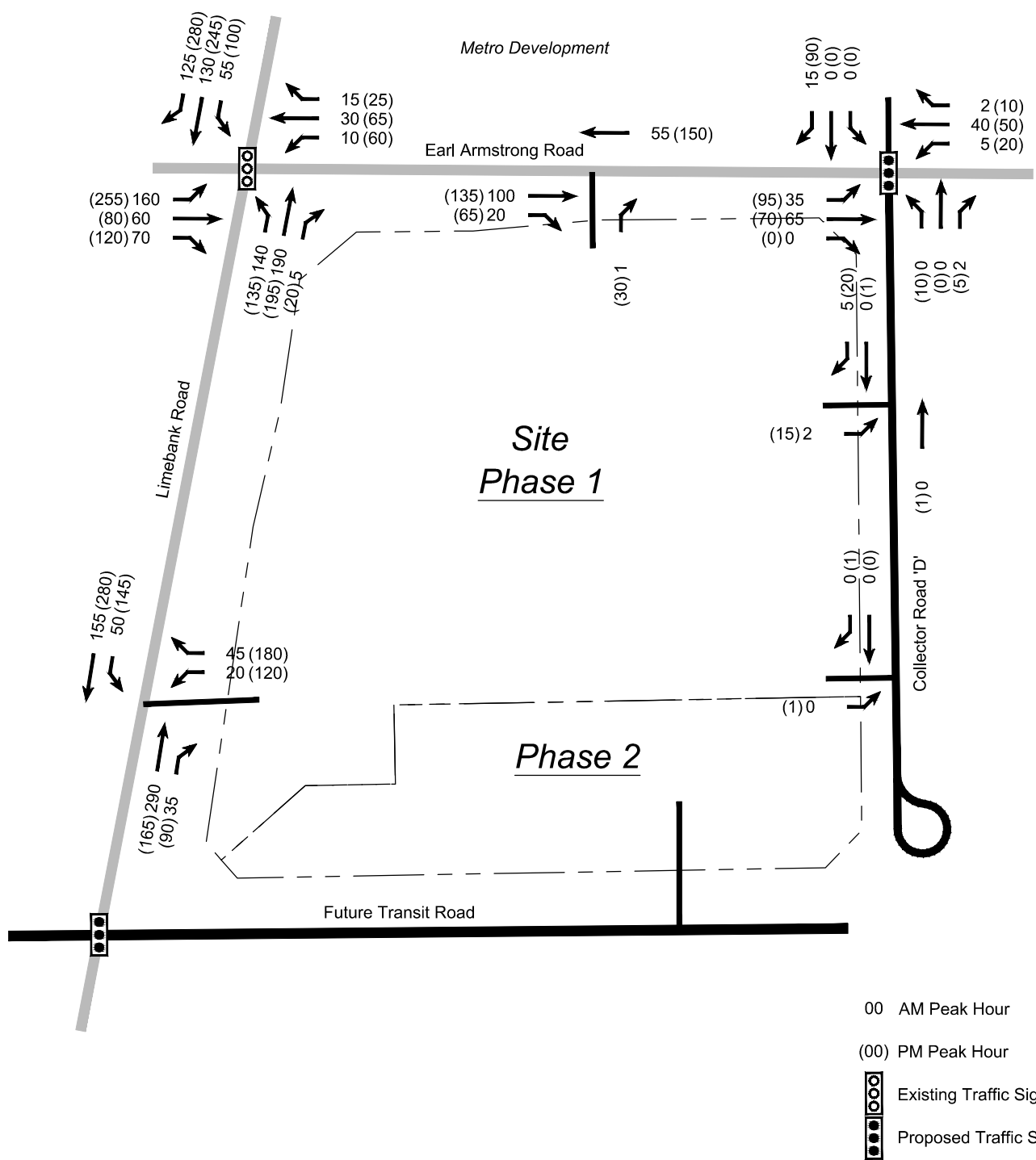


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NET SITE 2016 TRAFFIC VOLUMES

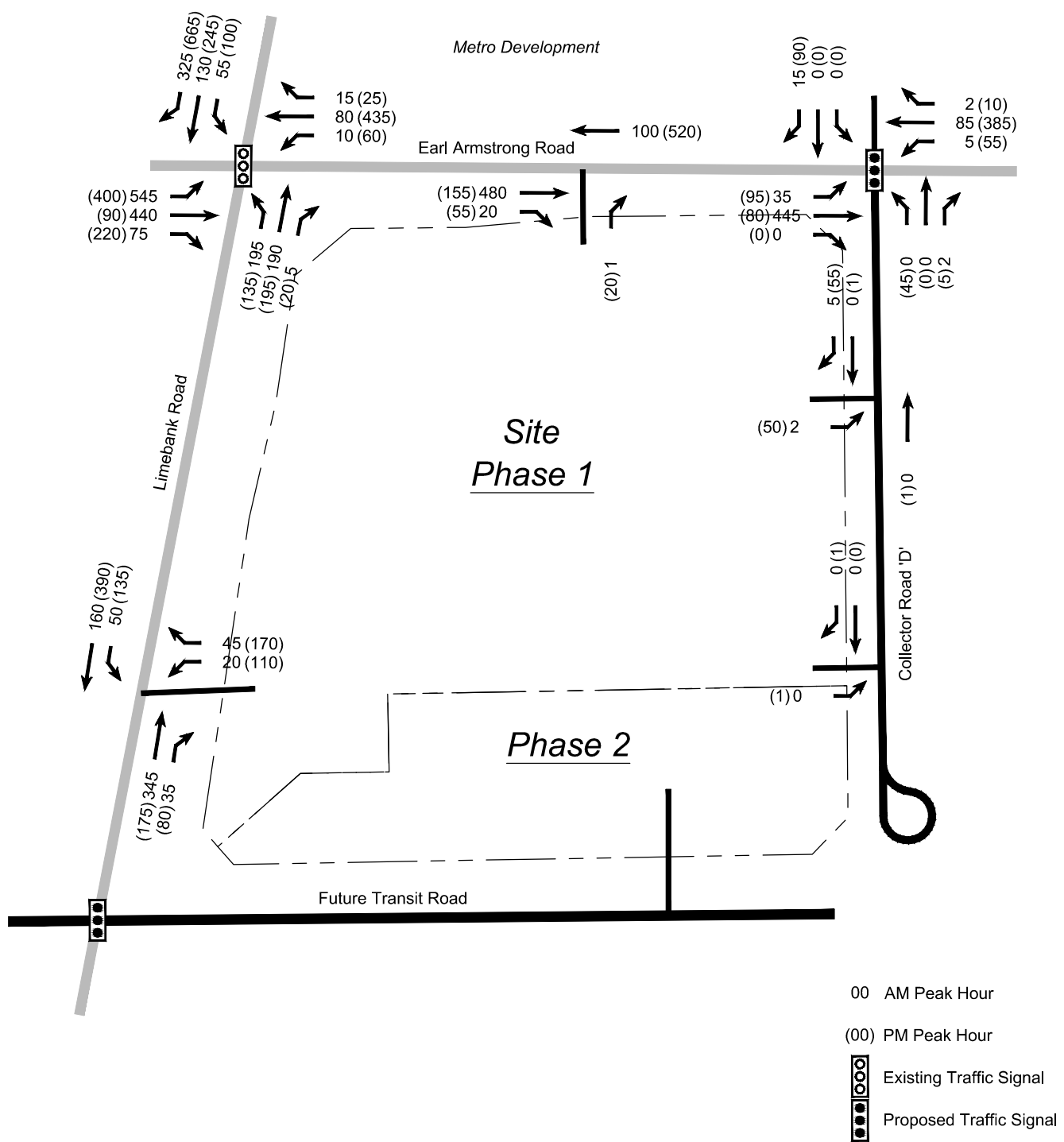
Unconstrained Interaction



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FUTURE TOTAL 2016 TRAFFIC VOLUMES

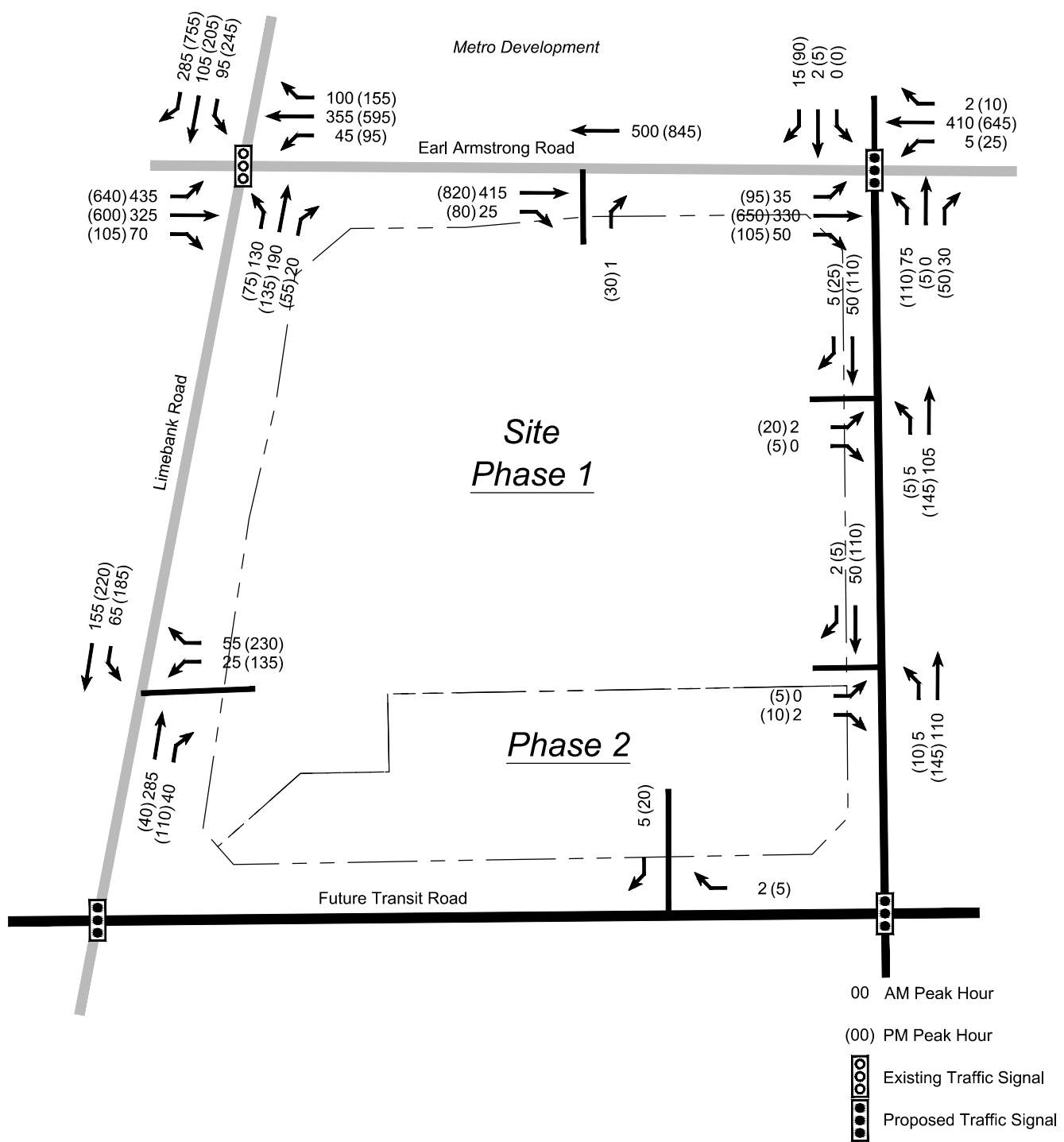
Zero Interaction



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FUTURE TOTAL 2016 TRAFFIC VOLUMES

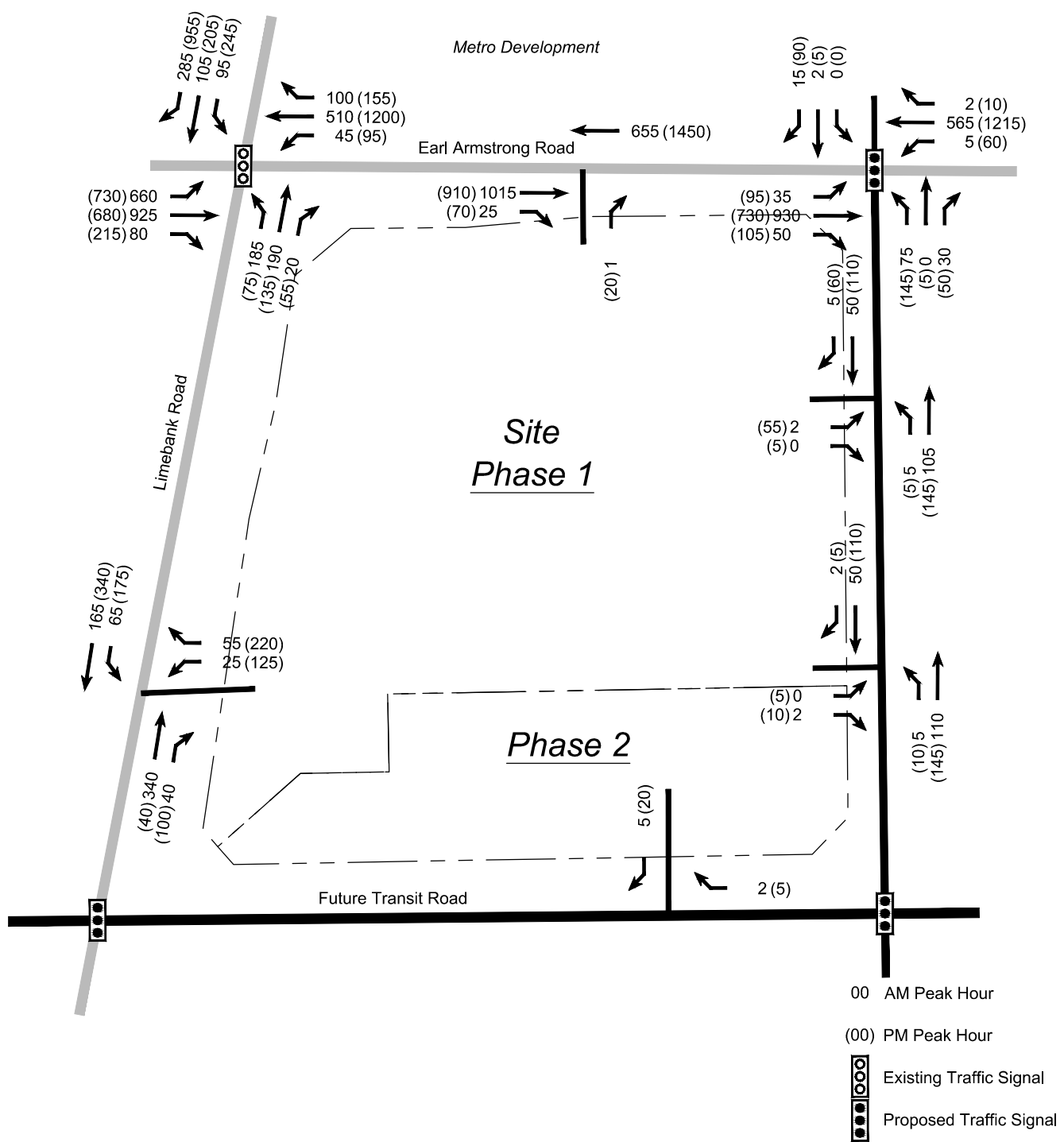
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FUTURE BACKGROUND 2021 TRAFFIC VOLUMES

Zero Interaction



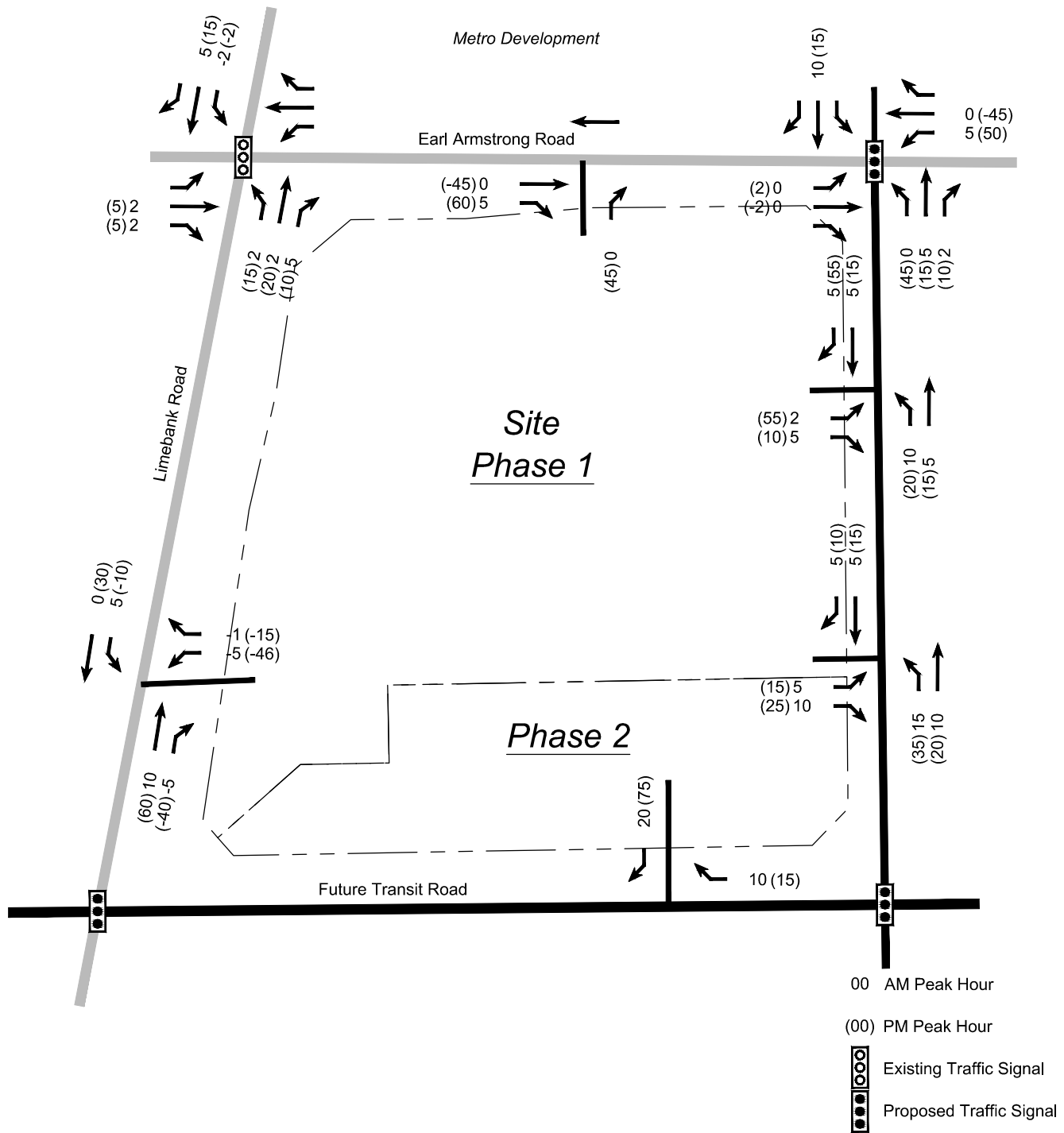
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FUTURE BACKGROUND 2021 TRAFFIC VOLUMES

Unconstrained Interaction



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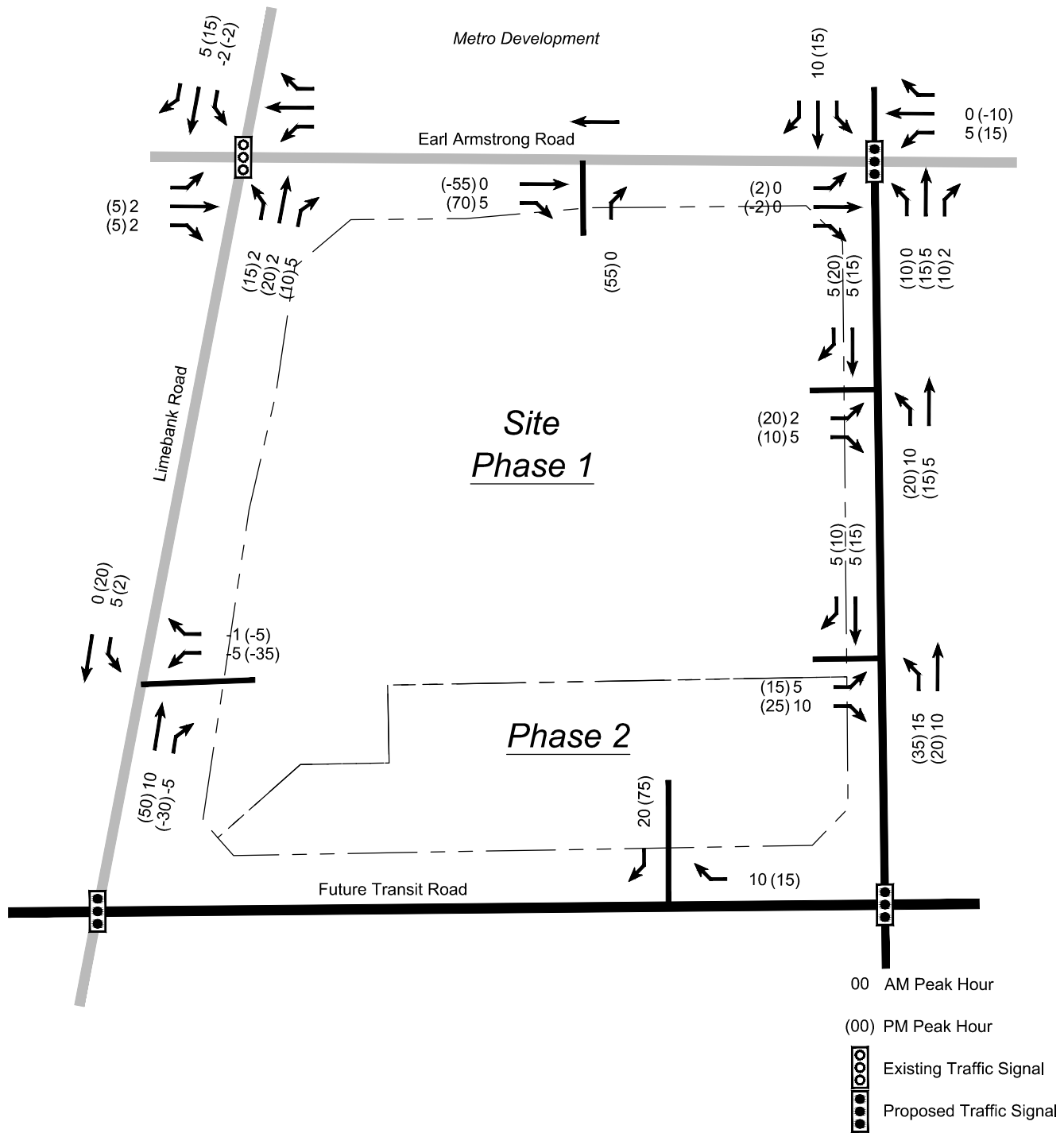


NET ADDITIONAL SITE 2021 TRAFFIC VOLUMES

Zero Interaction

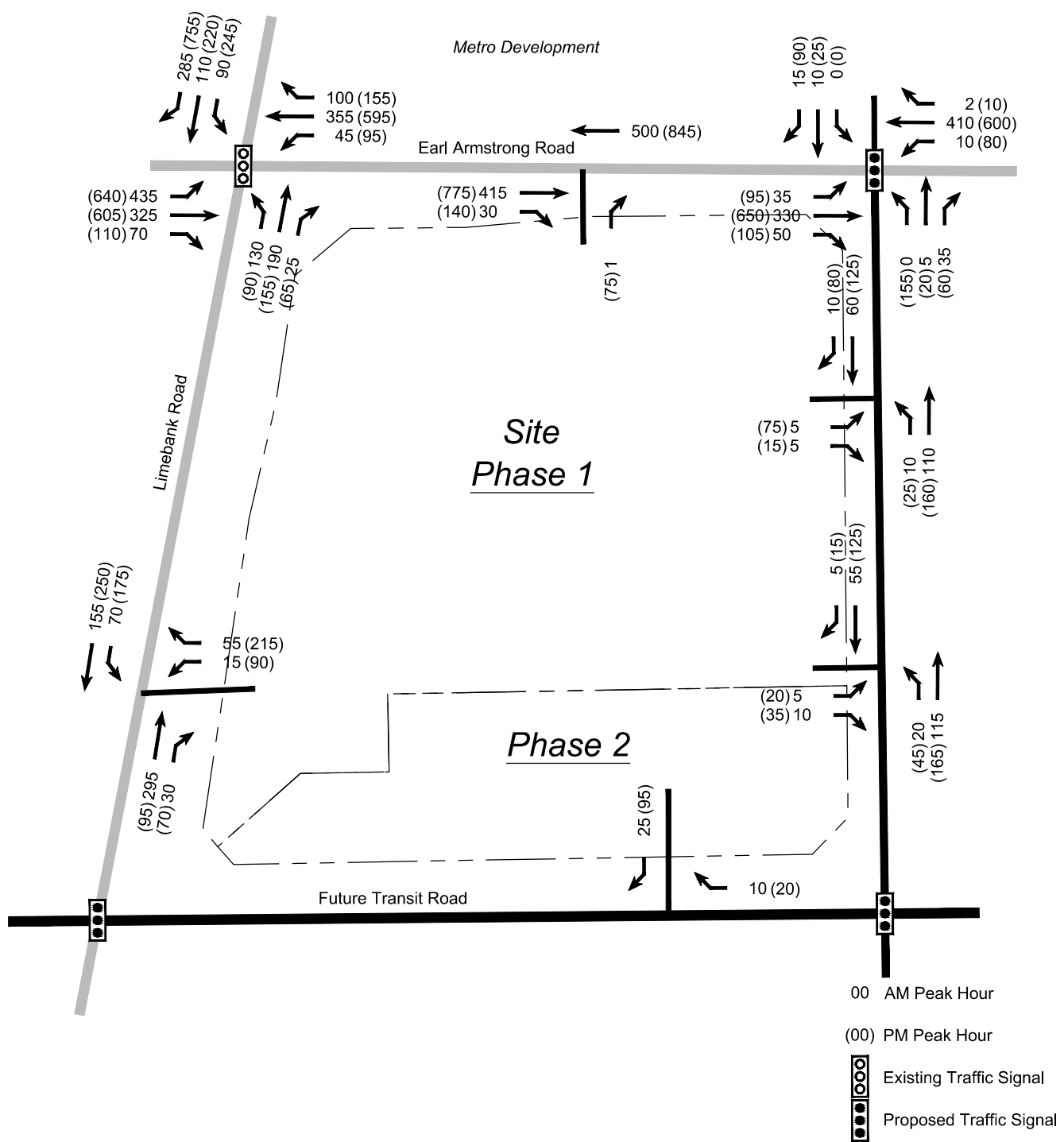


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NET ADDITIONAL SITE 2021 TRAFFIC VOLUMES

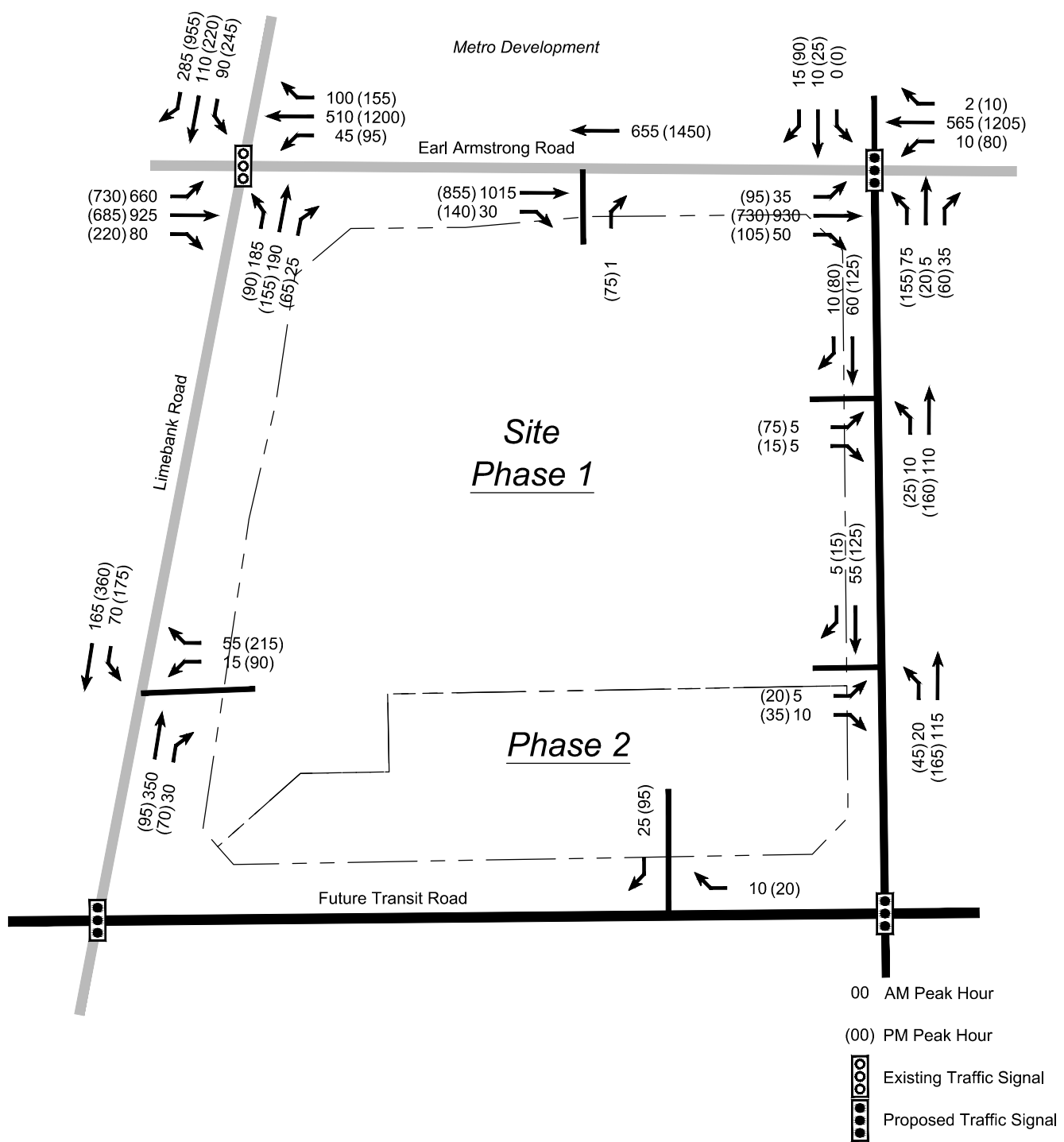
Unconstrained Interaction



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FUTURE TOTAL 2021 TRAFFIC VOLUMES

Zero Interaction



FUTURE TOTAL 2021 TRAFFIC VOLUMES
Unconstrained Interaction

6.0 TRAFFIC IMPACT ANALYSIS

6.1 SIGNALIZED INTERSECTIONS – ANALYSIS PARAMETERS

Analysis of the study area signalized intersections were analyzed based on procedures set out in Highway Capacity Manual (2000) with the assistance of Trafficware Traffic Signal Timing software - Synchro Version 7.0. Signal cycle lengths and timings currently in effect at the intersections were provided by City of Ottawa Traffic Operations Department. Adjustments were made to reflect future operating conditions as required. Relevant performance indicators for the weekday am and pm peak hours are summarized on Tables 3 and 4 for the 2016 and 2021 horizon years.

TABLE 3 CAPACITY ANALYSIS SUMMARY – SIGNALIZED INTERSECTIONS (2016)

| Intersection | Future Background Zero Interaction | | | Future Background Unconstrained | | | Future Total Zero Interaction | | | Future Total Unconstrained | | |
|---------------------------------------|------------------------------------|------------|-----|---------------------------------|------------|-----|-------------------------------|------------|-----|----------------------------|------------|-----|
| | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS |
| AM Peak Hour | | | | | | | | | | | | |
| Earl Armstrong / Limebank | 0.17 | 30.8 | C | 0.39 | 33.2 | C | 0.18 | 30.6 | C | 0.38 | 33.4 | C |
| Earl Armstrong / Collector 'D' | 0.03 | 5.4 | A | 0.14 | 1.6 | A | 0.03 | 5.8 | A | 0.14 | 1.8 | A |
| PM Peak Hour | | | | | | | | | | | | |
| Earl Armstrong / Limebank | 0.20 | 28.3 | C | 0.48 | 28.8 | C | 0.26 | 28.4 | C | 0.53 | 29.5 | C |
| Earl Armstrong / Collector 'D' | 0.09 | 12.9 | B | 0.14 | 7.4 | A | 0.09 | 13.7 | B | 0.16 | 9.7 | A |

1. City of Ottawa criteria that relate v/c ratio to a LOS rating.

Level of Service

A
B
C
D
E
F

Volume to Capacity Ratio

0.0 to 0.60
0.61 to 0.70
0.71 to 0.80
0.81 to 0.90
0.91 to 1.00
>1.00

6.1.1 Future (2016) Traffic Conditions

Under future background and future total traffic conditions, no operational issues were identified at the Limebank / Earl Armstrong and the Earl Armstrong / Collector Road 'D' signalized intersections for both the Zero Interaction and Unconstrained Interaction scenarios. Both intersections will operate at good levels of service LOS A (based upon City of Ottawa criteria) with no critical movements. Site traffic generated by the subject development, therefore, is not expected to impact intersection operations.



TABLE 4 CAPACITY ANALYSIS SUMMARY – SIGNALIZED INTERSECTIONS (2021)

| Intersection | Future Background Zero Interaction | | | Future Background Unconstrained | | | Future Total Zero Interaction | | | Future Total Unconstrained | | |
|---------------------------------------|------------------------------------|------------|-----|---------------------------------|------------|-----|-------------------------------|------------|-----|----------------------------|------------|-----|
| | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS |
| AM PEAK HOUR | | | | | | | | | | | | |
| Earl Armstrong / Limebank | 0.38 | 33.3 | C | 0.51 | 35.3 | D | 0.40 | 33.0 | C | 0.54 | 35.2 | D |
| | | | | | | | | | | | | |
| Earl Armstrong / Collector 'D' | 0.19 | 7.6 | A | 0.35 | 4.7 | A | 0.19 | 8.3 | A | 0.35 | 5.2 | A |
| | | | | | | | | | | | | |
| PM PEAK HOUR | | | | | | | | | | | | |
| Earl Armstrong / Limebank | 0.74 | 34.1 | C | 1.01 | 84.8 | F | 0.74 | 33.8 | C | 1.01 | 84.2 | F |
| | | | | | | | | | | | | |
| Earl Armstrong / Collector 'D' | 0.30 | 7.8 | A | 0.51 | 8.9 | A | 0.35 | 9.8 | A | 0.52 | 9.8 | A |

1. City of Ottawa criteria that relate v/c ratio to a LOS rating.

Level of Service

A
B
C
D
E
F

Volume to Capacity Ratio

0.0 to 0.60
0.61 to 0.70
0.71 to 0.80
0.81 to 0.90
0.91 to 1.00
>1.00

6.1.2 Future (2021) Traffic Conditions

Earl Armstrong Road / Collector Road 'D': Analysis results reflect good traffic operating characteristics under future (2021) conditions with no critical movements and significant reserve capacity.

The installation of traffic control signals is required at the Earl Armstrong Road / Collector Road 'D' intersection.

Limebank Road and Earl Armstrong Road: Under future background and future 2021 condition, the Limebank / Earl Armstrong intersection is expected to operate with an acceptable overall level of service during both peak hours under the Zero interaction scenario. This intersection is also expected to operate with an acceptable overall level of service during the am peak hour and poor overall levels of service during the pm peak hour under the unconstrained scenario.



6.2 UNSIGNALIZED INTERSECTIONS

Relevant performance indicators for the weekday am and pm peak hours are summarized on Tables 5 and 6 for the 2016 and 2021 horizon years.

Earl Armstrong Road / Site Access: Details of the capacity analysis indicate that the northbound right turn movement at the Earl Armstrong Road right in / right out site access will operate good levels of service, LOS A under 2016 and 2021 future traffic conditions.

Specific recommendations for the subject development include the following items:

- Widen the pavement on the south side of Earl Armstrong Road to provide a continuous eastbound right turn lane between Limebank Road and the site access driveway, as illustrated in drawing PRM02. The continuous right turn lane will also accommodate a future far side bus stop west of the site access driveway.
- Provide appropriate traffic control signs on the centre median and at the site driveway to preclude left turns.

Limebank Road / Site Access: Details of the capacity analysis indicate that westbound left turn movements will operate at acceptable levels of service, LOS C or better, under 2021 future total condition based upon the Zero and Unconstrained scenarios. Southbound left and westbound right turn movements will operate at good levels, LOS A, in the future, based upon the Zero and Unconstrained scenarios.

Specific recommendations for the subject development include the following items:

- Widen the pavement on the east side of Limebank Road to provide a northbound right turn lane with 30 metres storage and 50 metres taper, as illustrated in drawing PRM01.
- Modify the existing centre median on Limebank Road to accommodate a southbound left turn lane with 30 metres storage and 50 metres taper.
- Provide appropriate traffic control signs on centre median and at the site driveway.

The proposed access will be located approximately 213.10 metres south of Earl Armstrong Road signalized intersection which is beyond the horizon of this study. Construction of this future signalized intersection would provide opportunities for drivers with destinations south of subject site to make westbound left turns.

The functional design drawing indicates that the southbound and westbound turning movements can be physically accommodated respecting TAC Geometric Design guidelines. Site distance requirements are exceeded. The analysis results indicate that back-to-back left turns between Earl Armstrong Road (northbound) and the site driveway (southbound) can readily be accommodated without conflict.

A **full movement access** onto Limebank Road is, therefore, recommended as an appropriate strategy for the subject development.

6.3 SENSITIVITY ANALYSIS

A sensitivity analysis of the signalized intersection indicates that, without full turning movements at the Limebank Road access, the Limebank / Earl Armstrong intersection will operate at poor overall levels of service during the pm peak hour under future background and future total 2021 conditions (for both zero and unconstrained scenarios). The additional southbound and westbound left turn vehicles at the intersection will have a 13% impact on the overall v/c ratio and increases in delay per vehicle of approximately 18 seconds. Also, without full turning movements at the Limebank Road access the delay per vehicle for eastbound left turns and southbound left turns will **increase** by 46 and 42 seconds, respectively. The analysis results are summarized in Table 7.

Therefore, taking into consideration the significant impact a right in / right out only access onto Limebank Road would have on the Earl Armstrong / Limebank intersection, a **full movement access** onto Limebank Road is, therefore, recommended as an appropriate strategy for the subject development.

TABLE 5 CAPACITY ANALYSIS SUMMARY – UNSIGNALIZED INTERSECTIONS (2016)

| Intersection | Future Total Zero Interaction | | | Future Total Unconstrained Interaction | | |
|-------------------------------------|-------------------------------|------------|-----|--|------------|-----|
| | V/C | Delay (s) | LOS | V/C | Delay (s) | LOS |
| AM PEAK HOUR | | | | | | |
| Earl Armstrong / Site Access | | 0 | | | 0 | |
| NB Right Out | 0 | 8.6 | A | 0 | 8.7 | A |
| Limebank Rd Access | | 1.8 | | | 1.7 | |
| WB Left | 0.04 | 12.7 | B | 0.04 | 13.4 | B |
| WB Right | 0.05 | 9.5 | A | 0.05 | 9.6 | A |
| SB Left | 0.04 | 8.0 | A | 0.04 | 8.2 | A |
| PM PEAK HOUR | | | | | | |
| Earl Armstrong / Site Access | | 0.7 | | | 0.2 | |
| NB Right Out | 0.03 | 9.0 | A | 0.02 | 9.0 | A |
| Limebank Rd Access | | 5.5 | | | 4.7 | |
| WB Left | 0.33 | 19.8 | C | 0.31 | 19.9 | C |
| WB Right | 0.20 | 10.0 | B | 0.19 | 9.9 | A |
| SB Left | 0.11 | 8.1 | A | 0.10 | 8.1 | A |

TABLE 6 CAPACITY ANALYSIS SUMMARY – UNSIGNALIZED INTERSECTIONS (2021)

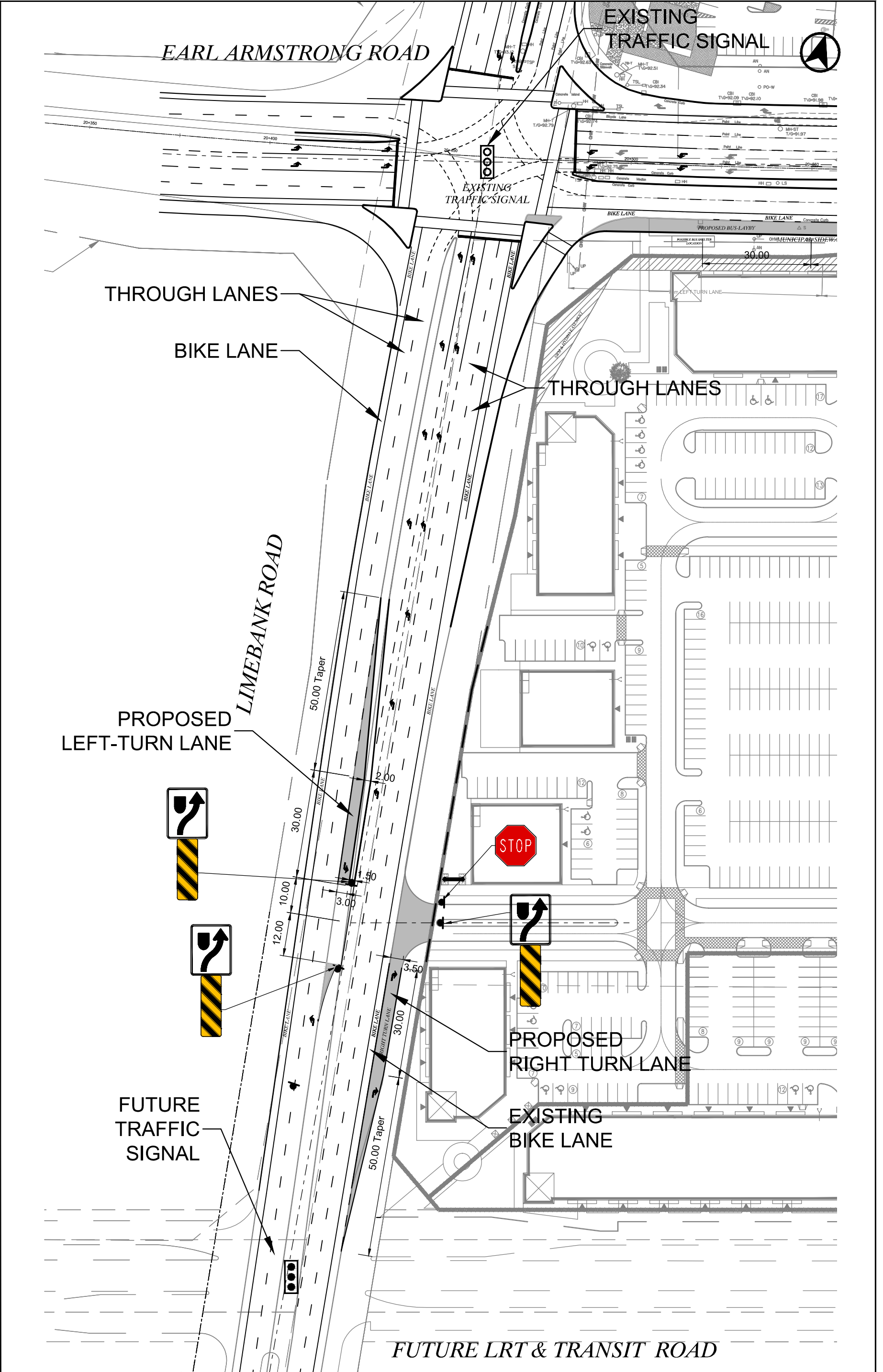
| Intersection | Future Background Zero Interaction | | | Future Background Unconstrained | | | Future Total Zero Interaction | | | Future Total Unconstrained | | |
|--------------------------------|------------------------------------|------------|-----|---------------------------------|------------|-----|-------------------------------|------------|-----|----------------------------|------------|-----|
| | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS |
| AM PEAK HOUR | | | | | | | | | | | | |
| Earl Armstrong / Access | | 0 | | | 0 | | | 0 | | | 0 | |
| NB Right Out | 0 | 8.7 | A | 0 | 9.2 | A | 0 | 8.8 | A | 0 | 9.2 | A |
| Limebank Rd Access | | 2.2 | | | 2.1 | | | 2.1 | | | 1.9 | |
| WB Left | 0.05 | 13.2 | B | 0.06 | 14.0 | B | 0.03 | 13.2 | B | 0.04 | 14.0 | B |
| WB Right | 0.05 | 9.5 | A | 0.07 | 9.7 | A | 0.06 | 9.5 | A | 0.07 | 9.7 | A |
| SB Left | 0.05 | 8.1 | A | 0.06 | 8.2 | A | 0.06 | 8.1 | A | 0.06 | 8.3 | A |
| PM PEAK HOUR | | | | | | | | | | | | |
| Earl Armstrong / Access | | 0.2 | | | 0.1 | | | 0.4 | | | 0.3 | |
| NB Right Out | 0.04 | 9.4 | A | 0.02 | 9.4 | A | 0.09 | 9.8 | A | 0.09 | 9.8 | A |
| Limebank Rd Access | | 6.8 | | | 5.9 | | | 5.7 | | | 5.2 | |
| WB Left | 0.35 | 19.0 | C | 0.34 | 19.7 | C | 0.24 | 17.6 | C | 0.26 | 19.0 | C |
| WB Right | 0.24 | 9.9 | A | 0.23 | 9.8 | A | 0.22 | 9.8 | A | 0.22 | 9.8 | A |
| SB Left | 0.13 | 7.9 | A | 0.12 | 7.9 | A | 0.12 | 7.9 | A | 0.12 | 7.9 | A |

TABLE 7 SENSITIVITY ANALYSIS – EARL ARMSTRONG / LIMEBANK INTERSECTION 2021

| PM PEAK HOUR | Future Background Zero Interaction | | | Future Background Unconstrained | | | Future Total Zero Interaction | | | Future Total Unconstrained | | |
|----------------------------------|------------------------------------|------------|-----|---------------------------------|------------|-----|-------------------------------|------------|-----|----------------------------|------------|-----|
| | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS | v/c | Delay sec. | LOS |
| Earl Armstrong / Limebank | 0.73 | 50.4 | D | 1.14 | 108.4 | F | 0.78 | 0.78 | D | 1.14 | 102.0 | F |
| Eastbound Left | 1.19 | 145.1 | F | 1.55 | 300.6 | F | 1.07 | 100.7 | F | 1.55 | 301.0 | F |
| Southbound Left | 0.84 | 57.1 | E | 1.33 | 218.3 | F | 0.98 | 86.3 | F | 1.33 | 218.0 | F |

Note: This sensitivity analysis assumes right in / right out movements only at the Limebank Road access.

Date Plotted: April 09, 2014. Filename: J:\5890-38\BA\2014\Proposed Road Modification\Bus Lay-By\RM01-WBLB-05-589038.dwg



**PROPOSED ROAD
MODIFICATION
LIMEBANK ROAD**

Project: Riverside South
 Project No. 5890-38
 Date: April 09, 2014
 Revised: August 12, 2014

Scale 0 10 20 30 40m
 1:1,000

Drawing No. **RM-03**

7.0 PUBLIC TRANSIT INFRASTRUCTURE & OPERATIONS

As illustrated in Figure 5 there is currently limited direct transit service to the study area. The nature of this development provides an opportunity for transit to play a key role in the transportation needs of retail employees. The City of Ottawa has recognized the transit potential of Riverside South as a whole and has slated the community for several transit investments over the coming years.

In the longer term, beyond the study horizon, the Riverside South Community Design Plan includes a rapid transit corridor that extends to connect the proposed transit service in South Nepean (Chapman Mills) and the future extension of the rapid transit corridor proposed to extend from the north (South Keys) into the Riverside South town centre. The Community Design Plan envisions the higher order transit corridor providing direct access to Riverside South Phase 5 at two points, both of which are located east between the Spratt Road extension and Earl Armstrong Road.



8.0 SUMMARY AND CONCLUSIONS

BA Group has completed a Transportation Impact Study for the proposed Riverside South Commercial Development that will be located at the southeast corner of Limebank Road and Earl Armstrong Road signalized intersection.

The subject development which includes a total GFA of approximately 19,319.11 m² (207,949 ft²) is anticipated to be developed in two phases: Phase 1 and Phase 2 which are expected to be built and occupied by 2016 and potentially 2021.

Vehicular access will be provided via a right in / right out access onto Earl Armstrong Road a full movement access onto Limebank Road located approximately 213.10 metres south of Earl Armstrong Road and two full movement access driveways onto Collector Road 'D'.

The TIS evaluated existing future 2016 and 2021 traffic conditions. Two assessment scenarios were developed to test the potential magnitude of the impact of the Strandherd-Armstrong Bridge on road network volumes in Riverside South. The two scenarios tested were the "Zero Interaction Scenario" and the "Unconstrained Interaction Scenario".

The findings of the transportation impact study are set out below:

- The site has a high degree of road accessibility. It is well served by major arterial roads, i.e., Limebank Road and Earl Armstrong Road, are located along the north and west site periphery.
- Phase 1 retail development will generate approximately 180 and 675 vehicle trips during weekday am and pm hours, respectively. With allowances for pass-by traffic, net new trips for Phase 1 will be 180 and 435 trips for am and pm hours, respectively. Net additional vehicle trips generated by Phase 2 retail / commercial development will be 75 and 290 trips during weekday am and pm hours, respectively.
- Under future 2016 background and future total traffic conditions, no operational issues were identified at the Limebank / Earl Armstrong and the Earl Armstrong / Collector Road 'D' signalized intersections for both the Zero Interaction and Unconstrained Interaction scenarios. Both intersections will operate at good levels of service LOS A (based upon City of Ottawa criteria) with no critical movements. Site traffic generated by the subject development, therefore, is not expected to impact intersection operations.
- Under future 2021 conditions Earl Armstrong Road / Collector Road 'D' no operational issues were identified at the Limebank / Earl Armstrong and the Earl Armstrong / Collector Road 'D' signalized intersections for both the Zero Interaction and Unconstrained Interaction scenarios.
- **The installation of traffic control signals is required at the Earl Armstrong Road / Collector Road 'D' intersection.**
- Under future background and future total 2021 condition, the Limebank / Earl Armstrong intersection is expected to operate with an acceptable overall level of service during both peak hours under the Zero interaction scenario. This intersection is also expected to operate with an acceptable overall



level of service during the am peak hour and poor overall level of service during the pm peak hour under the unconstrained scenario.

- Northbound right turn movement at the **Earl Armstrong Road right in / right out site access** will operate good levels of service, LOS A under 2016 and 2021 future traffic conditions. Specific recommendations for the Earl Armstrong Access include the following items:
 - Widen the pavement on the south side of Earl Armstrong Road to provide a continuous eastbound right turn lane between Limebank Road and the site access driveway, as illustrated in drawing PRM02. The continuous right turn lane will also accommodate a future far side bus stop west of the site access driveway.
 - Provide appropriate traffic control signs on the centre median and at the site driveway to preclude left turns.
- Westbound left turn movements at the **Limebank Road / Site Access** will operate at acceptable levels of service, LOS C or better, under 2021 future total condition based upon the Zero and Unconstrained scenarios. Southbound left and westbound right turn movements will operate at good levels, LOS A, in the future, based upon the Zero and Unconstrained scenarios. Specific recommendations for the subject development include the following items:
 - Widen the pavement on the east side of Limebank Road to provide a northbound right turn lane with 30 metres storage and 50 metres taper, as illustrated in drawing PRM01.
 - Modify the existing centre median on Limebank Road to accommodate a southbound left turn lane with 30 metres storage and 50 metres taper.
 - Provide appropriate traffic control signs on centre median and at the site driveway.
- The proposed southbound and westbound turning movements can be physically accommodated at the proposed T-intersection, respecting TAC Geometric Design guidelines. Site distance requirements are exceeded. Back-to-back left turns between Earl Armstrong Road (northbound) and the site driveway (southbound) can readily be accommodated without conflict.
- Taking into consideration the significant impact a right in / right out only access onto Limebank Road would have on the Earl Armstrong / Limebank intersection, a **full movement access** onto Limebank Road is, therefore, recommended as an appropriate strategy for the subject development, until westbound left turn movements can be provided at the future Limebank / Future Transit Road signalized intersection.

Conclusion

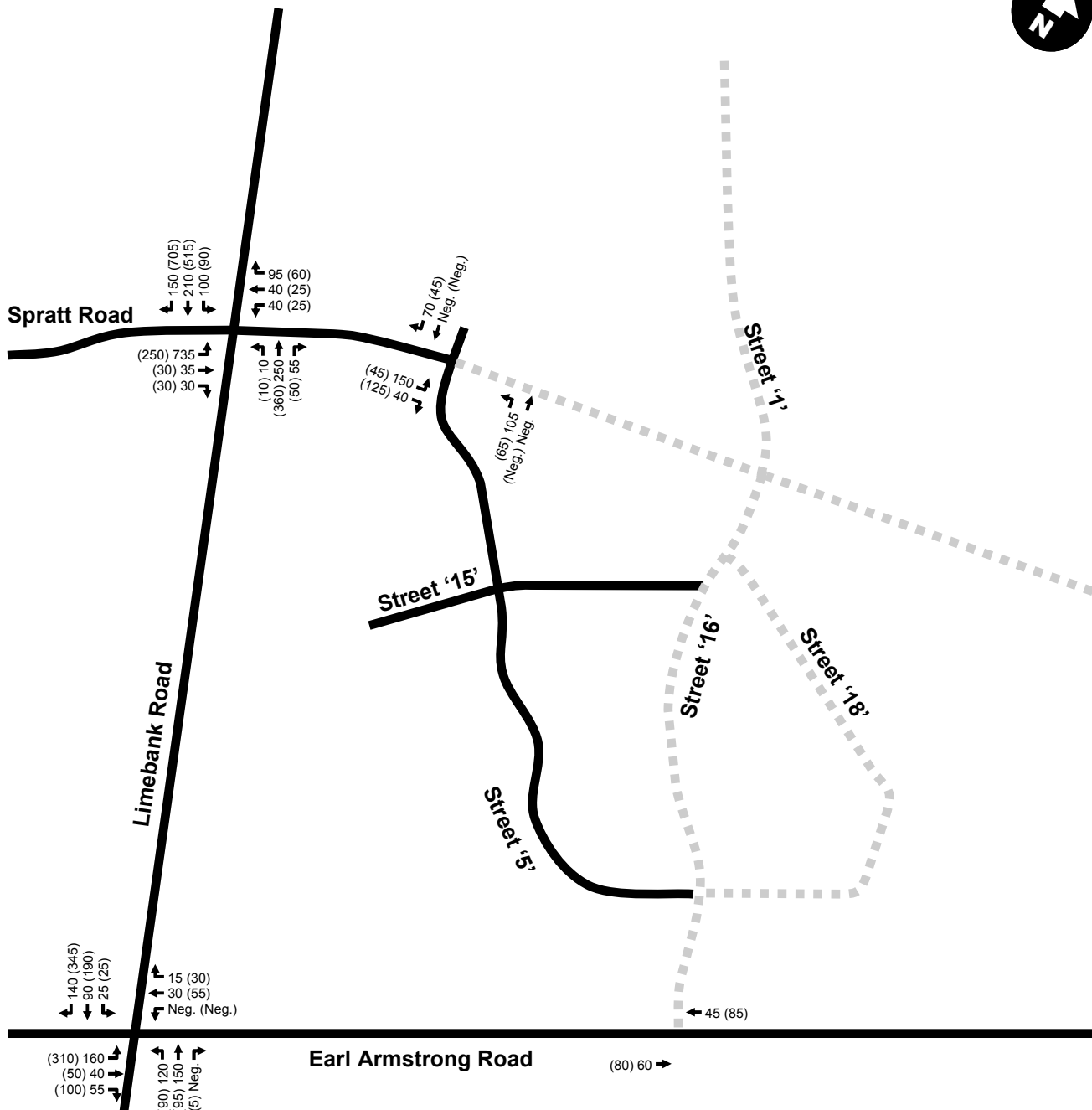
New traffic generated by the proposed Riverside South Commercial Development can be acceptably accommodated on the area road network with implementation of other planned improvements and road improvements.

The proposed site access and vehicular systems will acceptably accommodate site traffic demands and will appropriate support the proposed development.



APPENDIX A: Appendix Figures and Tables





LEGEND

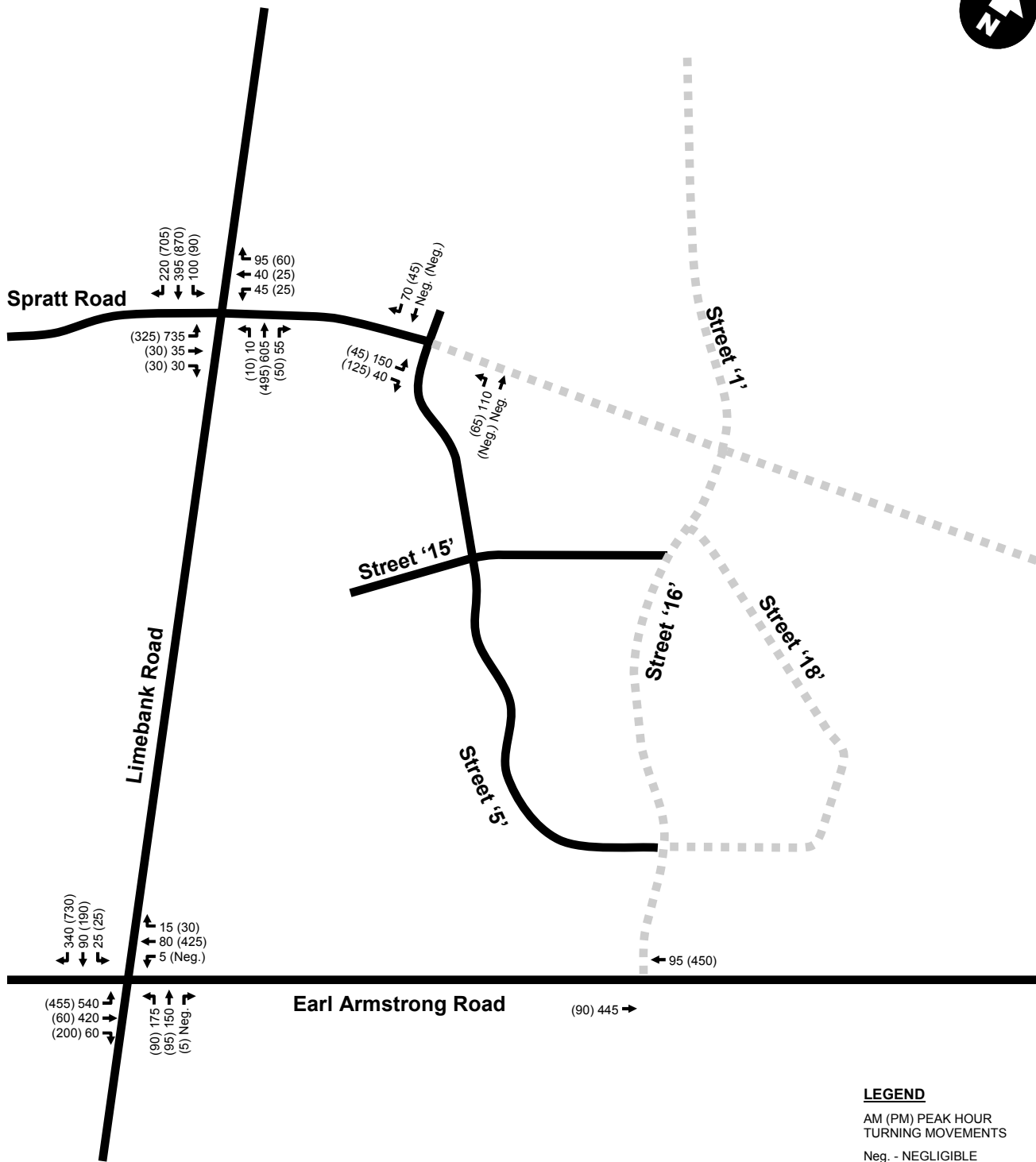
- AM (PM) PEAK HOUR TURNING MOVEMENTS
- Neg. - NEGLIGIBLE
- ROADS TO BE BUILT IN FUTURE PHASES

NOT TO SCALE



**Riverside South Phase 5
Transportation Impact Assessment**

**Figure 15
Zero Interaction Scenario 2013 Total Future Traffic Volumes**

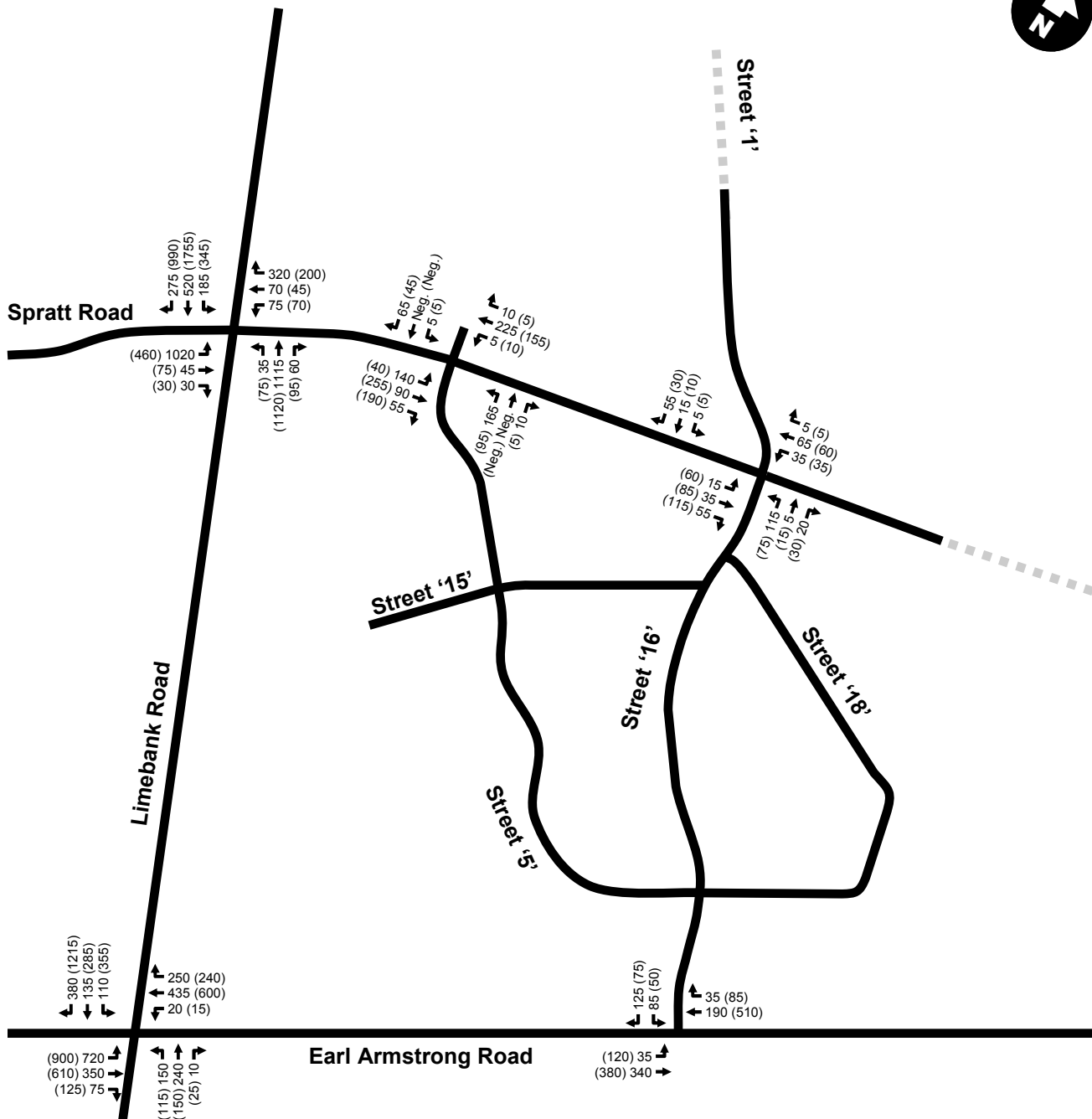


NOT TO SCALE



Riverside South Phase 5 Transportation Impact Assessment

Figure 16
Unconstrained Interaction Scenario 2013 Total Future Traffic Volumes



NOT TO SCALE

LEGEND

- AM (PM) PEAK HOUR TURNING MOVEMENTS
- Neg. - NEGLIGIBLE
- ROADS TO BE BUILT IN FUTURE PHASES



**Riverside South Phase 5
Transportation Impact Assessment**

**Figure 22
Zero Interaction Scenario 2023 Horizon Traffic Volumes**

APPENDIX B: Turning Movement Counts and Signal Timing Plan



Traffic Signal Timing

City of Ottawa, Public Works & Services Department

Traffic Operations Unit

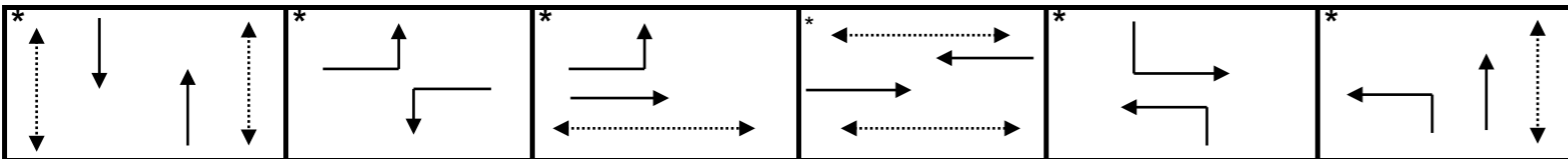
Intersection: Main: Earl Armstrong Side: Limebank
 Controller: ATC-3 TSD: 6725
 Author: Chong Luo Date: January 28th, 2014

Existing Timing Plans†

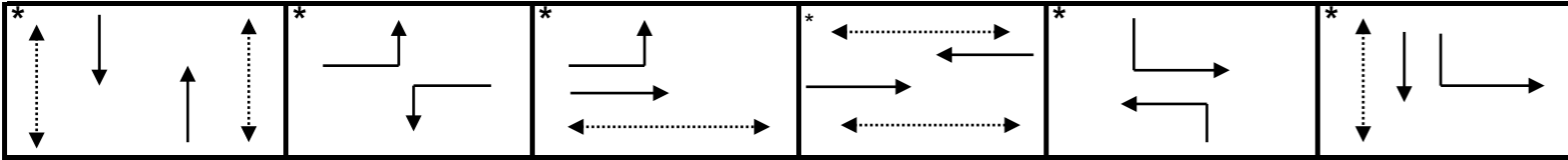
| | Plan | | | | Ped Minimum Time | | |
|--------------|--------------|---------------|--------------|---------------|------------------|----|---------|
| | AM Peak 1 | Off Peak 2 | PM Peak 3 | Off Peak 4 | Walk | DW | A+R |
| Cycle | Free | Free | Free | Free | | | |
| Offset | X | X | X | X | | | |
| NB Thru | 36.9 | 31.9 | 31.9 | 31.9 | 7 | 18 | 4.6+2.3 |
| SB Thru | 31.9 | 41.9 | 31.9 | 31.9 | 7 | 18 | 4.6+2.3 |
| WB Left (fp) | 11.9 | 21.9 | 11.9 | 16.9 | - | - | 4.6+2.3 |
| EB Left (fp) | 31.9 | 31.9 | 21.9 | 16.9 | - | - | 4.6+2.3 |
| WB Thru | 31.9 | 31.9 | 31.9 | 31.9 | 7 | 18 | 4.6+2.3 |
| EB Thru | 51.9 | 41.9 | 41.9 | 31.9 | 7 | 18 | 4.6+2.3 |
| NB Left (fp) | 16.9 | 21.9 | 16.9 | 16.9 | - | - | 4.6+2.3 |
| SB Left (fp) | 11.9 | 31.9 | 16.9 | 16.9 | - | - | 4.6+2.3 |

Phasing Sequence†

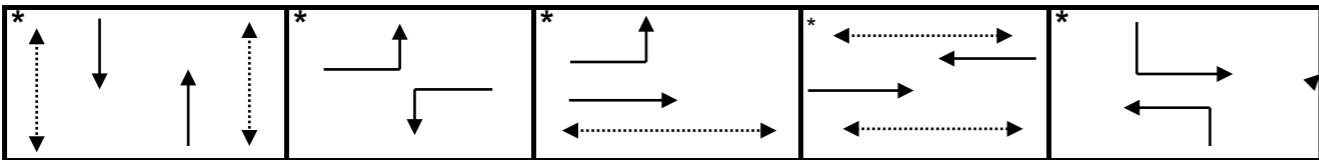
Plans: 1



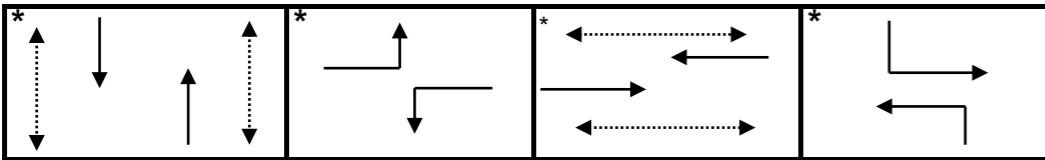
Plans: 2



Plans: 3



Plans: 4



Note: For all plans, the NS Thru phase has a minimum recall of 10 seconds green

Schedule

Weekday

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 6:30 | 1 |
| 9:30 | 2 |
| 15:00 | 3 |
| 18:00 | 2 |
| 23:30 | 4 |

Weekend

| Time | Plan |
|-------|------|
| 0:15 | 4 |
| 8:00 | 2 |
| 23:30 | 4 |

Notes

†: Time for each direction includes amber and all red intervals
 ‡: Start of first phase should be used as reference point for offset
 Asterix (*) Indicates actuated phase
 (fp): Fully Protected Left Turn

←.....→ Pedestrian signal

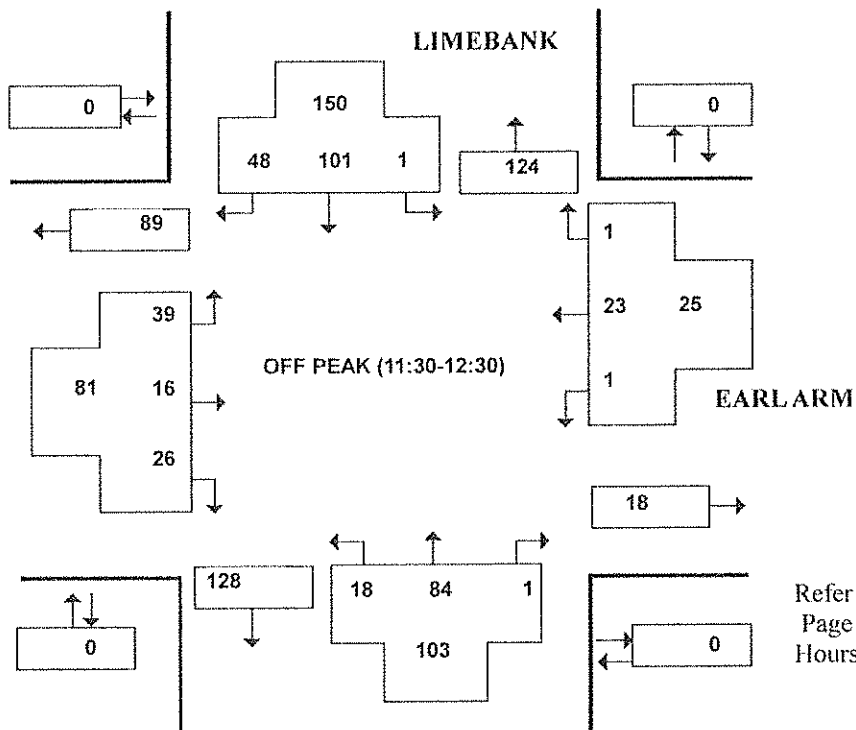
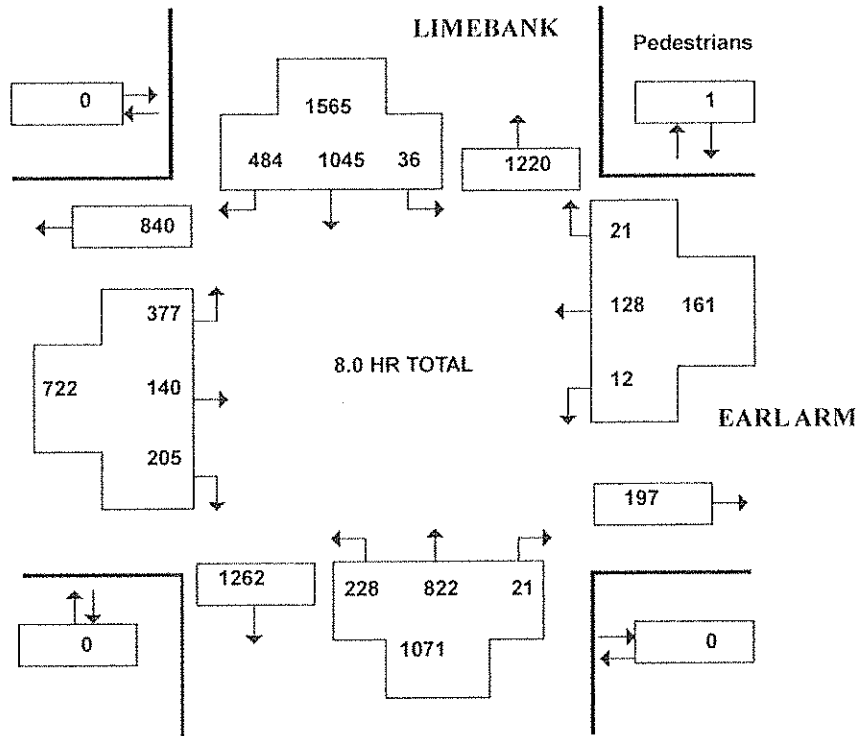
Cost is \$56.50 (\$50 + HST)

EARL ARMSTRONG RD and LIMEBANK RD
(ULRS Listing EARL ARM & LIMEBANK)

Survey Date: Friday 10 August 2012
 Conditions: dry
 Start Time: 0700

Total Observed U-Turns
 Northbound: 1 Southbound: 2
 Eastbound: 0 Westbound: 0

AADT Factor
 Friday in August is
 0.9



Refer to Summary Page for Survey Hours.

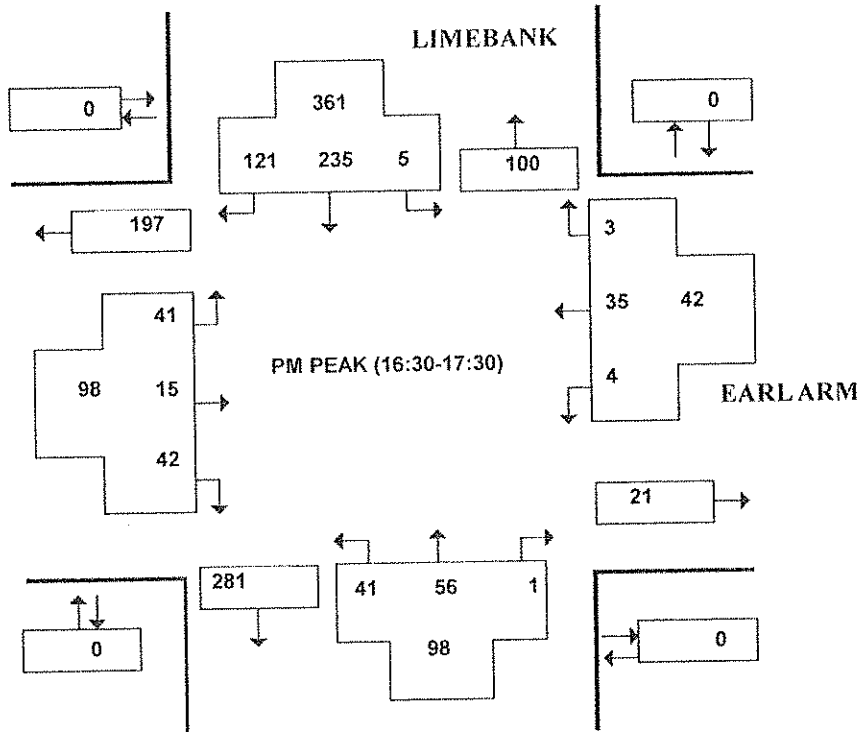
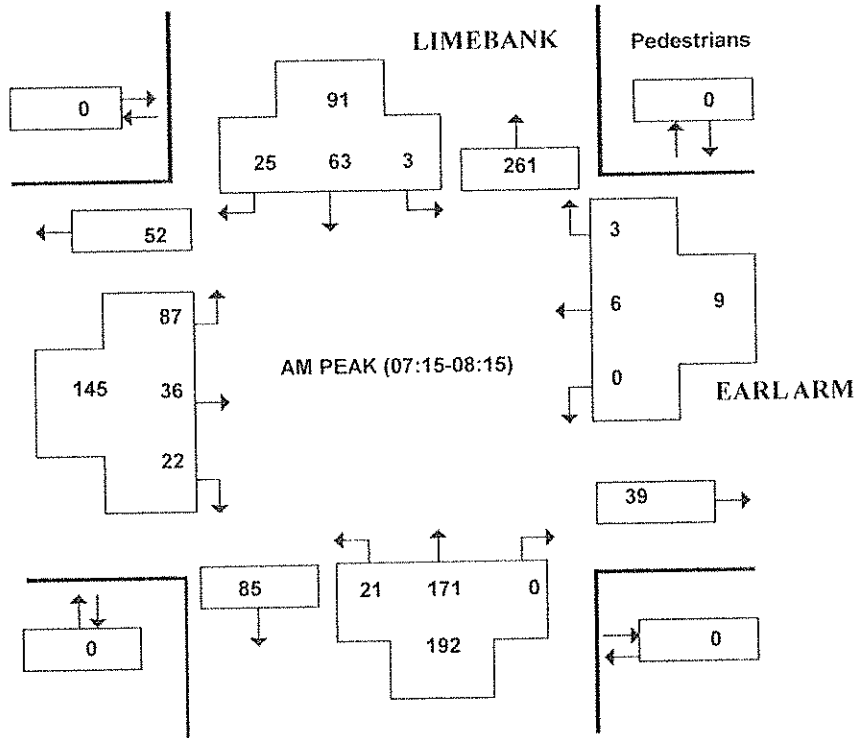
EARLARMSTRONG RD and LIMEBANK RD

(ULRS Listing EARL ARM & LIMEBANK)

Survey Date: Friday 10 August 2012
 Conditions: dry
 Start Time: 0700

Total Observed U-Turns
 Northbound: 1 Southbound: 2
 Eastbound: 0 Westbound: 0

AADT Factor
 Friday in August is
 0.9



Vehicular Turning Movements - Summary

EARL ARMSTRONG RD and LIMEBANK RD

(ULRS Listing EARL ARM & LIMEBANK)

Survey Date: Friday 10 August 2012
 Conditions: dry
 Start Time: 0700

Total Observed U-Turns
 Northbound: 1 Southbound: 2
 Eastbound: 0 Westbound: 0

AADT Factor
 Friday in August is
 0.9

| Time Period | LIMEBANK | | | | | | | | | EARLARM | | | | | | | | | |
|---------------------|------------|------------|-----------|-------------|------------|-------------|------------|-------------|-------------|------------|------------|------------|------------|-----------|------------|-----------|------------|------------|--------------|
| | Northbound | | | SUB TOT | Southbound | | | SUB TOT | STR TOT | Eastbound | | | SUB TOT | Westbound | | | SUB TOT | STR TOT | GRAND TOT |
| | LT | ST | RT | | LT | ST | RT | | | LT | ST | RT | | LT | ST | RT | | | |
| 07:00-08:00 | 20 | 166 | 3 | 189 | 1 | 55 | 27 | 83 | 272 | 71 | 27 | 23 | 121 | 1 | 3 | 3 | 7 | 128 | 400 |
| 08:00-09:00 | 17 | 179 | 4 | 200 | 5 | 71 | 28 | 104 | 304 | 70 | 28 | 17 | 115 | 2 | 8 | 3 | 13 | 128 | 432 |
| 09:00-10:00 | 28 | 121 | 6 | 155 | 4 | 80 | 46 | 130 | 285 | 41 | 14 | 8 | 63 | 0 | 8 | 5 | 13 | 76 | 361 |
| 11:30-12:30 | 18 | 84 | 1 | 103 | 1 | 101 | 48 | 150 | 253 | 39 | 16 | 26 | 81 | 1 | 23 | 1 | 25 | 106 | 359 |
| 12:30-13:30 | 44 | 77 | 2 | 123 | 3 | 101 | 27 | 131 | 254 | 51 | 12 | 20 | 83 | 0 | 5 | 2 | 7 | 90 | 344 |
| 15:00-16:00 | 24 | 67 | 0 | 91 | 11 | 184 | 93 | 288 | 379 | 27 | 14 | 32 | 73 | 1 | 24 | 3 | 28 | 101 | 480 |
| 16:00-17:00 | 38 | 54 | 2 | 94 | 8 | 221 | 115 | 344 | 438 | 40 | 11 | 31 | 82 | 4 | 40 | 2 | 46 | 128 | 566 |
| 17:00-18:00 | 39 | 74 | 3 | 116 | 3 | 232 | 100 | 335 | 451 | 38 | 18 | 48 | 104 | 3 | 17 | 2 | 22 | 126 | 577 |
| 8.0 HR TOTAL | 228 | 822 | 21 | 1071 | 36 | 1045 | 484 | 1565 | 2636 | 377 | 140 | 205 | 722 | 12 | 128 | 21 | 161 | 883 | 3519 |

EQU. 12 HR TOTAL 316 1142 29 1487 50 1452 672 2174 3661 524 194 284 1002 16 177 29 222 1224 4885

Note: These values are calculated by multiplying the totals by the appropriate expansion factor.

AVG. 12 HR TOTAL 284 1027 26 1337 45 1306 604 1955 3292 471 174 255 900 14 159 26 199 1099 4391

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.

AVG. 24 HR TOTAL 372 1345 34 1751 58 1710 791 2559 4310 617 227 334 1178 18 208 34 260 1438 5748

Note: These volumes were calculated by multiplying the Average Daily 12 hr totals by 1.31.

AM TOTAL (0700-0900) 37 345 7 389 6 126 55 187 576 141 55 40 236 3 11 6 20 256 832

PM TOTAL (1530-1730) 75 117 3 195 13 428 220 661 856 73 28 71 172 6 68 3 77 249 1105

Vehicular Turning Movements (15 Min. Volumes)

EARL ARMSTRONG RD and LIMEBANK RD

(ULRS Listing EARL ARM & LIMEBANK)

Survey Date: Friday 10 August 2012
 Conditions: dry
 Start Time: 07:00

Total Observed U-Turns
 Northbound: 1 Southbound: 2
 Eastbound: 0 Westbound: 0

AADT Factor
 Friday in August is
 0.9

| Time Period | LIMEBANK | | | | | | | | | EARL ARM | | | | | | | | | SUB TOT | STR TOT | GRAND TOT |
|-------------|------------|----|----|------------|------------|----|----|------------|------------|-----------|----|----|------------|----|----|----|------------|------------|------------|------------|--------------|
| | Northbound | | | | Southbound | | | | | Eastbound | | | Westbound | | | | | | | | |
| | LT | ST | RT | SUB TOT | LT | ST | RT | SUB TOT | STR TOT | LT | ST | RT | SUB TOT | LT | ST | RT | SUB TOT | STR TOT | | | |
| 07:00-07:15 | 4 | 39 | 3 | 46 | 0 | 9 | 4 | 13 | 59 | 8 | 0 | 3 | 11 | 1 | 0 | 1 | 2 | 13 | 72 | | |
| 07:15-07:30 | 2 | 41 | 0 | 43 | 0 | 17 | 10 | 27 | 70 | 19 | 9 | 6 | 34 | 0 | 1 | 0 | 1 | 35 | 105 | | |
| 07:30-07:45 | 7 | 42 | 0 | 49 | 1 | 17 | 4 | 22 | 71 | 23 | 7 | 9 | 39 | 0 | 2 | 2 | 4 | 43 | 114 | | |
| 07:45-08:00 | 7 | 44 | 0 | 51 | 0 | 12 | 9 | 21 | 72 | 21 | 11 | 5 | 37 | 0 | 0 | 0 | 0 | 37 | 109 | | |
| 08:00-08:15 | 5 | 44 | 0 | 49 | 2 | 17 | 2 | 21 | 70 | 24 | 9 | 2 | 35 | 0 | 3 | 1 | 4 | 39 | 109 | | |
| 08:15-08:30 | 4 | 46 | 0 | 50 | 0 | 17 | 4 | 21 | 71 | 17 | 7 | 5 | 29 | 1 | 0 | 1 | 2 | 31 | 102 | | |
| 08:30-08:45 | 2 | 39 | 2 | 43 | 2 | 22 | 3 | 27 | 70 | 15 | 6 | 6 | 27 | 1 | 4 | 0 | 5 | 32 | 102 | | |
| 08:45-09:00 | 6 | 50 | 2 | 58 | 1 | 15 | 19 | 35 | 93 | 14 | 6 | 4 | 24 | 0 | 1 | 1 | 2 | 26 | 119 | | |
| 09:00-09:15 | 13 | 33 | 2 | 48 | 1 | 20 | 9 | 30 | 78 | 8 | 5 | 1 | 14 | 0 | 1 | 1 | 2 | 16 | 94 | | |
| 09:15-09:30 | 3 | 27 | 1 | 31 | 1 | 18 | 14 | 33 | 64 | 13 | 3 | 4 | 20 | 0 | 4 | 0 | 4 | 24 | 88 | | |
| 09:30-09:45 | 7 | 32 | 2 | 41 | 0 | 22 | 11 | 33 | 74 | 9 | 3 | 2 | 14 | 0 | 2 | 2 | 4 | 18 | 92 | | |
| 09:45-10:00 | 5 | 29 | 1 | 35 | 2 | 20 | 12 | 34 | 69 | 11 | 3 | 1 | 15 | 0 | 1 | 2 | 3 | 18 | 87 | | |
| 11:30-11:45 | 4 | 19 | 0 | 23 | 0 | 31 | 15 | 46 | 69 | 12 | 5 | 8 | 25 | 0 | 7 | 0 | 7 | 32 | 101 | | |
| 11:45-12:00 | 6 | 21 | 0 | 27 | 0 | 24 | 15 | 39 | 66 | 6 | 6 | 5 | 17 | 0 | 4 | 0 | 4 | 21 | 87 | | |
| 12:00-12:15 | 5 | 19 | 1 | 25 | 0 | 22 | 9 | 31 | 56 | 13 | 1 | 6 | 20 | 0 | 4 | 0 | 4 | 24 | 80 | | |
| 12:15-12:30 | 3 | 25 | 0 | 28 | 1 | 24 | 9 | 34 | 62 | 8 | 4 | 7 | 19 | 1 | 8 | 1 | 10 | 29 | 91 | | |
| 12:30-12:45 | 6 | 20 | 0 | 26 | 1 | 18 | 9 | 28 | 54 | 8 | 4 | 1 | 13 | 0 | 2 | 0 | 2 | 15 | 69 | | |
| 12:45-13:00 | 7 | 20 | 0 | 27 | 2 | 26 | 5 | 33 | 60 | 16 | 4 | 6 | 26 | 0 | 2 | 1 | 3 | 29 | 89 | | |
| 13:00-13:15 | 16 | 19 | 0 | 35 | 0 | 28 | 7 | 35 | 70 | 12 | 1 | 8 | 21 | 0 | 0 | 0 | 0 | 21 | 91 | | |
| 13:15-13:30 | 15 | 18 | 2 | 35 | 0 | 29 | 6 | 35 | 70 | 15 | 3 | 5 | 23 | 0 | 1 | 1 | 2 | 25 | 95 | | |
| 15:00-15:15 | 4 | 17 | 0 | 21 | 3 | 47 | 24 | 74 | 95 | 8 | 3 | 9 | 20 | 0 | 3 | 2 | 5 | 25 | 120 | | |
| 15:15-15:30 | 5 | 24 | 0 | 29 | 5 | 46 | 22 | 73 | 102 | 4 | 3 | 8 | 15 | 1 | 5 | 1 | 7 | 22 | 124 | | |
| 15:30-15:45 | 5 | 12 | 0 | 17 | 0 | 38 | 24 | 62 | 79 | 8 | 3 | 9 | 20 | 0 | 8 | 0 | 8 | 28 | 107 | | |
| 15:45-16:00 | 10 | 14 | 0 | 24 | 3 | 53 | 23 | 79 | 103 | 7 | 5 | 6 | 18 | 0 | 8 | 0 | 8 | 26 | 129 | | |
| 16:00-16:15 | 10 | 17 | 1 | 28 | 2 | 53 | 15 | 70 | 98 | 8 | 1 | 4 | 13 | 1 | 11 | 0 | 12 | 25 | 123 | | |
| 16:15-16:30 | 9 | 18 | 1 | 28 | 3 | 49 | 37 | 89 | 117 | 9 | 4 | 10 | 23 | 1 | 6 | 0 | 7 | 30 | 147 | | |
| 16:30-16:45 | 7 | 8 | 0 | 15 | 0 | 57 | 31 | 88 | 103 | 12 | 2 | 9 | 23 | 1 | 11 | 1 | 13 | 36 | 139 | | |
| 16:45-17:00 | 12 | 11 | 0 | 23 | 3 | 62 | 32 | 97 | 120 | 11 | 4 | 8 | 23 | 1 | 12 | 1 | 14 | 37 | 157 | | |
| 17:00-17:15 | 14 | 12 | 0 | 26 | 1 | 52 | 34 | 87 | 113 | 7 | 4 | 15 | 26 | 2 | 9 | 1 | 12 | 38 | 151 | | |
| 17:15-17:30 | 8 | 25 | 1 | 34 | 1 | 64 | 24 | 89 | 123 | 11 | 5 | 10 | 26 | 0 | 3 | 0 | 3 | 29 | 152 | | |
| 17:30-17:45 | 7 | 14 | 0 | 21 | 0 | 57 | 19 | 76 | 97 | 9 | 5 | 12 | 26 | 1 | 2 | 0 | 3 | 29 | 126 | | |
| 17:45-18:00 | 10 | 23 | 2 | 35 | 1 | 59 | 23 | 83 | 118 | 11 | 4 | 11 | 26 | 0 | 3 | 1 | 4 | 30 | 148 | | |

Pedestrian Volume Summary Sheet - Hourly Volumes

EARL ARMSTRONG RD and LIMEBANK RD

(ULRS Listing EARL ARM & LIMEBANK)

Survey Date: Friday 10 August 2012

Conditions: dry

Start Time: 0700

| Time Period | CROSSING LIMEBANK N/B APPROACH | CROSSING LIMEBANK S/B APPROACH | STREET TOTAL | CROSSING EARL ARM E/B APPROACH | CROSSING EARL ARM W/B APPROACH | STREET TOTAL | GRAND TOTAL |
|--------------|--------------------------------------|--------------------------------------|-----------------|--------------------------------------|--------------------------------------|-----------------|----------------|
| 07:00-08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:00-09:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09:00-10:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:30-12:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:30-13:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:00-16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:00-17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:00-18:00 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 8.0 HR TOTAL | 0 | 0 | 0 | 0 | 1 | 1 | 1 |

PEAK PERIOD SUMMARIES

AM PEAK PERIOD (7:00-9:00)

| | | | | | | | |
|-------------|---|---|---|---|---|---|---|
| 07:00-07:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:15-07:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:30-07:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07:45-08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:00-08:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:15-08:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:30-08:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:45-09:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTALS | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

OFF PEAK PERIOD (11:30-13:30)

| | | | | | | | |
|-------------|---|---|---|---|---|---|---|
| 11:30-11:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:45-12:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:00-12:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:15-12:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:30-12:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:45-13:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:00-13:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13:15-13:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTALS | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

PM PEAK PERIOD (15:30-17:30)

| | | | | | | | |
|-------------|---|---|---|---|---|---|---|
| 15:30-15:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:45-16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:00-16:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:15-16:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:30-16:45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:45-17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:00-17:15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:15-17:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTALS | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Approved by: AWD

Printed on : 24/01/2014

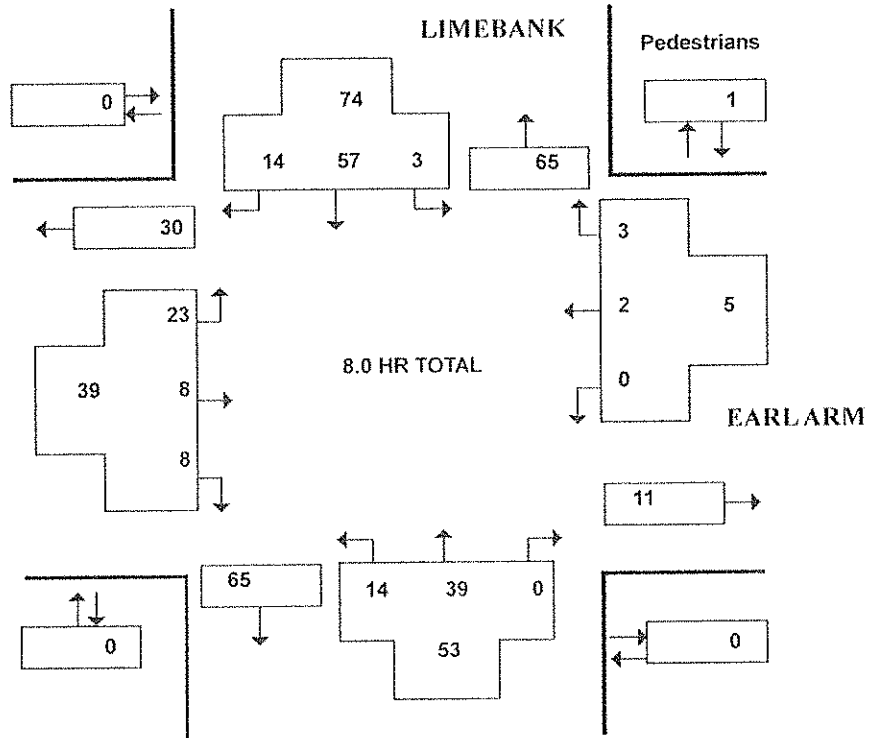
Heavy Vehicle Summary Sheet - Hourly Volumes

EARL ARMSTRONG RD and LIMEBANK RD
(ULRS Listing EARL ARM & LIMEBANK)

Survey Date : Friday 10 August 2012

Conditions : dry

Start Time : 0700



———— LIMEBANK ————

———— EARLARM ————

| Time Period | Northbound | | | SUB TOT | Southbound | | | SUB TOT | STR TOT | Eastbound | | | SUB TOT | Westbound | | | SUB TOT | STR TOT | GRAND TOT |
|---------------------|------------|-----------|----------|------------|------------|-----------|-----------|------------|------------|-----------|----------|----------|------------|-----------|----------|----------|------------|------------|--------------|
| | LT | ST | RT | | LT | ST | RT | | | LT | ST | RT | | LT | ST | RT | | | |
| 07:00-08:00 | 3 | 6 | 0 | 9 | 0 | 5 | 0 | 5 | 14 | 2 | 2 | 5 | 9 | 0 | 0 | 0 | 0 | 9 | 23 |
| 08:00-09:00 | 1 | 6 | 0 | 7 | 1 | 6 | 4 | 11 | 18 | 2 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 3 | 21 |
| 09:00-10:00 | 3 | 8 | 0 | 11 | 0 | 6 | 1 | 7 | 18 | 4 | 2 | 1 | 7 | 0 | 0 | 3 | 3 | 10 | 28 |
| 11:30-12:30 | 2 | 7 | 0 | 9 | 1 | 11 | 0 | 12 | 21 | 2 | 2 | 0 | 4 | 0 | 1 | 0 | 1 | 5 | 26 |
| 12:30-13:30 | 0 | 8 | 0 | 8 | 1 | 11 | 2 | 14 | 22 | 3 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 26 |
| 15:00-16:00 | 2 | 4 | 0 | 6 | 0 | 7 | 3 | 10 | 16 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 18 |
| 16:00-17:00 | 2 | 0 | 0 | 2 | 0 | 7 | 1 | 8 | 10 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 14 |
| 17:00-18:00 | 1 | 0 | 0 | 1 | 0 | 4 | 3 | 7 | 8 | 6 | 0 | 1 | 7 | 0 | 0 | 0 | 0 | 7 | 15 |
| 8.0 HR TOTAL | 14 | 39 | 0 | 53 | 3 | 57 | 14 | 74 | 127 | 23 | 8 | 8 | 39 | 0 | 2 | 3 | 5 | 44 | 171 |

Heavy Vehicles are vehicles having one rear axle with four or more wheels, or having two or more rear axles. These vehicles include most O.C. Transpo, school and inter-city buses. Further, they ARE included in the Turning Movement Count Summary.

Approved by: AWD

Printed on: 24/01/2014

Bicycle Volume Summary Sheet - Hourly Volumes

EARL ARMSTRONG RD and LIMEBANK RD

(ULRS Listing EARL ARM & LIMEBANK)

Survey Date: Friday 10 August 2012

Conditions: dry

Start Time: 0700

| Time Period | NORTHBOUND APPROACH ON LIMEBANK | SOUTHBOUND APPROACH ON LIMEBANK | STREET TOTAL | EASTBOUND APPROACH ON EARL ARM | WESTBOUND APPROACH ON EARL ARM | STREET TOTAL | GRAND TOTAL |
|---------------------|---------------------------------------|---------------------------------------|-----------------|--------------------------------------|--------------------------------------|-----------------|----------------|
| 07:00-08:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08:00-09:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09:00-10:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11:30-12:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12:30-13:30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15:00-16:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16:00-17:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17:00-18:00 | 0 | 2 | 2 | 1 | 0 | 1 | 3 |
| 8.0 HR TOTAL | 0 | 2 | 2 | 1 | 0 | 1 | 3 |

Note: These volumes consists of bicycles only (no mopeds or motorcycles) and ARE NOT included in the Turning Movement Count Summary.

APPENDIX C: Synchro Analysis – Future Background 2016 zero interaction



Queues

3: Earl Armstrong & Limebank

Future Background - 2016

Weekday AM Peak Hour - Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 160 | 45 | 55 | 10 | 30 | 15 | 120 | 160 | 5 | 45 | 90 | 125 |
| Lane Group Flow (vph) | 160 | 45 | 55 | 10 | 30 | 15 | 120 | 160 | 5 | 45 | 90 | 125 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 23.0 | 40.0 | 40.0 | 15.0 | 32.0 | 32.0 | 21.0 | 41.6 | 41.6 | 16.0 | 36.6 | 59.6 |
| Total Split (%) | 20.4% | 35.5% | 35.5% | 13.3% | 28.4% | 28.4% | 18.7% | 36.9% | 36.9% | 14.2% | 32.5% | 52.9% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.43 | 0.07 | 0.17 | 0.05 | 0.09 | 0.09 | 0.38 | 0.08 | 0.01 | 0.19 | 0.05 | 0.06 |
| Control Delay | 50.5 | 37.1 | 11.7 | 50.0 | 46.1 | 20.9 | 51.3 | 12.7 | 9.0 | 50.6 | 14.6 | 1.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 50.5 | 37.1 | 11.7 | 50.0 | 46.1 | 20.9 | 51.3 | 12.7 | 9.0 | 50.6 | 14.6 | 1.5 |
| Queue Length 50th (m) | 17.1 | 3.8 | 0.0 | 1.0 | 3.1 | 0.0 | 12.8 | 8.8 | 0.0 | 4.8 | 5.1 | 0.0 |
| Queue Length 95th (m) | 26.7 | 9.5 | 10.9 | 3.8 | 7.7 | 6.3 | 21.3 | 15.5 | 2.0 | 10.3 | 10.2 | 3.5 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 521 | 1072 | 518 | 277 | 820 | 378 | 460 | 2110 | 946 | 308 | 1958 | 2142 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.31 | 0.04 | 0.11 | 0.04 | 0.04 | 0.04 | 0.26 | 0.08 | 0.01 | 0.15 | 0.05 | 0.06 |

Intersection Summary

Cycle Length: 112.6

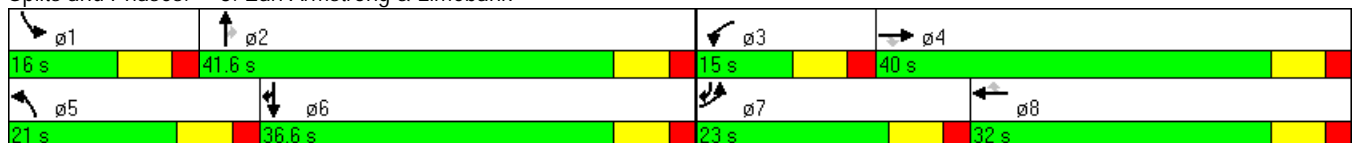
Actuated Cycle Length: 112.6

Offset: 82 (73%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 3: Earl Armstrong & Limebank















HCM Signalized Intersection Capacity Analysis
 3: Earl Armstrong & Limebank

Future Background - 2016
 Weekday AM Peak Hour - Zero Interaction

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|------|-------|------|-------|------|----------------------|-------|------|------|------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 160 | 45 | 55 | 10 | 30 | 15 | 120 | 160 | 5 | 45 | 90 | 125 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 160 | 45 | 55 | 10 | 30 | 15 | 120 | 160 | 5 | 45 | 90 | 125 |
| RTOR Reduction (vph) | 0 | 0 | 45 | 0 | 0 | 14 | 0 | 0 | 2 | 0 | 0 | 42 |
| Lane Group Flow (vph) | 160 | 45 | 10 | 10 | 30 | 1 | 120 | 160 | 3 | 45 | 90 | 83 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 11.2 | 18.6 | 18.6 | 1.3 | 8.7 | 8.7 | 9.3 | 59.3 | 59.3 | 5.8 | 55.8 | 73.9 |
| Effective Green, g (s) | 12.2 | 19.6 | 19.6 | 2.3 | 9.7 | 9.7 | 10.3 | 60.3 | 60.3 | 6.8 | 56.8 | 74.9 |
| Actuated g/C Ratio | 0.11 | 0.17 | 0.17 | 0.02 | 0.09 | 0.09 | 0.09 | 0.54 | 0.54 | 0.06 | 0.50 | 0.67 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 372 | 616 | 276 | 70 | 305 | 136 | 314 | 1895 | 848 | 207 | 1785 | 1854 |
| v/s Ratio Prot | c0.05 | 0.01 | | 0.00 | c0.01 | | c0.03 | c0.05 | | 0.01 | 0.03 | 0.03 |
| v/s Ratio Perm | | | 0.01 | | | 0.00 | | | 0.00 | | | |
| v/c Ratio | 0.43 | 0.07 | 0.03 | 0.14 | 0.10 | 0.01 | 0.38 | 0.08 | 0.00 | 0.22 | 0.05 | 0.04 |
| Uniform Delay, d1 | 46.9 | 38.9 | 38.6 | 54.2 | 47.4 | 47.1 | 48.2 | 12.7 | 12.2 | 50.4 | 14.2 | 6.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.98 | 0.96 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.8 | 0.1 | 0.1 | 0.9 | 0.1 | 0.0 | 0.8 | 0.1 | 0.0 | 0.5 | 0.1 | 0.0 |
| Delay (s) | 47.7 | 39.0 | 38.7 | 55.1 | 46.7 | 45.2 | 48.9 | 12.8 | 12.2 | 50.9 | 14.2 | 6.5 |
| Level of Service | D | D | D | E | D | D | D | B | B | D | B | A |
| Approach Delay (s) | | 44.3 | | | 47.8 | | | 28.0 | | | 16.9 | |
| Approach LOS | | D | | | D | | | C | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 30.8 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.17 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 23.6 | | | |
| Intersection Capacity Utilization | | | 38.5% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

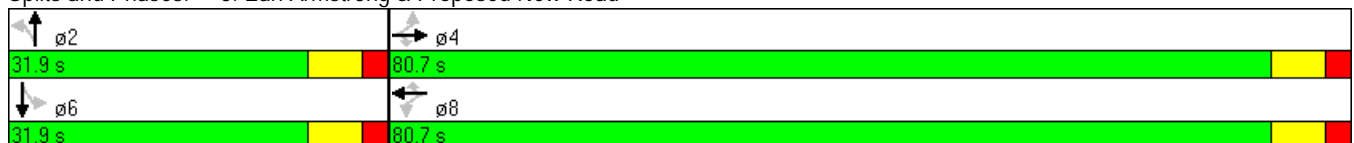
Future Background - 2016
Weekday AM Peak Hour - Zero Interaction

| |  |  |  |  |  | |
|------------------------|---|---|---|---|---|------|
| Lane Group | EBL | EBT | WBT | WBR | SBT | ø2 |
| Lane Configurations |  |   |   |  |  | |
| Volume (vph) | 35 | 65 | 40 | 2 | 0 | |
| Lane Group Flow (vph) | 35 | 65 | 40 | 2 | 15 | |
| Turn Type | Perm | | | Perm | | |
| Protected Phases | | 4 | 8 | | 6 | 2 |
| Permitted Phases | 4 | | | 8 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 6 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 80.7 | 80.7 | 80.7 | 80.7 | 31.9 | 31.9 |
| Total Split (%) | 71.7% | 71.7% | 71.7% | 71.7% | 28.3% | 28% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | None | None |
| v/c Ratio | 0.03 | 0.02 | 0.01 | 0.00 | 0.01 | |
| Control Delay | 0.2 | 0.2 | 1.6 | 1.5 | 0.0 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 0.2 | 0.2 | 1.6 | 1.5 | 0.0 | |
| Queue Length 50th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Queue Length 95th (m) | 0.3 | 0.3 | 1.6 | 0.4 | 0.0 | |
| Internal Link Dist (m) | | 95.8 | 43.9 | | 67.0 | |
| Turn Bay Length (m) | 30.0 | | | 30.0 | | |
| Base Capacity (vph) | 1250 | 3252 | 3252 | 1455 | 1143 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.03 | 0.02 | 0.01 | 0.00 | 0.01 | |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis







6: Earl Armstrong & Proposed New Road

Future Background - 2016
Weekday AM Peak Hour - Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 65 | 0 | 0 | 40 | 2 | 0 | 0 | 0 | 0 | 0 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | | 5.9 | 5.9 | | | | | | 5.9 |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | | | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Flt Permitted | 0.73 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (perm) | 1359 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 65 | 0 | 0 | 40 | 2 | 0 | 0 | 0 | 0 | 0 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 35 | 65 | 0 | 0 | 40 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 94.8 | 94.8 | | | 94.8 | 94.8 | | | | | | 4.0 |
| Effective Green, g (s) | 95.8 | 95.8 | | | 95.8 | 95.8 | | | | | | 5.0 |
| Actuated g/C Ratio | 0.85 | 0.85 | | | 0.85 | 0.85 | | | | | | 0.04 |
| Clearance Time (s) | 6.9 | 6.9 | | | 6.9 | 6.9 | | | | | | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | | | | | | 3.0 |
| Lane Grp Cap (vph) | 1156 | 3011 | | | 3011 | 1347 | | | | | | 70 |
| v/s Ratio Prot | | 0.02 | | | 0.01 | | | | | | | c0.00 |
| v/s Ratio Perm | c0.03 | | | | | 0.00 | | | | | | |
| v/c Ratio | 0.03 | 0.02 | | | 0.01 | 0.00 | | | | | | 0.01 |
| Uniform Delay, d1 | 1.3 | 1.3 | | | 1.3 | 1.3 | | | | | | 51.4 |
| Progression Factor | 0.10 | 0.10 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Incremental Delay, d2 | 0.0 | 0.0 | | | 0.0 | 0.0 | | | | | | 0.1 |
| Delay (s) | 0.2 | 0.1 | | | 1.3 | 1.3 | | | | | | 51.5 |
| Level of Service | A | A | | | A | A | | | | | | D |
| Approach Delay (s) | | 0.2 | | | 1.3 | | | 0.0 | | | | 51.5 |
| Approach LOS | | A | | | A | | | A | | | | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 5.4 | | | | HCM Level of Service | | | A | | |
| HCM Volume to Capacity ratio | | | 0.03 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 26.8% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background - 2016
 Weekday AM Peak Hour - Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 100 | 0 | 0 | 55 | 0 | 0 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 100 | 0 | 0 | 55 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | 120 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 100 | | 128 | 50 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 100 | | 128 | 50 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1490 | | 854 | 1008 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 67 | 33 | 28 | 28 | 0 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.04 | 0.02 | 0.02 | 0.02 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 6.7% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background - 2016
 Weekday AM Peak Hour - Zero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|-------------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 0 | 0 | 290 | 0 | 0 | 155 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 0 | 0 | 290 | 0 | 0 | 155 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | None | | | None | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | 144 | | | | | | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 368 | 145 | | | 290 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 368 | 145 | | | 290 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | | | 100 | | |
| cM capacity (veh/h) | 606 | 876 | | | 1269 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 0 | 0 | 193 | 97 | 0 | 78 | 78 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.00 | 0.00 | 0.11 | 0.06 | 0.00 | 0.05 | 0.05 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | A | | | | | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.0 | | | | |
| Intersection Capacity Utilization | | | 11.3% | ICU Level of Service | A | | |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background - 2016
 Weekday AM Peak Hour - Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background - 2016
 Weekday AM Peak Hour - Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

Future Background Traffic-2016

3: Earl Armstrong & Limebank

Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 255 | 50 | 95 | 60 | 65 | 25 | 75 | 105 | 20 | 85 | 175 | 280 |
| Lane Group Flow (vph) | 255 | 50 | 95 | 60 | 65 | 25 | 75 | 105 | 20 | 85 | 175 | 280 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 22.0 | 41.0 | 41.0 | 13.0 | 32.0 | 32.0 | 13.0 | 35.6 | 35.6 | 13.0 | 35.6 | 57.6 |
| Total Split (%) | 21.4% | 40.0% | 40.0% | 12.7% | 31.2% | 31.2% | 12.7% | 34.7% | 34.7% | 12.7% | 34.7% | 56.1% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.55 | 0.09 | 0.28 | 0.26 | 0.17 | 0.13 | 0.26 | 0.06 | 0.02 | 0.28 | 0.10 | 0.14 |
| Control Delay | 46.1 | 35.1 | 9.7 | 46.8 | 43.7 | 18.1 | 45.8 | 17.1 | 7.8 | 45.8 | 16.7 | 1.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.1 | 35.1 | 9.7 | 46.8 | 43.7 | 18.1 | 45.8 | 17.1 | 7.8 | 45.8 | 16.7 | 1.1 |
| Queue Length 50th (m) | 24.4 | 4.3 | 0.0 | 5.8 | 6.1 | 0.2 | 7.2 | 6.1 | 0.0 | 8.1 | 10.3 | 0.0 |
| Queue Length 95th (m) | 35.8 | 9.2 | 12.7 | 12.1 | 12.0 | 7.1 | 13.8 | 11.8 | 4.5 | 15.2 | 18.0 | 4.8 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 539 | 1211 | 604 | 238 | 900 | 421 | 291 | 1769 | 802 | 300 | 1779 | 2077 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.04 | 0.16 | 0.25 | 0.07 | 0.06 | 0.26 | 0.06 | 0.02 | 0.28 | 0.10 | 0.13 |

Intersection Summary

Cycle Length: 102.6

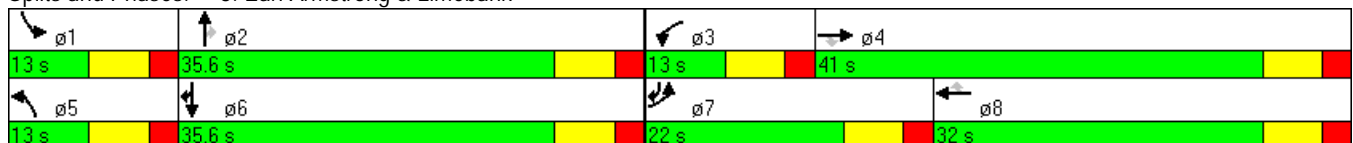
Actuated Cycle Length: 102.6

Offset: 27 (26%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated


































Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis













3: Earl Armstrong & Limebank

Future Background Traffic-2016
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |   |   |  |   |   |  |   |   |  |   |   |   |
| Volume (vph) | 255 | 50 | 95 | 60 | 65 | 25 | 75 | 105 | 20 | 85 | 175 | 280 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 255 | 50 | 95 | 60 | 65 | 25 | 75 | 105 | 20 | 85 | 175 | 280 |
| RTOR Reduction (vph) | 0 | 0 | 79 | 0 | 0 | 23 | 0 | 0 | 11 | 0 | 0 | 94 |
| Lane Group Flow (vph) | 255 | 50 | 16 | 60 | 65 | 2 | 75 | 105 | 9 | 85 | 175 | 186 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 12.7 | 15.9 | 15.9 | 4.9 | 8.1 | 8.1 | 6.5 | 47.5 | 47.5 | 6.7 | 47.7 | 67.3 |
| Effective Green, g (s) | 13.7 | 16.9 | 16.9 | 5.9 | 9.1 | 9.1 | 7.5 | 48.5 | 48.5 | 7.7 | 48.7 | 68.3 |
| Actuated g/C Ratio | 0.13 | 0.16 | 0.16 | 0.06 | 0.09 | 0.09 | 0.07 | 0.47 | 0.47 | 0.08 | 0.47 | 0.67 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 458 | 583 | 261 | 197 | 314 | 140 | 251 | 1673 | 748 | 258 | 1680 | 1855 |
| v/s Ratio Prot | c0.07 | 0.01 | | 0.02 | c0.02 | | 0.02 | 0.03 | | c0.02 | 0.05 | c0.07 |
| v/s Ratio Perm | | | 0.01 | | | 0.00 | | | 0.01 | | | |
| v/c Ratio | 0.56 | 0.09 | 0.06 | 0.30 | 0.21 | 0.02 | 0.30 | 0.06 | 0.01 | 0.33 | 0.10 | 0.10 |
| Uniform Delay, d1 | 41.6 | 36.3 | 36.1 | 46.4 | 43.4 | 42.7 | 45.1 | 14.7 | 14.3 | 45.0 | 14.9 | 6.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.97 | 1.02 | 1.02 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.5 | 0.1 | 0.1 | 0.9 | 0.3 | 0.0 | 0.7 | 0.1 | 0.0 | 0.8 | 0.1 | 0.0 |
| Delay (s) | 43.1 | 36.4 | 36.2 | 45.9 | 44.5 | 43.7 | 45.7 | 14.8 | 14.4 | 45.8 | 15.0 | 6.2 |
| Level of Service | D | D | D | D | D | D | D | B | B | D | B | A |
| Approach Delay (s) | | 40.6 | | | 44.9 | | | 26.3 | | | 15.3 | |
| Approach LOS | | D | | | D | | | C | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 28.3 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.20 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | 17.7 | | | |
| Intersection Capacity Utilization | | | 41.2% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

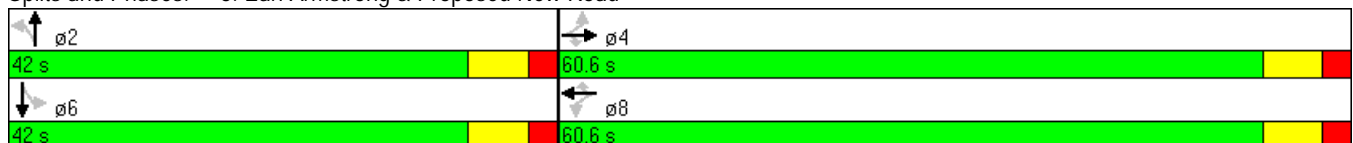
Future Background Traffic-2016
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBT | WBR | SBT | ø2 |
| Lane Configurations |  |  |  |  |  |  |
| Volume (vph) | 95 | 65 | 60 | 10 | 0 | |
| Lane Group Flow (vph) | 95 | 65 | 60 | 10 | 90 | |
| Turn Type | Perm | | | Perm | | |
| Protected Phases | | 4 | 8 | | 6 | 2 |
| Permitted Phases | 4 | | | 8 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 6 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 60.6 | 60.6 | 60.6 | 60.6 | 42.0 | 42.0 |
| Total Split (%) | 59.1% | 59.1% | 59.1% | 59.1% | 40.9% | 41% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | None | None |
| v/c Ratio | 0.09 | 0.02 | 0.02 | 0.01 | 0.09 | |
| Control Delay | 1.1 | 0.4 | 2.6 | 1.4 | 0.2 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 1.1 | 0.4 | 2.6 | 1.4 | 0.2 | |
| Queue Length 50th (m) | 0.5 | 0.2 | 1.1 | 0.0 | 0.0 | |
| Queue Length 95th (m) | 1.0 | 0.4 | 2.3 | 1.0 | 0.0 | |
| Internal Link Dist (m) | | 96.0 | 43.9 | | 67.0 | |
| Turn Bay Length (m) | 30.0 | | | 30.0 | | |
| Base Capacity (vph) | 1097 | 2910 | 2910 | 1303 | 1169 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.09 | 0.02 | 0.02 | 0.01 | 0.08 | |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis







6: Earl Armstrong & Proposed New Road

Future Background Traffic-2016
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 65 | 0 | 0 | 60 | 10 | 0 | 0 | 0 | 0 | 0 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | | 5.9 | 5.9 | | | | | | 5.9 |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | | | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Flt Permitted | 0.72 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (perm) | 1333 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 65 | 0 | 0 | 60 | 10 | 0 | 0 | 0 | 0 | 0 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 95 | 65 | 0 | 0 | 60 | 8 | 0 | 0 | 0 | 0 | 8 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 80.8 | 80.8 | | | 80.8 | 80.8 | | | | | | 8.0 |
| Effective Green, g (s) | 81.8 | 81.8 | | | 81.8 | 81.8 | | | | | | 9.0 |
| Actuated g/C Ratio | 0.80 | 0.80 | | | 0.80 | 0.80 | | | | | | 0.09 |
| Clearance Time (s) | 6.9 | 6.9 | | | 6.9 | 6.9 | | | | | | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | | | | | | 3.0 |
| Lane Grp Cap (vph) | 1063 | 2822 | | | 2822 | 1262 | | | | | | 139 |
| v/s Ratio Prot | | 0.02 | | | 0.02 | | | | | | | c0.00 |
| v/s Ratio Perm | c0.07 | | | | | 0.01 | | | | | | |
| v/c Ratio | 0.09 | 0.02 | | | 0.02 | 0.01 | | | | | | 0.06 |
| Uniform Delay, d1 | 2.3 | 2.1 | | | 2.1 | 2.1 | | | | | | 42.9 |
| Progression Factor | 0.34 | 0.15 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Incremental Delay, d2 | 0.2 | 0.0 | | | 0.0 | 0.0 | | | | | | 0.2 |
| Delay (s) | 0.9 | 0.3 | | | 2.2 | 2.1 | | | | | | 43.1 |
| Level of Service | A | A | | | A | A | | | | | | D |
| Approach Delay (s) | | 0.7 | | | 2.2 | | | 0.0 | | | | 43.1 |
| Approach LOS | | A | | | A | | | A | | | | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 12.9 | | | | HCM Level of Service | | | | | B |
| HCM Volume to Capacity ratio | | | 0.09 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 30.1% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |














HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2016
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 160 | 0 | 0 | 150 | 0 | 0 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 160 | 0 | 0 | 150 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 160 | | 235 | 80 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 160 | | 235 | 80 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1417 | | 732 | 964 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 107 | 53 | 75 | 75 | 0 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.06 | 0.03 | 0.04 | 0.04 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 7.8% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2016
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|--|---|---|--|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |   | |  |   | |
| Volume (veh/h) | 0 | 0 | 195 | 0 | 0 | 330 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 0 | 0 | 195 | 0 | 0 | 330 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 145 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 360 | 98 | | | 195 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 360 | 98 | | | 195 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | | | 100 | | |
| cM capacity (veh/h) | 612 | 940 | | | 1375 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 0 | 0 | 130 | 65 | 0 | 165 | 165 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.00 | 0.00 | 0.08 | 0.04 | 0.00 | 0.10 | 0.10 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | A | | | | | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.0 | | | | |
| Intersection Capacity Utilization | | | 12.5% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2016
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2016
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

APPENDIX D: Synchro Analysis – Future Background 2016 unconstrained interaction



Queues
3: Earl Armstrong & Limebank

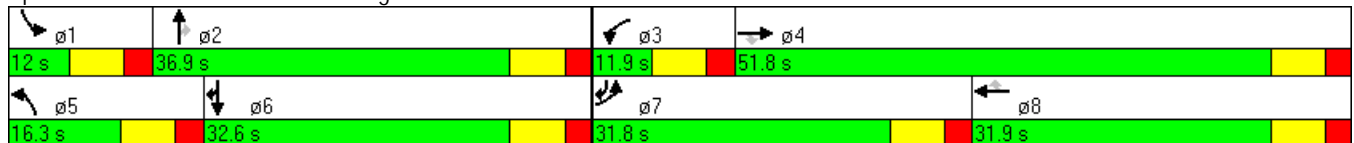
Future Background Traffic-2016
 Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 545 | 425 | 60 | 10 | 80 | 15 | 175 | 160 | 5 | 45 | 90 | 325 |
| Lane Group Flow (vph) | 545 | 425 | 60 | 10 | 80 | 15 | 175 | 160 | 5 | 45 | 90 | 325 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 31.8 | 51.8 | 51.8 | 11.9 | 31.9 | 31.9 | 16.3 | 36.9 | 36.9 | 12.0 | 32.6 | 64.4 |
| Total Split (%) | 28.2% | 46.0% | 46.0% | 10.6% | 28.3% | 28.3% | 14.5% | 32.8% | 32.8% | 10.7% | 29.0% | 57.2% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.76 | 0.39 | 0.11 | 0.05 | 0.23 | 0.09 | 0.48 | 0.10 | 0.01 | 0.19 | 0.06 | 0.16 |
| Control Delay | 49.5 | 31.6 | 7.9 | 49.2 | 47.8 | 20.1 | 51.3 | 20.4 | 13.2 | 50.6 | 23.9 | 1.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 49.5 | 31.6 | 7.9 | 49.2 | 47.8 | 20.1 | 51.3 | 20.4 | 13.2 | 50.6 | 23.9 | 1.2 |
| Queue Length 50th (m) | 56.9 | 34.4 | 0.0 | 0.9 | 8.5 | 0.0 | 18.7 | 11.2 | 0.0 | 4.8 | 6.6 | 0.0 |
| Queue Length 95th (m) | 74.2 | 54.6 | 9.7 | 3.9 | 13.1 | 4.6 | 28.5 | 18.8 | 2.4 | 10.3 | 12.7 | 5.5 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 790 | 1443 | 681 | 183 | 817 | 377 | 375 | 1652 | 742 | 242 | 1444 | 2025 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.69 | 0.29 | 0.09 | 0.05 | 0.10 | 0.04 | 0.47 | 0.10 | 0.01 | 0.19 | 0.06 | 0.16 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 51 (45%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2016
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  | |
| Volume (vph) | 545 | 425 | 60 | 10 | 80 | 15 | 175 | 160 | 5 | 45 | 90 | 325 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Adj. Flow (vph) | 545 | 425 | 60 | 10 | 80 | 15 | 175 | 160 | 5 | 45 | 90 | 325 | |
| RTOR Reduction (vph) | 0 | 0 | 42 | 0 | 0 | 13 | 0 | 0 | 3 | 0 | 0 | 124 | |
| Lane Group Flow (vph) | 545 | 425 | 18 | 10 | 80 | 2 | 175 | 160 | 2 | 45 | 90 | 201 | |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 | |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 | |
| Actuated Green, G (s) | 22.4 | 33.5 | 33.5 | 1.0 | 12.1 | 12.1 | 11.0 | 44.7 | 44.7 | 5.8 | 39.5 | 68.8 | |
| Effective Green, g (s) | 23.4 | 34.5 | 34.5 | 2.0 | 13.1 | 13.1 | 12.0 | 45.7 | 45.7 | 6.8 | 40.5 | 69.8 | |
| Actuated g/C Ratio | 0.21 | 0.31 | 0.31 | 0.02 | 0.12 | 0.12 | 0.11 | 0.41 | 0.41 | 0.06 | 0.36 | 0.62 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 713 | 1084 | 485 | 61 | 412 | 184 | 366 | 1436 | 642 | 207 | 1273 | 1728 | |
| v/s Ratio Prot | c0.16 | c0.12 | | 0.00 | 0.02 | | c0.05 | c0.05 | | 0.01 | 0.03 | c0.07 | |
| v/s Ratio Perm | | | 0.01 | | | 0.00 | | | 0.00 | | | | |
| v/c Ratio | 0.76 | 0.39 | 0.04 | 0.16 | 0.19 | 0.01 | 0.48 | 0.11 | 0.00 | 0.22 | 0.07 | 0.12 | |
| Uniform Delay, d1 | 42.0 | 30.8 | 27.4 | 54.5 | 45.0 | 44.0 | 47.4 | 20.8 | 19.9 | 50.4 | 23.7 | 8.8 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.96 | 0.98 | 0.93 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 4.9 | 0.2 | 0.0 | 1.3 | 0.2 | 0.0 | 1.0 | 0.2 | 0.0 | 0.5 | 0.1 | 0.0 | |
| Delay (s) | 46.9 | 31.0 | 27.4 | 53.4 | 44.3 | 40.7 | 48.3 | 21.0 | 19.9 | 50.9 | 23.8 | 8.8 | |
| Level of Service | D | C | C | D | D | D | D | C | B | D | C | A | |
| Approach Delay (s) | | 39.2 | | | 44.6 | | | 35.0 | | | 15.9 | | |
| Approach LOS | | D | | | D | | | D | | | B | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | | | 33.2 | | | | | | | | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.39 | | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | | | | | | Sum of lost time (s) | 23.6 |
| Intersection Capacity Utilization | | | 50.3% | | | | | | | | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

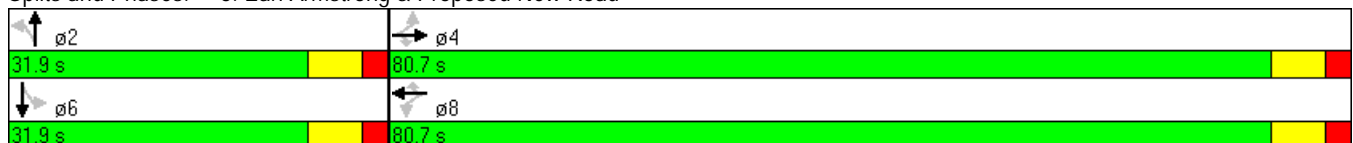
Future Background Traffic-2016
Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | WBT | WBR | SBT | ø2 |
|------------------------|-------|-------|-------|-------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 35 | 445 | 85 | 2 | 0 | |
| Lane Group Flow (vph) | 35 | 445 | 85 | 2 | 15 | |
| Turn Type | Perm | | | Perm | | |
| Protected Phases | | 4 | 8 | | 6 | 2 |
| Permitted Phases | 4 | | | 8 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 6 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 80.7 | 80.7 | 80.7 | 80.7 | 31.9 | 31.9 |
| Total Split (%) | 71.7% | 71.7% | 71.7% | 71.7% | 28.3% | 28% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | None | None |
| v/c Ratio | 0.03 | 0.14 | 0.03 | 0.00 | 0.02 | |
| Control Delay | 0.1 | 0.1 | 1.5 | 1.5 | 0.0 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 0.1 | 0.1 | 1.5 | 1.5 | 0.0 | |
| Queue Length 50th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Queue Length 95th (m) | 0.1 | 0.2 | 2.9 | 0.4 | 0.0 | |
| Internal Link Dist (m) | | 95.8 | 43.9 | | 67.0 | |
| Turn Bay Length (m) | 30.0 | | | 30.0 | | |
| Base Capacity (vph) | 1196 | 3252 | 3252 | 1455 | 1078 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.03 | 0.14 | 0.03 | 0.00 | 0.01 | |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2016
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 445 | 0 | 0 | 85 | 2 | 0 | 0 | 0 | 0 | 0 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | | 5.9 | 5.9 | | | | | | 5.9 |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | | | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Flt Permitted | 0.70 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (perm) | 1302 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 445 | 0 | 0 | 85 | 2 | 0 | 0 | 0 | 0 | 0 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 35 | 445 | 0 | 0 | 85 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 94.8 | 94.8 | | | 94.8 | 94.8 | | | | | | 4.0 |
| Effective Green, g (s) | 95.8 | 95.8 | | | 95.8 | 95.8 | | | | | | 5.0 |
| Actuated g/C Ratio | 0.85 | 0.85 | | | 0.85 | 0.85 | | | | | | 0.04 |
| Clearance Time (s) | 6.9 | 6.9 | | | 6.9 | 6.9 | | | | | | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | | | | | | 3.0 |
| Lane Grp Cap (vph) | 1108 | 3011 | | | 3011 | 1347 | | | | | | 70 |
| v/s Ratio Prot | | c0.13 | | | 0.02 | | | | | | | c0.00 |
| v/s Ratio Perm | 0.03 | | | | | 0.00 | | | | | | |
| v/c Ratio | 0.03 | 0.15 | | | 0.03 | 0.00 | | | | | | 0.01 |
| Uniform Delay, d1 | 1.3 | 1.4 | | | 1.3 | 1.3 | | | | | | 51.4 |
| Progression Factor | 0.03 | 0.02 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Incremental Delay, d2 | 0.1 | 0.1 | | | 0.0 | 0.0 | | | | | | 0.1 |
| Delay (s) | 0.1 | 0.1 | | | 1.3 | 1.3 | | | | | | 51.5 |
| Level of Service | A | A | | | A | A | | | | | | D |
| Approach Delay (s) | | 0.1 | | | 1.3 | | | 0.0 | | | | 51.5 |
| Approach LOS | | A | | | A | | | A | | | | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 1.6 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.14 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 30.5% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2016
 Weekday AM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 480 | 0 | 0 | 100 | 0 | 0 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 480 | 0 | 0 | 100 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.91 | | 0.91 | 0.91 |
| vC, conflicting volume | | | 480 | | 530 | 240 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 233 | | 288 | 0 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1213 | | 618 | 988 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 320 | 160 | 50 | 50 | 0 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.19 | 0.09 | 0.03 | 0.03 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 16.6% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2016
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 0 | 0 | 345 | 0 | 0 | 160 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 0 | 0 | 345 | 0 | 0 | 160 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | None | | | None | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | | 144 |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 425 | 172 | | | 345 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 425 | 172 | | | 345 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | | | 100 | | |
| cM capacity (veh/h) | 557 | 841 | | | 1211 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 0 | 0 | 230 | 115 | 0 | 80 | 80 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.00 | 0.00 | 0.14 | 0.07 | 0.00 | 0.05 | 0.05 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | A | | | | | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.0 | | | | |
| Intersection Capacity Utilization | | | 12.9% | ICU Level of Service | A | | |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2016
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2016
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues
3: Earl Armstrong & Limebank

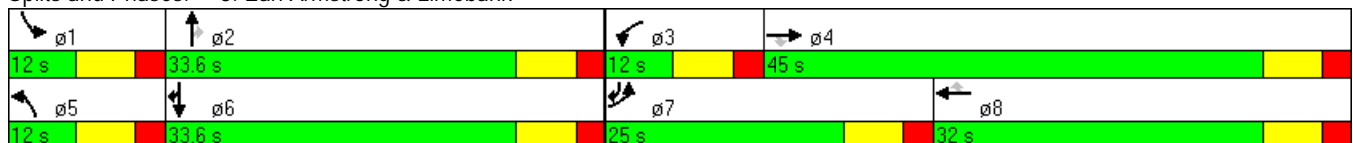
Future Background Traffic-2016
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 400 | 60 | 195 | 60 | 435 | 25 | 75 | 105 | 20 | 85 | 175 | 665 |
| Lane Group Flow (vph) | 400 | 60 | 195 | 60 | 435 | 25 | 75 | 105 | 20 | 85 | 175 | 665 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 25.0 | 45.0 | 45.0 | 12.0 | 32.0 | 32.0 | 12.0 | 33.6 | 33.6 | 12.0 | 33.6 | 58.6 |
| Total Split (%) | 24.4% | 43.9% | 43.9% | 11.7% | 31.2% | 31.2% | 11.7% | 32.7% | 32.7% | 11.7% | 32.7% | 57.1% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.68 | 0.05 | 0.31 | 0.29 | 0.67 | 0.08 | 0.27 | 0.08 | 0.03 | 0.30 | 0.14 | 0.38 |
| Control Delay | 45.9 | 23.9 | 4.8 | 47.5 | 42.0 | 11.8 | 46.6 | 25.7 | 11.7 | 46.8 | 25.6 | 8.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 45.9 | 23.9 | 4.8 | 47.5 | 42.0 | 11.8 | 46.6 | 25.7 | 11.7 | 46.8 | 25.6 | 8.8 |
| Queue Length 50th (m) | 37.7 | 4.3 | 0.0 | 5.9 | 33.1 | 0.0 | 7.2 | 7.6 | 0.0 | 8.1 | 12.9 | 24.3 |
| Queue Length 95th (m) | 52.8 | 8.3 | 13.9 | 12.2 | 41.0 | 5.0 | 14.0 | 14.7 | 5.6 | 15.6 | 22.4 | 41.7 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 639 | 1349 | 724 | 204 | 900 | 421 | 277 | 1262 | 578 | 285 | 1269 | 1769 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.63 | 0.04 | 0.27 | 0.29 | 0.48 | 0.06 | 0.27 | 0.08 | 0.03 | 0.30 | 0.14 | 0.38 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 28 (27%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2016
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 400 | 60 | 195 | 60 | 435 | 25 | 75 | 105 | 20 | 85 | 175 | 665 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 400 | 60 | 195 | 60 | 435 | 25 | 75 | 105 | 20 | 85 | 175 | 665 |
| RTOR Reduction (vph) | 0 | 0 | 133 | 0 | 0 | 20 | 0 | 0 | 13 | 0 | 0 | 100 |
| Lane Group Flow (vph) | 400 | 60 | 62 | 60 | 435 | 5 | 75 | 105 | 7 | 85 | 175 | 565 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 16.6 | 31.7 | 31.7 | 4.1 | 19.2 | 19.2 | 6.1 | 32.9 | 32.9 | 6.3 | 33.1 | 56.6 |
| Effective Green, g (s) | 17.6 | 32.7 | 32.7 | 5.1 | 20.2 | 20.2 | 7.1 | 33.9 | 33.9 | 7.3 | 34.1 | 57.6 |
| Actuated g/C Ratio | 0.17 | 0.32 | 0.32 | 0.05 | 0.20 | 0.20 | 0.07 | 0.33 | 0.33 | 0.07 | 0.33 | 0.56 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 589 | 1128 | 505 | 171 | 697 | 312 | 238 | 1169 | 523 | 244 | 1176 | 1565 |
| v/s Ratio Prot | c0.12 | 0.02 | | 0.02 | c0.12 | | 0.02 | 0.03 | | c0.02 | 0.05 | c0.20 |
| v/s Ratio Perm | | | 0.04 | | | 0.00 | | | 0.00 | | | |
| v/c Ratio | 0.68 | 0.05 | 0.12 | 0.35 | 0.62 | 0.02 | 0.32 | 0.09 | 0.01 | 0.35 | 0.15 | 0.36 |
| Uniform Delay, d1 | 39.9 | 24.2 | 24.8 | 47.1 | 37.7 | 33.2 | 45.4 | 23.7 | 23.1 | 45.4 | 24.1 | 12.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.94 | 0.95 | 0.91 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.1 | 0.0 | 0.1 | 1.2 | 1.7 | 0.0 | 0.8 | 0.2 | 0.0 | 0.9 | 0.3 | 0.1 |
| Delay (s) | 43.0 | 24.2 | 24.9 | 45.7 | 37.5 | 30.2 | 46.2 | 23.9 | 23.1 | 46.2 | 24.3 | 12.5 |
| Level of Service | D | C | C | D | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 35.9 | | | 38.1 | | | 32.2 | | | 17.9 | |
| Approach LOS | | D | | | D | | | C | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 28.8 | HCM Level of Service | | | | C | | | | |
| HCM Volume to Capacity ratio | | | 0.48 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | Sum of lost time (s) | | | | 17.7 | | | | |
| Intersection Capacity Utilization | | | 55.6% | ICU Level of Service | | | | B | | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

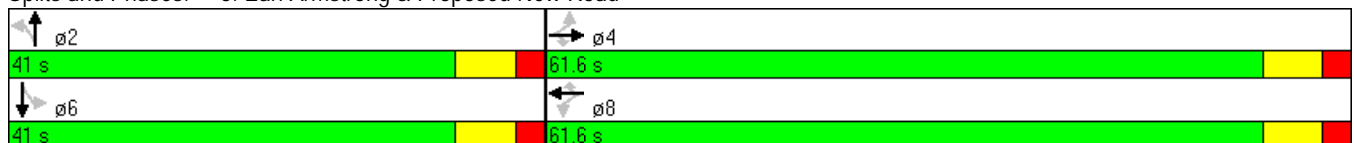
Future Background Traffic-2016
Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | WBT | WBR | SBT | ø2 |
|------------------------|-------|-------|-------|-------|-------|------|
| Lane Configurations | | | | | | |
| Volume (vph) | 95 | 75 | 430 | 10 | 0 | |
| Lane Group Flow (vph) | 95 | 75 | 430 | 10 | 90 | |
| Turn Type | Perm | | | Perm | | |
| Protected Phases | | 4 | 8 | | 6 | 2 |
| Permitted Phases | 4 | | | 8 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 6 | |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 61.6 | 61.6 | 61.6 | 61.6 | 41.0 | 41.0 |
| Total Split (%) | 60.0% | 60.0% | 60.0% | 60.0% | 40.0% | 40% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | None | None |
| v/c Ratio | 0.12 | 0.03 | 0.15 | 0.01 | 0.17 | |
| Control Delay | 1.7 | 0.4 | 2.7 | 1.4 | 0.7 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 1.7 | 0.4 | 2.7 | 1.4 | 0.7 | |
| Queue Length 50th (m) | 0.5 | 0.2 | 9.0 | 0.0 | 0.0 | |
| Queue Length 95th (m) | 0.9 | 0.3 | 12.5 | 1.0 | 0.0 | |
| Internal Link Dist (m) | | 96.0 | 43.9 | | 67.0 | |
| Turn Bay Length (m) | 30.0 | | | 30.0 | | |
| Base Capacity (vph) | 769 | 2910 | 2910 | 1303 | 799 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.12 | 0.03 | 0.15 | 0.01 | 0.11 | |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 100 (97%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2016
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|--|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 75 | 0 | 0 | 430 | 10 | 0 | 0 | 0 | 0 | 0 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | | 5.9 | 5.9 | | | | | | 5.9 |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | | | 1.00 |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Flt Permitted | 0.50 | 1.00 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Satd. Flow (perm) | 934 | 3539 | | | 3539 | 1583 | | | | | | 1583 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 75 | 0 | 0 | 430 | 10 | 0 | 0 | 0 | 0 | 0 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 95 | 75 | 0 | 0 | 430 | 8 | 0 | 0 | 0 | 0 | 8 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | | Perm | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 80.8 | 80.8 | | | 80.8 | 80.8 | | | | | | 8.0 |
| Effective Green, g (s) | 81.8 | 81.8 | | | 81.8 | 81.8 | | | | | | 9.0 |
| Actuated g/C Ratio | 0.80 | 0.80 | | | 0.80 | 0.80 | | | | | | 0.09 |
| Clearance Time (s) | 6.9 | 6.9 | | | 6.9 | 6.9 | | | | | | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | | | | | | 3.0 |
| Lane Grp Cap (vph) | 745 | 2822 | | | 2822 | 1262 | | | | | | 139 |
| v/s Ratio Prot | | 0.02 | | | c0.12 | | | | | | | c0.00 |
| v/s Ratio Perm | 0.10 | | | | | 0.01 | | | | | | |
| v/c Ratio | 0.13 | 0.03 | | | 0.15 | 0.01 | | | | | | 0.06 |
| Uniform Delay, d1 | 2.3 | 2.2 | | | 2.4 | 2.1 | | | | | | 42.9 |
| Progression Factor | 0.49 | 0.14 | | | 1.00 | 1.00 | | | | | | 1.00 |
| Incremental Delay, d2 | 0.4 | 0.0 | | | 0.1 | 0.0 | | | | | | 0.2 |
| Delay (s) | 1.5 | 0.3 | | | 2.5 | 2.1 | | | | | | 43.1 |
| Level of Service | A | A | | | A | A | | | | | | D |
| Approach Delay (s) | | 1.0 | | | 2.5 | | | 0.0 | | | | 43.1 |
| Approach LOS | | A | | | A | | | A | | | | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.4 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.14 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 43.3% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2016
 Weekday PM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 170 | 0 | 0 | 520 | 0 | 0 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 170 | 0 | 0 | 520 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | | | 0.99 | |
| vC, conflicting volume | | | 170 | | 430 | 85 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 170 | | 407 | 85 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1405 | | 567 | 957 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 113 | 57 | 260 | 260 | 0 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 0 | 0 | 0 | 0 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.07 | 0.03 | 0.15 | 0.15 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 17.7% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 0 | 0 | 195 | 0 | 0 | 430 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 0 | 0 | 195 | 0 | 0 | 430 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | None | | | None | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | | 145 |
| pX, platoon unblocked | 0.99 | | | | | | |
| vC, conflicting volume | 410 | 98 | | | 195 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 377 | 98 | | | 195 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 100 | 100 | | | 100 | | |
| cM capacity (veh/h) | 590 | 940 | | | 1375 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 0 | 0 | 130 | 65 | 0 | 215 | 215 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| cSH | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.00 | 0.00 | 0.08 | 0.04 | 0.00 | 0.13 | 0.13 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | A | | | | | |
| Approach Delay (s) | 0.0 | | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 0.0 | | | | |
| Intersection Capacity Utilization | | | 15.2% | ICU Level of Service | A | | |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

APPENDIX E: Synchro Analysis – Future Total 2016 zero interaction



Queues

3: Earl Armstrong & Limebank

Future Total Traffic-2016

Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 160 | 60 | 70 | 10 | 30 | 15 | 140 | 190 | 5 | 55 | 130 | 125 |
| Lane Group Flow (vph) | 160 | 60 | 70 | 10 | 30 | 15 | 140 | 190 | 5 | 55 | 130 | 125 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 22.0 | 40.0 | 40.0 | 14.0 | 32.0 | 32.0 | 21.0 | 42.6 | 42.6 | 16.0 | 37.6 | 59.6 |
| Total Split (%) | 19.5% | 35.5% | 35.5% | 12.4% | 28.4% | 28.4% | 18.7% | 37.8% | 37.8% | 14.2% | 33.4% | 52.9% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.43 | 0.10 | 0.21 | 0.05 | 0.09 | 0.09 | 0.42 | 0.09 | 0.01 | 0.22 | 0.07 | 0.06 |
| Control Delay | 50.5 | 37.5 | 10.8 | 50.0 | 46.1 | 20.9 | 51.3 | 12.8 | 9.2 | 50.8 | 14.8 | 1.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 50.5 | 37.5 | 10.8 | 50.0 | 46.1 | 20.9 | 51.3 | 12.8 | 9.2 | 50.8 | 14.8 | 1.5 |
| Queue Length 50th (m) | 17.1 | 5.2 | 0.0 | 1.0 | 3.1 | 0.0 | 15.0 | 10.6 | 0.0 | 5.9 | 7.5 | 0.0 |
| Queue Length 95th (m) | 26.7 | 11.9 | 12.1 | 3.2 | 7.7 | 6.3 | 24.0 | 18.1 | 2.0 | 12.0 | 14.0 | 3.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 491 | 1072 | 528 | 247 | 820 | 378 | 460 | 2101 | 942 | 308 | 1938 | 2103 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.33 | 0.06 | 0.13 | 0.04 | 0.04 | 0.04 | 0.30 | 0.09 | 0.01 | 0.18 | 0.07 | 0.06 |

Intersection Summary

Cycle Length: 112.6

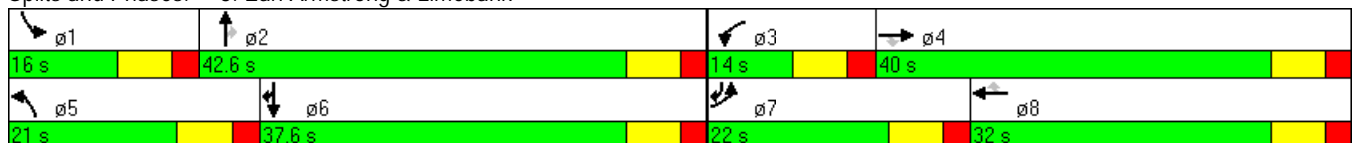
Actuated Cycle Length: 112.6

Offset: 72 (64%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

























Control Type: Actuated-Coordinated

Splits and Phases: 3: Earl Armstrong & Limebank

















HCM Signalized Intersection Capacity Analysis
3: Earl Armstrong & Limebank

Future Total Traffic-2016
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 160 | 60 | 70 | 10 | 30 | 15 | 140 | 190 | 5 | 55 | 130 | 125 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 160 | 60 | 70 | 10 | 30 | 15 | 140 | 190 | 5 | 55 | 130 | 125 |
| RTOR Reduction (vph) | 0 | 0 | 58 | 0 | 0 | 14 | 0 | 0 | 2 | 0 | 0 | 43 |
| Lane Group Flow (vph) | 160 | 60 | 12 | 10 | 30 | 1 | 140 | 190 | 3 | 55 | 130 | 82 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 11.2 | 18.6 | 18.6 | 1.3 | 8.7 | 8.7 | 9.9 | 59.0 | 59.0 | 6.1 | 55.2 | 73.3 |
| Effective Green, g (s) | 12.2 | 19.6 | 19.6 | 2.3 | 9.7 | 9.7 | 10.9 | 60.0 | 60.0 | 7.1 | 56.2 | 74.3 |
| Actuated g/C Ratio | 0.11 | 0.17 | 0.17 | 0.02 | 0.09 | 0.09 | 0.10 | 0.53 | 0.53 | 0.06 | 0.50 | 0.66 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 372 | 616 | 276 | 70 | 305 | 136 | 332 | 1886 | 844 | 216 | 1766 | 1839 |
| v/s Ratio Prot | c0.05 | c0.02 | | 0.00 | 0.01 | | c0.04 | c0.05 | | 0.02 | 0.04 | 0.03 |
| v/s Ratio Perm | | | 0.01 | | | 0.00 | | | 0.00 | | | |
| v/c Ratio | 0.43 | 0.10 | 0.04 | 0.14 | 0.10 | 0.01 | 0.42 | 0.10 | 0.00 | 0.25 | 0.07 | 0.04 |
| Uniform Delay, d1 | 46.9 | 39.1 | 38.7 | 54.2 | 47.4 | 47.1 | 47.9 | 13.0 | 12.3 | 50.2 | 14.7 | 6.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.98 | 0.96 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.8 | 0.1 | 0.1 | 0.9 | 0.1 | 0.0 | 0.9 | 0.1 | 0.0 | 0.6 | 0.1 | 0.0 |
| Delay (s) | 47.7 | 39.1 | 38.8 | 55.1 | 46.7 | 45.2 | 48.7 | 13.1 | 12.3 | 50.9 | 14.7 | 6.7 |
| Level of Service | D | D | D | E | D | D | D | B | B | D | B | A |
| Approach Delay (s) | | 43.8 | | | 47.8 | | | 28.0 | | | 17.9 | |
| Approach LOS | | D | | | D | | | C | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 30.6 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.18 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 17.7 | | | |
| Intersection Capacity Utilization | | | 38.5% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

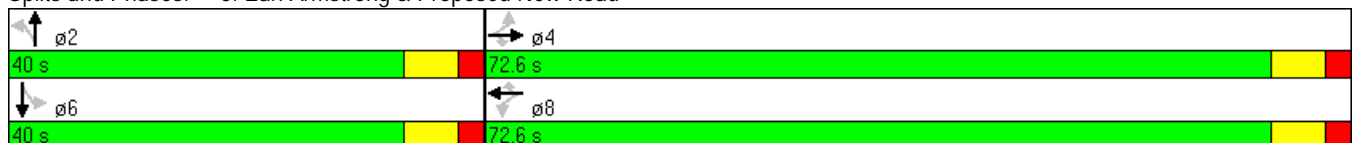
Future Total Traffic-2016
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBT |
| Lane Configurations |  |  |  |  |  |  |  |
| Volume (vph) | 35 | 65 | 5 | 40 | 2 | 0 | 0 |
| Lane Group Flow (vph) | 35 | 65 | 5 | 40 | 2 | 2 | 15 |
| Turn Type | Perm | | Perm | | Perm | | |
| Protected Phases | | 4 | | 8 | | 2 | 6 |
| Permitted Phases | 4 | | 8 | | 8 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 8 | 2 | 6 |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 40.0 | 40.0 |
| Total Split (%) | 64.5% | 64.5% | 64.5% | 64.5% | 64.5% | 35.5% | 35.5% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | |
| Lead-Lag Optimize? | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | None | None |
| v/c Ratio | 0.03 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 |
| Control Delay | 0.1 | 0.1 | 2.0 | 1.6 | 1.5 | 0.0 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.1 | 0.1 | 2.0 | 1.6 | 1.5 | 0.0 | 0.0 |
| Queue Length 50th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Queue Length 95th (m) | 0.2 | 0.1 | 0.8 | 1.6 | 0.4 | 0.0 | 0.0 |
| Internal Link Dist (m) | | 95.8 | | 43.9 | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | | 30.0 | | |
| Base Capacity (vph) | 1250 | 3252 | 1219 | 3252 | 1455 | 1141 | 1177 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.03 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis







6: Earl Armstrong & Proposed New Road

Future Total Traffic-2016
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 65 | 0 | 5 | 40 | 2 | 0 | 0 | 2 | 0 | 0 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | 5.9 | 5.9 | 5.9 | | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | | 0.85 | | | 0.85 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | | 1770 | 3539 | 1583 | | 1583 | | | 1583 | |
| Flt Permitted | 0.73 | 1.00 | | 0.71 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 1359 | 3539 | | 1327 | 3539 | 1583 | | 1583 | | | 1583 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 65 | 0 | 5 | 40 | 2 | 0 | 0 | 2 | 0 | 0 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 35 | 65 | 0 | 5 | 40 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 94.8 | 94.8 | | 94.8 | 94.8 | 94.8 | | 4.0 | | | 4.0 | |
| Effective Green, g (s) | 95.8 | 95.8 | | 95.8 | 95.8 | 95.8 | | 5.0 | | | 5.0 | |
| Actuated g/C Ratio | 0.85 | 0.85 | | 0.85 | 0.85 | 0.85 | | 0.04 | | | 0.04 | |
| Clearance Time (s) | 6.9 | 6.9 | | 6.9 | 6.9 | 6.9 | | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 1156 | 3011 | | 1129 | 3011 | 1347 | | 70 | | | 70 | |
| v/s Ratio Prot | | 0.02 | | | 0.01 | | | 0.00 | | | c0.00 | |
| v/s Ratio Perm | c0.03 | | | 0.00 | | 0.00 | | | | | | |
| v/c Ratio | 0.03 | 0.02 | | 0.00 | 0.01 | 0.00 | | 0.00 | | | 0.01 | |
| Uniform Delay, d1 | 1.3 | 1.3 | | 1.3 | 1.3 | 1.3 | | 51.4 | | | 51.4 | |
| Progression Factor | 0.05 | 0.05 | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.1 | |
| Delay (s) | 0.1 | 0.1 | | 1.3 | 1.3 | 1.3 | | 51.4 | | | 51.5 | |
| Level of Service | A | A | | A | A | A | | D | | | D | |
| Approach Delay (s) | | 0.1 | | | 1.3 | | | 51.4 | | | 51.5 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 5.8 | | | | HCM Level of Service | | | A | | |
| HCM Volume to Capacity ratio | | | 0.03 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 39.8% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |














HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2016
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 100 | 20 | 0 | 55 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 100 | 20 | 0 | 55 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 120 | | 138 | 60 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 120 | | 138 | 60 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1466 | | 842 | 993 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 67 | 53 | 28 | 28 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 20 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 993 | |
| Volume to Capacity | 0.04 | 0.03 | 0.02 | 0.02 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 8.6 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 8.6 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 13.4% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2016
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|--|---|---|--|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |   | |  |   | |
| Volume (veh/h) | 20 | 45 | 290 | 35 | 50 | 155 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 20 | 45 | 290 | 35 | 50 | 155 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 144 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 485 | 162 | | | 325 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 485 | 162 | | | 325 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 96 | 95 | | | 96 | | |
| cM capacity (veh/h) | 490 | 854 | | | 1231 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 20 | 45 | 193 | 132 | 50 | 78 | 78 |
| Volume Left | 20 | 0 | 0 | 0 | 50 | 0 | 0 |
| Volume Right | 0 | 45 | 0 | 35 | 0 | 0 | 0 |
| cSH | 490 | 854 | 1700 | 1700 | 1231 | 1700 | 1700 |
| Volume to Capacity | 0.04 | 0.05 | 0.11 | 0.08 | 0.04 | 0.05 | 0.05 |
| Queue Length 95th (m) | 1.0 | 1.3 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 |
| Control Delay (s) | 12.7 | 9.5 | 0.0 | 0.0 | 8.0 | 0.0 | 0.0 |
| Lane LOS | B | A | | | A | | |
| Approach Delay (s) | 10.4 | | 0.0 | | 2.0 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 1.8 | | | | |
| Intersection Capacity Utilization | | | 25.8% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2016
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 2 | 0 | 0 | 0 | 0 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 0 | 0 | 0 | 0 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 2 | 2 | 5 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 2 | 2 | 5 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1020 | 1082 | 1616 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 2 | 0 | 5 | | | |
| Volume Left | 2 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 5 | | | |
| cSH | 1020 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | | 13.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2016
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 186 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

3: Earl Armstrong & Limebank

Future Total Traffic-2016

Weekday PM Peak Hour IZero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 255 | 80 | 120 | 60 | 65 | 25 | 135 | 195 | 20 | 100 | 245 | 280 |
| Lane Group Flow (vph) | 255 | 80 | 120 | 60 | 65 | 25 | 135 | 195 | 20 | 100 | 245 | 280 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 20.0 | 40.0 | 40.0 | 12.0 | 32.0 | 32.0 | 15.0 | 36.6 | 36.6 | 14.0 | 35.6 | 55.6 |
| Total Split (%) | 19.5% | 39.0% | 39.0% | 11.7% | 31.2% | 31.2% | 14.6% | 35.7% | 35.7% | 13.6% | 34.7% | 54.2% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.58 | 0.14 | 0.33 | 0.29 | 0.17 | 0.13 | 0.39 | 0.11 | 0.02 | 0.32 | 0.15 | 0.15 |
| Control Delay | 47.7 | 36.0 | 9.4 | 49.2 | 41.2 | 16.3 | 46.0 | 16.7 | 7.5 | 45.9 | 17.8 | 1.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.7 | 36.0 | 9.4 | 49.2 | 41.2 | 16.3 | 46.0 | 16.7 | 7.5 | 45.9 | 17.8 | 1.3 |
| Queue Length 50th (m) | 24.4 | 7.0 | 0.0 | 5.7 | 5.8 | 0.3 | 12.9 | 11.7 | 0.0 | 9.6 | 15.2 | 0.0 |
| Queue Length 95th (m) | 36.7 | 13.3 | 14.4 | 11.9 | 12.0 | 7.0 | 21.4 | 19.3 | 4.4 | 17.0 | 24.2 | 5.2 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 472 | 1176 | 606 | 204 | 900 | 421 | 355 | 1777 | 805 | 321 | 1653 | 1940 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.54 | 0.07 | 0.20 | 0.29 | 0.07 | 0.06 | 0.38 | 0.11 | 0.02 | 0.31 | 0.15 | 0.14 |

Intersection Summary

Cycle Length: 102.6

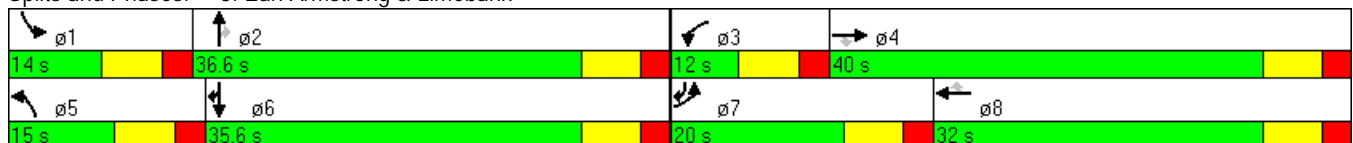
Actuated Cycle Length: 102.6

Offset: 37 (36%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Total Traffic-2016
Weekday PM Peak Hour IZero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|------|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR | |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  | |
| Volume (vph) | 255 | 80 | 120 | 60 | 65 | 25 | 135 | 195 | 20 | 100 | 245 | 280 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 | |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Adj. Flow (vph) | 255 | 80 | 120 | 60 | 65 | 25 | 135 | 195 | 20 | 100 | 245 | 280 | |
| RTOR Reduction (vph) | 0 | 0 | 100 | 0 | 0 | 23 | 0 | 0 | 11 | 0 | 0 | 101 | |
| Lane Group Flow (vph) | 255 | 80 | 20 | 60 | 65 | 2 | 135 | 195 | 9 | 100 | 245 | 179 | |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 | |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 | |
| Actuated Green, G (s) | 12.1 | 16.0 | 16.0 | 4.1 | 8.0 | 8.0 | 9.4 | 47.7 | 47.7 | 7.2 | 45.5 | 64.5 | |
| Effective Green, g (s) | 13.1 | 17.0 | 17.0 | 5.1 | 9.0 | 9.0 | 10.4 | 48.7 | 48.7 | 8.2 | 46.5 | 65.5 | |
| Actuated g/C Ratio | 0.13 | 0.17 | 0.17 | 0.05 | 0.09 | 0.09 | 0.10 | 0.47 | 0.47 | 0.08 | 0.45 | 0.64 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 438 | 586 | 262 | 171 | 310 | 139 | 348 | 1680 | 751 | 274 | 1604 | 1779 | |
| v/s Ratio Prot | c0.07 | 0.02 | | 0.02 | c0.02 | | c0.04 | 0.06 | | 0.03 | c0.07 | 0.06 | |
| v/s Ratio Perm | | | 0.01 | | | 0.00 | | | 0.01 | | | | |
| v/c Ratio | 0.58 | 0.14 | 0.08 | 0.35 | 0.21 | 0.02 | 0.39 | 0.12 | 0.01 | 0.36 | 0.15 | 0.10 | |
| Uniform Delay, d1 | 42.2 | 36.5 | 36.2 | 47.1 | 43.5 | 42.8 | 43.1 | 15.0 | 14.2 | 44.7 | 16.5 | 7.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.98 | 0.96 | 0.92 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.0 | 0.1 | 0.1 | 1.2 | 0.3 | 0.0 | 0.7 | 0.1 | 0.0 | 0.8 | 0.2 | 0.0 | |
| Delay (s) | 44.1 | 36.6 | 36.3 | 47.4 | 42.1 | 39.2 | 43.8 | 15.1 | 14.3 | 45.6 | 16.7 | 7.2 | |
| Level of Service | D | D | D | D | D | D | D | B | B | D | B | A | |
| Approach Delay (s) | | 40.8 | | | 43.7 | | | 26.2 | | | 17.1 | | |
| Approach LOS | | D | | | D | | | C | | | B | | |
| Intersection Summary | | | | | | | | | | | | | |
| HCM Average Control Delay | | | 28.4 | | | | | | | | | HCM Level of Service | C |
| HCM Volume to Capacity ratio | | | 0.26 | | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | | | | | | Sum of lost time (s) | 23.6 |
| Intersection Capacity Utilization | | | 41.2% | | | | | | | | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | | |

Queues

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2016

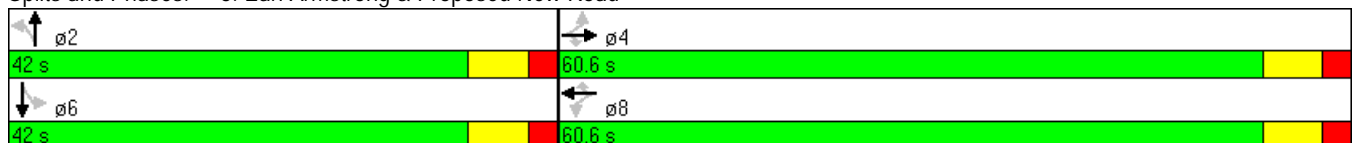
Weekday PM Peak Hour IZero Interaction

| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | |
| Volume (vph) | 95 | 70 | 20 | 50 | 10 | 10 | 0 | 0 |
| Lane Group Flow (vph) | 95 | 70 | 20 | 50 | 10 | 10 | 5 | 90 |
| Turn Type | Perm | | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 60.6 | 60.6 | 60.6 | 60.6 | 60.6 | 42.0 | 42.0 | 42.0 |
| Total Split (%) | 59.1% | 59.1% | 59.1% | 59.1% | 59.1% | 40.9% | 40.9% | 40.9% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.09 | 0.02 | 0.02 | 0.02 | 0.01 | 0.07 | 0.01 | 0.09 |
| Control Delay | 0.8 | 0.7 | 2.6 | 2.6 | 1.4 | 42.7 | 0.0 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.8 | 0.7 | 2.6 | 2.6 | 1.4 | 42.7 | 0.0 | 0.2 |
| Queue Length 50th (m) | 0.9 | 0.3 | 0.7 | 0.9 | 0.0 | 1.8 | 0.0 | 0.0 |
| Queue Length 95th (m) | 1.6 | 0.6 | 2.1 | 2.0 | 1.0 | 6.8 | 0.0 | 0.0 |
| Internal Link Dist (m) | | 96.0 | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 1108 | 2910 | 1086 | 2910 | 1303 | 458 | 1156 | 1184 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.09 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.00 | 0.08 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road







Future Total Traffic-2016
Weekday PM Peak Hour IZero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|--|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 70 | 0 | 20 | 50 | 10 | 10 | 0 | 5 | 0 | 0 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | | 5.9 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Flt | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | 1770 | 3539 | 1583 | 1770 | 1583 | | | | 1583 |
| Flt Permitted | 0.72 | 1.00 | | 0.71 | 1.00 | 1.00 | 0.70 | 1.00 | | | | 1.00 |
| Satd. Flow (perm) | 1346 | 3539 | | 1321 | 3539 | 1583 | 1301 | 1583 | | | | 1583 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 70 | 0 | 20 | 50 | 10 | 10 | 0 | 5 | 0 | 0 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 82 | 0 |
| Lane Group Flow (vph) | 95 | 70 | 0 | 20 | 50 | 8 | 10 | 0 | 0 | 0 | 8 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 80.8 | 80.8 | | 80.8 | 80.8 | 80.8 | 8.0 | 8.0 | | | | 8.0 |
| Effective Green, g (s) | 81.8 | 81.8 | | 81.8 | 81.8 | 81.8 | 9.0 | 9.0 | | | | 9.0 |
| Actuated g/C Ratio | 0.80 | 0.80 | | 0.80 | 0.80 | 0.80 | 0.09 | 0.09 | | | | 0.09 |
| Clearance Time (s) | 6.9 | 6.9 | | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 |
| Lane Grp Cap (vph) | 1073 | 2822 | | 1053 | 2822 | 1262 | 114 | 139 | | | | 139 |
| v/s Ratio Prot | | 0.02 | | | 0.01 | | | 0.00 | | | | 0.00 |
| v/s Ratio Perm | c0.07 | | | 0.02 | | 0.01 | c0.01 | | | | | |
| v/c Ratio | 0.09 | 0.02 | | 0.02 | 0.02 | 0.01 | 0.09 | 0.00 | | | | 0.06 |
| Uniform Delay, d1 | 2.3 | 2.2 | | 2.1 | 2.1 | 2.1 | 43.0 | 42.7 | | | | 42.9 |
| Progression Factor | 0.26 | 0.26 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Incremental Delay, d2 | 0.2 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | | | | 0.2 |
| Delay (s) | 0.8 | 0.6 | | 2.2 | 2.2 | 2.1 | 43.4 | 42.7 | | | | 43.1 |
| Level of Service | A | A | | A | A | A | D | D | | | | D |
| Approach Delay (s) | | 0.7 | | | 2.2 | | | 43.1 | | | | 43.1 |
| Approach LOS | | A | | | A | | | D | | | | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 13.7 | | | | HCM Level of Service | | | B | | |
| HCM Volume to Capacity ratio | | | 0.09 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 39.8% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis














9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2016
Weekday PM Peak Hour IZero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↑ |
| Volume (veh/h) | 135 | 65 | 0 | 150 | 0 | 30 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 135 | 65 | 0 | 150 | 0 | 30 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | | | 200 | | 242 | 100 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 200 | | 242 | 100 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 97 |
| cM capacity (veh/h) | | | 1370 | | 725 | 936 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 90 | 110 | 75 | 75 | 30 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 65 | 0 | 0 | 30 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 936 | |
| Volume to Capacity | 0.05 | 0.06 | 0.04 | 0.04 | 0.03 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.0 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.7 | | | |
| Intersection Capacity Utilization | | | 15.8% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2016
 Weekday PM Peak Hour IZero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|--|---|---|--|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |   | |  |   | |
| Volume (veh/h) | 120 | 180 | 165 | 90 | 145 | 280 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 120 | 180 | 165 | 90 | 145 | 280 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | None | | | None | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | | 145 |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 640 | 128 | | | 255 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 640 | 128 | | | 255 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 67 | 80 | | | 89 | | |
| cM capacity (veh/h) | 363 | 899 | | | 1307 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 120 | 180 | 110 | 145 | 145 | 140 | 140 |
| Volume Left | 120 | 0 | 0 | 0 | 145 | 0 | 0 |
| Volume Right | 0 | 180 | 0 | 90 | 0 | 0 | 0 |
| cSH | 363 | 899 | 1700 | 1700 | 1307 | 1700 | 1700 |
| Volume to Capacity | 0.33 | 0.20 | 0.06 | 0.09 | 0.11 | 0.08 | 0.08 |
| Queue Length 95th (m) | 10.6 | 5.6 | 0.0 | 0.0 | 2.8 | 0.0 | 0.0 |
| Control Delay (s) | 19.8 | 10.0 | 0.0 | 0.0 | 8.1 | 0.0 | 0.0 |
| Lane LOS | C | B | | | A | | |
| Approach Delay (s) | 13.9 | | 0.0 | | 2.8 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 5.5 | | | | |
| Intersection Capacity Utilization | | | 32.1% | ICU Level of Service | A | | |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N, Site Access & Proposed New Road

Future Total Traffic-2016
 Weekday PM Peak Hour IZero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 15 | 0 | 0 | 1 | 1 | 25 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 15 | 0 | 0 | 1 | 1 | 25 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 14 | 14 | 26 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 14 | 14 | 26 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 100 | 100 | | | |
| cM capacity (veh/h) | 1004 | 1067 | 1588 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 1 | 26 | | | |
| Volume Left | 15 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 25 | | | |
| cSH | 1004 | 1588 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.00 | 0.02 | | | |
| Queue Length 95th (m) | 0.3 | 0.0 | 0.0 | | | |
| Control Delay (s) | 8.6 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 8.6 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.1 | | | |
| Intersection Capacity Utilization | | 13.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2016
 Weekday PM Peak Hour IZero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1 | 0 | 0 | 0 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 180 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 1 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 1 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1084 | 1622 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 1 | 0 | 1 | | | |
| Volume Left | 1 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 1 | | | |
| cSH | 1023 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Lane LOS | | | | | | |
| Approach Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.3 | | | |
| Intersection Capacity Utilization | | 13.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

APPENDIX F: Synchro Analysis – Future Total 2016 unconstrained interaction



Queues

3: Earl Armstrong & Limebank

Future Total Traffic-2016

Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 545 | 440 | 75 | 10 | 80 | 15 | 195 | 190 | 5 | 55 | 130 | 325 |
| Lane Group Flow (vph) | 545 | 440 | 75 | 10 | 80 | 15 | 195 | 190 | 5 | 55 | 130 | 325 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 31.0 | 51.0 | 51.0 | 11.9 | 31.9 | 31.9 | 17.0 | 37.8 | 37.8 | 11.9 | 32.7 | 63.7 |
| Total Split (%) | 27.5% | 45.3% | 45.3% | 10.6% | 28.3% | 28.3% | 15.1% | 33.6% | 33.6% | 10.6% | 29.0% | 56.6% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.78 | 0.41 | 0.14 | 0.05 | 0.23 | 0.09 | 0.50 | 0.11 | 0.01 | 0.22 | 0.09 | 0.17 |
| Control Delay | 50.4 | 32.2 | 7.4 | 49.8 | 47.7 | 20.0 | 51.2 | 20.4 | 13.0 | 50.8 | 23.9 | 1.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 50.4 | 32.2 | 7.4 | 49.8 | 47.7 | 20.0 | 51.2 | 20.4 | 13.0 | 50.8 | 23.9 | 1.2 |
| Queue Length 50th (m) | 56.9 | 35.8 | 0.0 | 0.9 | 8.5 | 0.0 | 20.8 | 13.5 | 0.0 | 5.9 | 9.7 | 0.0 |
| Queue Length 95th (m) | 75.0 | 57.3 | 10.8 | 3.3 | 16.1 | 6.3 | 31.1 | 21.7 | 2.4 | 12.0 | 17.2 | 5.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 765 | 1417 | 679 | 183 | 817 | 377 | 397 | 1654 | 743 | 250 | 1435 | 2001 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.71 | 0.31 | 0.11 | 0.05 | 0.10 | 0.04 | 0.49 | 0.11 | 0.01 | 0.22 | 0.09 | 0.16 |

Intersection Summary

Cycle Length: 112.6

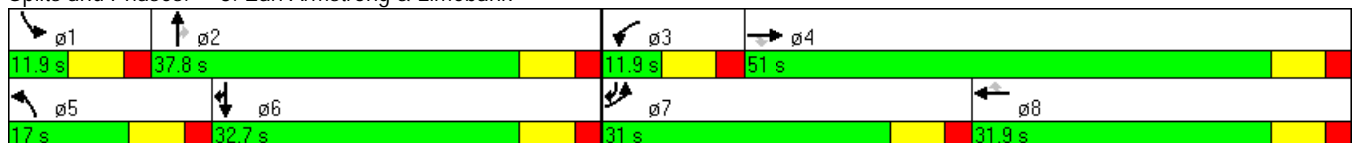
Actuated Cycle Length: 112.6

Offset: 73 (65%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis















3: Earl Armstrong & Limebank

Future Total Traffic-2016
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 545 | 440 | 75 | 10 | 80 | 15 | 195 | 190 | 5 | 55 | 130 | 325 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 545 | 440 | 75 | 10 | 80 | 15 | 195 | 190 | 5 | 55 | 130 | 325 |
| RTOR Reduction (vph) | 0 | 0 | 52 | 0 | 0 | 13 | 0 | 0 | 3 | 0 | 0 | 126 |
| Lane Group Flow (vph) | 545 | 440 | 23 | 10 | 80 | 2 | 195 | 190 | 2 | 55 | 130 | 199 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 22.0 | 33.2 | 33.2 | 1.0 | 12.2 | 12.2 | 11.7 | 44.7 | 44.7 | 6.1 | 39.1 | 68.0 |
| Effective Green, g (s) | 23.0 | 34.2 | 34.2 | 2.0 | 13.2 | 13.2 | 12.7 | 45.7 | 45.7 | 7.1 | 40.1 | 69.0 |
| Actuated g/C Ratio | 0.20 | 0.30 | 0.30 | 0.02 | 0.12 | 0.12 | 0.11 | 0.41 | 0.41 | 0.06 | 0.36 | 0.61 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 701 | 1075 | 481 | 61 | 415 | 186 | 387 | 1436 | 642 | 216 | 1260 | 1708 |
| v/s Ratio Prot | c0.16 | c0.12 | | 0.00 | 0.02 | | c0.06 | c0.05 | | 0.02 | 0.04 | 0.07 |
| v/s Ratio Perm | | | 0.01 | | | 0.00 | | | 0.00 | | | |
| v/c Ratio | 0.78 | 0.41 | 0.05 | 0.16 | 0.19 | 0.01 | 0.50 | 0.13 | 0.00 | 0.25 | 0.10 | 0.12 |
| Uniform Delay, d1 | 42.4 | 31.2 | 27.7 | 54.5 | 44.9 | 43.9 | 47.0 | 21.0 | 19.9 | 50.2 | 24.2 | 9.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 0.97 | 0.98 | 0.92 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 5.4 | 0.3 | 0.0 | 1.3 | 0.2 | 0.0 | 1.0 | 0.2 | 0.0 | 0.6 | 0.2 | 0.0 |
| Delay (s) | 47.8 | 31.4 | 27.7 | 54.0 | 44.1 | 40.4 | 48.0 | 21.2 | 19.9 | 50.9 | 24.4 | 9.1 |
| Level of Service | D | C | C | D | D | D | D | C | B | D | C | A |
| Approach Delay (s) | | 39.6 | | | 44.5 | | | 34.6 | | | 17.5 | |
| Approach LOS | | D | | | D | | | C | | | B | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 33.4 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.38 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 17.7 | | | |
| Intersection Capacity Utilization | | | 50.9% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

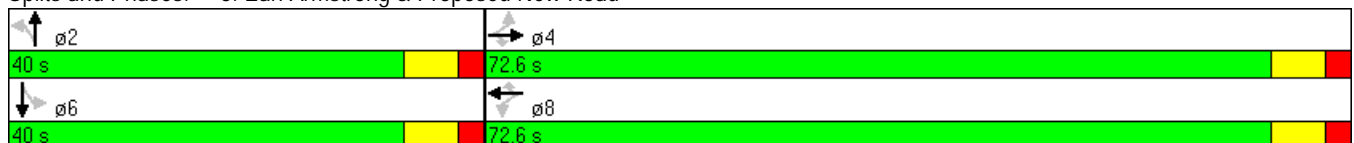
Future Total Traffic-2016
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBT | SBT |
| Lane Configurations |  |  |  |  |  |  |  |
| Volume (vph) | 35 | 445 | 5 | 85 | 2 | 0 | 0 |
| Lane Group Flow (vph) | 35 | 445 | 5 | 85 | 2 | 2 | 15 |
| Turn Type | Perm | | Perm | | Perm | | |
| Protected Phases | | 4 | | 8 | | 2 | 6 |
| Permitted Phases | 4 | | 8 | | 8 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 8 | 2 | 6 |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 40.0 | 40.0 |
| Total Split (%) | 64.5% | 64.5% | 64.5% | 64.5% | 64.5% | 35.5% | 35.5% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | |
| Lead-Lag Optimize? | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | None | None |
| v/c Ratio | 0.03 | 0.14 | 0.01 | 0.03 | 0.00 | 0.00 | 0.02 |
| Control Delay | 0.1 | 0.1 | 2.0 | 1.5 | 1.5 | 0.0 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.1 | 0.1 | 2.0 | 1.5 | 1.5 | 0.0 | 0.0 |
| Queue Length 50th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Queue Length 95th (m) | 0.0 | 0.1 | 0.8 | 2.9 | 0.4 | 0.0 | 0.0 |
| Internal Link Dist (m) | | 95.8 | | 43.9 | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | | 30.0 | | |
| Base Capacity (vph) | 1196 | 3252 | 846 | 3252 | 1455 | 768 | 1113 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.03 | 0.14 | 0.01 | 0.03 | 0.00 | 0.00 | 0.01 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2016
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 445 | 0 | 5 | 85 | 2 | 0 | 0 | 2 | 0 | 0 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | 5.9 | 5.9 | 5.9 | | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | | 0.85 | | | 0.85 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | | 1770 | 3539 | 1583 | | 1583 | | | 1583 | |
| Flt Permitted | 0.70 | 1.00 | | 0.49 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 1302 | 3539 | | 921 | 3539 | 1583 | | 1583 | | | 1583 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 445 | 0 | 5 | 85 | 2 | 0 | 0 | 2 | 0 | 0 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 14 | 0 |
| Lane Group Flow (vph) | 35 | 445 | 0 | 5 | 85 | 2 | 0 | 0 | 0 | 0 | 1 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 94.8 | 94.8 | | 94.8 | 94.8 | 94.8 | | 4.0 | | | 4.0 | |
| Effective Green, g (s) | 95.8 | 95.8 | | 95.8 | 95.8 | 95.8 | | 5.0 | | | 5.0 | |
| Actuated g/C Ratio | 0.85 | 0.85 | | 0.85 | 0.85 | 0.85 | | 0.04 | | | 0.04 | |
| Clearance Time (s) | 6.9 | 6.9 | | 6.9 | 6.9 | 6.9 | | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 1108 | 3011 | | 784 | 3011 | 1347 | | 70 | | | 70 | |
| v/s Ratio Prot | | c0.13 | | | 0.02 | | | 0.00 | | | c0.00 | |
| v/s Ratio Perm | 0.03 | | | 0.01 | | 0.00 | | | | | | |
| v/c Ratio | 0.03 | 0.15 | | 0.01 | 0.03 | 0.00 | | 0.00 | | | 0.01 | |
| Uniform Delay, d1 | 1.3 | 1.4 | | 1.3 | 1.3 | 1.3 | | 51.4 | | | 51.4 | |
| Progression Factor | 0.01 | 0.01 | | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.1 | |
| Delay (s) | 0.1 | 0.1 | | 1.3 | 1.3 | 1.3 | | 51.4 | | | 51.5 | |
| Level of Service | A | A | | A | A | A | | D | | | D | |
| Approach Delay (s) | | 0.1 | | | 1.3 | | | 51.4 | | | 51.5 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 1.8 | | | | HCM Level of Service | | | A | | |
| HCM Volume to Capacity ratio | | | 0.14 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 39.8% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |













HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2016
 Weekday AM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 480 | 20 | 0 | 100 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 480 | 20 | 0 | 100 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.91 | | 0.91 | 0.91 |
| vC, conflicting volume | | | 500 | | 540 | 250 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 242 | | 286 | 0 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1198 | | 617 | 983 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 320 | 180 | 50 | 50 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 20 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 983 | |
| Volume to Capacity | 0.19 | 0.11 | 0.03 | 0.03 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 8.7 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 23.9% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2016
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  |  |  |  | |
| Volume (veh/h) | 20 | 45 | 345 | 35 | 50 | 160 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 20 | 45 | 345 | 35 | 50 | 160 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 144 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 542 | 190 | | | 380 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 542 | 190 | | | 380 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 96 | 95 | | | 96 | | |
| cM capacity (veh/h) | 450 | 820 | | | 1175 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 20 | 45 | 230 | 150 | 50 | 80 | 80 |
| Volume Left | 20 | 0 | 0 | 0 | 50 | 0 | 0 |
| Volume Right | 0 | 45 | 0 | 35 | 0 | 0 | 0 |
| cSH | 450 | 820 | 1700 | 1700 | 1175 | 1700 | 1700 |
| Volume to Capacity | 0.04 | 0.05 | 0.14 | 0.09 | 0.04 | 0.05 | 0.05 |
| Queue Length 95th (m) | 1.0 | 1.3 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 |
| Control Delay (s) | 13.4 | 9.6 | 0.0 | 0.0 | 8.2 | 0.0 | 0.0 |
| Lane LOS | B | A | | | A | | |
| Approach Delay (s) | 10.8 | | 0.0 | | 2.0 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 1.7 | | | | |
| Intersection Capacity Utilization | | | 27.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2016
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 2 | 0 | 0 | 0 | 0 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 0 | 0 | 0 | 0 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 2 | 2 | 5 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 2 | 2 | 5 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1020 | 1082 | 1616 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 2 | 0 | 5 | | | |
| Volume Left | 2 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 5 | | | |
| cSH | 1020 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | | 13.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2016
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 186 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 0 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 0 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1085 | 1623 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 0 | 0 | 0 | | | |
| Volume Left | 0 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 0 | | | |
| cSH | 1700 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Lane LOS | | | | | | |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 0.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues
3: Earl Armstrong & Limebank

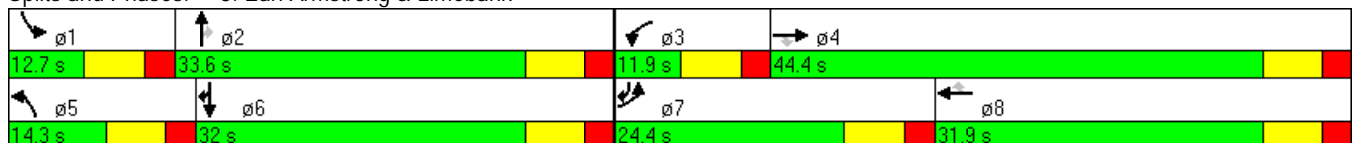
Future Total Traffic-2016
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 400 | 90 | 220 | 60 | 435 | 25 | 135 | 195 | 20 | 100 | 245 | 665 |
| Lane Group Flow (vph) | 400 | 90 | 220 | 60 | 435 | 25 | 135 | 195 | 20 | 100 | 245 | 665 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 24.4 | 44.4 | 44.4 | 11.9 | 31.9 | 31.9 | 14.3 | 33.6 | 33.6 | 12.7 | 32.0 | 56.4 |
| Total Split (%) | 23.8% | 43.3% | 43.3% | 11.6% | 31.1% | 31.1% | 13.9% | 32.7% | 32.7% | 12.4% | 31.2% | 55.0% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.69 | 0.08 | 0.34 | 0.30 | 0.67 | 0.08 | 0.40 | 0.15 | 0.03 | 0.33 | 0.22 | 0.41 |
| Control Delay | 46.8 | 24.5 | 4.8 | 51.1 | 40.2 | 10.6 | 46.9 | 25.8 | 11.7 | 46.9 | 27.8 | 10.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.8 | 24.5 | 4.8 | 51.1 | 40.2 | 10.6 | 46.9 | 25.8 | 11.7 | 46.9 | 27.8 | 10.6 |
| Queue Length 50th (m) | 37.9 | 6.6 | 0.0 | 5.9 | 36.5 | 0.3 | 12.9 | 14.5 | 0.0 | 9.6 | 18.8 | 27.5 |
| Queue Length 95th (m) | 53.2 | 11.4 | 14.9 | 12.4 | 45.6 | 4.9 | 21.9 | 24.5 | 5.6 | 17.4 | 30.7 | 46.1 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 619 | 1328 | 731 | 201 | 897 | 420 | 338 | 1261 | 577 | 299 | 1135 | 1645 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.65 | 0.07 | 0.30 | 0.30 | 0.48 | 0.06 | 0.40 | 0.15 | 0.03 | 0.33 | 0.22 | 0.40 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 27 (26%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

































Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis



















3: Earl Armstrong & Limebank

Future Total Traffic-2016
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |   |   |  |   |   |  |   |   |  |   |   |  |
| Volume (vph) | 400 | 90 | 220 | 60 | 435 | 25 | 135 | 195 | 20 | 100 | 245 | 665 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 400 | 90 | 220 | 60 | 435 | 25 | 135 | 195 | 20 | 100 | 245 | 665 |
| RTOR Reduction (vph) | 0 | 0 | 150 | 0 | 0 | 20 | 0 | 0 | 13 | 0 | 0 | 94 |
| Lane Group Flow (vph) | 400 | 90 | 70 | 60 | 435 | 5 | 135 | 195 | 7 | 100 | 245 | 571 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 16.3 | 31.5 | 31.5 | 4.0 | 19.2 | 19.2 | 9.0 | 32.8 | 32.8 | 6.7 | 30.5 | 53.7 |
| Effective Green, g (s) | 17.3 | 32.5 | 32.5 | 5.0 | 20.2 | 20.2 | 10.0 | 33.8 | 33.8 | 7.7 | 31.5 | 54.7 |
| Actuated g/C Ratio | 0.17 | 0.32 | 0.32 | 0.05 | 0.20 | 0.20 | 0.10 | 0.33 | 0.33 | 0.08 | 0.31 | 0.53 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 579 | 1121 | 501 | 167 | 697 | 312 | 335 | 1166 | 521 | 258 | 1087 | 1486 |
| v/s Ratio Prot | c0.12 | 0.03 | | 0.02 | c0.12 | | c0.04 | 0.06 | | 0.03 | 0.07 | c0.20 |
| v/s Ratio Perm | | | 0.04 | | | 0.00 | | | 0.00 | | | |
| v/c Ratio | 0.69 | 0.08 | 0.14 | 0.36 | 0.62 | 0.02 | 0.40 | 0.17 | 0.01 | 0.39 | 0.23 | 0.38 |
| Uniform Delay, d1 | 40.1 | 24.6 | 25.1 | 47.2 | 37.7 | 33.2 | 43.5 | 24.4 | 23.2 | 45.2 | 26.5 | 14.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.02 | 0.90 | 0.81 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.5 | 0.0 | 0.1 | 1.3 | 1.7 | 0.0 | 0.8 | 0.3 | 0.0 | 1.0 | 0.5 | 0.2 |
| Delay (s) | 43.7 | 24.6 | 25.2 | 49.3 | 35.8 | 26.9 | 44.3 | 24.7 | 23.2 | 46.2 | 26.9 | 14.2 |
| Level of Service | D | C | C | D | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 35.5 | | | 36.9 | | | 32.2 | | | 20.5 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 29.5 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.53 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | 23.6 | | | |
| Intersection Capacity Utilization | | | 55.6% | | | | ICU Level of Service | | B | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

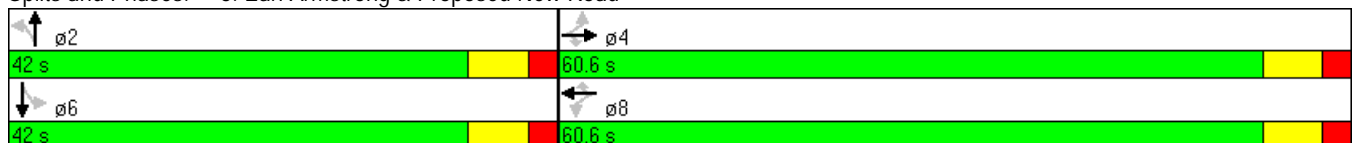
Future Total Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |
|------------------------|---|--|---|--|---|---|---|---|
| Lane Group | EBL | EBT | WBL | WBT | WBR | NBL | NBT | SBT |
| Lane Configurations |  |   |  |   |  |  |  |  |
| Volume (vph) | 95 | 80 | 55 | 385 | 10 | 45 | 0 | 0 |
| Lane Group Flow (vph) | 95 | 80 | 55 | 385 | 10 | 45 | 5 | 90 |
| Turn Type | Perm | | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 60.6 | 60.6 | 60.6 | 60.6 | 60.6 | 42.0 | 42.0 | 42.0 |
| Total Split (%) | 59.1% | 59.1% | 59.1% | 59.1% | 59.1% | 40.9% | 40.9% | 40.9% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.12 | 0.03 | 0.05 | 0.13 | 0.01 | 0.30 | 0.01 | 0.16 |
| Control Delay | 1.3 | 0.6 | 3.1 | 2.9 | 1.7 | 47.1 | 0.0 | 0.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 1.3 | 0.6 | 3.1 | 2.9 | 1.7 | 47.1 | 0.0 | 0.6 |
| Queue Length 50th (m) | 0.7 | 0.3 | 2.0 | 7.9 | 0.0 | 8.3 | 0.0 | 0.0 |
| Queue Length 95th (m) | 1.4 | 0.5 | 5.1 | 13.1 | 1.1 | 18.5 | 0.0 | 0.0 |
| Internal Link Dist (m) | | 96.0 | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 796 | 2887 | 1067 | 2887 | 1293 | 458 | 1142 | 836 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.12 | 0.03 | 0.05 | 0.13 | 0.01 | 0.10 | 0.00 | 0.11 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis







6: Earl Armstrong & Proposed New Road

Future Total Traffic-2016
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 80 | 0 | 55 | 385 | 10 | 45 | 0 | 5 | 0 | 0 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | | 5.9 |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Frt | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | | | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | | 1.00 |
| Satd. Flow (prot) | 1770 | 3539 | | 1770 | 3539 | 1583 | 1770 | 1583 | | | | 1583 |
| Flt Permitted | 0.52 | 1.00 | | 0.70 | 1.00 | 1.00 | 0.70 | 1.00 | | | | 1.00 |
| Satd. Flow (perm) | 976 | 3539 | | 1308 | 3539 | 1583 | 1301 | 1583 | | | | 1583 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 80 | 0 | 55 | 385 | 10 | 45 | 0 | 5 | 0 | 0 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 0 | 81 | 0 |
| Lane Group Flow (vph) | 95 | 80 | 0 | 55 | 385 | 8 | 45 | 0 | 0 | 0 | 9 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 80.1 | 80.1 | | 80.1 | 80.1 | 80.1 | 8.7 | 8.7 | | | | 8.7 |
| Effective Green, g (s) | 81.1 | 81.1 | | 81.1 | 81.1 | 81.1 | 9.7 | 9.7 | | | | 9.7 |
| Actuated g/C Ratio | 0.79 | 0.79 | | 0.79 | 0.79 | 0.79 | 0.09 | 0.09 | | | | 0.09 |
| Clearance Time (s) | 6.9 | 6.9 | | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.0 |
| Lane Grp Cap (vph) | 771 | 2797 | | 1034 | 2797 | 1251 | 123 | 150 | | | | 150 |
| v/s Ratio Prot | | 0.02 | | | c0.11 | | | 0.00 | | | | 0.01 |
| v/s Ratio Perm | 0.10 | | | 0.04 | | 0.00 | c0.03 | | | | | |
| v/c Ratio | 0.12 | 0.03 | | 0.05 | 0.14 | 0.01 | 0.37 | 0.00 | | | | 0.06 |
| Uniform Delay, d1 | 2.5 | 2.3 | | 2.4 | 2.5 | 2.3 | 43.6 | 42.1 | | | | 42.3 |
| Progression Factor | 0.33 | 0.19 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| Incremental Delay, d2 | 0.3 | 0.0 | | 0.1 | 0.1 | 0.0 | 1.8 | 0.0 | | | | 0.2 |
| Delay (s) | 1.1 | 0.4 | | 2.4 | 2.6 | 2.3 | 45.4 | 42.1 | | | | 42.4 |
| Level of Service | A | A | | A | A | A | D | D | | | | D |
| Approach Delay (s) | | 0.8 | | | 2.6 | | | 45.1 | | | | 42.4 |
| Approach LOS | | A | | | A | | | D | | | | D |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.7 | | | | | | | | | A |
| HCM Volume to Capacity ratio | | | 0.16 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | | | | | 11.8 | |
| Intersection Capacity Utilization | | | 42.9% | | | | | | | | | A |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↑ |
| Volume (veh/h) | 155 | 55 | 0 | 520 | 0 | 20 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 155 | 55 | 0 | 520 | 0 | 20 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | | | 1.00 | |
| vC, conflicting volume | | | 210 | | 442 | 105 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 210 | | 431 | 105 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 98 |
| cM capacity (veh/h) | | | 1358 | | 550 | 929 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 103 | 107 | 260 | 260 | 20 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 55 | 0 | 0 | 20 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 929 | |
| Volume to Capacity | 0.06 | 0.06 | 0.15 | 0.15 | 0.02 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.0 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.2 | | | |
| Intersection Capacity Utilization | | | 17.7% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 110 | 170 | 175 | 80 | 135 | 390 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 110 | 170 | 175 | 80 | 135 | 390 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | None | | | None | | | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | | 145 |
| pX, platoon unblocked | 0.99 | | | | | | |
| vC, conflicting volume | 680 | 128 | | | 255 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 666 | 128 | | | 255 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 69 | 81 | | | 90 | | |
| cM capacity (veh/h) | 350 | 899 | | | 1307 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 110 | 170 | 117 | 138 | 135 | 195 | 195 |
| Volume Left | 110 | 0 | 0 | 0 | 135 | 0 | 0 |
| Volume Right | 0 | 170 | 0 | 80 | 0 | 0 | 0 |
| cSH | 350 | 899 | 1700 | 1700 | 1307 | 1700 | 1700 |
| Volume to Capacity | 0.31 | 0.19 | 0.07 | 0.08 | 0.10 | 0.11 | 0.11 |
| Queue Length 95th (m) | 9.9 | 5.2 | 0.0 | 0.0 | 2.6 | 0.0 | 0.0 |
| Control Delay (s) | 19.9 | 9.9 | 0.0 | 0.0 | 8.1 | 0.0 | 0.0 |
| Lane LOS | C | A | | | A | | |
| Approach Delay (s) | 13.9 | 0.0 | | 2.1 | | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 4.7 | | | | |
| Intersection Capacity Utilization | | | 31.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 50 | 0 | 0 | 1 | 1 | 55 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 50 | 0 | 0 | 1 | 1 | 55 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 30 | 28 | 56 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 30 | 28 | 56 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 95 | 100 | 100 | | | |
| cM capacity (veh/h) | 985 | 1046 | 1549 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 50 | 1 | 56 | | | |
| Volume Left | 50 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 55 | | | |
| cSH | 985 | 1549 | 1700 | | | |
| Volume to Capacity | 0.05 | 0.00 | 0.03 | | | |
| Queue Length 95th (m) | 1.2 | 0.0 | 0.0 | | | |
| Control Delay (s) | 8.9 | 0.0 | 0.0 | | | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 8.9 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.1 | | | |
| Intersection Capacity Utilization | | 13.5% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Accesses & Proposed New Road

Future Total Traffic-2016
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 1 | 0 | 0 | 0 | 0 | 1 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1 | 0 | 0 | 0 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | 0 | 1 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | 0 | 1 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 1023 | 1084 | 1622 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 1 | 0 | 1 | | | |
| Volume Left | 1 | 0 | 0 | | | |
| Volume Right | 0 | 0 | 1 | | | |
| cSH | 1023 | 1700 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.00 | | | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | | | |
| Control Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Lane LOS | | | | | | |
| Approach Delay (s) | 8.5 | 0.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 4.3 | | | |
| Intersection Capacity Utilization | | 13.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

**APPENDIX G: Synchro Analysis – Future Background & Future
Total 2021 zero interaction**



Queues

Future Background Traffic-2021

3: Earl Armstrong & Limebank

Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 20 | 95 | 105 | 285 |
| Lane Group Flow (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 20 | 95 | 105 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 31.9 | 51.9 | 51.9 | 11.9 | 31.9 | 31.9 | 16.9 | 36.9 | 36.9 | 11.9 | 31.9 | 63.8 |
| Total Split (%) | 28.3% | 46.1% | 46.1% | 10.6% | 28.3% | 28.3% | 15.0% | 32.8% | 32.8% | 10.6% | 28.3% | 56.7% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.69 | 0.30 | 0.13 | 0.25 | 0.64 | 0.30 | 0.40 | 0.15 | 0.03 | 0.34 | 0.08 | 0.16 |
| Control Delay | 48.4 | 30.0 | 6.4 | 57.1 | 42.7 | 6.8 | 51.3 | 26.3 | 11.8 | 51.9 | 27.4 | 2.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.4 | 30.0 | 6.4 | 57.1 | 42.7 | 6.8 | 51.3 | 26.3 | 11.8 | 51.9 | 27.4 | 2.1 |
| Queue Length 50th (m) | 46.0 | 29.2 | 0.0 | 4.9 | 33.8 | 0.0 | 13.9 | 14.3 | 0.0 | 10.2 | 7.8 | 0.8 |
| Queue Length 95th (m) | 58.6 | 36.1 | 8.9 | 10.8 | 41.3 | 6.8 | 22.6 | 25.7 | 5.8 | 18.1 | 16.3 | 7.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 793 | 1446 | 688 | 183 | 817 | 442 | 353 | 1304 | 596 | 280 | 1259 | 1878 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.55 | 0.22 | 0.10 | 0.25 | 0.43 | 0.23 | 0.37 | 0.15 | 0.03 | 0.34 | 0.08 | 0.15 |

Intersection Summary

Cycle Length: 112.6

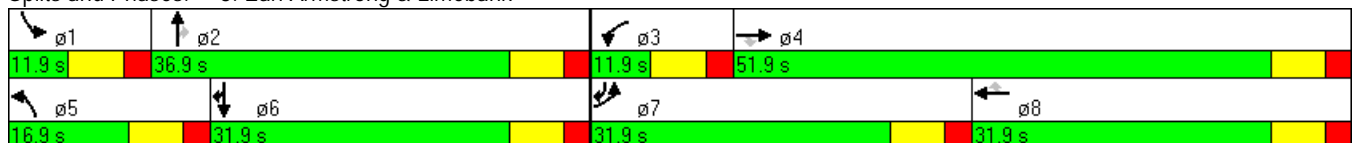
Actuated Cycle Length: 112.6

Offset: 28 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 20 | 95 | 105 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 20 | 95 | 105 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 48 | 0 | 0 | 83 | 0 | 0 | 13 | 0 | 0 | 112 |
| Lane Group Flow (vph) | 435 | 325 | 22 | 45 | 355 | 17 | 130 | 190 | 7 | 95 | 105 | 173 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 19.8 | 33.7 | 33.7 | 4.0 | 17.9 | 17.9 | 9.6 | 39.1 | 39.1 | 8.2 | 37.7 | 64.4 |
| Effective Green, g (s) | 20.8 | 34.7 | 34.7 | 5.0 | 18.9 | 18.9 | 10.6 | 40.1 | 40.1 | 9.2 | 38.7 | 65.4 |
| Actuated g/C Ratio | 0.18 | 0.31 | 0.31 | 0.04 | 0.17 | 0.17 | 0.09 | 0.36 | 0.36 | 0.08 | 0.34 | 0.58 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 634 | 1091 | 488 | 152 | 594 | 266 | 323 | 1260 | 564 | 280 | 1216 | 1619 |
| v/s Ratio Prot | c0.13 | 0.09 | | 0.01 | c0.10 | | c0.04 | c0.05 | | 0.03 | 0.03 | 0.06 |
| v/s Ratio Perm | | | 0.01 | | | 0.01 | | | 0.00 | | | |
| v/c Ratio | 0.69 | 0.30 | 0.04 | 0.30 | 0.60 | 0.06 | 0.40 | 0.15 | 0.01 | 0.34 | 0.09 | 0.11 |
| Uniform Delay, d1 | 42.9 | 29.7 | 27.3 | 52.1 | 43.3 | 39.4 | 48.0 | 24.7 | 23.4 | 48.8 | 25.0 | 10.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.05 | 0.84 | 0.57 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.1 | 0.2 | 0.0 | 1.1 | 1.6 | 0.1 | 0.8 | 0.3 | 0.0 | 0.7 | 0.1 | 0.0 |
| Delay (s) | 45.9 | 29.8 | 27.4 | 55.7 | 38.0 | 22.4 | 48.8 | 24.9 | 23.5 | 49.6 | 25.1 | 10.6 |
| Level of Service | D | C | C | E | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 38.1 | | | 36.4 | | | 34.0 | | | 21.4 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 33.3 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.38 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 17.7 | | | |
| Intersection Capacity Utilization | | | 54.4% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

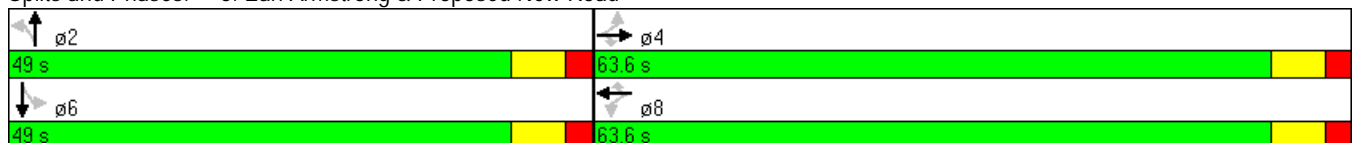
Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 35 | 330 | 50 | 5 | 410 | 2 | 75 | 0 | 0 |
| Lane Group Flow (vph) | 35 | 330 | 50 | 5 | 410 | 2 | 75 | 30 | 15 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 49.0 | 49.0 | 49.0 |
| Total Split (%) | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 43.5% | 43.5% | 43.5% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.45 | 0.05 | 0.03 |
| Control Delay | 0.2 | 0.2 | 0.1 | 3.6 | 3.2 | 2.5 | 54.7 | 0.2 | 0.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.2 | 0.2 | 0.1 | 3.6 | 3.2 | 2.5 | 54.7 | 0.2 | 0.1 |
| Queue Length 50th (m) | 0.1 | 0.3 | 0.0 | 0.2 | 9.2 | 0.0 | 15.6 | 0.0 | 0.0 |
| Queue Length 95th (m) | 0.1 | 0.3 | 0.0 | 1.2 | 16.3 | 0.6 | 28.9 | 0.0 | 0.0 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 778 | 2893 | 1303 | 842 | 2893 | 1294 | 533 | 900 | 845 |
| 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 | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.14 | 0.03 | 0.02 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 330 | 50 | 5 | 410 | 2 | 75 | 0 | 30 | 0 | 0 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | | 0.85 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1583 | | | 1583 | |
| Flt Permitted | 0.51 | 1.00 | 1.00 | 0.55 | 1.00 | 1.00 | 0.75 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 953 | 3539 | 1583 | 1029 | 3539 | 1583 | 1393 | 1583 | | | 1583 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 330 | 50 | 5 | 410 | 2 | 75 | 0 | 30 | 0 | 0 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 330 | 40 | 5 | 410 | 2 | 75 | 3 | 0 | 0 | 2 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 10.3 | 10.3 | | | 10.3 | |
| Effective Green, g (s) | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 11.3 | 11.3 | | | 11.3 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 757 | 2813 | 1258 | 818 | 2813 | 1258 | 140 | 159 | | | 159 | |
| v/s Ratio Prot | | 0.09 | | | c0.12 | | | 0.00 | | | 0.00 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.00 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.12 | 0.03 | 0.01 | 0.15 | 0.00 | 0.54 | 0.02 | | | 0.01 | |
| Uniform Delay, d1 | 2.5 | 2.6 | 2.4 | 2.4 | 2.7 | 2.4 | 48.2 | 45.7 | | | 45.6 | |
| Progression Factor | 0.04 | 0.04 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 3.9 | 0.0 | | | 0.0 | |
| Delay (s) | 0.2 | 0.2 | 0.0 | 2.4 | 2.8 | 2.4 | 52.1 | 45.7 | | | 45.6 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.2 | | | 2.8 | | | 50.2 | | | 45.6 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.6 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.19 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 45.2% | | | | ICU Level of Service | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 415 | 25 | 0 | 500 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 415 | 25 | 0 | 500 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.94 | | 0.94 | 0.94 |
| vC, conflicting volume | | | 440 | | 678 | 220 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 271 | | 489 | 36 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1210 | | 479 | 964 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 277 | 163 | 250 | 250 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 25 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 964 | |
| Volume to Capacity | 0.16 | 0.10 | 0.15 | 0.15 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 8.7 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 8.7 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 22.3% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 25 | 55 | 285 | 40 | 65 | 155 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 25 | 55 | 285 | 40 | 65 | 155 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 144 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 512 | 162 | | | 325 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 512 | 162 | | | 325 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 95 | 94 | | | 95 | | |
| cM capacity (veh/h) | 465 | 854 | | | 1231 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 25 | 55 | 190 | 135 | 65 | 78 | 78 |
| Volume Left | 25 | 0 | 0 | 0 | 65 | 0 | 0 |
| Volume Right | 0 | 55 | 0 | 40 | 0 | 0 | 0 |
| cSH | 465 | 854 | 1700 | 1700 | 1231 | 1700 | 1700 |
| Volume to Capacity | 0.05 | 0.06 | 0.11 | 0.08 | 0.05 | 0.05 | 0.05 |
| Queue Length 95th (m) | 1.3 | 1.5 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 |
| Control Delay (s) | 13.2 | 9.5 | 0.0 | 0.0 | 8.1 | 0.0 | 0.0 |
| Lane LOS | B | A | | | A | | |
| Approach Delay (s) | 10.7 | | 0.0 | | 2.4 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 2.2 | | | | |
| Intersection Capacity Utilization | | | 26.1% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 2 | 0 | 5 | 105 | 50 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 0 | 5 | 105 | 50 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 168 | 52 | 55 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 168 | 52 | 55 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 820 | 1015 | 1550 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 2 | 110 | 55 | | | |
| Volume Left | 2 | 5 | 0 | | | |
| Volume Right | 0 | 0 | 5 | | | |
| cSH | 820 | 1550 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.03 | | | |
| Queue Length 95th (m) | 0.1 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.4 | 0.4 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.4 | 0.4 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.3 | | | |
| Intersection Capacity Utilization | | 19.6% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 0 | 1 | 105 | 50 | 1 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 0 | 1 | 105 | 50 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 158 | 50 | 51 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 158 | 50 | 51 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 100 | 100 | | | |
| cM capacity (veh/h) | 833 | 1018 | 1555 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 5 | 106 | 51 | | | |
| Volume Left | 5 | 1 | 0 | | | |
| Volume Right | 0 | 0 | 1 | | | |
| cSH | 833 | 1555 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.00 | 0.03 | | | |
| Queue Length 95th (m) | 0.1 | 0.0 | 0.0 | | | |
| Control Delay (s) | 9.3 | 0.1 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.3 | 0.1 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.3 | | | |
| Intersection Capacity Utilization | | 16.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

Queues

Future Background Traffic-2021

3: Earl Armstrong & Limebank

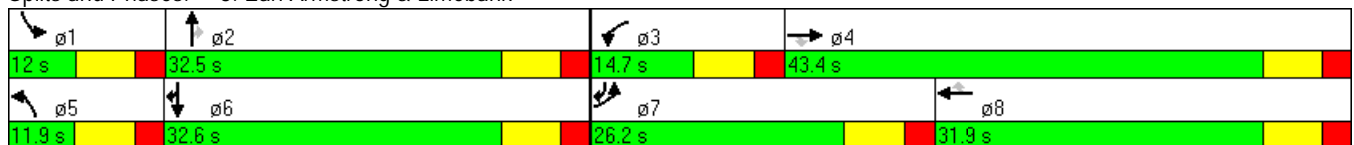
Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 640 | 600 | 105 | 95 | 595 | 155 | 75 | 135 | 55 | 245 | 205 | 755 |
| Lane Group Flow (vph) | 640 | 600 | 105 | 95 | 595 | 155 | 75 | 135 | 55 | 245 | 205 | 755 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 26.2 | 43.4 | 43.4 | 14.7 | 31.9 | 31.9 | 11.9 | 32.5 | 32.5 | 12.0 | 32.6 | 58.8 |
| Total Split (%) | 25.5% | 42.3% | 42.3% | 14.3% | 31.1% | 31.1% | 11.6% | 31.7% | 31.7% | 11.7% | 31.8% | 57.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.94 | 0.46 | 0.16 | 0.34 | 0.75 | 0.33 | 0.33 | 0.15 | 0.12 | 0.81 | 0.19 | 0.47 |
| Control Delay | 64.4 | 26.5 | 5.1 | 50.0 | 36.5 | 4.3 | 50.0 | 29.8 | 8.9 | 69.4 | 28.8 | 13.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 64.4 | 26.5 | 5.1 | 50.0 | 36.5 | 4.3 | 50.0 | 29.8 | 8.9 | 69.4 | 28.8 | 13.1 |
| Queue Length 50th (m) | 64.4 | 48.3 | 0.0 | 9.4 | 45.0 | 0.6 | 7.3 | 10.7 | 0.0 | 25.1 | 16.6 | 43.2 |
| Queue Length 95th (m) | #97.1 | 62.2 | 10.4 | 17.3 | 56.4 | 8.0 | 14.4 | 18.2 | 9.0 | #54.2 | 26.1 | 60.0 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 679 | 1340 | 665 | 294 | 897 | 517 | 230 | 918 | 451 | 302 | 1078 | 1617 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.94 | 0.45 | 0.16 | 0.32 | 0.66 | 0.30 | 0.33 | 0.15 | 0.12 | 0.81 | 0.19 | 0.47 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 24 (23%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 640 | 600 | 105 | 95 | 595 | 155 | 75 | 135 | 55 | 245 | 205 | 755 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 640 | 600 | 105 | 95 | 595 | 155 | 75 | 135 | 55 | 245 | 205 | 755 |
| RTOR Reduction (vph) | 0 | 0 | 67 | 0 | 0 | 118 | 0 | 0 | 41 | 0 | 0 | 60 |
| Lane Group Flow (vph) | 640 | 600 | 38 | 95 | 595 | 37 | 75 | 135 | 14 | 245 | 205 | 695 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 19.3 | 36.6 | 36.6 | 6.1 | 23.4 | 23.4 | 4.7 | 24.3 | 24.3 | 8.0 | 27.6 | 53.8 |
| Effective Green, g (s) | 20.3 | 37.6 | 37.6 | 7.1 | 24.4 | 24.4 | 5.7 | 25.3 | 25.3 | 9.0 | 28.6 | 54.8 |
| Actuated g/C Ratio | 0.20 | 0.37 | 0.37 | 0.07 | 0.24 | 0.24 | 0.06 | 0.25 | 0.25 | 0.09 | 0.28 | 0.53 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 679 | 1297 | 580 | 238 | 842 | 376 | 191 | 873 | 390 | 301 | 987 | 1489 |
| v/s Ratio Prot | c0.19 | 0.17 | | 0.03 | c0.17 | | 0.02 | 0.04 | | c0.07 | 0.06 | c0.25 |
| v/s Ratio Perm | | | 0.02 | | | 0.02 | | | 0.01 | | | |
| v/c Ratio | 0.94 | 0.46 | 0.07 | 0.40 | 0.71 | 0.10 | 0.39 | 0.15 | 0.03 | 0.81 | 0.21 | 0.47 |
| Uniform Delay, d1 | 40.6 | 24.8 | 21.1 | 45.7 | 35.8 | 30.5 | 46.8 | 30.3 | 29.4 | 46.0 | 28.3 | 14.8 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.05 | 0.82 | 0.47 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 21.5 | 0.3 | 0.0 | 1.1 | 2.7 | 0.1 | 1.3 | 0.4 | 0.2 | 15.4 | 0.5 | 0.2 |
| Delay (s) | 62.1 | 25.1 | 21.2 | 49.1 | 32.2 | 14.5 | 48.1 | 30.7 | 29.5 | 61.4 | 28.8 | 15.1 |
| Level of Service | E | C | C | D | C | B | D | C | C | E | C | B |
| Approach Delay (s) | | 42.4 | | | 30.8 | | | 35.4 | | | 26.8 | |
| Approach LOS | | D | | | C | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 34.1 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.74 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | 23.6 | | | |
| Intersection Capacity Utilization | | | 69.7% | | | | ICU Level of Service | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

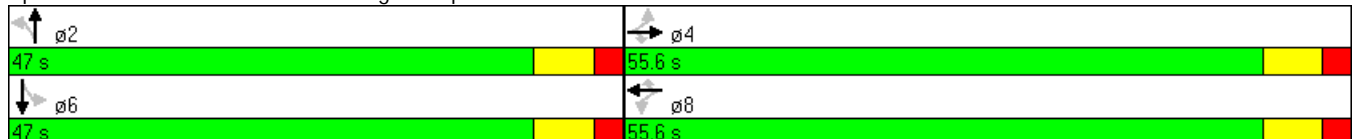
Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 5 | 5 |
| Lane Group Flow (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 55 | 95 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 47.0 | 47.0 | 47.0 |
| Total Split (%) | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 45.8% | 45.8% | 45.8% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.17 | 0.25 | 0.09 | 0.05 | 0.25 | 0.01 | 0.56 | 0.19 | 0.30 |
| Control Delay | 1.0 | 0.6 | 0.1 | 5.1 | 5.2 | 2.8 | 50.4 | 13.1 | 11.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 1.0 | 0.6 | 0.1 | 5.1 | 5.2 | 2.8 | 50.4 | 13.1 | 11.0 |
| Queue Length 50th (m) | 0.4 | 1.4 | 0.0 | 1.1 | 18.0 | 0.0 | 20.4 | 0.9 | 0.9 |
| Queue Length 95th (m) | m0.8 | m2.0 | m0.0 | 4.2 | 31.3 | 1.6 | 35.0 | 10.4 | 13.3 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 552 | 2593 | 1188 | 549 | 2593 | 1162 | 519 | 675 | 694 |
| 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 | 0.17 | 0.25 | 0.09 | 0.05 | 0.25 | 0.01 | 0.21 | 0.08 | 0.14 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 5 | 50 | 0 | 5 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.86 | | | 0.86 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1609 | | | 1598 | |
| Flt Permitted | 0.40 | 1.00 | 1.00 | 0.40 | 1.00 | 1.00 | 0.70 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 753 | 3539 | 1583 | 749 | 3539 | 1583 | 1295 | 1609 | | | 1598 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 5 | 50 | 0 | 5 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 28 | 0 | 0 | 3 | 0 | 42 | 0 | 0 | 76 | 0 |
| Lane Group Flow (vph) | 95 | 650 | 77 | 25 | 645 | 7 | 110 | 13 | 0 | 0 | 19 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 74.2 | 74.2 | 74.2 | 74.2 | 74.2 | 74.2 | 14.6 | 14.6 | | | 14.6 | |
| Effective Green, g (s) | 75.2 | 75.2 | 75.2 | 75.2 | 75.2 | 75.2 | 15.6 | 15.6 | | | 15.6 | |
| Actuated g/C Ratio | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.15 | 0.15 | | | 0.15 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 552 | 2594 | 1160 | 549 | 2594 | 1160 | 197 | 245 | | | 243 | |
| v/s Ratio Prot | | c0.18 | | | 0.18 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.13 | | 0.05 | 0.03 | | 0.00 | c0.08 | | | | | |
| v/c Ratio | 0.17 | 0.25 | 0.07 | 0.05 | 0.25 | 0.01 | 0.56 | 0.05 | | | 0.08 | |
| Uniform Delay, d1 | 4.2 | 4.5 | 3.8 | 3.8 | 4.5 | 3.7 | 40.3 | 37.2 | | | 37.3 | |
| Progression Factor | 0.07 | 0.08 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.6 | 0.2 | 0.1 | 0.2 | 0.2 | 0.0 | 3.4 | 0.1 | | | 0.1 | |
| Delay (s) | 0.9 | 0.6 | 0.1 | 3.9 | 4.7 | 3.7 | 43.7 | 37.3 | | | 37.5 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.5 | | | 4.7 | | | 41.6 | | | 37.5 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.8 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.30 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 53.8% | | | | ICU Level of Service | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access














Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 820 | 80 | 0 | 845 | 0 | 30 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 820 | 80 | 0 | 845 | 0 | 30 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.87 | | 0.90 | 0.87 |
| vC, conflicting volume | | | 900 | | 1282 | 450 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 598 | | 828 | 83 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 96 |
| cM capacity (veh/h) | | | 852 | | 279 | 839 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 547 | 353 | 422 | 422 | 30 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 80 | 0 | 0 | 30 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 839 | |
| Volume to Capacity | 0.32 | 0.21 | 0.25 | 0.25 | 0.04 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.4 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.4 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.2 | | | |
| Intersection Capacity Utilization | | | 35.2% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|--|---|---|--|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |   | |  |   | |
| Volume (veh/h) | 135 | 230 | 40 | 110 | 185 | 220 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 135 | 230 | 40 | 110 | 185 | 220 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 145 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 575 | 75 | | | 150 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 575 | 75 | | | 150 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 65 | 76 | | | 87 | | |
| cM capacity (veh/h) | 390 | 971 | | | 1429 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 135 | 230 | 27 | 123 | 185 | 110 | 110 |
| Volume Left | 135 | 0 | 0 | 0 | 185 | 0 | 0 |
| Volume Right | 0 | 230 | 0 | 110 | 0 | 0 | 0 |
| cSH | 390 | 971 | 1700 | 1700 | 1429 | 1700 | 1700 |
| Volume to Capacity | 0.35 | 0.24 | 0.02 | 0.07 | 0.13 | 0.06 | 0.06 |
| Queue Length 95th (m) | 11.4 | 6.9 | 0.0 | 0.0 | 3.3 | 0.0 | 0.0 |
| Control Delay (s) | 19.0 | 9.9 | 0.0 | 0.0 | 7.9 | 0.0 | 0.0 |
| Lane LOS | C | A | | | A | | |
| Approach Delay (s) | 13.2 | | 0.0 | | 3.6 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 6.8 | | | | |
| Intersection Capacity Utilization | | | 32.4% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 20 | 5 | 5 | 145 | 110 | 25 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 20 | 5 | 5 | 145 | 110 | 25 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 278 | 122 | 135 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 278 | 122 | 135 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 97 | 99 | 100 | | | |
| cM capacity (veh/h) | 710 | 929 | 1449 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 25 | 150 | 135 | | | |
| Volume Left | 20 | 5 | 0 | | | |
| Volume Right | 5 | 0 | 25 | | | |
| cSH | 745 | 1449 | 1700 | | | |
| Volume to Capacity | 0.03 | 0.00 | 0.08 | | | |
| Queue Length 95th (m) | 0.8 | 0.1 | 0.0 | | | |
| Control Delay (s) | 10.0 | 0.3 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.0 | 0.3 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | 21.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 10 | 10 | 145 | 110 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 10 | 10 | 145 | 110 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 278 | 112 | 115 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 278 | 112 | 115 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 707 | 940 | 1474 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 155 | 115 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 10 | 0 | 5 | | | |
| cSH | 847 | 1474 | 1700 | | | |
| Volume to Capacity | 0.02 | 0.01 | 0.07 | | | |
| Queue Length 95th (m) | 0.4 | 0.2 | 0.0 | | | |
| Control Delay (s) | 9.3 | 0.5 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.3 | 0.5 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.8 | | | |
| Intersection Capacity Utilization | | 24.9% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

3: Earl Armstrong & Limebank

Future Total Traffic-2021

Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 25 | 90 | 110 | 285 |
| Lane Group Flow (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 25 | 90 | 110 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 31.9 | 51.9 | 51.9 | 11.9 | 31.9 | 31.9 | 16.9 | 36.9 | 36.9 | 11.9 | 31.9 | 63.8 |
| Total Split (%) | 28.3% | 46.1% | 46.1% | 10.6% | 28.3% | 28.3% | 15.0% | 32.8% | 32.8% | 10.6% | 28.3% | 56.7% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.69 | 0.30 | 0.13 | 0.25 | 0.64 | 0.30 | 0.40 | 0.14 | 0.04 | 0.33 | 0.09 | 0.16 |
| Control Delay | 48.4 | 30.0 | 6.4 | 57.8 | 42.4 | 6.4 | 51.3 | 25.6 | 11.0 | 51.8 | 27.4 | 2.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.4 | 30.0 | 6.4 | 57.8 | 42.4 | 6.4 | 51.3 | 25.6 | 11.0 | 51.8 | 27.4 | 2.1 |
| Queue Length 50th (m) | 46.0 | 29.2 | 0.0 | 5.0 | 33.9 | 0.0 | 13.9 | 14.3 | 0.0 | 9.6 | 8.2 | 0.8 |
| Queue Length 95th (m) | 58.6 | 36.1 | 8.9 | 10.8 | 41.4 | 8.6 | 22.6 | 25.7 | 6.5 | 17.3 | 17.0 | 7.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 793 | 1446 | 688 | 183 | 817 | 442 | 353 | 1390 | 637 | 276 | 1259 | 1878 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.55 | 0.22 | 0.10 | 0.25 | 0.43 | 0.23 | 0.37 | 0.14 | 0.04 | 0.33 | 0.09 | 0.15 |

Intersection Summary

Cycle Length: 112.6

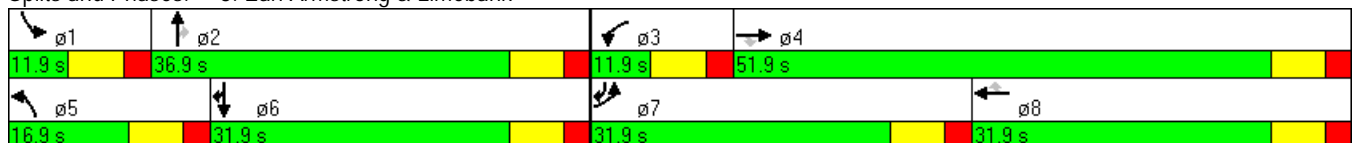
Actuated Cycle Length: 112.6

Offset: 28 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Total Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 25 | 90 | 110 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 435 | 325 | 70 | 45 | 355 | 100 | 130 | 190 | 25 | 90 | 110 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 48 | 0 | 0 | 83 | 0 | 0 | 16 | 0 | 0 | 112 |
| Lane Group Flow (vph) | 435 | 325 | 22 | 45 | 355 | 17 | 130 | 190 | 9 | 90 | 110 | 173 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 19.8 | 33.7 | 33.7 | 4.0 | 17.9 | 17.9 | 9.6 | 40.5 | 40.5 | 6.8 | 37.7 | 64.4 |
| Effective Green, g (s) | 20.8 | 34.7 | 34.7 | 5.0 | 18.9 | 18.9 | 10.6 | 41.5 | 41.5 | 7.8 | 38.7 | 65.4 |
| Actuated g/C Ratio | 0.18 | 0.31 | 0.31 | 0.04 | 0.17 | 0.17 | 0.09 | 0.37 | 0.37 | 0.07 | 0.34 | 0.58 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 634 | 1091 | 488 | 152 | 594 | 266 | 323 | 1304 | 583 | 238 | 1216 | 1619 |
| v/s Ratio Prot | c0.13 | 0.09 | | 0.01 | c0.10 | | c0.04 | c0.05 | | 0.03 | 0.03 | 0.06 |
| v/s Ratio Perm | | | 0.01 | | | 0.01 | | | 0.01 | | | |
| v/c Ratio | 0.69 | 0.30 | 0.04 | 0.30 | 0.60 | 0.06 | 0.40 | 0.15 | 0.02 | 0.38 | 0.09 | 0.11 |
| Uniform Delay, d1 | 42.9 | 29.7 | 27.3 | 52.1 | 43.3 | 39.4 | 48.0 | 23.7 | 22.6 | 50.1 | 25.0 | 10.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.06 | 0.83 | 0.52 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.1 | 0.2 | 0.0 | 1.1 | 1.6 | 0.1 | 0.8 | 0.2 | 0.0 | 1.0 | 0.1 | 0.0 |
| Delay (s) | 45.9 | 29.8 | 27.4 | 56.3 | 37.6 | 20.4 | 48.8 | 24.0 | 22.6 | 51.1 | 25.2 | 10.6 |
| Level of Service | D | C | C | E | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 38.1 | | | 35.9 | | | 33.2 | | | 21.4 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 33.0 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.40 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 23.6 | | | |
| Intersection Capacity Utilization | | | 54.4% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

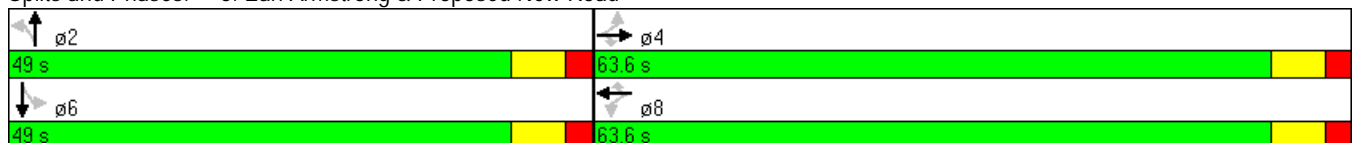
Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 10 |
| Lane Group Flow (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 40 | 25 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 49.0 | 49.0 | 49.0 |
| Total Split (%) | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 43.5% | 43.5% | 43.5% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.46 | 0.18 | 0.12 |
| Control Delay | 0.3 | 0.3 | 0.1 | 3.5 | 3.2 | 2.5 | 54.7 | 18.1 | 26.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.3 | 0.3 | 0.1 | 3.5 | 3.2 | 2.5 | 54.7 | 18.1 | 26.2 |
| Queue Length 50th (m) | 0.1 | 0.4 | 0.0 | 0.4 | 9.3 | 0.0 | 15.6 | 1.0 | 2.0 |
| Queue Length 95th (m) | 0.2 | 0.6 | 0.0 | 1.8 | 16.3 | 0.6 | 28.9 | 10.3 | 9.5 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 778 | 2891 | 1302 | 841 | 2891 | 1294 | 528 | 641 | 658 |
| 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 | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.14 | 0.06 | 0.04 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.87 | | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1618 | | | 1695 | |
| Flt Permitted | 0.51 | 1.00 | 1.00 | 0.55 | 1.00 | 1.00 | 0.74 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 953 | 3539 | 1583 | 1029 | 3539 | 1583 | 1380 | 1618 | | | 1695 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 330 | 40 | 10 | 410 | 2 | 75 | 9 | 0 | 0 | 12 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.4 | 88.4 | 88.4 | 88.4 | 88.4 | 88.4 | 10.4 | 10.4 | | | 10.4 | |
| Effective Green, g (s) | 89.4 | 89.4 | 89.4 | 89.4 | 89.4 | 89.4 | 11.4 | 11.4 | | | 11.4 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 757 | 2810 | 1257 | 817 | 2810 | 1257 | 140 | 164 | | | 172 | |
| v/s Ratio Prot | | 0.09 | | | c0.12 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.01 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.12 | 0.03 | 0.01 | 0.15 | 0.00 | 0.54 | 0.05 | | | 0.07 | |
| Uniform Delay, d1 | 2.5 | 2.6 | 2.5 | 2.4 | 2.7 | 2.4 | 48.1 | 45.7 | | | 45.8 | |
| Progression Factor | 0.06 | 0.06 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 3.9 | 0.1 | | | 0.2 | |
| Delay (s) | 0.3 | 0.2 | 0.0 | 2.4 | 2.8 | 2.4 | 52.0 | 45.9 | | | 46.0 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.2 | | | 2.8 | | | 49.9 | | | 46.0 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.3 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.19 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 45.2% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis














9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2021
Weekday AM Peak Hour Zero Interaction

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 415 | 30 | 0 | 500 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 415 | 30 | 0 | 500 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.94 | | 0.94 | 0.94 |
| vC, conflicting volume | | | 445 | | 680 | 222 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 276 | | 491 | 39 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1204 | | 478 | 961 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 277 | 168 | 250 | 250 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 30 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 961 | |
| Volume to Capacity | 0.16 | 0.10 | 0.15 | 0.15 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 8.8 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 8.8 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 22.4% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|--|---|---|--|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |   | |  |   | |
| Volume (veh/h) | 15 | 55 | 295 | 30 | 70 | 155 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 15 | 55 | 295 | 30 | 70 | 155 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 144 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 528 | 162 | | | 325 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 528 | 162 | | | 325 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 97 | 94 | | | 94 | | |
| cM capacity (veh/h) | 453 | 854 | | | 1231 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 15 | 55 | 197 | 128 | 70 | 78 | 78 |
| Volume Left | 15 | 0 | 0 | 0 | 70 | 0 | 0 |
| Volume Right | 0 | 55 | 0 | 30 | 0 | 0 | 0 |
| cSH | 453 | 854 | 1700 | 1700 | 1231 | 1700 | 1700 |
| Volume to Capacity | 0.03 | 0.06 | 0.12 | 0.08 | 0.06 | 0.05 | 0.05 |
| Queue Length 95th (m) | 0.8 | 1.5 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 |
| Control Delay (s) | 13.2 | 9.5 | 0.0 | 0.0 | 8.1 | 0.0 | 0.0 |
| Lane LOS | B | A | | | A | | |
| Approach Delay (s) | 10.3 | | 0.0 | | 2.5 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 2.1 | | | | |
| Intersection Capacity Utilization | | | 26.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 5 | 10 | 110 | 60 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 5 | 10 | 110 | 60 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 195 | 65 | 70 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 195 | 65 | 70 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 789 | 999 | 1531 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 10 | 120 | 70 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 5 | 0 | 10 | | | |
| cSH | 881 | 1531 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.3 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | 23.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 10 | 20 | 115 | 55 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 10 | 20 | 115 | 55 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 212 | 58 | 60 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 212 | 58 | 60 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 766 | 1009 | 1544 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 135 | 60 | | | |
| Volume Left | 5 | 20 | 0 | | | |
| Volume Right | 10 | 0 | 5 | | | |
| cSH | 912 | 1544 | 1700 | | | |
| Volume to Capacity | 0.02 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.4 | 0.3 | 0.0 | | | |
| Control Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.4 | | | |
| Intersection Capacity Utilization | | 23.8% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

3: Earl Armstrong & Limebank

Future Total Traffic-2021

Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 640 | 605 | 110 | 95 | 595 | 155 | 90 | 155 | 65 | 245 | 220 | 755 |
| Lane Group Flow (vph) | 640 | 605 | 110 | 95 | 595 | 155 | 90 | 155 | 65 | 245 | 220 | 755 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 26.3 | 43.4 | 43.4 | 14.8 | 31.9 | 31.9 | 12.4 | 32.4 | 32.4 | 12.0 | 32.0 | 58.3 |
| Total Split (%) | 25.6% | 42.3% | 42.3% | 14.4% | 31.1% | 31.1% | 12.1% | 31.6% | 31.6% | 11.7% | 31.2% | 56.8% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.94 | 0.47 | 0.17 | 0.34 | 0.75 | 0.33 | 0.37 | 0.17 | 0.14 | 0.81 | 0.21 | 0.47 |
| Control Delay | 63.4 | 26.6 | 5.0 | 55.3 | 35.4 | 3.9 | 50.2 | 30.1 | 8.4 | 69.4 | 29.4 | 13.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 63.4 | 26.6 | 5.0 | 55.3 | 35.4 | 3.9 | 50.2 | 30.1 | 8.4 | 69.4 | 29.4 | 13.5 |
| Queue Length 50th (m) | 64.3 | 48.8 | 0.0 | 9.6 | 43.6 | 1.8 | 8.7 | 12.4 | 0.0 | 25.1 | 18.1 | 44.6 |
| Queue Length 95th (m) | #96.7 | 62.8 | 10.5 | 17.8 | 54.3 | 7.1 | 16.6 | 20.5 | 9.9 | #54.2 | 28.0 | 61.5 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 683 | 1341 | 668 | 298 | 897 | 517 | 245 | 914 | 457 | 302 | 1061 | 1603 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.94 | 0.45 | 0.16 | 0.32 | 0.66 | 0.30 | 0.37 | 0.17 | 0.14 | 0.81 | 0.21 | 0.47 |

Intersection Summary

Cycle Length: 102.6

Actuated Cycle Length: 102.6

Offset: 31 (30%), Referenced to phase 2:NBT and 6:SBT, Start of Green

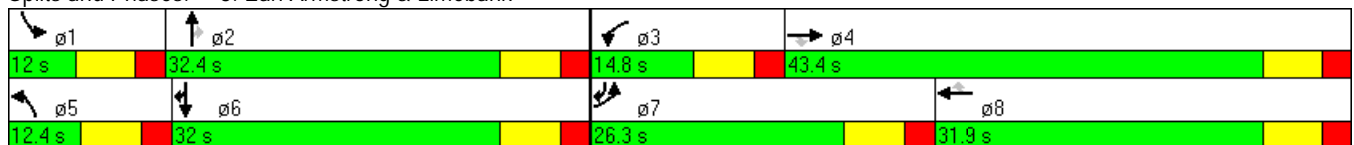
Natural Cycle: 100

Control Type: Actuated-Coordinated

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

























Queue shown is maximum after two cycles.

Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis
3: Earl Armstrong & Limebank

Future Total Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 640 | 605 | 110 | 95 | 595 | 155 | 90 | 155 | 65 | 245 | 220 | 755 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 640 | 605 | 110 | 95 | 595 | 155 | 90 | 155 | 65 | 245 | 220 | 755 |
| RTOR Reduction (vph) | 0 | 0 | 70 | 0 | 0 | 118 | 0 | 0 | 49 | 0 | 0 | 56 |
| Lane Group Flow (vph) | 640 | 605 | 40 | 95 | 595 | 37 | 90 | 155 | 16 | 245 | 220 | 699 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 19.4 | 36.7 | 36.7 | 6.2 | 23.5 | 23.5 | 5.1 | 24.1 | 24.1 | 8.0 | 27.0 | 53.3 |
| Effective Green, g (s) | 20.4 | 37.7 | 37.7 | 7.2 | 24.5 | 24.5 | 6.1 | 25.1 | 25.1 | 9.0 | 28.0 | 54.3 |
| Actuated g/C Ratio | 0.20 | 0.37 | 0.37 | 0.07 | 0.24 | 0.24 | 0.06 | 0.24 | 0.24 | 0.09 | 0.27 | 0.53 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 683 | 1300 | 582 | 241 | 845 | 378 | 204 | 866 | 387 | 301 | 966 | 1475 |
| v/s Ratio Prot | c0.19 | 0.17 | | 0.03 | c0.17 | | 0.03 | 0.04 | | c0.07 | 0.06 | c0.25 |
| v/s Ratio Perm | | | 0.03 | | | 0.02 | | | 0.01 | | | |
| v/c Ratio | 0.94 | 0.47 | 0.07 | 0.39 | 0.70 | 0.10 | 0.44 | 0.18 | 0.04 | 0.81 | 0.23 | 0.47 |
| Uniform Delay, d1 | 40.5 | 24.8 | 21.1 | 45.6 | 35.7 | 30.4 | 46.6 | 30.6 | 29.6 | 46.0 | 28.9 | 15.2 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.17 | 0.79 | 0.40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 20.3 | 0.3 | 0.1 | 1.0 | 2.6 | 0.1 | 1.5 | 0.5 | 0.2 | 15.4 | 0.5 | 0.2 |
| Delay (s) | 60.8 | 25.0 | 21.1 | 54.5 | 30.9 | 12.2 | 48.1 | 31.1 | 29.8 | 61.4 | 29.5 | 15.4 |
| Level of Service | E | C | C | D | C | B | D | C | C | E | C | B |
| Approach Delay (s) | | 41.6 | | | 30.2 | | | 35.7 | | | 27.2 | |
| Approach LOS | | D | | | C | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 33.8 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.74 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | 23.6 | | | |
| Intersection Capacity Utilization | | | 69.7% | | | | ICU Level of Service | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

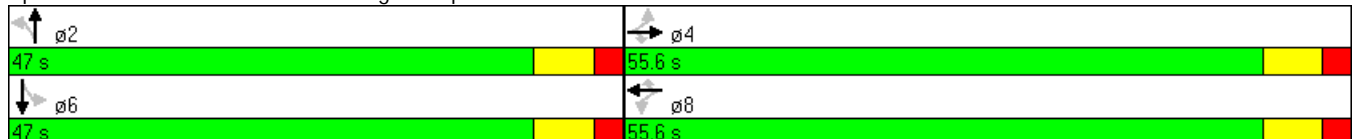
Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 155 | 20 | 25 |
| Lane Group Flow (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 155 | 80 | 115 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 47.0 | 47.0 | 47.0 |
| Total Split (%) | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 45.8% | 45.8% | 45.8% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.17 | 0.26 | 0.09 | 0.15 | 0.24 | 0.01 | 0.66 | 0.22 | 0.30 |
| Control Delay | 1.5 | 1.0 | 0.1 | 7.4 | 6.5 | 3.7 | 51.0 | 13.6 | 12.4 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 1.5 | 1.0 | 0.1 | 7.4 | 6.5 | 3.7 | 51.0 | 13.6 | 12.4 |
| Queue Length 50th (m) | 0.7 | 2.7 | 0.0 | 4.6 | 19.6 | 0.0 | 28.6 | 3.3 | 4.1 |
| Queue Length 95th (m) | m1.6 | m4.2 | m0.0 | 12.8 | 34.4 | 1.9 | 44.8 | 13.8 | 16.6 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 548 | 2475 | 1138 | 518 | 2475 | 1110 | 510 | 699 | 713 |
| 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 | 0.17 | 0.26 | 0.09 | 0.15 | 0.24 | 0.01 | 0.30 | 0.11 | 0.16 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.


























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |  |  |  |  | |
| Volume (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 155 | 20 | 60 | 0 | 25 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.89 | | | 0.88 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1653 | | | 1644 | |
| Flt Permitted | 0.42 | 1.00 | 1.00 | 0.40 | 1.00 | 1.00 | 0.68 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 785 | 3539 | 1583 | 740 | 3539 | 1583 | 1272 | 1653 | | | 1644 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 155 | 20 | 60 | 0 | 25 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 3 | 0 | 49 | 0 | 0 | 73 | 0 |
| Lane Group Flow (vph) | 95 | 650 | 74 | 80 | 600 | 7 | 155 | 31 | 0 | 0 | 42 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 70.8 | 70.8 | 70.8 | 70.8 | 70.8 | 70.8 | 18.0 | 18.0 | | | 18.0 | |
| Effective Green, g (s) | 71.8 | 71.8 | 71.8 | 71.8 | 71.8 | 71.8 | 19.0 | 19.0 | | | 19.0 | |
| Actuated g/C Ratio | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.19 | 0.19 | | | 0.19 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 549 | 2477 | 1108 | 518 | 2477 | 1108 | 236 | 306 | | | 304 | |
| v/s Ratio Prot | | c0.18 | | | 0.17 | | | 0.02 | | | 0.03 | |
| v/s Ratio Perm | 0.12 | | 0.05 | 0.11 | | 0.00 | c0.12 | | | | | |
| v/c Ratio | 0.17 | 0.26 | 0.07 | 0.15 | 0.24 | 0.01 | 0.66 | 0.10 | | | 0.14 | |
| Uniform Delay, d1 | 5.3 | 5.7 | 4.8 | 5.2 | 5.6 | 4.6 | 38.8 | 34.7 | | | 34.9 | |
| Progression Factor | 0.13 | 0.12 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.6 | 0.2 | 0.1 | 0.6 | 0.2 | 0.0 | 6.4 | 0.1 | | | 0.2 | |
| Delay (s) | 1.3 | 0.9 | 0.1 | 5.8 | 5.8 | 4.7 | 45.2 | 34.9 | | | 35.2 | |
| Level of Service | A | A | A | A | A | A | D | C | | | D | |
| Approach Delay (s) | | 0.9 | | | 5.8 | | | 41.7 | | | 35.2 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.8 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.35 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 56.3% | | | | ICU Level of Service | | | | B | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

9: Earl Armstrong & RIRO Site Access












Future Total Traffic-2021
Weekday PM Peak Hour Zero Interaction



| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 775 | 140 | 0 | 845 | 0 | 75 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 775 | 140 | 0 | 845 | 0 | 75 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.87 | | 0.90 | 0.87 |
| vC, conflicting volume | | | 915 | | 1268 | 458 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 612 | | 802 | 87 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 91 |
| cM capacity (veh/h) | | | 841 | | 289 | 832 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 517 | 398 | 422 | 422 | 75 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 140 | 0 | 0 | 75 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 832 | |
| Volume to Capacity | 0.30 | 0.23 | 0.25 | 0.25 | 0.09 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.8 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | 0.0 | | | 9.8 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.4 | | | |
| Intersection Capacity Utilization | | | 37.2% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 90 | 215 | 95 | 70 | 175 | 250 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 90 | 215 | 95 | 70 | 175 | 250 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 145 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 605 | 82 | | | 165 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 605 | 82 | | | 165 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 76 | 78 | | | 88 | | |
| cM capacity (veh/h) | 376 | 961 | | | 1411 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 90 | 215 | 63 | 102 | 175 | 125 | 125 |
| Volume Left | 90 | 0 | 0 | 0 | 175 | 0 | 0 |
| Volume Right | 0 | 215 | 0 | 70 | 0 | 0 | 0 |
| cSH | 376 | 961 | 1700 | 1700 | 1411 | 1700 | 1700 |
| Volume to Capacity | 0.24 | 0.22 | 0.04 | 0.06 | 0.12 | 0.07 | 0.07 |
| Queue Length 95th (m) | 6.9 | 6.4 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 |
| Control Delay (s) | 17.6 | 9.8 | 0.0 | 0.0 | 7.9 | 0.0 | 0.0 |
| Lane LOS | C | A | | | A | | |
| Approach Delay (s) | 12.1 | | 0.0 | | 3.3 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 5.7 | | | | |
| Intersection Capacity Utilization | | | 29.6% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 75 | 15 | 25 | 160 | 125 | 80 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 75 | 15 | 25 | 160 | 125 | 80 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 375 | 165 | 205 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 375 | 165 | 205 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 88 | 98 | 98 | | | |
| cM capacity (veh/h) | 615 | 879 | 1366 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 90 | 185 | 205 | | | |
| Volume Left | 75 | 25 | 0 | | | |
| Volume Right | 15 | 0 | 80 | | | |
| cSH | 647 | 1366 | 1700 | | | |
| Volume to Capacity | 0.14 | 0.02 | 0.12 | | | |
| Queue Length 95th (m) | 3.6 | 0.4 | 0.0 | | | |
| Control Delay (s) | 11.5 | 1.2 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 11.5 | 1.2 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.6 | | | |
| Intersection Capacity Utilization | | 36.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 20 | 35 | 45 | 165 | 125 | 15 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 20 | 35 | 45 | 165 | 125 | 15 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 388 | 132 | 140 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 388 | 132 | 140 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 97 | 96 | 97 | | | |
| cM capacity (veh/h) | 597 | 917 | 1443 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 55 | 210 | 140 | | | |
| Volume Left | 20 | 45 | 0 | | | |
| Volume Right | 35 | 0 | 15 | | | |
| cSH | 767 | 1443 | 1700 | | | |
| Volume to Capacity | 0.07 | 0.03 | 0.08 | | | |
| Queue Length 95th (m) | 1.7 | 0.7 | 0.0 | | | |
| Control Delay (s) | 10.1 | 1.8 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.1 | 1.8 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.3 | | | |
| Intersection Capacity Utilization | | 32.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

**APPENDIX H: Synchro Analysis – Future Background & Future
Total 2021 unconstrained interaction**

Queues
3: Earl Armstrong & Limebank

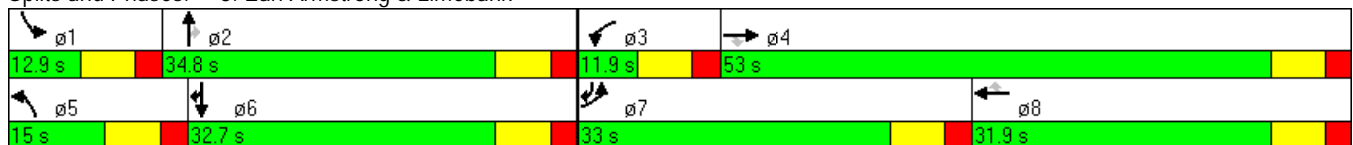
Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 20 | 95 | 105 | 285 |
| Lane Group Flow (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 20 | 95 | 105 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 33.0 | 53.0 | 53.0 | 11.9 | 31.9 | 31.9 | 15.0 | 34.8 | 34.8 | 12.9 | 32.7 | 65.7 |
| Total Split (%) | 29.3% | 47.1% | 47.1% | 10.6% | 28.3% | 28.3% | 13.3% | 30.9% | 30.9% | 11.5% | 29.0% | 58.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.84 | 0.66 | 0.12 | 0.25 | 0.73 | 0.25 | 0.59 | 0.18 | 0.04 | 0.39 | 0.11 | 0.18 |
| Control Delay | 51.8 | 30.5 | 6.7 | 55.8 | 42.9 | 5.8 | 57.3 | 31.8 | 12.9 | 55.0 | 33.0 | 8.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.8 | 30.5 | 6.7 | 55.8 | 42.9 | 5.8 | 57.3 | 31.8 | 12.9 | 55.0 | 33.0 | 8.8 |
| Queue Length 50th (m) | 69.7 | 86.6 | 1.5 | 5.0 | 43.1 | 0.0 | 19.7 | 16.8 | 0.0 | 10.2 | 9.4 | 11.0 |
| Queue Length 95th (m) | 90.4 | 102.3 | 10.2 | 10.8 | 52.6 | 8.1 | #32.5 | 26.5 | 6.0 | 18.7 | 16.5 | 18.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 826 | 1480 | 702 | 183 | 817 | 442 | 316 | 1033 | 476 | 245 | 960 | 1615 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.80 | 0.63 | 0.11 | 0.25 | 0.62 | 0.23 | 0.59 | 0.18 | 0.04 | 0.39 | 0.11 | 0.18 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 36 (32%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2021
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 20 | 95 | 105 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 20 | 95 | 105 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 42 | 0 | 0 | 79 | 0 | 0 | 14 | 0 | 0 | 45 |
| Lane Group Flow (vph) | 660 | 925 | 38 | 45 | 510 | 21 | 185 | 190 | 6 | 95 | 105 | 240 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 24.9 | 43.5 | 43.5 | 4.0 | 22.6 | 22.6 | 9.4 | 30.5 | 30.5 | 7.0 | 28.1 | 59.9 |
| Effective Green, g (s) | 25.9 | 44.5 | 44.5 | 5.0 | 23.6 | 23.6 | 10.4 | 31.5 | 31.5 | 8.0 | 29.1 | 60.9 |
| Actuated g/C Ratio | 0.23 | 0.40 | 0.40 | 0.04 | 0.21 | 0.21 | 0.09 | 0.28 | 0.28 | 0.07 | 0.26 | 0.54 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 790 | 1399 | 626 | 152 | 742 | 332 | 317 | 990 | 443 | 244 | 915 | 1507 |
| v/s Ratio Prot | c0.19 | c0.26 | | 0.01 | 0.14 | | c0.05 | c0.05 | | 0.03 | 0.03 | 0.09 |
| v/s Ratio Perm | | | 0.02 | | | 0.01 | | | 0.00 | | | |
| v/c Ratio | 0.84 | 0.66 | 0.06 | 0.30 | 0.69 | 0.06 | 0.58 | 0.19 | 0.01 | 0.39 | 0.11 | 0.16 |
| Uniform Delay, d1 | 41.3 | 27.9 | 21.1 | 52.1 | 41.1 | 35.6 | 49.0 | 30.9 | 29.3 | 50.0 | 31.9 | 13.0 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.02 | 0.86 | 0.60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 7.6 | 1.2 | 0.0 | 1.1 | 2.6 | 0.1 | 2.7 | 0.4 | 0.1 | 1.0 | 0.3 | 0.0 |
| Delay (s) | 49.0 | 29.1 | 21.1 | 54.4 | 38.1 | 21.3 | 51.8 | 31.3 | 29.4 | 51.0 | 32.2 | 13.0 |
| Level of Service | D | C | C | D | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 36.6 | | | 36.7 | | | 40.8 | | | 24.6 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 35.3 | | | | HCM Level of Service | | | | D | |
| HCM Volume to Capacity ratio | | | 0.51 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 66.2% | | | | ICU Level of Service | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 35 | 930 | 50 | 5 | 565 | 2 | 75 | 0 | 2 |
| Lane Group Flow (vph) | 35 | 930 | 50 | 5 | 565 | 2 | 75 | 30 | 17 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 39.0 | 39.0 | 39.0 |
| Total Split (%) | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 34.6% | 34.6% | 34.6% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.05 | 0.32 | 0.04 | 0.01 | 0.20 | 0.00 | 0.46 | 0.10 | 0.08 |
| Control Delay | 0.2 | 0.3 | 0.0 | 3.6 | 3.3 | 2.5 | 54.8 | 0.6 | 21.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.2 | 0.3 | 0.0 | 3.6 | 3.3 | 2.5 | 54.8 | 0.6 | 21.2 |
| Queue Length 50th (m) | 0.0 | 0.3 | 0.0 | 0.2 | 13.4 | 0.0 | 15.6 | 0.0 | 0.4 |
| Queue Length 95th (m) | m0.0 | 0.3 | m0.0 | 1.2 | 22.5 | 0.6 | 28.9 | 0.0 | 6.7 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 671 | 2894 | 1302 | 454 | 2894 | 1295 | 409 | 566 | 486 |
| 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 | 0.32 | 0.04 | 0.01 | 0.20 | 0.00 | 0.18 | 0.05 | 0.03 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 930 | 50 | 5 | 565 | 2 | 75 | 0 | 30 | 0 | 2 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | | 0.87 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1583 | | | 1616 | |
| Flt Permitted | 0.44 | 1.00 | 1.00 | 0.30 | 1.00 | 1.00 | 0.75 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 819 | 3539 | 1583 | 555 | 3539 | 1583 | 1390 | 1583 | | | 1616 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 930 | 50 | 5 | 565 | 2 | 75 | 0 | 30 | 0 | 2 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 930 | 42 | 5 | 565 | 2 | 75 | 3 | 0 | 0 | 4 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 10.3 | 10.3 | | | 10.3 | |
| Effective Green, g (s) | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 11.3 | 11.3 | | | 11.3 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 651 | 2813 | 1258 | 441 | 2813 | 1258 | 139 | 159 | | | 162 | |
| v/s Ratio Prot | | c0.26 | | | 0.16 | | | 0.00 | | | 0.00 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.01 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.33 | 0.03 | 0.01 | 0.20 | 0.00 | 0.54 | 0.02 | | | 0.02 | |
| Uniform Delay, d1 | 2.5 | 3.2 | 2.4 | 2.4 | 2.8 | 2.4 | 48.2 | 45.7 | | | 45.7 | |
| Progression Factor | 0.02 | 0.03 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.3 | 0.0 | 0.0 | 0.2 | 0.0 | 4.0 | 0.0 | | | 0.1 | |
| Delay (s) | 0.2 | 0.3 | 0.0 | 2.4 | 3.0 | 2.4 | 52.2 | 45.7 | | | 45.7 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.3 | | | 3.0 | | | 50.3 | | | 45.7 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 4.7 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.35 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 49.7% | | | | ICU Level of Service | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis












9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2021
Weekday AM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 1015 | 25 | 0 | 655 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1015 | 25 | 0 | 655 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.78 | | 0.80 | 0.78 |
| vC, conflicting volume | | | 1040 | | 1355 | 520 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 501 | | 779 | 0 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 831 | | 266 | 851 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 677 | 363 | 328 | 328 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 25 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 851 | |
| Volume to Capacity | 0.40 | 0.21 | 0.19 | 0.19 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.2 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.2 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 38.9% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|-------------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 25 | 55 | 340 | 40 | 65 | 165 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 25 | 55 | 340 | 40 | 65 | 165 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 144 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 572 | 190 | | | 380 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 572 | 190 | | | 380 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 94 | 93 | | | 94 | | |
| cM capacity (veh/h) | 425 | 820 | | | 1175 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 25 | 55 | 227 | 153 | 65 | 82 | 82 |
| Volume Left | 25 | 0 | 0 | 0 | 65 | 0 | 0 |
| Volume Right | 0 | 55 | 0 | 40 | 0 | 0 | 0 |
| cSH | 425 | 820 | 1700 | 1700 | 1175 | 1700 | 1700 |
| Volume to Capacity | 0.06 | 0.07 | 0.13 | 0.09 | 0.06 | 0.05 | 0.05 |
| Queue Length 95th (m) | 1.4 | 1.6 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 |
| Control Delay (s) | 14.0 | 9.7 | 0.0 | 0.0 | 8.2 | 0.0 | 0.0 |
| Lane LOS | B | A | | | A | | |
| Approach Delay (s) | 11.0 | | 0.0 | | 2.3 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 2.1 | | | | |
| Intersection Capacity Utilization | | | 27.6% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 2 | 0 | 5 | 105 | 50 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 0 | 5 | 105 | 50 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 168 | 52 | 55 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 168 | 52 | 55 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 820 | 1015 | 1550 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 2 | 110 | 55 | | | |
| Volume Left | 2 | 5 | 0 | | | |
| Volume Right | 0 | 0 | 5 | | | |
| cSH | 820 | 1550 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.03 | | | |
| Queue Length 95th (m) | 0.1 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.4 | 0.4 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.4 | 0.4 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.3 | | | |
| Intersection Capacity Utilization | | 19.6% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 0 | 2 | 5 | 110 | 50 | 2 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 2 | 5 | 110 | 50 | 2 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 186 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 171 | 51 | 52 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 171 | 51 | 52 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 100 | | | |
| cM capacity (veh/h) | 816 | 1017 | 1554 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 2 | 115 | 52 | | | |
| Volume Left | 0 | 5 | 0 | | | |
| Volume Right | 2 | 0 | 2 | | | |
| cSH | 1017 | 1554 | 1700 | | | |
| Volume to Capacity | 0.00 | 0.00 | 0.03 | | | |
| Queue Length 95th (m) | 0.0 | 0.1 | 0.0 | | | |
| Control Delay (s) | 8.5 | 0.3 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 8.5 | 0.3 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.3 | | | |
| Intersection Capacity Utilization | | 19.9% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

Queues
3: Earl Armstrong & Limebank

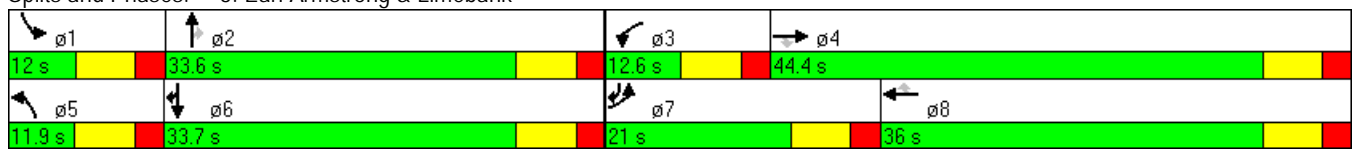
Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|--------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 730 | 680 | 215 | 95 | 1200 | 155 | 75 | 135 | 55 | 245 | 205 | 955 |
| Lane Group Flow (vph) | 730 | 680 | 215 | 95 | 1200 | 155 | 75 | 135 | 55 | 245 | 205 | 955 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 21.0 | 44.4 | 44.4 | 12.6 | 36.0 | 36.0 | 11.9 | 33.6 | 33.6 | 12.0 | 33.7 | 54.7 |
| Total Split (%) | 20.5% | 43.3% | 43.3% | 12.3% | 35.1% | 35.1% | 11.6% | 32.7% | 32.7% | 11.7% | 32.8% | 53.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 1.45 | 0.48 | 0.28 | 0.42 | 1.16 | 0.29 | 0.37 | 0.14 | 0.12 | 1.20 | 0.20 | 0.67 |
| Control Delay | 245.2 | 25.1 | 4.1 | 54.5 | 110.8 | 9.8 | 52.1 | 29.0 | 8.6 | 170.1 | 28.8 | 21.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 245.2 | 25.1 | 4.1 | 54.5 | 110.8 | 9.8 | 52.1 | 29.0 | 8.6 | 170.1 | 28.8 | 21.7 |
| Queue Length 50th (m) | ~101.1 | 53.6 | 0.0 | 9.3 | ~148.6 | 4.1 | 7.4 | 10.6 | 0.0 | ~30.3 | 16.4 | 76.6 |
| Queue Length 95th (m) | #135.8 | 70.2 | 13.9 | 17.4 | #182.5 | 16.0 | 14.4 | 18.0 | 8.8 | #54.2 | 25.7 | 101.5 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 505 | 1415 | 762 | 224 | 1038 | 530 | 201 | 955 | 468 | 204 | 1041 | 1419 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.45 | 0.48 | 0.28 | 0.42 | 1.16 | 0.29 | 0.37 | 0.14 | 0.12 | 1.20 | 0.20 | 0.67 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 43 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 ~ 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: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 730 | 680 | 215 | 95 | 1200 | 155 | 75 | 135 | 55 | 245 | 205 | 955 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 730 | 680 | 215 | 95 | 1200 | 155 | 75 | 135 | 55 | 245 | 205 | 955 |
| RTOR Reduction (vph) | 0 | 0 | 129 | 0 | 0 | 64 | 0 | 0 | 41 | 0 | 0 | 31 |
| Lane Group Flow (vph) | 730 | 680 | 86 | 95 | 1200 | 91 | 75 | 135 | 14 | 245 | 205 | 924 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 14.1 | 40.0 | 40.0 | 4.6 | 30.5 | 30.5 | 4.0 | 25.3 | 25.3 | 5.1 | 26.4 | 47.4 |
| Effective Green, g (s) | 15.1 | 41.0 | 41.0 | 5.6 | 31.5 | 31.5 | 5.0 | 26.3 | 26.3 | 6.1 | 27.4 | 48.4 |
| Actuated g/C Ratio | 0.15 | 0.40 | 0.40 | 0.05 | 0.31 | 0.31 | 0.05 | 0.26 | 0.26 | 0.06 | 0.27 | 0.47 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 505 | 1414 | 633 | 187 | 1087 | 486 | 167 | 907 | 406 | 204 | 945 | 1315 |
| v/s Ratio Prot | c0.21 | 0.19 | | 0.03 | c0.34 | | 0.02 | 0.04 | | c0.07 | 0.06 | c0.33 |
| v/s Ratio Perm | | | 0.05 | | | 0.06 | | | 0.01 | | | |
| v/c Ratio | 1.45 | 0.48 | 0.14 | 0.51 | 1.10 | 0.19 | 0.45 | 0.15 | 0.03 | 1.20 | 0.22 | 0.70 |
| Uniform Delay, d1 | 43.8 | 22.9 | 19.6 | 47.2 | 35.5 | 26.1 | 47.5 | 29.5 | 28.6 | 48.2 | 29.3 | 21.4 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.06 | 0.85 | 0.69 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 211.5 | 0.3 | 0.1 | 2.0 | 59.4 | 0.2 | 1.9 | 0.3 | 0.2 | 127.8 | 0.5 | 1.7 |
| Delay (s) | 255.2 | 23.2 | 19.7 | 52.0 | 89.7 | 18.3 | 49.4 | 29.8 | 28.8 | 176.0 | 29.8 | 23.1 |
| Level of Service | F | C | B | D | F | B | D | C | C | F | C | C |
| Approach Delay (s) | | 126.9 | | | 79.6 | | | 35.2 | | | 50.8 | |
| Approach LOS | | F | | | E | | | D | | | D | |

Intersection Summary

| | | | |
|-----------------------------------|-------|----------------------|------|
| HCM Average Control Delay | 84.8 | HCM Level of Service | F |
| HCM Volume to Capacity ratio | 1.01 | | |
| Actuated Cycle Length (s) | 102.6 | Sum of lost time (s) | 17.7 |
| Intersection Capacity Utilization | 89.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

Queues
6: Earl Armstrong & Proposed New Road

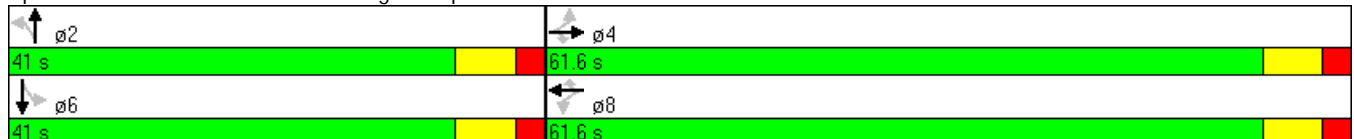
Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 95 | 730 | 105 | 60 | 1215 | 10 | 145 | 5 | 5 |
| Lane Group Flow (vph) | 95 | 730 | 105 | 60 | 1215 | 10 | 145 | 55 | 95 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 61.6 | 61.6 | 61.6 | 61.6 | 61.6 | 61.6 | 41.0 | 41.0 | 41.0 |
| Total Split (%) | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 40.0% | 40.0% | 40.0% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.36 | 0.29 | 0.09 | 0.12 | 0.48 | 0.01 | 0.64 | 0.17 | 0.29 |
| Control Delay | 6.8 | 0.8 | 0.1 | 6.8 | 8.0 | 4.4 | 51.4 | 11.9 | 19.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 6.8 | 0.8 | 0.1 | 6.8 | 8.0 | 4.4 | 51.4 | 11.9 | 19.0 |
| Queue Length 50th (m) | 0.4 | 1.4 | 0.0 | 3.2 | 48.1 | 0.2 | 26.8 | 0.8 | 6.9 |
| Queue Length 95th (m) | m4.1 | m3.9 | m0.1 | 9.6 | 78.5 | 2.0 | 43.0 | 9.9 | 18.8 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 262 | 2513 | 1154 | 480 | 2513 | 1126 | 443 | 583 | 582 |
| 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 | 0.36 | 0.29 | 0.09 | 0.13 | 0.48 | 0.01 | 0.33 | 0.09 | 0.16 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 100 (97%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 730 | 105 | 60 | 1215 | 10 | 145 | 5 | 50 | 0 | 5 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.86 | | | 0.86 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1609 | | | 1598 | |
| Flt Permitted | 0.20 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | 0.70 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 369 | 3539 | 1583 | 677 | 3539 | 1583 | 1295 | 1609 | | | 1598 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 730 | 105 | 60 | 1215 | 10 | 145 | 5 | 50 | 0 | 5 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 30 | 0 | 0 | 2 | 0 | 41 | 0 | 0 | 45 | 0 |
| Lane Group Flow (vph) | 95 | 730 | 75 | 60 | 1215 | 8 | 145 | 14 | 0 | 0 | 50 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 71.9 | 71.9 | 71.9 | 71.9 | 71.9 | 71.9 | 16.9 | 16.9 | | | 16.9 | |
| Effective Green, g (s) | 72.9 | 72.9 | 72.9 | 72.9 | 72.9 | 72.9 | 17.9 | 17.9 | | | 17.9 | |
| Actuated g/C Ratio | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.17 | 0.17 | | | 0.17 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 262 | 2515 | 1125 | 481 | 2515 | 1125 | 226 | 281 | | | 279 | |
| v/s Ratio Prot | | 0.21 | | | c0.34 | | | 0.01 | | | 0.03 | |
| v/s Ratio Perm | 0.26 | | 0.05 | 0.09 | | 0.01 | c0.11 | | | | | |
| v/c Ratio | 0.36 | 0.29 | 0.07 | 0.12 | 0.48 | 0.01 | 0.64 | 0.05 | | | 0.18 | |
| Uniform Delay, d1 | 5.8 | 5.4 | 4.5 | 4.7 | 6.5 | 4.3 | 39.4 | 35.3 | | | 36.1 | |
| Progression Factor | 0.46 | 0.10 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 3.0 | 0.2 | 0.1 | 0.5 | 0.7 | 0.0 | 6.1 | 0.1 | | | 0.3 | |
| Delay (s) | 5.7 | 0.8 | 0.1 | 5.2 | 7.2 | 4.3 | 45.5 | 35.3 | | | 36.4 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 1.2 | | | 7.1 | | | 42.7 | | | 36.4 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.9 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.51 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 71.4% | | | | ICU Level of Service | | | | C | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis














9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2021
Weekday PM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 910 | 70 | 0 | 1450 | 0 | 20 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 910 | 70 | 0 | 1450 | 0 | 20 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.86 | | 0.91 | 0.86 |
| vC, conflicting volume | | | 980 | | 1670 | 490 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 650 | | 848 | 80 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 98 |
| cM capacity (veh/h) | | | 801 | | 274 | 829 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 607 | 373 | 725 | 725 | 20 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 70 | 0 | 0 | 20 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 829 | |
| Volume to Capacity | 0.36 | 0.22 | 0.43 | 0.43 | 0.02 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.4 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.4 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.1 | | | |
| Intersection Capacity Utilization | | | 43.4% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|--|---|---|--|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |   | |  |   | |
| Volume (veh/h) | 125 | 220 | 50 | 100 | 175 | 340 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 125 | 220 | 50 | 100 | 175 | 340 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 145 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 620 | 75 | | | 150 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 620 | 75 | | | 150 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 66 | 77 | | | 88 | | |
| cM capacity (veh/h) | 368 | 971 | | | 1429 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 125 | 220 | 33 | 117 | 175 | 170 | 170 |
| Volume Left | 125 | 0 | 0 | 0 | 175 | 0 | 0 |
| Volume Right | 0 | 220 | 0 | 100 | 0 | 0 | 0 |
| cSH | 368 | 971 | 1700 | 1700 | 1429 | 1700 | 1700 |
| Volume to Capacity | 0.34 | 0.23 | 0.02 | 0.07 | 0.12 | 0.10 | 0.10 |
| Queue Length 95th (m) | 11.0 | 6.5 | 0.0 | 0.0 | 3.1 | 0.0 | 0.0 |
| Control Delay (s) | 19.7 | 9.8 | 0.0 | 0.0 | 7.9 | 0.0 | 0.0 |
| Lane LOS | C | A | | | A | | |
| Approach Delay (s) | 13.4 | | 0.0 | | 2.7 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 5.9 | | | | |
| Intersection Capacity Utilization | | | 31.2% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 55 | 5 | 5 | 145 | 110 | 60 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 55 | 5 | 5 | 145 | 110 | 60 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 295 | 140 | 170 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 295 | 140 | 170 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 92 | 99 | 100 | | | |
| cM capacity (veh/h) | 694 | 908 | 1407 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 60 | 150 | 170 | | | |
| Volume Left | 55 | 5 | 0 | | | |
| Volume Right | 5 | 0 | 60 | | | |
| cSH | 707 | 1407 | 1700 | | | |
| Volume to Capacity | 0.08 | 0.00 | 0.10 | | | |
| Queue Length 95th (m) | 2.1 | 0.1 | 0.0 | | | |
| Control Delay (s) | 10.6 | 0.3 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.6 | 0.3 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.8 | | | |
| Intersection Capacity Utilization | | 21.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 10 | 10 | 145 | 110 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 10 | 10 | 145 | 110 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 278 | 112 | 115 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 278 | 112 | 115 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 707 | 940 | 1474 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 155 | 115 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 10 | 0 | 5 | | | |
| cSH | 847 | 1474 | 1700 | | | |
| Volume to Capacity | 0.02 | 0.01 | 0.07 | | | |
| Queue Length 95th (m) | 0.4 | 0.2 | 0.0 | | | |
| Control Delay (s) | 9.3 | 0.5 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.3 | 0.5 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.8 | | | |
| Intersection Capacity Utilization | | 24.9% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

3: Earl Armstrong & Limebank

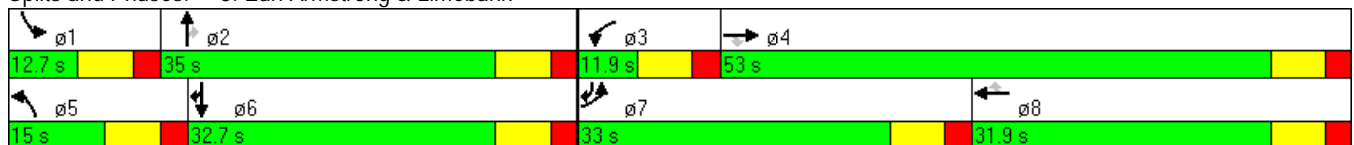
Future Total Traffic-2021
Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 25 | 90 | 110 | 285 |
| Lane Group Flow (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 25 | 90 | 110 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 33.0 | 53.0 | 53.0 | 11.9 | 31.9 | 31.9 | 15.0 | 35.0 | 35.0 | 12.7 | 32.7 | 65.7 |
| Total Split (%) | 29.3% | 47.1% | 47.1% | 10.6% | 28.3% | 28.3% | 13.3% | 31.1% | 31.1% | 11.3% | 29.0% | 58.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.84 | 0.66 | 0.12 | 0.25 | 0.73 | 0.25 | 0.59 | 0.17 | 0.05 | 0.38 | 0.11 | 0.18 |
| Control Delay | 51.8 | 30.5 | 6.7 | 56.0 | 42.8 | 5.8 | 57.3 | 30.9 | 12.0 | 55.0 | 33.0 | 8.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.8 | 30.5 | 6.7 | 56.0 | 42.8 | 5.8 | 57.3 | 30.9 | 12.0 | 55.0 | 33.0 | 8.8 |
| Queue Length 50th (m) | 69.7 | 86.6 | 1.5 | 5.0 | 43.0 | 0.0 | 19.7 | 16.8 | 0.0 | 9.6 | 9.8 | 11.0 |
| Queue Length 95th (m) | 90.4 | 102.3 | 10.2 | 10.8 | 52.7 | 8.1 | #32.5 | 26.4 | 6.6 | 17.9 | 17.2 | 18.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 826 | 1480 | 702 | 183 | 817 | 442 | 316 | 1121 | 519 | 239 | 960 | 1615 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.80 | 0.63 | 0.11 | 0.25 | 0.62 | 0.23 | 0.59 | 0.17 | 0.05 | 0.38 | 0.11 | 0.18 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 36 (32%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 3: Earl Armstrong & Limebank





















HCM Signalized Intersection Capacity Analysis
 3: Earl Armstrong & Limebank

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------|-------|-------|------|------|------|----------------------|-------|------|------|------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 25 | 90 | 110 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 660 | 925 | 80 | 45 | 510 | 100 | 185 | 190 | 25 | 90 | 110 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 42 | 0 | 0 | 79 | 0 | 0 | 18 | 0 | 0 | 45 |
| Lane Group Flow (vph) | 660 | 925 | 38 | 45 | 510 | 21 | 185 | 190 | 7 | 90 | 110 | 240 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 24.9 | 43.5 | 43.5 | 4.0 | 22.6 | 22.6 | 9.4 | 31.9 | 31.9 | 5.6 | 28.1 | 59.9 |
| Effective Green, g (s) | 25.9 | 44.5 | 44.5 | 5.0 | 23.6 | 23.6 | 10.4 | 32.9 | 32.9 | 6.6 | 29.1 | 60.9 |
| Actuated g/C Ratio | 0.23 | 0.40 | 0.40 | 0.04 | 0.21 | 0.21 | 0.09 | 0.29 | 0.29 | 0.06 | 0.26 | 0.54 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 790 | 1399 | 626 | 152 | 742 | 332 | 317 | 1034 | 463 | 201 | 915 | 1507 |
| v/s Ratio Prot | c0.19 | c0.26 | | 0.01 | 0.14 | | c0.05 | c0.05 | | 0.03 | 0.03 | 0.09 |
| v/s Ratio Perm | | | 0.02 | | | 0.01 | | | 0.00 | | | |
| v/c Ratio | 0.84 | 0.66 | 0.06 | 0.30 | 0.69 | 0.06 | 0.58 | 0.18 | 0.02 | 0.45 | 0.12 | 0.16 |
| Uniform Delay, d1 | 41.3 | 27.9 | 21.1 | 52.1 | 41.1 | 35.6 | 49.0 | 29.8 | 28.3 | 51.2 | 32.0 | 13.0 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.03 | 0.86 | 0.60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 7.6 | 1.2 | 0.0 | 1.1 | 2.6 | 0.1 | 2.7 | 0.4 | 0.1 | 1.6 | 0.3 | 0.0 |
| Delay (s) | 49.0 | 29.1 | 21.1 | 54.6 | 38.1 | 21.5 | 51.8 | 30.2 | 28.4 | 52.8 | 32.2 | 13.0 |
| Level of Service | D | C | C | D | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 36.6 | | | 36.7 | | | 40.1 | | | 24.8 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 35.2 | | | | HCM Level of Service | | | D | | |
| HCM Volume to Capacity ratio | | | 0.54 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 17.7 | | | |
| Intersection Capacity Utilization | | | 66.2% | | | | ICU Level of Service | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
| Lane Configurations |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 35 | 930 | 50 | 10 | 565 | 2 | 75 | 5 | 10 |
| Lane Group Flow (vph) | 35 | 930 | 50 | 10 | 565 | 2 | 75 | 40 | 25 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 39.0 | 39.0 | 39.0 |
| Total Split (%) | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 34.6% | 34.6% | 34.6% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.05 | 0.32 | 0.04 | 0.02 | 0.20 | 0.00 | 0.46 | 0.18 | 0.12 |
| Control Delay | 0.2 | 0.4 | 0.0 | 3.6 | 3.4 | 2.5 | 54.8 | 18.1 | 26.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.2 | 0.4 | 0.0 | 3.6 | 3.4 | 2.5 | 54.8 | 18.1 | 26.3 |
| Queue Length 50th (m) | 0.0 | 0.5 | 0.0 | 0.4 | 13.5 | 0.0 | 15.6 | 1.0 | 2.0 |
| Queue Length 95th (m) | m0.0 | 0.6 | m0.0 | 1.8 | 22.6 | 0.6 | 28.9 | 10.4 | 9.6 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 670 | 2892 | 1301 | 454 | 2892 | 1294 | 406 | 501 | 509 |
| 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 | 0.32 | 0.04 | 0.02 | 0.20 | 0.00 | 0.18 | 0.08 | 0.05 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.




























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |  |  |
| Volume (vph) | 35 | 930 | 50 | 10 | 565 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.87 | | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1618 | | | 1695 | |
| Flt Permitted | 0.44 | 1.00 | 1.00 | 0.30 | 1.00 | 1.00 | 0.74 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 819 | 3539 | 1583 | 555 | 3539 | 1583 | 1380 | 1618 | | | 1695 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 930 | 50 | 10 | 565 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 930 | 42 | 10 | 565 | 2 | 75 | 9 | 0 | 0 | 12 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 10.3 | 10.3 | | | 10.3 | |
| Effective Green, g (s) | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 11.3 | 11.3 | | | 11.3 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 651 | 2813 | 1258 | 441 | 2813 | 1258 | 138 | 162 | | | 170 | |
| v/s Ratio Prot | | c0.26 | | | 0.16 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.02 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.33 | 0.03 | 0.02 | 0.20 | 0.00 | 0.54 | 0.05 | | | 0.07 | |
| Uniform Delay, d1 | 2.5 | 3.2 | 2.4 | 2.4 | 2.8 | 2.4 | 48.2 | 45.8 | | | 45.9 | |
| Progression Factor | 0.02 | 0.03 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.3 | 0.0 | 0.1 | 0.2 | 0.0 | 4.3 | 0.1 | | | 0.2 | |
| Delay (s) | 0.2 | 0.4 | 0.0 | 2.5 | 3.0 | 2.4 | 52.5 | 45.9 | | | 46.0 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.3 | | | 3.0 | | | 50.2 | | | 46.0 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 5.2 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.35 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 49.7% | | | | ICU Level of Service | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|-------|------|------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 1015 | 30 | 0 | 655 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1015 | 30 | 0 | 655 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | | 0.78 | 0.80 | 0.78 |
| vC, conflicting volume | | | | 1045 | 1358 | 522 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | | 508 | 782 | 0 |
| tC, single (s) | | | | 4.1 | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | | 2.2 | 3.5 | 3.3 |
| p0 queue free % | | | | 100 | 100 | 100 |
| cM capacity (veh/h) | | | | 826 | 265 | 851 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 677 | 368 | 328 | 328 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 30 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 851 | |
| Volume to Capacity | 0.40 | 0.22 | 0.19 | 0.19 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.2 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | 0.0 | | | | 9.2 |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | | 0.0 | | |
| Intersection Capacity Utilization | 39.0% | | | ICU Level of Service | | A |
| Analysis Period (min) | 15 | | | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|---|---|---|---|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |  | |  |  | |
| Volume (veh/h) | 15 | 55 | 350 | 30 | 70 | 165 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 15 | 55 | 350 | 30 | 70 | 165 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 144 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 588 | 190 | | | 380 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 588 | 190 | | | 380 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 96 | 93 | | | 94 | | |
| cM capacity (veh/h) | 414 | 820 | | | 1175 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 15 | 55 | 233 | 147 | 70 | 82 | 82 |
| Volume Left | 15 | 0 | 0 | 0 | 70 | 0 | 0 |
| Volume Right | 0 | 55 | 0 | 30 | 0 | 0 | 0 |
| cSH | 414 | 820 | 1700 | 1700 | 1175 | 1700 | 1700 |
| Volume to Capacity | 0.04 | 0.07 | 0.14 | 0.09 | 0.06 | 0.05 | 0.05 |
| Queue Length 95th (m) | 0.8 | 1.6 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 |
| Control Delay (s) | 14.0 | 9.7 | 0.0 | 0.0 | 8.3 | 0.0 | 0.0 |
| Lane LOS | B | A | | | A | | |
| Approach Delay (s) | 10.6 | | 0.0 | | 2.5 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 1.9 | | | | |
| Intersection Capacity Utilization | | | 27.8% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 5 | 10 | 110 | 60 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 5 | 10 | 110 | 60 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 195 | 65 | 70 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 195 | 65 | 70 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 789 | 999 | 1531 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 10 | 120 | 70 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 5 | 0 | 10 | | | |
| cSH | 881 | 1531 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.3 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | 23.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 10 | 20 | 115 | 55 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 10 | 20 | 115 | 55 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 186 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 212 | 58 | 60 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 212 | 58 | 60 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 766 | 1009 | 1544 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 135 | 60 | | | |
| Volume Left | 5 | 20 | 0 | | | |
| Volume Right | 10 | 0 | 5 | | | |
| cSH | 912 | 1544 | 1700 | | | |
| Volume to Capacity | 0.02 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.4 | 0.3 | 0.0 | | | |
| Control Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.4 | | | |
| Intersection Capacity Utilization | | 23.8% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues
3: Earl Armstrong & Limebank

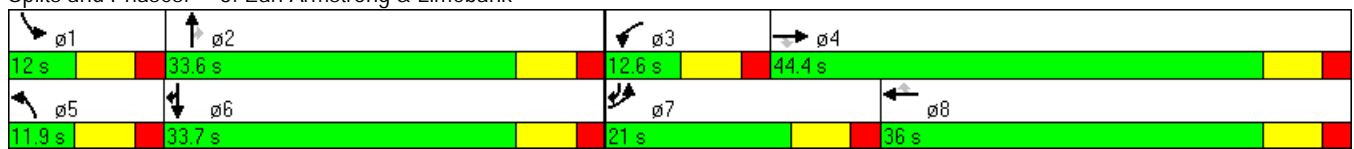
Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|--------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 730 | 685 | 220 | 95 | 1200 | 155 | 90 | 155 | 65 | 245 | 220 | 955 |
| Lane Group Flow (vph) | 730 | 685 | 220 | 95 | 1200 | 155 | 90 | 155 | 65 | 245 | 220 | 955 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 21.0 | 44.4 | 44.4 | 12.6 | 36.0 | 36.0 | 11.9 | 33.6 | 33.6 | 12.0 | 33.7 | 54.7 |
| Total Split (%) | 20.5% | 43.3% | 43.3% | 12.3% | 35.1% | 35.1% | 11.6% | 32.7% | 32.7% | 11.7% | 32.8% | 53.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 1.45 | 0.48 | 0.29 | 0.42 | 1.16 | 0.29 | 0.45 | 0.16 | 0.14 | 1.20 | 0.21 | 0.68 |
| Control Delay | 245.2 | 25.1 | 4.1 | 54.3 | 110.9 | 10.3 | 54.1 | 29.2 | 8.1 | 170.1 | 29.0 | 22.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 245.2 | 25.1 | 4.1 | 54.3 | 110.9 | 10.3 | 54.1 | 29.2 | 8.1 | 170.1 | 29.0 | 22.2 |
| Queue Length 50th (m) | ~101.1 | 54.1 | 0.0 | 9.3 | ~148.5 | 4.3 | 9.0 | 12.2 | 0.0 | ~30.3 | 17.6 | 78.0 |
| Queue Length 95th (m) | #135.8 | 70.8 | 14.2 | 17.4 | #182.6 | 17.2 | 16.7 | 20.1 | 9.7 | #54.2 | 27.3 | 103.0 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 505 | 1415 | 765 | 224 | 1038 | 530 | 201 | 955 | 475 | 204 | 1041 | 1412 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.45 | 0.48 | 0.29 | 0.42 | 1.16 | 0.29 | 0.45 | 0.16 | 0.14 | 1.20 | 0.21 | 0.68 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 43 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 ~ 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: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Total Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 730 | 685 | 220 | 95 | 1200 | 155 | 90 | 155 | 65 | 245 | 220 | 955 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 730 | 685 | 220 | 95 | 1200 | 155 | 90 | 155 | 65 | 245 | 220 | 955 |
| RTOR Reduction (vph) | 0 | 0 | 132 | 0 | 0 | 64 | 0 | 0 | 48 | 0 | 0 | 23 |
| Lane Group Flow (vph) | 730 | 685 | 88 | 95 | 1200 | 91 | 90 | 155 | 17 | 245 | 220 | 932 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 14.1 | 40.0 | 40.0 | 4.6 | 30.5 | 30.5 | 4.0 | 25.3 | 25.3 | 5.1 | 26.4 | 47.4 |
| Effective Green, g (s) | 15.1 | 41.0 | 41.0 | 5.6 | 31.5 | 31.5 | 5.0 | 26.3 | 26.3 | 6.1 | 27.4 | 48.4 |
| Actuated g/C Ratio | 0.15 | 0.40 | 0.40 | 0.05 | 0.31 | 0.31 | 0.05 | 0.26 | 0.26 | 0.06 | 0.27 | 0.47 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 505 | 1414 | 633 | 187 | 1087 | 486 | 167 | 907 | 406 | 204 | 945 | 1315 |
| v/s Ratio Prot | c0.21 | 0.19 | | 0.03 | c0.34 | | 0.03 | 0.04 | | c0.07 | 0.06 | c0.33 |
| v/s Ratio Perm | | | 0.06 | | | 0.06 | | | 0.01 | | | |
| v/c Ratio | 1.45 | 0.48 | 0.14 | 0.51 | 1.10 | 0.19 | 0.54 | 0.17 | 0.04 | 1.20 | 0.23 | 0.71 |
| Uniform Delay, d1 | 43.8 | 22.9 | 19.6 | 47.2 | 35.5 | 26.1 | 47.7 | 29.7 | 28.7 | 48.2 | 29.4 | 21.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.05 | 0.86 | 0.73 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 211.5 | 0.3 | 0.1 | 2.0 | 59.3 | 0.2 | 3.3 | 0.4 | 0.2 | 127.8 | 0.6 | 1.8 |
| Delay (s) | 255.2 | 23.2 | 19.7 | 51.7 | 89.8 | 19.3 | 51.0 | 30.1 | 28.9 | 176.0 | 30.0 | 23.3 |
| Level of Service | F | C | B | D | F | B | D | C | C | F | C | C |
| Approach Delay (s) | | 126.3 | | | 79.7 | | | 35.9 | | | 50.7 | |
| Approach LOS | | F | | | E | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 84.2 | | | | HCM Level of Service | | | F | | |
| HCM Volume to Capacity ratio | | | 1.01 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | 17.7 | | |
| Intersection Capacity Utilization | | | 89.0% | | | | ICU Level of Service | | | E | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

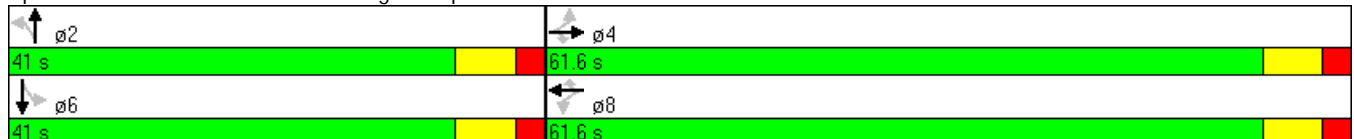
Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 95 | 730 | 105 | 80 | 1205 | 10 | 155 | 20 | 25 |
| Lane Group Flow (vph) | 95 | 730 | 105 | 80 | 1205 | 10 | 155 | 80 | 115 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 61.6 | 61.6 | 61.6 | 61.6 | 61.6 | 61.6 | 41.0 | 41.0 | 41.0 |
| Total Split (%) | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 40.0% | 40.0% | 40.0% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.37 | 0.29 | 0.09 | 0.17 | 0.49 | 0.01 | 0.66 | 0.23 | 0.33 |
| Control Delay | 7.0 | 1.2 | 0.1 | 7.6 | 8.5 | 4.7 | 51.5 | 13.7 | 20.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 7.0 | 1.2 | 0.1 | 7.6 | 8.5 | 4.7 | 51.5 | 13.7 | 20.7 |
| Queue Length 50th (m) | 0.8 | 2.8 | 0.0 | 4.7 | 49.6 | 0.3 | 28.6 | 3.3 | 9.9 |
| Queue Length 95th (m) | m4.6 | m6.1 | m0.2 | 13.0 | 81.4 | 2.1 | 45.0 | 13.9 | 22.6 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 259 | 2480 | 1141 | 472 | 2480 | 1111 | 435 | 605 | 600 |
| 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 | 0.37 | 0.29 | 0.09 | 0.17 | 0.49 | 0.01 | 0.36 | 0.13 | 0.19 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 100 (97%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 730 | 105 | 80 | 1205 | 10 | 155 | 20 | 60 | 0 | 25 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.89 | | | 0.88 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1653 | | | 1644 | |
| Flt Permitted | 0.20 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | 0.68 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 370 | 3539 | 1583 | 674 | 3539 | 1583 | 1272 | 1653 | | | 1644 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 730 | 105 | 80 | 1205 | 10 | 155 | 20 | 60 | 0 | 25 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 2 | 0 | 49 | 0 | 0 | 46 | 0 |
| Lane Group Flow (vph) | 95 | 730 | 74 | 80 | 1205 | 8 | 155 | 31 | 0 | 0 | 69 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 70.9 | 70.9 | 70.9 | 70.9 | 70.9 | 70.9 | 17.9 | 17.9 | | | 17.9 | |
| Effective Green, g (s) | 71.9 | 71.9 | 71.9 | 71.9 | 71.9 | 71.9 | 18.9 | 18.9 | | | 18.9 | |
| Actuated g/C Ratio | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.18 | 0.18 | | | 0.18 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 259 | 2480 | 1109 | 472 | 2480 | 1109 | 234 | 305 | | | 303 | |
| v/s Ratio Prot | | 0.21 | | | c0.34 | | | 0.02 | | | 0.04 | |
| v/s Ratio Perm | 0.26 | | 0.05 | 0.12 | | 0.01 | c0.12 | | | | | |
| v/c Ratio | 0.37 | 0.29 | 0.07 | 0.17 | 0.49 | 0.01 | 0.66 | 0.10 | | | 0.23 | |
| Uniform Delay, d1 | 6.2 | 5.8 | 4.8 | 5.2 | 7.0 | 4.6 | 38.9 | 34.8 | | | 35.6 | |
| Progression Factor | 0.42 | 0.15 | 0.01 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 3.2 | 0.2 | 0.1 | 0.8 | 0.7 | 0.0 | 6.9 | 0.1 | | | 0.4 | |
| Delay (s) | 5.8 | 1.1 | 0.1 | 6.0 | 7.6 | 4.6 | 45.8 | 34.9 | | | 36.0 | |
| Level of Service | A | A | A | A | A | A | D | C | | | D | |
| Approach Delay (s) | | 1.5 | | | 7.5 | | | 42.1 | | | 36.0 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.8 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.52 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 71.6% | | | | ICU Level of Service | | | | C | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |














HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 855 | 140 | 0 | 1450 | 0 | 75 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 855 | 140 | 0 | 1450 | 0 | 75 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.86 | | 0.91 | 0.86 |
| vC, conflicting volume | | | 995 | | 1650 | 498 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 663 | | 814 | 84 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 91 |
| cM capacity (veh/h) | | | 791 | | 287 | 823 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 570 | 425 | 725 | 725 | 75 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 140 | 0 | 0 | 75 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 823 | |
| Volume to Capacity | 0.34 | 0.25 | 0.43 | 0.43 | 0.09 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.8 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.8 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.3 | | | |
| Intersection Capacity Utilization | | | 43.4% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  | |
|-----------------------------------|---|---|--|---|---|--|------|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT | |
| Lane Configurations |  |  |   | |  |   | |
| Volume (veh/h) | 90 | 215 | 95 | 70 | 175 | 360 | |
| Sign Control | Stop | | Free | | | Free | |
| Grade | 0% | | 0% | | | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Hourly flow rate (vph) | 90 | 215 | 95 | 70 | 175 | 360 | |
| Pedestrians | | | | | | | |
| Lane Width (m) | | | | | | | |
| Walking Speed (m/s) | | | | | | | |
| Percent Blockage | | | | | | | |
| Right turn flare (veh) | | | | | | | |
| Median type | | | None | | | None | |
| Median storage (veh) | | | | | | | |
| Upstream signal (m) | | | | | | 145 | |
| pX, platoon unblocked | | | | | | | |
| vC, conflicting volume | 660 | 82 | | | 165 | | |
| vC1, stage 1 conf vol | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | |
| vCu, unblocked vol | 660 | 82 | | | 165 | | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | | |
| tC, 2 stage (s) | | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | | |
| p0 queue free % | 74 | 78 | | | 88 | | |
| cM capacity (veh/h) | 347 | 961 | | | 1411 | | |
| Direction, Lane # | WB 1 | WB 2 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
| Volume Total | 90 | 215 | 63 | 102 | 175 | 180 | 180 |
| Volume Left | 90 | 0 | 0 | 0 | 175 | 0 | 0 |
| Volume Right | 0 | 215 | 0 | 70 | 0 | 0 | 0 |
| cSH | 347 | 961 | 1700 | 1700 | 1411 | 1700 | 1700 |
| Volume to Capacity | 0.26 | 0.22 | 0.04 | 0.06 | 0.12 | 0.11 | 0.11 |
| Queue Length 95th (m) | 7.6 | 6.4 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 |
| Control Delay (s) | 19.0 | 9.8 | 0.0 | 0.0 | 7.9 | 0.0 | 0.0 |
| Lane LOS | C | A | | | A | | |
| Approach Delay (s) | 12.5 | | 0.0 | | 2.6 | | |
| Approach LOS | B | | | | | | |
| Intersection Summary | | | | | | | |
| Average Delay | | | 5.2 | | | | |
| Intersection Capacity Utilization | | | 29.6% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 75 | 15 | 25 | 160 | 125 | 80 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 75 | 15 | 25 | 160 | 125 | 80 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 375 | 165 | 205 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 375 | 165 | 205 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 88 | 98 | 98 | | | |
| cM capacity (veh/h) | 615 | 879 | 1366 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 90 | 185 | 205 | | | |
| Volume Left | 75 | 25 | 0 | | | |
| Volume Right | 15 | 0 | 80 | | | |
| cSH | 647 | 1366 | 1700 | | | |
| Volume to Capacity | 0.14 | 0.02 | 0.12 | | | |
| Queue Length 95th (m) | 3.6 | 0.4 | 0.0 | | | |
| Control Delay (s) | 11.5 | 1.2 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 11.5 | 1.2 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.6 | | | |
| Intersection Capacity Utilization | | 36.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 20 | 35 | 45 | 165 | 125 | 14 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 20 | 35 | 45 | 165 | 125 | 14 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 387 | 132 | 139 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 387 | 132 | 139 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 97 | 96 | 97 | | | |
| cM capacity (veh/h) | 597 | 917 | 1445 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 55 | 210 | 139 | | | |
| Volume Left | 20 | 45 | 0 | | | |
| Volume Right | 35 | 0 | 14 | | | |
| cSH | 768 | 1445 | 1700 | | | |
| Volume to Capacity | 0.07 | 0.03 | 0.08 | | | |
| Queue Length 95th (m) | 1.7 | 0.7 | 0.0 | | | |
| Control Delay (s) | 10.1 | 1.8 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.1 | 1.8 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.3 | | | |
| Intersection Capacity Utilization | | 31.9% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

APPENDIX I: Sensitivity Analysis - Future Background & Future Total 2021 Zero & Unconstrained interaction

Queues

Future Background Traffic-2021

3: Earl Armstrong & Limebank

Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 435 | 335 | 50 | 45 | 355 | 100 | 125 | 185 | 25 | 130 | 60 | 285 |
| Lane Group Flow (vph) | 435 | 335 | 50 | 45 | 355 | 100 | 125 | 185 | 25 | 130 | 60 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 31.9 | 51.9 | 51.9 | 11.9 | 31.9 | 31.9 | 16.9 | 36.9 | 36.9 | 11.9 | 31.9 | 63.8 |
| Total Split (%) | 28.3% | 46.1% | 46.1% | 10.6% | 28.3% | 28.3% | 15.0% | 32.8% | 32.8% | 10.6% | 28.3% | 56.7% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.69 | 0.31 | 0.10 | 0.25 | 0.64 | 0.30 | 0.39 | 0.15 | 0.04 | 0.42 | 0.05 | 0.16 |
| Control Delay | 48.4 | 30.1 | 7.2 | 57.8 | 42.4 | 6.4 | 51.3 | 26.9 | 11.2 | 52.5 | 27.7 | 2.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.4 | 30.1 | 7.2 | 57.8 | 42.4 | 6.4 | 51.3 | 26.9 | 11.2 | 52.5 | 27.7 | 2.0 |
| Queue Length 50th (m) | 46.0 | 30.2 | 0.0 | 5.0 | 33.9 | 0.0 | 13.4 | 14.2 | 0.0 | 13.9 | 4.4 | 0.6 |
| Queue Length 95th (m) | 58.6 | 37.1 | 7.5 | 10.8 | 41.4 | 8.6 | 22.0 | 25.3 | 6.5 | 23.4 | 10.5 | 7.3 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 793 | 1446 | 676 | 183 | 817 | 442 | 350 | 1272 | 585 | 310 | 1264 | 1883 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.55 | 0.23 | 0.07 | 0.25 | 0.43 | 0.23 | 0.36 | 0.15 | 0.04 | 0.42 | 0.05 | 0.15 |

Intersection Summary

Cycle Length: 112.6

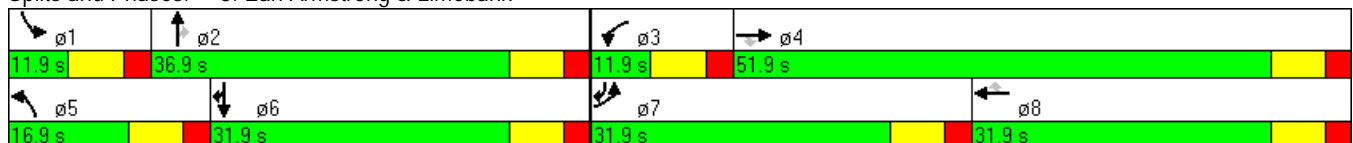
Actuated Cycle Length: 112.6

Offset: 28 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 435 | 335 | 50 | 45 | 355 | 100 | 125 | 185 | 25 | 130 | 60 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 435 | 335 | 50 | 45 | 355 | 100 | 125 | 185 | 25 | 130 | 60 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 35 | 0 | 0 | 83 | 0 | 0 | 16 | 0 | 0 | 113 |
| Lane Group Flow (vph) | 435 | 335 | 15 | 45 | 355 | 17 | 125 | 185 | 9 | 130 | 60 | 172 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 19.8 | 33.7 | 33.7 | 4.0 | 17.9 | 17.9 | 9.4 | 38.1 | 38.1 | 9.2 | 37.9 | 64.6 |
| Effective Green, g (s) | 20.8 | 34.7 | 34.7 | 5.0 | 18.9 | 18.9 | 10.4 | 39.1 | 39.1 | 10.2 | 38.9 | 65.6 |
| Actuated g/C Ratio | 0.18 | 0.31 | 0.31 | 0.04 | 0.17 | 0.17 | 0.09 | 0.35 | 0.35 | 0.09 | 0.35 | 0.58 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 634 | 1091 | 488 | 152 | 594 | 266 | 317 | 1229 | 550 | 311 | 1223 | 1624 |
| v/s Ratio Prot | c0.13 | 0.09 | | 0.01 | c0.10 | | 0.04 | c0.05 | | c0.04 | 0.02 | 0.06 |
| v/s Ratio Perm | | | 0.01 | | | 0.01 | | | 0.01 | | | |
| v/c Ratio | 0.69 | 0.31 | 0.03 | 0.30 | 0.60 | 0.06 | 0.39 | 0.15 | 0.02 | 0.42 | 0.05 | 0.11 |
| Uniform Delay, d1 | 42.9 | 29.8 | 27.2 | 52.1 | 43.3 | 39.4 | 48.1 | 25.3 | 24.1 | 48.4 | 24.5 | 10.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.06 | 0.83 | 0.52 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.1 | 0.2 | 0.0 | 1.1 | 1.6 | 0.1 | 0.8 | 0.3 | 0.1 | 0.9 | 0.1 | 0.0 |
| Delay (s) | 45.9 | 29.9 | 27.2 | 56.3 | 37.6 | 20.4 | 48.9 | 25.6 | 24.2 | 49.3 | 24.6 | 10.5 |
| Level of Service | D | C | C | E | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 38.3 | | | 35.9 | | | 34.2 | | | 22.9 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 33.6 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.38 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 17.7 | | | |
| Intersection Capacity Utilization | | | 54.4% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

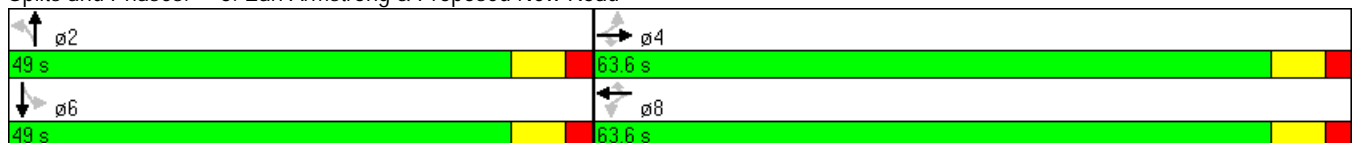
Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 10 |
| Lane Group Flow (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 40 | 25 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 49.0 | 49.0 | 49.0 |
| Total Split (%) | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 43.5% | 43.5% | 43.5% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.46 | 0.18 | 0.12 |
| Control Delay | 0.3 | 0.2 | 0.1 | 3.5 | 3.2 | 2.5 | 54.7 | 18.1 | 26.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.3 | 0.2 | 0.1 | 3.5 | 3.2 | 2.5 | 54.7 | 18.1 | 26.2 |
| Queue Length 50th (m) | 0.1 | 0.4 | 0.0 | 0.4 | 9.3 | 0.0 | 15.6 | 1.0 | 2.0 |
| Queue Length 95th (m) | 0.2 | 0.5 | 0.0 | 1.8 | 16.3 | 0.6 | 28.9 | 10.3 | 9.5 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 778 | 2891 | 1302 | 841 | 2891 | 1294 | 528 | 641 | 658 |
| 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 | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.14 | 0.06 | 0.04 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated


























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |  |  |  |  | |
| Volume (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.87 | | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1618 | | | 1695 | |
| Flt Permitted | 0.51 | 1.00 | 1.00 | 0.55 | 1.00 | 1.00 | 0.74 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 953 | 3539 | 1583 | 1029 | 3539 | 1583 | 1380 | 1618 | | | 1695 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 330 | 40 | 10 | 410 | 2 | 75 | 9 | 0 | 0 | 12 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.4 | 88.4 | 88.4 | 88.4 | 88.4 | 88.4 | 10.4 | 10.4 | | | 10.4 | |
| Effective Green, g (s) | 89.4 | 89.4 | 89.4 | 89.4 | 89.4 | 89.4 | 11.4 | 11.4 | | | 11.4 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 757 | 2810 | 1257 | 817 | 2810 | 1257 | 140 | 164 | | | 172 | |
| v/s Ratio Prot | | 0.09 | | | c0.12 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.01 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.12 | 0.03 | 0.01 | 0.15 | 0.00 | 0.54 | 0.05 | | | 0.07 | |
| Uniform Delay, d1 | 2.5 | 2.6 | 2.5 | 2.4 | 2.7 | 2.4 | 48.1 | 45.7 | | | 45.8 | |
| Progression Factor | 0.06 | 0.05 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 3.9 | 0.1 | | | 0.2 | |
| Delay (s) | 0.3 | 0.2 | 0.0 | 2.4 | 2.8 | 2.4 | 52.0 | 45.9 | | | 46.0 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.2 | | | 2.8 | | | 49.9 | | | 46.0 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.3 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.19 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 45.2% | | | | ICU Level of Service | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis












9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2021
Weekday AM Peak Hour Zero Interaction

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 415 | 80 | 0 | 500 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 415 | 80 | 0 | 500 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.94 | | 0.94 | 0.94 |
| vC, conflicting volume | | | 495 | | 705 | 248 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 322 | | 510 | 57 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1155 | | 463 | 932 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 277 | 218 | 250 | 250 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 80 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 932 | |
| Volume to Capacity | 0.16 | 0.13 | 0.15 | 0.15 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 8.9 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 8.9 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 24.0% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 40 | 290 | 25 | 0 | 155 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 40 | 290 | 25 | 0 | 155 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 144 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 380 | 158 | | | 315 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 380 | 158 | | | 315 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 95 | | | 100 | |
| cM capacity (veh/h) | 595 | 860 | | | 1242 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 40 | 193 | 122 | 78 | 78 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 40 | 0 | 25 | 0 | 0 | |
| cSH | 860 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.05 | 0.11 | 0.07 | 0.05 | 0.05 | |
| Queue Length 95th (m) | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.4 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.4 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.7 | | | |
| Intersection Capacity Utilization | | | 18.8% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 2 | 10 | 105 | 60 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 2 | 10 | 105 | 60 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 190 | 65 | 70 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 190 | 65 | 70 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 100 | 99 | | | |
| cM capacity (veh/h) | 794 | 999 | 1531 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 7 | 115 | 70 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 2 | 0 | 10 | | | |
| cSH | 843 | 1531 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.2 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.3 | 0.7 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.3 | 0.7 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.8 | | | |
| Intersection Capacity Utilization | | 22.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 2 | 5 | 15 | 115 | 55 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 5 | 15 | 115 | 55 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 202 | 58 | 60 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 202 | 58 | 60 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 99 | | | |
| cM capacity (veh/h) | 778 | 1009 | 1544 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 7 | 130 | 60 | | | |
| Volume Left | 2 | 15 | 0 | | | |
| Volume Right | 5 | 0 | 5 | | | |
| cSH | 930 | 1544 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.2 | 0.2 | 0.0 | | | |
| Control Delay (s) | 8.9 | 0.9 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 8.9 | 0.9 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | | 23.5% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

Future Background Traffic-2021

3: Earl Armstrong & Limebank

Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 640 | 635 | 70 | 115 | 595 | 155 | 75 | 135 | 60 | 365 | 85 | 755 |
| Lane Group Flow (vph) | 640 | 635 | 70 | 115 | 595 | 155 | 75 | 135 | 60 | 365 | 85 | 755 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 22.0 | 40.7 | 40.7 | 13.2 | 31.9 | 31.9 | 11.9 | 32.7 | 32.7 | 16.0 | 36.8 | 58.8 |
| Total Split (%) | 21.4% | 39.7% | 39.7% | 12.9% | 31.1% | 31.1% | 11.6% | 31.9% | 31.9% | 15.6% | 35.9% | 57.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 1.19 | 0.58 | 0.13 | 0.47 | 0.75 | 0.33 | 0.33 | 0.15 | 0.13 | 0.84 | 0.07 | 0.47 |
| Control Delay | 140.7 | 31.7 | 6.5 | 57.1 | 36.7 | 4.3 | 50.0 | 29.7 | 8.6 | 63.2 | 25.3 | 13.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 140.7 | 31.7 | 6.5 | 57.1 | 36.7 | 4.3 | 50.0 | 29.7 | 8.6 | 63.2 | 25.3 | 13.1 |
| Queue Length 50th (m) | ~78.5 | 54.0 | 0.0 | 11.8 | 45.3 | 0.6 | 7.3 | 10.7 | 0.0 | 37.1 | 6.2 | 43.2 |
| Queue Length 95th (m) | #112.0 | 69.2 | 9.0 | 20.8 | 56.6 | 8.5 | 14.4 | 18.2 | 9.4 | #69.2 | 11.8 | 60.0 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 539 | 1200 | 583 | 244 | 897 | 517 | 230 | 924 | 458 | 436 | 1223 | 1617 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.19 | 0.53 | 0.12 | 0.47 | 0.66 | 0.30 | 0.33 | 0.15 | 0.13 | 0.84 | 0.07 | 0.47 |

Intersection Summary

Cycle Length: 102.6

Actuated Cycle Length: 102.6

Offset: 28 (27%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

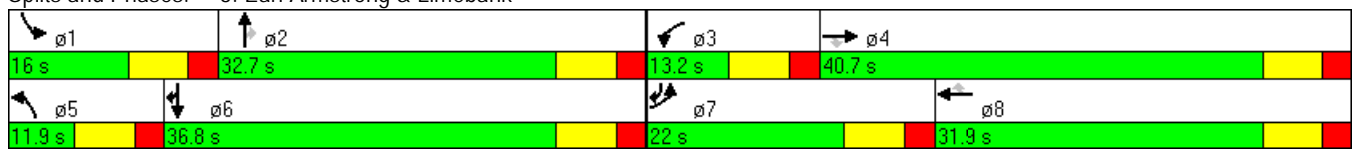
~ Volume exceeds capacity, queue is theoretically infinite.

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: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 640 | 635 | 70 | 115 | 595 | 155 | 75 | 135 | 60 | 365 | 85 | 755 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 640 | 635 | 70 | 115 | 595 | 155 | 75 | 135 | 60 | 365 | 85 | 755 |
| RTOR Reduction (vph) | 0 | 0 | 48 | 0 | 0 | 120 | 0 | 0 | 44 | 0 | 0 | 58 |
| Lane Group Flow (vph) | 640 | 635 | 22 | 115 | 595 | 35 | 75 | 135 | 16 | 365 | 85 | 697 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 15.1 | 30.9 | 30.9 | 6.3 | 22.1 | 22.1 | 4.7 | 25.8 | 25.8 | 12.0 | 33.1 | 55.1 |
| Effective Green, g (s) | 16.1 | 31.9 | 31.9 | 7.3 | 23.1 | 23.1 | 5.7 | 26.8 | 26.8 | 13.0 | 34.1 | 56.1 |
| Actuated g/C Ratio | 0.16 | 0.31 | 0.31 | 0.07 | 0.23 | 0.23 | 0.06 | 0.26 | 0.26 | 0.13 | 0.33 | 0.55 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 539 | 1100 | 492 | 244 | 797 | 356 | 191 | 924 | 413 | 435 | 1176 | 1524 |
| v/s Ratio Prot | c0.19 | 0.18 | | 0.03 | c0.17 | | 0.02 | 0.04 | | c0.11 | 0.02 | c0.25 |
| v/s Ratio Perm | | | 0.01 | | | 0.02 | | | 0.01 | | | |
| v/c Ratio | 1.19 | 0.58 | 0.04 | 0.47 | 0.75 | 0.10 | 0.39 | 0.15 | 0.04 | 0.84 | 0.07 | 0.46 |
| Uniform Delay, d1 | 43.2 | 29.7 | 24.7 | 45.8 | 37.0 | 31.5 | 46.8 | 29.1 | 28.3 | 43.8 | 23.4 | 14.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.10 | 0.83 | 0.49 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 101.8 | 0.7 | 0.0 | 1.4 | 3.8 | 0.1 | 1.3 | 0.3 | 0.2 | 13.3 | 0.1 | 0.2 |
| Delay (s) | 145.1 | 30.4 | 24.7 | 51.9 | 34.4 | 15.5 | 48.1 | 29.4 | 28.5 | 57.1 | 23.5 | 14.3 |
| Level of Service | F | C | C | D | C | B | D | C | C | E | C | B |
| Approach Delay (s) | | 84.7 | | | 33.3 | | | 34.4 | | | 27.9 | |
| Approach LOS | | F | | | C | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 50.4 | | | | HCM Level of Service | | | | D | |
| HCM Volume to Capacity ratio | | | 0.73 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | | 17.7 | |
| Intersection Capacity Utilization | | | 73.1% | | | | ICU Level of Service | | | | D | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

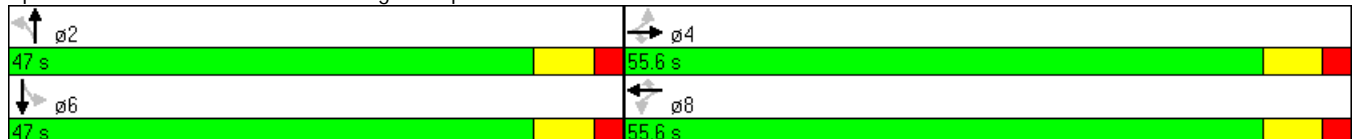
Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 5 | 5 |
| Lane Group Flow (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 55 | 95 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 47.0 | 47.0 | 47.0 |
| Total Split (%) | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 45.8% | 45.8% | 45.8% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.17 | 0.25 | 0.09 | 0.05 | 0.25 | 0.01 | 0.56 | 0.19 | 0.30 |
| Control Delay | 0.9 | 0.5 | 0.1 | 5.1 | 5.2 | 2.8 | 50.4 | 13.1 | 11.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.9 | 0.5 | 0.1 | 5.1 | 5.2 | 2.8 | 50.4 | 13.1 | 11.0 |
| Queue Length 50th (m) | 0.4 | 1.3 | 0.0 | 1.1 | 18.0 | 0.0 | 20.4 | 0.9 | 0.9 |
| Queue Length 95th (m) | m0.7 | m2.0 | m0.0 | 4.2 | 31.3 | 1.6 | 35.0 | 10.4 | 13.3 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 552 | 2593 | 1188 | 549 | 2593 | 1162 | 519 | 675 | 694 |
| 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 | 0.17 | 0.25 | 0.09 | 0.05 | 0.25 | 0.01 | 0.21 | 0.08 | 0.14 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 5 | 50 | 0 | 5 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.86 | | | 0.86 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1609 | | | 1598 | |
| Flt Permitted | 0.40 | 1.00 | 1.00 | 0.40 | 1.00 | 1.00 | 0.70 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 753 | 3539 | 1583 | 749 | 3539 | 1583 | 1295 | 1609 | | | 1598 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 650 | 105 | 25 | 645 | 10 | 110 | 5 | 50 | 0 | 5 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 28 | 0 | 0 | 3 | 0 | 42 | 0 | 0 | 76 | 0 |
| Lane Group Flow (vph) | 95 | 650 | 77 | 25 | 645 | 7 | 110 | 13 | 0 | 0 | 19 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 74.2 | 74.2 | 74.2 | 74.2 | 74.2 | 74.2 | 14.6 | 14.6 | | | 14.6 | |
| Effective Green, g (s) | 75.2 | 75.2 | 75.2 | 75.2 | 75.2 | 75.2 | 15.6 | 15.6 | | | 15.6 | |
| Actuated g/C Ratio | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.73 | 0.15 | 0.15 | | | 0.15 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 552 | 2594 | 1160 | 549 | 2594 | 1160 | 197 | 245 | | | 243 | |
| v/s Ratio Prot | | c0.18 | | | 0.18 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.13 | | 0.05 | 0.03 | | 0.00 | c0.08 | | | | | |
| v/c Ratio | 0.17 | 0.25 | 0.07 | 0.05 | 0.25 | 0.01 | 0.56 | 0.05 | | | 0.08 | |
| Uniform Delay, d1 | 4.2 | 4.5 | 3.8 | 3.8 | 4.5 | 3.7 | 40.3 | 37.2 | | | 37.3 | |
| Progression Factor | 0.07 | 0.07 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.5 | 0.2 | 0.1 | 0.2 | 0.2 | 0.0 | 3.4 | 0.1 | | | 0.1 | |
| Delay (s) | 0.8 | 0.5 | 0.1 | 3.9 | 4.7 | 3.7 | 43.7 | 37.3 | | | 37.5 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.5 | | | 4.7 | | | 41.6 | | | 37.5 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 7.8 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.30 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 53.8% | | | | ICU Level of Service | | | | A | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 820 | 80 | 0 | 845 | 0 | 30 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 820 | 80 | 0 | 845 | 0 | 30 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.87 | | 0.89 | 0.87 |
| vC, conflicting volume | | | 900 | | 1282 | 450 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 579 | | 812 | 61 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 97 |
| cM capacity (veh/h) | | | 859 | | 283 | 861 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 547 | 353 | 422 | 422 | 30 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 80 | 0 | 0 | 30 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 861 | |
| Volume to Capacity | 0.32 | 0.21 | 0.25 | 0.25 | 0.03 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.3 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.3 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.2 | | | |
| Intersection Capacity Utilization | | | 35.2% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 230 | 45 | 95 | 0 | 270 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 230 | 45 | 95 | 0 | 270 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 145 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 228 | 70 | | | 140 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 228 | 70 | | | 140 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 76 | | | 100 | |
| cM capacity (veh/h) | 740 | 978 | | | 1441 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 230 | 30 | 110 | 135 | 135 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 230 | 0 | 95 | 0 | 0 | |
| cSH | 978 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.24 | 0.02 | 0.06 | 0.08 | 0.08 | |
| Queue Length 95th (m) | 6.8 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.8 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.8 | 0.0 | | | 0.0 | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.5 | | | |
| Intersection Capacity Utilization | | | 25.2% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 20 | 5 | 5 | 145 | 110 | 25 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 20 | 5 | 5 | 145 | 110 | 25 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 278 | 122 | 135 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 278 | 122 | 135 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 97 | 99 | 100 | | | |
| cM capacity (veh/h) | 710 | 929 | 1449 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 25 | 150 | 135 | | | |
| Volume Left | 20 | 5 | 0 | | | |
| Volume Right | 5 | 0 | 25 | | | |
| cSH | 745 | 1449 | 1700 | | | |
| Volume to Capacity | 0.03 | 0.00 | 0.08 | | | |
| Queue Length 95th (m) | 0.8 | 0.1 | 0.0 | | | |
| Control Delay (s) | 10.0 | 0.3 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.0 | 0.3 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | 21.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 10 | 10 | 145 | 110 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 10 | 10 | 145 | 110 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 278 | 112 | 115 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 278 | 112 | 115 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 707 | 940 | 1474 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 155 | 115 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 10 | 0 | 5 | | | |
| cSH | 847 | 1474 | 1700 | | | |
| Volume to Capacity | 0.02 | 0.01 | 0.07 | | | |
| Queue Length 95th (m) | 0.4 | 0.2 | 0.0 | | | |
| Control Delay (s) | 9.3 | 0.5 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.3 | 0.5 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.8 | | | |
| Intersection Capacity Utilization | | 24.9% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

3: Earl Armstrong & Limebank

Future Background Traffic-2021

Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 660 | 935 | 60 | 45 | 510 | 100 | 180 | 185 | 25 | 130 | 60 | 285 |
| Lane Group Flow (vph) | 660 | 935 | 60 | 45 | 510 | 100 | 180 | 185 | 25 | 130 | 60 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 33.0 | 53.0 | 53.0 | 11.9 | 31.9 | 31.9 | 15.0 | 33.2 | 33.2 | 14.5 | 32.7 | 65.7 |
| Total Split (%) | 29.3% | 47.1% | 47.1% | 10.6% | 28.3% | 28.3% | 13.3% | 29.5% | 29.5% | 12.9% | 29.0% | 58.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.84 | 0.67 | 0.09 | 0.25 | 0.73 | 0.25 | 0.58 | 0.19 | 0.05 | 0.46 | 0.06 | 0.18 |
| Control Delay | 51.8 | 30.7 | 7.3 | 56.0 | 42.8 | 5.8 | 57.1 | 32.8 | 12.6 | 55.0 | 32.9 | 8.7 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.8 | 30.7 | 7.3 | 56.0 | 42.8 | 5.8 | 57.1 | 32.8 | 12.6 | 55.0 | 32.9 | 8.7 |
| Queue Length 50th (m) | 69.7 | 88.0 | 1.2 | 5.0 | 43.0 | 0.0 | 19.2 | 16.6 | 0.0 | 13.9 | 5.3 | 10.9 |
| Queue Length 95th (m) | 90.4 | 103.7 | 8.8 | 10.8 | 52.7 | 8.1 | 31.3 | 26.5 | 6.8 | 23.7 | 10.7 | 18.5 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 826 | 1480 | 692 | 183 | 817 | 442 | 312 | 996 | 463 | 285 | 963 | 1619 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.80 | 0.63 | 0.09 | 0.25 | 0.62 | 0.23 | 0.58 | 0.19 | 0.05 | 0.46 | 0.06 | 0.18 |

Intersection Summary

Cycle Length: 112.6

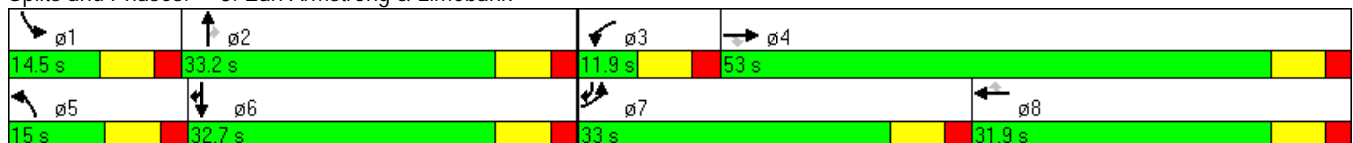
Actuated Cycle Length: 112.6

Offset: 36 (32%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Background Traffic-2021
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 660 | 935 | 60 | 45 | 510 | 100 | 180 | 185 | 25 | 130 | 60 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 660 | 935 | 60 | 45 | 510 | 100 | 180 | 185 | 25 | 130 | 60 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 79 | 0 | 0 | 18 | 0 | 0 | 45 |
| Lane Group Flow (vph) | 660 | 935 | 29 | 45 | 510 | 21 | 180 | 185 | 7 | 130 | 60 | 240 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 24.9 | 43.5 | 43.5 | 4.0 | 22.6 | 22.6 | 9.2 | 29.3 | 29.3 | 8.2 | 28.3 | 60.1 |
| Effective Green, g (s) | 25.9 | 44.5 | 44.5 | 5.0 | 23.6 | 23.6 | 10.2 | 30.3 | 30.3 | 9.2 | 29.3 | 61.1 |
| Actuated g/C Ratio | 0.23 | 0.40 | 0.40 | 0.04 | 0.21 | 0.21 | 0.09 | 0.27 | 0.27 | 0.08 | 0.26 | 0.54 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 790 | 1399 | 626 | 152 | 742 | 332 | 311 | 952 | 426 | 280 | 921 | 1512 |
| v/s Ratio Prot | c0.19 | c0.26 | | 0.01 | 0.14 | | c0.05 | c0.05 | | 0.04 | 0.02 | 0.09 |
| v/s Ratio Perm | | | 0.02 | | | 0.01 | | | 0.00 | | | |
| v/c Ratio | 0.84 | 0.67 | 0.05 | 0.30 | 0.69 | 0.06 | 0.58 | 0.19 | 0.02 | 0.46 | 0.07 | 0.16 |
| Uniform Delay, d1 | 41.3 | 28.0 | 21.0 | 52.1 | 41.1 | 35.6 | 49.1 | 31.7 | 30.2 | 49.3 | 31.3 | 12.9 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.03 | 0.86 | 0.60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 7.6 | 1.2 | 0.0 | 1.1 | 2.6 | 0.1 | 2.6 | 0.5 | 0.1 | 1.2 | 0.1 | 0.0 |
| Delay (s) | 49.0 | 29.2 | 21.0 | 54.6 | 38.1 | 21.5 | 51.7 | 32.2 | 30.3 | 50.6 | 31.5 | 12.9 |
| Level of Service | D | C | C | D | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 36.8 | | | 36.7 | | | 41.1 | | | 25.6 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 35.6 | | | | HCM Level of Service | | | D | | |
| HCM Volume to Capacity ratio | | | 0.50 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 11.8 | | | |
| Intersection Capacity Utilization | | | 66.1% | | | | ICU Level of Service | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 5 | 10 |
| Lane Group Flow (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 40 | 25 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 39.0 | 39.0 | 39.0 |
| Total Split (%) | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 34.6% | 34.6% | 34.6% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.05 | 0.32 | 0.04 | 0.02 | 0.20 | 0.00 | 0.46 | 0.18 | 0.12 |
| Control Delay | 0.2 | 0.3 | 0.0 | 3.6 | 3.4 | 2.5 | 54.8 | 18.1 | 26.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.2 | 0.3 | 0.0 | 3.6 | 3.4 | 2.5 | 54.8 | 18.1 | 26.3 |
| Queue Length 50th (m) | 0.0 | 0.5 | 0.0 | 0.4 | 13.5 | 0.0 | 15.6 | 1.0 | 2.0 |
| Queue Length 95th (m) | m0.1 | 0.5 | m0.0 | 1.8 | 22.6 | 0.6 | 28.9 | 10.4 | 9.6 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 670 | 2892 | 1301 | 450 | 2892 | 1294 | 406 | 501 | 509 |
| 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 | 0.32 | 0.04 | 0.02 | 0.20 | 0.00 | 0.18 | 0.08 | 0.05 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.87 | | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1618 | | | 1695 | |
| Flt Permitted | 0.44 | 1.00 | 1.00 | 0.30 | 1.00 | 1.00 | 0.74 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 819 | 3539 | 1583 | 552 | 3539 | 1583 | 1380 | 1618 | | | 1695 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 935 | 42 | 10 | 565 | 2 | 75 | 9 | 0 | 0 | 12 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 10.3 | 10.3 | | | 10.3 | |
| Effective Green, g (s) | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 11.3 | 11.3 | | | 11.3 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 651 | 2813 | 1258 | 439 | 2813 | 1258 | 138 | 162 | | | 170 | |
| v/s Ratio Prot | | c0.26 | | | 0.16 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.02 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.33 | 0.03 | 0.02 | 0.20 | 0.00 | 0.54 | 0.05 | | | 0.07 | |
| Uniform Delay, d1 | 2.5 | 3.2 | 2.4 | 2.4 | 2.8 | 2.4 | 48.2 | 45.8 | | | 45.9 | |
| Progression Factor | 0.02 | 0.03 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.3 | 0.0 | 0.1 | 0.2 | 0.0 | 4.3 | 0.1 | | | 0.2 | |
| Delay (s) | 0.2 | 0.4 | 0.0 | 2.5 | 3.0 | 2.4 | 52.5 | 45.9 | | | 46.0 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.3 | | | 3.0 | | | 50.2 | | | 46.0 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 5.2 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 49.7% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 1015 | 75 | 0 | 655 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1015 | 75 | 0 | 655 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.78 | 0.80 | 0.78 | |
| vC, conflicting volume | | | 1090 | 1380 | 545 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 555 | 801 | 0 | |
| tC, single (s) | | | 4.1 | 6.8 | 6.9 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | 3.5 | 3.3 | |
| p0 queue free % | | | 100 | 100 | 100 | |
| cM capacity (veh/h) | | | 790 | 256 | 847 | |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 677 | 413 | 328 | 328 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 75 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 847 | |
| Volume to Capacity | 0.40 | 0.24 | 0.19 | 0.19 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.3 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.3 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 40.4% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 40 | 350 | 30 | 0 | 165 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 40 | 350 | 30 | 0 | 165 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 144 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 448 | 190 | | | 380 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 448 | 190 | | | 380 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 95 | | | 100 | |
| cM capacity (veh/h) | 540 | 820 | | | 1175 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 40 | 233 | 147 | 82 | 82 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 40 | 0 | 30 | 0 | 0 | |
| cSH | 820 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.05 | 0.14 | 0.09 | 0.05 | 0.05 | |
| Queue Length 95th (m) | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.6 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.6 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.7 | | | |
| Intersection Capacity Utilization | | | 20.6% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 5 | 10 | 105 | 60 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 5 | 10 | 105 | 60 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 190 | 65 | 70 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 190 | 65 | 70 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 794 | 999 | 1531 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 10 | 115 | 70 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 5 | 0 | 10 | | | |
| cSH | 885 | 1531 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.3 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | 22.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 2 | 5 | 15 | 115 | 55 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 2 | 5 | 15 | 115 | 55 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 186 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 205 | 60 | 65 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 205 | 60 | 65 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 100 | 99 | | | |
| cM capacity (veh/h) | 776 | 1005 | 1537 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 7 | 130 | 65 | | | |
| Volume Left | 2 | 15 | 0 | | | |
| Volume Right | 5 | 0 | 10 | | | |
| cSH | 927 | 1537 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.2 | 0.2 | 0.0 | | | |
| Control Delay (s) | 8.9 | 0.9 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 8.9 | 0.9 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | 23.5% | | ICU Level of Service | A | |
| Analysis Period (min) | | 15 | | | | |

Queues

Future Background Traffic-2021

3: Earl Armstrong & Limebank

Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|--------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 730 | 715 | 180 | 110 | 1200 | 155 | 75 | 135 | 60 | 360 | 90 | 955 |
| Lane Group Flow (vph) | 730 | 715 | 180 | 110 | 1200 | 155 | 75 | 135 | 60 | 360 | 90 | 955 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 20.0 | 42.0 | 42.0 | 13.0 | 35.0 | 35.0 | 11.9 | 33.6 | 33.6 | 14.0 | 35.7 | 55.7 |
| Total Split (%) | 19.5% | 40.9% | 40.9% | 12.7% | 34.1% | 34.1% | 11.6% | 32.7% | 32.7% | 13.6% | 34.8% | 54.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 1.55 | 0.57 | 0.27 | 0.46 | 1.20 | 0.30 | 0.37 | 0.14 | 0.13 | 1.33 | 0.08 | 0.66 |
| Control Delay | 288.5 | 29.2 | 4.6 | 54.5 | 127.4 | 11.8 | 52.1 | 29.0 | 8.4 | 209.1 | 26.5 | 20.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 288.5 | 29.2 | 4.6 | 54.5 | 127.4 | 11.8 | 52.1 | 29.0 | 8.4 | 209.1 | 26.5 | 20.8 |
| Queue Length 50th (m) | ~104.6 | 59.4 | 0.0 | 10.8 | ~152.8 | 4.4 | 7.4 | 10.6 | 0.0 | ~47.5 | 6.7 | 74.9 |
| Queue Length 95th (m) | #139.4 | 77.5 | 13.5 | 19.6 | #186.5 | 20.7 | 14.4 | 18.0 | 9.3 | #75.3 | 12.5 | 99.2 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 472 | 1245 | 674 | 238 | 1004 | 515 | 201 | 955 | 471 | 271 | 1110 | 1446 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.55 | 0.57 | 0.27 | 0.46 | 1.20 | 0.30 | 0.37 | 0.14 | 0.13 | 1.33 | 0.08 | 0.66 |

Intersection Summary

Cycle Length: 102.6

Actuated Cycle Length: 102.6

Offset: 43 (42%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 150

Control Type: Actuated-Coordinated

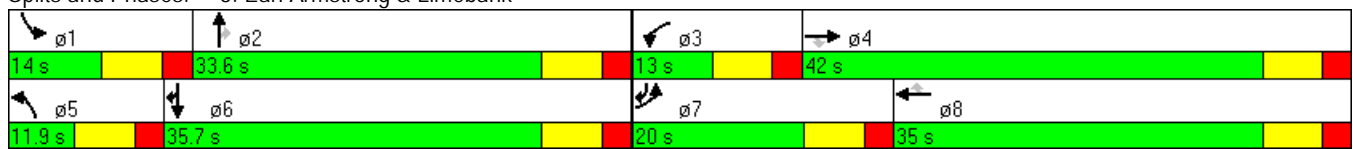
~ Volume exceeds capacity, queue is theoretically infinite.

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: 3: Earl Armstrong & Limebank





















HCM Signalized Intersection Capacity Analysis
 3: Earl Armstrong & Limebank

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 730 | 715 | 180 | 110 | 1200 | 155 | 75 | 135 | 60 | 360 | 90 | 955 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 730 | 715 | 180 | 110 | 1200 | 155 | 75 | 135 | 60 | 360 | 90 | 955 |
| RTOR Reduction (vph) | 0 | 0 | 117 | 0 | 0 | 66 | 0 | 0 | 44 | 0 | 0 | 30 |
| Lane Group Flow (vph) | 730 | 715 | 63 | 110 | 1200 | 89 | 75 | 135 | 16 | 360 | 90 | 925 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 13.1 | 35.1 | 35.1 | 6.1 | 28.1 | 28.1 | 4.0 | 26.7 | 26.7 | 7.1 | 29.8 | 49.8 |
| Effective Green, g (s) | 14.1 | 36.1 | 36.1 | 7.1 | 29.1 | 29.1 | 5.0 | 27.7 | 27.7 | 8.1 | 30.8 | 50.8 |
| Actuated g/C Ratio | 0.14 | 0.35 | 0.35 | 0.07 | 0.28 | 0.28 | 0.05 | 0.27 | 0.27 | 0.08 | 0.30 | 0.50 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 472 | 1245 | 557 | 238 | 1004 | 449 | 167 | 955 | 427 | 271 | 1062 | 1380 |
| v/s Ratio Prot | c0.21 | 0.20 | | 0.03 | c0.34 | | 0.02 | 0.04 | | c0.10 | 0.03 | c0.33 |
| v/s Ratio Perm | | | 0.04 | | | 0.06 | | | 0.01 | | | |
| v/c Ratio | 1.55 | 0.57 | 0.11 | 0.46 | 1.20 | 0.20 | 0.45 | 0.14 | 0.04 | 1.33 | 0.08 | 0.67 |
| Uniform Delay, d1 | 44.2 | 27.0 | 22.4 | 45.9 | 36.8 | 27.9 | 47.5 | 28.4 | 27.6 | 47.2 | 25.8 | 19.6 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.05 | 0.86 | 0.82 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 256.3 | 0.6 | 0.1 | 1.3 | 96.8 | 0.2 | 1.9 | 0.3 | 0.2 | 171.0 | 0.2 | 1.3 |
| Delay (s) | 300.6 | 27.7 | 22.5 | 49.7 | 128.6 | 23.1 | 49.4 | 28.7 | 27.8 | 218.3 | 25.9 | 20.9 |
| Level of Service | F | C | C | D | F | C | D | C | C | F | C | C |
| Approach Delay (s) | | 149.7 | | | 111.5 | | | 34.3 | | | 71.8 | |
| Approach LOS | | F | | | F | | | C | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 108.4 | | | | HCM Level of Service | | | | F | |
| HCM Volume to Capacity ratio | | | 1.14 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | 23.6 | | |
| Intersection Capacity Utilization | | | 92.3% | | | | ICU Level of Service | | | F | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road





Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |
|------------------------|---|---|---|---|---|---|---|---|---|
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
| Lane Configurations |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 95 | 730 | 105 | 75 | 1200 | 10 | 175 | 5 | 5 |
| Lane Group Flow (vph) | 95 | 730 | 105 | 75 | 1200 | 10 | 175 | 60 | 95 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 61.6 | 61.6 | 61.6 | 61.6 | 61.6 | 61.6 | 41.0 | 41.0 | 41.0 |
| Total Split (%) | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 60.0% | 40.0% | 40.0% | 40.0% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.38 | 0.30 | 0.09 | 0.16 | 0.49 | 0.01 | 0.68 | 0.17 | 0.26 |
| Control Delay | 6.8 | 0.9 | 0.1 | 8.2 | 9.2 | 5.1 | 51.0 | 10.5 | 16.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 6.8 | 0.9 | 0.1 | 8.2 | 9.2 | 5.1 | 51.0 | 10.5 | 16.5 |
| Queue Length 50th (m) | 0.5 | 1.6 | 0.0 | 4.6 | 52.0 | 0.3 | 32.2 | 0.8 | 6.2 |
| Queue Length 95th (m) | m3.9 | m3.8 | m0.0 | 12.9 | 84.7 | 2.2 | 49.5 | 10.0 | 17.5 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 252 | 2433 | 1121 | 460 | 2433 | 1090 | 443 | 586 | 584 |
| 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 | 0.38 | 0.30 | 0.09 | 0.16 | 0.49 | 0.01 | 0.40 | 0.10 | 0.16 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 100 (97%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road

| | |
|--|--|
|  ø2 |  ø4 |
| 41 s | 61.6 s |
|  ø6 |  ø8 |
| 41 s | 61.6 s |

HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Background Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 730 | 105 | 75 | 1200 | 10 | 175 | 5 | 55 | 0 | 5 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.86 | | | 0.86 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1607 | | | 1598 | |
| Flt Permitted | 0.20 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | 0.70 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 366 | 3539 | 1583 | 669 | 3539 | 1583 | 1295 | 1607 | | | 1598 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 730 | 105 | 75 | 1200 | 10 | 175 | 5 | 55 | 0 | 5 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 33 | 0 | 0 | 2 | 0 | 44 | 0 | 0 | 46 | 0 |
| Lane Group Flow (vph) | 95 | 730 | 72 | 75 | 1200 | 8 | 175 | 16 | 0 | 0 | 49 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 69.5 | 69.5 | 69.5 | 69.5 | 69.5 | 69.5 | 19.3 | 19.3 | | | 19.3 | |
| Effective Green, g (s) | 70.5 | 70.5 | 70.5 | 70.5 | 70.5 | 70.5 | 20.3 | 20.3 | | | 20.3 | |
| Actuated g/C Ratio | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.20 | 0.20 | | | 0.20 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 251 | 2432 | 1088 | 460 | 2432 | 1088 | 256 | 318 | | | 316 | |
| v/s Ratio Prot | | 0.21 | | | c0.34 | | | 0.01 | | | 0.03 | |
| v/s Ratio Perm | 0.26 | | 0.05 | 0.11 | | 0.01 | c0.14 | | | | | |
| v/c Ratio | 0.38 | 0.30 | 0.07 | 0.16 | 0.49 | 0.01 | 0.68 | 0.05 | | | 0.16 | |
| Uniform Delay, d1 | 6.8 | 6.3 | 5.3 | 5.7 | 7.6 | 5.0 | 38.2 | 33.3 | | | 34.1 | |
| Progression Factor | 0.43 | 0.09 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 2.7 | 0.2 | 0.1 | 0.8 | 0.7 | 0.0 | 7.3 | 0.1 | | | 0.2 | |
| Delay (s) | 5.6 | 0.8 | 0.1 | 6.4 | 8.3 | 5.1 | 45.5 | 33.4 | | | 34.3 | |
| Level of Service | A | A | A | A | A | A | D | C | | | C | |
| Approach Delay (s) | | 1.2 | | | 8.2 | | | 42.4 | | | 34.3 | |
| Approach LOS | | A | | | A | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 9.8 | | | | HCM Level of Service | | | A | | |
| HCM Volume to Capacity ratio | | | 0.54 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | 11.8 | | | |
| Intersection Capacity Utilization | | | 72.6% | | | | ICU Level of Service | | | C | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 905 | 230 | 0 | 1465 | 0 | 25 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 905 | 230 | 0 | 1465 | 0 | 25 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.84 | | 0.91 | 0.84 |
| vC, conflicting volume | | | 1135 | | 1752 | 568 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 773 | | 836 | 96 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 97 |
| cM capacity (veh/h) | | | 702 | | 280 | 789 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 603 | 532 | 732 | 732 | 25 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 230 | 0 | 0 | 25 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 789 | |
| Volume to Capacity | 0.35 | 0.31 | 0.43 | 0.43 | 0.03 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.7 | |
| Lane LOS | | | | | | A |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.7 | |
| Approach LOS | | | | | | A |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.1 | | | |
| Intersection Capacity Utilization | | | 43.8% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 210 | 65 | 75 | 0 | 380 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 210 | 65 | 75 | 0 | 380 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 145 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 292 | 70 | | | 140 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 292 | 70 | | | 140 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 79 | | | 100 | |
| cM capacity (veh/h) | 675 | 978 | | | 1441 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 210 | 43 | 97 | 190 | 190 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 210 | 0 | 75 | 0 | 0 | |
| cSH | 978 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.21 | 0.03 | 0.06 | 0.11 | 0.11 | |
| Queue Length 95th (m) | 6.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.7 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.7 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.8 | | | |
| Intersection Capacity Utilization | | | 23.9% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 80 | 5 | 15 | 155 | 120 | 65 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 80 | 5 | 15 | 155 | 120 | 65 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 338 | 152 | 185 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 338 | 152 | 185 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 88 | 99 | 99 | | | |
| cM capacity (veh/h) | 651 | 894 | 1390 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 85 | 170 | 185 | | | |
| Volume Left | 80 | 15 | 0 | | | |
| Volume Right | 5 | 0 | 65 | | | |
| cSH | 662 | 1390 | 1700 | | | |
| Volume to Capacity | 0.13 | 0.01 | 0.11 | | | |
| Queue Length 95th (m) | 3.3 | 0.2 | 0.0 | | | |
| Control Delay (s) | 11.2 | 0.8 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 11.2 | 0.8 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.5 | | | |
| Intersection Capacity Utilization | | 32.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Background Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 15 | 10 | 30 | 155 | 110 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 15 | 10 | 30 | 155 | 110 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 330 | 115 | 120 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 330 | 115 | 120 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 98 | 99 | 98 | | | |
| cM capacity (veh/h) | 651 | 937 | 1468 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 25 | 185 | 120 | | | |
| Volume Left | 15 | 30 | 0 | | | |
| Volume Right | 10 | 0 | 10 | | | |
| cSH | 742 | 1468 | 1700 | | | |
| Volume to Capacity | 0.03 | 0.02 | 0.07 | | | |
| Queue Length 95th (m) | 0.8 | 0.5 | 0.0 | | | |
| Control Delay (s) | 10.0 | 1.4 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.0 | 1.4 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.5 | | | |
| Intersection Capacity Utilization | | 26.5% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

3: Earl Armstrong & Limebank

Future Total Traffic-2021

Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 435 | 345 | 50 | 45 | 355 | 100 | 130 | 190 | 25 | 140 | 60 | 285 |
| Lane Group Flow (vph) | 435 | 345 | 50 | 45 | 355 | 100 | 130 | 190 | 25 | 140 | 60 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 31.9 | 51.9 | 51.9 | 11.9 | 31.9 | 31.9 | 16.9 | 36.9 | 36.9 | 11.9 | 31.9 | 63.8 |
| Total Split (%) | 28.3% | 46.1% | 46.1% | 10.6% | 28.3% | 28.3% | 15.0% | 32.8% | 32.8% | 10.6% | 28.3% | 56.7% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.69 | 0.32 | 0.10 | 0.25 | 0.64 | 0.30 | 0.40 | 0.15 | 0.04 | 0.44 | 0.05 | 0.16 |
| Control Delay | 48.4 | 30.2 | 7.2 | 57.8 | 42.4 | 6.4 | 51.3 | 27.2 | 11.2 | 52.5 | 27.9 | 2.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 48.4 | 30.2 | 7.2 | 57.8 | 42.4 | 6.4 | 51.3 | 27.2 | 11.2 | 52.5 | 27.9 | 2.1 |
| Queue Length 50th (m) | 46.0 | 31.2 | 0.0 | 5.0 | 33.9 | 0.0 | 13.9 | 14.7 | 0.0 | 14.9 | 4.4 | 0.8 |
| Queue Length 95th (m) | 58.6 | 38.1 | 7.5 | 10.8 | 41.4 | 8.6 | 22.6 | 25.7 | 6.5 | 24.9 | 10.6 | 7.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 793 | 1446 | 676 | 183 | 817 | 442 | 353 | 1261 | 580 | 321 | 1259 | 1878 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.55 | 0.24 | 0.07 | 0.25 | 0.43 | 0.23 | 0.37 | 0.15 | 0.04 | 0.44 | 0.05 | 0.15 |

Intersection Summary

Cycle Length: 112.6

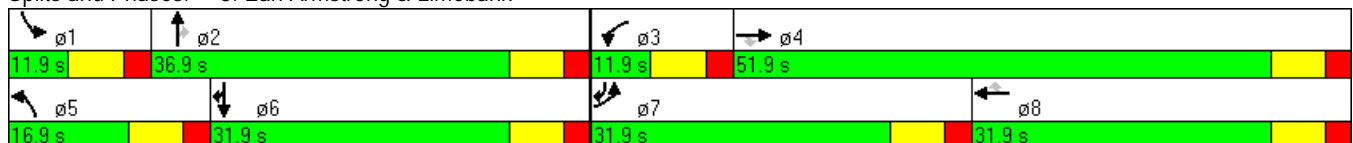
Actuated Cycle Length: 112.6

Offset: 28 (25%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Total Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 435 | 345 | 50 | 45 | 355 | 100 | 130 | 190 | 25 | 140 | 60 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 435 | 345 | 50 | 45 | 355 | 100 | 130 | 190 | 25 | 140 | 60 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 35 | 0 | 0 | 83 | 0 | 0 | 16 | 0 | 0 | 112 |
| Lane Group Flow (vph) | 435 | 345 | 15 | 45 | 355 | 17 | 130 | 190 | 9 | 140 | 60 | 173 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 19.8 | 33.7 | 33.7 | 4.0 | 17.9 | 17.9 | 9.6 | 37.8 | 37.8 | 9.5 | 37.7 | 64.4 |
| Effective Green, g (s) | 20.8 | 34.7 | 34.7 | 5.0 | 18.9 | 18.9 | 10.6 | 38.8 | 38.8 | 10.5 | 38.7 | 65.4 |
| Actuated g/C Ratio | 0.18 | 0.31 | 0.31 | 0.04 | 0.17 | 0.17 | 0.09 | 0.34 | 0.34 | 0.09 | 0.34 | 0.58 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 634 | 1091 | 488 | 152 | 594 | 266 | 323 | 1219 | 545 | 320 | 1216 | 1619 |
| v/s Ratio Prot | c0.13 | 0.10 | | 0.01 | c0.10 | | 0.04 | c0.05 | | c0.04 | 0.02 | 0.06 |
| v/s Ratio Perm | | | 0.01 | | | 0.01 | | | 0.01 | | | |
| v/c Ratio | 0.69 | 0.32 | 0.03 | 0.30 | 0.60 | 0.06 | 0.40 | 0.16 | 0.02 | 0.44 | 0.05 | 0.11 |
| Uniform Delay, d1 | 42.9 | 29.9 | 27.2 | 52.1 | 43.3 | 39.4 | 48.0 | 25.6 | 24.3 | 48.3 | 24.7 | 10.5 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.06 | 0.83 | 0.52 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 3.1 | 0.2 | 0.0 | 1.1 | 1.6 | 0.1 | 0.8 | 0.3 | 0.1 | 1.0 | 0.1 | 0.0 |
| Delay (s) | 45.9 | 30.0 | 27.2 | 56.3 | 37.6 | 20.4 | 48.8 | 25.8 | 24.4 | 49.2 | 24.7 | 10.6 |
| Level of Service | D | C | C | E | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 38.2 | | | 35.9 | | | 34.4 | | | 23.5 | |
| Approach LOS | | D | | | D | | | C | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 33.8 | | | | HCM Level of Service | | | C | | |
| HCM Volume to Capacity ratio | | | 0.38 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 17.7 | | | |
| Intersection Capacity Utilization | | | 54.4% | | | | ICU Level of Service | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

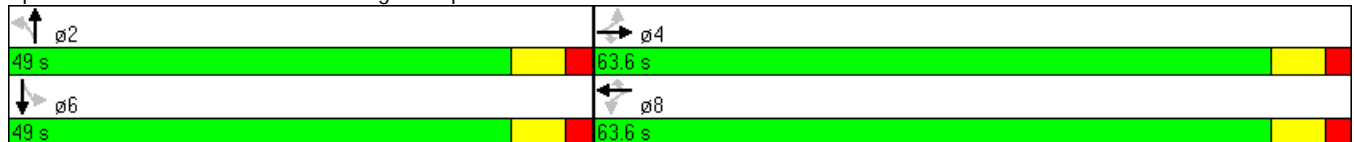
Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 10 |
| Lane Group Flow (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 40 | 25 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 49.0 | 49.0 | 49.0 |
| Total Split (%) | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 56.5% | 43.5% | 43.5% | 43.5% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.46 | 0.18 | 0.12 |
| Control Delay | 0.3 | 0.2 | 0.1 | 3.5 | 3.2 | 2.5 | 54.7 | 18.1 | 26.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.3 | 0.2 | 0.1 | 3.5 | 3.2 | 2.5 | 54.7 | 18.1 | 26.2 |
| Queue Length 50th (m) | 0.1 | 0.4 | 0.0 | 0.4 | 9.3 | 0.0 | 15.6 | 1.0 | 2.0 |
| Queue Length 95th (m) | m0.2 | 0.5 | 0.0 | 1.8 | 16.3 | 0.6 | 28.9 | 10.3 | 9.5 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 778 | 2891 | 1302 | 841 | 2891 | 1294 | 528 | 641 | 658 |
| 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 | 0.04 | 0.11 | 0.04 | 0.01 | 0.14 | 0.00 | 0.14 | 0.06 | 0.04 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.



























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |  | |
| Volume (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.87 | | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1618 | | | 1695 | |
| Flt Permitted | 0.51 | 1.00 | 1.00 | 0.55 | 1.00 | 1.00 | 0.74 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 953 | 3539 | 1583 | 1029 | 3539 | 1583 | 1380 | 1618 | | | 1695 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 330 | 50 | 10 | 410 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 330 | 40 | 10 | 410 | 2 | 75 | 9 | 0 | 0 | 12 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.4 | 88.4 | 88.4 | 88.4 | 88.4 | 88.4 | 10.4 | 10.4 | | | 10.4 | |
| Effective Green, g (s) | 89.4 | 89.4 | 89.4 | 89.4 | 89.4 | 89.4 | 11.4 | 11.4 | | | 11.4 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 757 | 2810 | 1257 | 817 | 2810 | 1257 | 140 | 164 | | | 172 | |
| v/s Ratio Prot | | 0.09 | | | c0.12 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.01 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.12 | 0.03 | 0.01 | 0.15 | 0.00 | 0.54 | 0.05 | | | 0.07 | |
| Uniform Delay, d1 | 2.5 | 2.6 | 2.5 | 2.4 | 2.7 | 2.4 | 48.1 | 45.7 | | | 45.8 | |
| Progression Factor | 0.06 | 0.05 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 3.9 | 0.1 | | | 0.2 | |
| Delay (s) | 0.3 | 0.2 | 0.0 | 2.4 | 2.8 | 2.4 | 52.0 | 45.9 | | | 46.0 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.2 | | | 2.8 | | | 49.9 | | | 46.0 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 8.3 | | | | HCM Level of Service | | | A | | |
| HCM Volume to Capacity ratio | | | 0.19 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 45.2% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis












9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2021
Weekday AM Peak Hour Zero Interaction

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 415 | 100 | 0 | 500 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 415 | 100 | 0 | 500 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.93 | | 0.94 | 0.93 |
| vC, conflicting volume | | | 515 | | 715 | 258 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 336 | | 514 | 59 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 1138 | | 460 | 927 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 277 | 238 | 250 | 250 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 100 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 927 | |
| Volume to Capacity | 0.16 | 0.14 | 0.15 | 0.15 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 8.9 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 8.9 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 24.7% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 55 | 295 | 30 | 0 | 155 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 55 | 295 | 30 | 0 | 155 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 144 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 388 | 162 | | | 325 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 388 | 162 | | | 325 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 94 | | | 100 | |
| cM capacity (veh/h) | 588 | 854 | | | 1231 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 55 | 197 | 128 | 78 | 78 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 55 | 0 | 30 | 0 | 0 | |
| cSH | 854 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.06 | 0.12 | 0.08 | 0.05 | 0.05 | |
| Queue Length 95th (m) | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.5 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.5 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.0 | | | |
| Intersection Capacity Utilization | | | 19.2% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 5 | 10 | 110 | 60 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 5 | 10 | 110 | 60 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 195 | 65 | 70 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 195 | 65 | 70 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 789 | 999 | 1531 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 10 | 120 | 70 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 5 | 0 | 10 | | | |
| cSH | 881 | 1531 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.3 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | | 23.0% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 10 | 20 | 115 | 55 | 5 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 10 | 20 | 115 | 55 | 5 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 212 | 58 | 60 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 212 | 58 | 60 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 766 | 1009 | 1544 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 135 | 60 | | | |
| Volume Left | 5 | 20 | 0 | | | |
| Volume Right | 10 | 0 | 5 | | | |
| cSH | 912 | 1544 | 1700 | | | |
| Volume to Capacity | 0.02 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.4 | 0.3 | 0.0 | | | |
| Control Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.4 | | | |
| Intersection Capacity Utilization | | 23.8% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues

3: Earl Armstrong & Limebank

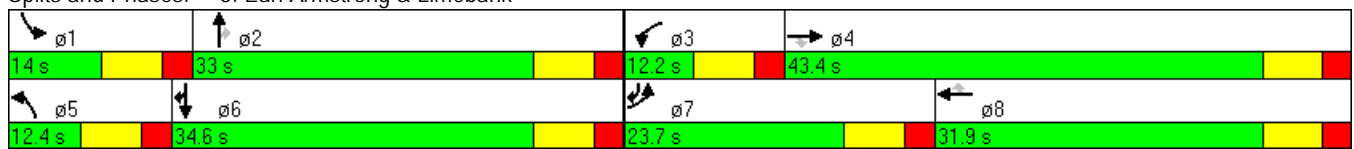
Future Total Traffic-2021
Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 640 | 645 | 70 | 100 | 595 | 155 | 90 | 155 | 65 | 360 | 100 | 755 |
| Lane Group Flow (vph) | 640 | 645 | 70 | 100 | 595 | 155 | 90 | 155 | 65 | 360 | 100 | 755 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 23.7 | 43.4 | 43.4 | 12.2 | 31.9 | 31.9 | 12.4 | 33.0 | 33.0 | 14.0 | 34.6 | 58.3 |
| Total Split (%) | 23.1% | 42.3% | 42.3% | 11.9% | 31.1% | 31.1% | 12.1% | 32.2% | 32.2% | 13.6% | 33.7% | 56.8% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 1.07 | 0.51 | 0.11 | 0.47 | 0.75 | 0.33 | 0.37 | 0.17 | 0.14 | 0.98 | 0.09 | 0.47 |
| Control Delay | 99.5 | 27.5 | 5.9 | 61.3 | 35.3 | 3.8 | 50.2 | 29.7 | 8.2 | 89.5 | 26.8 | 13.5 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 99.5 | 27.5 | 5.9 | 61.3 | 35.3 | 3.8 | 50.2 | 29.7 | 8.2 | 89.5 | 26.8 | 13.5 |
| Queue Length 50th (m) | -72.5 | 52.7 | 0.0 | 10.3 | 43.5 | 1.9 | 8.7 | 12.3 | 0.0 | -40.8 | 7.6 | 44.3 |
| Queue Length 95th (m) | #105.9 | 67.3 | 8.6 | 19.0 | 54.0 | 7.2 | 16.6 | 20.3 | 9.8 | #75.3 | 13.8 | 61.3 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 596 | 1323 | 636 | 211 | 897 | 517 | 245 | 935 | 466 | 369 | 1151 | 1604 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.07 | 0.49 | 0.11 | 0.47 | 0.66 | 0.30 | 0.37 | 0.17 | 0.14 | 0.98 | 0.09 | 0.47 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 33 (32%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 ~ 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: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Total Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |   |   |  |   |   |  |   |   |  |   |   |  |
| Volume (vph) | 640 | 645 | 70 | 100 | 595 | 155 | 90 | 155 | 65 | 360 | 100 | 755 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 640 | 645 | 70 | 100 | 595 | 155 | 90 | 155 | 65 | 360 | 100 | 755 |
| RTOR Reduction (vph) | 0 | 0 | 45 | 0 | 0 | 118 | 0 | 0 | 49 | 0 | 0 | 57 |
| Lane Group Flow (vph) | 640 | 645 | 25 | 100 | 595 | 37 | 90 | 155 | 16 | 360 | 100 | 698 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 16.8 | 36.0 | 36.0 | 4.2 | 23.4 | 23.4 | 5.1 | 24.8 | 24.8 | 10.0 | 29.7 | 53.4 |
| Effective Green, g (s) | 17.8 | 37.0 | 37.0 | 5.2 | 24.4 | 24.4 | 6.1 | 25.8 | 25.8 | 11.0 | 30.7 | 54.4 |
| Actuated g/C Ratio | 0.17 | 0.36 | 0.36 | 0.05 | 0.24 | 0.24 | 0.06 | 0.25 | 0.25 | 0.11 | 0.30 | 0.53 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 596 | 1276 | 571 | 174 | 842 | 376 | 204 | 890 | 398 | 368 | 1059 | 1478 |
| v/s Ratio Prot | c0.19 | 0.18 | | 0.03 | c0.17 | | 0.03 | 0.04 | | c0.10 | 0.03 | c0.25 |
| v/s Ratio Perm | | | 0.02 | | | 0.02 | | | 0.01 | | | |
| v/c Ratio | 1.07 | 0.51 | 0.04 | 0.57 | 0.71 | 0.10 | 0.44 | 0.17 | 0.04 | 0.98 | 0.09 | 0.47 |
| Uniform Delay, d1 | 42.4 | 25.6 | 21.3 | 47.6 | 35.8 | 30.5 | 46.6 | 30.1 | 29.0 | 45.7 | 25.9 | 15.1 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.15 | 0.79 | 0.40 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 58.3 | 0.3 | 0.0 | 4.5 | 2.7 | 0.1 | 1.5 | 0.4 | 0.2 | 40.6 | 0.2 | 0.2 |
| Delay (s) | 100.7 | 26.0 | 21.3 | 59.3 | 31.0 | 12.2 | 48.1 | 30.5 | 29.2 | 86.3 | 26.1 | 15.3 |
| Level of Service | F | C | C | E | C | B | D | C | C | F | C | B |
| Approach Delay (s) | | 61.0 | | | 30.9 | | | 35.3 | | | 37.3 | |
| Approach LOS | | E | | | C | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 44.3 | | | | HCM Level of Service | | | D | | |
| HCM Volume to Capacity ratio | | | 0.78 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | 23.6 | | | |
| Intersection Capacity Utilization | | | 73.0% | | | | ICU Level of Service | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

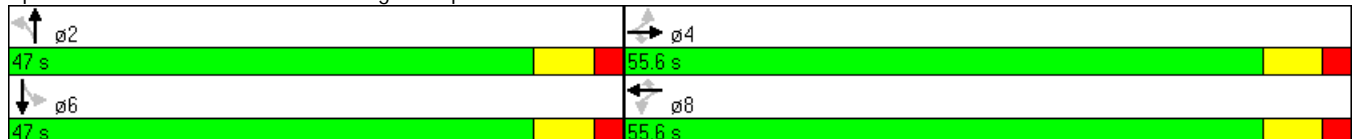
Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 160 | 20 | 25 |
| Lane Group Flow (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 160 | 80 | 115 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 55.6 | 47.0 | 47.0 | 47.0 |
| Total Split (%) | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 54.2% | 45.8% | 45.8% | 45.8% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.17 | 0.26 | 0.09 | 0.16 | 0.24 | 0.01 | 0.66 | 0.22 | 0.30 |
| Control Delay | 1.6 | 1.2 | 0.1 | 7.6 | 6.7 | 3.8 | 50.9 | 13.4 | 12.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 1.6 | 1.2 | 0.1 | 7.6 | 6.7 | 3.8 | 50.9 | 13.4 | 12.2 |
| Queue Length 50th (m) | 0.8 | 2.8 | 0.0 | 4.7 | 19.9 | 0.0 | 29.4 | 3.3 | 4.1 |
| Queue Length 95th (m) | m1.9 | m5.2 | m0.1 | 13.0 | 35.0 | 1.9 | 46.0 | 13.7 | 16.5 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 545 | 2461 | 1133 | 515 | 2461 | 1104 | 510 | 699 | 713 |
| 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 | 0.17 | 0.26 | 0.09 | 0.16 | 0.24 | 0.01 | 0.31 | 0.11 | 0.16 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 160 | 20 | 60 | 0 | 25 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.89 | | | 0.88 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1653 | | | 1644 | |
| Flt Permitted | 0.42 | 1.00 | 1.00 | 0.40 | 1.00 | 1.00 | 0.68 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 784 | 3539 | 1583 | 739 | 3539 | 1583 | 1272 | 1653 | | | 1644 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 650 | 105 | 80 | 600 | 10 | 160 | 20 | 60 | 0 | 25 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 32 | 0 | 0 | 3 | 0 | 49 | 0 | 0 | 73 | 0 |
| Lane Group Flow (vph) | 95 | 650 | 73 | 80 | 600 | 7 | 160 | 31 | 0 | 0 | 42 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 18.4 | 18.4 | | | 18.4 | |
| Effective Green, g (s) | 71.4 | 71.4 | 71.4 | 71.4 | 71.4 | 71.4 | 19.4 | 19.4 | | | 19.4 | |
| Actuated g/C Ratio | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.19 | 0.19 | | | 0.19 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 546 | 2463 | 1102 | 514 | 2463 | 1102 | 241 | 313 | | | 311 | |
| v/s Ratio Prot | | c0.18 | | | 0.17 | | | 0.02 | | | 0.03 | |
| v/s Ratio Perm | 0.12 | | 0.05 | 0.11 | | 0.00 | c0.13 | | | | | |
| v/c Ratio | 0.17 | 0.26 | 0.07 | 0.16 | 0.24 | 0.01 | 0.66 | 0.10 | | | 0.14 | |
| Uniform Delay, d1 | 5.4 | 5.8 | 5.0 | 5.3 | 5.7 | 4.8 | 38.6 | 34.4 | | | 34.6 | |
| Progression Factor | 0.15 | 0.14 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.6 | 0.2 | 0.1 | 0.6 | 0.2 | 0.0 | 6.7 | 0.1 | | | 0.2 | |
| Delay (s) | 1.4 | 1.0 | 0.1 | 6.0 | 5.9 | 4.8 | 45.3 | 34.5 | | | 34.8 | |
| Level of Service | A | A | A | A | A | A | D | C | | | C | |
| Approach Delay (s) | | 1.0 | | | 5.9 | | | 41.7 | | | 34.8 | |
| Approach LOS | | A | | | A | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.0 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.35 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 56.6% | | | | ICU Level of Service | | | | B | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis












9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2021
Weekday PM Peak Hour Zero Interaction

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|------|----------------------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 770 | 305 | 0 | 850 | 0 | 80 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 770 | 305 | 0 | 850 | 0 | 80 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.86 | | 0.89 | 0.86 |
| vC, conflicting volume | | | 1075 | | 1348 | 538 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 762 | | 857 | 137 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 90 |
| cM capacity (veh/h) | | | 728 | | 263 | 762 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 513 | 562 | 425 | 425 | 80 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 305 | 0 | 0 | 80 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 762 | |
| Volume to Capacity | 0.30 | 0.33 | 0.25 | 0.25 | 0.10 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 10.3 | |
| Lane LOS | | | | | | B |
| Approach Delay (s) | 0.0 | | 0.0 | | 10.3 | |
| Approach LOS | | | | | | B |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.4 | | | |
| Intersection Capacity Utilization | | | 42.7% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 225 | 85 | 80 | 0 | 270 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 225 | 85 | 80 | 0 | 270 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 145 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 260 | 82 | | | 165 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 260 | 82 | | | 165 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 77 | | | 100 | |
| cM capacity (veh/h) | 707 | 961 | | | 1411 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 225 | 57 | 108 | 135 | 135 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 225 | 0 | 80 | 0 | 0 | |
| cSH | 961 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.23 | 0.03 | 0.06 | 0.08 | 0.08 | |
| Queue Length 95th (m) | 6.8 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.9 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.9 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 3.4 | | | |
| Intersection Capacity Utilization | | | 25.5% | | ICU Level of Service | A |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 75 | 15 | 25 | 165 | 130 | 75 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 75 | 15 | 25 | 165 | 130 | 75 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 382 | 168 | 205 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 382 | 168 | 205 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 88 | 98 | 98 | | | |
| cM capacity (veh/h) | 609 | 877 | 1366 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 90 | 190 | 205 | | | |
| Volume Left | 75 | 25 | 0 | | | |
| Volume Right | 15 | 0 | 75 | | | |
| cSH | 641 | 1366 | 1700 | | | |
| Volume to Capacity | 0.14 | 0.02 | 0.12 | | | |
| Queue Length 95th (m) | 3.6 | 0.4 | 0.0 | | | |
| Control Delay (s) | 11.5 | 1.1 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 11.5 | 1.1 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.6 | | | |
| Intersection Capacity Utilization | | 36.6% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Zero Interaction

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 25 | 35 | 45 | 165 | 125 | 20 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 25 | 35 | 45 | 165 | 125 | 20 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 185 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 390 | 135 | 145 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 390 | 135 | 145 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 96 | 96 | 97 | | | |
| cM capacity (veh/h) | 595 | 914 | 1437 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 60 | 210 | 145 | | | |
| Volume Left | 25 | 45 | 0 | | | |
| Volume Right | 35 | 0 | 20 | | | |
| cSH | 747 | 1437 | 1700 | | | |
| Volume to Capacity | 0.08 | 0.03 | 0.09 | | | |
| Queue Length 95th (m) | 2.0 | 0.7 | 0.0 | | | |
| Control Delay (s) | 10.2 | 1.8 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.2 | 1.8 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | | 32.5% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues
3: Earl Armstrong & Limebank

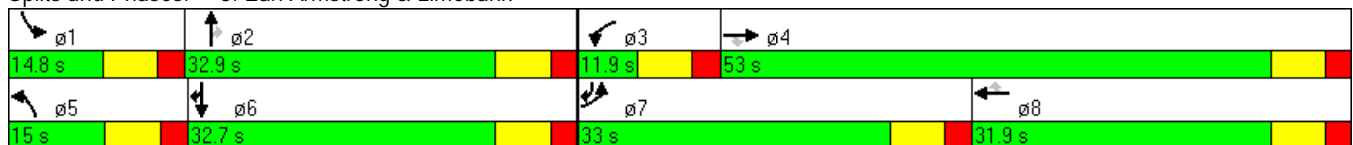
Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 660 | 945 | 60 | 45 | 510 | 100 | 185 | 190 | 30 | 140 | 60 | 285 |
| Lane Group Flow (vph) | 660 | 945 | 60 | 45 | 510 | 100 | 185 | 190 | 30 | 140 | 60 | 285 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 33.0 | 53.0 | 53.0 | 11.9 | 31.9 | 31.9 | 15.0 | 32.9 | 32.9 | 14.8 | 32.7 | 65.7 |
| Total Split (%) | 29.3% | 47.1% | 47.1% | 10.6% | 28.3% | 28.3% | 13.3% | 29.2% | 29.2% | 13.1% | 29.0% | 58.3% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 0.84 | 0.68 | 0.09 | 0.25 | 0.73 | 0.25 | 0.59 | 0.19 | 0.06 | 0.48 | 0.06 | 0.18 |
| Control Delay | 51.8 | 30.9 | 7.3 | 56.0 | 42.8 | 5.8 | 57.3 | 33.1 | 11.9 | 55.2 | 33.0 | 8.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.8 | 30.9 | 7.3 | 56.0 | 42.8 | 5.8 | 57.3 | 33.1 | 11.9 | 55.2 | 33.0 | 8.8 |
| Queue Length 50th (m) | 69.7 | 89.1 | 1.2 | 5.0 | 43.0 | 0.0 | 19.7 | 17.2 | 0.0 | 15.0 | 5.3 | 11.0 |
| Queue Length 95th (m) | 90.4 | 105.2 | 8.8 | 10.8 | 52.7 | 8.1 | #32.5 | 27.1 | 7.3 | 25.2 | 10.7 | 18.6 |
| Internal Link Dist (m) | | 131.0 | | | 112.8 | | | 120.2 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 826 | 1480 | 692 | 183 | 817 | 442 | 316 | 987 | 463 | 294 | 960 | 1615 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.80 | 0.64 | 0.09 | 0.25 | 0.62 | 0.23 | 0.59 | 0.19 | 0.06 | 0.48 | 0.06 | 0.18 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 36 (32%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

























Splits and Phases: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Total Traffic-2021
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 660 | 945 | 60 | 45 | 510 | 100 | 185 | 190 | 30 | 140 | 60 | 285 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 660 | 945 | 60 | 45 | 510 | 100 | 185 | 190 | 30 | 140 | 60 | 285 |
| RTOR Reduction (vph) | 0 | 0 | 31 | 0 | 0 | 79 | 0 | 0 | 22 | 0 | 0 | 45 |
| Lane Group Flow (vph) | 660 | 945 | 29 | 45 | 510 | 21 | 185 | 190 | 8 | 140 | 60 | 240 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 24.9 | 43.5 | 43.5 | 4.0 | 22.6 | 22.6 | 9.4 | 29.0 | 29.0 | 8.5 | 28.1 | 59.9 |
| Effective Green, g (s) | 25.9 | 44.5 | 44.5 | 5.0 | 23.6 | 23.6 | 10.4 | 30.0 | 30.0 | 9.5 | 29.1 | 60.9 |
| Actuated g/C Ratio | 0.23 | 0.40 | 0.40 | 0.04 | 0.21 | 0.21 | 0.09 | 0.27 | 0.27 | 0.08 | 0.26 | 0.54 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 790 | 1399 | 626 | 152 | 742 | 332 | 317 | 943 | 422 | 290 | 915 | 1507 |
| v/s Ratio Prot | c0.19 | c0.27 | | 0.01 | 0.14 | | c0.05 | c0.05 | | 0.04 | 0.02 | 0.09 |
| v/s Ratio Perm | | | 0.02 | | | 0.01 | | | 0.01 | | | |
| v/c Ratio | 0.84 | 0.68 | 0.05 | 0.30 | 0.69 | 0.06 | 0.58 | 0.20 | 0.02 | 0.48 | 0.07 | 0.16 |
| Uniform Delay, d1 | 41.3 | 28.1 | 21.0 | 52.1 | 41.1 | 35.6 | 49.0 | 32.0 | 30.5 | 49.2 | 31.5 | 13.0 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.03 | 0.86 | 0.60 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 7.6 | 1.3 | 0.0 | 1.1 | 2.6 | 0.1 | 2.7 | 0.5 | 0.1 | 1.3 | 0.1 | 0.0 |
| Delay (s) | 49.0 | 29.4 | 21.0 | 54.6 | 38.1 | 21.5 | 51.8 | 32.5 | 30.5 | 50.5 | 31.6 | 13.0 |
| Level of Service | D | C | C | D | D | C | D | C | C | D | C | B |
| Approach Delay (s) | | 36.8 | | | 36.7 | | | 41.1 | | | 26.1 | |
| Approach LOS | | D | | | D | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 35.7 | | | | HCM Level of Service | | | D | | |
| HCM Volume to Capacity ratio | | | 0.51 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | 11.8 | | | |
| Intersection Capacity Utilization | | | 66.2% | | | | ICU Level of Service | | C | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 5 | 10 |
| Lane Group Flow (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 40 | 25 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 73.6 | 39.0 | 39.0 | 39.0 |
| Total Split (%) | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 65.4% | 34.6% | 34.6% | 34.6% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.05 | 0.32 | 0.04 | 0.02 | 0.20 | 0.00 | 0.46 | 0.18 | 0.12 |
| Control Delay | 0.2 | 0.4 | 0.0 | 3.6 | 3.4 | 2.5 | 54.8 | 18.1 | 26.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 0.2 | 0.4 | 0.0 | 3.6 | 3.4 | 2.5 | 54.8 | 18.1 | 26.3 |
| Queue Length 50th (m) | 0.0 | 0.6 | 0.0 | 0.4 | 13.5 | 0.0 | 15.6 | 1.0 | 2.0 |
| Queue Length 95th (m) | m0.1 | 0.6 | m0.0 | 1.8 | 22.6 | 0.6 | 28.9 | 10.4 | 9.6 |
| Internal Link Dist (m) | | 95.8 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 670 | 2892 | 1301 | 450 | 2892 | 1294 | 406 | 501 | 509 |
| 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 | 0.32 | 0.04 | 0.02 | 0.20 | 0.00 | 0.18 | 0.08 | 0.05 |

Intersection Summary

Cycle Length: 112.6
 Actuated Cycle Length: 112.6
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.87 | | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1618 | | | 1695 | |
| Flt Permitted | 0.44 | 1.00 | 1.00 | 0.30 | 1.00 | 1.00 | 0.74 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 819 | 3539 | 1583 | 552 | 3539 | 1583 | 1380 | 1618 | | | 1695 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 35 | 935 | 50 | 10 | 565 | 2 | 75 | 5 | 35 | 0 | 10 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 13 | 0 |
| Lane Group Flow (vph) | 35 | 935 | 42 | 10 | 565 | 2 | 75 | 9 | 0 | 0 | 12 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 88.5 | 10.3 | 10.3 | | | 10.3 | |
| Effective Green, g (s) | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 89.5 | 11.3 | 11.3 | | | 11.3 | |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.79 | 0.10 | 0.10 | | | 0.10 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 651 | 2813 | 1258 | 439 | 2813 | 1258 | 138 | 162 | | | 170 | |
| v/s Ratio Prot | | c0.26 | | | 0.16 | | | 0.01 | | | 0.01 | |
| v/s Ratio Perm | 0.04 | | 0.03 | 0.02 | | 0.00 | c0.05 | | | | | |
| v/c Ratio | 0.05 | 0.33 | 0.03 | 0.02 | 0.20 | 0.00 | 0.54 | 0.05 | | | 0.07 | |
| Uniform Delay, d1 | 2.5 | 3.2 | 2.4 | 2.4 | 2.8 | 2.4 | 48.2 | 45.8 | | | 45.9 | |
| Progression Factor | 0.02 | 0.03 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.1 | 0.3 | 0.0 | 0.1 | 0.2 | 0.0 | 4.3 | 0.1 | | | 0.2 | |
| Delay (s) | 0.2 | 0.4 | 0.0 | 2.5 | 3.0 | 2.4 | 52.5 | 45.9 | | | 46.0 | |
| Level of Service | A | A | A | A | A | A | D | D | | | D | |
| Approach Delay (s) | | 0.3 | | | 3.0 | | | 50.2 | | | 46.0 | |
| Approach LOS | | A | | | A | | | D | | | D | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 5.2 | | | | HCM Level of Service | | | | A | |
| HCM Volume to Capacity ratio | | | 0.36 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 112.6 | | | | Sum of lost time (s) | | | 11.8 | | |
| Intersection Capacity Utilization | | | 49.7% | | | | ICU Level of Service | | | A | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 1015 | 100 | 0 | 655 | 0 | 1 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 1015 | 100 | 0 | 655 | 0 | 1 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.78 | | 0.79 | 0.78 |
| vC, conflicting volume | | | 1115 | | 1392 | 558 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 576 | | 808 | 0 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 100 |
| cM capacity (veh/h) | | | 772 | | 253 | 843 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 677 | 438 | 328 | 328 | 1 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 100 | 0 | 0 | 1 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 843 | |
| Volume to Capacity | 0.40 | 0.26 | 0.19 | 0.19 | 0.00 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 9.3 | |
| Lane LOS | | | | | A | |
| Approach Delay (s) | 0.0 | | 0.0 | | 9.3 | |
| Approach LOS | | | | | A | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.0 | | | |
| Intersection Capacity Utilization | | | 41.2% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 55 | 350 | 35 | 0 | 165 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 55 | 350 | 35 | 0 | 165 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | | None | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 144 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 450 | 192 | | | 385 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 450 | 192 | | | 385 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 93 | | | 100 | |
| cM capacity (veh/h) | 538 | 817 | | | 1170 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 55 | 233 | 152 | 82 | 82 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 55 | 0 | 35 | 0 | 0 | |
| cSH | 817 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.07 | 0.14 | 0.09 | 0.05 | 0.05 | |
| Queue Length 95th (m) | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.7 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | | | | | | |
| Approach Delay (s) | 9.7 | 0.0 | | | 0.0 | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | | 20.9% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |










HCM Unsignalized Intersection Capacity Analysis
 13: N. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 5 | 10 | 110 | 60 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 5 | 10 | 110 | 60 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 195 | 65 | 70 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 195 | 65 | 70 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 789 | 999 | 1531 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 10 | 120 | 70 | | | |
| Volume Left | 5 | 10 | 0 | | | |
| Volume Right | 5 | 0 | 10 | | | |
| cSH | 881 | 1531 | 1700 | | | |
| Volume to Capacity | 0.01 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.3 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.1 | 0.7 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.9 | | | |
| Intersection Capacity Utilization | | 23.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday AM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 5 | 10 | 20 | 115 | 55 | 10 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 5 | 10 | 20 | 115 | 55 | 10 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 186 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 215 | 60 | 65 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 215 | 60 | 65 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 99 | 99 | 99 | | | |
| cM capacity (veh/h) | 763 | 1005 | 1537 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 15 | 135 | 65 | | | |
| Volume Left | 5 | 20 | 0 | | | |
| Volume Right | 10 | 0 | 10 | | | |
| cSH | 909 | 1537 | 1700 | | | |
| Volume to Capacity | 0.02 | 0.01 | 0.04 | | | |
| Queue Length 95th (m) | 0.4 | 0.3 | 0.0 | | | |
| Control Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.0 | 1.2 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.4 | | | |
| Intersection Capacity Utilization | | 23.8% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

Queues
3: Earl Armstrong & Limebank

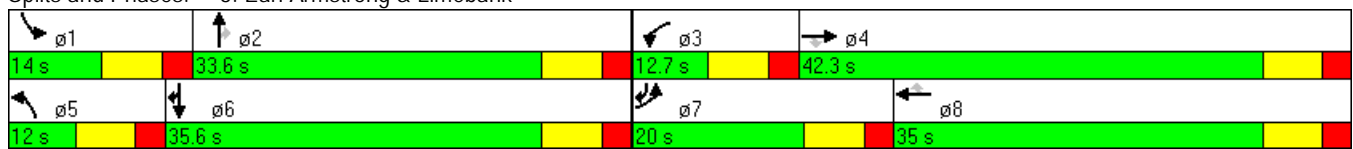
Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|--------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|--------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 730 | 725 | 180 | 100 | 1200 | 155 | 90 | 155 | 65 | 360 | 100 | 955 |
| Lane Group Flow (vph) | 730 | 725 | 180 | 100 | 1200 | 155 | 90 | 155 | 65 | 360 | 100 | 955 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 7 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Detector Phase | 7 | 4 | 4 | 3 | 8 | 8 | 5 | 2 | 2 | 1 | 6 | 6 7 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | 10.0 | 5.0 | 10.0 | |
| Minimum Split (s) | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | 31.9 | 11.9 | 31.9 | |
| Total Split (s) | 20.0 | 42.3 | 42.3 | 12.7 | 35.0 | 35.0 | 12.0 | 33.6 | 33.6 | 14.0 | 35.6 | 55.6 |
| Total Split (%) | 19.5% | 41.2% | 41.2% | 12.4% | 34.1% | 34.1% | 11.7% | 32.7% | 32.7% | 13.6% | 34.7% | 54.2% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | Lag | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | None | None | None | None | None | C-Max | C-Max | None | C-Max | |
| v/c Ratio | 1.55 | 0.54 | 0.25 | 0.44 | 1.20 | 0.30 | 0.44 | 0.16 | 0.14 | 1.33 | 0.09 | 0.66 |
| Control Delay | 288.5 | 27.5 | 4.5 | 54.9 | 127.0 | 11.2 | 53.7 | 29.2 | 8.1 | 209.1 | 26.6 | 21.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 288.5 | 27.5 | 4.5 | 54.9 | 127.0 | 11.2 | 53.7 | 29.2 | 8.1 | 209.1 | 26.6 | 21.3 |
| Queue Length 50th (m) | ~104.6 | 60.2 | 0.0 | 10.0 | ~152.5 | 4.2 | 8.9 | 12.2 | 0.0 | ~47.5 | 7.5 | 76.3 |
| Queue Length 95th (m) | #139.4 | 78.2 | 13.4 | 18.1 | #186.4 | 19.3 | 16.7 | 20.1 | 9.7 | #75.3 | 13.6 | 100.9 |
| Internal Link Dist (m) | | 131.0 | | | 113.3 | | | 120.8 | | | 61.2 | |
| Turn Bay Length (m) | 100.0 | | 50.0 | 30.0 | | 50.0 | 50.0 | | 50.0 | 50.0 | | 100.0 |
| Base Capacity (vph) | 472 | 1344 | 713 | 228 | 1004 | 515 | 204 | 955 | 475 | 271 | 1107 | 1437 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 1.55 | 0.54 | 0.25 | 0.44 | 1.20 | 0.30 | 0.44 | 0.16 | 0.14 | 1.33 | 0.09 | 0.66 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 51 (50%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 ~ 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: 3: Earl Armstrong & Limebank



HCM Signalized Intersection Capacity Analysis

3: Earl Armstrong & Limebank

Future Total Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph) | 730 | 725 | 180 | 100 | 1200 | 155 | 90 | 155 | 65 | 360 | 100 | 955 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lane Util. Factor | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 | 0.97 | 0.95 | 0.88 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Flt Permitted | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 1583 | 3433 | 3539 | 2787 |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 730 | 725 | 180 | 100 | 1200 | 155 | 90 | 155 | 65 | 360 | 100 | 955 |
| RTOR Reduction (vph) | 0 | 0 | 112 | 0 | 0 | 65 | 0 | 0 | 48 | 0 | 0 | 23 |
| Lane Group Flow (vph) | 730 | 725 | 68 | 100 | 1200 | 90 | 90 | 155 | 17 | 360 | 100 | 932 |
| Turn Type | Prot | | Perm | Prot | | Perm | Prot | | Perm | Prot | | custom |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Permitted Phases | | | 4 | | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | 13.1 | 37.9 | 37.9 | 4.6 | 29.4 | 29.4 | 4.1 | 25.4 | 25.4 | 7.1 | 28.4 | 48.4 |
| Effective Green, g (s) | 14.1 | 38.9 | 38.9 | 5.6 | 30.4 | 30.4 | 5.1 | 26.4 | 26.4 | 8.1 | 29.4 | 49.4 |
| Actuated g/C Ratio | 0.14 | 0.38 | 0.38 | 0.05 | 0.30 | 0.30 | 0.05 | 0.26 | 0.26 | 0.08 | 0.29 | 0.48 |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 472 | 1342 | 600 | 187 | 1049 | 469 | 171 | 911 | 407 | 271 | 1014 | 1342 |
| v/s Ratio Prot | c0.21 | 0.20 | | 0.03 | c0.34 | | 0.03 | 0.04 | | c0.10 | 0.03 | c0.33 |
| v/s Ratio Perm | | | 0.04 | | | 0.06 | | | 0.01 | | | |
| v/c Ratio | 1.55 | 0.54 | 0.11 | 0.53 | 1.14 | 0.19 | 0.53 | 0.17 | 0.04 | 1.33 | 0.10 | 0.69 |
| Uniform Delay, d1 | 44.2 | 24.9 | 20.7 | 47.2 | 36.1 | 26.9 | 47.6 | 29.6 | 28.6 | 47.2 | 26.9 | 20.7 |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.07 | 0.85 | 0.77 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | 256.3 | 0.4 | 0.1 | 2.6 | 75.3 | 0.2 | 2.9 | 0.4 | 0.2 | 171.0 | 0.2 | 1.6 |
| Delay (s) | 300.6 | 25.3 | 20.8 | 52.9 | 105.9 | 21.0 | 50.5 | 30.0 | 28.8 | 218.3 | 27.1 | 22.3 |
| Level of Service | F | C | C | D | F | C | D | C | C | F | C | C |
| Approach Delay (s) | | 147.7 | | | 93.3 | | | 35.7 | | | 72.5 | |
| Approach LOS | | F | | | F | | | D | | | E | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 101.9 | | | | HCM Level of Service | | | F | | |
| HCM Volume to Capacity ratio | | | 1.14 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | 23.6 | | | |
| Intersection Capacity Utilization | | | 92.3% | | | | ICU Level of Service | | F | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

Queues
6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | SBT |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | | | | | | | | | |
| Volume (vph) | 95 | 730 | 105 | 100 | 1185 | 10 | 180 | 20 | 25 |
| Lane Group Flow (vph) | 95 | 730 | 105 | 100 | 1185 | 10 | 180 | 80 | 115 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | |
| Detector Phase | 4 | 4 | 4 | 8 | 8 | 8 | 2 | 2 | 6 |
| Switch Phase | | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 | 31.9 |
| Total Split (s) | 69.6 | 69.6 | 69.6 | 69.6 | 69.6 | 69.6 | 33.0 | 33.0 | 33.0 |
| Total Split (%) | 67.8% | 67.8% | 67.8% | 67.8% | 67.8% | 67.8% | 32.2% | 32.2% | 32.2% |
| Yellow Time (s) | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| All-Red Time (s) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| Lead/Lag | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | C-Max | C-Max | None | None | None |
| v/c Ratio | 0.37 | 0.30 | 0.09 | 0.22 | 0.49 | 0.01 | 0.71 | 0.21 | 0.29 |
| Control Delay | 6.6 | 1.1 | 0.1 | 8.6 | 9.1 | 4.7 | 53.3 | 13.1 | 12.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 6.6 | 1.1 | 0.1 | 8.6 | 9.1 | 4.7 | 53.3 | 13.1 | 12.6 |
| Queue Length 50th (m) | 0.7 | 2.7 | 0.0 | 6.5 | 51.7 | 0.2 | 33.2 | 3.2 | 4.7 |
| Queue Length 95th (m) | m4.4 | m5.3 | m0.1 | 16.5 | 80.6 | 2.1 | 52.0 | 13.8 | 17.3 |
| Internal Link Dist (m) | | 96.0 | | | 43.9 | | | 72.0 | 67.0 |
| Turn Bay Length (m) | 30.0 | | 30.0 | 30.0 | | 30.0 | 30.0 | | |
| Base Capacity (vph) | 256 | 2430 | 1120 | 459 | 2430 | 1089 | 336 | 481 | 498 |
| 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 | 0.37 | 0.30 | 0.09 | 0.22 | 0.49 | 0.01 | 0.54 | 0.17 | 0.23 |

Intersection Summary

Cycle Length: 102.6
 Actuated Cycle Length: 102.6
 Offset: 100 (97%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 m Volume for 95th percentile queue is metered by upstream signal.





























Splits and Phases: 6: Earl Armstrong & Proposed New Road



HCM Signalized Intersection Capacity Analysis

6: Earl Armstrong & Proposed New Road

Future Total Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---|--|---|---|--|---|---|--|---|---|--|---|
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations |  |   |  |  |   |  |  |   |  |  |   |  |
| Volume (vph) | 95 | 730 | 105 | 100 | 1185 | 10 | 180 | 20 | 60 | 0 | 25 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | | 5.9 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.89 | | | 0.88 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | 1770 | 3539 | 1583 | 1770 | 3539 | 1583 | 1770 | 1653 | | | 1644 | |
| Flt Permitted | 0.20 | 1.00 | 1.00 | 0.36 | 1.00 | 1.00 | 0.68 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | 373 | 3539 | 1583 | 669 | 3539 | 1583 | 1272 | 1653 | | | 1644 | |
| Peak-hour factor, PHF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj. Flow (vph) | 95 | 730 | 105 | 100 | 1185 | 10 | 180 | 20 | 60 | 0 | 25 | 90 |
| RTOR Reduction (vph) | 0 | 0 | 33 | 0 | 0 | 2 | 0 | 48 | 0 | 0 | 69 | 0 |
| Lane Group Flow (vph) | 95 | 730 | 72 | 100 | 1185 | 8 | 180 | 32 | 0 | 0 | 46 | 0 |
| Turn Type | Perm | | Perm | Perm | | Perm | Perm | | | Perm | | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 69.4 | 69.4 | 69.4 | 69.4 | 69.4 | 69.4 | 19.4 | 19.4 | | | 19.4 | |
| Effective Green, g (s) | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 70.4 | 20.4 | 20.4 | | | 20.4 | |
| Actuated g/C Ratio | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.69 | 0.20 | 0.20 | | | 0.20 | |
| Clearance Time (s) | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | 6.9 | | | 6.9 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | 256 | 2428 | 1086 | 459 | 2428 | 1086 | 253 | 329 | | | 327 | |
| v/s Ratio Prot | | 0.21 | | | c0.33 | | | 0.02 | | | 0.03 | |
| v/s Ratio Perm | 0.25 | | 0.05 | 0.15 | | 0.00 | c0.14 | | | | | |
| v/c Ratio | 0.37 | 0.30 | 0.07 | 0.22 | 0.49 | 0.01 | 0.71 | 0.10 | | | 0.14 | |
| Uniform Delay, d1 | 6.8 | 6.4 | 5.3 | 5.9 | 7.6 | 5.1 | 38.4 | 33.6 | | | 33.9 | |
| Progression Factor | 0.39 | 0.13 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 2.8 | 0.2 | 0.1 | 1.1 | 0.7 | 0.0 | 9.1 | 0.1 | | | 0.2 | |
| Delay (s) | 5.5 | 1.1 | 0.1 | 7.0 | 8.3 | 5.1 | 47.4 | 33.7 | | | 34.1 | |
| Level of Service | A | A | A | A | A | A | D | C | | | C | |
| Approach Delay (s) | | 1.4 | | | 8.2 | | | 43.2 | | | 34.1 | |
| Approach LOS | | A | | | A | | | D | | | C | |
| Intersection Summary | | | | | | | | | | | | |
| HCM Average Control Delay | | | 10.4 | | | | HCM Level of Service | | | | B | |
| HCM Volume to Capacity ratio | | | 0.54 | | | | | | | | | |
| Actuated Cycle Length (s) | | | 102.6 | | | | Sum of lost time (s) | | | | 11.8 | |
| Intersection Capacity Utilization | | | 72.5% | | | | ICU Level of Service | | | | C | |
| Analysis Period (min) | | | 15 | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |












HCM Unsignalized Intersection Capacity Analysis
 9: Earl Armstrong & RIRO Site Access

Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| | → | ↘ | ↙ | ← | ↖ | ↗ |
|-----------------------------------|------|------|-------|----------------------|------|------|
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑ | | | ↑↑ | | ↗ |
| Volume (veh/h) | 865 | 290 | 0 | 1455 | 0 | 65 |
| Sign Control | Free | | | Free | Stop | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 865 | 290 | 0 | 1455 | 0 | 65 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | None | | None | | | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 137 | | | 120 | | |
| pX, platoon unblocked | | | 0.84 | | 0.92 | 0.84 |
| vC, conflicting volume | | | 1155 | | 1738 | 578 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | | | 808 | | 841 | 121 |
| tC, single (s) | | | 4.1 | | 6.8 | 6.9 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | | | 2.2 | | 3.5 | 3.3 |
| p0 queue free % | | | 100 | | 100 | 91 |
| cM capacity (veh/h) | | | 684 | | 278 | 763 |
| Direction, Lane # | EB 1 | EB 2 | WB 1 | WB 2 | NB 1 | |
| Volume Total | 577 | 578 | 728 | 728 | 65 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 0 | 290 | 0 | 0 | 65 | |
| cSH | 1700 | 1700 | 1700 | 1700 | 763 | |
| Volume to Capacity | 0.34 | 0.34 | 0.43 | 0.43 | 0.09 | |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | |
| Control Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 10.2 | |
| Lane LOS | | | | | | B |
| Approach Delay (s) | 0.0 | | 0.0 | | 10.2 | |
| Approach LOS | | | | | | B |
| Intersection Summary | | | | | | |
| Average Delay | | | 0.2 | | | |
| Intersection Capacity Utilization | | | 43.9% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 11: Site Access & Limebank










Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|--|---|---|--|
| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
| Lane Configurations | |  |   | | |   |
| Volume (veh/h) | 0 | 220 | 90 | 75 | 0 | 380 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 0 | 220 | 90 | 75 | 0 | 380 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | | 145 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 318 | 82 | | | 165 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 318 | 82 | | | 165 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 77 | | | 100 | |
| cM capacity (veh/h) | 651 | 961 | | | 1411 | |
| Direction, Lane # | WB 1 | NB 1 | NB 2 | SB 1 | SB 2 | |
| Volume Total | 220 | 60 | 105 | 190 | 190 | |
| Volume Left | 0 | 0 | 0 | 0 | 0 | |
| Volume Right | 220 | 0 | 75 | 0 | 0 | |
| cSH | 961 | 1700 | 1700 | 1700 | 1700 | |
| Volume to Capacity | 0.23 | 0.04 | 0.06 | 0.11 | 0.11 | |
| Queue Length 95th (m) | 6.6 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Control Delay (s) | 9.9 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.9 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.8 | | | |
| Intersection Capacity Utilization | | | 25.2% | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis










13: N. Site Access & Proposed New Road

Future Total Traffic-2021
Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 95 | 15 | 25 | 165 | 130 | 95 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 95 | 15 | 25 | 165 | 130 | 95 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 96 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 392 | 178 | 225 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 392 | 178 | 225 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 84 | 98 | 98 | | | |
| cM capacity (veh/h) | 600 | 866 | 1344 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 110 | 190 | 225 | | | |
| Volume Left | 95 | 25 | 0 | | | |
| Volume Right | 15 | 0 | 95 | | | |
| cSH | 627 | 1344 | 1700 | | | |
| Volume to Capacity | 0.18 | 0.02 | 0.13 | | | |
| Queue Length 95th (m) | 4.7 | 0.4 | 0.0 | | | |
| Control Delay (s) | 12.0 | 1.2 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 12.0 | 1.2 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.9 | | | |
| Intersection Capacity Utilization | | 38.9% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |

HCM Unsignalized Intersection Capacity Analysis
 15: S. Site Access & Proposed New Road

Future Total Traffic-2021
 Weekday PM Peak Hour Unconstrained

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Volume (veh/h) | 25 | 35 | 45 | 165 | 125 | 20 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Hourly flow rate (vph) | 25 | 35 | 45 | 165 | 125 | 20 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | | | | | 187 | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 390 | 135 | 145 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 390 | 135 | 145 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 96 | 96 | 97 | | | |
| cM capacity (veh/h) | 595 | 914 | 1437 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 60 | 210 | 145 | | | |
| Volume Left | 25 | 45 | 0 | | | |
| Volume Right | 35 | 0 | 20 | | | |
| cSH | 747 | 1437 | 1700 | | | |
| Volume to Capacity | 0.08 | 0.03 | 0.09 | | | |
| Queue Length 95th (m) | 2.0 | 0.7 | 0.0 | | | |
| Control Delay (s) | 10.2 | 1.8 | 0.0 | | | |
| Lane LOS | B | A | | | | |
| Approach Delay (s) | 10.2 | 1.8 | 0.0 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.4 | | | |
| Intersection Capacity Utilization | | 32.5% | | ICU Level of Service | | A |
| Analysis Period (min) | | | 15 | | | |