

AREA STRUCTURE PLAN CHINOOK INDUSTRIAL PARK

SUBDIVISION OF
LOTS 4 & 5 OF BLOCK 1 PLAN 1113171
& PUL LOT 6 BLOCK 1 PLAN 1410178
LETHBRIDGE COUNTY, AB



Submitted by:



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1 INTRODUCTION

This Area Structure Plan has been prepared by Hasegawa Engineering Ltd. on behalf of Ed Friesen and George Kirkham to describe the proposed development concept and municipal servicing strategy to be provided for the Chinook industrial/commercial business park. The Area Structure Plan describes the ultimate development of the subject lands, which include portions of NW & SW Section 10, Township 9, Range 21, West of the 4th Meridian.

Hasegawa respectfully submits this Area Structure Plan as support for the application to adopt the Plan as a By-Law of Lethbridge County. The Area Structure Plan will provide a basis for evaluation of future applications for a change in the proposed Land Use Designation of the parcels and evaluation of subsequent subdivision applications. The preliminary engineering and preparation of the area structure plan are parallel processes.

Two separate land owners are making the application for this development. George Kirkham (Kirkham Holdings Lethbridge Ltd.) owns Lot 4 Block 1 Plan 1113171 which is 20.24 hectares. This land has already been developed as a gravel parking area. 1000824 Alberta Ltd. owns Lot 5 Block 1 Plan 1113171 which is the large, undeveloped, northern portion of the development consisting of 59.56 hectares. The remaining portion of the development is Lot 6 Block 1 Plan 1410178, which is a 4.38-hectare Lethbridge County Public Utility Lot consisting of a stormwater detention pond. The total development area is 84.18 hectares (208.0 acres) located within Lethbridge County, directly adjacent to the City of Lethbridge (refer to Figures 2 and 3).

2 VISION

The Chinook Industrial Park Area Structure Plan has been developed through rigorous planning and careful consideration of the needs of a diverse group of stakeholders. The focus in developing this plan was to put forward a development proposal which would minimize the impact on area infrastructure, ensure a good fit with adjacent land uses, protect and preserve the natural environment and ultimately provide Lethbridge County with a cost-effective model for future commercial/industrial development adjacent to the City of Lethbridge.

The Chinook Industrial Park is proposed to be a combination Business Light Industrial and Rural General Industrial uses sited adjacent to 43rd Street between 9th and 26th Avenues. The goal of this development is to create an industrial center in the County adjacent to the City which creates a combination of excellent access and value for potential businesses. Good commercial/industrial land with adequate servicing is currently limited in the County. Key to achieving this goal is collaboration with the County, the City and the developer to establish the right balance of servicing level and cost.

Lethbridge and the surrounding community have deep agricultural roots and there is a strong cultural trend to embrace rural and farm living. However, there is still a strong need for industrial Development in the right locations. This land is located adjacent to The Rave Industrial Park to the south and the Lethbridge Industrial Park to the West. This results in a perfect location for this use and has great access to 43rd Street which is one of the major access points for the industrial area. Since 43rd Street has been upgraded to 9th Avenue, this location also has great access for an industrial development. Also, the east boundary is bordered by the SMRID canal which provides a barrier between agricultural uses east of the development.

As with any development there are numerous challenges and opportunities. The opportunity is to provide a unique Commercial /Industrial development in a rural jurisdiction with urban access and amenities. Key challenges to this development are identified and ultimately addressed in the remainder of this document.

Overall, the development concept acknowledges and seeks to positively integrate with the existing natural and built conditions in the area while successfully adding to existing commercial/industrial land use adjacent to northeast Lethbridge. The proposal and plan has been designed to offer a new high-quality industrial and agribusiness development to Lethbridge County and create opportunities for new businesses in the County and increase the tax base.

3 REGULATORY COMPLIANCE AND CONSULTATION

There are several documents that provide direction for the future development of Industrial/Commercial land in the Lethbridge Urban Fringe area. These documents include:

-) The Lethbridge County Municipal Development Plan 2010
-) Lethbridge County and City of Lethbridge: [Intermunicipal Development Plan \(IDP\) Bylaw 6015 & 1478, October 2016](#) (link to document)
-) Lethbridge County: [Industrial-Commercial Land Use Strategy, October 2016](#) (link to document)

This document has been prepared taking these important documents into account. For example, according to the Industrial Commercial Land Use Strategy:

“The areas identified for future industrial-commercial growth as types of grouped or clustered land use developments consist primarily of expansions to existing industrial business parks, along with some new areas which are in close proximity to the existing parks.” (refer to Section 5.6).

This development is essentially an extension of the Rave Industrial area. It is also intended to help improve the servicing level of that development. It is also adjacent to the City of Lethbridge Industrial Park to the East. As such, the IDP applies to this land and is specifically identified in Sections 3.4.4.12 for Policy Area 4 Subarea 1. Key to this expansion is improving the servicing and addressing issues such as storm drainage and sewage services. In addition, Section 4 of the IDP (Natural Environment, open spaces and water) have been observed.

In accordance with the IDP, the following agencies were consulted when preparing this document. Their comments and concerns are addressed throughout the remaining sections of the ASP.

-) Lethbridge County
-) Alberta Environment and Parks (AEP)
-) St. Mary River Irrigation District (SMRID)
-) City of Lethbridge

These plans have been prepared, taking into account feedback from each of these entities.

4 PLANS AND DRAWINGS

To illustrate the location of the property, site drainage, and the proposed subdivision layout, numerous figures have been prepared. The figures are provided in [Appendix A](#) and are as follows:

1. Location Plan
2. Land Ownership Map and Shallow Utility Connection
3. Existing Features and Topography
4. Proposed Development & Phasing Plan
5. Proposed Sanitary Servicing
6. Proposed Water Servicing Plan
7. Proposed Roads Layout
8. Proposed Storm Drainage
9. Section A-A
10. Section B-B
11. Sections C-C & D-D
12. Section E-E
13. Details
14. Pond Details

These maps are conceptual in nature and are to be used for planning purposes only. Upon ASP acceptance, detailed design drawings and plans will be prepared and submitted for review.

5 LAND USE CONCEPT

5.1 EXISTING CONDITIONS and CURRENT LAND USE

Currently the land is used for Agricultural purposes and is located within the Lethbridge Urban Fringe Zoning. The land is relatively flat with most of it draining to the southeast with the northern $\frac{1}{4}$ draining to the northeast. It is bounded by 43rd Street on the west, the SMRID canal on the north, 9th Avenue on the south and 26th Avenue on the north (refer to Figure 3). Cross-sections of existing site conditions can be seen in Figures 9-12.

The proposal is designed with the existing conditions of the land in mind. The impact on adjacent landowners and residents was carefully considered in the preparation of the plan.

The northern portion lands within the boundaries of the proposed Area Structure Plan are currently used as cultivated land. The southern 20.2 hectares have been developed into a parking area for trucks. In addition, a drainage pond has been created on the southeast corner. Adjacent land owners include:

-) To the east across the SMRID canal lie agricultural lands which includes agricultural cattle feeding area
-) To the north is agricultural lands
-) To the west across 43rd Street are industrial businesses
-) To the south is Rave Industrial Park

5.2 DEVELOPMENT OBJECTIVES

The objective of the Developers of the Chinook Industrial/Commercial Park is:

“To create a high-quality environment that will provide a location for the establishment and growth of businesses which provide service to the commercial and industrial base of the Lethbridge County.

5.2.1 *Preferred Development Concept*

The proposed development and phasing plan appears on Figure 4. The ultimate development will consist of approximately 81.84 hectares (202.25 acres) with 66.7 hectares of net developable area for commercial/industrial business properties. The developer has proposed that the area will be developed in four phases.

The adjacent 43rd Avenue Business Light Industrial will be used to allow for businesses that will benefit from exposure to 43rd Street. The remainder of the development will be Rural General Industrial. This fits with current usages to the west and south. Lots will vary in size to accommodate business exposure needs. Future lot sizes are anticipated to range from 0.45 – 2.3 ha. (1.0 – 5.0 ac) in size with two larger lots of 8.57 ha. (21.2 ac) and 11.21 ha (27.7 ac). Larger lots may be considered if the market permits.

Phase 1 will be completed in two separate phases. They will consist of Lot 4 Block 1 Plan 111 3171 and PUL Lot 6 Block 1 Plan 141 0178 and a portion of Lot 5 Block 1 Plan 111 3171. It is proposed that Phase 1A include up to 13 lots to be serviced by the water supply currently servicing the Rave Industrial Park. Waste water will flow to a storage tank to be pumped off peak to the City of Lethbridge sewer system. Phase 1B will be of similar size and have the same servicing concept. The existing overland drainage system will remain. Lot sizes in Phase 1 should range from 0.45 to 2.3 hectares (1 to 5 acres).

Phase 2A and 2B of the development will consist of Lot 5 Block 1 Plan 111 3171 and will have both commercial and industrial use properties. Phase 3, 4 and 5 will be constructed as economic conditions allow. It is proposed that complete underground water, sanitary, and storm services be installed in the new roadways which will also be constructed in Phase 2. Servicing concepts for these phases are further discussed in subsequent sections.

5.2.2 *Land Use Classification and Analysis*

The proposed land use classification of the subdivision is Business Light Industrial (BLI) or Rural General Industrial (RGI) per the Lethbridge County Land Use Bylaw. A figure depicting the anticipated land use designations within the Park is provided on Figure 4.

5.3 PROPOSED LAND USE AND POPULATION PREDICTIONS

The distribution of land use within the proposed ASP is shown in Table 1 below. The projected number of commercial lots will vary depending on the market. Lot locations and size will be established during subdivision.

Table 1. Land Use Statistics

	Hectares (ac.)	Percent
Developable Area	81.84 (202.25)	100%
Roads & Right-of-Ways	8.75 (21.62)	10.7%
Rural General Industrial	46.04 (113.78)	56.3%
Business Light Industrial	20.66 (51.06)	25.2%
Public Utility Lots	6.39 (15.79)	7.8%
Environmental Reserve – Parks/Green-Space	0	0%
Gross Area	81.84 (202.25)	100%

5.4 MUNICIPAL RESERVE

At this time, it is anticipated that at the time of subdivision, the municipal reserve requirements will be met by providing cash in lieu of land.

6 SERVICING

To determine the viability of this development, preliminary evaluations have been performed with respect to servicing. Key service items include sewer, water, natural gas, telephone, television, and electric. Additional information on key services is included in this section.

6.1 SANITARY SEWER SYSTEM

In initial meetings with County and City officials, it was determined that the current city sanitary infrastructure was not capable of accommodating the flows from the development. However, there were indications that temporary off-peak sewage flows could be routed through their system. As such, the primary sanitary servicing concept is to ultimately send the sewage to the County-managed system to the east. Alternate sewage servicing concepts have also been evaluated. A second concept is to create a private sewage treatment lagoon to the east. This would be funded and approved by the developer. A third option is to create a communal septic field system on the property. The final alternative to sewage treatment is to work with the City to allow for access to their sewage distribution infrastructure. Planning for a County-managed sewage system is currently underway. However, it is proposed that Phase 1 be serviced with a temporary system that utilizes off-peak discharge to the City sewage system.

In order to facilitate future design of sewage facilities; preliminary design analysis has been conducted. This analysis uses the City of Lethbridge criteria for industrial discharge. It has been assumed that for the purposes of sewage disposal, businesses will comply with Business Light Industrial standards. Businesses that produce more waste will need to incorporate recycling and reuse of water into their building and site design. Sewage generation estimates are shown in the following Table 2.

Table 2. Sewage Generation Estimates

Phase	Area		Dry weather flow	Peak factor	Wet Weather Flow	Infiltration	Total	Flow
	Acres	Hectares	m ³ /hectare/day		m ³ /hectare/day			L/min
1A	22.6	9.2	20	NA	7.5	2.25	29.75	209.4
1B	16.6	6.7	20	NA	7.5	2.25	29.75	153.8
2A	17.9	7.2	20	NA	7.5	2.25	29.75	165.8
2B	21.6	8.7	20	NA	7.5	2.25	29.75	200.1
3	37.3	15.1	20	NA	7.5	2.25	29.75	345.6
4	35.3	14.3	20	NA	7.5	2.25	29.75	327.0
5	36.3	14.7	20	NA	7.5	2.25	29.75	337.2
Total	187.6	75.9						1,738.9

Phase 1A and 1B sanitary sewage will be contained in a holding tank as shown in Figure 5. Daily flows will be held in the holding tank and pumped out during off peak times to the City of Lethbridge sewer system (typically in the late evening and early morning) and comply with the current Rave Industrial Park agreement. The size of that tank and pump/lift station will be determined and presented in the subdivision application for Phase 1A and 1B. Infrastructure (transportation, sewer, water and storm) that will support future phases will be installed as part of the Phase 1 development.

Phase 2-5 sanitary sewage will be handled through underground services to each lot from the sanitary mains located in the road. The sanitary sewage will be gravity fed away from the development to the south and into a lift station located offsite. This will ultimately flow into the County sewer system proposed for this phase. Plans for this system are underway. Alternative solutions are also under consideration as mentioned earlier in this document.

Piping sizes have been established using the calculations derived in Table 1. Due to the flat nature of the site, Phases 3-5 will require an additional sanitary lift station to convey sewage to the gravity system (refer to Figure 5).

6.2 WATER SYSTEM

It is proposed that each lot have a water service fed from a water main located in the adjacent roadways which will be fed by the existing water main currently servicing the Rave Industrial Park. Water for firefighting purposes will be provided by the same infrastructure. This section covers how each of these water supply issues will be addressed.

6.2.1 Potable and Fire Water

The proposed primary water source to this development will be by connecting to the distribution system servicing Rave Industrial park. This water is ultimately provided by the City of Lethbridge. Initial meetings with the City of Lethbridge infrastructure team gave indication that there is adequate supply of water in this area to service this development. The developers will formalize agreements with both the City and County to confirm access.

This water will be used for potable and fire protection purposes. This will be the only source of potable water for this development. A preliminary design layout has been proposed in Figure 6. This gives an indication of phasing as well. For Phase 1 there will be a single access point. Coincident with Phase 3, a second connection point will be added to the County line on the

north edge of the property allowing for looping of the system. All water mains are to be a minimum of 200 mm in diameter.

Potential hydrant and valve locations are also shown in Figure 6. Water network and flow analysis will be conducted as part of the subdivision application.

Each connection point to the City system will have a meter chamber and premise/isolation backflow protection.

6.2.2 *Non-Potable Water / Industrial Use*

In the event a business needs additional industrial water supply to accommodate a specialized or unique process, water may be available through the SMRID. The non-potable water system will distribute water from the SMRID canal to potential users. These users would need to be adjacent to the SMRID canal on the east side of the property. Each business owner would be responsible for providing their own infrastructure to support this use.

6.3 GAS

Natural gas distribution infrastructure in the area surrounding the site is operated by ATCO Gas. The developer will pay for the installation of natural gas distribution infrastructure to each lot. ATCO Gas will distribute natural gas within the development and lot purchasers will be able to select a retailer for natural gas supply. The closest service connection point is shown on Figure 2.

6.4 ELECTRICAL POWER

Fortis will provide services to the proposed subdivision and underground services to each property line. The designer will coordinate with Fortis to determine connection locations during the design phase.

6.5 TELEPHONE

Telus will provide services to the lots, but each individual owner must apply for the service when building. The development will connect to an existing Telus pedestal at the corner of 9th Avenue North and 44th Street North. The service would require boring under 9th Avenue.

6.6 CABLE TELEVISION

There is no cable television available in the area, however, small satellite dishes may be installed by the lot owner.

7 ROADS

A layout of the streets and accesses is shown in Figure 7. Roads within the subdivision will comply with City of Lethbridge engineering standards for a 20m right-of-way industrial collector and industrial local road throughout with no sidewalks (refer to road cross-section in Figure 13). Roads will be paved and will meet City of Lethbridge standards to allow for truck access (refer to Figure 13). The transportation improvements will be paid for by the developer.

There will ultimately be three access points to this development:

1. 9th Avenue East
2. 14th Avenue
3. 18th Avenue

The access to Phase 1 will be via 9th Avenue North, which runs east to west along the south border of the development. A portion of 44th Street North would be constructed from its intersection with 9th Avenue North to the north) to facilitate access to the proposed new building in Phase 1 and to the north for Phase 2 businesses. Phase 3 roads would include the rest of 44th Street North as well as 45th Street North and 14th Avenue North access. Access to 18th Avenue and 43rd Street will be constructed as part of Phase 5. The north side of 9th Avenue will be upgraded to an industrial collector standard (City standard) by the developer.

A traffic impact study (TIA) has been completed for the proposed Chinook Industrial Park. The traffic study was completed by EASL based on the projected land use shown on Figure 4 Proposed Development & Phasing Plan (refer to [Appendix C](#)). The results of this study indicate that the existing infrastructure on 43rd Street North from 9th Avenue North to 26th Avenue North will accommodate this development.

Although the TIA does indicate this development is feasible there are future improvements that are suggested for the year 2022 (full build out assumed). These recommendations are as follows:

-) Installation of westbound left turn only lane on 26th Avenue
-) Traffic signals at 43rd Street and 14th Avenue
-) Traffic signals at 43rd Street and 18th Avenue
-) Installation of second eastbound left turn only lane at the intersection of 43rd Street and Highway 3.

For additional details and analysis refer to [Appendix C](#).

8 SITE DRAINAGE AND GRADING

All drainage onsite must conform to Lethbridge County and Alberta Environmental requirements. Documents referred to when completing this analysis included Alberta Environment and Parks Storm Water Management Guidelines (2013). This document also includes descriptions of Best Management Practices (BMPs) which are used to mitigate peak runoff values. These practices, combined with the storm ponds, will provide control and containment of storm runoff over the entire development.

As can be seen in Figure 3 of the ASP, drainage on the existing ground on Lot 5 to the north generally flows from the east side along 43rd Street North to the east towards the existing SMRID irrigation canal. Grading on Lot 4 where the gravel parking lot is located is to the south into the drainage ditch, which then directs the stormwater east into the storm pond. Lot drainage will be directed to the street. It will not cross the various lots.

8.1 SITE DRAINAGE

The proposed development will have two stormwater detention ponds. The ponds will receive storm water runoff from the subdivision by means of an overland drainage system constructed within the development area. The overland drainage system will consist of a curb and gutter

system along the roads and lot line swales to collect storm water runoff from major events, and a storm drain system for minor events to convey the storm water to the ponds. The existing storm water management facility (SWMF) located at Lot 6 Block 1 Plan 141 0178 will remain and be extended both to the east and the north (refer to Figure 8). A second storm pond will be constructed at the north end of the development to provide additional storage for the northern lots. An additional lift station will need to be constructed at the north pond to pump effluent off-peak to the SMRID canal.

The south pond is currently released to the St Mary Reservoir Irrigation District (SMRID) main canal, which bounds the site to the east. There is an existing stormwater lift station that is used to pump storm water off-peak to the SMRID canal. This system would be capable of accommodating Phase 1A but would need to be upsized with future developments to a final capacity of approximately 235 l/sec (3750 US gal/min) to achieve drain down times of about 3 days in this enlarged SWMF.

The new stormwater detention pond to the north and the expansion of the existing pond to the south will require approval from, and registration with Alberta Environment prior to construction.

Storm water runoff from the subject lands presently flows into the existing roadside ditches. The ditch system will be replaced with a full urban curb and gutter cross-section using a major and minor storm water system. Pre-development storm drainage patterns are described in greater detail in the Hydrogeological and Site Drainage Analysis completed for the site by Hasegawa Engineering and attached to this document as [Appendix D](#).

8.2 POST-DEVELOPMENT

A detailed drainage analysis was performed for the site to compare pre-and post- development storm drainage patterns. A hydrologic model of the site was prepared using the PC SWMM hydrologic modeling software package. The hydrologic model was used to estimate the pre-development release rate for a 1:5 year, 4-hour storm event. The second hydrologic model of the post-development site was then analyzed using a 1:100-year 24-hour design storm event. This storm event is a synthetic Modified Chicago storm based on City of Lethbridge weather data. The storm water management facilities were sized based on the results of these models. Detailed methods and results of surface runoff analysis are provided in [Appendix D](#). A summary of the findings of this report appears below.

Primary channels for storm drainage within the proposed development are provided within the internal road right-of-ways. A storm drain system is utilized to accommodate minor storms.

Storm water runoff will be detained in two storm water management facilities. The existing Storm Water Management Facility (SWMF) continues to receive drainage from the Southland International parking area and Rave Industrial area through existing drainage channels but the parking area will be further developed and generate additional runoff. According to the July 2013 storm water management report for this facility, excess capacity already exists in this facility and the excess volume generated after development is well under this excess capacity.

Table 3 below and the following paragraphs summarize performance of the storage areas in the 100-year design storm comparing predevelopment and post development conditions.

Table 3. Predevelopment vs Post Development Runoff / Retention Pond Capacity

	Predevelopment Inflow Vol/ Rate	Post- development Inflow Vol/Rate	Post-develop. Outflow	Retention Pond Maximums Volume/Depth/% Capacity^a
North Storage	7055 m ³ 0.882 m ³ /sec	10,464 m ³ 2.893 m ³ /sec	Pumped - 0.04m ³ /sec assumed	8723 m ³ /1.3 m/58%
Existing South Storage ^b	34,016 m ³ 5.951 m ³ /sec	Not Applicable ^c	Not Applicable	Not Applicable
Proposed South Storage ^b	Not Applicable	76,718 m ³ 8.226 m ³ /sec	0 (delayed release)	69,690 m ³ /2.87 m/ 78%

^a Pond statistics for the north storage pond are based on assumed pumping rate of 40 l/sec into the outflow throughout the storm. Capacities shown include 0.6m freeboard.

^b The Rave Industrial Area Runoff model is not available – these volume figures include 17,000 m³ to account for reported Rave volume but runoff rates do not include Rave contributions.

^c Post development runoff for the existing parking lot modeled separately for comparison to predevelopment column, shows a volume of 35,269 m³ & a maximum inflow rate of 5.112 m³/sec. The area of new development contributing southbound runoff was also modeled separately for comparison although tributary areas are only approximate between pre- and post-development models - runoff volume increases from 12,163 m³ in the predevelopment model to a post development volume of 32,186 m³ while peak rates rise from 2.126 m³/sec to 6.62 m³/sec.

The “new” runoff from the south portion of the development will be routed into the existing storm water management facility which will be enlarged to accommodate the increased volume. This will occur during Phase 3 of the development. This facility will store the storm runoff until permission is received to release it into the adjacent SMRID irrigation canal. Upgrading pump capacity may need to be considered to avoid the risk associated with extended retention times – this will probably also depend on re-negotiating release agreements with SMRID. Expanding the capacity of this SWMF will be accomplished by enlarging the top 2.9 metres of the existing pond east and north to about 5 metres from the lot line to create an upper bench continuous from the inlet ditch (refer to Figure 14 [Appendix A](#)). Lesser storm events are passed through to the deeper storage area and major storm events back up into the extended pond and drainage ditch along the east boundary. Runoff models indicate that the 100-year storm will generate about 76,718 m³ of runoff routed to the south SWMF– by utilizing the drainage ditch itself to augment storage, the existing SWMF needs to be enlarged to store 69,690 m³ of this volume. Final design may adjust elevations and capacities of the ditch and SWMF extension.

A smaller area on the north of the proposed development will drain into a second retention area in the northeast corner. This runoff will also need to be pumped out, but the possibility exists for release into the ditch of a nearby Lethbridge County road during the storm. It is assumed that the limit for this release will be pump capacity rather than predevelopment runoff rates – assuming a constant pump outflow of 0.04 m³/sec (600 US gal/min), modeling indicates that 8720 m³ of storage is required at the north end and drain down times are about 3.5 days.

9 GEOTECHNICAL

Two geotechnical reports were conducted for this project. One for the south parcel (Lot 4 Block 1 and Lot 6 Block 1) conducted in March of 2012 and one for the north parcel (SW ¼ 10-9-21-W4M) conducted on May 2, 2017.

As part of the analysis on the Parcel 2 test pits and 4 boreholes were advanced to approximately 10 m depth. The overall lithology consisted of:

0.0 – 0.2 m	topsoil
0.2 – 1.5 m	clay
1.5 – 10 m	clay till

The groundwater was encountered between depths of 3.2 m and 9 m with the shallower water table being encountered closer to the SMRID canal. Sieve analysis and Atterberg limits were conducted on site soils to evaluate grain size distribution and plastic and liquid limits. Recommendations were also given for site grading and future foundations. Overall the site soil conditions are amenable to site development and building construction. For additional details and analysis refer to [Appendix E](#). This information will be used to facilitate design of grading, drainage and infrastructure. Additional geotechnical analysis will be required on each site to allow for proper foundation design.

10 SOLID WASTE DISPOSAL

Lot purchasers will be responsible for making arrangements for solid waste disposal. The City of Lethbridge Regional Solid Waste Facility is located approximately 23 km driving distance from the development. Alternatively, lot purchasers may contract with a private solid waste hauler.

11 ARCHITECTURAL CONTROLS

All construction will follow County standards and the County development permit process. The development of each lot will be considered on a case by case basis during the development permit process.

In accordance with the City of Lethbridge / Lethbridge County IDP Section 3.4.4.13, landscaping will follow standards with respect to shielding and buffering.

The Highway Entranceways Design Guidelines, as specified in Appendix B of the IDP, will also be followed.

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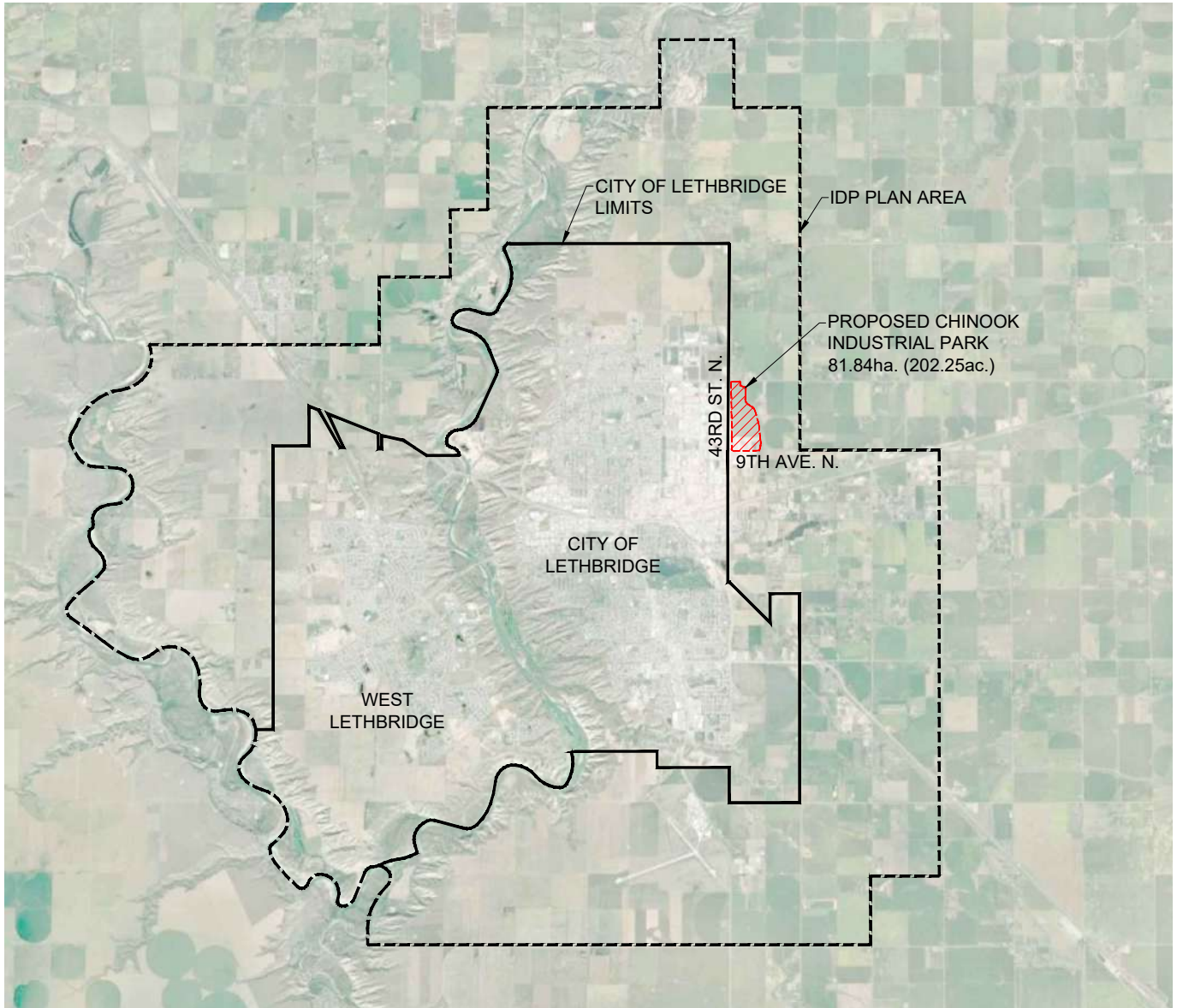
APPENDIX A

FIGURES

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LOCATION PLAN



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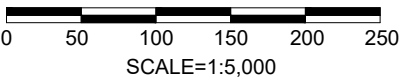
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DRAWN MDO	SCALE NTS	SHEET NO. FIG. 1	PROJECT NO. 17-006
CLIENT GEORGE KIRKHAM & ED FRIESEN	PROJECT TITLE CHINOOK INDUSTRIAL PARK - ASP	DATE DRAWN Mar 26, 2018	



LEGEND - LAND USE		AREA	
		PHASE 1	PHASE 2-5
	BUSINESS LIGHT INDUSTRIAL	75,100m ²	164,532m ²
	RURAL GENERAL INDUSTRIAL	75,353m ²	385,106m ²
	STORM WATER MANAGEMENT FACILITIES		56,104m ²
	DRAINAGE EASEMENT		17,323m ²
	LETHBRIDGE CITY LIMIT		

PROPOSED DEVELOPMENT & PHASING PLAN



NOTES
This is a copyright drawing and shall not be reproduced in any form without written permission of the engineer.
Contractor to check and verify all dimensions before construction, any errors and omissions shall be reported to the engineer immediately.
Drawing shall not be used for construction until approved.
Do not scale the drawing.
All construction shall be in accordance with the latest codes, may it be construction, mechanical, etc.

**HASEGAWA**
CONSULTING PROFESSIONAL ENGINEERS

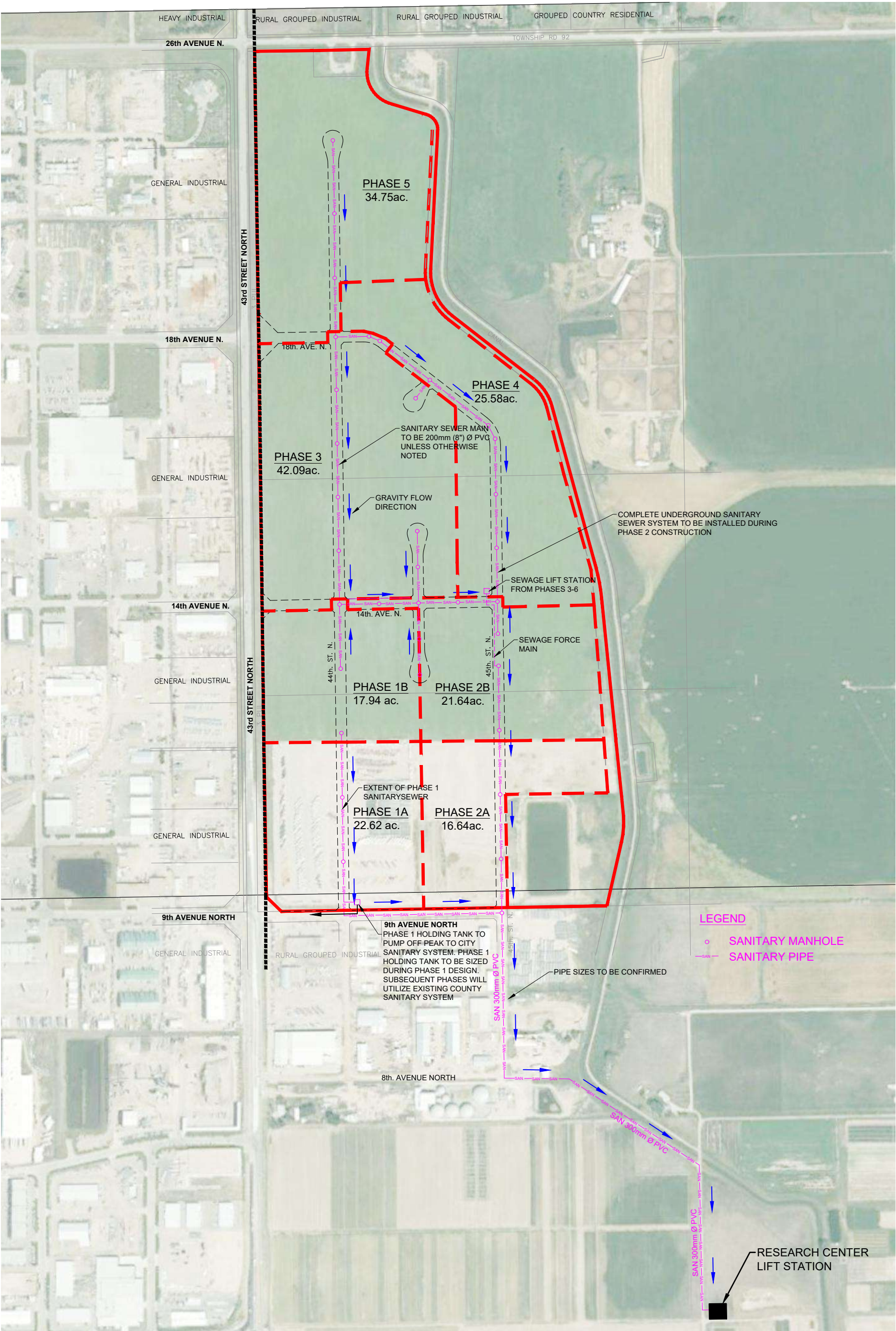
330 3120-32ND ST. S.
LETHBRIDGE, AB T1K 7B4
PH: 403-328-2686
FAX: 403-328-2728
EMAIL: office@hasegawa.ca

DESIGN	MAH
DRAWN	MDO
CHECKED	MAH
APPROVED	MAH
SCALE	AS SHOWN

DRAWING STATUS	
PRELIMINARY	
#	REVISION
	DATE BY

CLIENT	GEORGE KIRKHAM & ED FRIESEN
PROJECT TITLE	CHINOOK INDUSTRIAL PARK ASP
DRAWING TITLE	PROPOSED DEVELOPMENT & PHASING PLAN

PROJECT NUMBER	17-006
VERSION NUMBER	
DATE DRAWN	Mar 26, 2018
SHEET NUMBER	FIG.4



PROPOSED SANITARY SERVICING



NOTES
This is a copyright drawing and shall not be reproduced in any form without written permission of the engineer.
Contractor to check and verify all dimensions before construction, any errors and omissions shall be reported to the engineer immediately.
Drawing shall not be used for construction until approved.
Do not scale the drawing.
All construction shall be in accordance with the latest codes, may it be construction, mechanical, etc.

**HASEGAWA**
CONSULTING PROFESSIONAL ENGINEERS

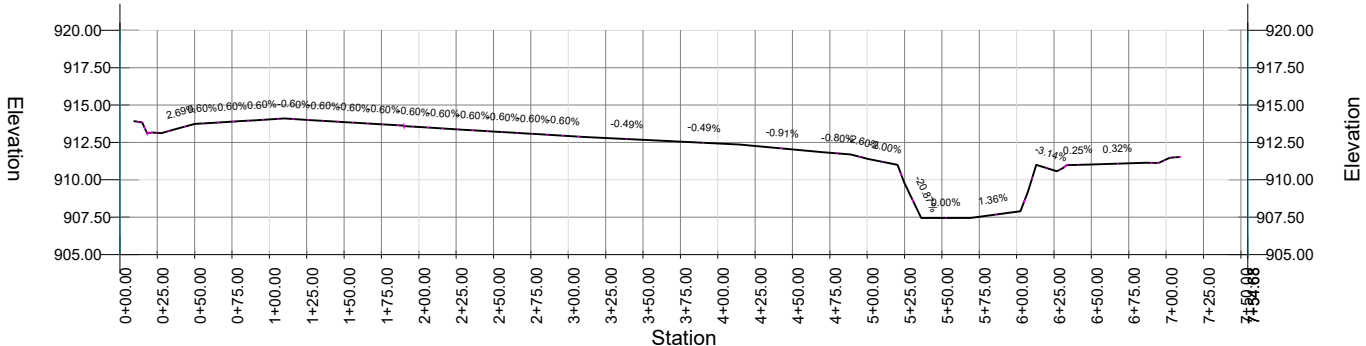
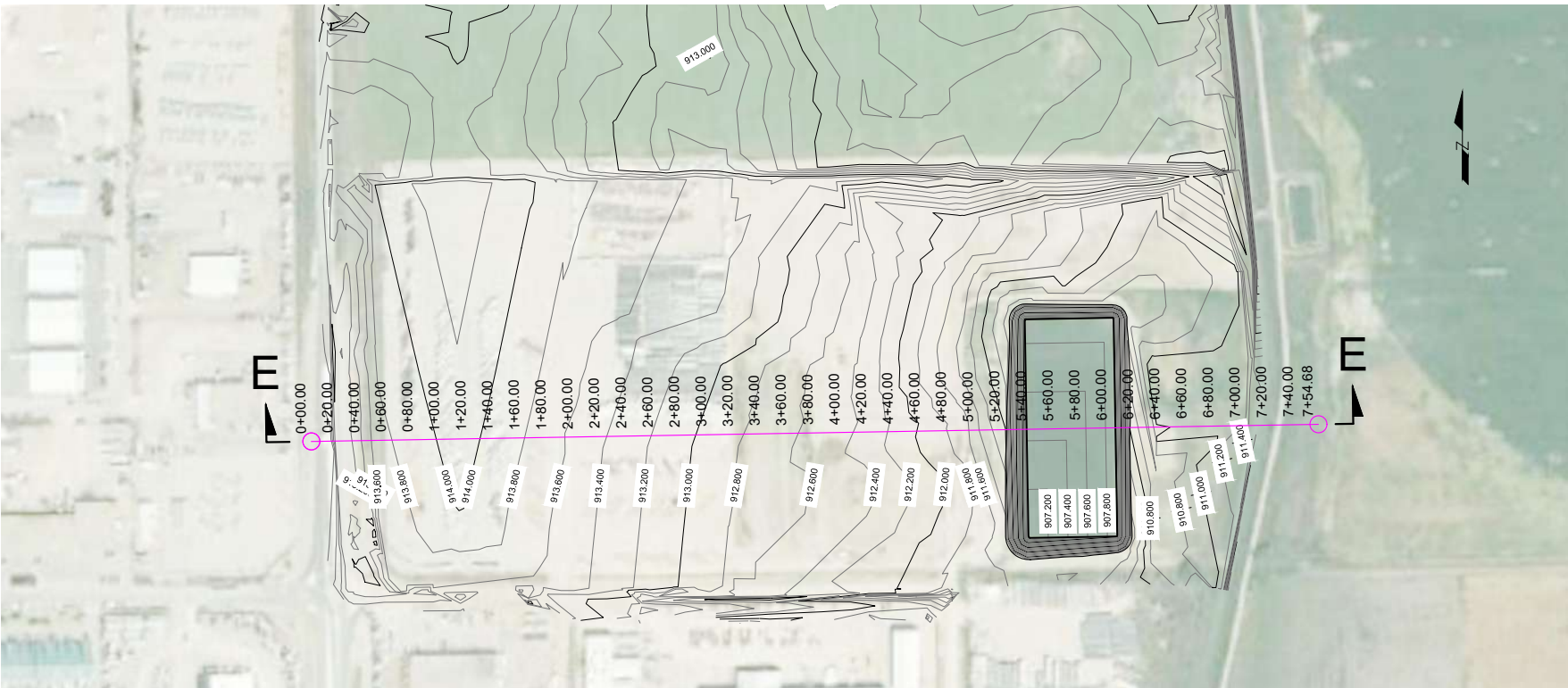
330 3120-32ND ST. S.
LETHBRIDGE, AB T1K 7B4
PH: 403-328-2686
FAX: 403-328-2728
EMAIL: office@hasegawa.ca

DESIGN	MAH
DRAWN	MDO
CHECKED	MAH
APPROVED	MAH
SCALE	NTS

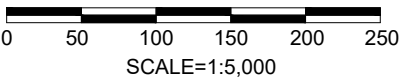
DRAWING STATUS	
PRELIMINARY	
#	REVISION
	DATE BY

CLIENT	GEORGE KIRKHAM & ED FRIESEN
PROJECT TITLE	CHINOOK INDUSTRIAL PARK ASP
DRAWING TITLE	PROPOSED SANITARY SERVICING

PROJECT NUMBER	17-006
VERSION NUMBER	
DATE DRAWN	Mar 26, 2018
SHEET NUMBER	FIG.5



SECTION E-E



NOTES

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Do not scale the drawing.

All construction shall be in accordance with the latest codes, may it be construction, mechanical, etc.

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CONSULTING PROFESSIONAL ENGINEERS

330 3120-32ND ST. S.
LETHBRIDGE, AB T1K 7B4
PH: 403-328-2686
FAX: 403-328-2728
EMAIL: office@hasegawa.ca

DESIGN	MAH
DRAWN	MDO
CHECKED	MAH
APPROVED	MAH
SCALE	AS SHOWN

DRAWING STATUS	
PRELIMINARY	
#	REVISION
	DATE BY

CLIENT	GEORGE KIRKHAM & ED FRIESEN
PROJECT TITLE	CHINOOK INDUSTRIAL PARK
DRAWING TITLE	SECTION E-E

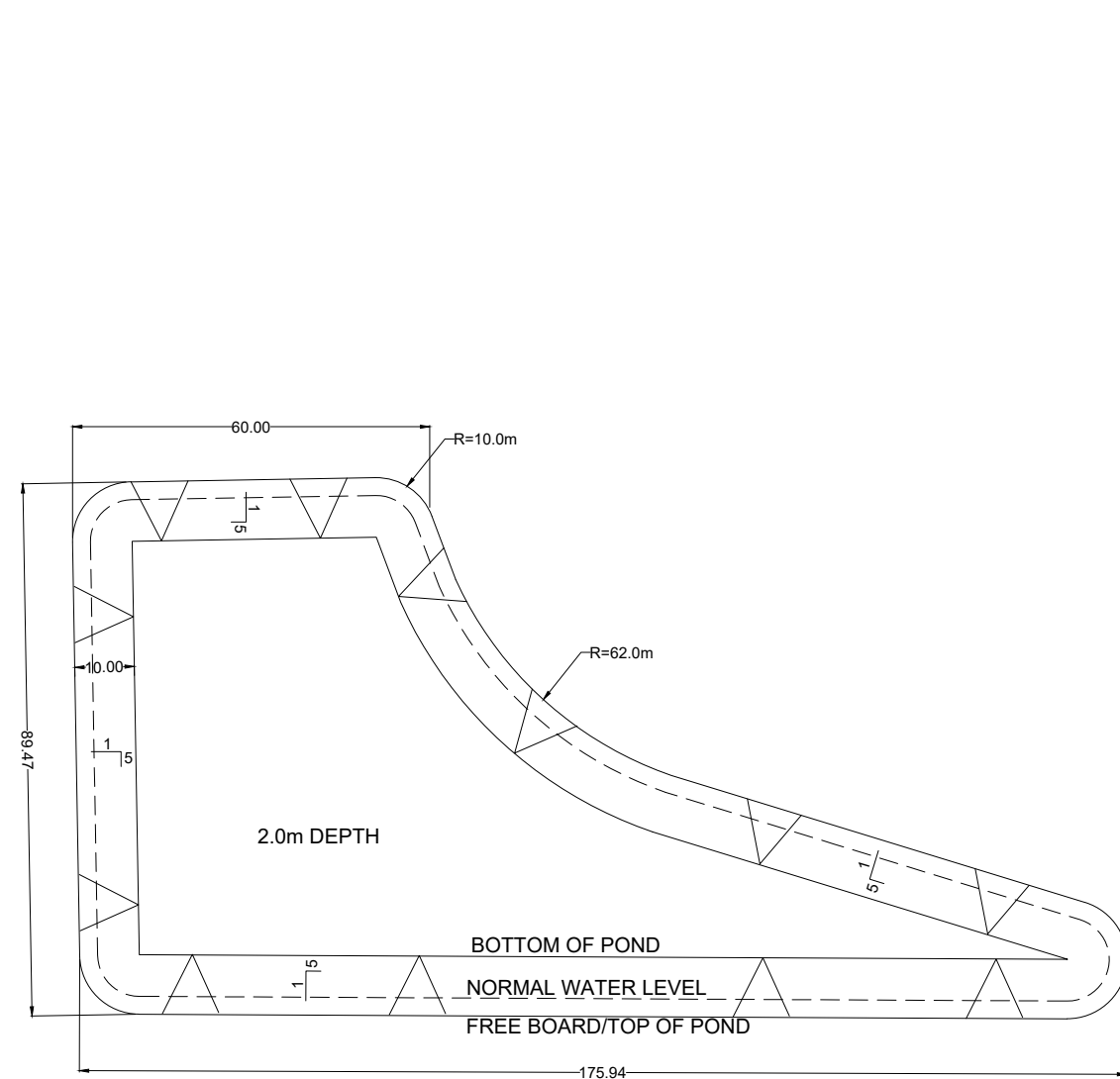
PROJECT NUMBER	17-006
VERSION NUMBER	
DATE DRAWN	Mar 26, 2018
SHEET NUMBER	FIG.12



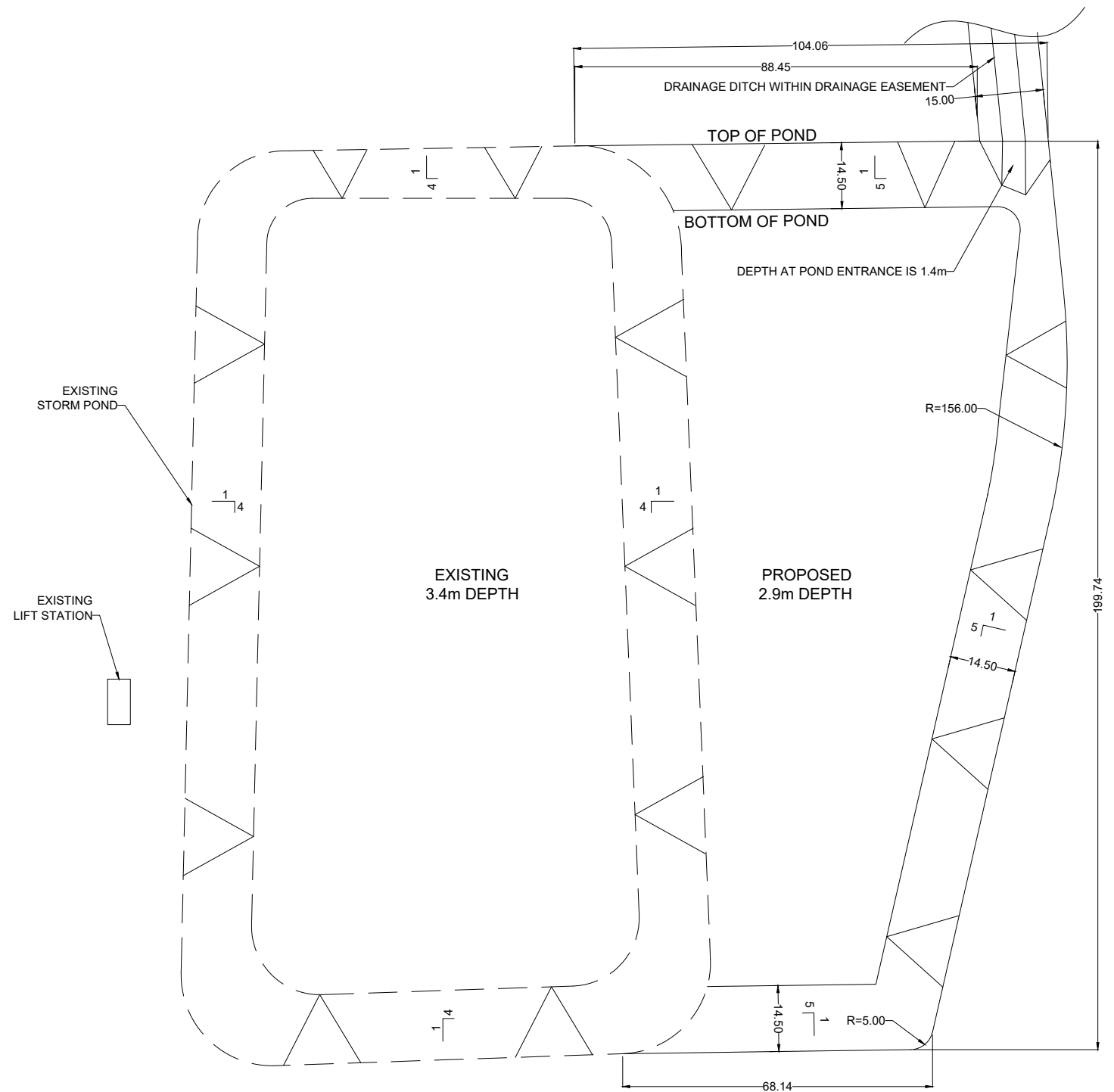
- SEE DEPTH ZONES OF SERVICES
- HYDRANT CENTERED ON LOT LINE EXTENSION
- TRANSFORMER UTILITY EASEMENT 2m x 2m ON PRIVATE PROPERTY
- MAINS GAS ON ONE SIDE, ELECTRIC ON THE OTHER



FIG. 13



NORTH STORM POND
SCALE: 1:1,250



SOUTH STORM POND EXTENSION
SCALE: 1:1,250

NOTES

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Drawing shall not be used for construction until approved

Do not scale the drawing

All construction shall be in accordance with the latest codes, may it be construction, mechanical, etc

HASEGAWA
CONSULTING PROFESSIONAL ENGINEERS

330 3120-32ND ST. S.
LETHBRIDGE, AB T1K 7B4
PH: 403-328-2686
FAX: 403-328-2728
EMAIL: office@hasegawa.ca

DESIGN: MAH
DRAWN: MDO
CHECKED: MAH
APPROVED: MAH
SCALE: AS SHOWN

PRELIMINARY

#	REVISION	DATE	BY

CLIENT: **GEORGE KIRKHAM & ED FRIESEN**

PROJECT TITLE: **CHINOOK INDUSTRIAL PARK ASP**

DRAWING TITLE: **POND DETAILS**

PROJECT NUMBER: 17-006

VERSION NUMBER: IFA1-1

DATE DRAWN: Mar 26, 2018

SHEET NUMBER

FIG. 14

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APPENDIX B

LAND TITLES

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LAND TITLE CERTIFICATE

S

LINC

SHORT LEGAL

TITLE NUMBER

0036 015 510

1113171;1;4

141 015 519 +1

LEGAL DESCRIPTION

PLAN 1113171

BLOCK 1

LOT 4

CONTAINING 20.24 HECTARES (50.01 ACRES) MORE OR LESS

EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	(ACRES)	MORE OR LESS
SUBDIVISION	1410178	4.38	10.82	

EXCEPTING THEREOUT ALL MINES AND MINERALS

ATS REFERENCE: 4;21;9;10;W

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 111 306 439

REGISTERED OWNER(S)				
REGISTRATION	DATE (DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
141 015 519	16/01/2014	SUBDIVISION PLAN		

OWNERS

KIRKHAM HOLDINGS (LETH) LTD.
OF 4310-9 AVE N
LETHBRIDGE
ALBERTA T1H 6N1

ENCUMBRANCES, LIENS & INTERESTS		
REGISTRATION	DATE (D/M/Y)	PARTICULARS
1485KX	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 2

141 015 519 +1

REGISTRATION

NUMBER	DATE (D/M/Y)	PARTICULARS
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. "PORTIONS OF LSD 4 AS DESCRIBED"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION PART OF AN IRRIGABLE UNIT
121 282 234	29/10/2012	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AS TO PORTION OR PLAN:1213161
131 206 116	20/08/2013	CAVEAT RE : UTILITY RIGHT OF WAY CAVEATOR - ATCO GAS AND PIPELINES LTD. 909 11 AVE SW CALGARY ALBERTA T2R1L8
141 015 521	16/01/2014	EASEMENT OVER AND FOR BENEFIT OF: SEE INSTRUMENT AS TO PORTION ON PLAN: SEE INSTRUMENT

TOTAL INSTRUMENTS: 006

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 8 DAY OF AUGUST,
2017 AT 10:27 A.M.

ORDER NUMBER: 33454731

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED
FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER,
SUBJECT TO WHAT IS SET OUT IN THE PARAGRAPH BELOW.

THE ABOVE PROVISIONS DO NOT PROHIBIT THE ORIGINAL PURCHASER FROM
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APPRAISAL OR OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS
PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

LAND TITLE CERTIFICATE

ENCUMBRANCES, LIENS & INTERESTS

PAGE 2

111 286 315 +1

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

881 219 612 01/12/1988 UTILITY RIGHT OF WAY
GRANTEE - ALBERTA GOVERNMENT TELEPHONES.
AS TO PORTION OR PLAN:8810684
"TAKES PRIORITY OF CAVEAT 871131928 REGISTERED
27/07/1987"

991 249 227 30/08/1999 IRRIGATION DISTRICT RESOLUTION
PART OF AN IRRIGABLE UNIT
" AFFECTS PART OF THIS TITLE "

081 230 993 02/07/2008 MORTGAGE
MORTGAGEE - ROYAL BANK OF CANADA.
180 WELLINGTON STREET WEST, 5TH FLOOR
TORONTO
ONTARIO M5J1J1
ORIGINAL PRINCIPAL AMOUNT: \$1,150,000

TOTAL INSTRUMENTS: 005

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:48 P.M.

ORDER NUMBER: 33319759

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

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FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER,
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PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE
TITLE CANCELLED ON NOVEMBER 03,2011

S
LINC SHORT LEGAL TITLE NUMBER
0033 904 780 4;21;9;10;SW 091 136 885 +3

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10
THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT:
PLAN NUMBER HECTARES (ACRES) MORE OR LESS
SUBDIVISION 0912605 2.032 5.02
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 081 230 992 +1

REGISTRATION	DATE (DMY)	REGISTERED OWNER(S) DOCUMENT TYPE	VALUE	CONSIDERATION
091 136 885	20/05/2009	SUBDIVISION PLAN		

OWNERS

1000824 ALBERTA LTD.
OF BOX 242
VAUXHALL
ALBERTA T0K 2K0

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
1485KX	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 2

091 136 885 +3

REGISTRATION

NUMBER	DATE (D/M/Y)	PARTICULARS
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTIONS OF LSD 4 AS DESCRIBED"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION PART OF AN IRRIGABLE UNIT
081 230 993	02/07/2008	MORTGAGE MORTGAGEE - ROYAL BANK OF CANADA. 180 WELLINGTON STREET WEST, 5TH FLOOR TORONTO ONTARIO M5J1J1 ORIGINAL PRINCIPAL AMOUNT: \$1,150,000
111 286 315	03/11/2011	SUBDIVISION PLAN 1113171 TITLE CANCELLED IN FULL

TOTAL INSTRUMENTS: 005

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED
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APPRAISAL OR OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS
PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE

TITLE CANCELLED ON MAY 20, 2009

S
LINC SHORT LEGAL TITLE NUMBER
0031 612 047 4;21;9;10;SW 081 230 992 +1

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10
THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 061 110 626 +1

REGISTRATION	DATE (DMY)	REGISTERED OWNER(S) DOCUMENT TYPE	VALUE	CONSIDERATION
081 230 992	02/07/2008	TRANSFER OF LAND		SEE INSTRUMENT

OWNERS

1000824 ALBERTA LTD.
OF BOX 242
VAUXHALL
ALBERTA T0K 2K0

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
1485KX	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE.

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 2

081 230 992 +1

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

AFFECTED LAND: 4;21;9;10;SW
"PORTION AS DESCRIBED"

881 213 325 22/11/1988 UTILITY RIGHT OF WAY
GRANTEE - THE CITY OF LETHBRIDGE.
AFFECTED LAND: 4;21;9;10;SW
"PORTIONS OF LSD 4 AS DESCRIBED"

991 249 227 30/08/1999 IRRIGATION DISTRICT RESOLUTION
PART OF AN IRRIGABLE UNIT

051 402 680 26/10/2005 MORTGAGE
MORTGAGEE - COMMUNITY CREDIT UNION LTD.
480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
ORIGINAL PRINCIPAL AMOUNT: \$400,000

051 402 681 26/10/2005 CAVEAT
RE : ASSIGNMENT OF RENTS
CAVEATOR - COMMUNITY CREDIT UNION LTD.
480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
AGENT - DOUGLAS D MILLAR

081 230 993 02/07/2008 MORTGAGE
MORTGAGEE - ROYAL BANK OF CANADA.
180 WELLINGTON STREET WEST, 5TH FLOOR
TORONTO
ONTARIO M5J1J1
ORIGINAL PRINCIPAL AMOUNT: \$1,150,000

081 252 018 17/07/2008 DISCHARGE OF MORTGAGE 051402680

081 252 019 17/07/2008 DISCHARGE OF CAVEAT 051402681

091 136 885 20/05/2009 SUBDIVISION PLAN 0912605
TITLE CANCELLED AS TO PART AND NEW TITLE ISSUED
FOR THE REMAINDER

TOTAL INSTRUMENTS: 010

(CONTINUED)

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

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PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE
TITLE CANCELLED ON FEBRUARY 18,2000

S	LINC	SHORT LEGAL	TITLE NUMBER
	0022 277 792	4;21;9;10;SW	001 043 891
	0022 277 800	4;21;9;10;SE	
	0022 277 818	4;21;9;10;NW	

LEGAL DESCRIPTION

FIRST

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THOSE PORTIONS OF SOUTH WEST QUARTER DESCRIBED AS FOLLOWS:

(A)

THAT PORTION OF LEGAL SUBDIVISION 6 WHICH LIES TO THE EAST OF
THE CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 5.732 HECTARES (14.16 ACRES) MORE OR LESS

(B)

THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

SECOND

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

LEGAL SUBDIVISIONS 7 AND 8 IN THE SOUTH EAST QUARTER
CONTAINING:

LEGAL SUBDIVISION	HECTARES	ACRES MORE OR LESS
7	16.2	40
8	16.2	40

EXCEPTING OUT OF LEGAL SUBDIVISION 8:

PLAN	NUMBER	HECTARES	ACRES MORE OR LESS
ROAD WIDENING	8010126	0.208	0.515

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

THIRD

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THAT PORTION OF THE NORTH WEST QUARTER
WHICH LIES TO THE WEST OF THE CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 30.84 HECTARES (76.1 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS

(CONTINUED)

AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 901 261 432

REGISTRATION	DATE (DMY)	REGISTERED OWNER(S) DOCUMENT TYPE	VALUE	CONSIDERATION

001 043 891	16/02/2000	TRANSMISSION OF LAND		

OWNERS

ROBERTA PAULINE LOMS
OF 35 KINGS MEW S
LETHBRIDGE
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

EDITH MARIE GARRETT
OF C/O MACLEOD DIXON
555 BENTALL BLDG
444-7TH AVE SW
CALGARY
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

GORDON HAROLD WALKER
OF 276 CANNINGTON PLACE SW
CALGARY
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

RAYMOND WILLIAM UPTON
OF 7312 KELSEY PLACE SW
CALGARY
ALBERTA T2V 2M9
EXECUTOR FOR OLIVE FRANCES UPTON
AS TO AN UNDIVIDED 1/5 INTEREST

MELVIN EARL LOMAS
OF C/O MACLEOD DIXON
555 BENTALL BLDG
444 - 7TH AVE SW
CALGARY
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

ENCUMBRANCES, LIENS & INTERESTS

PAGE 3

001 043 891

REGISTRATION

NUMBER	DATE (D/M/Y)	PARTICULARS
4361AI .		RESTRICTIVE COVENANT AFFECTED LAND: 4;21;9;10;SE
359EM .	31/01/1934	EASEMENT "(SUBJECT TO) IN FAVOUR OF NE 1/4 OF SECTION 10, PORTION LSD 6, ALL OF LSD 7 & 8"
1049KD .	05/02/1968	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AFFECTED LAND: 4;21;9;10;NW 4;21;9;10;SE "PORTION DESCRIBED"
1485KX .	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTION AS DESCRIBED"
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTIONS OF LSD 4 AS DESCRIBED"
881 219 612	01/12/1988	UTILITY RIGHT OF WAY GRANTEE - ALBERTA GOVERNMENT TELEPHONES. AFFECTED LAND: 4;21;9;10;NW AS TO PORTION OR PLAN:8810684 "TAKES PRIORITY OF CAVEAT 871131928 REGISTERED 27/07/1987"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION AFFECTED LAND: 4;21;9;10;SW 4;21;9;10;SE PART OF AN IRRIGABLE UNIT
001 046 189	18/02/2000	TRANSFER OF LAND OWNERS - RAYMOND WILLIAM UPTON 7312 KELSEY PLACE SW CALGARY ALBERTA T2V2M9 AS TO 1/5 OWNERS - ROBERTA PAULINE LOMS 35 KINGS MEW S LETHBRIDGE ALBERTA

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 4

001 043 891

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

AS TO 1/5
OWNERS - EDITH MARIE GARRETT
C/O MACLEOD DIXON
555 BENTALL BLDG
444-7TH AVE SW
CALGARY
ALBERTA
AS TO 1/5
OWNERS - GORDON HAROLD WALKER
276 CANNINGTON PLACE SW
CALGARY
ALBERTA
AS TO 1/5
OWNERS - MELVIN EARL LOMAS
C/O MACLEOD DIXON
555 BENTALL BLDG
444-7TH AVE SW
CALGARY
ALBERTA
AS TO 1/5
NEW TITLE ISSUED

TOTAL INSTRUMENTS: 009

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED
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PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE
TITLE CANCELLED ON DECEMBER 12,2000

S	LINE	SHORT LEGAL	TITLE NUMBER
	0022 277 792	4;21;9;10;SW	001 046 189
	0022 277 800	4;21;9;10;SE	
	0022 277 818	4;21;9;10;NW	

LEGAL DESCRIPTION

FIRST

MERIDIAN 4 RANGE 21 TOWNSHIP 9

SECTION 10

THOSE PORTIONS OF SOUTH WEST QUARTER DESCRIBED AS FOLLOWS:

(A)

THAT PORTION OF LEGAL SUBDIVISION 6 WHICH LIES TO THE EAST OF
THE CANAL RIGHT OF WAY ON PLAN IRR55

CONTAINING 5.732 HECTARES (14.16 ACRES) MORE OR LESS

(B)

THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55

CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS

EXCEPTING THEREOUT ALL MINES AND MINERALS

AND THE RIGHT TO WORK THE SAME

SECOND

MERIDIAN 4 RANGE 21 TOWNSHIP 9

SECTION 10

LEGAL SUBDIVISIONS 7 AND 8 IN THE SOUTH EAST QUARTER

CONTAINING:

LEGAL SUBDIVISION	HECTARES	ACRES MORE OR LESS
7	16.2	40
8	16.2	40

EXCEPTING OUT OF LEGAL SUBDIVISION 8:

PLAN	NUMBER	HECTARES	ACRES MORE OR LESS
ROAD WIDENING	8010126	0.208	0.515

EXCEPTING THEREOUT ALL MINES AND MINERALS

AND THE RIGHT TO WORK THE SAME

THIRD

MERIDIAN 4 RANGE 21 TOWNSHIP 9

SECTION 10

THAT PORTION OF THE NORTH WEST QUARTER

WHICH LIES TO THE WEST OF THE CANAL RIGHT OF WAY ON PLAN IRR55

CONTAINING 30.84 HECTARES (76.1 ACRES) MORE OR LESS

EXCEPTING THEREOUT ALL MINES AND MINERALS

(CONTINUED)

AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 001 043 891

REGISTRATION	DATE (DMY)	REGISTERED OWNER(S) DOCUMENT TYPE	VALUE	CONSIDERATION
001 046 189	18/02/2000	TRANSFER OF LAND		SEE INSTRUMENT

OWNERS

RAYMOND WILLIAM UPTON
OF 7312 KELSEY PLACE SW
CALGARY
ALBERTA T2V 2M9
AS TO AN UNDIVIDED 1/5 INTEREST

ROBERTA PAULINE LOMAS
OF 35 KINGS MEW S
LETHBRIDGE
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

EDITH MARIE GARRETT
OF APARTMENT 4A
820 15 STREET SOUTH
LETHBRIDGE
ALBERTA T1J 3A4
AS TO AN UNDIVIDED 1/5 INTEREST

GORDON HAROLD WALKER
OF 276 CANNINGTON PLACE SW
CALGARY
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

MELVIN EARL LOMAS
OF 1114 39 AVENUE SW
CALGARY
ALBERTA T2T 2K5
AS TO AN UNDIVIDED 1/5 INTEREST

(DATA UPDATED BY: CHANGE OF NAME 001356586)
(DATA UPDATED BY: CHANGE OF ADDRESS 001356587)
(DATA UPDATED BY: CHANGE OF ADDRESS 001356588)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 3

001 046 189

REGISTRATION

NUMBER	DATE (D/M/Y)	PARTICULARS
4361AI .		RESTRICTIVE COVENANT AFFECTED LAND: 4;21;9;10;SE
359EM .	31/01/1934	EASEMENT "(SUBJECT TO) IN FAVOUR OF NE 1/4 OF SECTION 10, PORTION LSD 6, ALL OF LSD 7 & 8"
1049KD .	05/02/1968	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AFFECTED LAND: 4;21;9;10;NW 4;21;9;10;SE "PORTION DESCRIBED"
1485KX .	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTION AS DESCRIBED"
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTIONS OF LSD 4 AS DESCRIBED"
881 219 612	01/12/1988	UTILITY RIGHT OF WAY GRANTEE - ALBERTA GOVERNMENT TELEPHONES. AFFECTED LAND: 4;21;9;10;NW AS TO PORTION OR PLAN:8810684 "TAKES PRIORITY OF CAVEAT 871131928 REGISTERED 27/07/1987"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION AFFECTED LAND: 4;21;9;10;SW 4;21;9;10;SE PART OF AN IRRIGABLE UNIT
001 356 586	12/12/2000	CHANGE OF NAME RE: ROBERTA PAULINE LOMAS 35 KINGS MEW S LETHBRIDGE ALBERTA AFFECTS INSTRUMENT: 001046189 AFFECTED PARTY: ROBERTA PAULINE LOMS
001 356 587	12/12/2000	CHANGE OF ADDRESS FOR SERVICE RE: MELVIN EARL LOMAS

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 4

001 046 189

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

1114 39 AVENUE SW
CALGARY
ALBERTA T2T2K5
AFFECTS INSTRUMENT: 001046189

001 356 588 12/12/2000 CHANGE OF ADDRESS FOR SERVICE
RE: EDITH MARIE GARRETT
APARTMENT 4A
820 15 STREET SOUTH
LETHBRIDGE
ALBERTA T1J3A4
AFFECTS INSTRUMENT: 001046189

001 356 629 12/12/2000 SUBDIVISION PLAN 0013201
AFFECTED LAND: 4;21;9;10;NW CANCELLED AS TO
PART
NEW TITLE ISSUED FOR THE REMAINDER

TOTAL INSTRUMENTS: 012

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED
FOR THE SOLE USE OF THE ORIGINAL PURCHASER, AND NONE OTHER,
SUBJECT TO WHAT IS SET OUT IN THE PARAGRAPH BELOW.

THE ABOVE PROVISIONS DO NOT PROHIBIT THE ORIGINAL PURCHASER FROM
INCLUDING THIS UNMODIFIED PRODUCT IN ANY REPORT, OPINION,
APPRAISAL OR OTHER ADVICE PREPARED BY THE ORIGINAL PURCHASER AS
PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE
TITLE CANCELLED ON DECEMBER 29,2005

S	LINC	SHORT LEGAL	TITLE NUMBER
	0022 277 792	4;21;9;10;SW	051 402 679
	0022 277 800	4;21;9;10;SE	
	0028 725 803	4;21;9;10;NW	

LEGAL DESCRIPTION

FIRST

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THOSE PORTIONS OF SOUTH WEST QUARTER DESCRIBED AS FOLLOWS:

(A)

THAT PORTION OF LEGAL SUBDIVISION 6 WHICH LIES TO THE EAST OF
THE CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 5.732 HECTARES (14.16 ACRES) MORE OR LESS

(B)

THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

SECOND

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

LEGAL SUBDIVISIONS 7 AND 8 IN THE SOUTH EAST QUARTER
CONTAINING:

LEGAL SUBDIVISION	HECTARES	ACRES MORE OR LESS
7	16.2	40
8	16.2	40

EXCEPTING OUT OF LEGAL SUBDIVISION 8:

PLAN	NUMBER	HECTARES	ACRES MORE OR LESS
ROAD WIDENING	8010126	0.208	0.515

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

THIRD

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THAT PORTION OF THE NORTH WEST QUARTER
WHICH LIES WEST OF CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 30.84 HECTARES (76.1 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

(CONTINUED)

PLAN	NUMBER	HECTARES	(ACRES)	MORE OR LESS
SUBDIVISION	0013201	0.559	1.38	
ROAD	0110313	0.063	0.16	

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 041 138 184

REGISTERED OWNER(S)				
REGISTRATION	DATE (DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
051 402 679	26/10/2005	TRANSFER OF LAND		SEE INSTRUMENT

OWNERS

GEORGE B. LOMAS PROFESSIONAL CORPORATION.
OF 3425-2 AVE SOUTH
LETHBRIDGE
ALBERTA T1J 4V1

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION		
NUMBER	DATE (D/M/Y)	PARTICULARS
4361AI		RESTRICTIVE COVENANT AFFECTED LAND: 4;21;9;10;SE
359EM	31/01/1934	EASEMENT "(SUBJECT TO) IN FAVOUR OF NE 1/4 OF SECTION 10, PORTION LSD 6, ALL OF LSD 7 & 8"
1049KD	05/02/1968	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AFFECTED LAND: 4;21;9;10;NW 4;21;9;10;SE "PORTION DESCRIBED"
1485KX	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 3

051 402 679

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

"PORTION AS DESCRIBED"

881 213 325 22/11/1988 UTILITY RIGHT OF WAY
GRANTEE - THE CITY OF LETHBRIDGE.
AFFECTED LAND: 4;21;9;10;SW
"PORTIONS OF LSD 4 AS DESCRIBED"

881 219 612 01/12/1988 UTILITY RIGHT OF WAY
GRANTEE - ALBERTA GOVERNMENT TELEPHONES.
AFFECTED LAND: 4;21;9;10;NW
AS TO PORTION OR PLAN:8810684
"TAKES PRIORITY OF CAVEAT 871131928 REGISTERED
27/07/1987"

991 249 227 30/08/1999 IRRIGATION DISTRICT RESOLUTION
AFFECTED LAND: 4;21;9;10;SW
4;21;9;10;SE
PART OF AN IRRIGABLE UNIT

051 402 680 26/10/2005 MORTGAGE
MORTGAGEE - COMMUNITY CREDIT UNION LTD.
480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
ORIGINAL PRINCIPAL AMOUNT: \$400,000

051 402 681 26/10/2005 CAVEAT
RE : ASSIGNMENT OF RENTS
CAVEATOR - COMMUNITY CREDIT UNION LTD.
480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
AGENT - DOUGLAS D MILLAR

051 491 537 29/12/2005 SEPARATION - LINGS
NEW TITLE ISSUED

TOTAL INSTRUMENTS: 011

(CONTINUED)

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

THIS ELECTRONICALLY TRANSMITTED LAND TITLES PRODUCT IS INTENDED
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PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE

TITLE CANCELLED ON MARCH 16, 2006

S		
LINC	SHORT LEGAL	TITLE NUMBER
0022 277 792	4;21;9;10;SW	051 491 537
0022 277 800	4;21;9;10;SE	

LEGAL DESCRIPTION

FIRST

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THOSE PORTIONS OF SOUTH WEST QUARTER DESCRIBED AS FOLLOWS:

(A)

THAT PORTION OF LEGAL SUBDIVISION 6 WHICH LIES TO THE EAST OF
THE CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 5.732 HECTARES (14.16 ACRES) MORE OR LESS

(B)

THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

SECOND

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

LEGAL SUBDIVISIONS 7 AND 8 IN THE SOUTH EAST QUARTER
CONTAINING:

LEGAL SUBDIVISION	HECTARES	ACRES MORE OR LESS
7	16.2	40
8	16.2	40

EXCEPTING OUT OF LEGAL SUBDIVISION 8:

PLAN	NUMBER	HECTARES	ACRES MORE OR LESS
ROAD WIDENING	8010126	0.208	0.515

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 051 402 679

(CONTINUED)

REGISTRATION	DATE (DMY)	REGISTERED OWNER(S) DOCUMENT TYPE	VALUE	CONSIDERATION
051 491 537	29/12/2005	SEPARATION - LINCS		

OWNERS

GEORGE B. LOMAS PROFESSIONAL CORPORATION.
OF 3425-2 AVE SOUTH
LETHBRIDGE
ALBERTA T1J 4V1

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
4361AI		RESTRICTIVE COVENANT AFFECTED LAND: 4;21;9;10;SE
359EM	31/01/1934	EASEMENT "(SUBJECT TO) IN FAVOUR OF NE 1/4 OF SECTION 10, PORTION LSD 6, ALL OF LSD 7 & 8"
1049KD	05/02/1968	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AFFECTED LAND: 4;21;9;10;SE "PORTION DESCRIBED"
1485KX	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTION AS DESCRIBED"
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTIONS OF LSD 4 AS DESCRIBED"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION PART OF AN IRRIGABLE UNIT
051 402 680	26/10/2005	MORTGAGE MORTGAGEE - COMMUNITY CREDIT UNION LTD.

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 3

051 491 537

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
ORIGINAL PRINCIPAL AMOUNT: \$400,000

051 402 681 26/10/2005 CAVEAT
RE : ASSIGNMENT OF RENTS
CAVEATOR - COMMUNITY CREDIT UNION LTD.
480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
AGENT - DOUGLAS D MILLAR

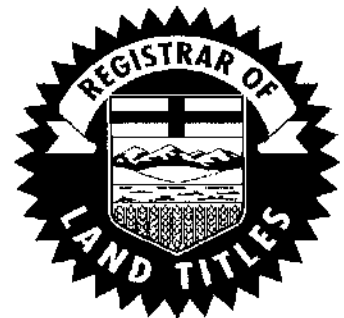
061 110 626 16/03/2006 SUBDIVISION PLAN 0610847
TITLE CANCELLED AS TO PART AND NEW TITLE ISSUED
FOR THE REMAINDER

TOTAL INSTRUMENTS: 010

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

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PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE
TITLE CANCELLED ON JANUARY 25,2001

S	LINC	SHORT LEGAL	TITLE NUMBER
	0022 277 792	4;21;9;10;SW	001 356 629 +1
	0022 277 800	4;21;9;10;SE	
	0028 675 230	4;21;9;10;NW	

LEGAL DESCRIPTION

FIRST

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THOSE PORTIONS OF SOUTH WEST QUARTER DESCRIBED AS FOLLOWS:

(A)

THAT PORTION OF LEGAL SUBDIVISION 6 WHICH LIES TO THE EAST OF
THE CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 5.732 HECTARES (14.16 ACRES) MORE OR LESS

(B)

THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

SECOND

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

LEGAL SUBDIVISIONS 7 AND 8 IN THE SOUTH EAST QUARTER
CONTAINING:

LEGAL SUBDIVISION	HECTARES	ACRES MORE OR LESS
7	16.2	40
8	16.2	40

EXCEPTING OUT OF LEGAL SUBDIVISION 8:

PLAN	NUMBER	HECTARES	ACRES MORE OR LESS
ROAD WIDENING	8010126	0.208	0.515

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

THIRD

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THAT PORTION OF THE NORTH WEST QUARTER
WHICH LIES TO THE WEST OF THE CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 30.84 HECTARES (76.1 ACRES) MORE OR LESS
EXCEPTING THEREOUT: HECTARES (ACRES) MORE OR LESS

(CONTINUED)

A) PLAN 0013201 SUBDIVISION 0.559 1.38
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 001 046 189

REGISTERED OWNER(S)				
REGISTRATION	DATE (DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
001 356 629	12/12/2000	SUBDIVISION PLAN		

OWNERS

RAYMOND WILLIAM UPTON
OF 7312 KELSEY PLACE SW
CALGARY
ALBERTA T2V 2M9
AS TO AN UNDIVIDED 1/5 INTEREST

ROBERTA PAULINE LOMAS
OF 35 KINGS MEW S
LETHBRIDGE
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

EDITH MARIE GARRETT
OF APARTMENT 4A
820 15 STREET SOUTH
LETHBRIDGE
ALBERTA T1J 3A4
AS TO AN UNDIVIDED 1/5 INTEREST

GORDON HAROLD WALKER
OF 276 CANNINGTON PLACE SW
CALGARY
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

MELVIN EARL LOMAS
OF 1114 39 AVENUE SW
CALGARY
ALBERTA T2T 2K5
AS TO AN UNDIVIDED 1/5 INTEREST

ENCUMBRANCES, LIENS & INTERESTS

PAGE 3

001 356 629 +1

REGISTRATION

NUMBER	DATE (D/M/Y)	PARTICULARS
4361AI .		RESTRICTIVE COVENANT AFFECTED LAND: 4;21;9;10;SE
359EM .	31/01/1934	EASEMENT "(SUBJECT TO) IN FAVOUR OF NE 1/4 OF SECTION 10, PORTION LSD 6, ALL OF LSD 7 & 8"
1049KD .	05/02/1968	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AFFECTED LAND: 4;21;9;10;NW 4;21;9;10;SE "PORTION DESCRIBED"
1485KX .	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTION AS DESCRIBED"
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTIONS OF LSD 4 AS DESCRIBED"
881 219 612	01/12/1988	UTILITY RIGHT OF WAY GRANTEE - ALBERTA GOVERNMENT TELEPHONES. AFFECTED LAND: 4;21;9;10;NW AS TO PORTION OR PLAN:8810684 "TAKES PRIORITY OF CAVEAT 871131928 REGISTERED 27/07/1987"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION AFFECTED LAND: 4;21;9;10;SW 4;21;9;10;SE PART OF AN IRRIGABLE UNIT
011 025 754	25/01/2001	ROAD PLAN 0110313 AFFECTED LAND: 4;21;9;10;NW CANCELLED AS TO PART NEW TITLE ISSUED FOR THE REMAINDER

TOTAL INSTRUMENTS: 009

(CONTINUED)

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

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PART OF THE ORIGINAL PURCHASER APPLYING PROFESSIONAL, CONSULTING
OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE
TITLE CANCELLED ON JULY 02, 2008

S
LINC SHORT LEGAL TITLE NUMBER
0031 612 047 4;21;9;10;SW 061 110 626 +1

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10
THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 051 491 537

REGISTRATION	DATE (DMY)	REGISTERED OWNER(S) DOCUMENT TYPE	VALUE	CONSIDERATION
061 110 626	16/03/2006	SUBDIVISION PLAN		

OWNERS

GEORGE B. LOMAS PROFESSIONAL CORPORATION.
OF 3425-2 AVE SOUTH
LETHBRIDGE
ALBERTA T1J 4V1

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
1485KX	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE.

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 2

061 110 626 +1

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

AFFECTED LAND: 4;21;9;10;SW
"PORTION AS DESCRIBED"

881 213 325 22/11/1988 UTILITY RIGHT OF WAY
GRANTEE - THE CITY OF LETHBRIDGE.
AFFECTED LAND: 4;21;9;10;SW
"PORTIONS OF LSD 4 AS DESCRIBED"

991 249 227 30/08/1999 IRRIGATION DISTRICT RESOLUTION
PART OF AN IRRIGABLE UNIT

051 402 680 26/10/2005 MORTGAGE
MORTGAGEE - COMMUNITY CREDIT UNION LTD.
480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
ORIGINAL PRINCIPAL AMOUNT: \$400,000

051 402 681 26/10/2005 CAVEAT
RE : ASSIGNMENT OF RENTS
CAVEATOR - COMMUNITY CREDIT UNION LTD.
480 SCENIC DR SOUTH
LETHBRIDGE
ALBERTA T1J4S3
AGENT - DOUGLAS D MILLAR

081 230 992 02/07/2008 TRANSFER OF LAND
OWNERS - 1000824 ALBERTA LTD.
BOX 242
VAUXHALL
ALBERTA T0K2K0
NEW TITLE ISSUED

TOTAL INSTRUMENTS: 007

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

(CONTINUED)

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HISTORICAL LAND TITLE CERTIFICATE

TITLE CANCELLED ON OCTOBER 26, 2005

S	LINE	SHORT LEGAL	TITLE NUMBER
	0022 277 792	4;21;9;10;SW	041 138 184
	0022 277 800	4;21;9;10;SE	
	0028 725 803	4;21;9;10;NW	

LEGAL DESCRIPTION

FIRST

MERIDIAN 4 RANGE 21 TOWNSHIP 9

SECTION 10

THOSE PORTIONS OF SOUTH WEST QUARTER DESCRIBED AS FOLLOWS:

(A)

THAT PORTION OF LEGAL SUBDIVISION 6 WHICH LIES TO THE EAST OF
THE CANAL RIGHT OF WAY ON PLAN IRR55

CONTAINING 5.732 HECTARES (14.16 ACRES) MORE OR LESS

(B)

THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55

CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS

EXCEPTING THEREOUT ALL MINES AND MINERALS

AND THE RIGHT TO WORK THE SAME

SECOND

MERIDIAN 4 RANGE 21 TOWNSHIP 9

SECTION 10

LEGAL SUBDIVISIONS 7 AND 8 IN THE SOUTH EAST QUARTER

CONTAINING:

LEGAL SUBDIVISION	HECTARES	ACRES MORE OR LESS
7	16.2	40
8	16.2	40

EXCEPTING OUT OF LEGAL SUBDIVISION 8:

PLAN	NUMBER	HECTARES	ACRES MORE OR LESS
ROAD WIDENING	8010126	0.208	0.515

EXCEPTING THEREOUT ALL MINES AND MINERALS

AND THE RIGHT TO WORK THE SAME

THIRD

MERIDIAN 4 RANGE 21 TOWNSHIP 9

SECTION 10

THAT PORTION OF THE NORTH WEST QUARTER

WHICH LIES WEST OF CANAL RIGHT OF WAY ON PLAN IRR55

CONTAINING 30.84 HECTARES (76.1 ACRES) MORE OR LESS

EXCEPTING THEREOUT:

(CONTINUED)

PLAN	NUMBER	HECTARES	(ACRES)	MORE OR LESS
SUBDIVISION	0013201	0.559	1.38	
ROAD	0110313	0.063	0.16	

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 011 025 754

REGISTRATION	DATE (DMY)	REGISTERED OWNER(S) DOCUMENT TYPE	VALUE	CONSIDERATION
041 138 184	20/04/2004	TRANSFER OF LAND		SEE INSTRUMENT

OWNERS

GEORGE BAIN LOMAS
OF 3814 OAK DR S
LETHBRIDGE
ALBERTA T1K 4H5
AS TO AN UNDIVIDED 1/10 INTEREST

RODNEY DAVID LOMAS
OF 1126 GREAT LAKES RD S
LETHBRIDGE
ALBERTA T1K 3N6
AS TO AN UNDIVIDED 1/10 INTEREST

RAYMOND WILLIAM UPTON
OF 7312 KELSEY PL SW
CALGARY
ALBERTA T2V 2M9
AS TO AN UNDIVIDED 1/5 INTEREST

EDITH MARIE GARRETT
OF APT. 4A, 820 15 ST S
LETHBRIDGE
ALBERTA T1J 3A4
AS TO AN UNDIVIDED 1/5 INTEREST

GORDON HAROLD WALKER
OF 276 CANNINGTON PL SW
CALGARY
ALBERTA T2W 1Z8
AS TO AN UNDIVIDED 1/5 INTEREST

MELVIN EARL LOMAS
OF 1114 39 AVE SW

CALGARY
ALBERTA T2T 2K5
AS TO AN UNDIVIDED 1/5 INTEREST

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION

NUMBER	DATE (D/M/Y)	PARTICULARS
4361AI		RESTRICTIVE COVENANT AFFECTED LAND: 4;21;9;10;SE
359EM	31/01/1934	EASEMENT "(SUBJECT TO) IN FAVOUR OF NE 1/4 OF SECTION 10, PORTION LSD 6, ALL OF LSD 7 & 8"
1049KD	05/02/1968	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. AFFECTED LAND: 4;21;9;10;NW 4;21;9;10;SE "PORTION DESCRIBED"
1485KX	21/06/1971	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE ST. MARY RIVER IRRIGATION DISTRICT
881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTION AS DESCRIBED"
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTIONS OF LSD 4 AS DESCRIBED"
881 219 612	01/12/1988	UTILITY RIGHT OF WAY GRANTEE - ALBERTA GOVERNMENT TELEPHONES. AFFECTED LAND: 4;21;9;10;NW AS TO PORTION OR PLAN:8810684 "TAKES PRIORITY OF CAVEAT 871131928 REGISTERED 27/07/1987"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION AFFECTED LAND: 4;21;9;10;SW 4;21;9;10;SE PART OF AN IRRIGABLE UNIT
051 402 679	26/10/2005	TRANSFER OF LAND OWNERS - GEORGE B. LOMAS PROFESSIONAL CORPORATION.

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 4

041 138 184

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

3425-2 AVE SOUTH
LETHBRIDGE
ALBERTA T1J4V1
NEW TITLE ISSUED

TOTAL INSTRUMENTS: 009

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN
ACCURATE REPRODUCTION OF THE CERTIFICATE OF
TITLE REPRESENTED HEREIN THIS 17 DAY OF JULY,
2017 AT 02:53 P.M.

ORDER NUMBER: 33319869

CUSTOMER FILE NUMBER:



END OF CERTIFICATE

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OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).



HISTORICAL LAND TITLE CERTIFICATE
TITLE CANCELLED ON APRIL 20, 2004

S	LINC	SHORT LEGAL	TITLE NUMBER
	0022 277 792	4;21;9;10;SW	011 025 754
	0022 277 800	4;21;9;10;SE	
	0028 725 803	4;21;9;10;NW	

LEGAL DESCRIPTION

FIRST

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THOSE PORTIONS OF SOUTH WEST QUARTER DESCRIBED AS FOLLOWS:

(A)

THAT PORTION OF LEGAL SUBDIVISION 6 WHICH LIES TO THE EAST OF
THE CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 5.732 HECTARES (14.16 ACRES) MORE OR LESS

(B)

THAT PORTION OF THE SOUTH WEST QUARTER WHICH LIES TO THE WEST
OF THE SAID CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 52.4 HECTARES (129.55 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

SECOND

MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

LEGAL SUBDIVISIONS 7 AND 8 IN THE SOUTH EAST QUARTER
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MERIDIAN 4 RANGE 21 TOWNSHIP 9
SECTION 10

THAT PORTION OF THE NORTH WEST QUARTER
WHICH LIES WEST OF CANAL RIGHT OF WAY ON PLAN IRR55
CONTAINING 30.84 HECTARES (76.1 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

(CONTINUED)

PLAN	NUMBER	HECTARES	(ACRES)	MORE OR LESS
SUBDIVISION	0013201	0.559	1.38	
ROAD	0110313	0.063	0.16	

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: LETHBRIDGE COUNTY

REFERENCE NUMBER: 001 356 629 +1

REGISTERED OWNER(S)				
REGISTRATION	DATE (DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION

011 025 754 25/01/2001 ROAD PLAN

OWNERS

RAYMOND WILLIAM UPTON
OF 7312 KELSEY PLACE SW
CALGARY
ALBERTA T2V 2M9
AS TO AN UNDIVIDED 1/5 INTEREST

ROBERTA PAULINE LOMAS
OF 35 KINGS MEW S
LETHBRIDGE
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

EDITH MARIE GARRETT
OF APARTMENT 4A
820 15 STREET SOUTH
LETHBRIDGE
ALBERTA T1J 3A4
AS TO AN UNDIVIDED 1/5 INTEREST

GORDON HAROLD WALKER
OF 276 CANNINGTON PLACE SW
CALGARY
ALBERTA
AS TO AN UNDIVIDED 1/5 INTEREST

MELVIN EARL LOMAS
OF 1114 39 AVENUE SW
CALGARY
ALBERTA T2T 2K5
AS TO AN UNDIVIDED 1/5 INTEREST

ENCUMBRANCES, LIENS & INTERESTS

PAGE 3

011 025 754

REGISTRATION

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881 039 638	11/03/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTION AS DESCRIBED"
881 213 325	22/11/1988	UTILITY RIGHT OF WAY GRANTEE - THE CITY OF LETHBRIDGE. AFFECTED LAND: 4;21;9;10;SW "PORTIONS OF LSD 4 AS DESCRIBED"
881 219 612	01/12/1988	UTILITY RIGHT OF WAY GRANTEE - ALBERTA GOVERNMENT TELEPHONES. AFFECTED LAND: 4;21;9;10;NW AS TO PORTION OR PLAN:8810684 "TAKES PRIORITY OF CAVEAT 871131928 REGISTERED 27/07/1987"
991 249 227	30/08/1999	IRRIGATION DISTRICT RESOLUTION AFFECTED LAND: 4;21;9;10;SW 4;21;9;10;SE PART OF AN IRRIGABLE UNIT
041 138 184	20/04/2004	TRANSFER OF LAND OWNERS - GEORGE BAIN LOMAS 3814 OAK DR S LETHBRIDGE ALBERTA T1K4H5 AS TO 1/10 OWNERS - RODNEY DAVID LOMAS 1126 GREAT LAKES RD S LETHBRIDGE ALBERTA T1K3N6

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

PAGE 4
011 025 754

REGISTRATION

NUMBER DATE (D/M/Y) PARTICULARS

AS TO 1/10
OWNERS - RAYMOND WILLIAM UPTON
7312 KELSEY PL SW
CALGARY
ALBERTA T2V2M9
AS TO 1/5
OWNERS - EDITH MARIE GARRETT
APT. 4A, 820 15 ST S
LETHBRIDGE
ALBERTA T1J3A4
AS TO 1/5
OWNERS - GORDON HAROLD WALKER
276 CANNINGTON PL SW
CALGARY
ALBERTA T2W1Z8
AS TO 1/5
OWNERS - MELVIN EARL LOMAS
1114 39 AVE SW
CALGARY
ALBERTA T2T2K5
AS TO 1/5
NEW TITLE ISSUED

TOTAL INSTRUMENTS: 009

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OR TECHNICAL EXPERTISE FOR THE BENEFIT OF CLIENT(S).

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APPENDIX C

TRAFFIC IMPACT ASSESSMENT

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A Traffic Impact Assessment (TIA) Report
For
CHINOOK INDUSTRIAL PARK AREA STRUCTURE PLAN DEVELOPMENT

Lethbridge, Alberta

Prepared for

Hasegawa Consulting Professional Engineers

November 3, 2017
1st Revision: April 9, 2018
2nd Revision: September 6, 2018
3rd Revision: October 10, 2018



EASL Transportation Consultants, Inc.

Delivering Engineering and Planning Solutions

840 6 Avenue SW, Suite 300

Calgary, Alberta, T2P 3E5

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info@easltransportation.ca

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1.0 INTRODUCTION

1.1 General

Hasegawa Consulting Professional Engineers retained EASL Transportation Consultants, Inc. to undertake a traffic impact assessment (TIA) in support of the proposed Chinook Industrial Park Development to be located within Quarter Sections SW 1/4-10-9-21-4 and NW 1/4-10-9-21-4 in Lethbridge County, Alberta. This traffic impact assessment is being prepared to assess potential transportation impacts of the proposed development and to satisfy Lethbridge County's and City of Lethbridge's requirements for such a study as a result of the proposed development. **Figure 1a** presents a site map that shows the general location of the proposed development, and **Figure 1b** presents a local context aerial map. The proposed development is defined by the following boundaries:

- 43 Street N to the west;
- Greenfield to the east;
- Township Road 92 to the north; and
- 9 Avenue N to the south.

1.2 Existing Land Use

The southern portion of project area located at the northeastern corner of 43 Street / 9 Avenue N intersection is occupied by the currently operating Southland International Truck Facility. The remaining portion of the land to the north is a Greenfield unoccupied area.

1.3 Proposed Development Plan

The proposed Chinook Industrial Park Development site will consist of the following:

1. **Phase 1:** will be located within the existing Southland International Truck Facility and will include 18.56 acres of General Light Industrial land use and 18.62 acres of Business Park land use. Phase 1 will be completed after 2 years from today.
2. **Phases 2 to 5:** will be located within the Greenfield area north of the existing Southland International Truck Facility and will consist of 95.17 acres of General Light Industrial land use and 40.66 acres of Business Park land use. Phase 2 will be completed within 5 years from today.

The proposed project development site plan and internal roadway plan are included in **Appendix A** of this report.

1.4 Purpose of Study

The primary purposes of this traffic impact assessment study are:

- To evaluate the traffic operations and levels of service (LOS) at the following intersections:

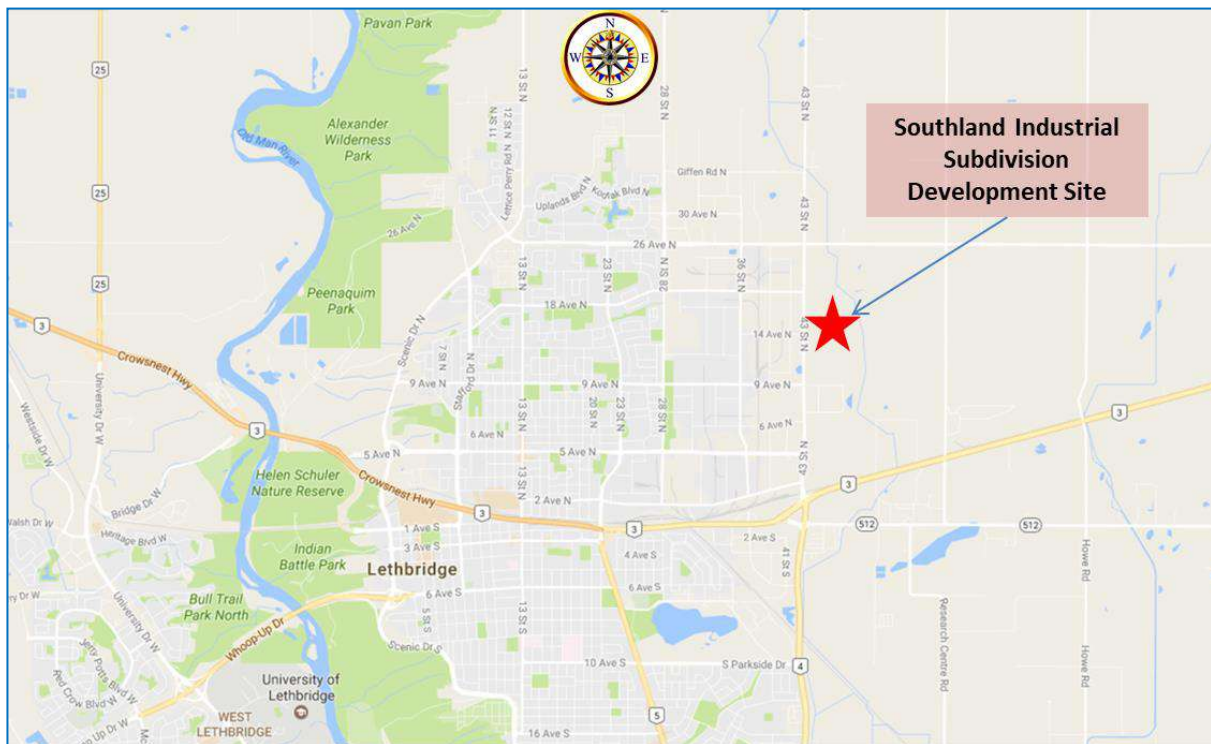


Figure 1a: Site Location Map



Figure 1b: Local Context Aerial Map

- 43 Street North and 26 Avenue North intersection (Unsignalized);
 - 43 Street North and 18 Avenue North intersection (Unsignalized);
 - 43 Street North and 14 Avenue North intersection (Unsignalized);
 - 43 Street North and 9 Avenue North intersection (Signalized);
 - 43 Street North and 5 Avenue North intersection (Signalized); and
 - Highway 3 / Crowsnest Highway and 43 Street North intersection (signalized).
- To evaluate any potential project traffic impacts of the proposed development to the surrounding roadway network, and to determine if the roadways, site access and traffic circulations in the project vicinities would be suitable for the intended development and the amount of development traffic volumes anticipated.
 - To identify suitable intersection control and geometric configurations that would be required to properly service the proposed development including conducting a signal warrant analyses for any of the study unsignalized intersections, as needed.
 - Also, to identify any needed short-term and long-term roadway improvements in the areas to enable acceptable traffic operations that would satisfy both the Lethbridge County and the City of Lethbridge requirements.

1.5 Methodologies

This traffic impact assessment utilizes the following evaluation methodologies:

- Data collection including but not limited to existing roadway and intersection geometric characteristic, pavement markings, traffic control types, and intersection turning movement traffic counts.
- The forecast of background peak hour traffic volumes without the site traffic for the 2, 5 and 20-year horizons (2019, 2022 and 2037).
- Trip generation estimate for the proposed development based on appropriate **Trip Generation** land use categories and corresponding trip generation rates by the Institute of Transportation Engineers (ITE).
- Distribution of the site generated trips to/from the development site based on population, land uses, roadway network, and existing traffic patterns in the project vicinities.
- Assignment of the project trips to the adjacent roadways based on the proposed project site plan and the estimated roadway trip distribution characteristics.
- Existing, background, and future traffic capacity analysis for the study area intersections and roadways to identify possible capacity constraints and to assess overall traffic impacts of the proposed development, which is based on the **latest Highway Capacity Manual (HCM)** methodologies by the Transportation Research Board, the US National Academies of Sciences, Engineering and Medicine.

2.0 EXISTING CONDITIONS

2.1 Area Road Network

The existing transportation system within the vicinity of the proposed project site consists of the following roadways:

43 Street North is within the City of Lethbridge limits and represent the borderline between the City of Lethbridge and Lethbridge County. 43 Street N is a paved arterial two-lane two-way roadway north of 9 Avenue N and a divided 4-lane roadway with two lanes per direction south of 9 Avenue N. 43 Street North is classified as a dangerous goods route with a posted speed limit of 70 km/h. Based on the City of Lethbridge 2016 Traffic Flow Map, the daily traffic volumes on 43 Street N in the vicinity of 9 Avenue N is 8,300 vehicles per day and north of 26 Avenue N is 800 vehicles per day.

26 Avenue North / Township Road 92: 26 Avenue N, to the west of 43 Street N is within the City of Lethbridge limits and is a two-lane two-way paved roadway with a posted speed limit of 60km/h. The existing daily traffic volume on 26 Avenue North is 4,800 vehicles per day based on the City of Lethbridge 2016 Traffic Flow Map. This road's name changes to Township Road 92 to the east of 43 Street N and becomes under the jurisdiction of Lethbridge County.

18 Avenue North is within the City of Lethbridge limits and is a two-lane two-way paved industrial collector road with a posted speed limit of 50km/h. The existing daily traffic volume on 18 Avenue N is 3,900 vehicles per day based on the City of Lethbridge 2016 Traffic Flow Map.

14 Avenue North is within the City of Lethbridge limits and is a two-lane two-way paved roadway paved industrial collector road with a posted speed limit of 50km/h. The existing daily traffic volumes on 14 Avenue North is 1,200 vehicles per day based on the City of Lethbridge 2016 Traffic Flow Map.

9 Avenue North west of 43 Street N is within the City of Lethbridge limits and is a paved two-lane two-way industrial collector roadway with allowed parallel parking on both sides of the road. However, 9 Avenue N east of 43 Street N is within the Lethbridge County limits and is a two-lane two-way gravel roadway. The posted speed limit is 50km/h. Access to the existing Southland International Truck Facility as well as the Phase 1 of the proposed development will be off 9 Avenue N at 44 Street North. The existing daily traffic volume on 9 Avenue N west of 43 Street N is 4,400 vehicles per day based on the City of Lethbridge 2016 Traffic Flow Map.

5 Avenue North is within the City of Lethbridge limits and is a paved four lane divided roadway with a posted speed limit of 60km/h. The existing daily traffic volume on 5 Avenue N just west of 43 Street N is 4,200 vehicles per day based on the City of Lethbridge 2016 Traffic Flow Map.

Highway 3 (Crowsnest Highway) is a provincial paved and divided four lane highway with a posted speed limit of 80 Km/h in the vicinity of 43 Street. The existing daily traffic volume on

Highway 3 west of 43 Street N is 25,100 vehicles per day based on the City of Lethbridge 2016 Traffic Flow Map.

2.2 Existing Intersection Conditions

All study area intersections are located along 43 Street North with the northern three intersections at 26 Avenue N, 18 Avenue N, and 14 Avenue N currently unsignalized and controlled by stop signs on the east/west intersecting roads. The remaining three study intersections located at 9 Avenue N, 5 Avenue N, and Highway 3 (Crowsnest Hwy) are signalized intersections. **Figure 2a** has been prepared to present the lane configurations, the channelized movements and the control types at each of the study area intersections.

2.3 Existing Traffic Volumes and Conditions

A field reconnaissance of the site and its surroundings was conducted to establish a database of the existing conditions. The peak period for the proposed Chinook Industrial Park Development would typically occur during the weekday morning and the late afternoon periods.

Turning movement traffic count data were collected by Hasegawa Engineering on March 14, 2017 and March 16, 2017 from 7:00 AM to 9:00 AM, and from 4:00 PM to 6:00 PM at the following four study intersections:

- 43 Street North and 18 Avenue North intersection
- 43 Street North and 14 Avenue North intersection
- 43 Street North and 9 Avenue North intersection
- 43 Street North and 5 Avenue North intersection

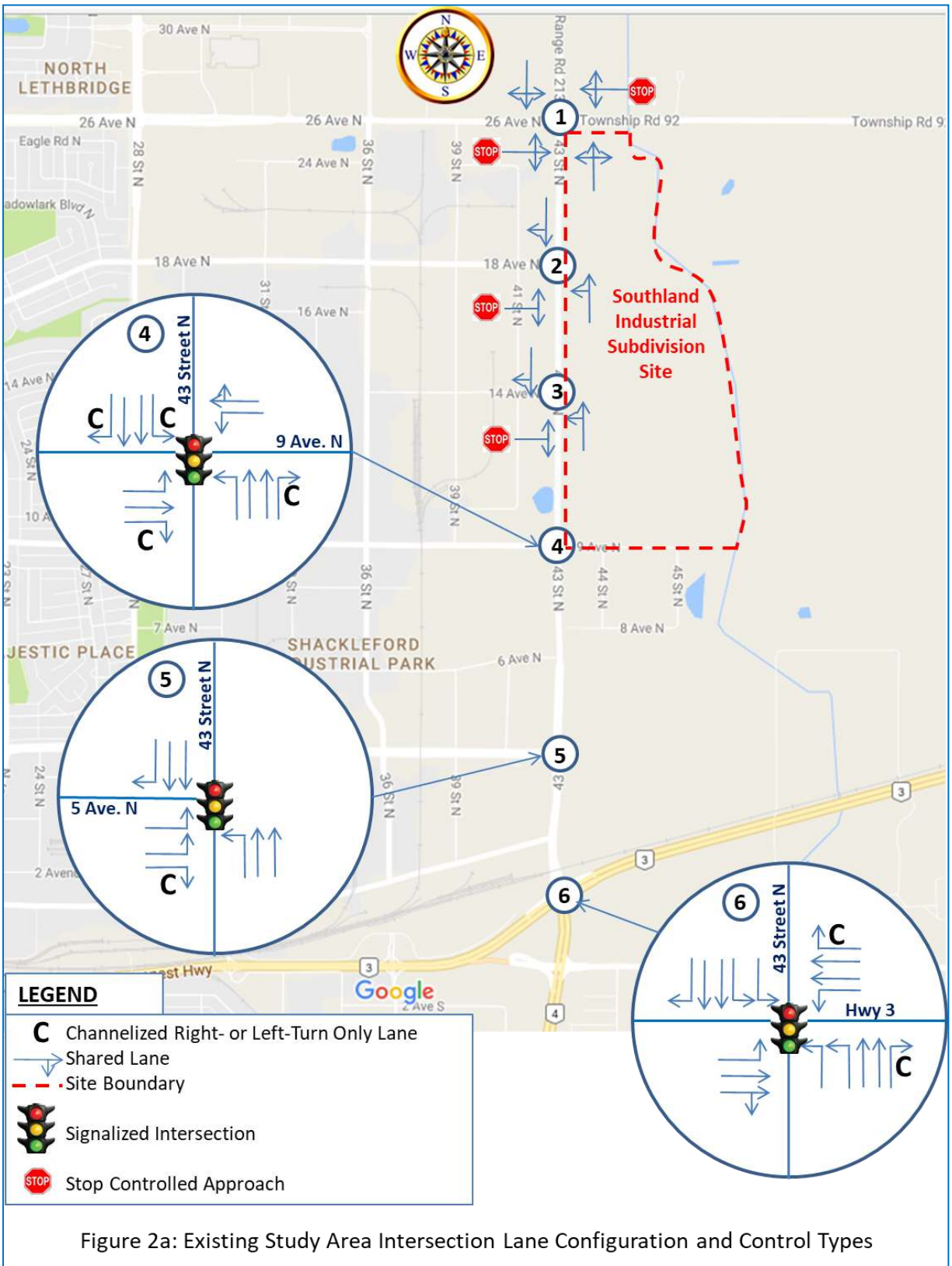
The City of Lethbridge's 2016 traffic counts were obtained for the intersection of:

- 43 Street North and 26 Avenue North

Also, Alberta Transportation's 2016 traffic count data has been utilized to represent the existing traffic volumes for the intersection of:

- Highway 3/Crowsnest Highway and 43 Street

Analysis of the 15-minute turning movement traffic count data at study intersections indicated that the AM peak hour of traffic occurs between 7:15 AM and 8:15 AM; and the PM peak hour of traffic occurs between 4:15 PM and 5:15 PM. The existing AM and PM peak-hour traffic volumes for all study intersections are illustrated on **Figure 2b**. Details of the collected traffic count data as well as the City of Lethbridge and Alberta Transportation 2016 traffic count data are contained in **Appendix B**.



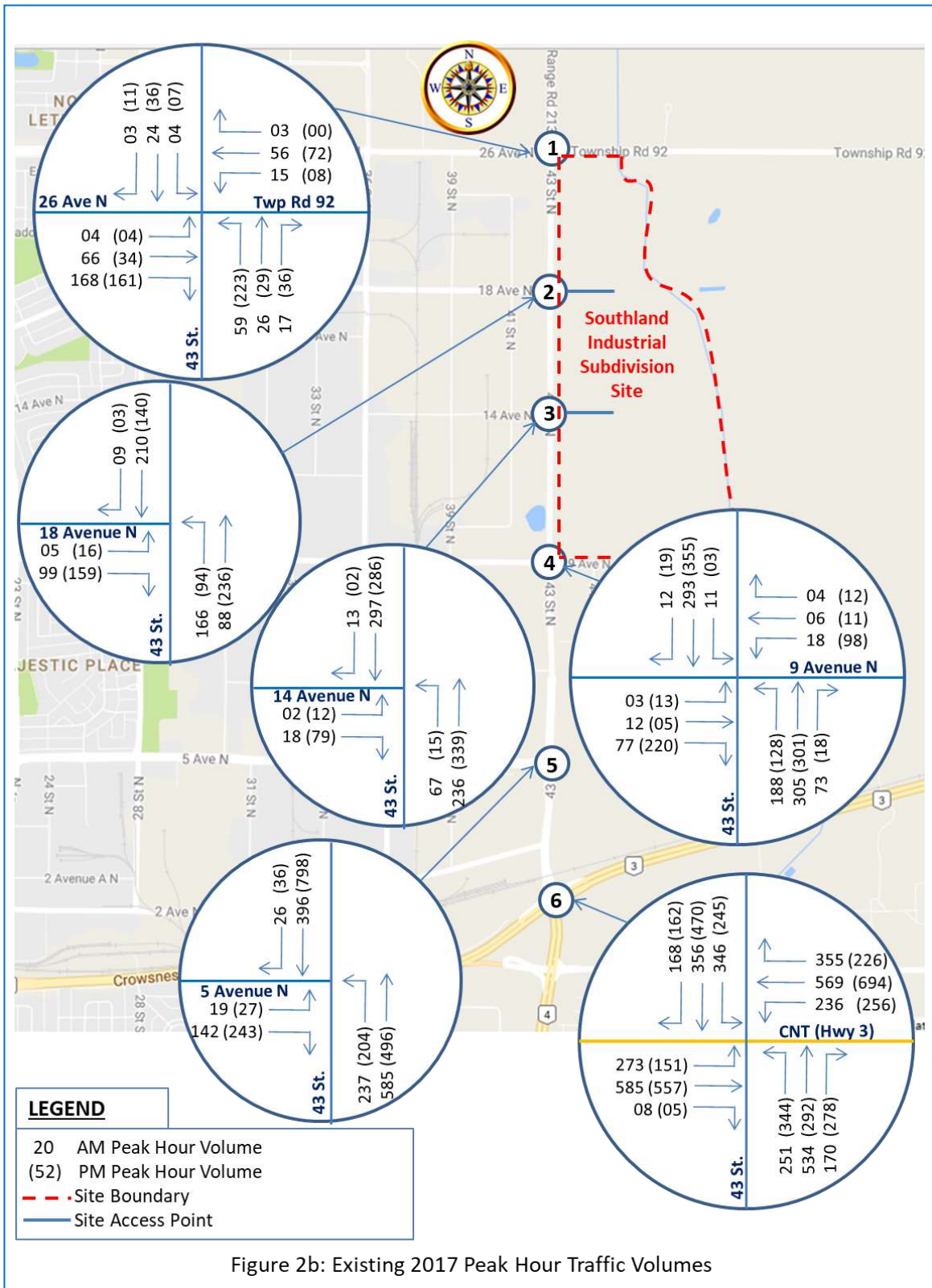


Figure 2b: Existing 2017 Peak Hour Traffic Volumes

2.4 Existing Heavy Vehicle Composition

The turning movement traffic count completed for the study intersections as well as the traffic count data obtained from the City of Lethbridge / Alberta Transportation were analyzed and the heavy vehicle percentages were determined at all study intersections. The AM peak hour and the PM peak hour heavy vehicle compositions were determined and are presented in Table 1. Note that heavy vehicle traffic volume considered included trucks, multi-axle vehicles, city buses and school buses.

Table 1: Adjacent Highway Heavy Vehicle Composition (in %)

Intersection Name	Peak Hour Period	2016 / 2017 Traffic Count Data			
		EB	WB	NB	SB
43 Street North and 26 Avenue	AM and PM	4%	4%	7%	16%
43 Street North and 18 Avenue North	AM	12%	-	10%	3%
	PM	9%	-	9%	8%
43 Street North and 14 Avenue North	AM	55%	-	10%	6%
	PM	3%	-	9%	10%
43 Street North and 9 Avenue North	AM	3%	36%	9%	9%
	PM	6%	2%	13%	7%
43 Street North and 5 Avenue North	AM	12%	-	6%	16%
	PM	7%	-	12%	6%
Highway 3 / Crowsnest Highway 43 Street North	AM	10.7%	8.7%	9.7%	14.8%
	PM	9.5%	6.3%	6.7%	11.2%

Based on the above results, the capacity analysis for study intersections utilized the observed heavy vehicle percentages as noted in Table 1. However, for new approaches, a heavy vehicle percentage of **10%** was utilized in the capacity analysis software for that approach as per the City of Lethbridge TIA standards.

2.5 Planned Roadway Improvements

City of Lethbridge has been contacted in order to find out if there are any plans for any roadway improvements within the study area in the near future. The City of Lethbridge development planning staff indicated that 43 Street N, north of 9 Avenue will be upgraded to 4-lane roadway in the future. However, the City of Lethbridge further confirmed that 43 Street N north of 9 Ave N is not anticipated to be twinned by 2037, which is the future horizon design year for this TIA. Therefore, existing layout will be considered in the analysis and needed improvements will be recommended. Additionally, the **2006 Functional Planning Study completed by Stantec⁽¹⁾** for Highways 3 & 4 in Lethbridge area proposes / recommends new alignments for these highways that would provide external links allowing external traffic to by-pass the City and hence reducing Crowsnest Highway traffic within Lethbridge.

⁽¹⁾ http://www.transportation.alberta.ca/projects/assets/Area_8_South/Hwy%203%20Lethbridge/Executive_Summary.pdf

3.0 PROJECTED TRAFFIC VOLUMES

3.1 Trip Generation for Background Developments

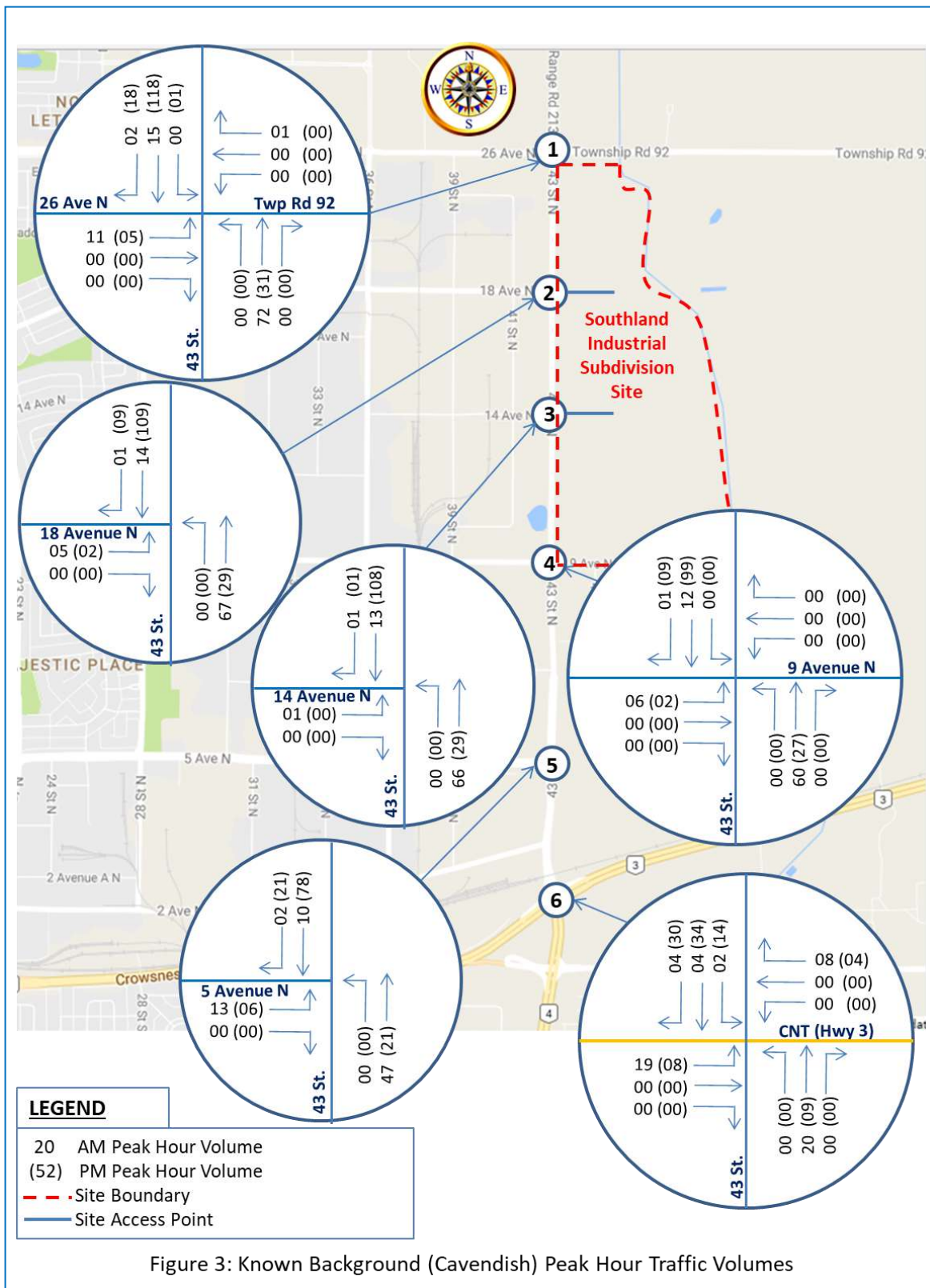
Background traffic takes into account additional traffic on the roadway systems that will be generated by approved developments in the area that may be completed by the time of the site build-out. The current project is projected to be built-out in the near term. Based on EASL Transportation Consultants' discussion with the City of Lethbridge, there is one approved development, Cavendish Farms within the vicinity of the project site that must be considered. The AM and PM peak hour traffic volumes generated by this background development and would impact the current study area intersections were obtained from the City of Lethbridge and are presented on **Figure 3**. A copy of the original City of Lethbridge's traffic volumes generated by Cavendish Farms is contained in **Appendix B**.

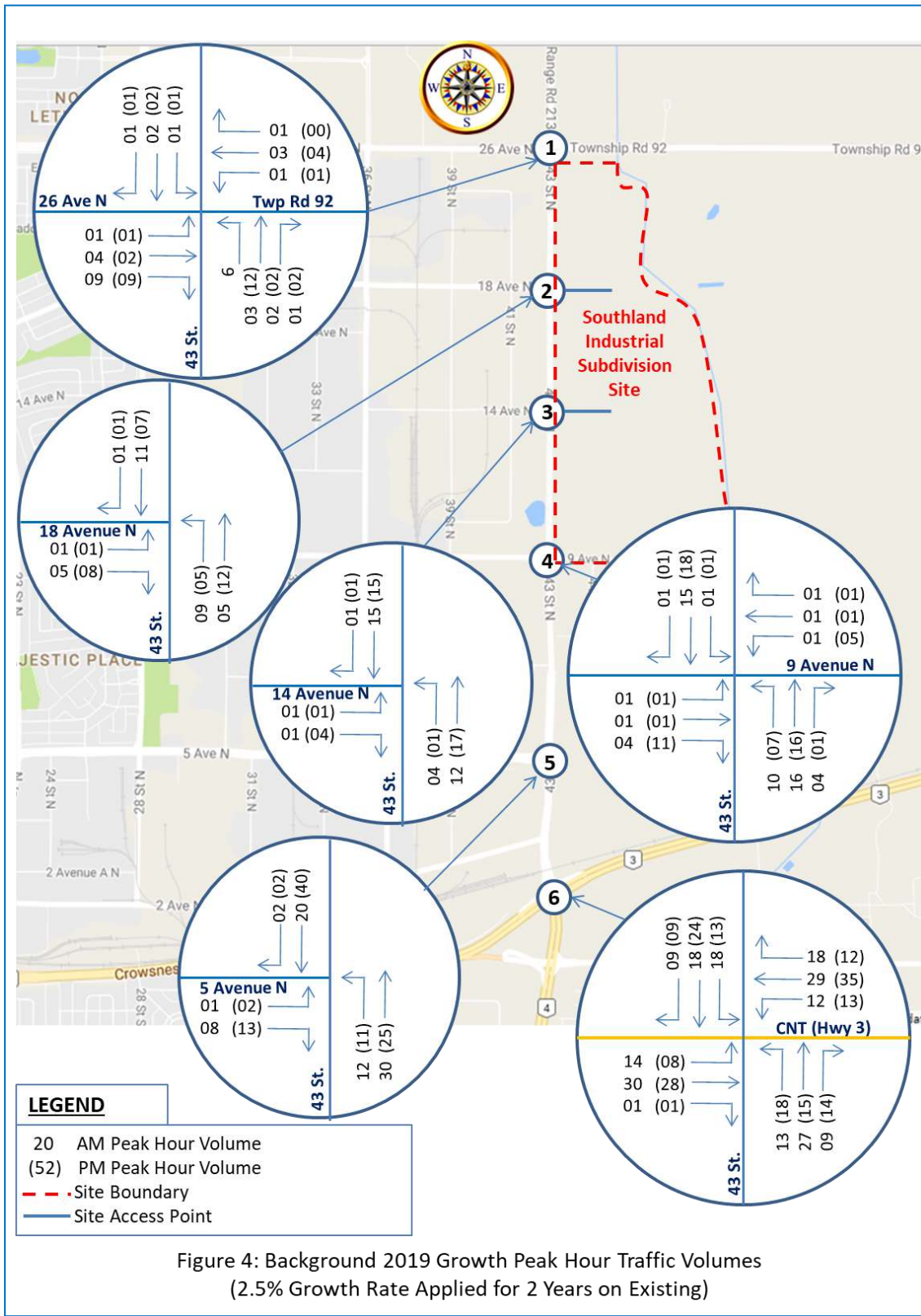
3.2 Historical Traffic Growth Rate

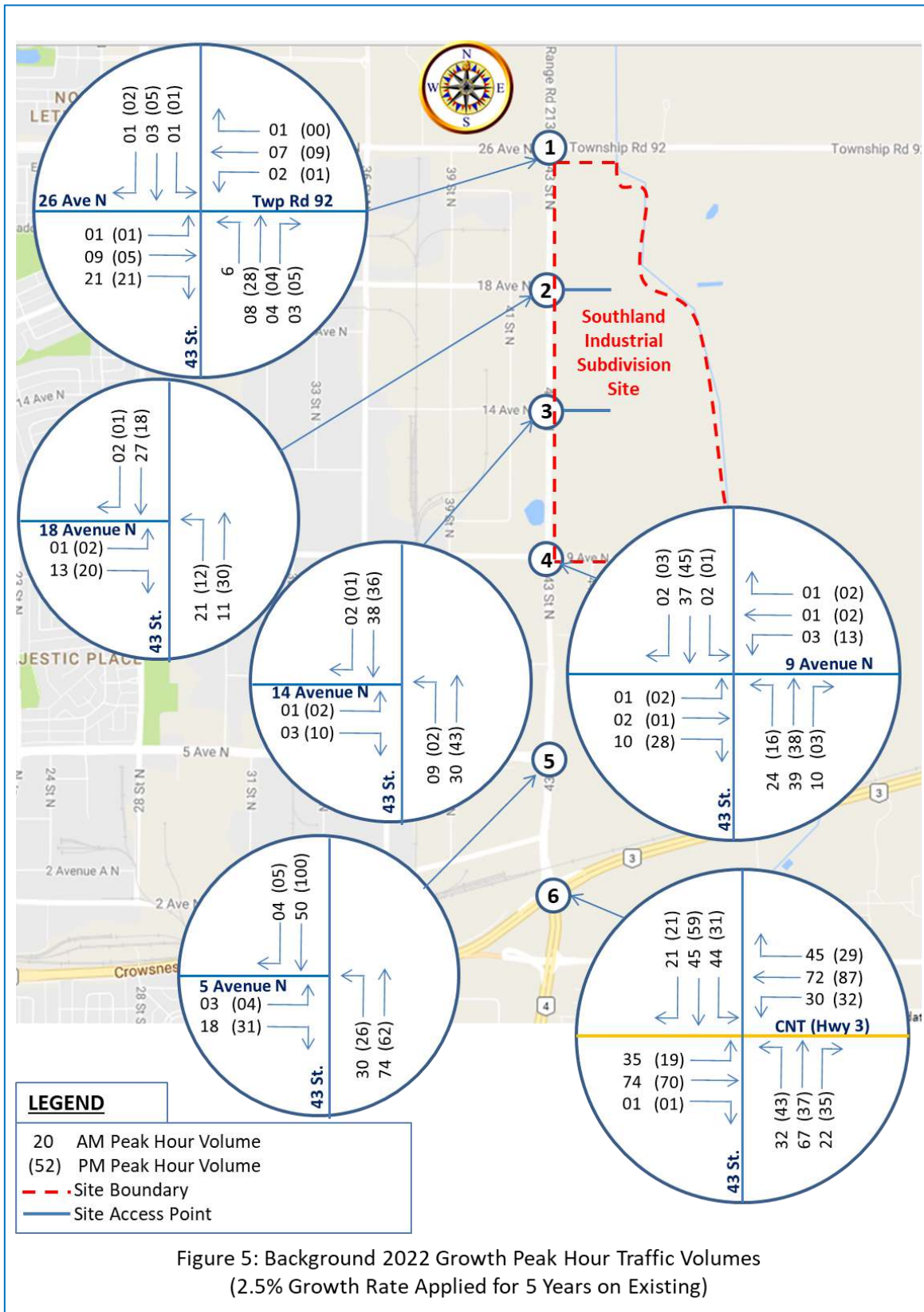
To account for inherited growth in traffic and the traffic generated by other unknown developments that may occur at the build-out of the proposed project, a traffic growth factor was applied to the existing traffic volumes to forecast the future traffic conditions. A 2.5% annual growth rate was used to estimate traffic growth for the 2-year, 5-year and 20-year horizons. This 2.5% growth rate was applied to the 2017 existing traffic volumes to derive the 2019, 2022, and 2037 background growth traffic volumes to be used to estimate the total background traffic volumes. Note that the 2.5% annual growth rate is in accordance with the City of Lethbridge / Lethbridge County acceptable medium to long range growth standards. The background growth traffic volumes for the years 2019, 2022, and 2037 are illustrated on **Figures 4, 5, and 6**, respectively.

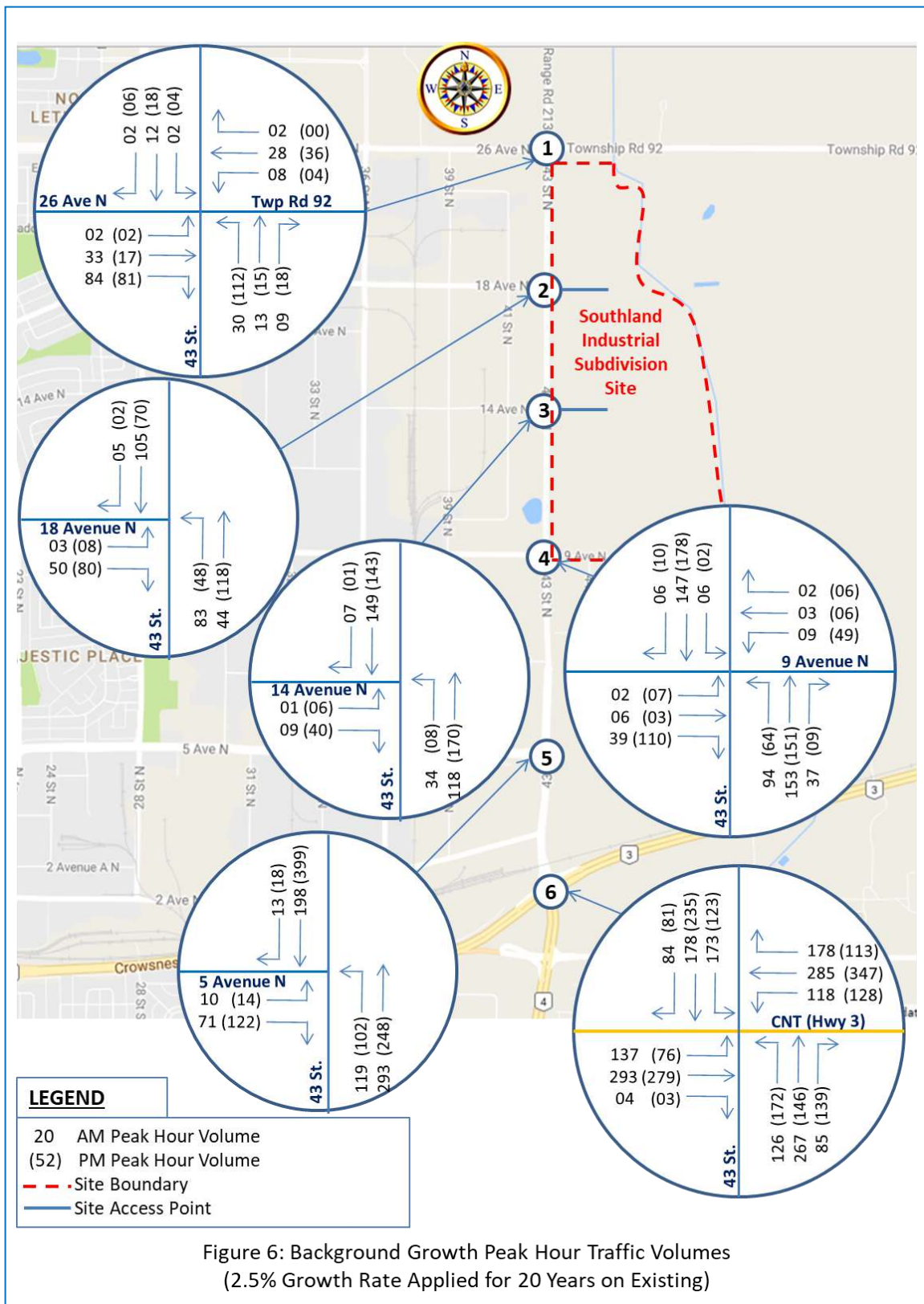
3.3 Background Traffic

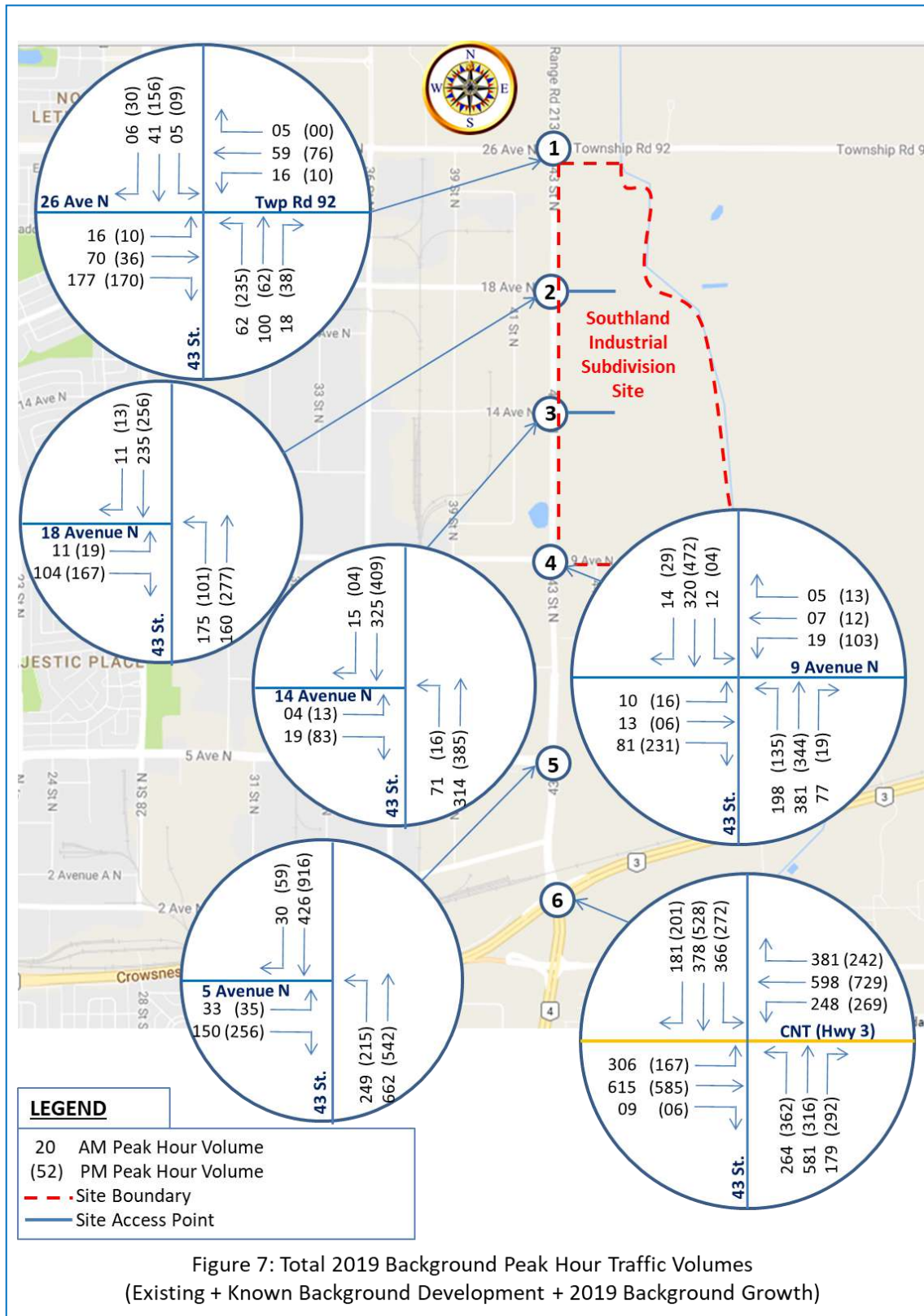
The Cavendish Farms Background traffic volumes presented on Figure 3 were added to the traffic growth due to unknown developments (Figures 4, 5 and 6) then added to the existing 2017 peak hour traffic volumes shown on Figure 2, creating the 2019, 2022 and 2037 background traffic scenario (without site volumes) as illustrated on **Figures 7, 8 and 9**.

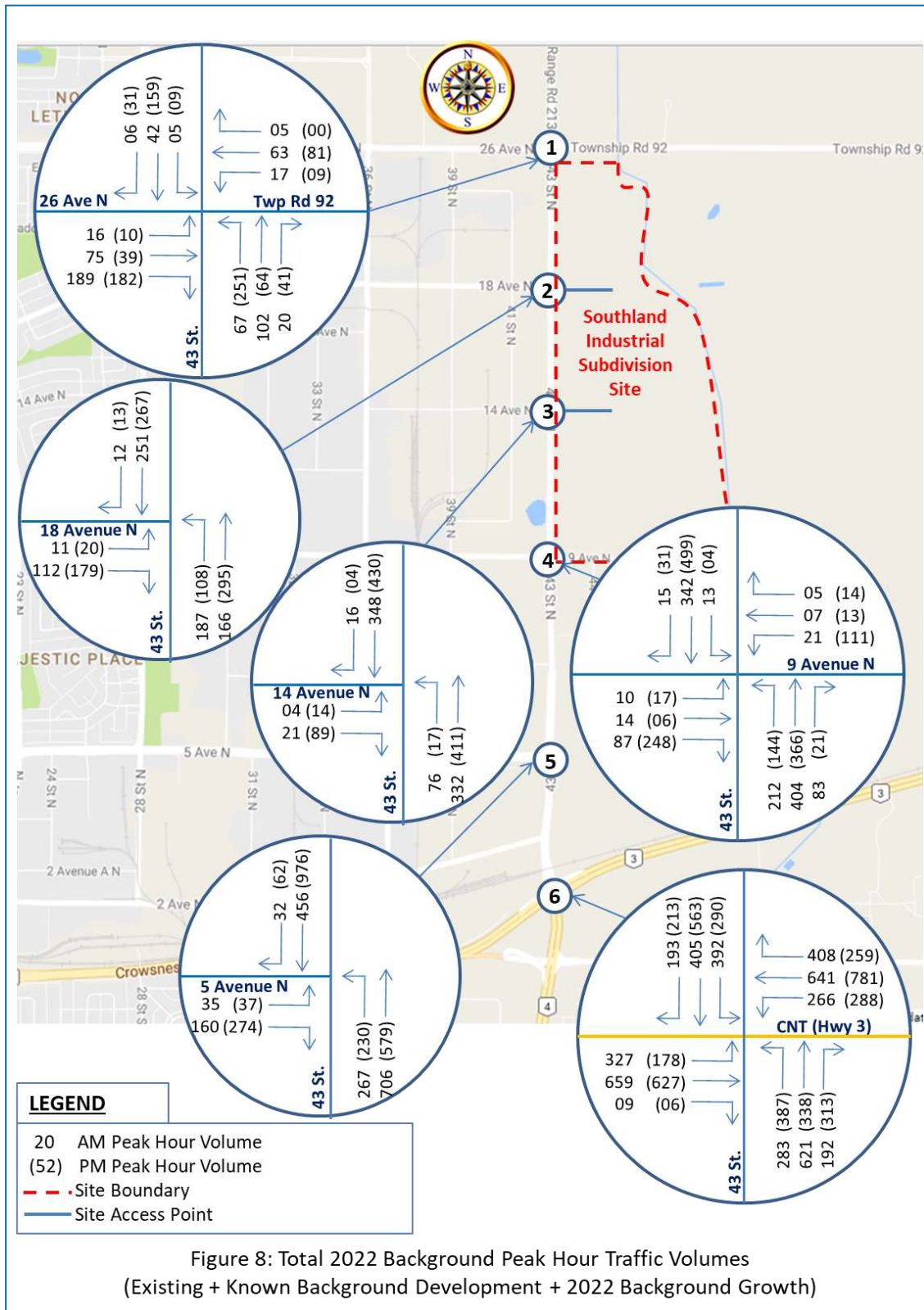


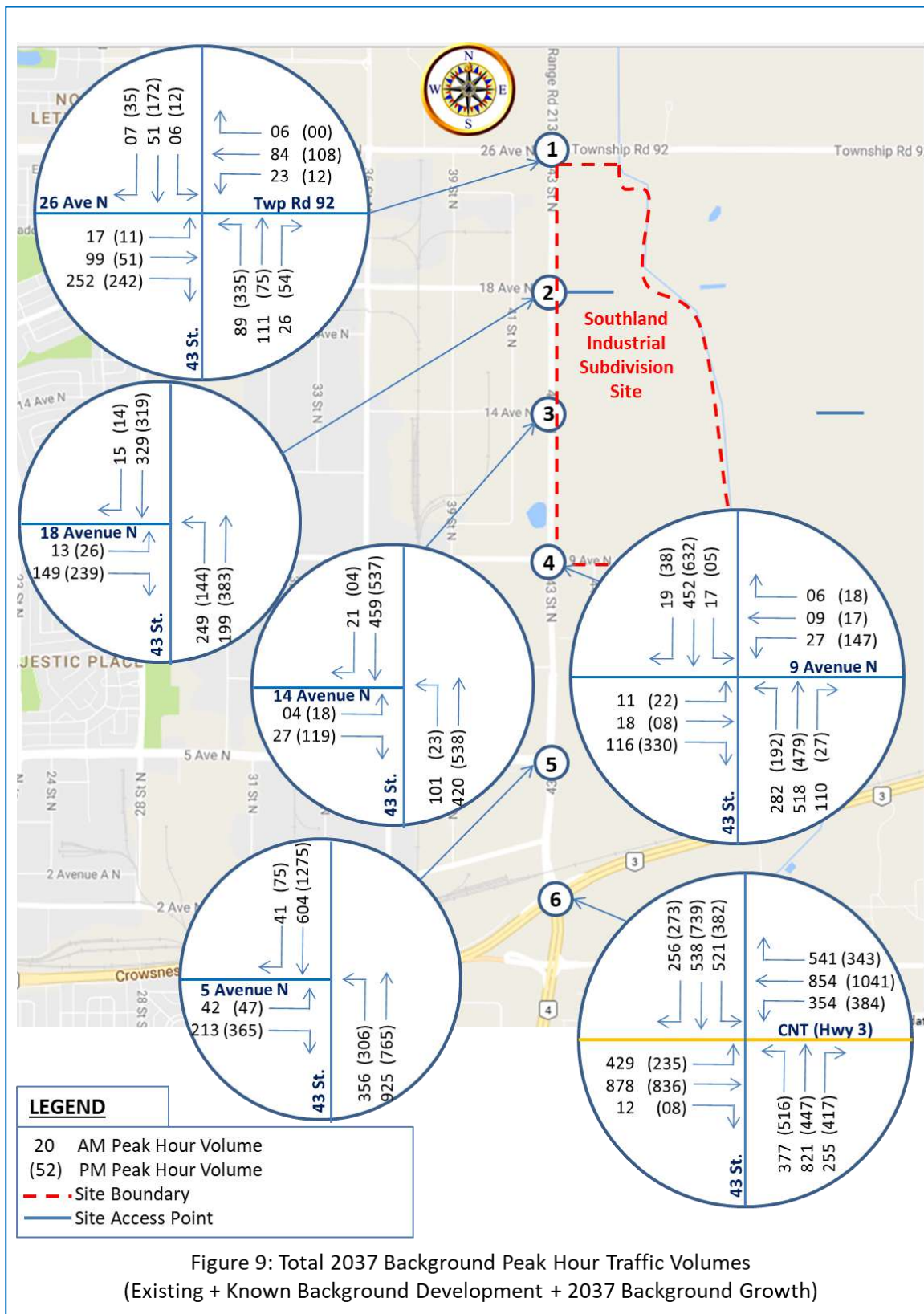












3.4 Site Generated Trips

To estimate the number of vehicle trips expected to be generated by a particular development, trip generation rates are applied based on the proposed land uses and intensity. The number of trips that would be generated by the proposed development was estimated based on the rates published in ***Trip Generation, 10th Edition*** by the Institute of Transportation Engineers (ITE). The trip generation rates along with the proposed land uses and the corresponding ITE land use codes are presented in **Table 2**. The projected Chinook Industrial Park development peak-hours and daily site-generated traffic volumes are presented in **Table 3**.

It should be noted that the proposed site development plan provides land use areas in acres and the ITE 10th Edition Trip Generation manual uses the gross floor area (GFA) as the independent variable. Based on reviewing several near-by, Lethbridge area existing industrial parks, building area ratios to the total acreage area ranged from 6,114 SF per acre to 11,155 SF per acre. We are selecting 8,200 SF per Acre for the proposed development as this is the average planned building areas. All proposed land use areas within each of the planned phases were converted to GFA based on this rate and are presented in the 4th column of **Table 3**.

Table 2: Trip Generation Rates (ITE Trip Generation Manual 10th Edition)

Land Use	ITE Code	Unit	AM Peak Hour			PM Peak Hour			Daily Trips
			in	out	total	in	out	total	
General Light Industrial	110	KSF	88%	12%	0.70	13%	87%	0.63	4.96
Business Park	770	KSF	61%	39%	0.40	46%	54%	0.42	12.44

Table 3: Projected Site-Generated Peak-Hour and Daily Traffic Volumes

Land Use		ITE Code	Intensity (KSF)	AM Peak Hour			PM Peak Hour			Daily Trips
				in	out	total	in	out	total	
Phase 1	G. Light Industrial	110	152.2	94	13	107	12	84	96	755
	Business Park	770	152.7	38	24	62	30	35	65	1,900
	Phase 1 Total			132	37	169	42	119	161	2,655
Phases 2 to 5	G. Light Industrial	110	780.4	481	66	547	64	428	492	3,871
	Business Park	770	333.4	82	52	134	65	76	141	4,148
	Phases 2 to 5 Total			563	118	681	129	504	633	8,019
Full Development Total Trips				695	155	850	171	623	794	10,674

3.4.1 Pass-by Trips

Pass-by trips are not new trips, but they are the trips that are attracted from the traffic passing the site on adjacent roadways. While pass-by trips are new trips at the access points to the site, they are not new trips on the adjacent roadway systems

3.4.2 Internal Trips

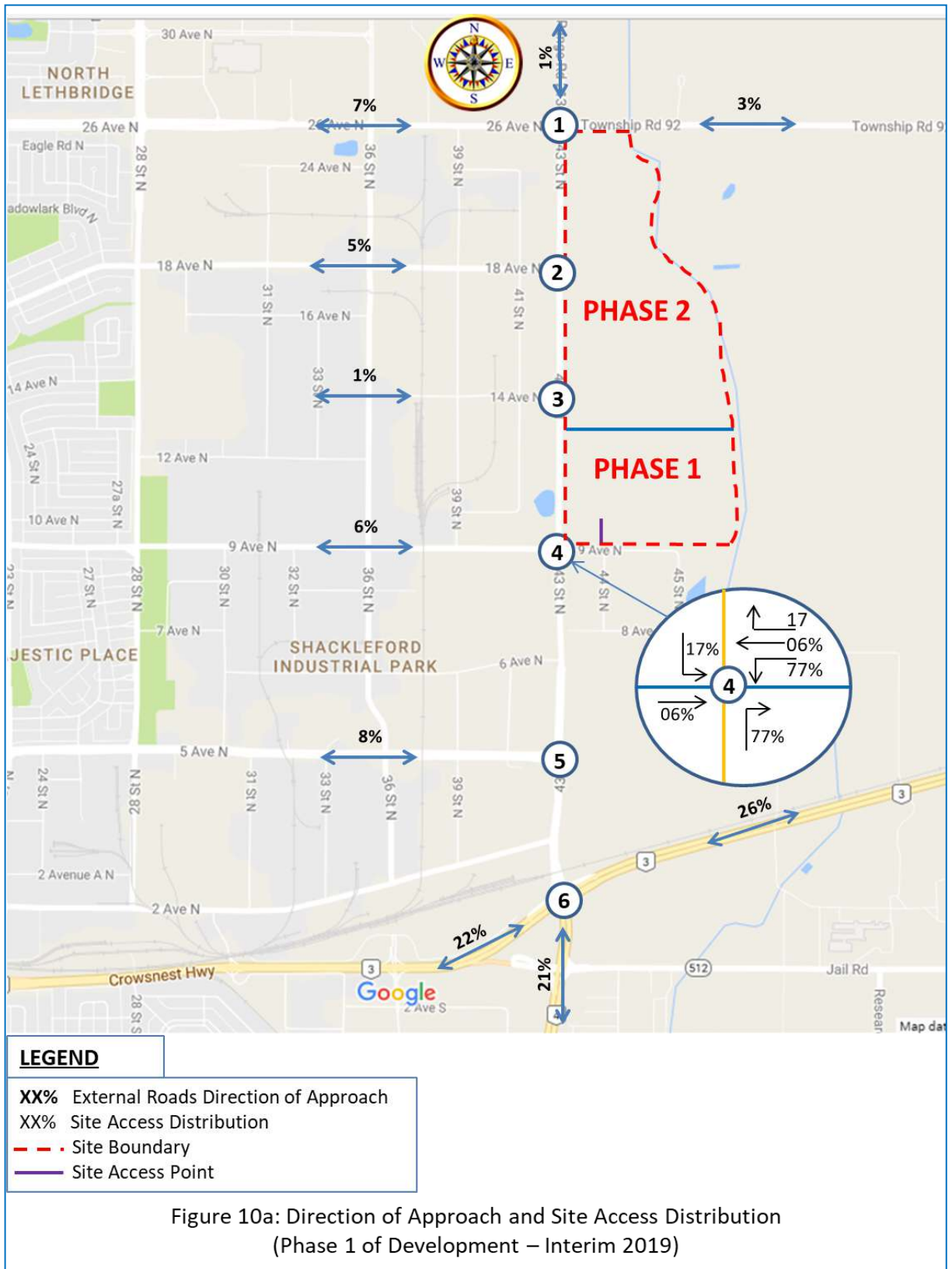
An internal trip is a trip that has both its origin and destination within a multi-use development area under investigation, which should be deducted from the total number of trips departing and entering the study site. The appropriate internal trip reduction rates are based on the characteristics of the mixed land uses. The proposed development has a potential for some internal trips but to be conservative in the analysis no internal trips were considered for this development.

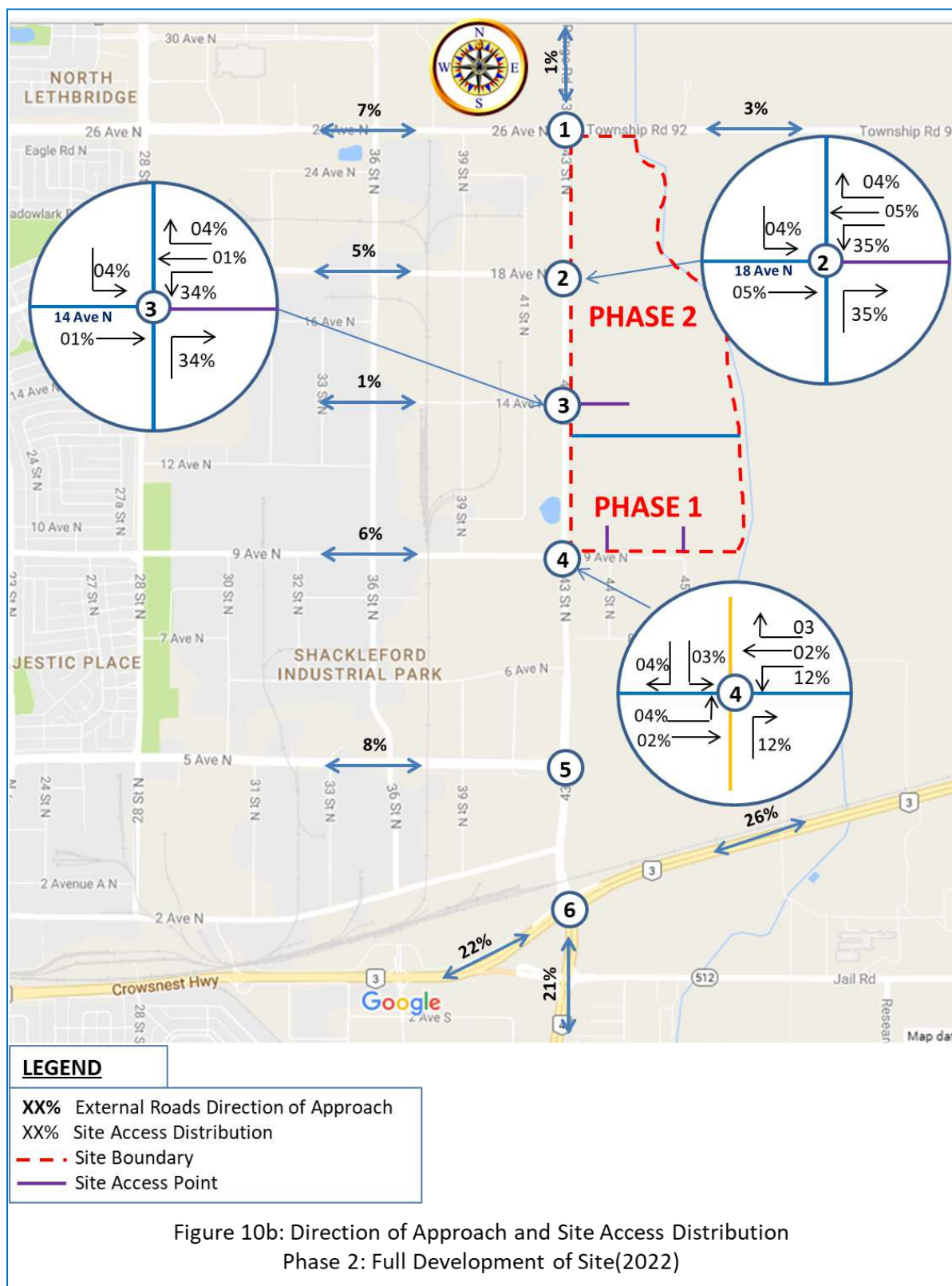
3.5 Trip Distribution

The directions from which vehicles will approach and depart a site is a function of several variables, including the population and employment distribution within the development's area of influence, the operational characteristics of the road system, and the ease with which drivers can travel over various sections of the roadway network without encountering congestion. The directional distribution of new project trips by the Chinook Industrial Park development was estimated based on the consideration of all the pertinent factors above including existing traffic patterns. The resulting directional distributions are as follows:

- 22% of site generated trips will travel to and from the west on Highway 3;
- 21% of site generated trips will travel to and from the south on 43 Street S;
- 26% of site generated trips will travel to and from the east on Highway 3;
- 08% of site generated trips will travel to and from the west on 5 Avenue N;
- 06% of site generated trips will travel to and from the west on 9 Avenue N;
- 01% of site generated trips will travel to and from the west on 14 Avenue N;
- 05% of site generated trips will travel to and from the west on 18 Avenue N;
- 07% of site generated trips will travel to and from the west on 26 Avenue N;
- 01% of site generated trips will travel to and from the north on 43 Street N; and
- 03% of site generated trips will travel to and from the east on Township Road 92.

Site access distribution percentages were determined based on the above directional distributions coupled with the ability of traffic to perform the needed turns and in relation to the available site accesses during each development phase. The resulting final directions of approaches and site access traffic distributions for Phase 1 and Phase 2 are illustrated on **Figure 10a** and **Figure 10b**, respectively.





3.6 Trip Assignment

3.6.1 Project Built-Out (Opening Year – 2019) Volumes

The projected peak-hour traffic volumes for the Chinook Industrial Park Phase 1 of the development were assigned to the adjacent roadways based on the estimated directional distribution as shown on **Figure 10a**. The resulting site generated AM peak hour and PM peak hour trips are illustrated on **Figure 11**.

The project built-out year traffic volumes (opening year volumes) were prepared by adding the development's Phase 1 site-generated trips shown on Figure 11 to the Total 2019 Background traffic volumes shown on Figure 7. The resulting project built-out 2019 traffic volumes are presented on **Figure 13**.

3.6.2 Future Traffic Volumes

The projected full development (Phase 2) peak-hour traffic volumes for the Chinook Industrial Park were assigned to the adjacent roadways based on the estimated directional distribution as shown on **Figure 10b**. The resulting site generated AM peak hour and PM peak hour trips for the full development of the site are illustrated on **Figure 12**.

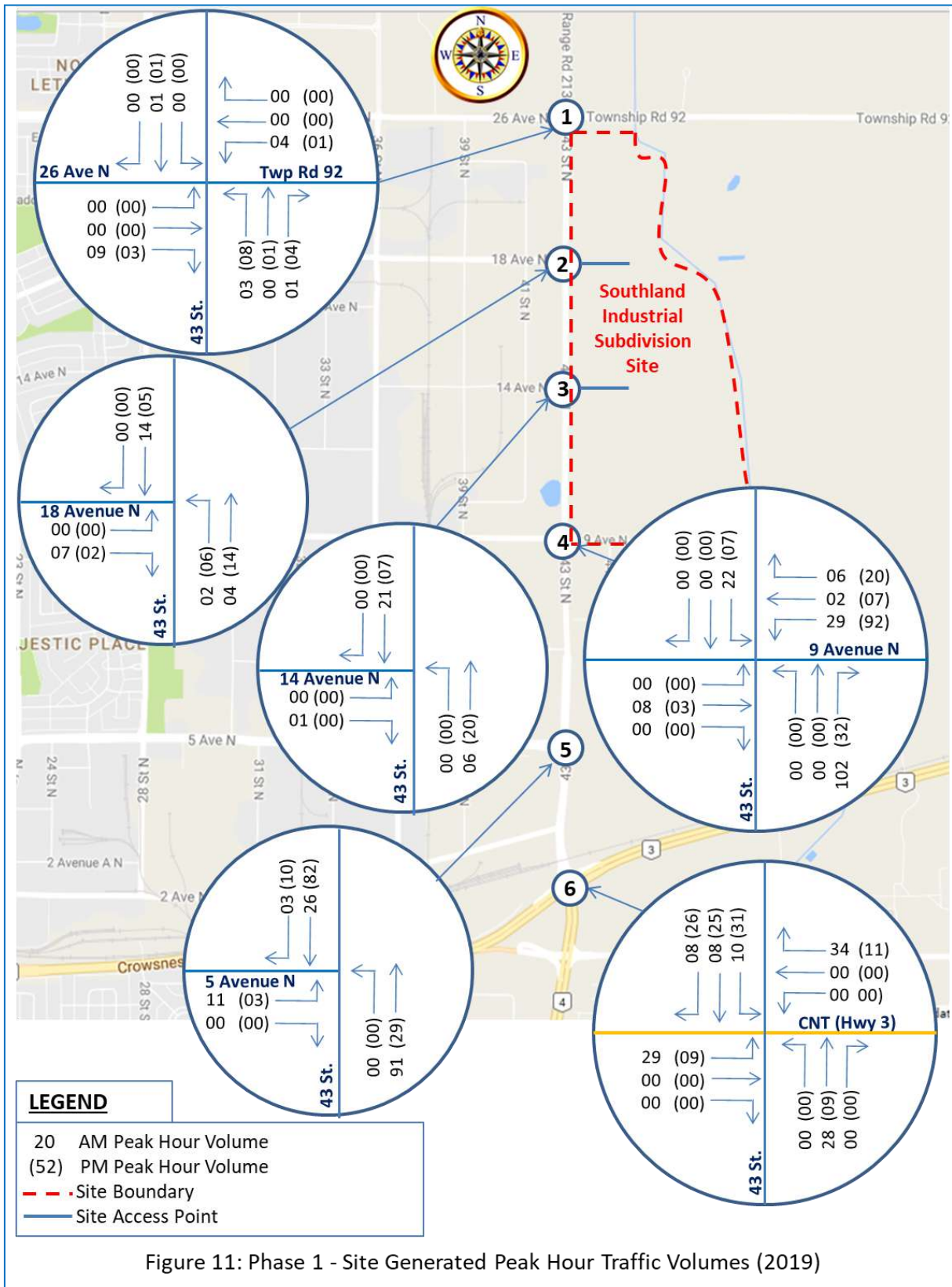
The development site-generated trips shown on **Figure 12** were then added to the 2022 and 2037 total background peak-hour traffic volumes shown on **Figure 8 and Figure 9** to arrive at the future 2022 and future 2037 peak-hour total traffic volumes, which are illustrated on **Figure 14 and Figure 15**.

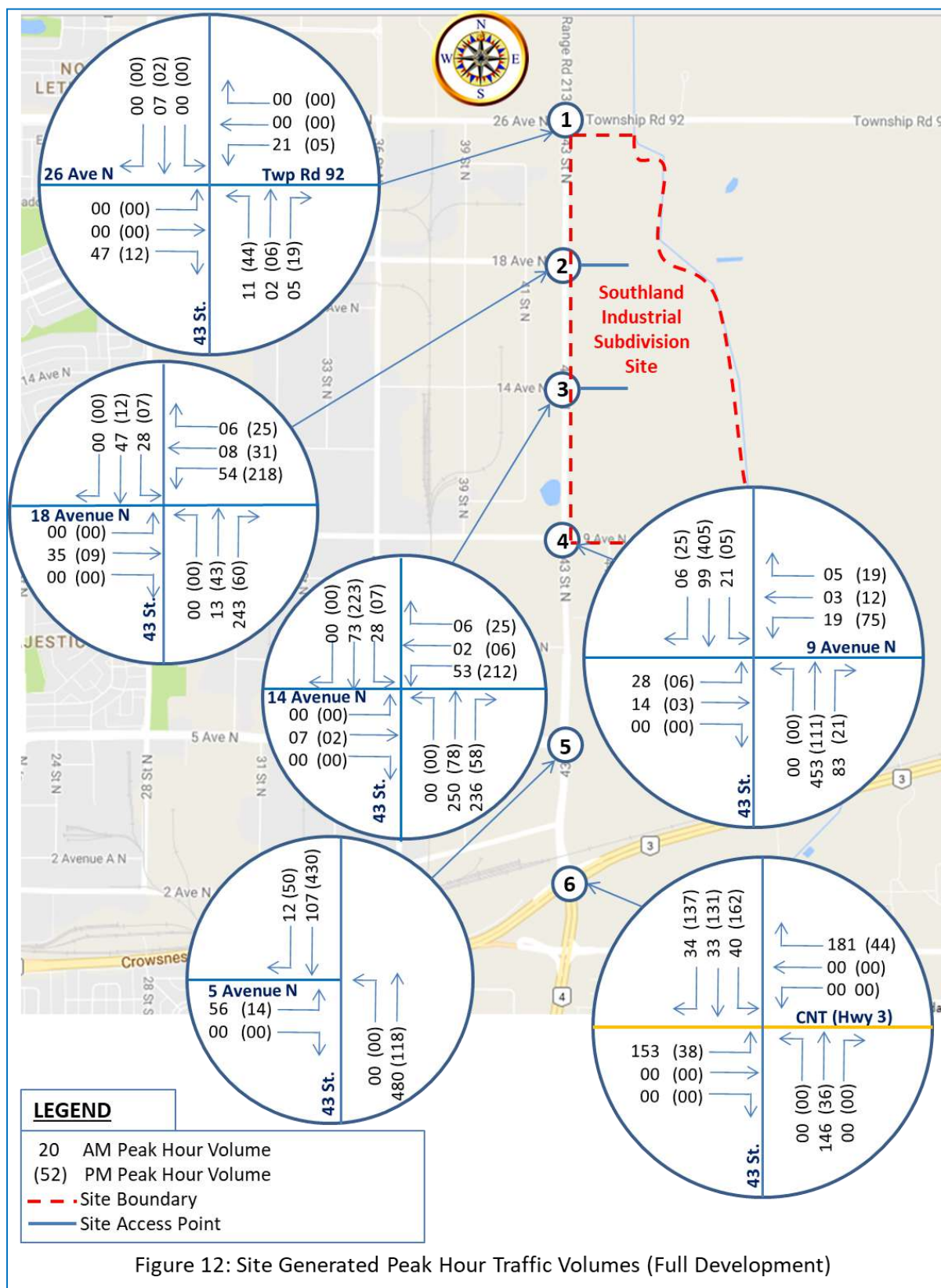
3.6.3 Average Daily Traffic Volumes

The Future 2037 average daily traffic (ADT) volumes for the study area roadway links with the proposed Chinook Industrial Park traffic were estimated from the AM and PM peak hour volumes. As per the City of Lethbridge directions, the following formula was utilized to calculate the ADT volumes:

$$ADT = (AM\ Peak\ Hour\ Volume + PM\ Peak\ Hour\ Volume) * 5.6$$

The above formula was applied on the turning movement traffic volumes in order to estimate the roadway link ADT volumes. The resulting Future 2037 estimated ADT volumes are illustrated on **Figure 16**.





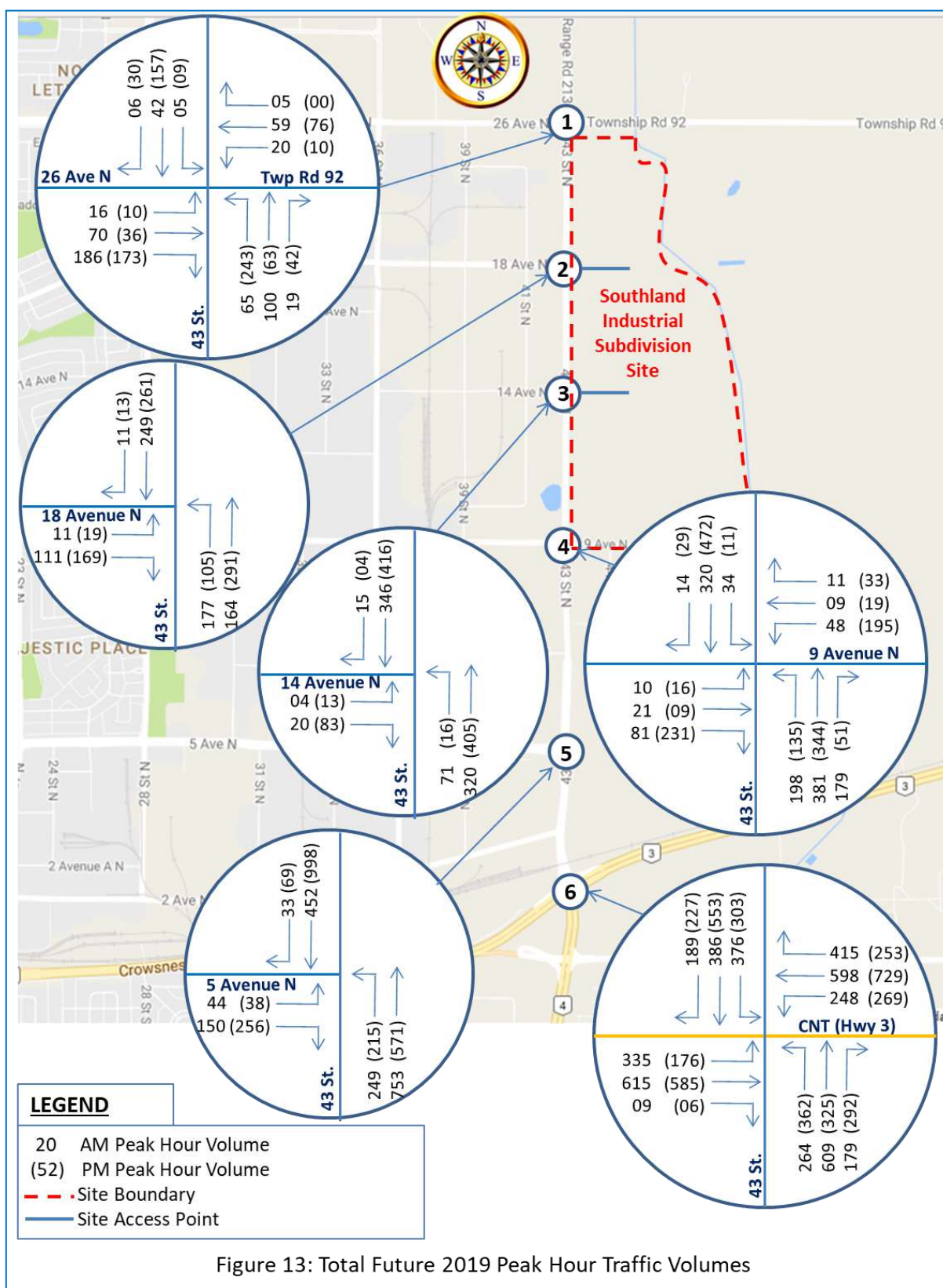
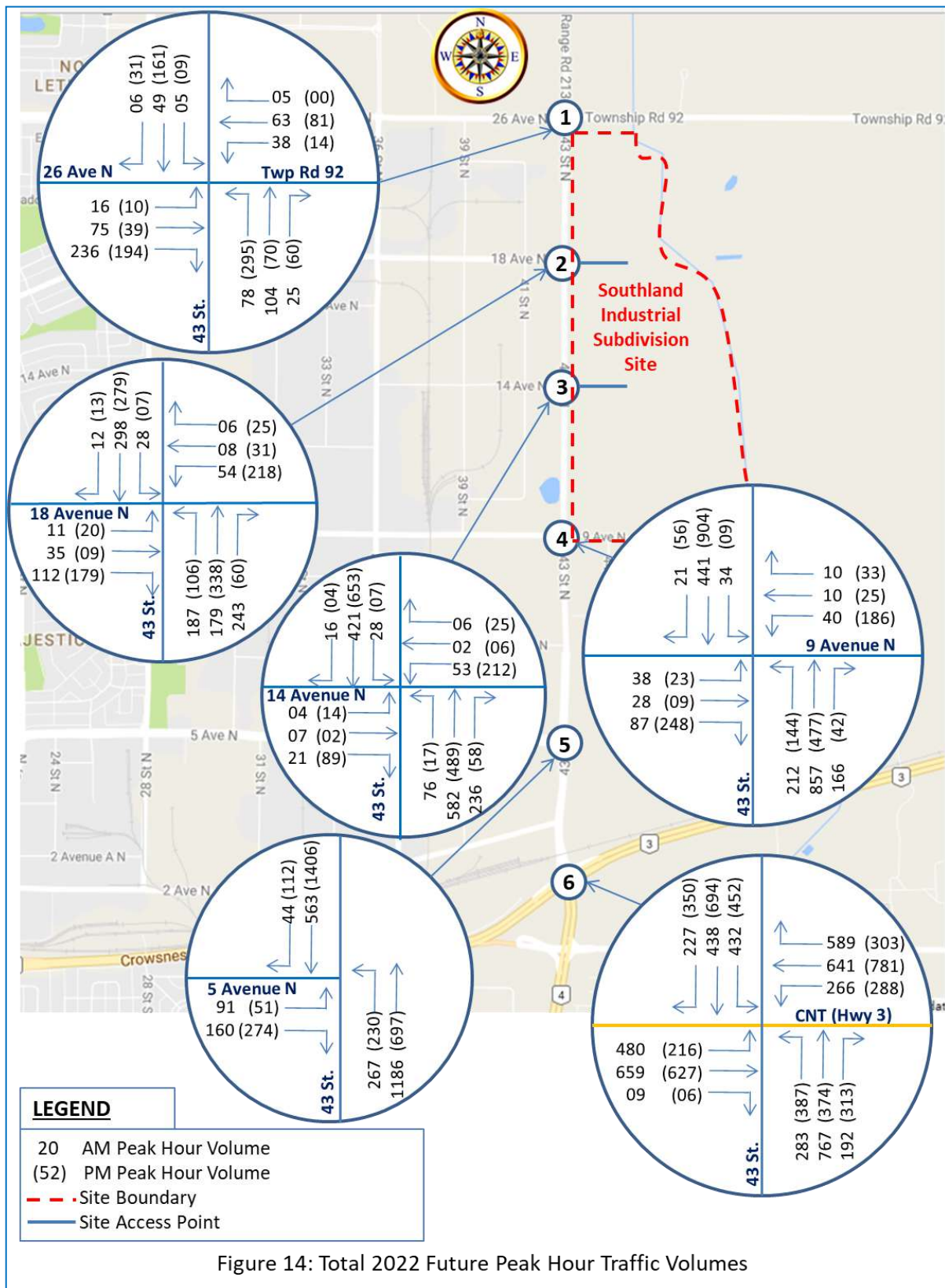


Figure 13: Total Future 2019 Peak Hour Traffic Volumes



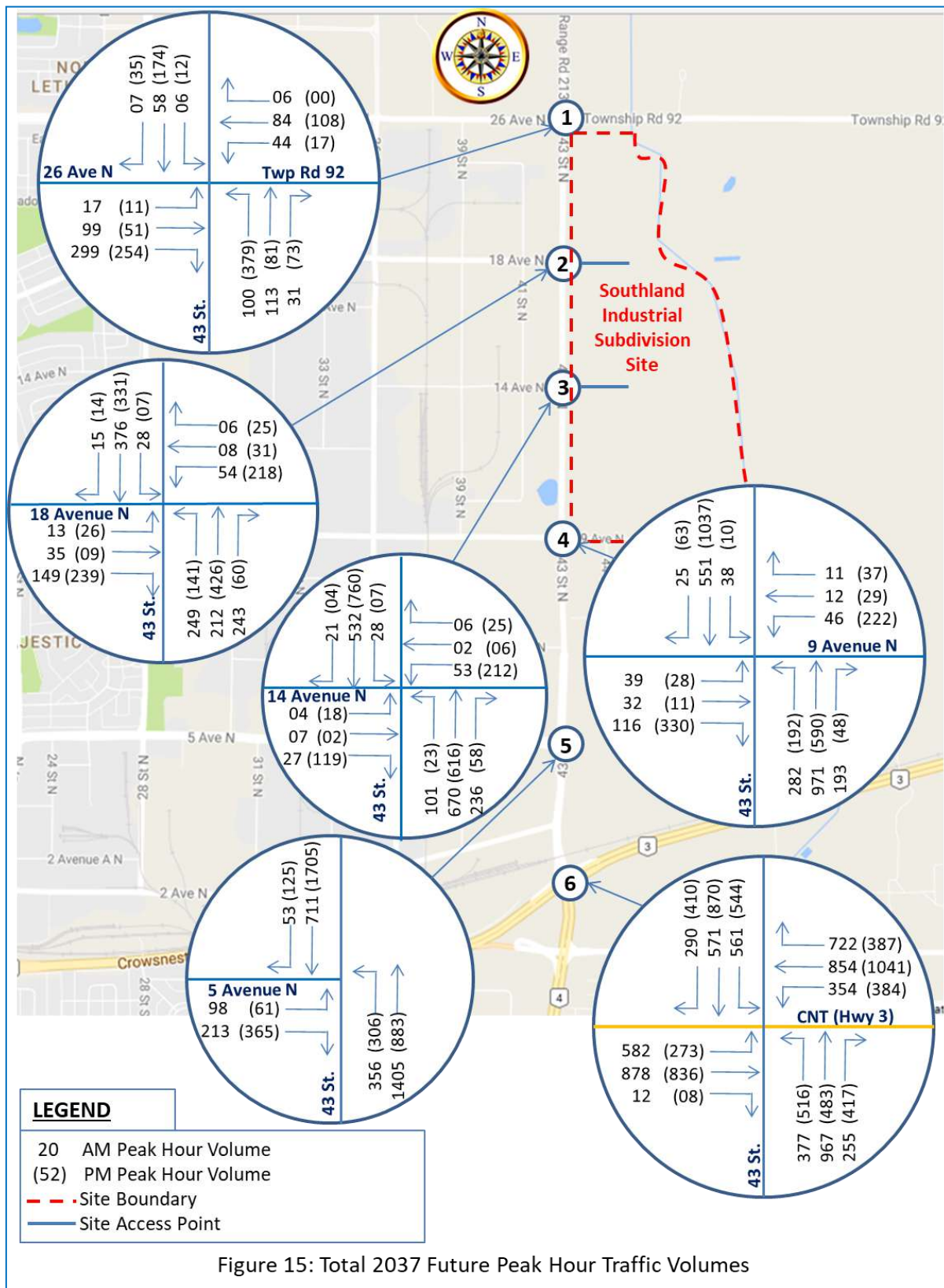
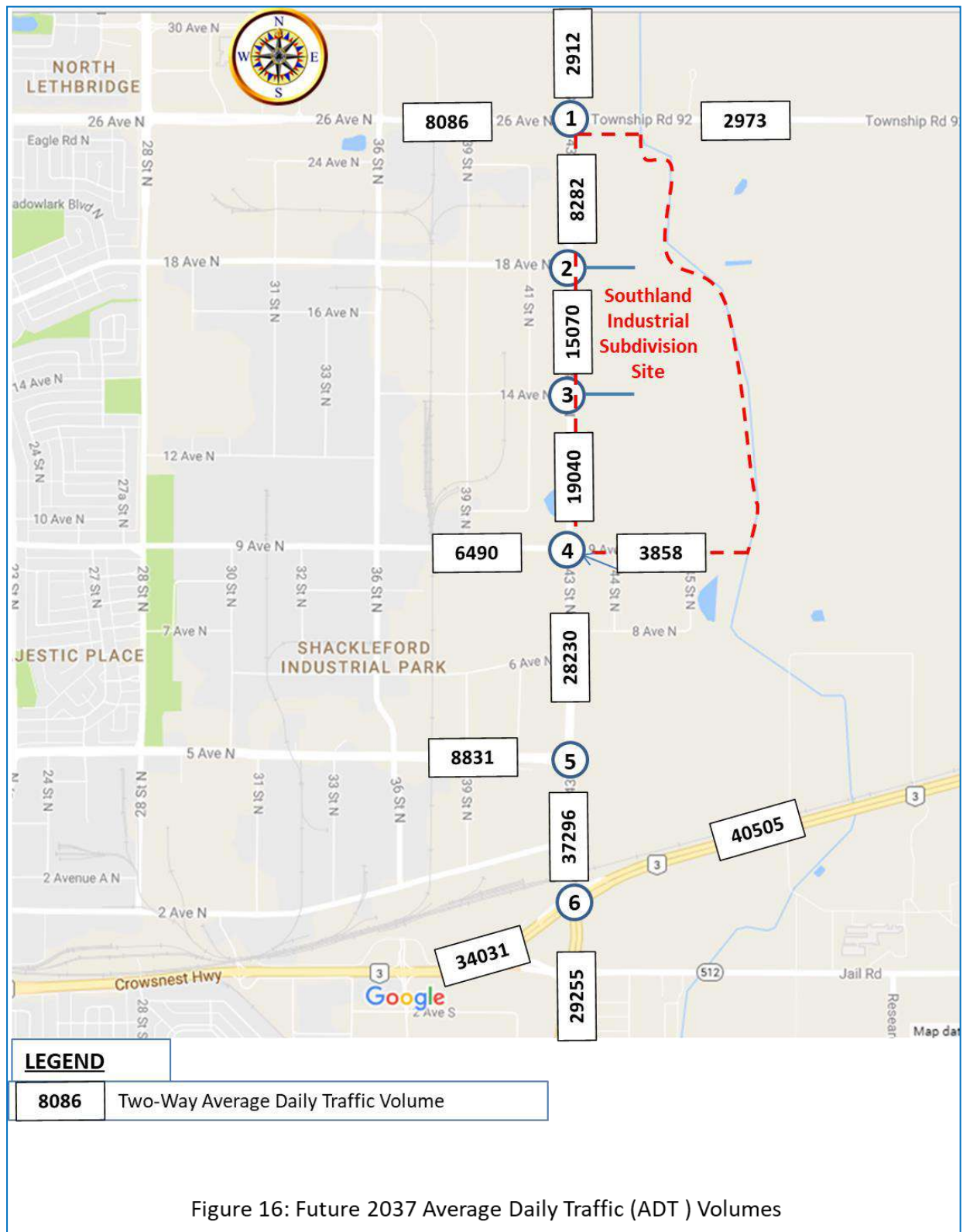


Figure 15: Total 2037 Future Peak Hour Traffic Volumes



4.0 EVALUATION AND RECOMMENDED IMPROVEMENTS

4.1 Level of Service Criteria for Intersections

The intersections identified for the study were analyzed according to the methodologies presented in the **2010 Highway Capacity Manual**. The analysis determines the "Level of Service (LOS)" of unsignalized and signalized intersections considering the factors including but not limited to number and types of lanes, traffic volumes, heavy vehicle composition, peak hour factors, pedestrian activities, etc. Levels of service are expressed in a range from "A" through "F," with "A" being the highest level of service, and "F" representing the lowest level of service. **Table 4** shows the thresholds for Levels of Service "A" through "F" for unsignalized intersections and **Table 5** presents the LOS criteria for signalized intersections.

Table 4: Level of Service Criteria for Unsignalized Intersections *

Level of Service	Delay/Vehicle (seconds)	Description
A	≤ 10.0	Little or no delay, very low main street traffic.
B	10.1 to 15.0	Short traffic delays, many acceptable gaps.
C	15.1 to 25.0	Average traffic delays, frequent gaps still occur.
D	25.1 to 35.0	Long traffic delays, limited number of acceptable gaps.
E	35.1 to 50.0	Very long traffic delays, very small number of acceptable gaps.
F	> 50.0	Extreme traffic delays, virtually no acceptable gaps in traffic.

* Note: Capacity analysis for two-way stop-controlled intersection provides the LOS for the critical movements, not of the overall intersection.

Table 5: Level of Service Criteria for Signalized Intersections

Level of Service	Delay/Vehicle (seconds)	Description
A	≤ 10.0	Most vehicles do not stop at all.
B	10.1 to 20.0	Some vehicles stop.
C	20.1 to 35.0	The number of vehicles stopping is significant, although many pass through without stopping.
D	35.1 to 55.0	Many vehicles stop. Individual cycle failures are noticeable.
E	55.1 to 80.0	Considered to be the limit of acceptable delay. Individual cycle failures are frequent.
F	> 80.0	Unacceptable delay.

4.2 Capacity and Level of Service Analyses

Capacity and level of service analyses were conducted for the following conditions:

- Existing 2017 Conditions;
- Background 2019, 2022, and 2037 Conditions (without site traffic); and
- Future 2019, 2022 and 2037 Conditions (with the site traffic);

The software package Synchro 8 was utilized for the capacity analyses of all study intersections and site accesses. The Synchro software utilizes *Highway Capacity Manual 2010* methodologies for the evaluations.

Note that the observed heavy vehicle percentages and peak hour factors (PHF) were utilized in the Synchro software capacity analysis. For new approaches, a heavy vehicle percentage of 10% and a PHF of 0.92 were utilized for capacity analysis.

4.2.1 Existing 2017 Conditions

Existing capacity and level of service analysis results for the study intersections are presented in **Table 6**. These results were taken from the HCM 2010 Capacity Analyses Reports produced by Synchro software. Note that all capacity analysis results reported in all results tables that follow were also taken from the **HCM 2010**. The detailed capacity and LOS HCM 2010 analyses reports for all capacity analyses scenarios are contained in **Appendix C** of this report. The detailed capacity and LOS analyses reports, based on Synchro capacity analyses method, for all scenarios are contained in **Appendix D** for comparison purposes. The actual Synchro software capacity analyses files are contained in **Appendix E**.

A review of **Table 6** capacity analysis results indicates that all study area intersections, both signalized and unsignalized, are currently operating at acceptable levels of service during both the AM and the PM peak hours including the stop-controlled intersection approaches. Therefore, no mitigation is needed under existing traffic conditions.

A review of **Table 6** regarding the volume to capacity (V/C) ratios indicates that all existing intersections movements V/C have values below 0.80 except the northbound left-turn movements at the 43 Street N / 9 Avenue N intersection and 43 Street N / 5 Avenue N intersection that have values exceeding 0.80 and reaching 1.00. However, these reported V/C values in the results tables are based on the HCM 2010 analysis method. If these same values were compared with those produced based on the Synchro analysis method, the Synchro method estimated much lower values. For example, HCM estimated **1.00** V/C value for the NB left turn movement at the intersection of 43 Street N and 5 Avenue N; however, the Synchro method estimated **0.68** ratio for the same movement, this is significantly lower. Therefore, it is believed that the HCM analysis method, in general, estimates higher V/C ratios and therefore, these movements should be carefully reviewed before recommending improvements.

Table 6: HCM Capacity Analysis Results for Existing 2017 Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized)	EB	0.360	11.5	B	0.293	12.0	B
	WB	0.173	12.8	B	0.261	19.8	C
	NB	0.050	4.3	A	0.157	6.0	A
	SB	0.004	1.0	A	0.005	1.0	A
43 Street North and 18 Avenue North (Unsignalized)	EB	0.195	11.5	B	0.264	11.3	A
	WB	-	-	-	-	-	-
	NB	0.172	5.6	A	0.080	2.2	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 14 Avenue North (Unsignalized)	EB	0.049	12.5	B	0.178	12.1	A
	WB	-	-	-	-	-	-
	NB	0.073	1.9	A	0.015	0.3	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 9 Avenue North (Signalized)	Overall	-	27.9	C	-	20.8	C
	EB	0.10	43.4	D	0.08	40.9	D
	WB	0.15	44.3	D	0.54	44.4	D
	NB	0.98	37.9	D	0.85	22.0	C
	SB	0.18	9.4	A	0.23	10.5	B
43 Street North and 5 Avenue North (Signalized)	Overall	-	22.7	C	-	16.9	B
	EB	0.15	46.3	D	0.16	45.3	D
	NB	1.00	28.9	C	0.89	22.2	C
	SB	0.24	9.4	A	0.44	11.6	B
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	36.1	D	-	33.1	C
	EB	0.75	36.1	D	0.59	33.4	C
	WB	0.67	34.7	C	0.67	29.8	C
	NB	0.78	40.2	D	0.60	31.6	C
	SB	0.64	33.9	C	0.73	37.4	D

^(a) The V/C values presented are for the movements with highest V/C within that approach

4.2.2 Background 2019, 2022 and 2037 Conditions

LOS and capacity analyses results for the background 2019, 2022 and 2037 traffic conditions (without site development generated traffic) for all study area intersections are presented in **Table 7, Table 8 and Table 9**, respectively.

The Background 2037 Mitigated traffic conditions capacity analysis results are presented in **Table 10**.

Table 7: HCM Capacity Analysis Results for Background 2019 Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized)	EB	0.452	13.6	B	0.433	16.7	C
	WB	0.228	15.2	C	0.404	31.0	D
	NB	0.053	2.6	A	0.188	5.8	A
	SB	0.005	0.7	A	0.007	0.4	A
43 Street North and 18 Avenue North (Unsignalized)	EB	0.254	13.3	B	0.349	13.9	B
	WB	-	-	-	-	-	-
	NB	0.187	4.5	A	0.097	2.2	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 14 Avenue North (Unsignalized)	EB	0.068	14.2	B	0.234	14.5	B
	WB	-	-	-	-	-	-
	NB	0.080	1.6	A	0.019	0.3	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 9 Avenue North (Signalized)	Overall	-	29.5	C	-	20.4	C
	EB	0.10	43.0	D	0.10	40.4	D
	WB	0.15	43.7	D	0.55	44.0	D
	NB	1.03	39.4	D	0.86	21.7	C
	SB	0.20	9.9	A	0.31	11.8	B
43 Street North and 5 Avenue North (Signalized)	Overall	-	25.2	C	-	18.3	B
	EB	0.19	44.7	D	0.18	44.5	D
	NB	1.05	31.8	C	0.92	23.9	C
	SB	0.27	10.5	B	0.51	13.0	B
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	40.0	D	-	35.9	D
	EB	0.83	40.8	D	0.64	37.2	D
	WB	0.71	38.4	D	0.73	33.5	C
	NB	0.86	45.2	D	0.65	32.5	C
	SB	0.71	35.8	D	0.78	39.7	D

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 7** indicates that all study intersections would continue to operate at acceptable levels during both AM peak hour and PM peak hour. Therefore, no mitigation would be needed for any of the study area intersections under background 2019 conditions.

Table 8: HCM Capacity Analysis Results for Background 2022 Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized)	EB	0.489	14.4	B	0.485	18.5	C
	WB	0.253	16.0	C	0.456	35.5	E
	NB	0.058	2.7	A	0.202	5.9	A
	SB	0.005	0.7	A	0.007	0.3	A
43 Street North and 18 Avenue North (Unsignalized)	EB	0.281	13.9	B	0.385	14.7	B
	WB	-	-	-	-	-	-
	NB	0.203	4.7	A	0.105	2.2	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 14 Avenue North (Unsignalized)	EB	0.077	14.7	B	0.263	15.4	C
	WB	-	-	-	-	-	-
	NB	0.088	1.6	A	0.020	0..	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 9 Avenue North (Signalized)	Overall	-	18.4	B	-	19.0	B
	EB	0.11	42.9	D	0.10	39.9	D
	WB	0.16	43.7	D	0.57	43.7	D
	NB	0.87	19.9	B	0.84	17.3	B
	SB	0.23	11.9	B	0.34	12.9	B
43 Street North and 5 Avenue North (Signalized)	Overall	-	14.8	B	-	16.5	B
	EB	0.19	44.5	D	0.18	44.4	D
	NB	0.87	14.5	B	0.88	17.2	B
	SB	0.31	13.2	B	0.57	15.0	B
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	44.8	D	-	39.3	D
	EB	0.93	50.5	D	0.71	41.8	D
	WB	0.79	42.8	D	0.81	38.3	D
	NB	0.91	49.4	D	0.70	33.6	C
	SB	0.76	36.8	D	0.82	42.3	D

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 8** indicates that all study intersections would continue to operate at acceptable levels during both AM peak hour and PM peak hour under the 2022 background conditions. Therefore, no mitigation would be needed for any of the study area intersections under background 2022 conditions.

Table 9: HCM Capacity Analysis Results for Background 2037 Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized)	EB	0.697	21.4	C	0.901	59.8	F
	WB	0.438	23.9	C	0.985	139.5	F
	NB	0.077	3.0	A	0.274	6.3	A
	SB	0.006	0.7	A	0.009	0.4	A
43 Street North and 18 Avenue North (Unsignalized)	EB	0.472	20.3	C	0.604	22.3	C
	WB	-	-	-	-	-	-
	NB	0.296	5.4	A	0.148	2.4	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 14 Avenue North (Unsignalized)	EB	0.125	18.4	C	0.445	22.3	C
	WB	-	-	-	-	-	-
	NB	0.132	1.8	A	0.031	0.4	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 9 Avenue North (Signalized)	Overall	-	20.6	C	-	22.6	C
	EB	0.13	42.5	D	0.11	37.7	D
	WB	0.21	43.7	D	0.63	41.9	D
	NB	0.90	21.3	C	0.88	20.2	C
	SB	0.33	15.9	B	0.49	18.8	B
43 Street North and 5 Avenue North (Signalized)	Overall	-	17.4	B	-	23.4	C
	EB	0.21	44.0	D	0.21	43.7	D
	NB	0.90	15.8	B	0.92	20.7	C
	SB	0.47	18.9	B	0.82	24.8	C
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	114.5	F	-	80.2	F
	EB	1.54	180.7	F	1.15	98.9	F
	WB	1.26	121.9	F	1.09	61.7	E
	NB	1.18	109.8	F	1.15	85.9	F
	SB	0.90	45.6	D	1.07	80.6	F

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 9** indicates that all study area intersections would continue to operate at acceptable levels during both AM peak hour and PM peak hour except for the following two intersections that would operate at unacceptable levels of service:

1. 43 Street N and 26 Avenue N / Township Road 92; and
2. Highway 3/Crowsnest Highway and 43 Street N.

Therefore, mitigations would be needed for these two intersections under the **background 2037 traffic conditions**. The proposed mitigations consist of the following:

43 Street N and 26 Avenue N / Township Road 92 Intersection

- Installation of a two-phase traffic signal

Highway 3/Crowsnest Highway and 43 Street Intersection

- Installation of a second westbound left-turn only lane;
- Installation of a second eastbound left-turn only lane;
- Installation of a third westbound through only lane;
- Installation of a third eastbound through only lane; and
- Optimization of the traffic signal splits.

The background 2037 Synchro traffic capacity analysis models were updated with the above suggested mitigations and the capacity analysis results of the mitigated traffic conditions are presented in **Table 10**.

Table 10: HCM Capacity Analysis Results for Background 2037 Mitigated Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Signalized)	Overall	-	11.3	B	-	13.1	B
	EB	0.64	10.9	B	0.66	18.0	B
	WB	0.19	7.8	A	0.23	14.2	B
	NB	0.54	13.8	B	0.68	12.0	B
	SB	0.16	11.3	B	0.29	8.2	A
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	47.3	D	-	43.1	D
	EB	0.83	39.8	D	0.74	35.1	D
	WB	0.72	34.3	C	0.91	39.3	D
	NB	1.05	63.5	E	1.05	55.7	E
	SB	1.05	52.0	D	0.97	44.5	D

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 10** indicates that the operation at these two intersections would improve significantly with the suggested mitigations. The intersection of 43 Street and 26 Avenue N / Township Road 92 would operate at acceptable levels of service during the AM and PM peak hours with the two-phase signal. The intersection of Highway 3 / Crowsnest Highway and 43 Street would improve but the NB would continue to operate at LOS "E", which represents full capacity level of service. Any additional traffic would cause this intersection to perform at unacceptable levels of service and therefore, grade separation would be the most appropriate solution after 20 years.

Also, as discussed earlier, the **2006 Functional Planning Study completed by Stantec⁽¹⁾** for Highways 3 & 4 in Lethbridge area proposes / recommends new alignments for these highways that would provide external links allowing external traffic to by-pass the City and hence reducing Crowsnest Highway traffic within Lethbridge city. When these external links are built, significant reductions in traffic volumes would occur at the Crowsnest Highway / 43 Street intersection and operation would improve. Therefore, a reevaluation of this intersection operations at that time, should be performed to determine whether intersection improvements would actually be required.

4.2.3 Future 2019, 2022 and 2037 Conditions

LOS and capacity analyses results for the future 2019, 2022 and 2037 traffic conditions (with site development generated traffic) for all study area intersections are presented in **Table 11, Table 12 and Table 14**, respectively.

The capacity analysis results for the future 2022 mitigated conditions and future 2037 mitigated conditions are presented in **Table 13 and Table 15**, respectively.

⁽¹⁾ http://www.transportation.alberta.ca/projects/assets/Area_8_South/Hwy%203%20Lethbridge/Executive_Summary.pdf

Table 11: HCM Capacity Analysis Results for Future 2019 Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized)	EB	0.468	13.9	B	0.446	17.2	C
	WB	0.252	16.1	C	0.420	32.7	D
	NB	0.056	2.7	A	0.195	5.8	A
	SB	0.005	0.7	A	0.007	0.3	A
43 Street North and 18 Avenue North (Unsignalized)	EB	0.274	13.7	B	0.359	14.2	B
	WB	-	-	-	-	-	-
	NB	0.192	4.5	A	0.102	2.2	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 14 Avenue North (Unsignalized)	EB	0.073	14.6	B	0.239	14.8	B
	WB	-	-	-	-	-	-
	NB	0.082	1.6	A	0.019	0.3	A
	SB	-	0.0	A	-	0.0	A
43 Street North and 9 Avenue North (Signalized)	Overall	-	19.2	B	-	22.9	C
	EB	0.14	42.1	D	0.070	33.8	C
	WB	0.37	44.8	D	0.690	39.9	D
	NB	0.86	19.6	B	0.840	19.4	B
	SB	0.21	11.8	B	0.30	17.0	B
43 Street North and 5 Avenue North (Signalized)	Overall	-	14.4	B	-	16.0	B
	EB	0.21	43.9	D	0.19	44.3	D
	NB	0.87	13.8	B	0.87	16.6	B
	SB	0.31	13.0	B	0.57	14.5	B
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	42.2	D	-	36.9	D
	EB	0.91	45.2	D	0.650	37.9	D
	WB	0.72	39.0	D	0.740	34.6	C
	NB	0.90	48.6	D	0.660	33.1	C
	SB	0.74	36.1	D	0.800	40.8	D

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 11** indicates that all study intersections would continue to operate at acceptable levels during both AM peak hour and PM peak hour under the future 2019 traffic conditions with site generated traffic. Therefore, no mitigations would be needed for any of the study area intersections under future 2019 traffic conditions.

Table 12: HCM Capacity Analysis Results for Future 2022 Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized)	EB	0.573	16.2	C	0.571	22.8	C
	WB	0.416	23.6	C	0.627	58.3	F
	NB	0.068	2.9	A	0.237	5.9	A
	SB	0.005	0.6	A	-	0.0	A
43 Street North and 18 Avenue North (Unsignalized)	EB	0.974	103.7	F	0.517	20.6	C
	WB	1.848	619.3	F	2.524	768.6	F
	NB	0.214	2.8	A	0.104	1.8	A
	SB	0.035	0.7	A	0.008	0.2	A
43 Street North and 14 Avenue North (Unsignalized)	EB	0.373	579	F	0.484	31.1	D
	WB	1.300	357.2	F	3.720	1345.6	F
	NB	0.095	0.8	A	0.026	0.3	A
	SB	0.052	0.6	A	0.008	0.1	A
43 Street North and 9 Avenue North (Signalized)	Overall	-	16.9	B	-	23.9	C
	EB	0.250	43.3	D	0.110	35.4	D
	WB	0.310	44.3	D	0.69	41.4	D
	NB	0.880	154	B	0.850	18.8	B
	SB	0.300	13.1	B	0.69	22.3	C
43 Street North and 5 Avenue North (Signalized)	Overall	-	15.3	B	-	20.8	C
	EB	0.350	43.1	D	0.220	43.5	D
	NB	0.880	13.5	B	0.89	17.3	B
	SB	0.410	15.6	B	0.83	22.1	C
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	85.0	F	-	50.0	D
	EB	1.720	188.6	F	0.830	47.3	D
	WB	0.860	41.4	D	0.800	36.2	D
	NB	0.950	56.7	E	0.860	44.7	D
	SB	0.880	39.3	D	1.030	64.1	E

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 12** indicates that the following four intersections would operate at unacceptable levels of service and would require mitigations:

1. 43 Street North and 18 Avenue North (Unsignalized);
2. 43 Street North and 14 Avenue North (Unsignalized); and
3. Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)

The intersection of 43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized) would have the westbound approach, during the PM peak hour only, operate at LOS "F" with an average delay of 58.3 seconds per vehicle and a V/C ratio of 0.627. This amount of delay is usually considered acceptable by the drivers especially noting that the V/C ratio is relatively low. However, to ensure that no such delays are experienced by intersection users the following is recommended:

- Installation of a two-phase traffic signal under future 2022 traffic conditions.

The remaining two signalized intersections located at 9 Avenue North and at 5 Avenue North would continue to operate at acceptable levels of service during both AM peak hour and PM peak hour. Therefore, mitigations would only be needed for the three study intersections listed above under future 2022 conditions (with site traffic).

The proposed mitigations under the future 2022 conditions consist of the following:

43 Street N and 18 Avenue N / Site Access

- Installation of a two-phase traffic signal

43 Street N and 14 Avenue N / Site Access

- Installation of a two-phase traffic signal; and
- Installation of a northbound left-turn only lane.

Highway 3 / Crowsnest Highway and 43 Street Intersection

- Installation of a second eastbound left-turn only lane; and
- Optimization of the traffic signal splits.

The future 2022 Synchro traffic capacity analysis models were updated with the above suggested mitigations and the capacity analysis results for the mitigated traffic conditions are presented in **Table 13**.

Table 13: HCM Capacity Analysis Results for Future 2022 Mitigated Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street North and 18 Avenue North (Signalized)	Overall	-	32.7	C	-	26.3	C
	EB	0.47	34.8	C	0.39	25.7	C
	WB	0.23	31.2	C	0.69	39.2	D
	NB	0.96	44.1	D	0.74	25.8	C
	SB	0.42	11.4	B	0.38	16.6	B
43 Street North and 14 Avenue North (Signalized)	Overall	-	37.1	D	-	23.6	C
	EB	0.14	32.2	C	0.24	28.0	C
	WB	0.18	32.4	C	0.62	38.8	D
	NB	0.95	34.1	C	0.66	17.8	B
	SB	0.93	43.6	D	0.78	22.8	C
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	47.4	D	-	46.2	D
	EB	0.89	53.4	D	0.70	43.8	D
	WB	0.86	42.1	D	0.82	38.8	D
	NB	0.93	53.8	D	0.83	42.1	D
	SB	0.88	39.4	D	0.97	54.9	D

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 13** results indicates that the three intersections that previously failed would operate at acceptable levels of service with the proposed mitigations. Therefore, no further mitigations to any of these intersections would be needed under the future 2022 traffic conditions.

Table 14: HCM Capacity Analysis Results for Future 2037 Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street N and 26 Avenue N / Twp. Road 92 (Unsignalized)	EB	0.793	27.4	D	1.641	350.2	F
	WB	0.440	28.6	D	0.968	143.4	F
	NB	0.088	3.1	A	0.31	6.4	A
	SB	0.006	0.7	A	0.01	0.4	A
43 Street North and 18 Avenue North (Signalized)	Overall	-	102.9	F	-	42.5	D
	EB	0.55	35.4	D	0.63	38.2	D
	WB	0.24	30.4	C	1.11	129.5	F
	NB	1.32	180.8	F	0.82	25.8	C
	SB	0.51	14.0	B	0.39	12.3	B
43 Street North and 14 Avenue North (Signalized)	Overall	-	122.3	F	-	25.5	c
	EB	0.17	32.7	C	0.39	36.2	D
	WB	0.18	32.4	C	0.88	69.0	E
	NB	1.05	58.5	E	0.73	15.8	B
	SB	1.45	264.4	F	0.81	20.0	B
43 Street North and 9 Avenue North (Signalized)	Overall	-	21.7	C	-	33.2	C
	EB	0.26	43.4	D	0.11	33.2	C
	WB	0.36	44.9	D	0.74	42.2	D
	NB	0.98	21.8	C	0.89	23.0	C
	SB	0.40	16.2	B	0.92	38.4	D
43 Street North and 5 Avenue North (Signalized)	Overall	-	18.9	B	-	54.0	D
	EB	0.38	43.2	D	0.24	43.2	D
	NB	0.92	16.4	B	0.96	22.1	C
	SB	0.58	21.5	C	1.10	75.1	E
Highway 3 (Crowsnest Hwy) and 43 Street (Signalized)	Overall	-	78.6	E	-	50.6	D
	EB	1.15	77.1	E	0.76	50.3	D
	WB	0.67	36.5	D	0.86	48.6	D
	NB	1.26	138.9	F	0.91	43.7	D
	SB	1.05	59.0	E	0.99	56.2	E

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 14** results indicates that four intersections of the total six intersections would operate at unacceptable levels of service. Therefore, mitigations would be required under the future 2037 conditions at these intersections.

The proposed mitigations under the **future 2037** conditions consist of the following:

43 Street N and 26 Avenue N / Township Road 92 Intersection

- Installation of a two-phase traffic signal

43 Street N and 18 Avenue N / Site Access

- Installation of a northbound left-turn only lane; and
- Optimization of the traffic signal splits.

43 Street N and 14 Avenue N / Site Access

- Optimization of the traffic signal splits.

Highway 3 / Crowsnest Highway and 43 Street Intersection

- As mentioned earlier, the **2006 Functional Planning Study completed by Stantec⁽¹⁾** for Highways 3 & 4 in Lethbridge area proposes / recommends new alignments for these two highways that would provide external links allowing external traffic to by-pass the City and hence reducing Crowsnest Highway traffic within Lethbridge city. When these external links are built, significant reductions in traffic volumes would occur at the Crowsnest Highway / 43 Street intersection and operation would improve. Therefore, a reevaluation of this intersection operations at that time, should be performed to determine whether intersection improvements would be required.

The future 2037 Synchro traffic capacity analysis models were updated with the above suggested mitigations (excluding Highway 3 / Crowsnest Highway and 43 Street Intersection) and the capacity analysis results for the mitigated traffic conditions are presented in **Table 15**.

⁽¹⁾ http://www.transportation.alberta.ca/projects/assets/Area_8_South/Hwy%203%20Lethbridge/Executive_Summary.pdf

Table 15: HCM Capacity Analysis Results for Future 2037 Mitigated Traffic Conditions

Intersection	App.	AM Peak Hour			PM Peak Hour		
		V/C ^(a)	Delay "Sec"	LOS	V/C ^(a)	Delay "Sec"	LOS
43 Street North and 26 Avenue North / Township Road 92 (Signalized)	Overall	-	19.1	B	-	17.8	B
	EB	0.84	26.0	C	0.67	18.9	B
	WB	0.33	12.0	B	0.24	14.6	B
	NB	0.46	13.7	B	0.80	21.5	C
	SB	0.13	10.3	B	0.29	9.1	A
43 Street North and 18 Avenue North (Signalized)	Overall	-	16.9	B	-	25.3	C
	EB	0.78	48.4	D	0.48	24.3	C
	WB	0.40	38.6	D	0.74	37.3	D
	NB	0.54	11.5	B	0.69	24.3	C
	SB	0.44	8.4	A	0.47	19.3	B
43 Street North and 14 Avenue North/Site Access (Signalized)	Overall	-	12.1	B	-	27.9	C
	EB	0.42	47.9	D	0.32	29.0	C
	WB	0.40	47.0	D	0.70	37.00	D
	NB	0.84	12.4	B	0.80	22.4	C
	SB	0.58	6.0	A	0.89	30.0	C

^(a) The V/C values presented are for the movements with highest V/C within that approach

A review of **Table 15** results indicates that the three mitigated intersections would operate at acceptable levels of service with the proposed mitigations. Therefore, no further mitigations would be needed under the future 2037 traffic conditions.

4.2.4 Highway 3 / Crowsnest Highway and 43 Street Intersection

The capacity analysis results for the at grade intersection of Highway 3 / Crowsnest Highway and 43 Street with traffic signal showed unacceptable operations under background 2037 traffic conditions (without proposed site traffic) as well as under future 2037 with proposed site traffic. Therefore, by the year 2037 significant improvements including considering an interchange would be required based on the above capacity analysis results. However, if the proposed / recommended Highway 3 & 4 external links were built, Highway 3 east-west traffic volumes would be reduced significantly. Therefore, a reevaluation of this intersection is recommended.

A review of this intersection's future 2037 AM and PM left turning movement traffic volumes shown on Figure 15 indicates that they range between 287 and 705 vehicles per hour. These amounts of hourly traffic volumes indicate that a single free-flow interchange lane for each left turn movement would be able to accommodate the expected volumes. Merge / diverge capacity analysis has not been performed since there is no information about the future interchange configuration if it were determined needed.

4.2.5 Average Daily Traffic Volume Review

Figure 16 presents the Future 2037 ADT volumes for the study area roadway links with the proposed Chinook Industrial Park traffic volumes included. Note that these ADT's were estimated from the AM and PM peak hour volumes based on the City of Lethbridge recommended procedure discussed previously in subsection 3.6.3.

A review of the 43 Street North ADT volumes shown on Figure 16 between 9 Avenue N and 26 Avenue N indicates that they range between 8282 and 19040 vehicles per day these volumes are higher than the acceptable two-lane two-way facilities capacity levels as the City of Lethbridge's roadway design standards indicate 4-lane cross sections are required for ADT volumes above 8,000 vehicles per day. Based on the above, the existing 43 Street North two-lane roadway section between 9 Avenue N and 26 Avenue N would not be able to accommodate the future 2037 estimated traffic volumes. Therefore, under 2037 traffic conditions this section of 43 Street must be upgraded to 4-lane cross section to allow it to accommodate the 2037 expected daily traffic volumes.

A review of the 43 Street and Crowsnest Highway ADT volumes shown on Figure 16 indicates that they range between 28230 and 40505 vehicles per day. These daily traffic volumes are well below the full capacity of a four-lane divide highway capacity. Therefore, the existing four-lane divided highways (43 Street south of 9 Avenue to Crowsnest Highway; and the Crowsnest Highway east and west of 43 Street) would be able to accommodate the estimated ADT through volumes with the proposed site traffic. Note however, that the intersection widening recommended based on the intersection capacity analysis would still be needed at Highway 3 and 43 Street signalized intersection.

4.3 Traffic Control Signal Warrants

Traffic signal installation warrants for the unsignalized study intersections were conducted for several traffic volume scenarios as shown in **Table 16**. The purposes of these analyses were to determine if the installation of traffic signal controls would be warranted and when would it be expected to become warranted. Signal warrant analysis was performed in accordance with Transportation Association of Canada (TAC) standards and utilizing TAC warrants table. The 6-hour traffic volumes for each analysis year scenario considered were estimated as follows:

- AM peak hour volumes presented on the corresponding scenario figure were used for the 2 AM hours in TAC warrants table.
- PM peak hour volumes presented on the corresponding scenario figure were used for the 2 PM hours in TAC warrants table.
- To estimate the 2 mid-day hours, 60% of the AM volumes were used for one hour and 60% of the PM volumes were used for the second hour.

Table 16 presents a summary of the signal warrant analyses results for the three currently unsignalized intersections. The worksheet results for the traffic signal warrant analysis are included in **Appendix F**.

Table 16: TAC - Traffic Signal Warrant Results

Intersection	Scenario / Analyses Year	Warranting Score	Traffic Signal, Warranted?
43 Street North and 26 Avenue North / Township Road 92	Future 2022	59	No
	Future 2037	89	No
43 Street North and 18 Avenue North / Site Access	Background 2037	61	No
	Future 2022	131	Yes
	Future 2037	182	Yes
43 Street North and 14 Avenue North / Site Access	Background 2037	34	No
	Future 2022	133	Yes
	Future 2037	174	Yes

A review of **Table 16** indicates that traffic signal installation would NOT be warranted at the intersection of 43 Street North and 26 Avenue North / Township Road 92 by the future 2022 or the future 2037 traffic conditions with proposed site traffic volumes. However, by the year 2037 the TAC warranting score is 89, which is very close to the traffic signal warranting score of 100 breaking point. Also, the high expected delays to be experienced by the eastbound and westbound traffic, indicates a traffic signal installation would probably be required by the future 2037.

Additionally, a review of **Table 16** regarding the following two study intersections:

- 43 Street North and 18 Avenue North / Site Access
- 43 Street North and 14 Avenue North / Site Access

indicates that a traffic signal installation would be warranted under the future 2022 traffic conditions as well as under the future 2037 traffic conditions (with the proposed site traffic).

5.0 BICYCLE ROUTE MAP, BUS ROUTES AND STOPS REVIEW

5.1 Bicycle Route Map

Per the discussion and consultation with the City of Lethbridge Transportation Department, a review of the Cycling Master Plan should be considered as part of this TIA. Figure 17 presents the city-wide cycling network and infrastructure plan. A review of the cycling infrastructure plan indicated that 43 Street corridor has an existing Multi-use Pathway between 2 Avenue North and just north of 9 Avenue North. Additionally, a proposed Multi-use Pathway is also planned to connect to the existing Pathway along 43 Street south of 2 Avenue N and will continue all the way to the southern border of the City. Similarly, another Multi-use Pathway is planned to connect to the existing one along 43 Street N just north of 9 Avenue N and will extend all the way to the northern border of the City.

In addition to the above, there are four Multi-use Pathways planned along 5 Avenue N, 9 Avenue N, 18 Avenue N, and 26 Avenue N that would connect 43 Street N with the City of Lethbridge internal areas west of 43 Street N. These proposed Multi-use Pathways would connect to the existing facilities along 26 Avenue N and 28 Street N creating an efficient cycling and pedestrian connectivity.

The existing as well as the proposed Multi-use Pathways would allow significant percentages of the proposed development generated trips / customers to utilize active modes to access the proposed development, which would reduce vehicle trips and reduce vehicle traffic congestions. Additionally, it should be noted that the proposed development is proposing to have internal pedestrian infrastructure including sidewalks and/or multi-use pathways that would connect to the external Multi-use Pathways and sidewalks to ensure smooth and easy pedestrian / cyclist movements and access to the proposed development.

Cycling Network and Infrastructure Types

- Shared Lane
- Bike Boulevard
- Proposed Multi-use Pathway
- Existing Multi-use Pathway
- Bike Lane / Buffered Bike Lane
- Protected Bike Lane
- Future Neighbourhoods
- ★ Further Investigation of Rail Crossing Needed

Construction of the cycling network will occur based on existing programs and available funding.

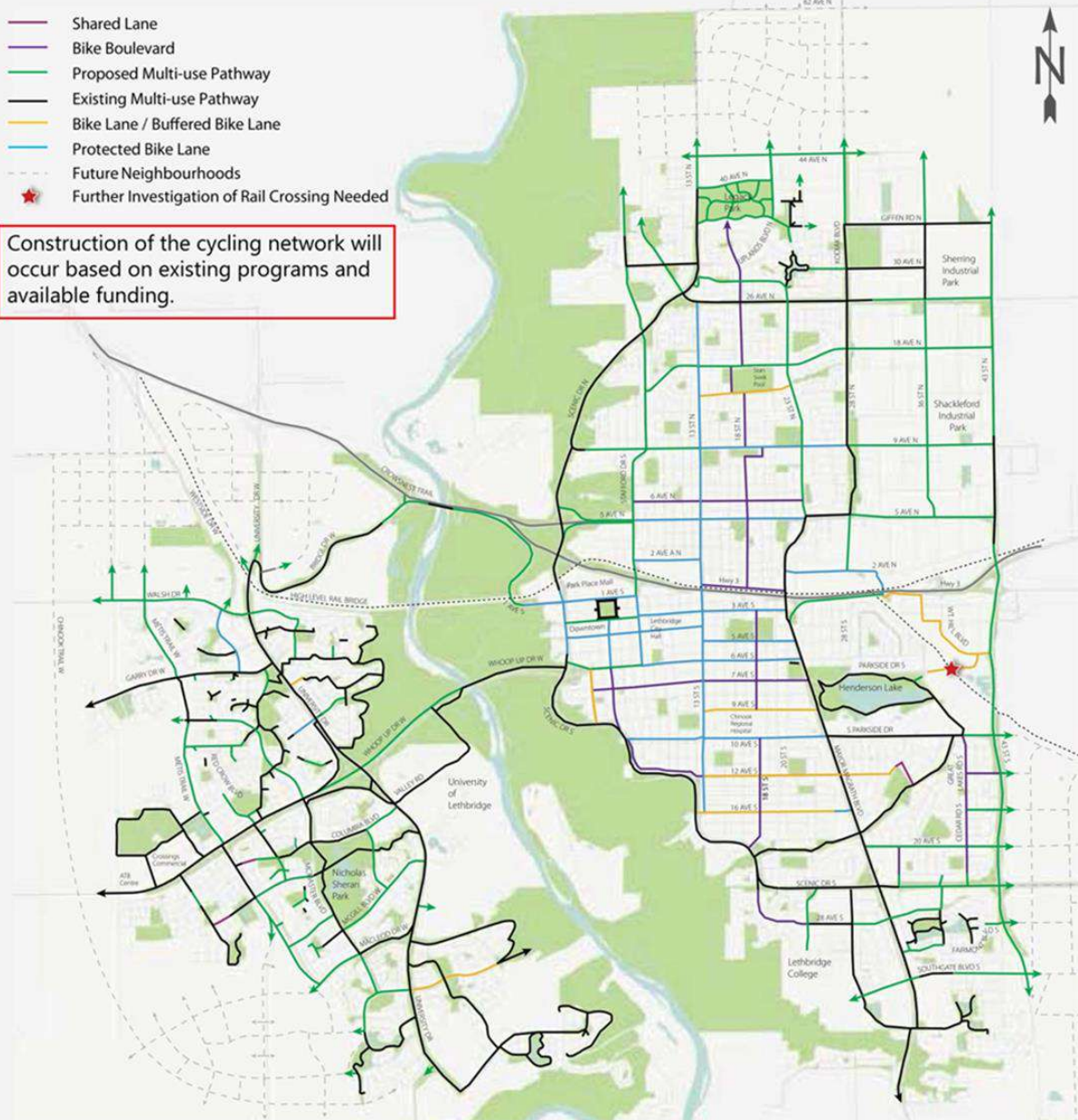


Figure 17: City of Lethbridge Cycling Master Plan

5.2 Bus Routes and Stops

As part of this TIA, a review of the Lethbridge Transit System and the available bus routes / stops to serve the project area is required. Figure 18 presents the Lethbridge Transit System Map with all available bus routes within the city shown. Figure 19 presents Route 21 Map as Route 21 with its varieties is the route that serves the vicinity of the proposed project area.

A review of Figure 18 indicates that there are a total of 18 routes, including their different service areas and service time varieties, available to serve the public within Lethbridge. There is a total of four transit terminals that provide connectivity of the service routes to allow full coverage of the city, these terminals are:

- University Terminal;
- North Terminal;
- College Terminal; and
- City Centre Terminal.

These terminals are placed at key locations within the City that allow smooth passenger transfers between the different routes in order to access different areas of the city. Reviewing Figure 18 closely indicates that Route “21S Day” is the route that directly serves the project vicinity as it passes through 43 Street N, north of Crowsnest Highway until it reaches 9 Avenue N where it turns left into the city.

A review of Figure 19 indicates that Route “21S Day” service is only available during the weekdays, Monday through Friday during daytime hours only. There is one bus stop along 9 Avenue N just west of 43 Street N that would be suitable to serve the proposed project site.

Consider modifying Route “21S Day” operation to also cover the weekends and the nights starting from year 2022, which is the opening year of Phase 2 of the proposed Chinook Industrial Park development. Also consider that the service coverage area of this route be modified to cover 43 Street N north of 9 Avenue N until 26 Avenue N and provision of two new bus stops in the vicinity of 14 Avenue and 18 Avenue to help Transit users access the proposed development since the site has an access point at each of these two roads.

Modifying the service area coverage and time / days coverage of Route “21S Day” would encourage reducing private vehicle trips and increasing the utilization of the transit, which in turn reduces traffic congestions.

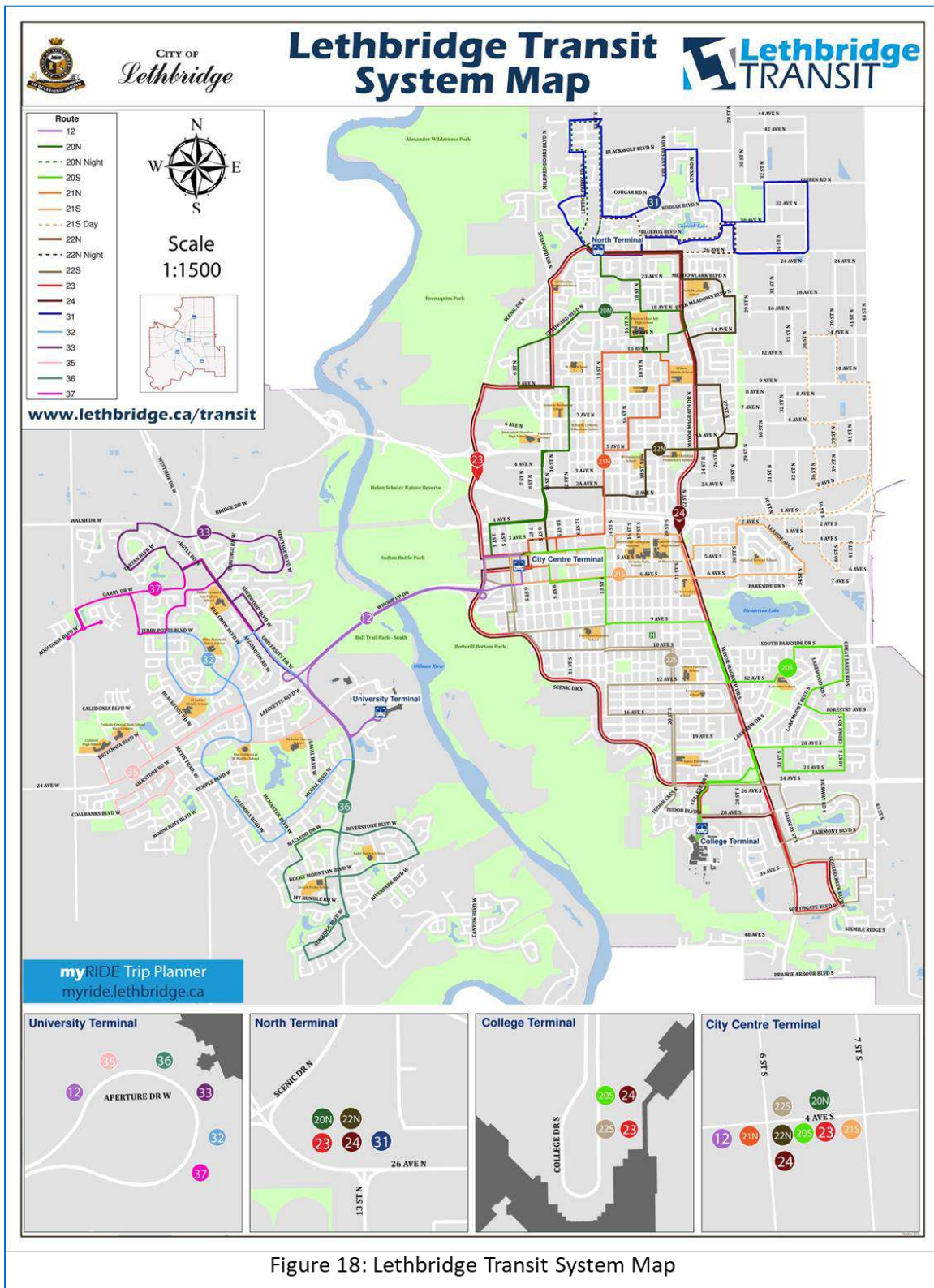


Figure 18: Lethbridge Transit System Map

6.0 CONCLUSIONS AND RECOMMENDATIONS

This study analyzed the traffic impacts of the proposed Chinook Industrial Park Development project to be located in Lethbridge County, Alberta. The proposed development will have a total of five phases with Phase 1 including 18.56 acres of General Light Industrial land use and 18.62 acres of Business Park land use. Phase 1 will be completed after 2 years from today. Phases 2 to 5 will consist of 95.17 acres of General Light Industrial land use and 40.66 acres of Business Park land use. Phases 2 to 5 will be completed within 5 years from today. The estimated number of total site generated trips entering and exiting the development would be 10,674 trips daily, 850 trips during the AM peak, and 794 trips during the PM peak hour. The following conclusions have been reached by this traffic impact assessment study:

- LOS and capacity analyses indicated that under the **Existing 2017, Background 2019 and Background 2022** traffic conditions (without site traffic), all study area intersections operate at acceptable levels of service with no issues. Therefore, no intersection improvements required for any study intersection under these traffic conditions.
- **Background 2037** without the Project Site Traffic LOS analyses indicated that four study intersections would continue to operate at acceptable levels of service. However, the following two intersections would operate at unacceptable levels of service:
 - a. 43 Street N and 26 Avenue N / Township Road 92; and
 - b. Highway 3/Crowsnest Highway and 43 Street N.

Therefore, mitigations would be needed for these two intersections under the background 2037 traffic conditions.

- The proposed mitigations under the Background 2037 conditions include:
 - 43 Street N and 26 Avenue N / Township Road 92 Intersection
 - Installation of a traffic signal
 - Highway 3 / Crowsnest Highway and 43 Street Intersection
 - Installation of a second westbound left-turn only lane;
 - Installation of a second eastbound left-turn only lane;
 - Installation of a third westbound through only lane;
 - Installation of a third eastbound through only lane; and
 - Optimization of the traffic signal splits.
- The above mitigation would improve the operations at the above intersections. However, the intersection of Highway 3 / Crowsnest Highway and 43 Street would have the NB approach continue to operate at LOS “E”, which represents full capacity level of service.

- Any additional traffic would cause this intersection to perform at unacceptable levels of service and therefore, grade separation would be the most appropriate solution after 20 years from today.
- LOS and capacity analyses indicated that under the **Future 2019** traffic conditions (with site traffic), all study area intersections would operate at acceptable levels of service with no issues. Therefore, no intersection improvements would be required for any study intersection under future 2019 traffic conditions.
- **Future 2022** with the Project Site Traffic LOS analyses indicated that the three unsignalized study intersections and one of the signalized intersections would operate with unacceptable levels of service. The remaining two signalized intersections would continue to operate at acceptable levels of service. Therefore, mitigations would be needed for four of the study intersections under future 2022 conditions (with site traffic).
- The proposed mitigations under the future 2022 conditions consist of the following:
 - 43 Street N and 26 Avenue N / Township Road 92 Intersection
 - Installation of a two-phase traffic signal.
 - 43 Street N and 18 Avenue N / Site Access
 - Installation of a two-phase traffic signal
 - 43 Street N and 14 Avenue N / Site Access
 - Installation of a two-phase traffic signal; and
 - Installation of a northbound left-turn only lane.
 - Highway 3 / Crowsnest Highway and 43 Street Intersection
 - Installation of a second eastbound left-turn only lane; and
 - Optimization of the traffic signal splits.
- The mitigated Future 2022 capacity analysis results indicate that the four intersections that previously failed would operate at acceptable levels of service with the proposed mitigations. Therefore, no further mitigations to any of these intersections would be needed under the future 2022 traffic conditions.
- **Future 2037** with the Project Site Traffic LOS analyses indicated that four intersections of the total six intersections would operate at unacceptable levels of service. Therefore, mitigations would be required under the Future 2037 conditions at these intersections.
- The proposed mitigations under the Future 2037 conditions consist of the following:
 - 43 Street N and 26 Avenue N / Township Road 92 Intersection
 - Installation of two-phase traffic signal.

43 Street N and 18 Avenue N / Site Access

- Installation of a northbound left-turn only lane; and
- Optimization of the traffic signal splits.

43 Street N and 14 Avenue N / Site Access

- Optimization of the traffic signal splits.

Highway 3 / Crowsnest Highway and 43 Street Intersection

- If the Stantec 2006 Functional Planning Study's proposed / recommended Highway 3 & 4 external links were built, Highway 3 east-west traffic volumes would be reduced significantly, and this intersection operation would improve. Therefore, a reevaluation of this intersection operation is recommended after the external highway links are built.
- Traffic signal control warrant analyses were performed for three stop-controlled intersections and the results indicated:
- Traffic signal installation would NOT be warranted at the intersection of 43 Street North and 26 Avenue North / Township Road 92 by the future 2037 traffic conditions. **However, a traffic signal will be required to mitigate delays to traffic.** This is why it is recommended to monitor this intersection starting from year 2022 to determine when the installation of a traffic signal becomes warranted based on actual traffic count data.
- The traffic signal control warrant analyses further indicated that a traffic signal installation would be warranted under the future 2022 and future 2037 traffic conditions at the following two study intersections:
- 43 Street North and 18 Avenue North / Site Access
 - 43 Street North and 14 Avenue North / Site Access
- A thorough review of the Cycling Master Plan / Infrastructure Plan has been completed and the results of the review indicated that the existing as well as the proposed Multi-use Pathways could allow significant percentages of the proposed development generated trips / customers to utilize active modes to access the proposed development, which would reduce vehicle trips and reduce vehicle traffic congestions.
- A review of the Lethbridge Transit System and the available bus routes / stops to serve the proposed project area was completed, the results indicated the following:
- Route "21S Day" is the route that directly serves the project vicinity as it passes through 43 Street N, north of Crowsnest Highway until it reaches 9 Avenue N where it turns left into the city.

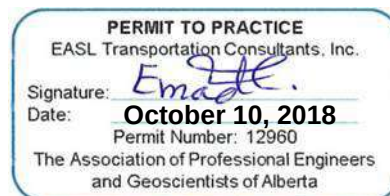
- Route “21S Day” service is only available during the weekdays, Monday through Friday during daytime hours only. There is one bus stop along 9 Avenue N just west of 43 Street N that would be suitable to serve the proposed project site.
- Consider modifying Route “21S Day” operation to also cover the weekends and the nights starting from year 2022, which is the opening year of Phase 2 of the proposed development.
- It is also recommended to consider that the service coverage area of this route be modified to cover 43 Street N north of 9 Avenue N until 26 Avenue N and provision of two new bus stops in the vicinity of 14 Avenue and 18 Avenue to help Transit users access the proposed development since the site has access points at each of these two roads.
- Modifying the service area coverage and time / days coverage of Route “21S Day” would encourage reducing private vehicle trips and increasing the utilization of the transit, which in turn reduces traffic congestions.

In summary, this traffic impact assessment concludes that the proposed Chinook Industrial Park Development will have impact on the traffic operations of both existing and future road network. However, this impact will be alleviated by implementing the improvements recommended above.

Yours truly,

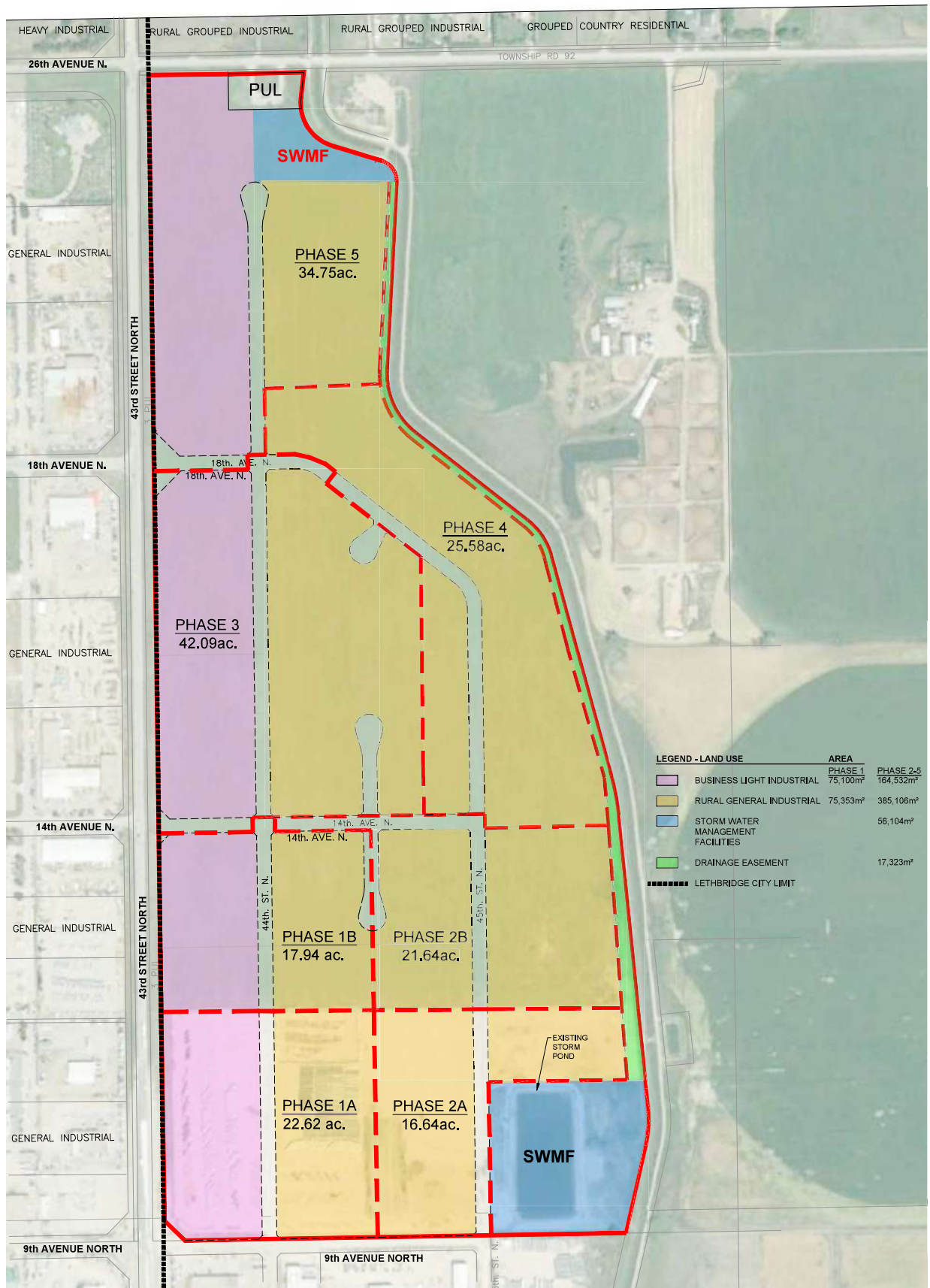
EASL Transportation Consultants, Inc.

Prepared by:

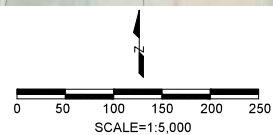


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 E-mail: ealsaidi@easltransportation.ca

Appendix A
Proposed Development Site Plan



PROPOSED DEVELOPMENT & PHASING PLAN



NOTES

This is a copyright drawing and shall not be reproduced in any form without written permission of the engineer.

Contractor to check and verify all dimensions before construction, any errors and omissions shall be reported to the engineer immediately.

Drawing shall not be used for construction until approved.

Do not scale the drawing.

All construction shall be in accordance with the latest codes, may it be construction, mechanical, etc.

HASEGAWA

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MAH
MDO
MAH
MAH
AS SHOWN

PRELIMINARY

DATE	BY

GEORGE KIRKHAM & ED FRIESEN

CHNOOK INDUSTRIAL PARK ASP

PROPOSED DEVELOPMENT & PHASING PLAN

17-006

Mar 26, 2018

FIG.4

Appendix B

Intersection Turning Movement Traffic Counts

- 1. City of Lethbridge 2016 Traffic Count**
 - 2. Cavendish Farms Background Volumes**
 - 3. Alberta Transportation 2016 Traffic Count**
-

City of Lethbridge: Intersection Summary

Northbound Street:	43 St N	RTOR	Y	Speed	70	Heavy Veh %	7	Next Signal		Median Wth		Bus Route	N	
Eastbound Street:	26 Ave N	RTOR	Y	Speed	60	Heavy Veh %	4	Next Signal		Median Wth		Bus Route	N	
Southbound Street:	43 St N	RTOR	Y	Speed	80	Heavy Veh %	16	Next Signal		Median Wth		Bus Route	N	
Westbound Street:	Twp 92	RTOR	Y	Speed	50	Heavy Veh %	4	Next Signal		Median Wth		Bus Route	N	
Weather:	-16°C	Persons Challenged by Mobility Issues				N	Adjacent to Elementary School				N	Pathway for School		N
Date:	Thu, Dec 15, 2016	Counted By MioVision				Intersection N-451				Senior Centre or Junior High				N
Notes:	Site Code N-451													N

AM	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks					15 Minute Totals	60 Minute Totals	Peak Hour
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total			
7:00 - 7:15	10	5	1		2			8	37	3	8	1						75		
7:15 - 7:30	10	1			6		1	14	37	4	4							77		
7:30 - 7:45	11	8	2		8	1		14	48	2	9							103		
7:45 - 8:00	24	12	1	2	6		2	21	51	7	17	1						144	399	
8:00 - 8:15	17	4	8	1	4	1	1	15	45	1	13							110	434	
8:15 - 8:30	7	2	6	1	6	1	1	16	24	5	17	2						88	445	7:30-8:30
8:30 - 8:45	21	4	3		6	1		10	23	4	19	1						92	434	
8:45 - 9:00	17	7	4	1	3	1	1	6	21	3	6	2						72	362	
Peak Hour:	59	26	17	4	24	3	4	66	168	15	56	3								PHF: 0.77
PHF:	0.61	0.54	0.53	0.50	0.75	0.75	0.50	0.79	0.82	0.54	0.82	0.38								

MID	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks					15 Minute Totals	60 Minute Totals	Peak Hour
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total			
11:00 - 11:15	17	7	7		8	1	1	4	18	3	4							70		
11:15 - 11:30	18	2	7		5			7	29	6	11							85		
11:30 - 11:45	28	4	3		6	4	1	8	30	3	12							99		
11:45 - 12:00	35	3	3		3	2	4	5	27	7	10							99	353	
12:00 - 12:15	43	3	4	1	7			3	30	1	11							103	386	
12:15 - 12:30	46	1	4		11	3		10	36	2	6							119	420	
12:30 - 12:45	27	4	4	1	5	1		5	28	2	5							82	403	
12:45 - 13:00	33	9	2		4	1	1	7	50	2	7	1						117	421	12:00-13:00
Peak Hour:	149	17	14	2	27	5	1	25	144	7	29	1								PHF: 0.88
PHF:	0.81	0.47	0.88	0.50	0.61	0.42	0.25	0.63	0.72	0.88	0.66	0.25								

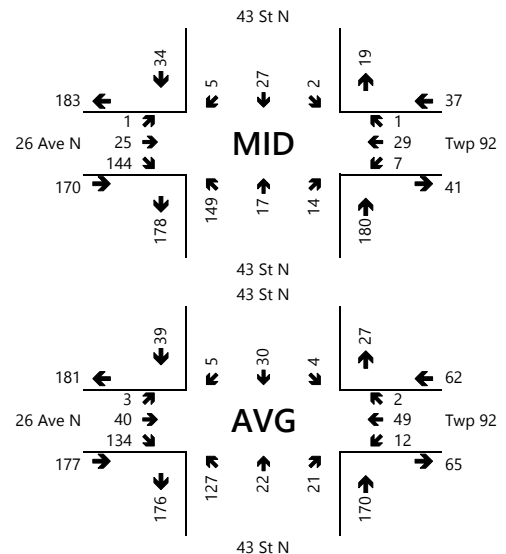
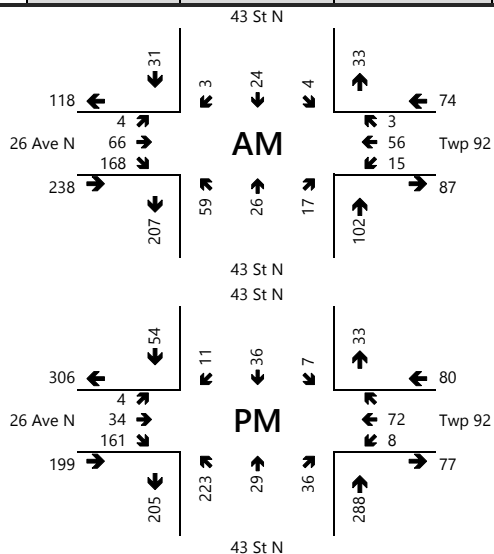
PM	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks					15 Minute Totals	60 Minute Totals	Peak Hour
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total			
15:00 - 15:15	32	2	7		8		4	10	31	3	4							101		
15:15 - 15:30	26	1	4		10	1	1	22	28	2	10	1						106		
15:30 - 15:45	47	4	10	3	32		1	17	26	1	15							156		
15:45 - 16:00	44	8	4	3	8			13	21	3	20							124	487	
16:00 - 16:15	41	8	5	1	10	2		11	35	1	12	1						127	513	
16:15 - 16:30	54	9	5	1	11	6	1	8	32	2	15							144	551	
16:30 - 16:45	66	6	4	4	11	1	1	10	45	2	17							167	562	
16:45 - 17:00	56	7	14		6	2	2	12	41	3	21							164	602	
17:00 - 17:15	47	7	13	2	8	2		4	43	1	19							146	621	16:15-17:15
17:15 - 17:30	40	7	14		6	2		10	28	1	16	1						125	602	
Peak Hour:	223	29	36	7	36	11	4	34	161	8	72									PHF: 0.93
PHF:	0.84	0.81	0.64	0.44	0.82	0.46	0.50	0.71	0.89	0.67	0.86									

6 Hour Average	127	22	21	4	30	5	3	40	134	12	49	2								
Approach Lanes	0.5	1	0.5	0.5	1	0.5	0.5	1	0.5	0.5	1	0.5								
Departure Lanes		1			1			1			1									

Not Warranted

Pedestrian Points: 0
Vehicle Points: 21
Total: 21

2 Hour PM Range Used for Vehicles: 15:30 to 17:30



Intersection: 43 Street N and 18 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers



ALL VEHICLES
AM Peak Hour Traffic Count at 43 Street N and 18 Avenue N Intersection

Time Period	18 Avenue N Eastbound			18 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
7:00 - 7:15	0	0	25	0	0	0	25	10	0	0	44	0	104		
7:15 - 7:30	0	0	28	0	0	0	25	17	0	0	50	2	122		
7:30 - 7:45	1	0	17	0	0	0	49	18	0	0	58	0	143		
7:45 - 8:00	2	0	33	0	0	0	59	31	0	0	56	5	186	555	
8:00 - 8:15	2	0	21	0	0	0	33	22	0	0	46	2	126	577	0.78
8:15 - 8:30	1	0	28	0	0	0	25	22	0	0	29	2	107	562	
8:30 - 8:45	0	0	25	0	0	0	22	18	0	0	29	1	95	514	
8:45 - 9:00	3	0	18	0	0	0	24	29	0	0	44	2	120	448	
Peak Hour	5	0	99	0	0	0	166	88	0	0	210	9	577		
App Total	104			0			254			219			577		
HV %	12%			#DIV/0!			10%			3%			7%		

ALL VEHICLES

PM Peak Hour Traffic Count at 43 Street N and 18 Avenue N Intersection

Time Period	18 Avenue N Eastbound			18 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
4:00 - 4:15	2	0	33	0	0	0	19	41	0	0	43	2	140		
4:15 - 4:30	1	0	26	0	0	0	24	55	0	0	29	3	138		
4:30 - 4:45	5	0	53	0	0	0	27	74	0	0	26	0	185		
4:45 - 5:00	5	0	32	0	0	0	25	42	0	0	32	0	136	599	
5:00 - 5:15	5	0	48	0	0	0	18	65	0	0	53	0	189	648	0.86
5:15 - 5:30	1	0	15	0	0	0	29	44	0	0	41	4	134	644	
5:30 - 5:45	1	0	23	0	0	0	16	54	0	0	31	2	127	586	
5:45 - 6:00	3	0	15	0	0	0	17	32	0	0	26	1	94	544	
Peak Hour	16	0	159	0	0	0	94	236	0	0	140	3	648		
App Total	175			0			330			143			648		
HV %	9%			#DIV/0!			9%			8%			9%		



Intersection: 43 Street N and 18 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
AM Peak Hour Traffic Count at 43 Street N and 18 Avenue N Intersection

Time Period	18 Avenue N Eastbound			18 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
7:00 - 7:15	0	0	1	0	0	0	3	2	0	0	2	0	8
7:15 - 7:30	0	0	1	0	0	0	2	1	0	0	2	1	7
7:30 - 7:45	0	0	1	0	0	0	4	3	0	0	3	0	11
7:45 - 8:00	0	0	4	0	0	0	5	4	0	0	0	0	13
8:00 - 8:15	0	0	6	0	0	0	4	2	0	0	0	0	12
8:15 - 8:30	0	0	9	0	0	0	4	3	0	0	1	1	18
8:30 - 8:45	0	0	6	0	0	0	7	0	0	0	3	0	16
8:45 - 9:00	2	0	2	0	0	0	4	5	0	0	3	0	16
Peak Hour	0	0	12	0	0	0	15	10	0	0	5	1	43
App Total	12			0			25			6			43

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
PM Peak Hour Traffic Count at 43 Street N and 18 Avenue N Intersection

Time Period	18 Avenue N Eastbound			18 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
4:00 - 4:15	0	0	3	0	0	0	2	2	0	0	3	0	10
4:15 - 4:30	0	0	4	0	0	0	4	3	0	0	6	0	17
4:30 - 4:45	0	0	2	0	0	0	4	7	0	0	1	0	14
4:45 - 5:00	0	0	5	0	0	0	7	1	0	0	0	0	13
5:00 - 5:15	0	0	4	0	0	0	2	3	0	0	4	0	13
5:15 - 5:30	0	0	0	0	0	0	2	0	0	0	1	1	4
5:30 - 5:45	0	0	2	0	0	0	2	1	0	0	0	0	5
5:45 - 6:00	0	0	0	0	0	0	1	0	0	0	0	0	1
Peak Hour	0	0	15	0	0	0	17	14	0	0	11	0	57
App Total	15			0			31			11			57



Intersection: 43 Street N and 18 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers

PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

AM Peak Hour Traffic Count at 43 Street N and 18 Avenue N Intersection

Time Period	18 Avenue N Eastbound				18 Avenue N Westbound				43 Street N Northbound				43 Street N Southbound				Sum
	L	T	R		L	T	R		L	T	R		L	T	R		
AM																	
7:00 - 7:15	0	0	24		0	0	0		22	8	0		0	42	0		96
7:15 - 7:30	0	0	27		0	0	0		23	16	0		0	48	1		115
7:30 - 7:45	1	0	16		0	0	0		45	15	0		0	55	0		132
7:45 - 8:00	2	0	29		0	0	0		54	27	0		0	56	5		173
8:00 - 8:15	2	0	15		0	0	0		29	20	0		0	46	2		114
8:15 - 8:30	1	0	19		0	0	0		21	19	0		0	28	1		89
8:30 - 8:45	0	0	19		0	0	0		15	18	0		0	26	1		79
8:45 - 9:00	1	0	16		0	0	0		20	24	0		0	41	2		104
Peak Hour	5	0	87		0	0	0		151	78	0		0	205	8		534
App Total	92				0				229				213				534

PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

PM Peak Hour Traffic Count at 43 Street N and 18 Avenue N Intersection

Time Period	18 Avenue N Eastbound				18 Avenue N Westbound				43 Street N Northbound				43 Street N Southbound				Sum
	L	T	R		L	T	R		L	T	R		L	T	R		
PM																	
4:00 - 4:15	2	0	30		0	0	0		17	39	0		0	40	2		130
4:15 - 4:30	1	0	22		0	0	0		20	52	0		0	23	3		121
4:30 - 4:45	5	0	51		0	0	0		23	67	0		0	25	0		171
4:45 - 5:00	5	0	27		0	0	0		18	41	0		0	32	0		123
5:00 - 5:15	5	0	44		0	0	0		16	62	0		0	49	0		176
5:15 - 5:30	1	0	15		0	0	0		27	44	0		0	40	3		130
5:30 - 5:45	1	0	21		0	0	0		14	53	0		0	31	2		122
5:45 - 6:00	3	0	15		0	0	0		16	32	0		0	26	1		93
Peak Hour	16	0	144		0	0	0		77	222	0		0	129	3		591
App Total	160				0				299				132				591

Intersection: 43 Street N and 14 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers



ALL VEHICLES
AM Peak Hour Traffic Count at 43 Street N and 14 Avenue N Intersection

Time Period	14 Avenue N Eastbound			14 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
7:00 - 7:15	0	0	0	0	0	0	0	10	32	0	0	0	103		
7:15 - 7:30	0	0	2	0	0	0	0	19	39	0	0	0	136		
7:30 - 7:45	0	0	5	0	0	0	0	22	62	0	0	0	167		
7:45 - 8:00	1	0	6	0	0	0	0	18	86	0	0	0	196	602	
8:00 - 8:15	1	0	5	0	0	0	0	8	49	0	0	0	134	633	0.81
8:15 - 8:30	0	0	4	0	0	0	0	10	51	0	0	0	126	623	
8:30 - 8:45	0	0	7	0	0	0	0	11	47	0	0	0	119	575	
8:45 - 9:00	1	0	5	0	0	0	0	10	49	0	0	0	121	500	
Peak Hour	2	0	18	0	0	0	0	67	236	0	0	0	633		
App Total	20			0			303			310			633		
HV %	55%			#DIV/0!			10%			6%			10%		

ALL VEHICLES

PM Peak Hour Traffic Count at 43 Street N and 14 Avenue N Intersection

Time Period	14 Avenue N Eastbound			14 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
4:00 - 4:15	0	0	20	0	0	0	0	2	59	0	0	0	151		
4:15 - 4:30	3	0	9	0	0	0	0	4	89	0	0	0	168		
4:30 - 4:45	6	0	43	0	0	0	0	4	99	0	0	0	221		
4:45 - 5:00	0	0	17	0	0	0	0	3	68	0	0	0	150	690	
5:00 - 5:15	3	0	10	0	0	0	0	4	83	0	0	0	194	733	0.83
5:15 - 5:30	0	0	7	0	0	0	0	6	76	0	0	0	145	710	
5:30 - 5:45	1	0	5	0	0	0	0	3	74	0	0	0	135	624	
5:45 - 6:00	0	0	8	0	0	0	0	4	51	0	0	0	111	585	
Peak Hour	12	0	79	0	0	0	0	15	339	0	0	0	733		
App Total	91			0			354			288			733		
HV %	3%			#DIV/0!			9%			10%			9%		



Intersection: 43 Street N and 14 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
AM Peak Hour Traffic Count at 43 Street N and 14 Avenue N Intersection

Time Period	14 Avenue N Eastbound			14 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
7:00 - 7:15	0	0	0	0	0	0	0	5	0	0	1	0	6
7:15 - 7:30	0	0	2	0	0	0	1	3	0	0	4	0	10
7:30 - 7:45	0	0	2	0	0	0	0	8	0	0	4	0	14
7:45 - 8:00	0	0	2	0	0	0	0	9	0	0	3	2	16
8:00 - 8:15	0	1	4	0	0	0	2	7	0	0	7	0	21
8:15 - 8:30	0	0	1	0	0	0	1	8	0	0	10	1	21
8:30 - 8:45	0	0	2	0	0	0	1	9	0	0	9	1	22
8:45 - 9:00	1	0	1	0	0	0	3	7	0	0	4	1	17
Peak Hour	0	1	10	0	0	0	3	27	0	0	18	2	61
App Total	11			0			30			20			61

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
PM Peak Hour Traffic Count at 43 Street N and 14 Avenue N Intersection

Time Period	14 Avenue N Eastbound			14 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
4:00 - 4:15	0	0	2	0	0	0	0	4	0	0	7	0	13
4:15 - 4:30	0	0	0	0	0	0	1	8	0	0	11	1	21
4:30 - 4:45	0	0	2	0	0	0	0	10	0	0	3	0	15
4:45 - 5:00	0	0	0	0	0	0	1	8	0	0	5	0	14
5:00 - 5:15	1	0	0	0	0	0	0	4	0	0	7	1	13
5:15 - 5:30	0	0	0	0	0	0	2	3	0	0	1	0	6
5:30 - 5:45	0	0	1	0	0	0	1	4	0	0	1	0	7
5:45 - 6:00	0	0	0	0	0	0	1	1	0	0	1	0	3
Peak Hour	1	0	2	0	0	0	2	30	0	0	26	2	63
App Total	3			0			32			28			63



Intersection: 43 Street N and 14 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers

PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

AM Peak Hour Traffic Count at 43 Street N and 14 Avenue N Intersection

Time Period	14 Avenue N Eastbound				14 Avenue N Westbound				43 Street N Northbound				43 Street N Southbound				Sum
	L	T	R		L	T	R		L	T	R		L	T	R		
AM																	
7:00 - 7:15	0	0	0		0	0	0		10	27	0		0	59	1		97
7:15 - 7:30	0	0	0		0	0	0		18	36	0		0	68	4		126
7:30 - 7:45	0	0	3		0	0	0		22	54	0		0	72	2		153
7:45 - 8:00	1	0	4		0	0	0		18	77	0		0	77	3		180
8:00 - 8:15	0	0	1		0	0	0		6	42	0		0	62	2		113
8:15 - 8:30	0	0	3		0	0	0		9	43	0		0	50	0		105
8:30 - 8:45	0	0	5		0	0	0		10	38	0		0	44	0		97
8:45 - 9:00	0	0	4		0	0	0		7	42	0		0	49	2		104
Peak Hour	1	0	8		0	0	0		64	209	0		0	279	11		572
App Total	9				0				273				290				572

PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

PM Peak Hour Traffic Count at 43 Street N and 14 Avenue N Intersection

Time Period	14 Avenue N Eastbound				14 Avenue N Westbound				43 Street N Northbound				43 Street N Southbound				Sum
	L	T	R		L	T	R		L	T	R		L	T	R		
PM																	
4:00 - 4:15	0	0	18		0	0	0		2	55	0		0	62	1		138
4:15 - 4:30	3	0	9		0	0	0		3	81	0		0	51	0		147
4:30 - 4:45	6	0	41		0	0	0		4	89	0		0	66	0		206
4:45 - 5:00	0	0	17		0	0	0		2	60	0		0	57	0		136
5:00 - 5:15	2	0	10		0	0	0		4	79	0		0	86	0		181
5:15 - 5:30	0	0	7		0	0	0		4	73	0		0	55	0		139
5:30 - 5:45	1	0	4		0	0	0		2	70	0		0	51	0		128
5:45 - 6:00	0	0	8		0	0	0		3	50	0		0	47	0		108
Peak Hour	11	0	77		0	0	0		13	309	0		0	260	0		670
App Total	88				0				322				260				670



Intersection: 43 Street N and 9 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers

ALL VEHICLES
AM Peak Hour Traffic Count at 43 Street N and 9 Avenue N Intersection

Time Period	9 Avenue N Eastbound			9 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
7:00 - 7:15	0	4	9	2	0	0	24	36	24	5	52	2	158		
7:15 - 7:30	0	7	13	2	3	2	39	67	20	7	68	2	230		
7:30 - 7:45	1	3	18	8	3	1	35	88	16	2	71	1	247		
7:45 - 8:00	1	2	22	1	0	0	60	101	24	1	85	4	301	936	
8:00 - 8:15	1	0	24	7	0	1	54	49	13	1	69	5	224	1002	0.83
8:15 - 8:30	2	2	29	7	2	1	39	54	13	4	62	4	219	991	
8:30 - 8:45	3	4	25	7	1	1	33	58	14	1	55	1	203	947	
8:45 - 9:00	1	5	27	6	2	2	42	56	11	3	54	3	212	858	
Peak Hour	3	12	77	18	6	4	188	305	73	11	293	12	1002		
App Total	92			28			566			316			1002		
HV %	3%			36%			9%			9%			9%		

ALL VEHICLES
PM Peak Hour Traffic Count at 43 Street N and 9 Avenue N Intersection

Time Period	9 Avenue N Eastbound			9 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
4:00 - 4:15	2	1	41	32	14	12	30	39	2	1	69	5	248		
4:15 - 4:30	1	4	46	13	4	2	38	71	3	1	59	5	247		
4:30 - 4:45	7	0	49	53	3	4	26	93	4	0	126	5	370		
4:45 - 5:00	1	1	42	15	1	2	32	63	7	2	67	6	239	1104	
5:00 - 5:15	4	0	83	17	3	4	32	74	4	0	103	3	327	1183	0.80
5:15 - 5:30	1	1	38	13	0	0	27	92	1	0	65	3	241	1177	
5:30 - 5:45	0	0	27	20	62	2	17	5	1	0	53	1	188	995	
5:45 - 6:00	0	0	21	5	0	1	14	51	2	0	54	1	149	905	
Peak Hour	13	5	220	98	11	12	128	301	18	3	355	19	1183		
App Total	238			121			447			377			1183		
HV %	6%			2%			13%			7%			9%		



Intersection: 43 Street N and 9 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
AM Peak Hour Traffic Count at 43 Street N and 9 Avenue N Intersection

Time Period	9 Avenue N Eastbound			9 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
7:00 - 7:15	0	0	0	0	0	0	0	4	0	0	1	0	5
7:15 - 7:30	0	0	0	1	0	1	3	4	2	0	5	1	17
7:30 - 7:45	0	0	1	2	1	0	2	8	2	0	6	0	22
7:45 - 8:00	0	0	2	1	0	0	2	9	1	0	5	0	20
8:00 - 8:15	0	0	0	3	0	1	9	8	2	1	11	0	35
8:15 - 8:30	1	0	3	2	0	0	2	8	2	1	9	0	28
8:30 - 8:45	1	1	4	5	0	0	3	9	1	0	10	1	35
8:45 - 9:00	0	1	2	3	0	2	3	7	3	1	6	0	28
Peak Hour	0	0	3	7	1	2	16	29	7	1	27	1	94
App Total	3			10			52			29			94

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
PM Peak Hour Traffic Count at 43 Street N and 9 Avenue N Intersection

Time Period	9 Avenue N Eastbound			9 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
4:00 - 4:15	1	0	2	1	1	0	3	3	0	0	9	1	21
4:15 - 4:30	0	2	4	0	0	0	5	8	0	1	10	0	30
4:30 - 4:45	0	0	4	1	0	0	6	11	0	0	3	1	26
4:45 - 5:00	0	0	0	0	1	0	6	9	2	1	5	0	24
5:00 - 5:15	0	0	5	0	1	0	4	4	1	0	7	0	22
5:15 - 5:30	0	0	3	0	0	0	5	5	1	0	1	0	15
5:30 - 5:45	0	0	5	2	0	0	2	4	0	0	2	0	15
5:45 - 6:00	0	0	5	0	0	0	2	3	1	0	1	0	12
Peak Hour	0	2	13	1	2	0	21	32	3	2	25	1	102
App Total	15			3			56			28			102

Intersection: 43 Street N and 9 Avenue N
 Count Date: 14-Mar-17
 Count Day: Tuesday
 Counted By: Hasegawa Consulting Professional Engineers



PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

AM Peak Hour Traffic Count at 43 Street N and 9 Avenue N Intersection

Time Period	9 Avenue N Eastbound			9 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
7:00 - 7:15	0	4	9	2	0	0	24	32	24	5	51	2	153
7:15 - 7:30	0	7	13	1	3	1	36	63	18	7	63	1	213
7:30 - 7:45	1	3	17	6	2	1	33	80	14	2	65	1	225
7:45 - 8:00	1	2	20	0	0	0	58	92	23	1	80	4	281
8:00 - 8:15	1	0	24	4	0	0	45	41	11	0	58	5	189
8:15 - 8:30	1	2	26	5	2	1	37	46	11	3	53	4	191
8:30 - 8:45	2	3	21	2	1	1	30	49	13	1	45	0	168
8:45 - 9:00	1	4	25	3	2	0	39	49	8	2	48	3	184
Peak Hour	3	12	74	11	5	2	172	276	66	10	266	11	908
App Total	89			18			514			287			908

PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

PM Peak Hour Traffic Count at 43 Street N and 9 Avenue N Intersection

Time Period	9 Avenue N Eastbound			9 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
4:00 - 4:15	1	1	39	31	13	12	27	36	2	1	60	4	227
4:15 - 4:30	1	2	42	13	4	2	33	63	3	0	49	5	217
4:30 - 4:45	7	0	45	52	3	4	20	82	4	0	123	4	344
4:45 - 5:00	1	1	42	15	0	2	26	54	5	1	62	6	215
5:00 - 5:15	4	0	78	17	2	4	28	70	3	0	96	3	305
5:15 - 5:30	1	1	35	13	0	0	22	87	0	0	64	3	226
5:30 - 5:45	0	0	22	18	62	2	15	1	1	0	51	1	173
5:45 - 6:00	0	0	16	5	0	1	12	48	1	0	53	1	137
Peak Hour	13	3	207	97	9	12	107	269	15	1	330	18	1081
App Total	223			118			391			349			1081

Intersection: 43 Street N and 5 Avenue N
 Count Date: 16-Mar-17
 Count Day: Thursday
 Counted By: Hasegawa Consulting Professional Engineers



ALL VEHICLES
AM Peak Hour Traffic Count at 43 Street N and 5 Avenue N Intersection

Time Period	5 Avenue N Eastbound			5 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
7:00 - 7:15	6	0	23	0	0	0	38	76	0	0	65	4	212		
7:15 - 7:30	5	0	35	0	0	0	64	116	0	0	79	3	302		
7:30 - 7:45	3	0	27	0	0	0	67	136	0	0	101	8	342		
7:45 - 8:00	8	0	44	0	0	0	57	168	0	0	119	10	406	1262	
8:00 - 8:15	3	0	36	0	0	0	49	165	0	0	97	5	355	1405	0.87
8:15 - 8:30	3	0	22	0	0	0	45	119	0	0	116	4	309	1412	
8:30 - 8:45	4	0	36	0	0	0	32	104	0	0	95	5	276	1346	
8:45 - 9:00	5	0	37	0	0	0	50	93	0	0	86	5	276	1216	
Peak Hour	19	0	142	0	0	0	237	585	0	0	396	26	1405		
App Total	161			0			822			422			1405		
HV %	12%			#DIV/0!			6%			16%			10%		

ALL VEHICLES
PM Peak Hour Traffic Count at 43 Street N and 5 Avenue N Intersection

Time Period	5 Avenue N Eastbound			5 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum	4-P Total	PHF
	L	T	R	L	T	R	L	T	R	L	T	R			
4:00 - 4:15	8	0	45	0	0	0	60	105	0	0	162	4	384		
4:15 - 4:30	6	0	46	0	0	0	53	138	0	0	140	10	393		
4:30 - 4:45	9	0	58	0	0	0	57	128	0	0	235	12	499		
4:45 - 5:00	6	0	59	0	0	0	48	113	0	0	202	3	431	1707	
5:00 - 5:15	6	0	80	0	0	0	46	117	0	0	221	11	481	1804	0.90
5:15 - 5:30	3	0	41	0	0	0	37	106	0	0	172	3	362	1773	
5:30 - 5:45	1	0	41	0	0	0	35	74	0	0	103	5	259	1533	
5:45 - 6:00	1	0	40	0	0	0	24	57	0	0	102	5	229	1331	
Peak Hour	27	0	243	0	0	0	204	496	0	0	798	36	1804		
App Total	270			0			700			834			1804		
HV %	7%			#DIV/0!			12%			6%			8%		



Intersection: 43 Street N and 5 Avenue N
 Count Date: 16-Mar-17
 Count Day: Thursday
 Counted By: Hasegawa Consulting Professional Engineers

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
AM Peak Hour Traffic Count at 43 Street N and 5 Avenue N Intersection

Time Period	5 Avenue N Eastbound			5 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
7:00 - 7:15	0	0	6	0	0	0	3	3	0	0	17	1	30
7:15 - 7:30	0	0	6	0	0	0	2	8	0	0	9	0	25
7:30 - 7:45	0	0	2	0	0	0	3	7	0	0	11	3	26
7:45 - 8:00	2	0	5	0	0	0	0	11	0	0	18	2	38
8:00 - 8:15	0	0	4	0	0	0	3	14	0	0	24	2	47
8:15 - 8:30	1	0	5	0	0	0	4	7	0	0	19	0	36
8:30 - 8:45	0	0	6	0	0	0	8	16	0	0	26	1	57
8:45 - 9:00	0	0	7	0	0	0	4	13	0	0	16	1	41
Peak Hour	2	0	17	0	0	0	8	40	0	0	62	7	136
App Total	19			0			48			69			136

TRUCKS, MULTI-AXLE VEHICLE, CITY BUS OR SCHOOL BUS
PM Peak Hour Traffic Count at 43 Street N and 5 Avenue N Intersection

Time Period	5 Avenue N Eastbound			5 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
4:00 - 4:15	1	0	5	0	0	0	13	10	0	0	6	0	35
4:15 - 4:30	1	0	5	0	0	0	15	15	0	0	9	5	50
4:30 - 4:45	1	0	4	0	0	0	9	11	0	0	13	1	39
4:45 - 5:00	4	0	2	0	0	0	7	13	0	0	6	0	32
5:00 - 5:15	0	0	2	0	0	0	5	6	0	0	9	3	25
5:15 - 5:30	1	0	2	0	0	0	3	7	0	0	14	0	27
5:30 - 5:45	1	0	2	0	0	0	11	12	0	0	7	1	34
5:45 - 6:00	0	0	2	0	0	0	2	5	0	0	4	1	14
Peak Hour	6	0	13	0	0	0	36	45	0	0	37	9	146
App Total	19			0			81			46			146



Intersection: 43 Street N and 5 Avenue N
 Count Date: 16-Mar-17
 Count Day: Thursday
 Counted By: Hasegawa Consulting Professional Engineers

PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

AM Peak Hour Traffic Count at 43 Street N and 5 Avenue N Intersection

Time Period	5 Avenue N Eastbound			5 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
7:00 - 7:15	6	0	17	0	0	0	35	73	0	0	48	3	182
7:15 - 7:30	5	0	29	0	0	0	62	108	0	0	70	3	277
7:30 - 7:45	3	0	25	0	0	0	64	129	0	0	90	5	316
7:45 - 8:00	6	0	39	0	0	0	57	157	0	0	101	8	368
8:00 - 8:15	3	0	32	0	0	0	46	151	0	0	73	3	308
8:15 - 8:30	2	0	17	0	0	0	41	112	0	0	97	4	273
8:30 - 8:45	4	0	30	0	0	0	24	88	0	0	69	4	219
8:45 - 9:00	5	0	30	0	0	0	46	80	0	0	70	4	235
Peak Hour	17	0	125	0	0	0	229	545	0	0	334	19	1269
App Total	142			0			774			353			1269

PASSENGER CARS, MINI-VANS, TWO AXLE TRUCKS, MOTOR CYCLES AND STATION WAGONS

PM Peak Hour Traffic Count at 43 Street N and 5 Avenue N Intersection

Time Period	5 Avenue N Eastbound			5 Avenue N Westbound			43 Street N Northbound			43 Street N Southbound			Sum
	L	T	R	L	T	R	L	T	R	L	T	R	
4:00 - 4:15	7	0	40	0	0	0	47	95	0	0	156	4	349
4:15 - 4:30	5	0	41	0	0	0	38	123	0	0	131	5	343
4:30 - 4:45	8	0	54	0	0	0	48	117	0	0	222	11	460
4:45 - 5:00	2	0	57	0	0	0	41	100	0	0	196	3	399
5:00 - 5:15	6	0	78	0	0	0	41	111	0	0	212	8	456
5:15 - 5:30	2	0	39	0	0	0	34	99	0	0	158	3	335
5:30 - 5:45	0	0	39	0	0	0	24	62	0	0	96	4	225
5:45 - 6:00	1	0	38	0	0	0	22	52	0	0	98	4	215
Peak Hour	21	0	230	0	0	0	168	451	0	0	761	27	1658
App Total	251			0			619			788			1658

2016 AADT / ASDT ESTIMATES

South On 4		
Vehicle Type	Vol	%
A: Passenger Vehicle	13936	89.
B: Recreational Vehicle	224	1.
C: Bus	41	0.
D: Single Unit Truck	615	3.
E: Tractor Trailer Unit	754	4.
ASDT 16150	AADT 15570	

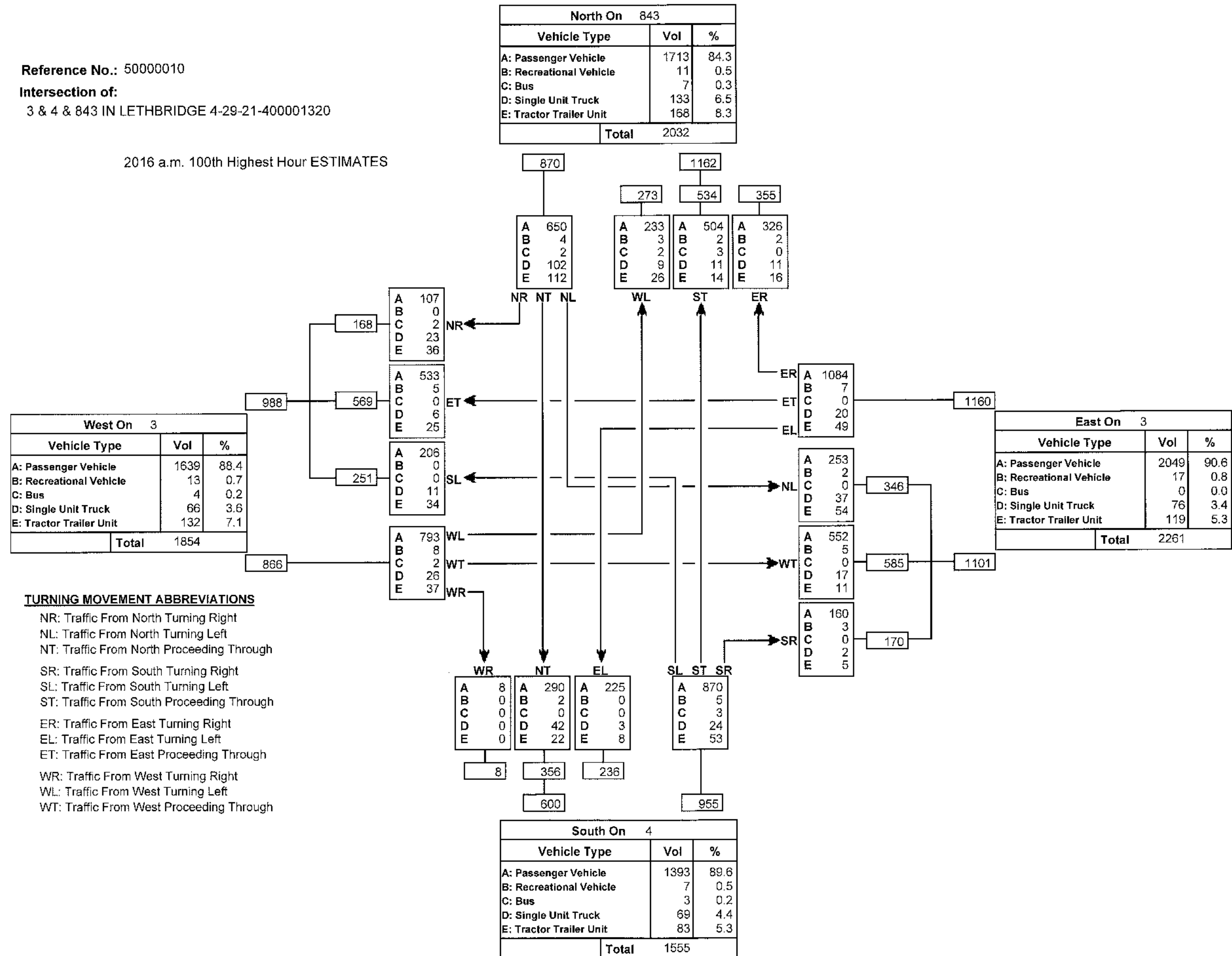
Reference No.: 50000010

Intersection of:

3 & 4 & 843 IN LETHBRIDGE 4-29-21-400001320

2016 a.m. 100th Highest Hour ESTIMATES

Turning Movement Summary Diagram



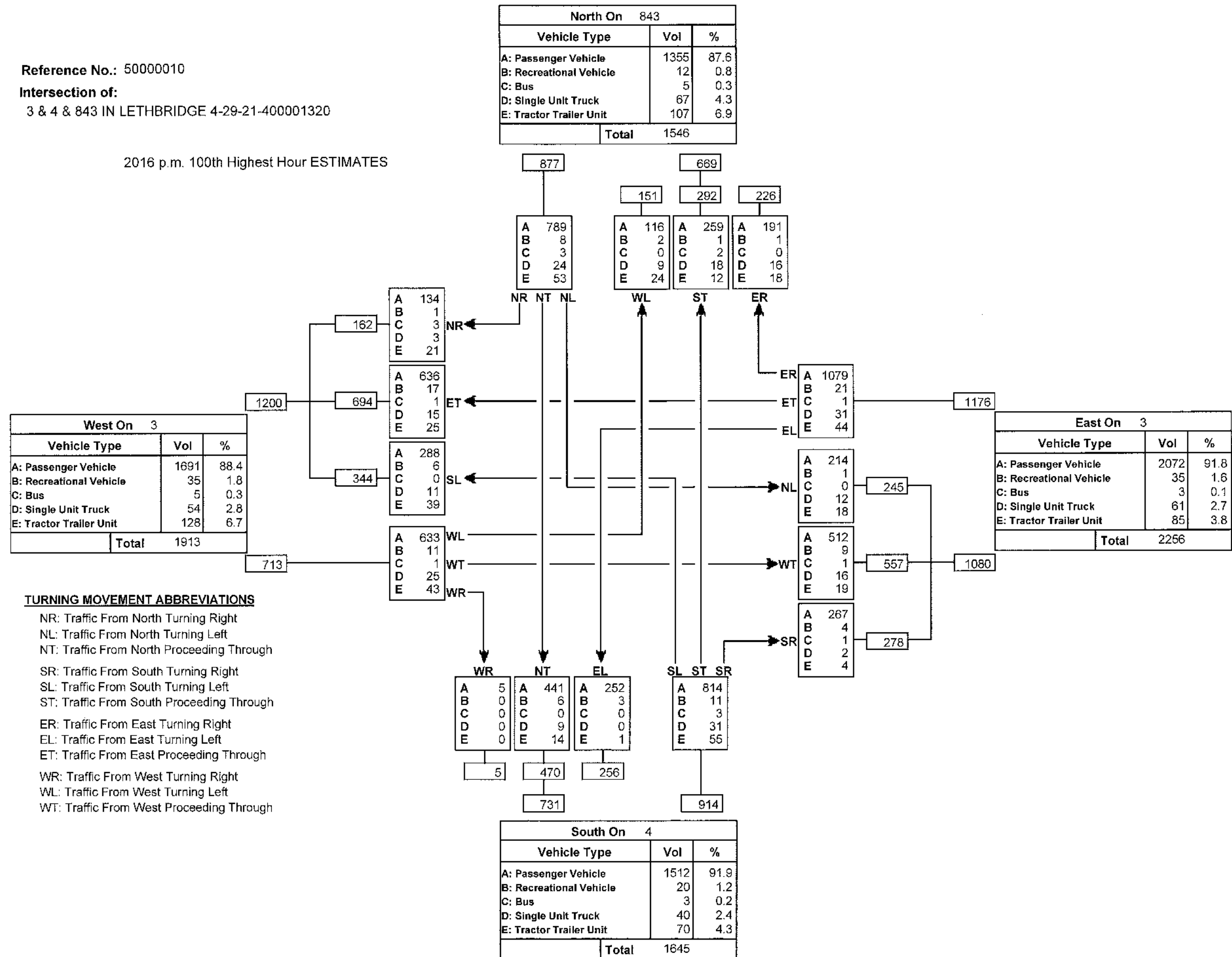
Reference No.: 50000010

Intersection of:

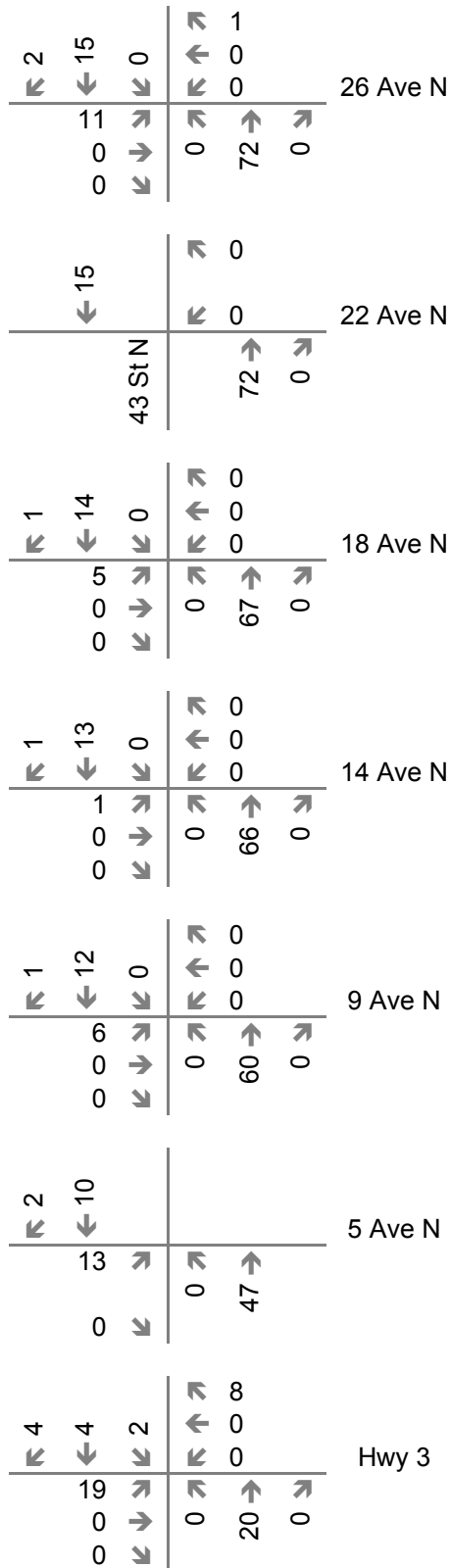
3 & 4 & 843 IN LETHBRIDGE 4-29-21-400001320

2016 p.m. 100th Highest Hour ESTIMATES

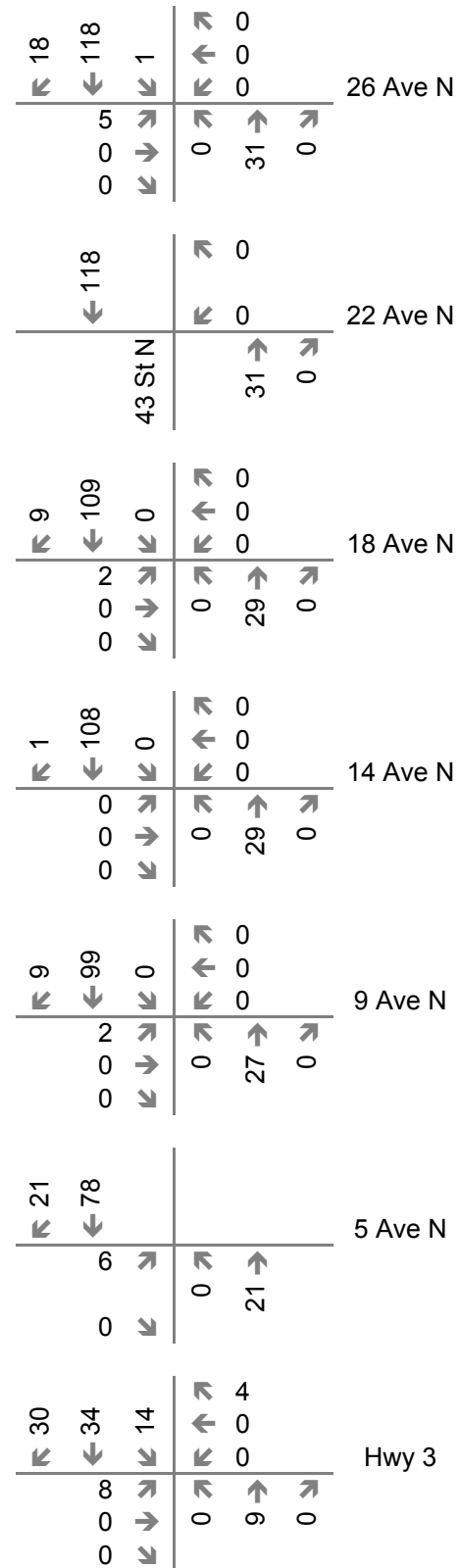
Turning Movement Summary Diagram



AM Peak Hour



PM Peak Hour



Appendix C

HCM Capacity Analysis Results Reports

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: EX-AM
Existing AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	12	77	18	6	4	188	305	73	11	293	12
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	4	14	0	22	7	5	227	367	0	13	353	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	166	141	120	145	58	41	232	2628	1176	634	1966	879
Arrive On Green	0.08	0.08	0.00	0.08	0.08	0.08	0.14	0.79	0.00	0.59	0.59	0.00
Sat Flow, veh/h	1383	1845	1568	1046	759	542	1660	3312	1482	946	3312	1482
Grp Volume(v), veh/h	4	14	0	22	0	12	227	367	0	13	353	0
Grp Sat Flow(s),veh/h/ln	1383	1845	1568	1046	0	1301	1660	1656	1482	946	1656	1482
Q Serve(g_s), s	0.3	0.7	0.0	2.0	0.0	0.9	13.6	2.6	0.0	0.6	4.8	0.0
Cycle Q Clear(g_c), s	1.1	0.7	0.0	2.7	0.0	0.9	13.6	2.6	0.0	0.6	4.8	0.0
Prop In Lane	1.00		1.00	1.00		0.42	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	166	141	120	145	0	99	232	2628	1176	634	1966	879
V/C Ratio(X)	0.02	0.10	0.00	0.15	0.00	0.12	0.98	0.14	0.00	0.02	0.18	0.00
Avail Cap(c_a), veh/h	427	489	416	342	0	345	232	2628	1176	634	1966	879
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.6	43.0	0.0	44.2	0.0	43.0	42.8	2.4	0.0	8.4	9.2	0.0
Incr Delay (d2), s/veh	0.1	0.3	0.0	0.5	0.0	0.5	52.3	0.1	0.0	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.4	0.0	0.6	0.0	0.3	9.6	1.2	0.0	0.2	2.3	0.0
LnGrp Delay(d),s/veh	43.6	43.3	0.0	44.7	0.0	43.6	95.1	2.5	0.0	8.4	9.4	0.0
LnGrp LOS	D	D		D		D	F	A		A	A	
Approach Vol, veh/h		18			34			594			366	
Approach Delay, s/veh		43.4			44.3			37.9			9.4	
Approach LOS		D			D			D			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		85.9		14.1	20.0	65.9		14.1				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		60.5		26.5	14.0	40.5		26.5				
Max Q Clear Time (g_c+l1), s		4.6		3.1	15.6	6.8		4.7				
Green Ext Time (p_c), s		6.6		0.2	0.0	6.3		0.2				
Intersection Summary												
HCM 2010 Ctrl Delay			27.9									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary
5: 43 Street N & 5 Ave N

Timing Plan: EX-AM
Exisiting AM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	19	142	237	585	396	26		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	22	0	272	672	455	30		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	143	66	273	2807	1881	841		
Arrive On Green	0.05	0.00	0.16	0.82	0.60	0.60		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	22	0	272	672	455	30		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	0.7	0.0	15.9	4.3	6.8	0.9		
Cycle Q Clear(g_c), s	0.7	0.0	15.9	4.3	6.8	0.9		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	143	66	273	2807	1881	841		
V/C Ratio(X)	0.15	0.00	1.00	0.24	0.24	0.04		
Avail Cap(c_a), veh/h	580	267	273	2807	1881	841		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	45.9	0.0	42.0	1.9	9.2	8.0		
Incr Delay (d2), s/veh	0.5	0.0	53.2	0.2	0.3	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.3	0.0	11.5	2.0	3.0	0.4		
LnGrp Delay(d),s/veh	46.3	0.0	95.2	2.1	9.5	8.1		
LnGrp LOS	D		F	A	A	A		
Approach Vol, veh/h	22			944	485			
Approach Delay, s/veh	46.3			28.9	9.4			
Approach LOS	D			C	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		88.9		11.1	22.0	66.9		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		68.5		18.5	16.0	46.5		
Max Q Clear Time (g_c+I1), s		6.3		2.7	17.9	8.8		
Green Ext Time (p_c), s		12.3		0.0	0.0	11.3		
Intersection Summary								
HCM 2010 Ctrl Delay			22.7					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: EX-AM
Existing AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	273	585	8	236	569	355	251	534	170	346	356	168
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	297	636	9	257	618	0	273	580	0	376	387	183
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	398	1022	14	383	971	434	649	741	332	585	804	360
Arrive On Green	0.15	0.31	0.31	0.13	0.29	0.00	0.09	0.23	0.00	0.12	0.26	0.26
Sat Flow, veh/h	1630	3283	46	1660	3312	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	297	315	330	257	618	0	273	580	0	376	387	183
Grp Sat Flow(s),veh/h/ln	1630	1626	1704	1660	1656	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	14.1	18.6	18.6	11.9	18.3	0.0	7.2	18.7	0.0	10.3	11.8	12.5
Cycle Q Clear(g_c), s	14.1	18.6	18.6	11.9	18.3	0.0	7.2	18.7	0.0	10.3	11.8	12.5
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	398	506	530	383	971	434	649	741	332	585	804	360
V/C Ratio(X)	0.75	0.62	0.62	0.67	0.64	0.00	0.42	0.78	0.00	0.64	0.48	0.51
Avail Cap(c_a), veh/h	436	506	530	451	971	434	1065	846	378	891	809	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.1	33.1	33.1	24.2	34.6	0.0	29.1	41.0	0.0	29.2	35.5	35.8
Incr Delay (d2), s/veh	6.3	5.7	5.4	3.1	3.2	0.0	0.4	4.3	0.0	1.2	0.4	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	9.1	9.6	5.7	8.8	0.0	3.2	8.9	0.0	4.4	5.2	5.0
LnGrp Delay(d),s/veh	30.4	38.8	38.5	27.3	37.8	0.0	29.5	45.2	0.0	30.4	36.0	37.0
LnGrp LOS	C	D	D	C	D		C	D		C	D	D
Approach Vol, veh/h		942			875			853			946	
Approach Delay, s/veh		36.1			34.7			40.2			33.9	
Approach LOS		D			C			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.4	42.0	18.7	31.4	22.4	40.0	15.3	34.8				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	13.9	20.6	12.3	20.7	16.1	20.3	9.2	14.5				
Green Ext Time (p_c), s	0.5	6.9	1.5	4.7	0.4	7.1	1.1	6.9				
Intersection Summary												
HCM 2010 Ctrl Delay			36.1									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	9.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	66	168	15	56	3	59	26	17	4	24	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	5	86	218	19	73	4	77	34	22	5	31	4
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	280	253	33	393	243	45	35	0	0	56	0	0
Stage 1	44	44	-	198	198	-	-	-	-	-	-	-
Stage 2	236	209	-	195	45	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	668	647	1035	563	655	1019	1544	-	-	1464	-	-
Stage 1	965	854	-	799	733	-	-	-	-	-	-	-
Stage 2	763	725	-	802	853	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	581	612	1035	380	619	1019	1544	-	-	1464	-	-
Mov Cap-2 Maneuver	581	612	-	380	619	-	-	-	-	-	-	-
Stage 1	915	851	-	757	695	-	-	-	-	-	-	-
Stage 2	645	687	-	567	850	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	11.5			12.8			4.3			1		
HCM LOS	B			B								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1544	-	-	859	557	1464	-	-				
HCM Lane V/C Ratio	0.05	-	-	0.36	0.173	0.004	-	-				
HCM Control Delay (s)	7.5	0	-	11.5	12.8	7.5	0	-				
HCM Lane LOS	A	A	-	B	B	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	1.6	0.6	0	-	-				

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	99	166	88	210	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	12	12	10	10	3	3
Mvmt Flow	6	127	213	113	269	12
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	813	275	281	0	-	0
Stage 1	275	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Critical Hdwy	6.52	6.32	4.2	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.408	2.29	-	-	-
Pot Cap-1 Maneuver	335	740	1237	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	566	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	273	740	1237	-	-	-
Mov Cap-2 Maneuver	273	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	462	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	11.5		5.6		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1237	-	684	-	-	
HCM Lane V/C Ratio	0.172	-	0.195	-	-	
HCM Control Delay (s)	8.5	0	11.5	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.6	-	0.7	-	-	

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	2	18	67	236	297	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	55	55	10	10	6	6
Mvmt Flow	2	22	83	291	367	16
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	832	375	383	0	-	0
Stage 1	375	-	-	-	-	-
Stage 2	457	-	-	-	-	-
Critical Hdwy	6.95	6.75	4.2	-	-	-
Critical Hdwy Stg 1	5.95	-	-	-	-	-
Critical Hdwy Stg 2	5.95	-	-	-	-	-
Follow-up Hdwy	3.995	3.795	2.29	-	-	-
Pot Cap-1 Maneuver	277	569	1133	-	-	-
Stage 1	593	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	253	569	1133	-	-	-
Mov Cap-2 Maneuver	253	-	-	-	-	-
Stage 1	593	-	-	-	-	-
Stage 2	493	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	12.5		1.9		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1133	-	506	-	-	
HCM Lane V/C Ratio	0.073	-	0.049	-	-	
HCM Control Delay (s)	8.4	0	12.5	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.2	-	0.2	-	-	

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: EX-PM
Existing PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	5	220	98	11	12	128	301	18	3	355	19
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	16	6	0	122	14	15	160	376	0	4	444	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	201	203	172	227	93	100	188	2418	1082	626	1954	874
Arrive On Green	0.11	0.11	0.00	0.11	0.11	0.11	0.12	0.76	0.00	0.58	0.58	0.00
Sat Flow, veh/h	1323	1792	1524	1404	824	883	1601	3195	1429	956	3374	1509
Grp Volume(v), veh/h	16	6	0	122	0	29	160	376	0	4	444	0
Grp Sat Flow(s),veh/h/ln	1323	1792	1524	1404	0	1707	1601	1597	1429	956	1687	1509
Q Serve(g_s), s	1.1	0.3	0.0	8.5	0.0	1.5	9.8	3.2	0.0	0.2	6.4	0.0
Cycle Q Clear(g_c), s	2.6	0.3	0.0	8.8	0.0	1.5	9.8	3.2	0.0	0.2	6.4	0.0
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	201	203	172	227	0	193	188	2418	1082	626	1954	874
V/C Ratio(X)	0.08	0.03	0.00	0.54	0.00	0.15	0.85	0.16	0.00	0.01	0.23	0.00
Avail Cap(c_a), veh/h	402	475	404	440	0	452	224	2418	1082	626	1954	874
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.2	39.5	0.0	43.4	0.0	40.0	43.2	3.3	0.0	8.9	10.2	0.0
Incr Delay (d2), s/veh	0.2	0.1	0.0	2.0	0.0	0.4	22.3	0.1	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.1	0.0	3.4	0.0	0.7	5.5	1.5	0.0	0.0	3.0	0.0
LnGrp Delay(d),s/veh	41.4	39.5	0.0	45.3	0.0	40.4	65.5	3.5	0.0	8.9	10.5	0.0
LnGrp LOS	D	D		D		D	E	A		A	B	
Approach Vol, veh/h		22			151			536			448	
Approach Delay, s/veh		40.9			44.4			22.0			10.5	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		82.2		17.8	17.8	64.4		17.8				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		60.5		26.5	14.0	40.5		26.5				
Max Q Clear Time (g_c+l1), s		5.2		4.6	11.8	8.4		10.8				
Green Ext Time (p_c), s		7.7		0.7	0.1	7.1		0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			20.8									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary
5: 43 Street N & 5 Ave N

Timing Plan: EX-PM
Existing PM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	27	243	204	496	798	36		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	30	0	227	551	887	40		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	185	85	255	2622	2029	908		
Arrive On Green	0.06	0.00	0.16	0.81	0.60	0.60		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	30	0	227	551	887	40		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	0.9	0.0	13.8	3.8	14.2	1.1		
Cycle Q Clear(g_c), s	0.9	0.0	13.8	3.8	14.2	1.1		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	185	85	255	2622	2029	908		
V/C Ratio(X)	0.16	0.00	0.89	0.21	0.44	0.04		
Avail Cap(c_a), veh/h	607	279	259	2622	2029	908		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	44.9	0.0	41.3	2.1	11.0	8.4		
Incr Delay (d2), s/veh	0.4	0.0	29.3	0.2	0.7	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.4	0.0	8.2	1.8	6.8	0.5		
LnGrp Delay(d),s/veh	45.3	0.0	70.6	2.3	11.7	8.5		
LnGrp LOS	D		E	A	B	A		
Approach Vol, veh/h	30			778	927			
Approach Delay, s/veh	45.3			22.2	11.6			
Approach LOS	D			C	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		87.8		12.2	21.8	66.1		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		68.5		18.5	16.0	46.5		
Max Q Clear Time (g_c+l1), s		5.8		2.9	15.8	16.2		
Green Ext Time (p_c), s		18.3		0.1	0.0	14.3		
Intersection Summary								
HCM 2010 Ctrl Delay			16.9					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: EX-PM
Existing PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	151	557	5	256	694	226	344	292	278	245	470	162
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	164	605	5	278	754	0	374	317	0	266	511	176
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	327	1032	9	413	1178	527	619	807	361	734	696	311
Arrive On Green	0.09	0.31	0.31	0.13	0.35	0.00	0.12	0.24	0.00	0.09	0.21	0.21
Sat Flow, veh/h	1645	3336	28	1691	3374	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	164	298	312	278	754	0	374	317	0	266	511	176
Grp Sat Flow(s),veh/h/ln	1645	1641	1722	1691	1687	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	7.1	16.3	16.3	11.7	20.0	0.0	9.2	8.4	0.0	6.8	15.6	11.5
Cycle Q Clear(g_c), s	7.1	16.3	16.3	11.7	20.0	0.0	9.2	8.4	0.0	6.8	15.6	11.5
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	327	507	533	413	1178	527	619	807	361	734	696	311
V/C Ratio(X)	0.50	0.59	0.59	0.67	0.64	0.00	0.60	0.39	0.00	0.36	0.73	0.57
Avail Cap(c_a), veh/h	466	507	533	489	1178	527	997	917	410	1178	884	395
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.7	31.1	31.1	21.7	29.1	0.0	28.4	34.1	0.0	28.1	39.1	37.5
Incr Delay (d2), s/veh	1.2	4.9	4.7	2.9	2.7	0.0	1.0	0.3	0.0	0.3	2.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	8.0	8.4	5.7	9.8	0.0	4.2	4.0	0.0	3.0	7.3	4.8
LnGrp Delay(d),s/veh	23.9	36.0	35.8	24.6	31.8	0.0	29.3	34.4	0.0	28.4	41.5	39.1
LnGrp LOS	C	D	D	C	C		C	C		C	D	D
Approach Vol, veh/h		774			1032			691			953	
Approach Delay, s/veh		33.4			29.8			31.6			37.4	
Approach LOS		C			C			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.2	40.0	15.0	31.5	15.9	44.3	17.7	28.8				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	13.7	18.3	8.8	10.4	9.1	22.0	11.2	17.6				
Green Ext Time (p_c), s	0.5	8.4	1.1	6.8	0.4	6.9	1.5	5.2				
Intersection Summary												
HCM 2010 Ctrl Delay			33.1									
HCM 2010 LOS			C									

Intersection												
Int Delay, s/veh	9.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	34	161	8	72	0	223	29	36	7	36	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	4	37	173	9	77	0	240	31	39	8	39	12
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	629	609	45	695	596	51	51	0	0	70	0	0
Stage 1	60	60	-	530	530	-	-	-	-	-	-	-
Stage 2	569	549	-	165	66	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	392	407	1019	354	414	1011	1524	-	-	1446	-	-
Stage 1	946	841	-	529	523	-	-	-	-	-	-	-
Stage 2	504	513	-	832	836	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	283	338	1019	235	344	1011	1524	-	-	1446	-	-
Mov Cap-2 Maneuver	283	338	-	235	344	-	-	-	-	-	-	-
Stage 1	790	836	-	442	437	-	-	-	-	-	-	-
Stage 2	346	428	-	656	831	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	12			19.8			6			1		
HCM LOS	B			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1524	-	-	730	329	1446	-	-				
HCM Lane V/C Ratio	0.157	-	-	0.293	0.261	0.005	-	-				
HCM Control Delay (s)	7.8	0	-	12	19.8	7.5	0	-				
HCM Lane LOS	A	A	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.6	-	-	1.2	1	0	-	-				

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	159	94	236	140	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	9	9	9	9	8	8
Mvmt Flow	19	185	109	274	163	3
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	658	165	166	0	-	0
Stage 1	165	-	-	-	-	-
Stage 2	493	-	-	-	-	-
Critical Hdwy	6.49	6.29	4.19	-	-	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.381	2.281	-	-	-
Pot Cap-1 Maneuver	418	862	1371	-	-	-
Stage 1	848	-	-	-	-	-
Stage 2	600	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	379	862	1371	-	-	-
Mov Cap-2 Maneuver	379	-	-	-	-	-
Stage 1	848	-	-	-	-	-
Stage 2	544	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	11.3		2.2		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1371	-	772	-	-	
HCM Lane V/C Ratio	0.08	-	0.264	-	-	
HCM Control Delay (s)	7.9	0	11.3	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	1.1	-	-	

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	12	79	15	339	286	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	3	3	9	9	10	10
Mvmt Flow	14	95	18	408	345	2
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	791	346	347	0	-	0
Stage 1	346	-	-	-	-	-
Stage 2	445	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.19	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.281	-	-	-
Pot Cap-1 Maneuver	357	695	1174	-	-	-
Stage 1	714	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	350	695	1174	-	-	-
Mov Cap-2 Maneuver	350	-	-	-	-	-
Stage 1	714	-	-	-	-	-
Stage 2	631	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	12.1		0.3		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1174	-	615	-	-	
HCM Lane V/C Ratio	0.015	-	0.178	-	-	
HCM Control Delay (s)	8.1	0	12.1	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.6	-	-	

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: BG2019-AM
Background 2019 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	13	81	19	7	5	198	381	77	12	320	14
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	12	16	0	23	8	6	239	459	0	14	386	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	174	154	131	151	62	47	232	2605	1165	582	1942	869
Arrive On Green	0.08	0.08	0.00	0.08	0.08	0.08	0.14	0.79	0.00	0.59	0.59	0.00
Sat Flow, veh/h	1380	1845	1568	1044	742	557	1660	3312	1482	869	3312	1482
Grp Volume(v), veh/h	12	16	0	23	0	14	239	459	0	14	386	0
Grp Sat Flow(s),veh/h/ln	1380	1845	1568	1044	0	1299	1660	1656	1482	869	1656	1482
Q Serve(g_s), s	0.8	0.8	0.0	2.1	0.0	1.0	14.0	3.4	0.0	0.7	5.5	0.0
Cycle Q Clear(g_c), s	1.8	0.8	0.0	2.9	0.0	1.0	14.0	3.4	0.0	0.7	5.5	0.0
Prop In Lane	1.00		1.00	1.00		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	154	131	151	0	109	232	2605	1165	582	1942	869
V/C Ratio(X)	0.07	0.10	0.00	0.15	0.00	0.13	1.03	0.18	0.00	0.02	0.20	0.00
Avail Cap(c_a), veh/h	424	489	416	340	0	344	232	2605	1165	582	1942	869
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.3	42.4	0.0	43.7	0.0	42.5	43.0	2.6	0.0	8.7	9.7	0.0
Incr Delay (d2), s/veh	0.2	0.3	0.0	0.5	0.0	0.5	66.6	0.1	0.0	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.4	0.0	0.6	0.0	0.4	10.7	1.6	0.0	0.2	2.5	0.0
LnGrp Delay(d),s/veh	43.5	42.7	0.0	44.2	0.0	43.0	109.7	2.8	0.0	8.8	9.9	0.0
LnGrp LOS	D	D		D		D	F	A		A	A	
Approach Vol, veh/h	28			37			698			400		
Approach Delay, s/veh	43.0			43.7			39.4			9.9		
Approach LOS	D			D			D			A		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4		5	6	8				
Phs Duration (G+Y+Rc), s	85.1			14.9		20.0	65.1	14.9				
Change Period (Y+Rc), s	6.5			6.5		6.0	6.5	6.5				
Max Green Setting (Gmax), s	60.5			26.5		14.0	40.5	26.5				
Max Q Clear Time (g_c+l1), s	5.4			3.8		16.0	7.5	4.9				
Green Ext Time (p_c), s	8.1			0.3		0.0	7.6	0.3				
Intersection Summary												
HCM 2010 Ctrl Delay	29.5											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: BG2019-AM
Background 2019 AM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	33	150	249	662	426	30		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	38	0	286	761	490	34		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	204	94	273	2741	1820	814		
Arrive On Green	0.07	0.00	0.16	0.80	0.58	0.58		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	38	0	286	761	490	34		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	1.1	0.0	16.0	5.6	7.8	1.0		
Cycle Q Clear(g_c), s	1.1	0.0	16.0	5.6	7.8	1.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	204	94	273	2741	1820	814		
V/C Ratio(X)	0.19	0.00	1.05	0.28	0.27	0.04		
Avail Cap(c_a), veh/h	580	267	273	2741	1820	814		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	44.2	0.0	42.0	2.5	10.2	8.8		
Incr Delay (d2), s/veh	0.4	0.0	67.3	0.3	0.4	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.5	0.0	12.6	2.6	3.4	0.4		
LnGrp Delay(d),s/veh	44.7	0.0	109.3	2.7	10.6	8.9		
LnGrp LOS	D		F	A	B	A		
Approach Vol, veh/h	38			1047	524			
Approach Delay, s/veh	44.7			31.8	10.5			
Approach LOS	D			C	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		87.0		13.0	22.0	65.0		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		68.5		18.5	16.0	46.5		
Max Q Clear Time (g_c+I1), s		7.6		3.1	18.0	9.8		
Green Ext Time (p_c), s		14.4		0.1	0.0	12.9		
Intersection Summary								
HCM 2010 Ctrl Delay			25.2					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2019-AM
Background 2019 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	306	615	9	248	598	381	264	581	179	366	378	181
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	333	668	10	270	650	0	287	632	0	398	411	197
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	400	1015	15	378	937	419	635	737	330	563	806	361
Arrive On Green	0.16	0.31	0.31	0.13	0.28	0.00	0.09	0.22	0.00	0.13	0.26	0.26
Sat Flow, veh/h	1630	3280	49	1660	3312	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	333	331	347	270	650	0	287	632	0	398	411	197
Grp Sat Flow(s),veh/h/ln	1630	1626	1703	1660	1656	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	16.7	20.6	20.6	13.2	20.4	0.0	7.9	21.6	0.0	11.2	13.1	14.2
Cycle Q Clear(g_c), s	16.7	20.6	20.6	13.2	20.4	0.0	7.9	21.6	0.0	11.2	13.1	14.2
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	400	503	527	378	937	419	635	737	330	563	806	361
V/C Ratio(X)	0.83	0.66	0.66	0.71	0.69	0.00	0.45	0.86	0.00	0.71	0.51	0.55
Avail Cap(c_a), veh/h	404	503	527	426	937	419	1018	816	365	831	806	361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	34.9	34.9	25.8	37.3	0.0	30.2	43.4	0.0	30.5	37.1	37.5
Incr Delay (d2), s/veh	13.6	6.6	6.3	4.9	4.2	0.0	0.5	8.4	0.0	1.6	0.5	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	10.1	10.6	6.5	9.9	0.0	3.5	10.6	0.0	4.8	5.7	5.6
LnGrp Delay(d),s/veh	39.6	41.5	41.3	30.7	41.6	0.0	30.7	51.8	0.0	32.1	37.6	39.2
LnGrp LOS	D	D	D	C	D		C	D		C	D	D
Approach Vol, veh/h		1011			920			919			1006	
Approach Delay, s/veh		40.8			38.4			45.2			35.8	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.6	43.1	19.7	32.2	24.7	40.0	16.0	36.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	15.2	22.6	13.2	23.6	18.7	22.4	9.9	16.2				
Green Ext Time (p_c), s	0.4	6.4	1.5	2.6	0.1	6.5	1.2	6.9				
Intersection Summary												
HCM 2010 Ctrl Delay			40.0									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	9.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	70	177	16	59	5	62	100	18	5	41	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	21	91	230	21	77	6	81	130	23	6	53	8
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	414	384	57	534	377	142	61	0	0	153	0	0
Stage 1	70	70	-	303	303	-	-	-	-	-	-	-
Stage 2	344	314	-	231	74	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	545	546	1004	454	551	900	1511	-	-	1346	-	-
Stage 1	935	833	-	702	660	-	-	-	-	-	-	-
Stage 2	667	653	-	767	829	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	457	511	1004	288	516	900	1511	-	-	1346	-	-
Mov Cap-2 Maneuver	457	511	-	288	516	-	-	-	-	-	-	-
Stage 1	880	829	-	661	621	-	-	-	-	-	-	-
Stage 2	546	614	-	524	825	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	13.6			15.2			2.6			0.7		
HCM LOS	B			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1511	-	-	755	456	1346	-	-				
HCM Lane V/C Ratio	0.053	-	-	0.452	0.228	0.005	-	-				
HCM Control Delay (s)	7.5	0	-	13.6	15.2	7.7	0	-				
HCM Lane LOS	A	A	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	2.4	0.9	0	-	-				

Intersection						
Int Delay, s/veh	4.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	11	104	175	160	235	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	12	12	10	10	3	3
Mvmt Flow	14	133	224	205	301	14
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	962	308	315	0	-	0
Stage 1	308	-	-	-	-	-
Stage 2	654	-	-	-	-	-
Critical Hdwy	6.52	6.32	4.2	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.408	2.29	-	-	-
Pot Cap-1 Maneuver	272	709	1201	-	-	-
Stage 1	723	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	215	709	1201	-	-	-
Mov Cap-2 Maneuver	215	-	-	-	-	-
Stage 1	723	-	-	-	-	-
Stage 2	394	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.3	4.5		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1201	-	581	-	-	
HCM Lane V/C Ratio	0.187	-	0.254	-	-	
HCM Control Delay (s)	8.7	0	13.3	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.7	-	1	-	-	

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	4	19	71	314	325	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	55	55	10	10	6	6
Mvmt Flow	5	23	88	388	401	19
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	973	410	420	0	-	0
Stage 1	410	-	-	-	-	-
Stage 2	563	-	-	-	-	-
Critical Hdwy	6.95	6.75	4.2	-	-	-
Critical Hdwy Stg 1	5.95	-	-	-	-	-
Critical Hdwy Stg 2	5.95	-	-	-	-	-
Follow-up Hdwy	3.995	3.795	2.29	-	-	-
Pot Cap-1 Maneuver	225	542	1097	-	-	-
Stage 1	570	-	-	-	-	-
Stage 2	478	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	202	542	1097	-	-	-
Mov Cap-2 Maneuver	202	-	-	-	-	-
Stage 1	570	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	14.2	1.6		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1097	-	419	-	-	
HCM Lane V/C Ratio	0.08	-	0.068	-	-	
HCM Control Delay (s)	8.6	0	14.2	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	0.2	-	-	

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: BG2019-PM
Background 2019 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	6	231	103	12	13	135	344	19	4	472	29
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	20	8	0	129	15	16	169	430	0	5	590	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	209	215	183	234	99	106	197	2396	1072	588	1912	856
Arrive On Green	0.12	0.12	0.00	0.12	0.12	0.12	0.12	0.75	0.00	0.57	0.57	0.00
Sat Flow, veh/h	1321	1792	1524	1402	826	881	1601	3195	1429	909	3374	1509
Grp Volume(v), veh/h	20	8	0	129	0	31	169	430	0	5	590	0
Grp Sat Flow(s),veh/h/ln	1321	1792	1524	1402	0	1707	1601	1597	1429	909	1687	1509
Q Serve(g_s), s	1.4	0.4	0.0	9.0	0.0	1.6	10.3	3.9	0.0	0.2	9.2	0.0
Cycle Q Clear(g_c), s	3.0	0.4	0.0	9.4	0.0	1.6	10.3	3.9	0.0	0.2	9.2	0.0
Prop In Lane	1.00		1.00	1.00		0.52	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	209	215	183	234	0	205	197	2396	1072	588	1912	856
V/C Ratio(X)	0.10	0.04	0.00	0.55	0.00	0.15	0.86	0.18	0.00	0.01	0.31	0.00
Avail Cap(c_a), veh/h	401	475	404	438	0	452	224	2396	1072	588	1912	856
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.8	38.9	0.0	43.0	0.0	39.4	43.0	3.6	0.0	9.4	11.4	0.0
Incr Delay (d2), s/veh	0.2	0.1	0.0	2.0	0.0	0.3	24.3	0.2	0.0	0.0	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.2	0.0	3.6	0.0	0.8	5.9	1.7	0.0	0.1	4.4	0.0
LnGrp Delay(d),s/veh	41.0	39.0	0.0	45.0	0.0	39.8	67.2	3.8	0.0	9.5	11.8	0.0
LnGrp LOS	D	D		D		D	E	A		A	B	
Approach Vol, veh/h	28			160			599			595		
Approach Delay, s/veh	40.4			44.0			21.7			11.8		
Approach LOS	D			D			C			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4	5	6	8					
Phs Duration (G+Y+Rc), s	81.5			18.5	18.3	63.2	18.5					
Change Period (Y+Rc), s	6.5			6.5	6.0	6.5	6.5					
Max Green Setting (Gmax), s	60.5			26.5	14.0	40.5	26.5					
Max Q Clear Time (g_c+l1), s	5.9			5.0	12.3	11.2	11.4					
Green Ext Time (p_c), s	10.3			0.8	0.1	9.1	0.7					
Intersection Summary												
HCM 2010 Ctrl Delay	20.4											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: BG2019-PM
Background 2019 PM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	35	256	215	542	916	59		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	39	0	239	602	1018	66		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	217	100	259	2591	1988	890		
Arrive On Green	0.07	0.00	0.16	0.80	0.58	0.58		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	39	0	239	602	1018	66		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	1.1	0.0	14.6	4.5	17.7	1.9		
Cycle Q Clear(g_c), s	1.1	0.0	14.6	4.5	17.7	1.9		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	217	100	259	2591	1988	890		
V/C Ratio(X)	0.18	0.00	0.92	0.23	0.51	0.07		
Avail Cap(c_a), veh/h	607	279	259	2591	1988	890		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(l)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	44.1	0.0	41.4	2.4	12.4	9.1		
Incr Delay (d2), s/veh	0.4	0.0	36.3	0.2	0.9	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.5	0.0	9.1	2.0	8.6	0.8		
LnGrp Delay(d),s/veh	44.5	0.0	77.7	2.6	13.3	9.2		
LnGrp LOS	D		E	A	B	A		
Approach Vol, veh/h	39			841	1084			
Approach Delay, s/veh	44.5			23.9	13.0			
Approach LOS	D			C	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		86.9		13.1	22.0	64.9		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		68.5		18.5	16.0	46.5		
Max Q Clear Time (g_c+l1), s		6.5		3.1	16.6	19.7		
Green Ext Time (p_c), s		22.7		0.1	0.0	15.5		
Intersection Summary								
HCM 2010 Ctrl Delay			18.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2019-PM
Background 2019 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	585	6	269	729	242	362	316	292	272	528	201
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	182	636	7	292	792	0	393	343	0	296	574	218
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	310	989	11	397	1144	512	604	841	376	744	737	330
Arrive On Green	0.10	0.30	0.30	0.14	0.34	0.00	0.12	0.25	0.00	0.10	0.23	0.23
Sat Flow, veh/h	1645	3325	37	1691	3374	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	182	314	329	292	792	0	393	343	0	296	574	218
Grp Sat Flow(s),veh/h/ln	1645	1641	1721	1691	1687	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	8.4	18.4	18.5	12.9	22.5	0.0	9.9	9.4	0.0	7.7	18.4	15.1
Cycle Q Clear(g_c), s	8.4	18.4	18.5	12.9	22.5	0.0	9.9	9.4	0.0	7.7	18.4	15.1
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	310	488	512	397	1144	512	604	841	376	744	737	330
V/C Ratio(X)	0.59	0.64	0.64	0.73	0.69	0.00	0.65	0.41	0.00	0.40	0.78	0.66
Avail Cap(c_a), veh/h	433	488	512	452	1144	512	946	881	394	1145	850	380
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	33.9	33.9	23.6	31.7	0.0	29.0	34.8	0.0	28.1	40.3	39.0
Incr Delay (d2), s/veh	1.8	6.4	6.1	5.3	3.5	0.0	1.2	0.3	0.0	0.3	4.1	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	9.2	9.6	6.6	11.0	0.0	4.5	4.4	0.0	3.4	8.7	6.4
LnGrp Delay(d),s/veh	26.7	40.3	40.0	28.9	35.1	0.0	30.2	35.1	0.0	28.5	44.4	42.5
LnGrp LOS	C	D	D	C	D		C	D		C	D	D
Approach Vol, veh/h		825			1084			736			1088	
Approach Delay, s/veh		37.2			33.5			32.5			39.7	
Approach LOS		D			C			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.4	40.0	15.9	33.7	16.7	44.6	18.4	31.2				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	14.9	20.5	9.7	11.4	10.4	24.5	11.9	20.4				
Green Ext Time (p_c), s	0.5	7.9	1.2	7.5	0.4	5.8	1.6	4.8				
Intersection Summary												
HCM 2010 Ctrl Delay			35.9									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	10											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	36	170	10	76	0	235	62	38	9	156	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	11	39	183	11	82	0	253	67	41	10	168	32
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	836	816	184	906	811	87	200	0	0	108	0	0
Stage 1	203	203	-	592	592	-	-	-	-	-	-	-
Stage 2	633	613	-	314	219	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	284	309	853	255	311	966	1343	-	-	1400	-	-
Stage 1	794	730	-	489	491	-	-	-	-	-	-	-
Stage 2	464	480	-	693	718	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	179	245	853	149	247	966	1343	-	-	1400	-	-
Mov Cap-2 Maneuver	179	245	-	149	247	-	-	-	-	-	-	-
Stage 1	634	724	-	391	392	-	-	-	-	-	-	-
Stage 2	293	384	-	511	712	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.7			31			5.8			0.4		
HCM LOS	C			D								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1343	-	-	537	229	1400	-	-				
HCM Lane V/C Ratio	0.188	-	-	0.433	0.404	0.007	-	-				
HCM Control Delay (s)	8.3	0	-	16.7	31	7.6	0	-				
HCM Lane LOS	A	A	-	C	D	A	A	-				
HCM 95th %tile Q(veh)	0.7	-	-	2.2	1.8	0	-	-				

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	19	167	101	277	256	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	9	9	9	9	8	8
Mvmt Flow	22	194	117	322	298	15
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	862	305	313	0	-	0
Stage 1	305	-	-	-	-	-
Stage 2	557	-	-	-	-	-
Critical Hdwy	6.49	6.29	4.19	-	-	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.381	2.281	-	-	-
Pot Cap-1 Maneuver	317	719	1209	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	560	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	280	719	1209	-	-	-
Mov Cap-2 Maneuver	280	-	-	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	13.9		2.2		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1209	-	620	-	-	
HCM Lane V/C Ratio	0.097	-	0.349	-	-	
HCM Control Delay (s)	8.3	0	13.9	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	1.6	-	-	

Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	13	83	16	385	409	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	3	3	9	9	10	10
Mvmt Flow	16	100	19	464	493	5

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	997	495	498 0
Stage 1	495	-	- -
Stage 2	502	-	- -
Critical Hdwy	6.43	6.23	4.19 -
Critical Hdwy Stg 1	5.43	-	- -
Critical Hdwy Stg 2	5.43	-	- -
Follow-up Hdwy	3.527	3.327	2.281 -
Pot Cap-1 Maneuver	269	573	1031 -
Stage 1	611	-	- -
Stage 2	606	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	262	573	1031 -
Mov Cap-2 Maneuver	262	-	- -
Stage 1	611	-	- -
Stage 2	591	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	14.5	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1031	-	494	-	-
HCM Lane V/C Ratio	0.019	-	0.234	-	-
HCM Control Delay (s)	8.6	0	14.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: BG2022-AM
Background 2022 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	14	87	21	7	5	212	404	83	13	342	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	12	17	0	25	8	6	255	487	0	16	412	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	175	157	133	152	63	47	293	2600	1163	537	1818	813
Arrive On Green	0.08	0.08	0.00	0.08	0.08	0.08	0.18	0.79	0.00	0.55	0.55	0.00
Sat Flow, veh/h	1380	1845	1568	1043	742	557	1660	3312	1482	847	3312	1482
Grp Volume(v), veh/h	12	17	0	25	0	14	255	487	0	16	412	0
Grp Sat Flow(s),veh/h/ln	1380	1845	1568	1043	0	1299	1660	1656	1482	847	1656	1482
Q Serve(g_s), s	0.8	0.9	0.0	2.3	0.0	1.0	15.0	3.7	0.0	0.9	6.4	0.0
Cycle Q Clear(g_c), s	1.8	0.9	0.0	3.1	0.0	1.0	15.0	3.7	0.0	0.9	6.4	0.0
Prop In Lane	1.00		1.00	1.00		0.43	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	175	157	133	152	0	110	293	2600	1163	537	1818	813
V/C Ratio(X)	0.07	0.11	0.00	0.16	0.00	0.13	0.87	0.19	0.00	0.03	0.23	0.00
Avail Cap(c_a), veh/h	424	489	416	339	0	344	432	2600	1163	537	1818	813
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.2	42.3	0.0	43.7	0.0	42.3	40.1	2.7	0.0	10.4	11.6	0.0
Incr Delay (d2), s/veh	0.2	0.3	0.0	0.5	0.0	0.5	12.3	0.2	0.0	0.1	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.4	0.0	0.7	0.0	0.4	7.9	1.7	0.0	0.2	3.0	0.0
LnGrp Delay(d),s/veh	43.3	42.6	0.0	44.2	0.0	42.8	52.4	2.9	0.0	10.5	11.9	0.0
LnGrp LOS	D	D		D		D	D	A		B	B	
Approach Vol, veh/h	29			39			742			428		
Approach Delay, s/veh	42.9			43.7			19.9			11.9		
Approach LOS	D			D			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	85.0			15.0			23.6			61.4		
Change Period (Y+Rc), s	6.5			6.5			6.0			6.5		
Max Green Setting (Gmax), s	60.5			26.5			26.0			28.5		
Max Q Clear Time (g_c+l1), s	5.7			3.8			17.0			8.4		
Green Ext Time (p_c), s	8.8			0.3			0.7			6.9		
Intersection Summary												
HCM 2010 Ctrl Delay	18.4											
HCM 2010 LOS	B											

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: BG2022-AM
Background 2022 AM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	35	160	267	706	456	32		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	40	0	307	811	524	37		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	210	97	352	2734	1671	748		
Arrive On Green	0.07	0.00	0.21	0.80	0.54	0.54		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	40	0	307	811	524	37		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	1.2	0.0	17.4	6.2	9.4	1.3		
Cycle Q Clear(g_c), s	1.2	0.0	17.4	6.2	9.4	1.3		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	210	97	352	2734	1671	748		
V/C Ratio(X)	0.19	0.00	0.87	0.30	0.31	0.05		
Avail Cap(c_a), veh/h	360	166	615	2734	1671	748		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	44.1	0.0	38.4	2.5	12.9	11.0		
Incr Delay (d2), s/veh	0.4	0.0	6.8	0.3	0.5	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.5	0.0	8.9	2.9	4.1	0.5		
LnGrp Delay(d),s/veh	44.5	0.0	45.3	2.8	13.4	11.1		
LnGrp LOS	D		D	A	B	B		
Approach Vol, veh/h	40			1118	561			
Approach Delay, s/veh	44.5			14.5	13.2			
Approach LOS	D			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		86.8		13.2	26.6	60.2		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		75.5		11.5	36.0	33.5		
Max Q Clear Time (g_c+I1), s		8.2		3.2	19.4	11.4		
Green Ext Time (p_c), s		16.2		0.1	1.2	11.1		
Intersection Summary								
HCM 2010 Ctrl Delay			14.8					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2022-AM
Background 2022 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	327	659	9	266	641	408	283	621	192	392	405	193
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	355	716	10	289	697	0	308	675	0	426	440	210
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	380	973	14	364	921	412	634	746	334	561	818	366
Arrive On Green	0.16	0.30	0.30	0.14	0.28	0.00	0.10	0.23	0.00	0.13	0.26	0.26
Sat Flow, veh/h	1630	3284	46	1660	3312	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	355	354	372	289	697	0	308	675	0	426	440	210
Grp Sat Flow(s),veh/h/ln	1630	1626	1704	1660	1656	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	18.6	23.3	23.3	14.5	22.8	0.0	8.5	23.8	0.0	12.2	14.3	15.4
Cycle Q Clear(g_c), s	18.6	23.3	23.3	14.5	22.8	0.0	8.5	23.8	0.0	12.2	14.3	15.4
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	380	482	505	364	921	412	634	746	334	561	818	366
V/C Ratio(X)	0.93	0.74	0.74	0.79	0.76	0.00	0.49	0.91	0.00	0.76	0.54	0.57
Avail Cap(c_a), veh/h	380	482	505	394	921	412	989	802	359	800	818	366
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.7	37.6	37.6	27.4	39.2	0.0	30.4	44.6	0.0	30.7	37.7	38.2
Incr Delay (d2), s/veh	29.9	9.6	9.2	10.0	5.8	0.0	0.6	13.2	0.0	2.6	0.7	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	11.7	12.2	7.6	11.2	0.0	3.8	12.2	0.0	5.2	6.3	6.2
LnGrp Delay(d),s/veh	57.6	47.2	46.8	37.4	45.0	0.0	31.0	57.9	0.0	33.4	38.4	40.3
LnGrp LOS	E	D	D	D	D		C	E		C	D	D
Approach Vol, veh/h	1081				986			983			1076	
Approach Delay, s/veh	50.5				42.8			49.4			36.8	
Approach LOS	D				D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	42.2	20.7	33.0	25.0	40.0	16.8	36.9				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	16.5	25.3	14.2	25.8	20.6	24.8	10.5	17.4				
Green Ext Time (p_c), s	0.3	5.3	1.6	1.2	0.0	5.6	1.2	6.8				
Intersection Summary												
HCM 2010 Ctrl Delay	44.8											
HCM 2010 LOS	D											

Intersection												
Int Delay, s/veh	9.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	75	189	17	63	5	67	102	20	5	42	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	21	97	245	22	82	6	87	132	26	6	55	8
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	435	403	58	562	394	145	62	0	0	158	0	0
Stage 1	71	71	-	319	319	-	-	-	-	-	-	-
Stage 2	364	332	-	243	75	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	528	533	1002	435	539	897	1510	-	-	1341	-	-
Stage 1	934	832	-	688	649	-	-	-	-	-	-	-
Stage 2	651	641	-	756	829	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	436	497	1002	265	503	897	1510	-	-	1341	-	-
Mov Cap-2 Maneuver	436	497	-	265	503	-	-	-	-	-	-	-
Stage 1	875	828	-	645	608	-	-	-	-	-	-	-
Stage 2	524	601	-	501	825	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	14.4			16			2.7			0.7		
HCM LOS	B			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1510	-	-	744	436	1341	-	-				
HCM Lane V/C Ratio	0.058	-	-	0.489	0.253	0.005	-	-				
HCM Control Delay (s)	7.5	0	-	14.4	16	7.7	0	-				
HCM Lane LOS	A	A	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	2.7	1	0	-	-				

Intersection						
Int Delay, s/veh	4.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	11	112	187	166	251	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	12	12	10	10	3	3
Mvmt Flow	14	144	240	213	322	15
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1021	329	337	0	-	0
Stage 1	329	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Critical Hdwy	6.52	6.32	4.2	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.408	2.29	-	-	-
Pot Cap-1 Maneuver	251	690	1179	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	193	690	1179	-	-	-
Mov Cap-2 Maneuver	193	-	-	-	-	-
Stage 1	707	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	13.9		4.7		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1179	-	561	-	-	
HCM Lane V/C Ratio	0.203	-	0.281	-	-	
HCM Control Delay (s)	8.8	0	13.9	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.8	-	1.1	-	-	

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	4	21	76	332	348	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	55	55	10	10	6	6
Mvmt Flow	5	26	94	410	430	20
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1038	440	449	0	-	0
Stage 1	440	-	-	-	-	-
Stage 2	598	-	-	-	-	-
Critical Hdwy	6.95	6.75	4.2	-	-	-
Critical Hdwy Stg 1	5.95	-	-	-	-	-
Critical Hdwy Stg 2	5.95	-	-	-	-	-
Follow-up Hdwy	3.995	3.795	2.29	-	-	-
Pot Cap-1 Maneuver	205	520	1070	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	459	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	182	520	1070	-	-	-
Mov Cap-2 Maneuver	182	-	-	-	-	-
Stage 1	550	-	-	-	-	-
Stage 2	407	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	14.7	1.6		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1070	-	401	-	-	
HCM Lane V/C Ratio	0.088	-	0.077	-	-	
HCM Control Delay (s)	8.7	0	14.7	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	0.2	-	-	

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: BG2022-PM
Background 2022 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	6	248	111	13	14	144	366	21	4	499	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	21	8	0	139	16	18	180	458	0	5	624	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	216	227	193	244	102	114	214	2374	1062	559	1855	830
Arrive On Green	0.13	0.13	0.00	0.13	0.13	0.13	0.13	0.74	0.00	0.55	0.55	0.00
Sat Flow, veh/h	1317	1792	1524	1402	802	902	1601	3195	1429	886	3374	1509
Grp Volume(v), veh/h	21	8	0	139	0	34	180	458	0	5	624	0
Grp Sat Flow(s),veh/h/ln	1317	1792	1524	1402	0	1704	1601	1597	1429	886	1687	1509
Q Serve(g_s), s	1.4	0.4	0.0	9.7	0.0	1.8	11.0	4.3	0.0	0.3	10.2	0.0
Cycle Q Clear(g_c), s	3.2	0.4	0.0	10.0	0.0	1.8	11.0	4.3	0.0	0.3	10.2	0.0
Prop In Lane	1.00		1.00	1.00		0.53	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	216	227	193	244	0	216	214	2374	1062	559	1855	830
V/C Ratio(X)	0.10	0.04	0.00	0.57	0.00	0.16	0.84	0.19	0.00	0.01	0.34	0.00
Avail Cap(c_a), veh/h	371	439	373	410	0	417	368	2374	1062	559	1855	830
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	40.3	38.3	0.0	42.7	0.0	38.9	42.3	3.9	0.0	10.2	12.4	0.0
Incr Delay (d2), s/veh	0.2	0.1	0.0	2.1	0.0	0.3	8.7	0.2	0.0	0.0	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.2	0.0	3.9	0.0	0.9	5.4	1.9	0.0	0.1	4.9	0.0
LnGrp Delay(d),s/veh	40.5	38.3	0.0	44.8	0.0	39.2	51.0	4.0	0.0	10.2	12.9	0.0
LnGrp LOS	D	D		D		D	D	A		B	B	
Approach Vol, veh/h	29			173			638			629		
Approach Delay, s/veh	39.9			43.7			17.3			12.9		
Approach LOS	D			D			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	80.8			19.2			61.5			19.2		
Change Period (Y+Rc), s	6.5			6.5			6.5			6.5		
Max Green Setting (Gmax), s	62.5			24.5			33.5			24.5		
Max Q Clear Time (g_c+l1), s	6.3			5.2			12.2			12.0		
Green Ext Time (p_c), s	11.3			0.8			8.6			0.7		
Intersection Summary												
HCM 2010 Ctrl Delay				19.0								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
5: 43 Street N & 5 Ave N

Timing Plan: BG2022-PM
Background 2022 PM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Volume (veh/h)	37	274	230	579	976	62		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	41	0	256	643	1084	69		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	223	103	292	2585	1912	855		
Arrive On Green	0.07	0.00	0.18	0.80	0.56	0.56		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	41	0	256	643	1084	69		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	1.2	0.0	15.4	4.9	20.5	2.1		
Cycle Q Clear(g_c), s	1.2	0.0	15.4	4.9	20.5	2.1		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	223	103	292	2585	1912	855		
V/C Ratio(X)	0.18	0.00	0.88	0.25	0.57	0.08		
Avail Cap(c_a), veh/h	328	151	420	2585	1912	855		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	44.0	0.0	39.9	2.4	14.1	10.1		
Incr Delay (d2), s/veh	0.4	0.0	13.6	0.2	1.2	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.5	0.0	8.0	2.2	9.8	0.9		
LnGrp Delay(d),s/veh	44.4	0.0	53.5	2.7	15.3	10.3		
LnGrp LOS	D		D	A	B	B		
Approach Vol, veh/h	41			899	1153			
Approach Delay, s/veh	44.4			17.2	15.0			
Approach LOS	D			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		86.7		13.3	24.1	62.6		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	26.0	45.0		
Max Q Clear Time (g_c+I1), s		6.9		3.2	17.4	22.5		
Green Ext Time (p_c), s		26.2		0.0	0.7	14.8		
Intersection Summary								
HCM 2010 Ctrl Delay			16.5					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2022-PM
Background 2022 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	178	627	6	288	781	259	387	338	313	290	563	213
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	193	682	7	313	849	0	421	367	0	315	612	232
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	295	957	10	385	1120	501	603	859	384	744	749	335
Arrive On Green	0.10	0.29	0.29	0.15	0.33	0.00	0.13	0.25	0.00	0.10	0.23	0.23
Sat Flow, veh/h	1645	3328	34	1691	3374	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	193	336	353	313	849	0	421	367	0	315	612	232
Grp Sat Flow(s),veh/h/ln	1645	1641	1721	1691	1687	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	9.3	21.1	21.1	14.5	25.8	0.0	10.9	10.4	0.0	8.5	20.5	16.8
Cycle Q Clear(g_c), s	9.3	21.1	21.1	14.5	25.8	0.0	10.9	10.4	0.0	8.5	20.5	16.8
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	295	472	495	385	1120	501	603	859	384	744	749	335
V/C Ratio(X)	0.65	0.71	0.71	0.81	0.76	0.00	0.70	0.43	0.00	0.42	0.82	0.69
Avail Cap(c_a), veh/h	399	472	495	417	1120	501	902	859	384	1109	822	368
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.0	36.7	36.7	25.4	34.2	0.0	29.8	35.8	0.0	28.7	41.9	40.5
Incr Delay (d2), s/veh	2.5	8.9	8.5	11.0	4.8	0.0	1.5	0.3	0.0	0.4	6.0	4.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	10.7	11.2	7.9	12.8	0.0	5.0	4.9	0.0	3.7	9.8	7.2
LnGrp Delay(d),s/veh	29.4	45.5	45.1	36.4	39.0	0.0	31.3	36.1	0.0	29.1	47.9	45.4
LnGrp LOS	C	D	D	D	D		C	D		C	D	D
Approach Vol, veh/h		882			1162			788			1159	
Approach Delay, s/veh		41.8			38.3			33.6			42.3	
Approach LOS		D			D			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	40.0	16.7	35.2	17.7	45.1	19.5	32.4				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	16.5	23.1	10.5	12.4	11.3	27.8	12.9	22.5				
Green Ext Time (p_c), s	0.3	6.9	1.3	7.8	0.4	4.0	1.7	4.0				
Intersection Summary												
HCM 2010 Ctrl Delay			39.3									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	11											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	39	182	9	81	0	251	64	41	9	159	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	11	42	196	10	87	0	270	69	44	10	171	33
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	881	860	188	957	855	91	204	0	0	113	0	0
Stage 1	207	207	-	631	631	-	-	-	-	-	-	-
Stage 2	674	653	-	326	224	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	265	291	849	235	293	961	1338	-	-	1394	-	-
Stage 1	790	727	-	466	471	-	-	-	-	-	-	-
Stage 2	441	461	-	682	715	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	156	226	849	129	228	961	1338	-	-	1394	-	-
Mov Cap-2 Maneuver	156	226	-	129	228	-	-	-	-	-	-	-
Stage 1	619	721	-	365	369	-	-	-	-	-	-	-
Stage 2	264	361	-	490	709	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	18.5			35.5			5.9			0.3		
HCM LOS	C			E								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1338	-	-	512	212	1394	-	-				
HCM Lane V/C Ratio	0.202	-	-	0.485	0.456	0.007	-	-				
HCM Control Delay (s)	8.4	0	-	18.5	35.5	7.6	0	-				
HCM Lane LOS	A	A	-	C	E	A	A	-				
HCM 95th %tile Q(veh)	0.8	-	-	2.6	2.2	0	-	-				

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	20	179	108	295	267	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	9	9	9	9	8	8
Mvmt Flow	23	208	126	343	310	15
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	912	318	326	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	594	-	-	-	-	-
Critical Hdwy	6.49	6.29	4.19	-	-	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.381	2.281	-	-	-
Pot Cap-1 Maneuver	295	707	1195	-	-	-
Stage 1	722	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	257	707	1195	-	-	-
Mov Cap-2 Maneuver	257	-	-	-	-	-
Stage 1	722	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	14.7		2.2		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1195	-	601	-	-	
HCM Lane V/C Ratio	0.105	-	0.385	-	-	
HCM Control Delay (s)	8.4	0	14.7	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.4	-	1.8	-	-	

Intersection

Int Delay, s/veh 1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	14	89	17	411	430	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	3	3	9	9	10	10
Mvmt Flow	17	107	20	495	518	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1056	520	523	0	-	0
Stage 1	520	-	-	-	-	-
Stage 2	536	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.19	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.281	-	-	-
Pot Cap-1 Maneuver	248	554	1009	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	585	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	241	554	1009	-	-	-
Mov Cap-2 Maneuver	241	-	-	-	-	-
Stage 1	595	-	-	-	-	-
Stage 2	569	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.4	0.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1009	-	471	-	-
HCM Lane V/C Ratio	0.02	-	0.263	-	-
HCM Control Delay (s)	8.6	0	15.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1	-	-

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: BG2037-AM
Background 2037 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	18	116	27	9	6	282	518	110	17	452	19
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	13	22	0	33	11	7	340	624	0	20	545	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	179	168	142	155	73	46	378	2581	1154	439	1628	728
Arrive On Green	0.09	0.09	0.00	0.09	0.09	0.09	0.23	0.78	0.00	0.49	0.49	0.00
Sat Flow, veh/h	1376	1845	1568	1038	799	508	1660	3312	1482	746	3312	1482
Grp Volume(v), veh/h	13	22	0	33	0	18	340	624	0	20	545	0
Grp Sat Flow(s),veh/h/ln	1376	1845	1568	1038	0	1307	1660	1656	1482	746	1656	1482
Q Serve(g_s), s	0.9	1.1	0.0	3.0	0.0	1.3	19.9	5.1	0.0	1.4	10.0	0.0
Cycle Q Clear(g_c), s	2.1	1.1	0.0	4.1	0.0	1.3	19.9	5.1	0.0	1.4	10.0	0.0
Prop In Lane	1.00		1.00	1.00		0.39	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	179	168	142	155	0	119	378	2581	1154	439	1628	728
V/C Ratio(X)	0.07	0.13	0.00	0.21	0.00	0.15	0.90	0.24	0.00	0.05	0.33	0.00
Avail Cap(c_a), veh/h	412	480	408	330	0	340	481	2581	1154	439	1628	728
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.9	41.8	0.0	43.7	0.0	41.9	37.5	3.0	0.0	13.3	15.5	0.0
Incr Delay (d2), s/veh	0.2	0.4	0.0	0.7	0.0	0.6	16.9	0.2	0.0	0.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.6	0.0	0.9	0.0	0.5	10.8	2.3	0.0	0.3	4.7	0.0
LnGrp Delay(d),s/veh	43.1	42.2	0.0	44.4	0.0	42.5	54.4	3.2	0.0	13.5	16.0	0.0
LnGrp LOS	D	D		D		D	D	A		B	B	
Approach Vol, veh/h		35			51			964			565	
Approach Delay, s/veh		42.5			43.7			21.3			15.9	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		84.4		15.6	28.7	55.7		15.6				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		61.0		26.0	29.0	26.0		26.0				
Max Q Clear Time (g_c+l1), s		7.1		4.1	21.9	12.0		6.1				
Green Ext Time (p_c), s		12.8		0.4	0.9	7.4		0.4				
Intersection Summary												
HCM 2010 Ctrl Delay			20.6									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: BG2037-AM
Background 2037 AM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Volume (veh/h)	42	213	356	925	604	41		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	48	0	409	1063	694	47		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	231	106	454	2712	1464	655		
Arrive On Green	0.07	0.00	0.27	0.80	0.47	0.47		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	48	0	409	1063	694	47		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	1.4	0.0	23.1	9.2	15.2	1.9		
Cycle Q Clear(g_c), s	1.4	0.0	23.1	9.2	15.2	1.9		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	231	106	454	2712	1464	655		
V/C Ratio(X)	0.21	0.00	0.90	0.39	0.47	0.07		
Avail Cap(c_a), veh/h	313	144	632	2712	1464	655		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	43.6	0.0	35.4	3.0	18.0	14.5		
Incr Delay (d2), s/veh	0.4	0.0	12.6	0.4	1.1	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.6	0.0	12.5	4.4	6.7	0.7		
LnGrp Delay(d),s/veh	44.0	0.0	48.0	3.4	19.2	14.7		
LnGrp LOS	D		D	A	B	B		
Approach Vol, veh/h	48			1472	741			
Approach Delay, s/veh	44.0			15.8	18.9			
Approach LOS	D			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		86.1		13.9	32.6	53.5		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	37.0	34.0		
Max Q Clear Time (g_c+I1), s		11.2		3.4	25.1	17.2		
Green Ext Time (p_c), s		26.0		0.1	1.5	12.0		
Intersection Summary								
HCM 2010 Ctrl Delay			17.4					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-AM
Background 2037 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	429	878	12	354	854	541	377	821	255	521	538	256
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	466	954	13	385	928	0	410	892	0	566	585	278
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	302	858	12	306	865	387	633	753	337	631	865	387
Arrive On Green	0.15	0.26	0.26	0.15	0.26	0.00	0.12	0.23	0.00	0.17	0.28	0.28
Sat Flow, veh/h	1630	3285	45	1660	3312	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	466	472	495	385	928	0	410	892	0	566	585	278
Grp Sat Flow(s),veh/h/ln	1630	1626	1704	1660	1656	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	19.0	33.0	33.0	19.0	33.0	0.0	12.1	29.0	0.0	18.1	21.0	22.6
Cycle Q Clear(g_c), s	19.0	33.0	33.0	19.0	33.0	0.0	12.1	29.0	0.0	18.1	21.0	22.6
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	302	425	445	306	865	387	633	753	337	631	865	387
V/C Ratio(X)	1.54	1.11	1.11	1.26	1.07	0.00	0.65	1.18	0.00	0.90	0.68	0.72
Avail Cap(c_a), veh/h	302	425	445	306	865	387	871	753	337	718	865	387
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	46.7	46.7	38.1	46.7	0.0	31.8	48.7	0.0	34.4	40.8	41.4
Incr Delay (d2), s/veh	260.3	77.8	76.9	139.1	52.2	0.0	1.1	96.4	0.0	13.0	2.1	6.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	32.3	23.9	24.9	22.5	21.3	0.0	5.3	23.1	0.0	10.7	9.4	9.4
LnGrp Delay(d),s/veh	298.2	124.5	123.6	177.3	99.0	0.0	32.9	145.1	0.0	47.4	42.9	47.7
LnGrp LOS	F	F	F	F	F		C	F		D	D	D
Approach Vol, veh/h	1433				1313			1302			1429	
Approach Delay, s/veh	180.7				121.9			109.8			45.6	
Approach LOS	F				F			F			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	25.0	40.0	26.4	35.0	25.0	40.0	20.6	40.8				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	21.0	35.0	20.1	31.0	21.0	35.0	14.1	24.6				
Green Ext Time (p_c), s	0.0	0.0	1.3	0.0	0.0	0.0	1.5	3.6				
Intersection Summary												
HCM 2010 Ctrl Delay	114.5											
HCM 2010 LOS	F											

Intersection												
Int Delay, s/veh	14.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	99	252	23	84	6	89	111	26	6	51	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	22	129	327	30	109	8	116	144	34	8	66	9
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	537	495	71	706	483	161	75	0	0	178	0	0
Stage 1	86	86	-	392	392	-	-	-	-	-	-	-
Stage 2	451	409	-	314	91	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	452	473	986	348	480	879	1493	-	-	1318	-	-
Stage 1	917	820	-	629	603	-	-	-	-	-	-	-
Stage 2	584	593	-	693	816	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	337	429	986	167	436	879	1493	-	-	1318	-	-
Mov Cap-2 Maneuver	337	429	-	167	436	-	-	-	-	-	-	-
Stage 1	837	815	-	574	551	-	-	-	-	-	-	-
Stage 2	424	541	-	388	811	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	21.4			23.9			3			0.7		
HCM LOS	C			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1493	-	-	686	335	1318	-	-				
HCM Lane V/C Ratio	0.077	-	-	0.697	0.438	0.006	-	-				
HCM Control Delay (s)	7.6	0	-	21.4	23.9	7.7	0	-				
HCM Lane LOS	A	A	-	C	C	A	A	-				
HCM 95th %tile Q(veh)	0.3	-	-	5.7	2.1	0	-	-				

Intersection						
Int Delay, s/veh	6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	13	149	249	199	329	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	12	12	10	10	3	3
Mvmt Flow	17	191	319	255	422	19
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1325	431	441	0	-	0
Stage 1	431	-	-	-	-	-
Stage 2	894	-	-	-	-	-
Critical Hdwy	6.52	6.32	4.2	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.408	2.29	-	-	-
Pot Cap-1 Maneuver	164	604	1078	-	-	-
Stage 1	635	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	107	604	1078	-	-	-
Mov Cap-2 Maneuver	107	-	-	-	-	-
Stage 1	635	-	-	-	-	-
Stage 2	252	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	20.3		5.4		0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1078	-	440	-	-	
HCM Lane V/C Ratio	0.296	-	0.472	-	-	
HCM Control Delay (s)	9.7	0	20.3	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	1.2	-	2.5	-	-	

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	4	27	101	420	459	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	55	55	10	10	6	6
Mvmt Flow	5	33	125	519	567	26
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1348	580	593	0	-	0
Stage 1	580	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Critical Hdwy	6.95	6.75	4.2	-	-	-
Critical Hdwy Stg 1	5.95	-	-	-	-	-
Critical Hdwy Stg 2	5.95	-	-	-	-	-
Follow-up Hdwy	3.995	3.795	2.29	-	-	-
Pot Cap-1 Maneuver	129	427	945	-	-	-
Stage 1	469	-	-	-	-	-
Stage 2	376	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	105	427	945	-	-	-
Mov Cap-2 Maneuver	105	-	-	-	-	-
Stage 1	469	-	-	-	-	-
Stage 2	306	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	18.4	1.8		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	945	-	306	-	-	
HCM Lane V/C Ratio	0.132	-	0.125	-	-	
HCM Control Delay (s)	9.4	0	18.4	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.5	-	0.4	-	-	

HCM 2010 Signalized Intersection Summary

1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	99	252	23	84	6	89	111	26	6	51	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1827	1900	1900	1827	1900	1900	1776	1900	1900	1638	1900
Adj Flow Rate, veh/h	22	129	327	30	109	8	116	144	34	8	66	9
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	4	4	4	4	4	4	7	7	7	16	16	16
Cap, veh/h	107	193	446	187	566	37	258	238	48	114	366	46
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	31	480	1106	194	1406	92	486	880	179	53	1355	171
Grp Volume(v), veh/h	478	0	0	147	0	0	294	0	0	83	0	0
Grp Sat Flow(s),veh/h/ln	1617	0	0	1693	0	0	1544	0	0	1579	0	0
Q Serve(g_s), s	0.6	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.9	0.0	0.0	2.1	0.0	0.0	6.7	0.0	0.0	1.6	0.0	0.0
Prop In Lane	0.05		0.68	0.20		0.05	0.39		0.12	0.10		0.11
Lane Grp Cap(c), veh/h	746	0	0	791	0	0	543	0	0	526	0	0
V/C Ratio(X)	0.64	0.00	0.00	0.19	0.00	0.00	0.54	0.00	0.00	0.16	0.00	0.00
Avail Cap(c_a), veh/h	1129	0	0	1151	0	0	951	0	0	940	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.0	0.0	0.0	7.7	0.0	0.0	12.9	0.0	0.0	11.2	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.1	0.0	0.0	0.8	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	0.0	1.0	0.0	0.0	3.0	0.0	0.0	0.7	0.0	0.0
LnGrp Delay(d),s/veh	10.9	0.0	0.0	7.8	0.0	0.0	13.8	0.0	0.0	11.3	0.0	0.0
LnGrp LOS	B			A			B			B		
Approach Vol, veh/h		478			147			294			83	
Approach Delay, s/veh		10.9			7.8			13.8			11.3	
Approach LOS		B			A			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		17.2		22.5		17.2		22.5				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		21.5		25.5		21.5		25.5				
Max Q Clear Time (g_c+l1), s		8.7		11.9		3.6		4.1				
Green Ext Time (p_c), s		2.0		4.2		2.4		5.1				
Intersection Summary												
HCM 2010 Ctrl Delay				11.3								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	429	878	12	354	854	541	377	821	255	521	538	256
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	466	954	13	385	928	0	410	892	0	566	585	278
Adj No. of Lanes	2	3	0	2	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	560	1283	17	557	1285	400	627	853	382	541	879	393
Arrive On Green	0.10	0.27	0.27	0.10	0.27	0.00	0.11	0.26	0.00	0.13	0.28	0.28
Sat Flow, veh/h	3163	4751	65	3221	4759	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	466	625	342	385	928	0	410	892	0	566	585	278
Grp Sat Flow(s),veh/h/ln	1581	1558	1700	1610	1586	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	10.0	18.3	18.4	8.6	17.7	0.0	9.3	26.0	0.0	13.0	16.5	17.8
Cycle Q Clear(g_c), s	10.0	18.3	18.4	8.6	17.7	0.0	9.3	26.0	0.0	13.0	16.5	17.8
Prop In Lane	1.00		0.04	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	560	841	459	557	1285	400	627	853	382	541	879	393
V/C Ratio(X)	0.83	0.74	0.74	0.69	0.72	0.00	0.65	1.05	0.00	1.05	0.67	0.71
Avail Cap(c_a), veh/h	560	841	459	557	1285	400	627	853	382	541	879	393
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.3	33.3	33.3	25.2	33.1	0.0	24.4	37.0	0.0	26.2	31.9	32.3
Incr Delay (d2), s/veh	10.3	5.9	10.5	3.6	3.5	0.0	2.4	43.3	0.0	51.4	1.9	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	8.6	10.0	4.0	8.2	0.0	4.3	16.9	0.0	9.3	7.4	7.5
LnGrp Delay(d),s/veh	37.6	39.2	43.8	28.8	36.6	0.0	26.8	80.3	0.0	77.6	33.8	38.0
LnGrp LOS	D	D	D	C	D		C	F		F	C	D
Approach Vol, veh/h	1433			1313			1302			1429		
Approach Delay, s/veh	39.8			34.3			63.5			52.0		
Approach LOS	D			C			E			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.0	34.0	18.0	32.0	16.0	34.0	16.0	34.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	10.0	27.0	13.0	26.0	10.0	27.0	11.0	28.0				
Max Q Clear Time (g_c+l1), s	10.6	20.4	15.0	28.0	12.0	19.7	11.3	19.8				
Green Ext Time (p_c), s	0.0	5.6	0.0	0.0	0.0	6.1	0.0	6.4				
Intersection Summary												
HCM 2010 Ctrl Delay	47.3											
HCM 2010 LOS	D											

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: BG2037-PM
Background 2037 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	22	8	330	147	17	18	192	479	27	5	632	38
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	28	10	0	184	21	22	240	599	0	6	790	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	254	289	246	291	135	141	274	2264	1013	444	1612	721
Arrive On Green	0.16	0.16	0.00	0.16	0.16	0.16	0.17	0.71	0.00	0.48	0.48	0.00
Sat Flow, veh/h	1307	1792	1524	1399	834	874	1601	3195	1429	778	3374	1509
Grp Volume(v), veh/h	28	10	0	184	0	43	240	599	0	6	790	0
Grp Sat Flow(s),veh/h/ln	1307	1792	1524	1399	0	1708	1601	1597	1429	778	1687	1509
Q Serve(g_s), s	1.9	0.5	0.0	12.8	0.0	2.2	14.6	6.7	0.0	0.4	16.0	0.0
Cycle Q Clear(g_c), s	4.0	0.5	0.0	13.2	0.0	2.2	14.6	6.7	0.0	0.4	16.0	0.0
Prop In Lane	1.00		1.00	1.00		0.51	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	254	289	246	291	0	275	274	2264	1013	444	1612	721
V/C Ratio(X)	0.11	0.03	0.00	0.63	0.00	0.16	0.88	0.26	0.00	0.01	0.49	0.00
Avail Cap(c_a), veh/h	383	466	396	429	0	444	368	2264	1013	444	1612	721
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.8	35.4	0.0	41.0	0.0	36.1	40.4	5.2	0.0	13.7	17.8	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	2.3	0.0	0.3	16.4	0.3	0.0	0.1	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.2	0.0	5.1	0.0	1.0	7.7	3.0	0.0	0.1	7.6	0.0
LnGrp Delay(d),s/veh	38.0	35.4	0.0	43.2	0.0	36.3	56.8	5.5	0.0	13.8	18.9	0.0
LnGrp LOS	D	D		D		D	E	A		B	B	
Approach Vol, veh/h		38			227			839			796	
Approach Delay, s/veh		37.3			41.9			20.2			18.8	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		77.4		22.6	23.1	54.3		22.6				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		61.0		26.0	23.0	32.0		26.0				
Max Q Clear Time (g_c+l1), s		8.7		6.0	16.6	18.0		15.2				
Green Ext Time (p_c), s		16.2		1.2	0.5	8.6		0.9				
Intersection Summary												
HCM 2010 Ctrl Delay			22.6									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: BG2037-PM
Background 2037 PM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	47	365	306	765	1275	75		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	52	0	340	850	1417	83		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	251	115	368	2558	1722	770		
Arrive On Green	0.08	0.00	0.23	0.79	0.51	0.51		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	52	0	340	850	1417	83		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	1.5	0.0	20.6	7.4	35.2	2.8		
Cycle Q Clear(g_c), s	1.5	0.0	20.6	7.4	35.2	2.8		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	251	115	368	2558	1722	770		
V/C Ratio(X)	0.21	0.00	0.92	0.33	0.82	0.11		
Avail Cap(c_a), veh/h	328	151	388	2558	1722	770		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	43.3	0.0	37.7	2.9	20.9	12.9		
Incr Delay (d2), s/veh	0.4	0.0	26.7	0.3	4.6	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.7	0.0	11.9	3.3	17.6	1.3		
LnGrp Delay(d),s/veh	43.7	0.0	64.4	3.2	25.5	13.2		
LnGrp LOS	D		E	A	C	B		
Approach Vol, veh/h	52			1190	1500			
Approach Delay, s/veh	43.7			20.7	24.8			
Approach LOS	D			C	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		85.9		14.1	28.8	57.1		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	24.0	47.0		
Max Q Clear Time (g_c+I1), s		9.4		3.5	22.6	37.2		
Green Ext Time (p_c), s		41.1		0.1	0.2	8.8		
Intersection Summary								
HCM 2010 Ctrl Delay			23.4					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-PM
Background 2037 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	235	836	8	384	1041	343	516	447	417	382	739	273
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	255	909	9	417	1132	0	561	486	0	415	803	297
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	221	922	9	384	1324	592	489	908	406	590	751	336
Arrive On Green	0.08	0.28	0.28	0.19	0.39	0.00	0.12	0.27	0.00	0.08	0.23	0.23
Sat Flow, veh/h	1645	3329	33	1691	3374	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	255	448	470	417	1132	0	561	486	0	415	803	297
Grp Sat Flow(s),veh/h/ln	1645	1641	1721	1691	1687	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	10.0	35.3	35.3	25.0	39.9	0.0	15.0	16.0	0.0	10.0	30.0	25.6
Cycle Q Clear(g_c), s	10.0	35.3	35.3	25.0	39.9	0.0	15.0	16.0	0.0	10.0	30.0	25.6
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	221	454	477	384	1324	592	489	908	406	590	751	336
V/C Ratio(X)	1.15	0.99	0.99	1.09	0.86	0.00	1.15	0.54	0.00	0.70	1.07	0.88
Avail Cap(c_a), veh/h	221	454	477	384	1324	592	489	908	406	590	751	336
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	46.7	46.7	40.4	36.1	0.0	37.0	40.6	0.0	39.6	50.0	48.3
Incr Delay (d2), s/veh	108.0	38.9	37.9	71.2	7.2	0.0	87.6	0.6	0.0	3.8	53.2	23.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	20.8	21.7	21.3	19.9	0.0	14.7	7.5	0.0	6.0	19.0	12.5
LnGrp Delay(d),s/veh	148.5	85.6	84.6	111.6	43.4	0.0	124.6	41.2	0.0	43.4	103.2	71.6
LnGrp LOS	F	F	F	F	D		F	D		D	F	E
Approach Vol, veh/h	1173				1549			1047			1515	
Approach Delay, s/veh	98.9				61.7			85.9			80.6	
Approach LOS	F				E			F			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	31.0	43.0	15.0	41.0	16.0	58.0	20.0	36.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	25.0	36.0	10.0	35.0	10.0	51.0	15.0	30.0				
Max Q Clear Time (g_c+l1), s	27.0	37.3	12.0	18.0	12.0	41.9	17.0	32.0				
Green Ext Time (p_c), s	0.0	0.0	0.0	10.3	0.0	7.7	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	80.2											
HCM 2010 LOS	F											

Intersection												
Int Delay, s/veh	34.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	51	242	12	108	0	335	75	54	12	172	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	12	55	260	13	116	0	360	81	58	13	185	38
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1118	1089	204	1217	1078	110	223	0	0	139	0	0
Stage 1	230	230	-	830	830	-	-	-	-	-	-	-
Stage 2	888	859	-	387	248	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	183	214	832	156	217	938	1317	-	-	1363	-	-
Stage 1	768	710	-	361	382	-	-	-	-	-	-	-
Stage 2	336	370	-	633	698	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	54	149	832	60	151	938	1317	-	-	1363	-	-
Mov Cap-2 Maneuver	54	149	-	60	151	-	-	-	-	-	-	-
Stage 1	539	702	-	253	268	-	-	-	-	-	-	-
Stage 2	134	260	-	397	690	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	59.8			139.5			6.3			0.4		
HCM LOS	F			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1317	-	-	363	131	1363	-	-				
HCM Lane V/C Ratio	0.274	-	-	0.901	0.985	0.009	-	-				
HCM Control Delay (s)	8.8	0	-	59.8	139.5	7.7	0	-				
HCM Lane LOS	A	A	-	F	F	A	A	-				
HCM 95th %tile Q(veh)	1.1	-	-	9	6.8	0	-	-				

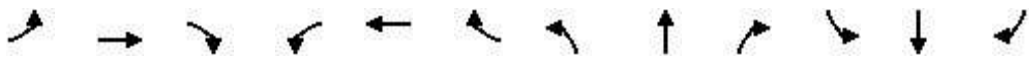
Intersection						
Int Delay, s/veh	6.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	26	239	144	383	319	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	9	9	9	9	8	8
Mvmt Flow	30	278	167	445	371	16
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1159	379	387	0	-	0
Stage 1	379	-	-	-	-	-
Stage 2	780	-	-	-	-	-
Critical Hdwy	6.49	6.29	4.19	-	-	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.381	2.281	-	-	-
Pot Cap-1 Maneuver	210	653	1134	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	440	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	653	1134	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	677	-	-	-	-	-
Stage 2	354	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	22.3		2.4		0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1134	-	510	-	-	
HCM Lane V/C Ratio	0.148	-	0.604	-	-	
HCM Control Delay (s)	8.7	0	22.3	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.5	-	4	-	-	

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	18	119	23	538	537	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	3	3	9	9	10	10
Mvmt Flow	22	143	28	648	647	5
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1353	649	652	0	-	0
Stage 1	649	-	-	-	-	-
Stage 2	704	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.19	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.281	-	-	-
Pot Cap-1 Maneuver	164	468	902	-	-	-
Stage 1	518	-	-	-	-	-
Stage 2	489	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	156	468	902	-	-	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	518	-	-	-	-	-
Stage 2	465	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	22.3		0.4		0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	902	-	371	-	-	
HCM Lane V/C Ratio	0.031	-	0.445	-	-	
HCM Control Delay (s)	9.1	0	22.3	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.1	-	2.2	-	-	

HCM 2010 Signalized Intersection Summary

1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	51	242	12	108	0	335	75	54	12	172	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1827	1900	1900	1827	1900	1900	1776	1900	1900	1638	1900
Adj Flow Rate, veh/h	12	55	260	13	116	0	360	81	58	13	185	38
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	4	4	4	4	4	4	7	7	7	16	16	16
Cap, veh/h	84	80	333	102	452	0	556	103	70	93	603	118
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.00	0.46	0.46	0.46	0.46	0.46	0.46
Sat Flow, veh/h	23	303	1266	71	1718	0	917	222	150	29	1298	255
Grp Volume(v), veh/h	327	0	0	129	0	0	499	0	0	236	0	0
Grp Sat Flow(s),veh/h/ln	1593	0	0	1790	0	0	1289	0	0	1582	0	0
Q Serve(g_s), s	1.5	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.0	0.0	0.0	2.7	0.0	0.0	15.5	0.0	0.0	4.4	0.0	0.0
Prop In Lane	0.04		0.80	0.10		0.00	0.72		0.12	0.06		0.16
Lane Grp Cap(c), veh/h	497	0	0	554	0	0	729	0	0	814	0	0
V/C Ratio(X)	0.66	0.00	0.00	0.23	0.00	0.00	0.68	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	628	0	0	694	0	0	940	0	0	1085	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.3	0.0	0.0	13.9	0.0	0.0	10.6	0.0	0.0	8.0	0.0	0.0
Incr Delay (d2), s/veh	1.7	0.0	0.0	0.2	0.0	0.0	1.4	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	0.0	0.0	1.4	0.0	0.0	5.8	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	18.0	0.0	0.0	14.2	0.0	0.0	12.0	0.0	0.0	8.2	0.0	0.0
LnGrp LOS	B			B			B			A		
Approach Vol, veh/h		327			129			499			236	
Approach Delay, s/veh		18.0			14.2			12.0			8.2	
Approach LOS		B			B			B			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.7		19.1		28.7		19.1				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		30.5		16.5		30.5		16.5				
Max Q Clear Time (g_c+l1), s		17.5		11.0		6.4		4.7				
Green Ext Time (p_c), s		4.7		1.5		6.2		2.6				
Intersection Summary												
HCM 2010 Ctrl Delay			13.1									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	235	836	8	384	1041	343	516	447	417	382	739	273
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	255	909	9	417	1132	0	561	486	0	415	803	297
Adj No. of Lanes	2	3	0	2	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	540	1230	12	617	1240	386	535	862	386	722	831	372
Arrive On Green	0.11	0.26	0.26	0.11	0.26	0.00	0.11	0.26	0.00	0.11	0.26	0.26
Sat Flow, veh/h	3191	4815	48	3281	4848	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	255	593	325	417	1132	0	561	486	0	415	803	297
Grp Sat Flow(s),veh/h/ln	1596	1572	1719	1640	1616	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	5.0	15.6	15.6	8.3	20.4	0.0	10.0	11.3	0.0	8.6	22.0	17.2
Cycle Q Clear(g_c), s	5.0	15.6	15.6	8.3	20.4	0.0	10.0	11.3	0.0	8.6	22.0	17.2
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	540	803	439	617	1240	386	535	862	386	722	831	372
V/C Ratio(X)	0.47	0.74	0.74	0.68	0.91	0.00	1.05	0.56	0.00	0.57	0.97	0.80
Avail Cap(c_a), veh/h	540	803	439	617	1240	386	535	862	386	722	831	372
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.4	30.7	30.7	22.8	32.5	0.0	25.9	29.1	0.0	21.7	33.1	31.3
Incr Delay (d2), s/veh	0.6	6.0	10.6	2.9	11.7	0.0	52.0	0.8	0.0	1.1	23.2	11.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	7.4	8.7	4.0	10.5	0.0	3.9	5.4	0.0	3.8	12.5	8.1
LnGrp Delay(d),s/veh	23.1	36.8	41.4	25.7	44.3	0.0	77.9	30.0	0.0	22.8	56.3	43.0
LnGrp LOS	C	D	D	C	D		F	C		C	E	D
Approach Vol, veh/h	1173			1549			1047			1515		
Approach Delay, s/veh	35.1			39.3			55.7			44.5		
Approach LOS	D			D			E			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.0	30.0	15.0	29.0	16.0	30.0	15.0	29.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	10.0	23.0	10.0	23.0	10.0	23.0	10.0	23.0				
Max Q Clear Time (g_c+l1), s	10.3	17.6	10.6	13.3	7.0	22.4	12.0	24.0				
Green Ext Time (p_c), s	0.0	4.8	0.0	6.8	0.3	0.6	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	43.1											
HCM 2010 LOS	D											

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	21	81	48	9	11	198	381	179	34	320	14
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	12	25	0	58	11	13	239	459	0	41	386	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	180	178	151	159	56	67	277	2562	1146	548	1812	811
Arrive On Green	0.10	0.10	0.00	0.10	0.10	0.10	0.17	0.77	0.00	0.55	0.55	0.00
Sat Flow, veh/h	1368	1845	1568	1035	584	691	1660	3312	1482	869	3312	1482
Grp Volume(v), veh/h	12	25	0	58	0	24	239	459	0	41	386	0
Grp Sat Flow(s),veh/h/ln	1368	1845	1568	1035	0	1275	1660	1656	1482	869	1656	1482
Q Serve(g_s), s	0.8	1.2	0.0	5.4	0.0	1.7	14.0	3.6	0.0	2.2	6.0	0.0
Cycle Q Clear(g_c), s	2.5	1.2	0.0	6.7	0.0	1.7	14.0	3.6	0.0	2.2	6.0	0.0
Prop In Lane	1.00		1.00	1.00		0.54	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	178	151	159	0	123	277	2562	1146	548	1812	811
V/C Ratio(X)	0.07	0.14	0.00	0.37	0.00	0.20	0.86	0.18	0.00	0.07	0.21	0.00
Avail Cap(c_a), veh/h	411	489	416	333	0	338	432	2562	1146	548	1812	811
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	42.8	41.4	0.0	44.5	0.0	41.6	40.6	3.0	0.0	10.8	11.6	0.0
Incr Delay (d2), s/veh	0.2	0.4	0.0	1.4	0.0	0.8	10.6	0.2	0.0	0.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.6	0.0	1.6	0.0	0.6	7.3	1.7	0.0	0.6	2.8	0.0
LnGrp Delay(d),s/veh	42.9	41.7	0.0	45.9	0.0	42.4	51.2	3.1	0.0	11.0	11.9	0.0
LnGrp LOS	D	D		D		D	D	A		B	B	
Approach Vol, veh/h		37			82			698			427	
Approach Delay, s/veh		42.1			44.8			19.6			11.8	
Approach LOS		D			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		83.9		16.1	22.7	61.2		16.1				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		60.5		26.5	26.0	28.5		26.5				
Max Q Clear Time (g_c+l1), s		5.6		4.5	16.0	8.0		8.7				
Green Ext Time (p_c), s		8.4		0.6	0.7	6.7		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay			19.2									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
5: 43 Street N & 5 Ave N

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Volume (veh/h)	44	150	249	753	452	33		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	51	0	286	866	520	38		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	237	109	330	2705	1684	753		
Arrive On Green	0.08	0.00	0.19	0.79	0.54	0.54		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	51	0	286	866	520	38		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	1.5	0.0	16.2	7.0	9.2	1.3		
Cycle Q Clear(g_c), s	1.5	0.0	16.2	7.0	9.2	1.3		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	237	109	330	2705	1684	753		
V/C Ratio(X)	0.21	0.00	0.87	0.32	0.31	0.05		
Avail Cap(c_a), veh/h	360	166	597	2705	1684	753		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	43.4	0.0	39.1	2.8	12.6	10.8		
Incr Delay (d2), s/veh	0.4	0.0	6.9	0.3	0.5	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.7	0.0	8.3	3.4	4.0	0.5		
LnGrp Delay(d),s/veh	43.9	0.0	46.0	3.2	13.1	11.0		
LnGrp LOS	D		D	A	B	B		
Approach Vol, veh/h	51			1152	558			
Approach Delay, s/veh	43.9			13.8	13.0			
Approach LOS	D			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		85.9		14.1	25.3	60.6		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		75.5		11.5	35.0	34.5		
Max Q Clear Time (g_c+I1), s		9.0		3.5	18.2	11.2		
Green Ext Time (p_c), s		17.3		0.1	1.1	12.0		
Intersection Summary								
HCM 2010 Ctrl Delay			14.4					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	335	615	9	248	598	415	264	609	179	376	386	189
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	364	668	10	270	650	0	287	662	0	409	420	205
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	400	1011	15	377	929	416	631	739	330	554	815	365
Arrive On Green	0.16	0.31	0.31	0.13	0.28	0.00	0.09	0.23	0.00	0.13	0.26	0.26
Sat Flow, veh/h	1630	3280	49	1660	3312	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	364	331	347	270	650	0	287	662	0	409	420	205
Grp Sat Flow(s),veh/h/ln	1630	1626	1703	1660	1656	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	18.9	20.8	20.8	13.4	20.7	0.0	7.9	23.0	0.0	11.6	13.4	14.9
Cycle Q Clear(g_c), s	18.9	20.8	20.8	13.4	20.7	0.0	7.9	23.0	0.0	11.6	13.4	14.9
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	400	501	525	377	929	416	631	739	330	554	815	365
V/C Ratio(X)	0.91	0.66	0.66	0.72	0.70	0.00	0.45	0.90	0.00	0.74	0.52	0.56
Avail Cap(c_a), veh/h	400	501	525	423	929	416	1009	809	362	810	815	365
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	35.3	35.3	26.2	37.9	0.0	30.4	44.2	0.0	30.6	37.2	37.7
Incr Delay (d2), s/veh	24.5	6.7	6.4	5.0	4.4	0.0	0.5	12.0	0.0	2.0	0.6	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	10.2	10.7	6.6	10.0	0.0	3.5	11.6	0.0	5.0	5.9	6.0
LnGrp Delay(d),s/veh	51.4	42.0	41.7	31.2	42.2	0.0	30.9	56.2	0.0	32.6	37.8	39.7
LnGrp LOS	D	D	D	C	D		C	E		C	D	D
Approach Vol, veh/h		1042			920			949			1034	
Approach Delay, s/veh		45.2			39.0			48.6			36.1	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.7	43.3	20.1	32.5	25.0	40.0	16.1	36.5				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	15.4	22.8	13.6	25.0	20.9	22.7	9.9	16.9				
Green Ext Time (p_c), s	0.4	6.3	1.5	1.4	0.0	6.4	1.2	6.8				
Intersection Summary												
HCM 2010 Ctrl Delay			42.2									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	9.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	70	186	20	59	5	65	100	19	5	42	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	21	91	242	26	77	6	84	130	25	6	55	8
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	424	394	58	549	386	142	62	0	0	155	0	0
Stage 1	71	71	-	311	311	-	-	-	-	-	-	-
Stage 2	353	323	-	238	75	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	537	539	1002	443	545	900	1510	-	-	1344	-	-
Stage 1	934	832	-	695	655	-	-	-	-	-	-	-
Stage 2	660	647	-	761	829	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	448	504	1002	276	509	900	1510	-	-	1344	-	-
Mov Cap-2 Maneuver	448	504	-	276	509	-	-	-	-	-	-	-
Stage 1	877	828	-	653	615	-	-	-	-	-	-	-
Stage 2	539	608	-	512	825	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	13.9			16.1			2.7			0.7		
HCM LOS	B			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1510	-	-	755	433	1344	-	-				
HCM Lane V/C Ratio	0.056	-	-	0.468	0.252	0.005	-	-				
HCM Control Delay (s)	7.5	0	-	13.9	16.1	7.7	0	-				
HCM Lane LOS	A	A	-	B	C	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	2.5	1	0	-	-				

Intersection						
Int Delay, s/veh	4.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	11	111	177	164	249	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	12	12	10	10	3	3
Mvmt Flow	14	142	227	210	319	14
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	990	326	333	0	-	0
Stage 1	326	-	-	-	-	-
Stage 2	664	-	-	-	-	-
Critical Hdwy	6.52	6.32	4.2	-	-	-
Critical Hdwy Stg 1	5.52	-	-	-	-	-
Critical Hdwy Stg 2	5.52	-	-	-	-	-
Follow-up Hdwy	3.608	3.408	2.29	-	-	-
Pot Cap-1 Maneuver	262	693	1183	-	-	-
Stage 1	710	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	205	693	1183	-	-	-
Mov Cap-2 Maneuver	205	-	-	-	-	-
Stage 1	710	-	-	-	-	-
Stage 2	387	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.7	4.5		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1183	-	571	-	-	
HCM Lane V/C Ratio	0.192	-	0.274	-	-	
HCM Control Delay (s)	8.8	0	13.7	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.7	-	1.1	-	-	

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	4	20	71	320	346	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	81	81	81	81
Heavy Vehicles, %	55	55	10	10	6	6
Mvmt Flow	5	25	88	395	427	19
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1006	436	446	0	-	0
Stage 1	436	-	-	-	-	-
Stage 2	570	-	-	-	-	-
Critical Hdwy	6.95	6.75	4.2	-	-	-
Critical Hdwy Stg 1	5.95	-	-	-	-	-
Critical Hdwy Stg 2	5.95	-	-	-	-	-
Follow-up Hdwy	3.995	3.795	2.29	-	-	-
Pot Cap-1 Maneuver	214	522	1073	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	474	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	192	522	1073	-	-	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	424	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	14.6		1.6		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1073	-	406	-	-	
HCM Lane V/C Ratio	0.082	-	0.073	-	-	
HCM Control Delay (s)	8.7	0	14.6	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	0.2	-	-	

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	9	231	195	19	33	135	344	51	11	472	29
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	20	11	0	244	24	41	169	430	0	14	590	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	294	368	313	352	127	217	201	2124	950	508	1616	723
Arrive On Green	0.21	0.21	0.00	0.21	0.21	0.21	0.13	0.66	0.00	0.48	0.48	0.00
Sat Flow, veh/h	1281	1792	1524	1398	619	1057	1601	3195	1429	909	3374	1509
Grp Volume(v), veh/h	20	11	0	244	0	65	169	430	0	14	590	0
Grp Sat Flow(s),veh/h/ln	1281	1792	1524	1398	0	1676	1601	1597	1429	909	1687	1509
Q Serve(g_s), s	1.3	0.5	0.0	16.9	0.0	3.2	10.3	5.2	0.0	0.8	11.0	0.0
Cycle Q Clear(g_c), s	4.5	0.5	0.0	17.4	0.0	3.2	10.3	5.2	0.0	0.8	11.0	0.0
Prop In Lane	1.00		1.00	1.00		0.63	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	294	368	313	352	0	344	201	2124	950	508	1616	723
V/C Ratio(X)	0.07	0.03	0.00	0.69	0.00	0.19	0.84	0.20	0.00	0.03	0.37	0.00
Avail Cap(c_a), veh/h	396	511	434	464	0	478	336	2124	950	508	1616	723
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.7	31.8	0.0	38.7	0.0	32.9	42.7	6.5	0.0	13.8	16.4	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	2.9	0.0	0.3	9.1	0.2	0.0	0.1	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.2	0.0	6.8	0.0	1.5	5.1	2.3	0.0	0.2	5.2	0.0
LnGrp Delay(d),s/veh	34.8	31.8	0.0	41.7	0.0	33.1	51.8	6.7	0.0	13.9	17.1	0.0
LnGrp LOS	C	C		D		C	D	A		B	B	
Approach Vol, veh/h		31			309			599			604	
Approach Delay, s/veh		33.8			39.9			19.4			17.0	
Approach LOS		C			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		73.0		27.0	18.6	54.4		27.0				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		58.5		28.5	21.0	31.5		28.5				
Max Q Clear Time (g_c+l1), s		7.2		6.5	12.3	13.0		19.4				
Green Ext Time (p_c), s		10.4		1.7	0.4	7.5		1.1				
Intersection Summary												
HCM 2010 Ctrl Delay			22.9									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	38	256	215	571	998	69		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	42	0	239	634	1109	77		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	226	104	275	2582	1945	870		
Arrive On Green	0.07	0.00	0.17	0.80	0.57	0.57		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	42	0	239	634	1109	77		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	1.2	0.0	14.4	4.9	20.7	2.3		
Cycle Q Clear(g_c), s	1.2	0.0	14.4	4.9	20.7	2.3		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	226	104	275	2582	1945	870		
V/C Ratio(X)	0.19	0.00	0.87	0.25	0.57	0.09		
Avail Cap(c_a), veh/h	328	151	404	2582	1945	870		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	43.9	0.0	40.4	2.5	13.6	9.7		
Incr Delay (d2), s/veh	0.4	0.0	13.0	0.2	1.2	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.6	0.0	7.4	2.2	10.0	1.0		
LnGrp Delay(d),s/veh	44.3	0.0	53.4	2.7	14.9	9.9		
LnGrp LOS	D		D	A	B	A		
Approach Vol, veh/h	42			873	1186			
Approach Delay, s/veh	44.3			16.6	14.5			
Approach LOS	D			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		86.6		13.4	23.0	63.6		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	25.0	46.0		
Max Q Clear Time (g_c+I1), s		6.9		3.2	16.4	22.7		
Green Ext Time (p_c), s		26.9		0.0	0.6	15.4		
Intersection Summary								
HCM 2010 Ctrl Delay			16.0					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	176	585	6	269	729	253	362	325	292	303	553	227
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	191	636	7	292	792	0	393	353	0	329	601	247
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	311	979	11	395	1123	502	592	828	371	753	754	337
Arrive On Green	0.10	0.29	0.29	0.14	0.33	0.00	0.12	0.25	0.00	0.11	0.23	0.23
Sat Flow, veh/h	1645	3325	37	1691	3374	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	191	314	329	292	792	0	393	353	0	329	601	247
Grp Sat Flow(s),veh/h/ln	1645	1641	1721	1691	1687	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	8.9	18.7	18.7	13.2	22.9	0.0	9.9	9.9	0.0	8.6	19.5	17.6
Cycle Q Clear(g_c), s	8.9	18.7	18.7	13.2	22.9	0.0	9.9	9.9	0.0	8.6	19.5	17.6
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	311	483	507	395	1123	502	592	828	371	753	754	337
V/C Ratio(X)	0.61	0.65	0.65	0.74	0.71	0.00	0.66	0.43	0.00	0.44	0.80	0.73
Avail Cap(c_a), veh/h	424	483	507	446	1123	502	929	873	391	1121	842	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.4	34.5	34.5	24.2	32.6	0.0	29.2	35.6	0.0	27.8	40.6	39.8
Incr Delay (d2), s/veh	2.0	6.6	6.3	5.6	3.7	0.0	1.3	0.3	0.0	0.4	4.9	6.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	9.3	9.8	6.7	11.3	0.0	4.5	4.6	0.0	3.7	9.3	7.7
LnGrp Delay(d),s/veh	27.4	41.1	40.8	29.8	36.3	0.0	30.5	36.0	0.0	28.2	45.5	46.2
LnGrp LOS	C	D	D	C	D		C	D		C	D	D
Approach Vol, veh/h		834			1084			746			1177	
Approach Delay, s/veh		37.9			34.6			33.1			40.8	
Approach LOS		D			C			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.6	40.0	16.9	33.5	17.3	44.3	18.5	32.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	19.0	33.0	25.0	29.0	19.0	33.0	25.0	29.0				
Max Q Clear Time (g_c+l1), s	15.2	20.7	10.6	11.9	10.9	24.9	11.9	21.5				
Green Ext Time (p_c), s	0.4	7.8	1.3	7.8	0.4	5.6	1.6	4.5				
Intersection Summary												
HCM 2010 Ctrl Delay			36.9									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	10.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	36	173	10	76	0	243	63	42	9	157	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	11	39	186	11	82	0	261	68	45	10	169	32
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	858	839	185	930	833	90	201	0	0	113	0	0
Stage 1	204	204	-	613	613	-	-	-	-	-	-	-
Stage 2	654	635	-	317	220	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	275	300	852	246	302	962	1342	-	-	1394	-	-
Stage 1	793	729	-	476	480	-	-	-	-	-	-	-
Stage 2	452	469	-	690	717	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	170	235	852	141	237	962	1342	-	-	1394	-	-
Mov Cap-2 Maneuver	170	235	-	141	237	-	-	-	-	-	-	-
Stage 1	627	723	-	377	380	-	-	-	-	-	-	-
Stage 2	281	371	-	506	711	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	17.2			32.7			5.8			0.3		
HCM LOS	C			D								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1342	-	-	528	220	1394	-	-				
HCM Lane V/C Ratio	0.195	-	-	0.446	0.42	0.007	-	-				
HCM Control Delay (s)	8.3	0	-	17.2	32.7	7.6	0	-				
HCM Lane LOS	A	A	-	C	D	A	A	-				
HCM 95th %tile Q(veh)	0.7	-	-	2.3	1.9	0	-	-				

Intersection						
Int Delay, s/veh	4.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	19	169	105	291	261	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	9	9	9	9	8	8
Mvmt Flow	22	197	122	338	303	15
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	894	311	319	0	-	0
Stage 1	311	-	-	-	-	-
Stage 2	583	-	-	-	-	-
Critical Hdwy	6.49	6.29	4.19	-	-	-
Critical Hdwy Stg 1	5.49	-	-	-	-	-
Critical Hdwy Stg 2	5.49	-	-	-	-	-
Follow-up Hdwy	3.581	3.381	2.281	-	-	-
Pot Cap-1 Maneuver	303	713	1202	-	-	-
Stage 1	727	-	-	-	-	-
Stage 2	545	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	265	713	1202	-	-	-
Mov Cap-2 Maneuver	265	-	-	-	-	-
Stage 1	727	-	-	-	-	-
Stage 2	477	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	14.2		2.2		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1202	-	609	-	-	
HCM Lane V/C Ratio	0.102	-	0.359	-	-	
HCM Control Delay (s)	8.3	0	14.2	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	1.6	-	-	

Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	13	83	16	405	416	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	3	3	9	9	10	10
Mvmt Flow	16	100	19	488	501	5
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1031	504	506	0	-	0
Stage 1	504	-	-	-	-	-
Stage 2	527	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.19	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.281	-	-	-
Pot Cap-1 Maneuver	257	566	1024	-	-	-
Stage 1	605	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	251	566	1024	-	-	-
Mov Cap-2 Maneuver	251	-	-	-	-	-
Stage 1	605	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	14.8	0.3		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1024	-	484	-	-	
HCM Lane V/C Ratio	0.019	-	0.239	-	-	
HCM Control Delay (s)	8.6	0	14.8	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-	

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	28	87	40	10	10	212	857	166	34	441	21
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	46	34	0	48	12	12	255	1033	0	41	531	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	183	182	154	156	63	63	288	2555	1143	346	1781	797
Arrive On Green	0.10	0.10	0.00	0.10	0.10	0.10	0.17	0.77	0.00	0.54	0.54	0.00
Sat Flow, veh/h	1368	1845	1568	1027	642	642	1660	3312	1482	509	3312	1482
Grp Volume(v), veh/h	46	34	0	48	0	24	255	1033	0	41	531	0
Grp Sat Flow(s),veh/h/ln	1368	1845	1568	1027	0	1284	1660	1656	1482	509	1656	1482
Q Serve(g_s), s	3.2	1.7	0.0	4.5	0.0	1.7	15.0	10.4	0.0	4.0	8.8	0.0
Cycle Q Clear(g_c), s	4.9	1.7	0.0	6.2	0.0	1.7	15.0	10.4	0.0	4.0	8.8	0.0
Prop In Lane	1.00		1.00	1.00		0.50	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	183	182	154	156	0	126	288	2555	1143	346	1781	797
V/C Ratio(X)	0.25	0.19	0.00	0.31	0.00	0.19	0.88	0.40	0.00	0.12	0.30	0.00
Avail Cap(c_a), veh/h	404	480	408	322	0	334	349	2555	1143	346	1781	797
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.7	41.4	0.0	44.2	0.0	41.4	40.3	3.8	0.0	11.6	12.7	0.0
Incr Delay (d2), s/veh	0.7	0.5	0.0	1.1	0.0	0.7	20.0	0.5	0.0	0.7	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.9	0.0	1.3	0.0	0.6	8.5	4.8	0.0	0.6	4.1	0.0
LnGrp Delay(d),s/veh	44.4	41.9	0.0	45.3	0.0	42.1	60.4	4.3	0.0	12.3	13.1	0.0
LnGrp LOS	D	D		D		D	E	A		B	B	
Approach Vol, veh/h	80				72			1288			572	
Approach Delay, s/veh	43.3				44.3			15.4			13.1	
Approach LOS	D				D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4	5	6	8					
Phs Duration (G+Y+Rc), s	83.6			16.4	23.4	60.3	16.4					
Change Period (Y+Rc), s	6.5			6.5	6.0	6.5	6.5					
Max Green Setting (Gmax), s	61.0			26.0	21.0	34.0	26.0					
Max Q Clear Time (g_c+l1), s	12.4			6.9	17.0	10.8	8.2					
Green Ext Time (p_c), s	20.4			0.7	0.4	14.0	0.7					
Intersection Summary												
HCM 2010 Ctrl Delay	16.9											
HCM 2010 LOS	B											

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	91	160	267	1186	563	44		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	105	0	307	1363	647	51		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	296	136	348	2641	1593	713		
Arrive On Green	0.09	0.00	0.20	0.78	0.51	0.51		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	105	0	307	1363	647	51		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	3.1	0.0	17.5	15.0	12.8	1.9		
Cycle Q Clear(g_c), s	3.1	0.0	17.5	15.0	12.8	1.9		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	296	136	348	2641	1593	713		
V/C Ratio(X)	0.35	0.00	0.88	0.52	0.41	0.07		
Avail Cap(c_a), veh/h	313	144	495	2641	1593	713		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	42.4	0.0	38.7	4.2	15.0	12.4		
Incr Delay (d2), s/veh	0.7	0.0	12.7	0.7	0.8	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.4	0.0	9.4	7.1	5.7	0.7		
LnGrp Delay(d),s/veh	43.1	0.0	51.4	4.9	15.8	12.6		
LnGrp LOS	D		D	A	B	B		
Approach Vol, veh/h	105			1670	698			
Approach Delay, s/veh	43.1			13.5	15.6			
Approach LOS	D			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		84.0		16.0	26.4	57.7		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	29.0	42.0		
Max Q Clear Time (g_c+I1), s		17.0		5.1	19.5	14.8		
Green Ext Time (p_c), s		32.0		0.1	0.9	19.5		
Intersection Summary								
HCM 2010 Ctrl Delay			15.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	480	659	9	266	641	589	283	750	192	432	438	227
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	522	716	10	289	697	0	308	815	0	470	476	247
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	304	934	13	337	1099	492	614	855	383	533	982	439
Arrive On Green	0.09	0.28	0.28	0.13	0.33	0.00	0.08	0.26	0.00	0.13	0.31	0.31
Sat Flow, veh/h	1630	3284	46	1660	3312	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	522	354	372	289	697	0	308	815	0	470	476	247
Grp Sat Flow(s),veh/h/ln	1630	1626	1704	1660	1656	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	11.0	25.3	25.3	15.1	22.5	0.0	8.9	30.9	0.0	13.6	15.6	18.6
Cycle Q Clear(g_c), s	11.0	25.3	25.3	15.1	22.5	0.0	8.9	30.9	0.0	13.6	15.6	18.6
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	304	462	484	337	1099	492	614	855	383	533	982	439
V/C Ratio(X)	1.72	0.77	0.77	0.86	0.63	0.00	0.50	0.95	0.00	0.88	0.48	0.56
Avail Cap(c_a), veh/h	304	462	484	337	1099	492	614	855	383	615	1066	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	41.5	41.5	29.1	35.8	0.0	31.0	46.0	0.0	31.1	35.2	36.3
Incr Delay (d2), s/veh	337.0	11.5	11.1	19.1	2.8	0.0	0.6	20.2	0.0	12.8	0.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.4	12.8	13.4	8.6	10.7	0.0	3.9	16.4	0.0	6.6	6.8	7.4
LnGrp Delay(d),s/veh	377.5	53.0	52.5	48.2	38.6	0.0	31.6	66.2	0.0	43.9	35.6	37.6
LnGrp LOS	F	D	D	D	D		C	E		D	D	D
Approach Vol, veh/h	1248				986			1123			1193	
Approach Delay, s/veh	188.6				41.4			56.7			39.3	
Approach LOS	F				D			E			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.0	43.0	21.6	39.0	17.0	49.0	15.0	45.6				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	17.0	36.0	20.0	33.0	11.0	42.0	10.0	43.0				
Max Q Clear Time (g_c+l1), s	17.1	27.3	15.6	32.9	13.0	24.5	10.9	20.6				
Green Ext Time (p_c), s	0.0	5.9	1.0	0.1	0.0	9.7	0.0	12.0				
Intersection Summary												
HCM 2010 Ctrl Delay	85.0											
HCM 2010 LOS	F											

Intersection												
Int Delay, s/veh	12											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	75	236	38	63	5	78	104	25	5	49	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	21	97	306	49	82	6	101	135	32	6	64	8
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	479	451	68	636	438	151	71	0	0	168	0	0
Stage 1	81	81	-	354	354	-	-	-	-	-	-	-
Stage 2	398	370	-	282	84	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	494	501	990	388	509	890	1498	-	-	1329	-	-
Stage 1	922	824	-	659	627	-	-	-	-	-	-	-
Stage 2	624	617	-	721	821	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	399	461	990	211	468	890	1498	-	-	1329	-	-
Mov Cap-2 Maneuver	399	461	-	211	468	-	-	-	-	-	-	-
Stage 1	853	820	-	610	580	-	-	-	-	-	-	-
Stage 2	492	571	-	436	817	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.2			23.4			2.9			0.6		
HCM LOS	C			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1498	-	-	741	331	1329	-	-				
HCM Lane V/C Ratio	0.068	-	-	0.573	0.416	0.005	-	-				
HCM Control Delay (s)	7.6	0	-	16.2	23.4	7.7	0	-				
HCM Lane LOS	A	A	-	C	C	A	A	-				
HCM 95th %tile Q(veh)	0.2	-	-	3.7	2	0	-	-				

Intersection												
Int Delay, s/veh	46.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	35	112	54	8	6	187	179	243	28	298	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	92	92	92	78	78	78	78	78	78
Heavy Vehicles, %	12	12	12	10	10	10	10	10	10	3	3	3
Mvmt Flow	14	45	144	59	9	7	240	229	312	36	382	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1334	1483	390	1421	1334	385	397	0	0	541	0	0
Stage 1	462	462	-	865	865	-	-	-	-	-	-	-
Stage 2	872	1021	-	556	469	-	-	-	-	-	-	-
Critical Hdwy	7.22	6.62	6.32	7.2	6.6	6.3	4.2	-	-	4.13	-	-
Critical Hdwy Stg 1	6.22	5.62	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.22	5.62	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.608	4.108	3.408	3.59	4.09	3.39	2.29	-	-	2.227	-	-
Pot Cap-1 Maneuver	125	119	637	109	148	645	1119	-	-	1023	-	-
Stage 1	561	548	-	337	360	-	-	-	-	-	-	-
Stage 2	332	301	-	501	547	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	84	77	637	~ 34	96	645	1119	-	-	1023	-	-
Mov Cap-2 Maneuver	84	77	-	~ 34	96	-	-	-	-	-	-	-
Stage 1	380	523	-	228	244	-	-	-	-	-	-	-
Stage 2	215	204	-	339	522	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	103.7	\$ 619.3	2.8	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1119	-	-	208 40	1023	-	-
HCM Lane V/C Ratio	0.214	-	-	0.974 1.848	0.035	-	-
HCM Control Delay (s)	9.1	0	-	103.7\$ 619.3	8.6	0	-
HCM Lane LOS	A	A	-	F F	A	A	-
HCM 95th %tile Q(veh)	0.8	-	-	8.4 7.8	0.1	-	-

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

Intersection												
Int Delay, s/veh	15.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	7	21	53	2	6	76	582	236	28	421	16
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	92	92	92	81	81	81	81	81	81
Heavy Vehicles, %	55	55	55	10	10	10	10	10	10	6	6	6
Mvmt Flow	5	9	26	58	2	7	94	719	291	35	520	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1655	1797	530	1668	1661	864	540	0	0	1010	0	0
Stage 1	599	599	-	1052	1052	-	-	-	-	-	-	-
Stage 2	1056	1198	-	616	609	-	-	-	-	-	-	-
Critical Hdwy	7.65	7.05	6.75	7.2	6.6	6.3	4.2	-	-	4.16	-	-
Critical Hdwy Stg 1	6.65	6.05	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.65	6.05	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.995	4.495	3.795	3.59	4.09	3.39	2.29	-	-	2.254	-	-
Pot Cap-1 Maneuver	58	60	458	73	93	342	989	-	-	671	-	-
Stage 1	408	416	-	265	294	-	-	-	-	-	-	-
Stage 2	218	206	-	465	473	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	43	43	458	~ 46	66	342	989	-	-	671	-	-
Mov Cap-2 Maneuver	43	43	-	~ 46	66	-	-	-	-	-	-	-
Stage 1	313	385	-	203	225	-	-	-	-	-	-	-
Stage 2	162	158	-	397	438	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	57.9	\$ 357.2	0.8	0.6
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	989	-	-	106	51	671	-
HCM Lane V/C Ratio	0.095	-	-	0.373	1.3	0.052	-
HCM Control Delay (s)	9	0	-	57.9	\$ 357.2	10.7	0
HCM Lane LOS	A	A	-	F	F	B	A
HCM 95th %tile Q(veh)	0.3	-	-	1.5	6	0.2	-

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

HCM 2010 Signalized Intersection Summary

2: 43 Street N & 18 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	35	112	54	8	6	187	179	243	28	298	12
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1696	1900	1900	1727	1900	1900	1727	1900	1900	1845	1900
Adj Flow Rate, veh/h	14	45	144	59	9	7	240	229	312	36	382	15
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.78	0.78	0.78	0.92	0.92	0.92	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	12	12	12	10	10	10	10	10	10	3	3	3
Cap, veh/h	51	103	281	265	39	25	275	232	306	91	913	35
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.61	0.61	0.61	0.61	0.61	0.61
Sat Flow, veh/h	46	388	1060	758	147	93	376	384	505	86	1509	57
Grp Volume(v), veh/h	203	0	0	75	0	0	781	0	0	433	0	0
Grp Sat Flow(s),veh/h/ln	1494	0	0	999	0	0	1265	0	0	1652	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	48.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	11.4	0.0	0.0	7.8	0.0	0.0	60.5	0.0	0.0	12.2	0.0	0.0
Prop In Lane	0.07		0.71	0.79		0.09	0.31		0.40	0.08		0.03
Lane Grp Cap(c), veh/h	434	0	0	329	0	0	812	0	0	1039	0	0
V/C Ratio(X)	0.47	0.00	0.00	0.23	0.00	0.00	0.96	0.00	0.00	0.42	0.00	0.00
Avail Cap(c_a), veh/h	434	0	0	329	0	0	812	0	0	1039	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.2	0.0	0.0	29.6	0.0	0.0	20.7	0.0	0.0	10.2	0.0	0.0
Incr Delay (d2), s/veh	3.6	0.0	0.0	1.6	0.0	0.0	23.5	0.0	0.0	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.0	0.0	1.8	0.0	0.0	26.8	0.0	0.0	6.5	0.0	0.0
LnGrp Delay(d),s/veh	34.8	0.0	0.0	31.2	0.0	0.0	44.1	0.0	0.0	11.4	0.0	0.0
LnGrp LOS	C			C			D			B		
Approach Vol, veh/h		203			75			781			433	
Approach Delay, s/veh		34.8			31.2			44.1			11.4	
Approach LOS		C			C			D			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		67.0		33.0		67.0		33.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		60.5		26.5		60.5		26.5				
Max Q Clear Time (g_c+l1), s		62.5		13.4		14.2		9.8				
Green Ext Time (p_c), s		0.0		1.6		15.6		1.8				
Intersection Summary												
HCM 2010 Ctrl Delay			32.7									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

3: 43 Street N & 14 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	7	21	53	2	6	76	582	236	28	421	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1226	1900	1900	1727	1900	1727	1727	1900	1900	1792	1900
Adj Flow Rate, veh/h	5	9	26	58	2	7	94	719	291	35	520	20
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	55	55	55	10	10	10	10	10	10	6	6	6
Cap, veh/h	56	70	158	324	14	32	172	755	305	46	554	20
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.64	0.64	0.64	0.64	0.64	0.64
Sat Flow, veh/h	68	309	702	1143	60	140	799	1170	474	12	859	31
Grp Volume(v), veh/h	40	0	0	67	0	0	94	0	1010	575	0	0
Grp Sat Flow(s),veh/h/ln	1079	0	0	1344	0	0	799	0	1644	902	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	56.6	7.9	0.0	0.0
Cycle Q Clear(g_c), s	2.9	0.0	0.0	3.4	0.0	0.0	54.1	0.0	56.6	64.5	0.0	0.0
Prop In Lane	0.12		0.65	0.87		0.10	1.00		0.29	0.06		0.03
Lane Grp Cap(c), veh/h	283	0	0	370	0	0	172	0	1060	620	0	0
V/C Ratio(X)	0.14	0.00	0.00	0.18	0.00	0.00	0.55	0.00	0.95	0.93	0.00	0.00
Avail Cap(c_a), veh/h	283	0	0	370	0	0	172	0	1060	620	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.2	0.0	0.0	31.3	0.0	0.0	15.9	0.0	16.3	21.4	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	1.1	0.0	0.0	11.8	0.0	18.4	22.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	1.6	0.0	0.0	2.9	0.0	30.7	14.6	0.0	0.0
LnGrp Delay(d),s/veh	32.2	0.0	0.0	32.4	0.0	0.0	27.7	0.0	34.7	43.6	0.0	0.0
LnGrp LOS	C			C			C		C	D		
Approach Vol, veh/h		40			67			1104			575	
Approach Delay, s/veh		32.2			32.4			34.1			43.6	
Approach LOS		C			C			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		71.0		29.0		71.0		29.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		64.5		22.5		64.5		22.5				
Max Q Clear Time (g_c+l1), s		58.6		4.9		66.5		5.4				
Green Ext Time (p_c), s		5.0		0.5		0.0		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				37.1								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	28	87	40	10	10	212	857	166	34	441	21
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	46	34	0	48	12	12	255	1033	0	41	531	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	183	182	154	156	63	63	292	2555	1143	345	1774	794
Arrive On Green	0.10	0.10	0.00	0.10	0.10	0.10	0.18	0.77	0.00	0.54	0.54	0.00
Sat Flow, veh/h	1368	1845	1568	1027	642	642	1660	3312	1482	509	3312	1482
Grp Volume(v), veh/h	46	34	0	48	0	24	255	1033	0	41	531	0
Grp Sat Flow(s),veh/h/ln	1368	1845	1568	1027	0	1284	1660	1656	1482	509	1656	1482
Q Serve(g_s), s	3.2	1.7	0.0	4.5	0.0	1.7	15.0	10.4	0.0	4.1	8.9	0.0
Cycle Q Clear(g_c), s	4.9	1.7	0.0	6.2	0.0	1.7	15.0	10.4	0.0	4.1	8.9	0.0
Prop In Lane	1.00		1.00	1.00		0.50	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	183	182	154	156	0	126	292	2555	1143	345	1774	794
V/C Ratio(X)	0.25	0.19	0.00	0.31	0.00	0.19	0.87	0.40	0.00	0.12	0.30	0.00
Avail Cap(c_a), veh/h	404	480	408	322	0	334	415	2555	1143	345	1774	794
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.7	41.4	0.0	44.2	0.0	41.4	40.1	3.8	0.0	11.7	12.8	0.0
Incr Delay (d2), s/veh	0.7	0.5	0.0	1.1	0.0	0.7	13.6	0.5	0.0	0.7	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.9	0.0	1.3	0.0	0.6	8.0	4.8	0.0	0.6	4.2	0.0
LnGrp Delay(d),s/veh	44.4	41.9	0.0	45.3	0.0	42.1	53.8	4.3	0.0	12.4	13.3	0.0
LnGrp LOS	D	D		D		D	D	A		B	B	
Approach Vol, veh/h		80			72			1288			572	
Approach Delay, s/veh		43.3			44.3			14.1			13.2	
Approach LOS		D			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		83.6		16.4	23.6	60.1		16.4				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		61.0		26.0	25.0	30.0		26.0				
Max Q Clear Time (g_c+l1), s		12.4		6.9	17.0	10.9		8.2				
Green Ext Time (p_c), s		20.4		0.7	0.6	12.3		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay			16.1									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	91	160	267	1186	563	44		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	105	0	307	1363	647	51		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	296	136	348	2641	1593	713		
Arrive On Green	0.09	0.00	0.20	0.78	0.51	0.51		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	105	0	307	1363	647	51		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	3.1	0.0	17.5	15.0	12.8	1.9		
Cycle Q Clear(g_c), s	3.1	0.0	17.5	15.0	12.8	1.9		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	296	136	348	2641	1593	713		
V/C Ratio(X)	0.35	0.00	0.88	0.52	0.41	0.07		
Avail Cap(c_a), veh/h	313	144	495	2641	1593	713		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	42.4	0.0	38.7	4.2	15.0	12.4		
Incr Delay (d2), s/veh	0.7	0.0	12.7	0.7	0.8	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.4	0.0	9.4	7.1	5.7	0.7		
LnGrp Delay(d),s/veh	43.1	0.0	51.4	4.9	15.8	12.6		
LnGrp LOS	D		D	A	B	B		
Approach Vol, veh/h	105			1670	698			
Approach Delay, s/veh	43.1			13.5	15.6			
Approach LOS	D			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		84.0		16.0	26.4	57.7		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	29.0	42.0		
Max Q Clear Time (g_c+I1), s		17.0		5.1	19.5	14.8		
Green Ext Time (p_c), s		32.0		0.1	0.9	19.5		
Intersection Summary								
HCM 2010 Ctrl Delay			15.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 			 		 	 		 	 	
Volume (veh/h)	480	659	9	266	641	589	283	750	192	432	438	227
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	522	716	10	289	697	0	308	815	0	470	476	247
Adj No. of Lanes	2	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	588	929	13	335	1093	489	618	872	390	534	993	444
Arrive On Green	0.09	0.28	0.28	0.13	0.33	0.00	0.08	0.27	0.00	0.13	0.32	0.32
Sat Flow, veh/h	3163	3284	46	1660	3312	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	522	354	372	289	697	0	308	815	0	470	476	247
Grp Sat Flow(s),veh/h/ln	1581	1626	1704	1660	1656	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	11.0	25.4	25.4	15.2	22.7	0.0	8.9	30.9	0.0	13.6	15.6	18.6
Cycle Q Clear(g_c), s	11.0	25.4	25.4	15.2	22.7	0.0	8.9	30.9	0.0	13.6	15.6	18.6
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	588	460	482	335	1093	489	618	872	390	534	993	444
V/C Ratio(X)	0.89	0.77	0.77	0.86	0.64	0.00	0.50	0.93	0.00	0.88	0.48	0.56
Avail Cap(c_a), veh/h	588	460	482	335	1093	489	618	877	392	596	1061	475
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.2	41.8	41.8	29.5	36.2	0.0	30.7	45.6	0.0	31.1	35.1	36.1
Incr Delay (d2), s/veh	15.3	11.8	11.3	20.1	2.8	0.0	0.6	16.7	0.0	13.3	0.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	12.9	13.5	8.8	10.8	0.0	4.0	16.1	0.0	6.7	6.8	7.4
LnGrp Delay(d),s/veh	53.5	53.6	53.1	49.6	39.0	0.0	31.3	62.4	0.0	44.4	35.4	37.3
LnGrp LOS	D	D	D	D	D		C	E		D	D	D
Approach Vol, veh/h	1248				986			1123			1193	
Approach Delay, s/veh	53.4				42.1			53.8			39.4	
Approach LOS	D				D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.0	43.0	21.4	39.8	17.0	49.0	15.0	46.2				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	17.0	36.0	19.0	34.0	11.0	42.0	10.0	43.0				
Max Q Clear Time (g_c+l1), s	17.2	27.4	15.6	32.9	13.0	24.7	10.9	20.6				
Green Ext Time (p_c), s	0.0	5.8	0.8	0.9	0.0	9.7	0.0	12.0				
Intersection Summary												
HCM 2010 Ctrl Delay	47.4											
HCM 2010 LOS	D											

Intersection												
Int Delay, s/veh	11.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	75	236	38	63	5	78	104	25	5	49	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	750	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	21	97	306	49	82	6	101	135	32	6	64	8
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	479	451	68	636	438	151	71	0	0	168	0	0
Stage 1	81	81	-	354	354	-	-	-	-	-	-	-
Stage 2	398	370	-	282	84	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	494	501	990	388	509	890	1498	-	-	1329	-	-
Stage 1	922	824	-	659	627	-	-	-	-	-	-	-
Stage 2	624	617	-	721	821	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	399	461	990	211	468	890	1498	-	-	1329	-	-
Mov Cap-2 Maneuver	399	461	-	211	468	-	-	-	-	-	-	-
Stage 1	853	820	-	610	580	-	-	-	-	-	-	-
Stage 2	492	571	-	436	817	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.2			18.8			2.9			0.6		
HCM LOS	C			C								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR			
Capacity (veh/h)	1498	-	-	741	211	485	1329	-	-			
HCM Lane V/C Ratio	0.068	-	-	0.573	0.234	0.182	0.005	-	-			
HCM Control Delay (s)	7.6	0	-	16.2	27.2	14.1	7.7	0	-			
HCM Lane LOS	A	A	-	C	D	B	A	A	-			
HCM 95th %tile Q(veh)	0.2	-	-	3.7	0.9	0.7	0	-	-			

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	23	9	248	186	25	33	144	477	42	9	904	56
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	29	11	0	232	31	41	180	596	0	11	1130	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	273	347	295	336	141	187	211	2160	966	450	1634	731
Arrive On Green	0.19	0.19	0.00	0.19	0.19	0.19	0.13	0.68	0.00	0.48	0.48	0.00
Sat Flow, veh/h	1273	1792	1524	1398	729	964	1601	3195	1429	780	3374	1509
Grp Volume(v), veh/h	29	11	0	232	0	72	180	596	0	11	1130	0
Grp Sat Flow(s),veh/h/ln	1273	1792	1524	1398	0	1693	1601	1597	1429	780	1687	1509
Q Serve(g_s), s	2.0	0.5	0.0	16.1	0.0	3.6	11.0	7.4	0.0	0.7	26.0	0.0
Cycle Q Clear(g_c), s	5.5	0.5	0.0	16.6	0.0	3.6	11.0	7.4	0.0	0.7	26.0	0.0
Prop In Lane	1.00		1.00	1.00		0.57	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	273	347	295	336	0	328	211	2160	966	450	1634	731
V/C Ratio(X)	0.11	0.03	0.00	0.69	0.00	0.22	0.85	0.28	0.00	0.02	0.69	0.00
Avail Cap(c_a), veh/h	326	421	358	394	0	398	288	2160	966	450	1634	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.3	32.7	0.0	39.5	0.0	33.9	42.5	6.4	0.0	13.5	20.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	4.1	0.0	0.3	16.3	0.3	0.0	0.1	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.3	0.0	6.6	0.0	1.7	5.8	3.3	0.0	0.2	12.6	0.0
LnGrp Delay(d),s/veh	36.4	32.7	0.0	43.6	0.0	34.3	58.8	6.8	0.0	13.6	22.4	0.0
LnGrp LOS	D	C		D		C	E	A		B	C	
Approach Vol, veh/h		40			304			776			1141	
Approach Delay, s/veh		35.4			41.4			18.8			22.3	
Approach LOS		D			D			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		74.1		25.9	19.2	54.9		25.9				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		63.5		23.5	18.0	39.5		23.5				
Max Q Clear Time (g_c+l1), s		9.4		7.5	13.0	28.0		18.6				
Green Ext Time (p_c), s		23.5		1.5	0.3	8.8		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay			23.9									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	51	274	230	697	1406	112		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	57	0	256	774	1562	124		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	261	120	289	2548	1879	841		
Arrive On Green	0.08	0.00	0.18	0.79	0.55	0.55		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	57	0	256	774	1562	124		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	1.6	0.0	15.5	6.6	38.0	4.0		
Cycle Q Clear(g_c), s	1.6	0.0	15.5	6.6	38.0	4.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	261	120	289	2548	1879	841		
V/C Ratio(X)	0.22	0.00	0.89	0.30	0.83	0.15		
Avail Cap(c_a), veh/h	328	151	355	2548	1879	841		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	43.1	0.0	40.1	2.9	18.5	10.9		
Incr Delay (d2), s/veh	0.4	0.0	19.8	0.3	4.5	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.8	0.0	8.5	3.0	19.0	1.7		
LnGrp Delay(d),s/veh	43.5	0.0	59.8	3.2	23.0	11.3		
LnGrp LOS	D		E	A	C	B		
Approach Vol, veh/h	57			1030	1686			
Approach Delay, s/veh	43.5			17.3	22.1			
Approach LOS	D			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		85.6		14.4	23.9	61.7		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	22.0	49.0		
Max Q Clear Time (g_c+l1), s		8.6		3.6	17.5	40.0		
Green Ext Time (p_c), s		44.3		0.1	0.4	8.3		
Intersection Summary								
HCM 2010 Ctrl Delay			20.8					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	216	627	6	288	781	303	387	374	313	452	694	350
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	235	682	7	313	849	0	421	407	0	491	754	380
Adj No. of Lanes	1	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	282	1042	11	391	1272	569	490	882	395	705	826	369
Arrive On Green	0.08	0.31	0.31	0.14	0.38	0.00	0.11	0.26	0.00	0.10	0.25	0.25
Sat Flow, veh/h	1645	3328	34	1691	3374	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	235	336	353	313	849	0	421	407	0	491	754	380
Grp Sat Flow(s),veh/h/ln	1645	1641	1721	1691	1687	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	10.0	23.0	23.0	15.7	27.2	0.0	12.2	13.2	0.0	13.0	29.3	33.0
Cycle Q Clear(g_c), s	10.0	23.0	23.0	15.7	27.2	0.0	12.2	13.2	0.0	13.0	29.3	33.0
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	282	514	539	391	1272	569	490	882	395	705	826	369
V/C Ratio(X)	0.83	0.65	0.65	0.80	0.67	0.00	0.86	0.46	0.00	0.70	0.91	1.03
Avail Cap(c_a), veh/h	282	514	539	452	1272	569	490	882	395	705	826	369
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.7	38.6	38.6	26.7	33.7	0.0	34.5	40.3	0.0	34.8	47.1	48.5
Incr Delay (d2), s/veh	18.7	6.4	6.1	8.7	2.8	0.0	14.2	0.4	0.0	3.0	14.5	54.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	11.4	11.9	8.3	13.1	0.0	6.5	6.2	0.0	6.8	14.8	18.8
LnGrp Delay(d),s/veh	54.5	44.9	44.7	35.5	36.5	0.0	48.7	40.7	0.0	37.8	61.6	102.9
LnGrp LOS	D	D	D	D	D		D	D		D	E	F
Approach Vol, veh/h		924			1162			828			1625	
Approach Delay, s/veh		47.3			36.2			44.7			64.1	
Approach LOS		D			D			D			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.3	47.7	18.0	40.0	16.0	56.0	19.0	39.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	23.0	36.0	13.0	34.0	10.0	49.0	14.0	33.0				
Max Q Clear Time (g_c+l1), s	17.7	25.0	15.0	15.2	12.0	29.2	14.2	35.0				
Green Ext Time (p_c), s	0.6	7.5	0.0	10.6	0.0	11.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			50.0									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	14.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	39	194	14	81	0	295	70	60	9	161	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	11	42	209	15	87	0	317	75	65	10	173	33
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	994	983	190	1076	968	108	206	0	0	140	0	0
Stage 1	209	209	-	742	742	-	-	-	-	-	-	-
Stage 2	785	774	-	334	226	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	222	247	847	195	252	940	1336	-	-	1362	-	-
Stage 1	788	725	-	404	419	-	-	-	-	-	-	-
Stage 2	383	405	-	676	713	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	114	182	847	97	185	940	1336	-	-	1362	-	-
Mov Cap-2 Maneuver	114	182	-	97	185	-	-	-	-	-	-	-
Stage 1	584	719	-	299	310	-	-	-	-	-	-	-
Stage 2	204	300	-	476	707	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	22.8			58.3			5.9			0.3		
HCM LOS	C			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	1336	-	-	458	163	1362	-	-				
HCM Lane V/C Ratio	0.237	-	-	0.571	0.627	0.007	-	-				
HCM Control Delay (s)	8.5	0	-	22.8	58.3	7.7	0	-				
HCM Lane LOS	A	A	-	C	F	A	A	-				
HCM 95th %tile Q(veh)	0.9	-	-	3.5	3.5	0	-	-				

Intersection												
Int Delay, s/veh	159.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	9	179	218	31	25	106	338	60	7	279	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	92	92	92	86	86	86	86	86	86
Heavy Vehicles, %	9	9	9	10	10	10	9	9	9	8	8	8
Mvmt Flow	23	10	208	237	34	27	123	393	70	8	324	15

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1053	1057	332	1132	1030	428	340	0	0	463	0	0
Stage 1	348	348	-	674	674	-	-	-	-	-	-	-
Stage 2	705	709	-	458	356	-	-	-	-	-	-	-
Critical Hdwy	7.19	6.59	6.29	7.2	6.6	6.3	4.19	-	-	4.18	-	-
Critical Hdwy Stg 1	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.19	5.59	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.581	4.081	3.381	3.59	4.09	3.39	2.281	-	-	2.272	-	-
Pot Cap-1 Maneuver	198	219	694	~ 174	226	610	1181	-	-	1067	-	-
Stage 1	654	622	-	431	442	-	-	-	-	-	-	-
Stage 2	416	427	-	568	615	-	-	-	-	-	-	-
Platoon blocked, %							-	-	-	-	-	-
Mov Cap-1 Maneuver	145	186	694	~ 103	192	610	1181	-	-	1067	-	-
Mov Cap-2 Maneuver	145	186	-	~ 103	192	-	-	-	-	-	-	-
Stage 1	561	616	-	370	379	-	-	-	-	-	-	-
Stage 2	311	366	-	387	609	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.6	\$ 768.6	1.8	0.2
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1181	-	-	468	118	1067	-
HCM Lane V/C Ratio	0.104	-	-	0.517	2.524	0.008	-
HCM Control Delay (s)	8.4	0	-	20.6	\$ 768.6	8.4	0
HCM Lane LOS	A	A	-	C	F	A	A
HCM 95th %tile Q(veh)	0.3	-	-	2.9	26.7	0	-

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

Intersection												
Int Delay, s/veh	193.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	2	89	212	6	25	17	489	58	7	653	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	92	83	92	92	92	83	83	92	92	83	83
Heavy Vehicles, %	3	3	3	10	10	10	9	9	9	10	10	10
Mvmt Flow	17	2	107	230	7	27	20	589	63	8	787	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1482	1497	789	1521	1469	621	792	0	0	652	0	0
Stage 1	804	804	-	662	662	-	-	-	-	-	-	-
Stage 2	678	693	-	859	807	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.2	6.6	6.3	4.19	-	-	4.2	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.59	4.09	3.39	2.281	-	-	2.29	-	-
Pot Cap-1 Maneuver	103	122	389	~ 93	122	473	798	-	-	898	-	-
Stage 1	375	394	-	438	447	-	-	-	-	-	-	-
Stage 2	440	443	-	340	383	-	-	-	-	-	-	-
Platoon blocked, %							-	-		-	-	-
Mov Cap-1 Maneuver	89	115	389	~ 64	115	473	798	-	-	898	-	-
Mov Cap-2 Maneuver	89	115	-	~ 64	115	-	-	-	-	-	-	-
Stage 1	360	388	-	420	429	-	-	-	-	-	-	-
Stage 2	392	425	-	241	377	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	31.1	\$ 1345.6	0.3	0.1
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	798	-	-	261 71	898	-	-
HCM Lane V/C Ratio	0.026	-	-	0.484 3.72	0.008	-	-
HCM Control Delay (s)	9.6	0	-	31.1 \$ 1345.6	9	0	-
HCM Lane LOS	A	A	-	D F	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	2.5 27.7	0	-	-

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

HCM 2010 Signalized Intersection Summary

2: 43 Street N & 18 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	9	179	218	31	25	106	338	60	7	279	13
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1743	1900	1900	1727	1900	1900	1743	1900	1900	1759	1900
Adj Flow Rate, veh/h	23	10	208	237	34	27	123	393	70	8	324	15
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	9	9	9	10	10	10	9	9	9	8	8	8
Cap, veh/h	71	47	496	355	45	33	181	526	90	43	828	38
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.50	0.50	0.50	0.50	0.50	0.50
Sat Flow, veh/h	87	128	1352	791	122	91	273	1046	179	13	1645	75
Grp Volume(v), veh/h	241	0	0	298	0	0	586	0	0	347	0	0
Grp Sat Flow(s),veh/h/ln	1567	0	0	1003	0	0	1498	0	0	1733	0	0
Q Serve(g_s), s	0.0	0.0	0.0	16.5	0.0	0.0	18.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.0	0.0	0.0	28.5	0.0	0.0	31.3	0.0	0.0	12.3	0.0	0.0
Prop In Lane	0.10		0.86	0.80		0.09	0.21		0.12	0.02		0.04
Lane Grp Cap(c), veh/h	614	0	0	433	0	0	797	0	0	909	0	0
V/C Ratio(X)	0.39	0.00	0.00	0.69	0.00	0.00	0.74	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	614	0	0	433	0	0	797	0	0	909	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	23.8	0.0	0.0	30.5	0.0	0.0	19.8	0.0	0.0	15.4	0.0	0.0
Incr Delay (d2), s/veh	1.9	0.0	0.0	8.7	0.0	0.0	6.0	0.0	0.0	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.0	0.0	8.6	0.0	0.0	14.3	0.0	0.0	6.2	0.0	0.0
LnGrp Delay(d),s/veh	25.7	0.0	0.0	39.2	0.0	0.0	25.8	0.0	0.0	16.6	0.0	0.0
LnGrp LOS	C			D			C			B		
Approach Vol, veh/h		241			298			586			347	
Approach Delay, s/veh		25.7			39.2			25.8			16.6	
Approach LOS		C			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		56.8		43.2		56.8		43.2				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		50.3		36.7		50.3		36.7				
Max Q Clear Time (g_c+l1), s		33.3		14.0		14.3		30.5				
Green Ext Time (p_c), s		6.7		4.4		8.9		2.1				
Intersection Summary												
HCM 2010 Ctrl Delay			26.3									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

3: 43 Street N & 14 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	2	89	212	6	25	17	489	58	7	653	4
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1845	1900	1900	1727	1900	1743	1743	1900	1900	1727	1900
Adj Flow Rate, veh/h	17	2	107	230	7	27	20	589	63	8	787	5
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.83	0.92	0.83	0.92	0.92	0.92	0.83	0.83	0.92	0.92	0.83	0.83
Percent Heavy Veh, %	3	3	3	10	10	10	9	9	9	10	10	10
Cap, veh/h	82	32	412	377	9	36	270	890	95	39	978	6
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.57	0.57	0.57	0.57	0.57	0.57
Sat Flow, veh/h	139	109	1396	1049	32	123	638	1548	166	5	1702	11
Grp Volume(v), veh/h	126	0	0	264	0	0	20	0	652	800	0	0
Grp Sat Flow(s),veh/h/ln	1644	0	0	1204	0	0	638	0	1714	1718	0	0
Q Serve(g_s), s	0.0	0.0	0.0	14.0	0.0	0.0	0.0	0.0	26.1	0.0	0.0	0.0
Cycle Q Clear(g_c), s	6.0	0.0	0.0	20.0	0.0	0.0	5.4	0.0	26.1	36.7	0.0	0.0
Prop In Lane	0.13		0.85	0.87		0.10	1.00		0.10	0.01		0.01
Lane Grp Cap(c), veh/h	526	0	0	422	0	0	270	0	985	1024	0	0
V/C Ratio(X)	0.24	0.00	0.00	0.62	0.00	0.00	0.07	0.00	0.66	0.78	0.00	0.00
Avail Cap(c_a), veh/h	526	0	0	422	0	0	270	0	985	1024	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	27.0	0.0	0.0	32.0	0.0	0.0	10.2	0.0	14.6	16.8	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	6.8	0.0	0.0	0.5	0.0	3.5	5.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	0.0	0.0	7.4	0.0	0.0	0.3	0.0	13.1	19.0	0.0	0.0
LnGrp Delay(d),s/veh	28.0	0.0	0.0	38.8	0.0	0.0	10.7	0.0	18.1	22.8	0.0	0.0
LnGrp LOS	C			D			B		B	C		
Approach Vol, veh/h		126			264			672			800	
Approach Delay, s/veh		28.0			38.8			17.8			22.8	
Approach LOS		C			D			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		64.0		36.0		64.0		36.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		57.5		29.5		57.5		29.5				
Max Q Clear Time (g_c+l1), s		28.1		8.0		38.7		22.0				
Green Ext Time (p_c), s		15.0		2.9		11.4		1.6				
Intersection Summary												
HCM 2010 Ctrl Delay			23.6									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	23	9	248	186	25	33	144	477	42	9	904	56
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	29	11	0	232	31	41	180	596	0	11	1130	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	273	347	295	336	141	187	211	2160	966	450	1634	731
Arrive On Green	0.19	0.19	0.00	0.19	0.19	0.19	0.13	0.68	0.00	0.48	0.48	0.00
Sat Flow, veh/h	1273	1792	1524	1398	729	964	1601	3195	1429	780	3374	1509
Grp Volume(v), veh/h	29	11	0	232	0	72	180	596	0	11	1130	0
Grp Sat Flow(s),veh/h/ln	1273	1792	1524	1398	0	1693	1601	1597	1429	780	1687	1509
Q Serve(g_s), s	2.0	0.5	0.0	16.1	0.0	3.6	11.0	7.4	0.0	0.7	26.0	0.0
Cycle Q Clear(g_c), s	5.5	0.5	0.0	16.6	0.0	3.6	11.0	7.4	0.0	0.7	26.0	0.0
Prop In Lane	1.00		1.00	1.00		0.57	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	273	347	295	336	0	328	211	2160	966	450	1634	731
V/C Ratio(X)	0.11	0.03	0.00	0.69	0.00	0.22	0.85	0.28	0.00	0.02	0.69	0.00
Avail Cap(c_a), veh/h	326	421	358	394	0	398	288	2160	966	450	1634	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.3	32.7	0.0	39.5	0.0	33.9	42.5	6.4	0.0	13.5	20.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	4.1	0.0	0.3	16.3	0.3	0.0	0.1	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.3	0.0	6.6	0.0	1.7	5.8	3.3	0.0	0.2	12.6	0.0
LnGrp Delay(d),s/veh	36.4	32.7	0.0	43.6	0.0	34.3	58.8	6.8	0.0	13.6	22.4	0.0
LnGrp LOS	D	C		D		C	E	A		B	C	
Approach Vol, veh/h		40			304			776			1141	
Approach Delay, s/veh		35.4			41.4			18.8			22.3	
Approach LOS		D			D			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		74.1		25.9	19.2	54.9		25.9				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		63.5		23.5	18.0	39.5		23.5				
Max Q Clear Time (g_c+l1), s		9.4		7.5	13.0	28.0		18.6				
Green Ext Time (p_c), s		23.5		1.5	0.3	8.8		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay			23.9									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	51	274	230	697	1406	112		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	57	0	256	774	1562	124		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	261	120	289	2548	1879	841		
Arrive On Green	0.08	0.00	0.18	0.79	0.55	0.55		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	57	0	256	774	1562	124		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	1.6	0.0	15.5	6.6	38.0	4.0		
Cycle Q Clear(g_c), s	1.6	0.0	15.5	6.6	38.0	4.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	261	120	289	2548	1879	841		
V/C Ratio(X)	0.22	0.00	0.89	0.30	0.83	0.15		
Avail Cap(c_a), veh/h	328	151	355	2548	1879	841		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	43.1	0.0	40.1	2.9	18.5	10.9		
Incr Delay (d2), s/veh	0.4	0.0	19.8	0.3	4.5	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.8	0.0	8.5	3.0	19.0	1.7		
LnGrp Delay(d),s/veh	43.5	0.0	59.8	3.2	23.0	11.3		
LnGrp LOS	D		E	A	C	B		
Approach Vol, veh/h	57			1030	1686			
Approach Delay, s/veh	43.5			17.3	22.1			
Approach LOS	D			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		85.6		14.4	23.9	61.7		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	22.0	49.0		
Max Q Clear Time (g_c+l1), s		8.6		3.6	17.5	40.0		
Green Ext Time (p_c), s		44.3		0.1	0.4	8.3		
Intersection Summary								
HCM 2010 Ctrl Delay			20.8					
HCM 2010 LOS			C					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	216	627	6	288	781	303	387	374	313	452	694	350
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	235	682	7	313	849	0	421	407	0	491	754	380
Adj No. of Lanes	2	2	0	1	2	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	527	981	10	380	1220	546	508	907	406	745	876	392
Arrive On Green	0.08	0.29	0.29	0.14	0.36	0.00	0.11	0.27	0.00	0.11	0.27	0.27
Sat Flow, veh/h	3191	3328	34	1691	3374	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	235	336	353	313	849	0	421	407	0	491	754	380
Grp Sat Flow(s),veh/h/ln	1596	1641	1721	1691	1687	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	6.5	23.6	23.6	16.1	27.9	0.0	11.9	13.0	0.0	14.0	28.7	33.6
Cycle Q Clear(g_c), s	6.5	23.6	23.6	16.1	27.9	0.0	11.9	13.0	0.0	14.0	28.7	33.6
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	527	484	507	380	1220	546	508	907	406	745	876	392
V/C Ratio(X)	0.45	0.70	0.70	0.82	0.70	0.00	0.83	0.45	0.00	0.66	0.86	0.97
Avail Cap(c_a), veh/h	527	484	507	436	1220	546	509	909	407	745	876	392
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.5	40.6	40.7	28.1	35.4	0.0	33.4	39.5	0.0	31.5	45.2	46.9
Incr Delay (d2), s/veh	0.6	8.0	7.7	10.9	3.3	0.0	11.0	0.3	0.0	2.2	8.7	37.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	11.8	12.4	8.6	13.5	0.0	6.1	6.1	0.0	6.6	13.9	17.6
LnGrp Delay(d),s/veh	30.1	48.7	48.3	39.1	38.7	0.0	44.4	39.8	0.0	33.6	53.9	84.3
LnGrp LOS	C	D	D	D	D		D	D		C	D	F
Approach Vol, veh/h		924			1162			828			1625	
Approach Delay, s/veh		43.8			38.8			42.1			54.9	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.7	45.3	19.0	40.9	16.0	54.0	18.9	41.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	23.0	34.0	14.0	35.0	10.0	47.0	14.0	35.0				
Max Q Clear Time (g_c+l1), s	18.1	25.6	16.0	15.0	8.5	29.9	13.9	35.6				
Green Ext Time (p_c), s	0.6	6.0	0.0	10.9	0.2	10.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			46.2									
HCM 2010 LOS			D									

Intersection												
Int Delay, s/veh	12.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	39	194	14	81	0	295	70	60	9	161	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	750	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	11	42	209	15	87	0	317	75	65	10	173	33
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	994	983	190	1076	968	108	206	0	0	140	0	0
Stage 1	209	209	-	742	742	-	-	-	-	-	-	-
Stage 2	785	774	-	334	226	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	222	247	847	195	252	940	1336	-	-	1362	-	-
Stage 1	788	725	-	404	419	-	-	-	-	-	-	-
Stage 2	383	405	-	676	713	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	114	182	847	97	185	940	1336	-	-	1362	-	-
Mov Cap-2 Maneuver	114	182	-	97	185	-	-	-	-	-	-	-
Stage 1	584	719	-	299	310	-	-	-	-	-	-	-
Stage 2	204	300	-	476	707	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	22.8			41.9			5.9			0.3		
HCM LOS	C			E								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR			
Capacity (veh/h)	1336	-	-	458	97	185	1362	-	-			
HCM Lane V/C Ratio	0.237	-	-	0.571	0.155	0.471	0.007	-	-			
HCM Control Delay (s)	8.5	0	-	22.8	48.8	40.7	7.7	0	-			
HCM Lane LOS	A	A	-	C	E	E	A	A	-			
HCM 95th %tile Q(veh)	0.9	-	-	3.5	0.5	2.3	0	-	-			

HCM 2010 Signalized Intersection Summary

2: 43 Street N & 18 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	35	149	54	8	6	249	212	243	28	376	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1696	1900	1900	1727	1900	1900	1727	1900	1900	1845	1900
Adj Flow Rate, veh/h	17	45	191	59	9	7	319	272	312	36	482	19
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.78	0.78	0.78	0.92	0.92	0.92	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	12	12	12	10	10	10	10	10	10	3	3	3
Cap, veh/h	52	90	319	253	37	23	272	191	219	78	931	36
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.58	0.58	0.58	0.58	0.58	0.58
Sat Flow, veh/h	48	315	1119	662	130	82	382	326	374	67	1591	61
Grp Volume(v), veh/h	253	0	0	75	0	0	903	0	0	537	0	0
Grp Sat Flow(s),veh/h/ln	1483	0	0	874	0	0	1083	0	0	1719	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	41.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.5	0.0	0.0	9.5	0.0	0.0	58.5	0.0	0.0	17.2	0.0	0.0
Prop In Lane	0.07		0.75	0.79		0.09	0.35		0.35	0.07		0.04
Lane Grp Cap(c), veh/h	461	0	0	314	0	0	682	0	0	1044	0	0
V/C Ratio(X)	0.55	0.00	0.00	0.24	0.00	0.00	1.32	0.00	0.00	0.51	0.00	0.00
Avail Cap(c_a), veh/h	461	0	0	314	0	0	682	0	0	1044	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	30.8	0.0	0.0	28.6	0.0	0.0	24.9	0.0	0.0	12.2	0.0	0.0
Incr Delay (d2), s/veh	4.6	0.0	0.0	1.8	0.0	0.0	155.9	0.0	0.0	1.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	0.0	0.0	1.8	0.0	0.0	48.3	0.0	0.0	9.2	0.0	0.0
LnGrp Delay(d),s/veh	35.4	0.0	0.0	30.4	0.0	0.0	180.8	0.0	0.0	14.0	0.0	0.0
LnGrp LOS	D			C			F			B		
Approach Vol, veh/h		253			75			903			537	
Approach Delay, s/veh		35.4			30.4			180.8			14.0	
Approach LOS		D			C			F			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		65.0		35.0		65.0		35.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		58.5		28.5		58.5		28.5				
Max Q Clear Time (g_c+l1), s		60.5		16.5		19.2		11.5				
Green Ext Time (p_c), s		0.0		1.8		20.0		2.2				
Intersection Summary												
HCM 2010 Ctrl Delay			102.9									
HCM 2010 LOS			F									

HCM 2010 Signalized Intersection Summary

3: 43 Street N & 14 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	7	27	53	2	6	101	670	236	28	532	21
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1226	1900	1900	1727	1900	1727	1727	1900	1900	1792	1900
Adj Flow Rate, veh/h	5	9	33	58	2	7	125	827	291	35	657	26
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	55	55	55	10	10	10	10	10	10	6	6	6
Cap, veh/h	52	60	170	325	14	32	164	788	277	38	441	17
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.64	0.64	0.64	0.64	0.64	0.64
Sat Flow, veh/h	52	268	755	1146	60	141	700	1222	430	0	684	26
Grp Volume(v), veh/h	47	0	0	67	0	0	125	0	1118	718	0	0
Grp Sat Flow(s),veh/h/ln	1075	0	0	1347	0	0	700	0	1651	710	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.5	0.0	0.0	3.3	0.0	0.0	64.5	0.0	64.5	64.5	0.0	0.0
Prop In Lane	0.11		0.70	0.87		0.10	1.00		0.26	0.05		0.04
Lane Grp Cap(c), veh/h	282	0	0	370	0	0	164	0	1065	496	0	0
V/C Ratio(X)	0.17	0.00	0.00	0.18	0.00	0.00	0.76	0.00	1.05	1.45	0.00	0.00
Avail Cap(c_a), veh/h	282	0	0	370	0	0	164	0	1065	496	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	31.4	0.0	0.0	31.3	0.0	0.0	26.3	0.0	17.8	33.5	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	1.1	0.0	0.0	28.0	0.0	41.5	213.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.0	1.6	0.0	0.0	4.7	0.0	41.3	41.9	0.0	0.0
LnGrp Delay(d),s/veh	32.7	0.0	0.0	32.4	0.0	0.0	54.3	0.0	59.3	246.4	0.0	0.0
LnGrp LOS	C			C			D		F	F		
Approach Vol, veh/h		47			67			1243			718	
Approach Delay, s/veh		32.7			32.4			58.8			246.4	
Approach LOS		C			C			E			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		71.0		29.0		71.0		29.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		64.5		22.5		64.5		22.5				
Max Q Clear Time (g_c+l1), s		66.5		5.5		66.5		5.3				
Green Ext Time (p_c), s		0.0		0.5		0.0		0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			122.3									
HCM 2010 LOS			F									

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	39	32	116	46	12	11	282	971	193	38	551	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	47	39	0	55	14	13	340	1170	0	46	664	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	181	183	155	153	66	61	349	2553	1142	296	1659	742
Arrive On Green	0.10	0.10	0.00	0.10	0.10	0.10	0.21	0.77	0.00	0.50	0.50	0.00
Sat Flow, veh/h	1364	1845	1568	1022	668	620	1660	3312	1482	447	3312	1482
Grp Volume(v), veh/h	47	39	0	55	0	27	340	1170	0	46	664	0
Grp Sat Flow(s),veh/h/ln	1364	1845	1568	1022	0	1288	1660	1656	1482	447	1656	1482
Q Serve(g_s), s	3.3	1.9	0.0	5.2	0.0	1.9	20.3	12.5	0.0	5.7	12.5	0.0
Cycle Q Clear(g_c), s	5.2	1.9	0.0	7.2	0.0	1.9	20.3	12.5	0.0	5.7	12.5	0.0
Prop In Lane	1.00		1.00	1.00		0.48	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	181	183	155	153	0	128	349	2553	1142	296	1659	742
V/C Ratio(X)	0.26	0.21	0.00	0.36	0.00	0.21	0.98	0.46	0.00	0.16	0.40	0.00
Avail Cap(c_a), veh/h	400	480	408	318	0	335	349	2553	1142	296	1659	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.9	41.5	0.0	44.8	0.0	41.5	39.2	4.1	0.0	13.9	15.6	0.0
Incr Delay (d2), s/veh	0.8	0.6	0.0	1.4	0.0	0.8	41.4	0.6	0.0	1.1	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	1.0	0.0	1.5	0.0	0.7	13.4	5.9	0.0	0.8	5.9	0.0
LnGrp Delay(d),s/veh	44.6	42.0	0.0	46.2	0.0	42.3	80.7	4.7	0.0	15.0	16.3	0.0
LnGrp LOS	D	D		D		D	F	A		B	B	
Approach Vol, veh/h		86			82			1510			710	
Approach Delay, s/veh		43.4			44.9			21.8			16.2	
Approach LOS		D			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		83.6		16.4	27.0	56.6		16.4				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		61.0		26.0	21.0	34.0		26.0				
Max Q Clear Time (g_c+l1), s		14.5		7.2	22.3	14.5		9.2				
Green Ext Time (p_c), s		25.3		0.8	0.0	14.3		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay			21.7									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Volume (veh/h)	98	213	356	1405	711	53		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	113	0	409	1615	817	61		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	300	138	444	2637	1414	633		
Arrive On Green	0.10	0.00	0.26	0.77	0.45	0.45		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	113	0	409	1615	817	61		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	3.4	0.0	23.3	20.4	19.4	2.5		
Cycle Q Clear(g_c), s	3.4	0.0	23.3	20.4	19.4	2.5		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	300	138	444	2637	1414	633		
V/C Ratio(X)	0.38	0.00	0.92	0.61	0.58	0.10		
Avail Cap(c_a), veh/h	313	144	495	2637	1414	633		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	42.4	0.0	36.0	4.8	20.2	15.6		
Incr Delay (d2), s/veh	0.8	0.0	21.6	1.1	1.7	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.5	0.0	13.7	9.8	8.6	1.0		
LnGrp Delay(d),s/veh	43.2	0.0	57.6	5.9	21.9	15.9		
LnGrp LOS	D		E	A	C	B		
Approach Vol, veh/h	113			2024	878			
Approach Delay, s/veh	43.2			16.4	21.5			
Approach LOS	D			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		83.9		16.1	32.0	51.9		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	29.0	42.0		
Max Q Clear Time (g_c+l1), s		22.4		5.4	25.3	21.4		
Green Ext Time (p_c), s		39.3		0.2	0.7	17.8		
Intersection Summary								
HCM 2010 Ctrl Delay			18.9					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	582	878	12	354	854	722	377	967	255	561	571	290
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	633	954	13	385	928	0	410	1051	0	610	621	315
Adj No. of Lanes	2	3	0	2	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	549	1453	20	577	1537	479	534	833	373	580	1038	465
Arrive On Green	0.08	0.31	0.31	0.10	0.32	0.00	0.08	0.25	0.00	0.15	0.33	0.33
Sat Flow, veh/h	3163	4751	65	3221	4759	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	633	625	342	385	928	0	410	1051	0	610	621	315
Grp Sat Flow(s),veh/h/ln	1581	1558	1700	1610	1586	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	11.0	22.7	22.7	10.5	21.3	0.0	10.0	33.0	0.0	20.0	21.5	25.2
Cycle Q Clear(g_c), s	11.0	22.7	22.7	10.5	21.3	0.0	10.0	33.0	0.0	20.0	21.5	25.2
Prop In Lane	1.00		0.04	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	549	953	520	577	1537	479	534	833	373	580	1038	465
V/C Ratio(X)	1.15	0.66	0.66	0.67	0.60	0.00	0.77	1.26	0.00	1.05	0.60	0.68
Avail Cap(c_a), veh/h	549	953	520	670	1537	479	534	833	373	580	1038	465
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.7	39.2	39.2	29.0	37.0	0.0	37.6	48.5	0.0	38.8	36.3	37.5
Incr Delay (d2), s/veh	88.4	3.5	6.4	2.1	1.8	0.0	6.7	127.3	0.0	51.5	0.9	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.8	10.2	11.5	4.8	9.6	0.0	3.2	29.7	0.0	14.5	9.5	10.2
LnGrp Delay(d),s/veh	128.2	42.7	45.6	31.1	38.8	0.0	44.3	175.8	0.0	90.2	37.2	41.5
LnGrp LOS	F	D	D	C	D		D	F		F	D	D
Approach Vol, veh/h	1600			1313			1461			1546		
Approach Delay, s/veh	77.1			36.5			138.9			59.0		
Approach LOS	E			D			F			E		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.2	46.8	25.0	39.0	17.0	49.0	15.0	49.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	17.0	36.0	20.0	33.0	11.0	42.0	10.0	43.0				
Max Q Clear Time (g_c+l1), s	12.5	24.7	22.0	35.0	13.0	23.3	12.0	27.2				
Green Ext Time (p_c), s	0.8	8.9	0.0	0.0	0.0	13.2	0.0	11.9				
Intersection Summary												
HCM 2010 Ctrl Delay	78.6											
HCM 2010 LOS	E											

HCM 2010 TWSC
1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

Intersection												
Int Delay, s/veh	18.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	99	299	44	84	6	100	113	31	6	58	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	22	129	388	57	109	8	130	147	40	8	75	9
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	580	542	80	781	527	167	84	0	0	187	0	0
Stage 1	95	95	-	427	427	-	-	-	-	-	-	-
Stage 2	485	447	-	354	100	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	423	445	975	310	453	872	1482	-	-	1307	-	-
Stage 1	907	812	-	602	582	-	-	-	-	-	-	-
Stage 2	560	570	-	659	808	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	307	399	975	130	406	872	1482	-	-	1307	-	-
Mov Cap-2 Maneuver	307	399	-	130	406	-	-	-	-	-	-	-
Stage 1	818	807	-	543	525	-	-	-	-	-	-	-
Stage 2	397	514	-	331	803	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	27.4			28.6			3.1			0.7		
HCM LOS	D			D								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR					
Capacity (veh/h)	1482	-	-	680	130	421	1307	-	-			
HCM Lane V/C Ratio	0.088	-	-	0.793	0.44	0.278	0.006	-	-			
HCM Control Delay (s)	7.7	0	-	27.4	52.8	16.8	7.8	0	-			
HCM Lane LOS	A	A	-	D	F	C	A	A	-			
HCM 95th %tile Q(veh)	0.3	-	-	7.9	1.9	1.1	0	-	-			

HCM 2010 Signalized Intersection Summary

1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	99	299	44	84	6	100	113	31	6	58	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1827	1900	1900	1827	1900	1900	1776	1900	1900	1638	1900
Adj Flow Rate, veh/h	22	129	388	57	109	8	130	147	40	8	75	9
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Percent Heavy Veh, %	4	4	4	4	4	4	7	7	7	16	16	16
Cap, veh/h	85	148	405	191	319	20	304	316	75	97	538	60
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	29	421	1158	271	912	57	520	810	192	49	1379	155
Grp Volume(v), veh/h	539	0	0	174	0	0	317	0	0	92	0	0
Grp Sat Flow(s),veh/h/ln	1609	0	0	1240	0	0	1522	0	0	1583	0	0
Q Serve(g_s), s	6.7	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	16.4	0.0	0.0	3.5	0.0	0.0	7.7	0.0	0.0	1.8	0.0	0.0
Prop In Lane	0.04		0.72	0.33		0.05	0.41		0.13	0.09		0.10
Lane Grp Cap(c), veh/h	638	0	0	530	0	0	695	0	0	696	0	0
V/C Ratio(X)	0.84	0.00	0.00	0.33	0.00	0.00	0.46	0.00	0.00	0.13	0.00	0.00
Avail Cap(c_a), veh/h	638	0	0	530	0	0	695	0	0	696	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.8	0.0	0.0	11.7	0.0	0.0	11.5	0.0	0.0	9.9	0.0	0.0
Incr Delay (d2), s/veh	10.1	0.0	0.0	0.4	0.0	0.0	2.2	0.0	0.0	0.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.0	0.0	0.0	1.7	0.0	0.0	3.7	0.0	0.0	0.9	0.0	0.0
LnGrp Delay(d),s/veh	26.0	0.0	0.0	12.0	0.0	0.0	13.7	0.0	0.0	10.3	0.0	0.0
LnGrp LOS	C			B			B			B		
Approach Vol, veh/h		539			174			317			92	
Approach Delay, s/veh		26.0			12.0			13.7			10.3	
Approach LOS		C			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		26.0		24.0		26.0		24.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		19.5		17.5		19.5		17.5				
Max Q Clear Time (g_c+l1), s		9.7		18.4		3.8		5.5				
Green Ext Time (p_c), s		1.9		0.0		2.5		4.5				
Intersection Summary												
HCM 2010 Ctrl Delay			19.1									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

2: 43 Street N & 18 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	35	149	54	8	6	249	212	243	28	376	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1696	1900	1900	1727	1900	1727	1727	1900	1900	1845	1900
Adj Flow Rate, veh/h	17	45	191	59	9	7	319	272	312	36	482	19
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.78	0.78	0.78	0.92	0.92	0.92	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	12	12	12	10	10	10	10	10	10	3	3	3
Cap, veh/h	49	60	217	154	22	12	594	500	574	87	1097	42
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.68	0.68	0.68	0.68	0.68	0.68
Sat Flow, veh/h	54	318	1144	476	117	61	829	735	843	71	1611	62
Grp Volume(v), veh/h	253	0	0	75	0	0	319	0	584	537	0	0
Grp Sat Flow(s),veh/h/ln	1516	0	0	654	0	0	829	0	1578	1744	0	0
Q Serve(g_s), s	4.2	0.0	0.0	0.0	0.0	0.0	14.9	0.0	18.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	16.1	0.0	0.0	12.0	0.0	0.0	28.1	0.0	18.8	13.2	0.0	0.0
Prop In Lane	0.07		0.75	0.79		0.09	1.00		0.53	0.07		0.04
Lane Grp Cap(c), veh/h	325	0	0	188	0	0	594	0	1074	1226	0	0
V/C Ratio(X)	0.78	0.00	0.00	0.40	0.00	0.00	0.54	0.00	0.54	0.44	0.00	0.00
Avail Cap(c_a), veh/h	370	0	0	223	0	0	594	0	1074	1226	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	39.4	0.0	0.0	37.2	0.0	0.0	10.6	0.0	8.1	7.2	0.0	0.0
Incr Delay (d2), s/veh	8.9	0.0	0.0	1.4	0.0	0.0	3.4	0.0	2.0	1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	0.0	2.0	0.0	0.0	5.8	0.0	8.7	7.0	0.0	0.0
LnGrp Delay(d),s/veh	48.4	0.0	0.0	38.6	0.0	0.0	14.0	0.0	10.1	8.4	0.0	0.0
LnGrp LOS	D			D			B		B	A		
Approach Vol, veh/h	253				75		903				537	
Approach Delay, s/veh	48.4				38.6		11.5				8.4	
Approach LOS	D				D		B				A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	74.6		25.4		74.6		25.4					
Change Period (Y+Rc), s	6.5		6.5		6.5		6.5					
Max Green Setting (Gmax), s	65.0		22.0		65.0		22.0					
Max Q Clear Time (g_c+l1), s	30.1		18.1		15.2		14.0					
Green Ext Time (p_c), s	15.6		0.8		17.8		1.4					
Intersection Summary												
HCM 2010 Ctrl Delay			16.9									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

3: 43 Street N & 14 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	7	27	53	2	6	101	670	236	28	532	21
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1226	1900	1900	1727	1900	1727	1727	1900	1900	1792	1900
Adj Flow Rate, veh/h	5	9	33	58	2	7	125	827	291	35	657	26
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	55	55	55	10	10	10	10	10	10	6	6	6
Cap, veh/h	44	18	52	151	4	10	377	981	345	68	1120	43
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.80	0.80	0.80	0.80	0.80	0.80
Sat Flow, veh/h	61	266	769	1253	66	154	700	1222	430	37	1394	54
Grp Volume(v), veh/h	47	0	0	67	0	0	125	0	1118	718	0	0
Grp Sat Flow(s),veh/h/ln	1095	0	0	1472	0	0	700	0	1651	1485	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	41.3	7.4	0.0	0.0
Cycle Q Clear(g_c), s	4.1	0.0	0.0	4.1	0.0	0.0	49.0	0.0	41.3	48.7	0.0	0.0
Prop In Lane	0.11		0.70	0.87		0.10	1.00		0.26	0.05		0.04
Lane Grp Cap(c), veh/h	113	0	0	166	0	0	377	0	1326	1230	0	0
V/C Ratio(X)	0.42	0.00	0.00	0.40	0.00	0.00	0.33	0.00	0.84	0.58	0.00	0.00
Avail Cap(c_a), veh/h	502	0	0	640	0	0	377	0	1326	1230	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	45.5	0.0	0.0	45.4	0.0	0.0	7.1	0.0	6.0	4.0	0.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	0.0	1.6	0.0	0.0	2.4	0.0	6.7	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.0	1.9	0.0	0.0	2.6	0.0	20.8	7.1	0.0	0.0
LnGrp Delay(d),s/veh	47.9	0.0	0.0	47.0	0.0	0.0	9.5	0.0	12.7	6.0	0.0	0.0
LnGrp LOS	D			D			A		B	A		
Approach Vol, veh/h		47			67			1243			718	
Approach Delay, s/veh		47.9			47.0			12.4			6.0	
Approach LOS		D			D			B			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		86.8		13.2		86.8		13.2				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		43.5		43.5		43.5		43.5				
Max Q Clear Time (g_c+l1), s		51.0		6.1		50.7		6.1				
Green Ext Time (p_c), s		0.0		0.8		0.0		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay			12.1									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	39	32	116	46	12	11	282	971	193	38	551	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1845	1845	1845	1397	1397	1900	1743	1743	1743	1743	1743	1743
Adj Flow Rate, veh/h	47	39	0	55	14	13	340	1170	0	46	664	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	3	3	3	36	36	36	9	9	9	9	9	9
Cap, veh/h	181	183	155	153	66	61	374	2553	1142	289	1609	720
Arrive On Green	0.10	0.10	0.00	0.10	0.10	0.10	0.23	0.77	0.00	0.49	0.49	0.00
Sat Flow, veh/h	1364	1845	1568	1022	668	620	1660	3312	1482	447	3312	1482
Grp Volume(v), veh/h	47	39	0	55	0	27	340	1170	0	46	664	0
Grp Sat Flow(s),veh/h/ln	1364	1845	1568	1022	0	1288	1660	1656	1482	447	1656	1482
Q Serve(g_s), s	3.3	1.9	0.0	5.2	0.0	1.9	20.0	12.5	0.0	5.9	12.9	0.0
Cycle Q Clear(g_c), s	5.2	1.9	0.0	7.2	0.0	1.9	20.0	12.5	0.0	5.9	12.9	0.0
Prop In Lane	1.00		1.00	1.00		0.48	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	181	183	155	153	0	128	374	2553	1142	289	1609	720
V/C Ratio(X)	0.26	0.21	0.00	0.36	0.00	0.21	0.91	0.46	0.00	0.16	0.41	0.00
Avail Cap(c_a), veh/h	400	480	408	318	0	335	432	2553	1142	289	1609	720
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.9	41.5	0.0	44.8	0.0	41.5	37.7	4.1	0.0	14.7	16.5	0.0
Incr Delay (d2), s/veh	0.8	0.6	0.0	1.4	0.0	0.8	21.2	0.6	0.0	1.2	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	1.0	0.0	1.5	0.0	0.7	11.4	5.9	0.0	0.8	6.1	0.0
LnGrp Delay(d),s/veh	44.6	42.0	0.0	46.2	0.0	42.3	59.0	4.7	0.0	15.9	17.3	0.0
LnGrp LOS	D	D		D		D	E	A		B	B	
Approach Vol, veh/h		86			82			1510			710	
Approach Delay, s/veh		43.4			44.9			16.9			17.2	
Approach LOS		D			D			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		83.6		16.4	28.5	55.1		16.4				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		61.0		26.0	26.0	29.0		26.0				
Max Q Clear Time (g_c+l1), s		14.5		7.2	22.0	14.9		9.2				
Green Ext Time (p_c), s		25.3		0.8	0.6	11.0		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay			18.9									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	98	213	356	1405	711	53		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1696	1696	1792	1792	1638	1638		
Adj Flow Rate, veh/h	113	0	409	1615	817	61		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87		
Percent Heavy Veh, %	12	12	6	6	16	16		
Cap, veh/h	398	183	449	2341	1054	471		
Arrive On Green	0.13	0.00	0.26	0.69	0.34	0.34		
Sat Flow, veh/h	3134	1442	1707	3495	3194	1392		
Grp Volume(v), veh/h	113	0	409	1615	817	61		
Grp Sat Flow(s),veh/h/ln	1567	1442	1707	1703	1556	1392		
Q Serve(g_s), s	2.3	0.0	16.3	19.7	16.5	2.1		
Cycle Q Clear(g_c), s	2.3	0.0	16.3	19.7	16.5	2.1		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	398	183	449	2341	1054	471		
V/C Ratio(X)	0.28	0.00	0.91	0.69	0.78	0.13		
Avail Cap(c_a), veh/h	448	206	463	2341	1054	471		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	27.7	0.0	25.0	6.5	20.8	16.0		
Incr Delay (d2), s/veh	0.4	0.0	21.7	1.7	5.6	0.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.0	0.0	10.3	9.5	7.9	0.9		
LnGrp Delay(d),s/veh	28.1	0.0	46.7	8.2	26.3	16.6		
LnGrp LOS	C		D	A	C	B		
Approach Vol, veh/h	113			2024	878			
Approach Delay, s/veh	28.1			16.0	25.7			
Approach LOS	C			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		54.6		15.4	24.4	30.2		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		47.0		10.0	19.0	22.0		
Max Q Clear Time (g_c+I1), s		21.7		4.3	18.3	18.5		
Green Ext Time (p_c), s		21.3		0.2	0.2	3.4		
Intersection Summary								
HCM 2010 Ctrl Delay			19.3					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	582	878	12	354	854	722	377	967	255	561	571	290
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1712	1712	1900	1743	1743	1743	1727	1727	1727	1652	1652	1652
Adj Flow Rate, veh/h	633	954	13	385	928	0	410	1051	0	610	621	315
Adj No. of Lanes	2	3	0	2	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	11	11	11	9	9	9	10	10	10	15	15	15
Cap, veh/h	473	1227	17	519	1354	422	647	1085	486	501	1096	490
Arrive On Green	0.08	0.26	0.26	0.10	0.28	0.00	0.10	0.33	0.00	0.12	0.35	0.35
Sat Flow, veh/h	3163	4751	65	3221	4759	1482	3191	3282	1468	3053	3139	1404
Grp Volume(v), veh/h	633	625	342	385	928	0	410	1051	0	610	621	315
Grp Sat Flow(s),veh/h/ln	1581	1558	1700	1610	1586	1482	1596	1641	1468	1526	1570	1404
Q Serve(g_s), s	10.0	24.2	24.2	11.3	22.5	0.0	10.8	41.0	0.0	16.0	20.9	24.5
Cycle Q Clear(g_c), s	10.0	24.2	24.2	11.3	22.5	0.0	10.8	41.0	0.0	16.0	20.9	24.5
Prop In Lane	1.00		0.04	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	473	805	439	519	1354	422	647	1085	486	501	1096	490
V/C Ratio(X)	1.34	0.78	0.78	0.74	0.69	0.00	0.63	0.97	0.00	1.22	0.57	0.64
Avail Cap(c_a), veh/h	473	805	439	533	1354	422	730	1086	486	501	1096	490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	44.7	44.7	33.5	41.3	0.0	25.9	42.8	0.0	37.3	34.3	35.5
Incr Delay (d2), s/veh	165.8	7.3	12.7	5.4	2.8	0.0	1.5	20.0	0.0	115.3	0.7	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.0	11.2	12.9	5.4	10.2	0.0	4.9	21.6	0.0	17.0	9.2	9.9
LnGrp Delay(d),s/veh	209.1	52.0	57.5	38.9	44.2	0.0	27.4	62.8	0.0	152.6	35.0	38.3
LnGrp LOS	F	D	E	D	D		C	E		F	D	D
Approach Vol, veh/h	1600			1313			1461			1546		
Approach Delay, s/veh	115.3			42.6			52.9			82.1		
Approach LOS	F			D			D			F		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.4	40.6	21.0	49.0	16.0	44.0	18.6	51.4				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	14.0	33.0	16.0	43.0	10.0	37.0	17.0	42.0				
Max Q Clear Time (g_c+l1), s	13.3	26.2	18.0	43.0	12.0	24.5	12.8	26.5				
Green Ext Time (p_c), s	0.2	5.6	0.0	0.0	0.0	9.6	0.8	11.7				
Intersection Summary												
HCM 2010 Ctrl Delay	75.1											
HCM 2010 LOS	E											

HCM 2010 Signalized Intersection Summary

2: 43 Street N & 18 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	9	239	218	31	25	141	426	60	7	331	14
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1743	1900	1900	1727	1900	1900	1743	1900	1900	1759	1900
Adj Flow Rate, veh/h	30	10	278	237	34	27	164	495	70	8	385	16
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	9	9	9	10	10	10	9	9	9	8	8	8
Cap, veh/h	67	31	405	226	23	18	217	588	81	43	970	40
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.58	0.58	0.58	0.58	0.58	0.58
Sat Flow, veh/h	97	107	1422	568	81	65	295	1005	138	11	1658	68
Grp Volume(v), veh/h	318	0	0	298	0	0	729	0	0	409	0	0
Grp Sat Flow(s),veh/h/ln	1626	0	0	714	0	0	1438	0	0	1737	0	0
Q Serve(g_s), s	0.0	0.0	0.0	10.5	0.0	0.0	29.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	18.0	0.0	0.0	28.5	0.0	0.0	42.4	0.0	0.0	12.7	0.0	0.0
Prop In Lane	0.09		0.87	0.80		0.09	0.22		0.10	0.02		0.04
Lane Grp Cap(c), veh/h	503	0	0	268	0	0	885	0	0	1053	0	0
V/C Ratio(X)	0.63	0.00	0.00	1.11	0.00	0.00	0.82	0.00	0.00	0.39	0.00	0.00
Avail Cap(c_a), veh/h	503	0	0	268	0	0	885	0	0	1053	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	32.2	0.0	0.0	41.3	0.0	0.0	17.2	0.0	0.0	11.2	0.0	0.0
Incr Delay (d2), s/veh	5.9	0.0	0.0	88.2	0.0	0.0	8.6	0.0	0.0	1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	0.0	0.0	13.9	0.0	0.0	18.7	0.0	0.0	6.3	0.0	0.0
LnGrp Delay(d),s/veh	38.2	0.0	0.0	129.5	0.0	0.0	25.8	0.0	0.0	12.3	0.0	0.0
LnGrp LOS	D			F			C			B		
Approach Vol, veh/h		318			298			729			409	
Approach Delay, s/veh		38.2			129.5			25.8			12.3	
Approach LOS		D			F			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		65.0		35.0		65.0		35.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		58.5		28.5		58.5		28.5				
Max Q Clear Time (g_c+l1), s		44.4		20.0		14.7		30.5				
Green Ext Time (p_c), s		7.6		3.1		12.9		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			42.5									
HCM 2010 LOS			D									

HCM 2010 Signalized Intersection Summary

3: 43 Street N & 14 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	2	119	212	6	25	23	616	58	7	760	4
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1845	1900	1900	1727	1900	1743	1743	1900	1900	1727	1900
Adj Flow Rate, veh/h	22	2	143	230	7	27	28	742	63	8	916	5
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.83	0.92	0.83	0.92	0.92	0.92	0.83	0.83	0.92	0.92	0.83	0.83
Percent Heavy Veh, %	3	3	3	10	10	10	9	9	9	10	10	10
Cap, veh/h	71	26	331	271	6	24	268	1022	87	39	1099	6
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.64	0.64	0.64	0.64	0.64	0.64
Sat Flow, veh/h	133	114	1471	906	28	106	566	1585	135	5	1704	9
Grp Volume(v), veh/h	167	0	0	264	0	0	28	0	805	929	0	0
Grp Sat Flow(s),veh/h/ln	1718	0	0	1040	0	0	566	0	1719	1718	0	0
Q Serve(g_s), s	0.0	0.0	0.0	13.5	0.0	0.0	0.0	0.0	31.3	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.0	0.0	0.0	22.5	0.0	0.0	7.6	0.0	31.3	41.4	0.0	0.0
Prop In Lane	0.13		0.86	0.87		0.10	1.00		0.08	0.01		0.01
Lane Grp Cap(c), veh/h	427	0	0	301	0	0	268	0	1109	1144	0	0
V/C Ratio(X)	0.39	0.00	0.00	0.88	0.00	0.00	0.10	0.00	0.73	0.81	0.00	0.00
Avail Cap(c_a), veh/h	427	0	0	301	0	0	268	0	1109	1144	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	33.5	0.0	0.0	40.9	0.0	0.0	7.7	0.0	11.8	13.6	0.0	0.0
Incr Delay (d2), s/veh	2.7	0.0	0.0	28.1	0.0	0.0	0.8	0.0	4.2	6.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	0.0	9.6	0.0	0.0	0.4	0.0	15.8	21.4	0.0	0.0
LnGrp Delay(d),s/veh	36.2	0.0	0.0	69.0	0.0	0.0	8.4	0.0	16.0	20.0	0.0	0.0
LnGrp LOS	D			E			A		B	B		
Approach Vol, veh/h		167			264			833			929	
Approach Delay, s/veh		36.2			69.0			15.8			20.0	
Approach LOS		D			E			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		71.0		29.0		71.0		29.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		64.5		22.5		64.5		22.5				
Max Q Clear Time (g_c+l1), s		33.3		11.0		43.4		24.5				
Green Ext Time (p_c), s		19.9		2.5		15.1		0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			25.5									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	28	11	330	222	29	37	192	590	48	10	1037	63
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	35	14	0	278	36	46	240	738	0	12	1296	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	305	402	341	376	167	213	269	2064	923	358	1411	631
Arrive On Green	0.22	0.22	0.00	0.22	0.22	0.22	0.17	0.65	0.00	0.42	0.42	0.00
Sat Flow, veh/h	1261	1792	1524	1394	744	951	1601	3195	1429	684	3374	1509
Grp Volume(v), veh/h	35	14	0	278	0	82	240	738	0	12	1296	0
Grp Sat Flow(s),veh/h/ln	1261	1792	1524	1394	0	1695	1601	1597	1429	684	1687	1509
Q Serve(g_s), s	2.3	0.6	0.0	19.5	0.0	3.9	14.7	10.6	0.0	1.0	36.3	0.0
Cycle Q Clear(g_c), s	6.3	0.6	0.0	20.1	0.0	3.9	14.7	10.6	0.0	1.0	36.3	0.0
Prop In Lane	1.00		1.00	1.00		0.56	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	305	402	341	376	0	380	269	2064	923	358	1411	631
V/C Ratio(X)	0.11	0.03	0.00	0.74	0.00	0.22	0.89	0.36	0.00	0.03	0.92	0.00
Avail Cap(c_a), veh/h	319	421	358	391	0	398	288	2064	923	358	1411	631
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.2	30.3	0.0	38.2	0.0	31.6	40.7	8.2	0.0	17.2	27.5	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	7.0	0.0	0.3	26.6	0.5	0.0	0.2	11.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.3	0.0	8.2	0.0	1.9	8.5	4.8	0.0	0.2	18.9	0.0
LnGrp Delay(d),s/veh	34.4	30.4	0.0	45.2	0.0	31.9	67.3	8.6	0.0	17.4	38.6	0.0
LnGrp LOS	C	C		D		C	E	A		B	D	
Approach Vol, veh/h		49			360			978			1308	
Approach Delay, s/veh		33.2			42.2			23.0			38.4	
Approach LOS		C			D			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		71.1		28.9	22.8	48.3		28.9				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		63.5		23.5	18.0	39.5		23.5				
Max Q Clear Time (g_c+l1), s		12.6		8.3	16.7	38.3		22.1				
Green Ext Time (p_c), s		29.3		1.8	0.1	1.1		0.3				
Intersection Summary												
HCM 2010 Ctrl Delay			33.2									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (With BG2037 Mitigation)

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	61	365	306	883	1705	125		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	68	0	340	981	1894	139		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	278	128	355	2531	1720	770		
Arrive On Green	0.08	0.00	0.22	0.79	0.51	0.51		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	68	0	340	981	1894	139		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	1.9	0.0	20.8	9.4	50.5	5.0		
Cycle Q Clear(g_c), s	1.9	0.0	20.8	9.4	50.5	5.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	278	128	355	2531	1720	770		
V/C Ratio(X)	0.24	0.00	0.96	0.39	1.10	0.18		
Avail Cap(c_a), veh/h	328	151	355	2531	1720	770		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	42.8	0.0	38.5	3.3	24.7	13.5		
Incr Delay (d2), s/veh	0.5	0.0	36.3	0.4	54.9	0.5		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.9	0.0	12.8	4.2	36.8	2.2		
LnGrp Delay(d),s/veh	43.2	0.0	74.9	3.8	79.6	14.0		
LnGrp LOS	D		E	A	F	B		
Approach Vol, veh/h	68			1321	2033			
Approach Delay, s/veh	43.2			22.1	75.1			
Approach LOS	D			C	E			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		85.0		15.0	28.0	57.0		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		77.0		10.0	22.0	49.0		
Max Q Clear Time (g_c+I1), s		11.4		3.9	22.8	52.5		
Green Ext Time (p_c), s		54.6		0.1	0.0	0.0		
Intersection Summary								
HCM 2010 Ctrl Delay			54.0					
HCM 2010 LOS			D					

HCM 2010 Signalized Intersection Summary 6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (With BG2037 Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	273	836	8	384	1041	387	516	483	417	544	870	410
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	297	909	9	417	1132	0	561	525	0	591	946	446
Adj No. of Lanes	2	3	0	2	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	426	1195	12	550	1321	411	613	1150	514	821	1009	451
Arrive On Green	0.08	0.25	0.25	0.11	0.27	0.00	0.15	0.34	0.00	0.12	0.31	0.31
Sat Flow, veh/h	3191	4815	48	3281	4848	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	297	593	325	417	1132	0	561	525	0	591	946	446
Grp Sat Flow(s),veh/h/ln	1596	1572	1719	1640	1616	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	8.8	22.6	22.6	12.1	28.6	0.0	16.5	15.7	0.0	15.0	36.5	39.3
Cycle Q Clear(g_c), s	8.8	22.6	22.6	12.1	28.6	0.0	16.5	15.7	0.0	15.0	36.5	39.3
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	426	780	427	550	1321	411	613	1150	514	821	1009	451
V/C Ratio(X)	0.70	0.76	0.76	0.76	0.86	0.00	0.91	0.46	0.00	0.72	0.94	0.99
Avail Cap(c_a), veh/h	429	780	427	550	1321	411	640	1177	527	821	1009	451
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.2	44.9	44.9	33.6	44.5	0.0	35.8	33.2	0.0	28.3	43.3	44.2
Incr Delay (d2), s/veh	4.9	6.9	12.1	6.1	7.3	0.0	17.4	0.3	0.0	3.1	15.6	39.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	10.6	12.2	5.8	13.7	0.0	11.3	7.3	0.0	3.0	18.6	20.6
LnGrp Delay(d),s/veh	40.0	51.8	57.0	39.7	51.9	0.0	53.2	33.5	0.0	31.4	58.9	83.4
LnGrp LOS	D	D	E	D	D		D	C		C	E	F
Approach Vol, veh/h	1215				1549				1086			
Approach Delay, s/veh	50.3				48.6				43.7			
Approach LOS	D				D				D			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	39.0	20.0	50.0	16.9	42.1	24.0	46.0				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	14.0	32.0	15.0	45.0	11.0	35.0	20.0	40.0				
Max Q Clear Time (g_c+l1), s	14.1	24.6	17.0	17.7	10.8	30.6	18.5	41.3				
Green Ext Time (p_c), s	0.0	6.4	0.0	16.7	0.0	3.9	0.5	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	50.6											
HCM 2010 LOS	D											

Intersection												
Int Delay, s/veh	110.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	51	254	17	108	0	379	81	73	12	174	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	4	4	4	4	4	4	7	7	7	16	16	16
Mvmt Flow	12	55	273	18	116	0	408	87	78	13	187	38

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1231	1213	206	1337	1192	126	225	0	0	166	0	0
Stage 1	232	232	-	941	941	-	-	-	-	-	-	-
Stage 2	999	981	-	396	251	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.17	-	-	4.26	-	-
Critical Hdwy Stg 1	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.54	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.036	3.336	3.536	4.036	3.336	2.263	-	-	2.344	-	-
Pot Cap-1 Maneuver	153	180	829	129	185	919	1315	-	-	1331	-	-
Stage 1	766	709	-	313	339	-	-	-	-	-	-	-
Stage 2	291	325	-	625	695	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	14	117	829	41	120	919	1315	-	-	1331	-	-
Mov Cap-2 Maneuver	14	117	-	41	120	-	-	-	-	-	-	-
Stage 1	502	701	-	205	222	-	-	-	-	-	-	-
Stage 2	91	213	-	382	687	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	\$ 350.2	143.4	6.4	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1315	-	-	207 41 120	1331	-	-
HCM Lane V/C Ratio	0.31	-	-	1.641 0.446 0.968	0.01	-	-
HCM Control Delay (s)	9	0	-\$ 350.2	150.2 142.3	7.7	0	-
HCM Lane LOS	A	A	-	F F F	A	A	-
HCM 95th %tile Q(veh)	1.3	-	-	22.3 1.6 6.4	0	-	-

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

HCM 2010 Signalized Intersection Summary

1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	51	254	17	108	0	379	81	73	12	174	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1827	1900	1900	1827	1900	1900	1776	1900	1900	1638	1900
Adj Flow Rate, veh/h	12	55	273	18	116	0	408	87	78	13	187	38
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	4	4	4	4	4	4	7	7	7	16	16	16
Cap, veh/h	80	79	345	110	452	0	547	90	81	90	616	120
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.00	0.47	0.47	0.47	0.47	0.47	0.47
Sat Flow, veh/h	22	292	1278	104	1674	0	901	192	172	30	1312	255
Grp Volume(v), veh/h	340	0	0	134	0	0	573	0	0	238	0	0
Grp Sat Flow(s),veh/h/ln	1591	0	0	1778	0	0	1265	0	0	1596	0	0
Q Serve(g_s), s	1.6	0.0	0.0	0.0	0.0	0.0	17.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.9	0.0	0.0	2.9	0.0	0.0	21.8	0.0	0.0	4.7	0.0	0.0
Prop In Lane	0.04		0.80	0.13		0.00	0.71		0.14	0.05		0.16
Lane Grp Cap(c), veh/h	505	0	0	562	0	0	718	0	0	826	0	0
V/C Ratio(X)	0.67	0.00	0.00	0.24	0.00	0.00	0.80	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	630	0	0	694	0	0	718	0	0	826	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.9	0.0	0.0	14.4	0.0	0.0	12.4	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	0.0	0.2	0.0	0.0	9.0	0.0	0.0	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	0.0	1.5	0.0	0.0	9.3	0.0	0.0	2.3	0.0	0.0
LnGrp Delay(d),s/veh	18.9	0.0	0.0	14.6	0.0	0.0	21.5	0.0	0.0	9.1	0.0	0.0
LnGrp LOS	B			B			C			A		
Approach Vol, veh/h		340			134			573			238	
Approach Delay, s/veh		18.9			14.6			21.5			9.1	
Approach LOS		B			B			C			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		30.0		20.0		30.0		20.0				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		19.5		17.5		19.5		17.5				
Max Q Clear Time (g_c+l1), s		23.8		11.9		6.7		4.9				
Green Ext Time (p_c), s		0.0		1.7		5.2		2.9				
Intersection Summary												
HCM 2010 Ctrl Delay			17.8									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

2: 43 Street N & 18 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	26	9	239	218	31	25	141	426	60	7	331	14
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1743	1900	1900	1727	1900	1743	1743	1900	1900	1759	1900
Adj Flow Rate, veh/h	30	10	278	237	34	27	164	495	70	8	385	16
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	9	9	9	10	10	10	9	9	9	8	8	8
Cap, veh/h	75	42	539	328	43	30	434	721	102	42	799	33
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	91	109	1392	679	110	79	917	1494	211	11	1655	68
Grp Volume(v), veh/h	318	0	0	298	0	0	164	0	565	409	0	0
Grp Sat Flow(s),veh/h/ln	1593	0	0	868	0	0	917	0	1706	1734	0	0
Q Serve(g_s), s	0.0	0.0	0.0	17.6	0.0	0.0	6.1	0.0	25.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	16.3	0.0	0.0	33.9	0.0	0.0	21.9	0.0	25.6	15.8	0.0	0.0
Prop In Lane	0.09		0.87	0.80		0.09	1.00		0.12	0.02		0.04
Lane Grp Cap(c), veh/h	656	0	0	401	0	0	434	0	823	874	0	0
V/C Ratio(X)	0.48	0.00	0.00	0.74	0.00	0.00	0.38	0.00	0.69	0.47	0.00	0.00
Avail Cap(c_a), veh/h	726	0	0	453	0	0	434	0	823	874	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	23.8	0.0	0.0	31.6	0.0	0.0	20.5	0.0	20.0	17.5	0.0	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	5.7	0.0	0.0	2.5	0.0	4.6	1.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	0.0	0.0	8.4	0.0	0.0	3.6	0.0	13.0	8.0	0.0	0.0
LnGrp Delay(d),s/veh	24.3	0.0	0.0	37.3	0.0	0.0	23.0	0.0	24.6	19.3	0.0	0.0
LnGrp LOS	C			D			C		C	B		
Approach Vol, veh/h		318			298			729			409	
Approach Delay, s/veh		24.3			37.3			24.3			19.3	
Approach LOS		C			D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.8		45.2		54.8		45.2				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		43.5		43.5		43.5		43.5				
Max Q Clear Time (g_c+l1), s		27.6		18.3		17.8		35.9				
Green Ext Time (p_c), s		7.5		5.5		9.6		2.8				
Intersection Summary												
HCM 2010 Ctrl Delay			25.3									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

3: 43 Street N & 14 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	2	119	212	6	25	23	616	58	7	760	4
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1845	1900	1900	1727	1900	1743	1743	1900	1900	1727	1900
Adj Flow Rate, veh/h	22	2	143	230	7	27	28	742	63	8	916	5
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	0	1	0
Peak Hour Factor	0.83	0.92	0.83	0.92	0.92	0.92	0.83	0.83	0.92	0.92	0.83	0.83
Percent Heavy Veh, %	3	3	3	10	10	10	9	9	9	10	10	10
Cap, veh/h	79	30	408	338	8	32	195	928	79	39	998	5
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.59	0.59	0.59	0.59	0.59	0.59
Sat Flow, veh/h	136	105	1437	953	29	112	566	1585	135	5	1704	9
Grp Volume(v), veh/h	167	0	0	264	0	0	28	0	805	929	0	0
Grp Sat Flow(s),veh/h/ln	1678	0	0	1094	0	0	566	0	1719	1717	0	0
Q Serve(g_s), s	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0	36.5	8.6	0.0	0.0
Cycle Q Clear(g_c), s	8.3	0.0	0.0	23.3	0.0	0.0	10.7	0.0	36.5	48.6	0.0	0.0
Prop In Lane	0.13		0.86	0.87		0.10	1.00		0.08	0.01		0.01
Lane Grp Cap(c), veh/h	518	0	0	378	0	0	195	0	1007	1042	0	0
V/C Ratio(X)	0.32	0.00	0.00	0.70	0.00	0.00	0.14	0.00	0.80	0.89	0.00	0.00
Avail Cap(c_a), veh/h	750	0	0	557	0	0	195	0	1007	1042	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	28.6	0.0	0.0	34.7	0.0	0.0	10.8	0.0	16.1	18.6	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.0	2.3	0.0	0.0	1.5	0.0	6.6	11.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	0.0	7.1	0.0	0.0	0.5	0.0	19.1	26.0	0.0	0.0
LnGrp Delay(d),s/veh	29.0	0.0	0.0	37.0	0.0	0.0	12.3	0.0	22.7	30.0	0.0	0.0
LnGrp LOS	C			D			B		C	C		
Approach Vol, veh/h		167			264			833			929	
Approach Delay, s/veh		29.0			37.0			22.4			30.0	
Approach LOS		C			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		65.1		34.9		65.1		34.9				
Change Period (Y+Rc), s		6.5		6.5		6.5		6.5				
Max Green Setting (Gmax), s		43.5		43.5		43.5		43.5				
Max Q Clear Time (g_c+l1), s		38.5		10.3		50.6		25.3				
Green Ext Time (p_c), s		4.4		3.7		0.0		3.1				
Intersection Summary												
HCM 2010 Ctrl Delay			27.9									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

4: 43 Street N & 9 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	28	11	330	222	29	37	192	590	48	10	1037	63
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1792	1792	1863	1863	1900	1681	1681	1681	1776	1776	1776
Adj Flow Rate, veh/h	35	14	0	278	36	46	240	738	0	12	1296	0
Adj No. of Lanes	1	1	1	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	6	6	6	2	2	2	13	13	13	7	7	7
Cap, veh/h	310	408	347	381	170	217	240	2052	918	368	1458	652
Arrive On Green	0.23	0.23	0.00	0.23	0.23	0.23	0.15	0.64	0.00	0.43	0.43	0.00
Sat Flow, veh/h	1261	1792	1524	1394	744	951	1601	3195	1429	684	3374	1509
Grp Volume(v), veh/h	35	14	0	278	0	82	240	738	0	12	1296	0
Grp Sat Flow(s),veh/h/ln	1261	1792	1524	1394	0	1695	1601	1597	1429	684	1687	1509
Q Serve(g_s), s	2.3	0.6	0.0	19.4	0.0	3.9	15.0	10.7	0.0	1.0	35.4	0.0
Cycle Q Clear(g_c), s	6.2	0.6	0.0	20.0	0.0	3.9	15.0	10.7	0.0	1.0	35.4	0.0
Prop In Lane	1.00		1.00	1.00		0.56	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	310	408	347	381	0	386	240	2052	918	368	1458	652
V/C Ratio(X)	0.11	0.03	0.00	0.73	0.00	0.21	1.00	0.36	0.00	0.03	0.89	0.00
Avail Cap(c_a), veh/h	350	466	396	426	0	441	240	2052	918	368	1458	652
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.9	30.0	0.0	37.8	0.0	31.3	42.5	8.3	0.0	16.4	26.2	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0	5.5	0.0	0.3	57.8	0.5	0.0	0.2	8.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.3	0.0	8.1	0.0	1.9	10.5	4.9	0.0	0.2	18.1	0.0
LnGrp Delay(d),s/veh	34.0	30.1	0.0	43.4	0.0	31.6	100.3	8.8	0.0	16.6	34.6	0.0
LnGrp LOS	C	C		D		C	F	A		B	C	
Approach Vol, veh/h		49			360			978			1308	
Approach Delay, s/veh		32.9			40.7			31.3			34.4	
Approach LOS		C			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		70.7		29.3	21.0	49.7		29.3				
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		6.5				
Max Green Setting (Gmax), s		61.0		26.0	15.0	40.0		26.0				
Max Q Clear Time (g_c+I1), s		12.7		8.2	17.0	37.4		22.0				
Green Ext Time (p_c), s		28.4		1.9	0.0	2.4		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay			34.1									
HCM 2010 LOS			C									

HCM 2010 Signalized Intersection Summary

5: 43 Street N & 5 Ave N

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (Mitigation)

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 			 	 			
Volume (veh/h)	61	365	306	883	1705	125		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1776	1776	1696	1696	1792	1792		
Adj Flow Rate, veh/h	68	0	340	981	1894	139		
Adj No. of Lanes	2	1	1	2	2	1		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90		
Percent Heavy Veh, %	7	7	12	12	6	6		
Cap, veh/h	245	113	337	2633	1903	851		
Arrive On Green	0.07	0.00	0.21	0.82	0.56	0.56		
Sat Flow, veh/h	3281	1509	1616	3308	3495	1524		
Grp Volume(v), veh/h	68	0	340	981	1894	139		
Grp Sat Flow(s),veh/h/ln	1640	1509	1616	1612	1703	1524		
Q Serve(g_s), s	2.4	0.0	25.0	9.6	66.4	5.3		
Cycle Q Clear(g_c), s	2.4	0.0	25.0	9.6	66.4	5.3		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	245	113	337	2633	1903	851		
V/C Ratio(X)	0.28	0.00	1.01	0.37	1.00	0.16		
Avail Cap(c_a), veh/h	273	126	337	2633	1903	851		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	52.5	0.0	47.5	2.9	26.3	12.9		
Incr Delay (d2), s/veh	0.6	0.0	51.6	0.4	19.6	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.1	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	0.0	16.0	4.4	36.2	2.3		
LnGrp Delay(d),s/veh	53.1	0.0	99.2	3.3	45.9	13.3		
LnGrp LOS	D		F	A	D	B		
Approach Vol, veh/h	68			1321	2033			
Approach Delay, s/veh	53.1			28.0	43.7			
Approach LOS	D			C	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		104.5		15.5	31.0	73.5		
Change Period (Y+Rc), s		6.5		6.5	6.0	6.5		
Max Green Setting (Gmax), s		97.0		10.0	25.0	66.0		
Max Q Clear Time (g_c+I1), s		11.6		4.4	27.0	68.4		
Green Ext Time (p_c), s		67.6		0.1	0.0	0.0		
Intersection Summary								
HCM 2010 Ctrl Delay			37.8					
HCM 2010 LOS			D					

HCM 2010 Signalized Intersection Summary

6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-PM
Future 2037 PM Peak Hour - (Mitigation)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	273	836	8	384	1041	387	516	483	417	544	870	410
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1727	1727	1900	1776	1776	1776	1776	1776	1776	1712	1712	1712
Adj Flow Rate, veh/h	297	909	9	417	1132	0	561	525	0	591	946	446
Adj No. of Lanes	2	3	0	2	3	1	2	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	10	10	7	7	7	7	7	7	11	11	11
Cap, veh/h	398	1127	11	533	1286	400	618	1137	508	866	1061	474
Arrive On Green	0.08	0.23	0.23	0.11	0.27	0.00	0.14	0.34	0.00	0.13	0.33	0.33
Sat Flow, veh/h	3191	4815	48	3281	4848	1509	3281	3374	1509	3163	3252	1455
Grp Volume(v), veh/h	297	593	325	417	1132	0	561	525	0	591	946	446
Grp Sat Flow(s),veh/h/ln	1596	1572	1719	1640	1616	1509	1640	1687	1509	1581	1626	1455
Q Serve(g_s), s	9.0	22.8	22.9	12.3	28.7	0.0	15.7	15.7	0.0	15.9	35.4	38.2
Cycle Q Clear(g_c), s	9.0	22.8	22.9	12.3	28.7	0.0	15.7	15.7	0.0	15.9	35.4	38.2
Prop In Lane	1.00		0.03	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	398	736	402	533	1286	400	618	1137	508	866	1061	474
V/C Ratio(X)	0.75	0.81	0.81	0.78	0.88	0.00	0.91	0.46	0.00	0.68	0.89	0.94
Avail Cap(c_a), veh/h	398	736	402	533	1286	400	660	1184	530	866	1066	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.6	46.4	46.4	34.6	45.1	0.0	33.6	33.4	0.0	24.4	41.0	42.0
Incr Delay (d2), s/veh	7.5	9.2	15.8	7.4	8.8	0.0	15.8	0.3	0.0	2.2	9.6	26.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	10.8	12.6	6.1	13.8	0.0	11.1	7.3	0.0	7.2	17.3	18.8
LnGrp Delay(d),s/veh	44.1	55.6	62.2	42.1	54.0	0.0	49.4	33.7	0.0	26.6	50.7	68.8
LnGrp LOS	D	E	E	D	D		D	C		C	D	E
Approach Vol, veh/h		1215			1549			1086			1983	
Approach Delay, s/veh		54.5			50.8			41.8			47.6	
Approach LOS		D			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	37.0	22.0	49.2	16.0	41.0	23.4	47.8				
Change Period (Y+Rc), s	6.0	7.0	5.0	6.0	6.0	7.0	5.0	6.0				
Max Green Setting (Gmax), s	14.0	30.0	17.0	45.0	10.0	34.0	20.0	42.0				
Max Q Clear Time (g_c+l1), s	14.3	24.9	17.9	17.7	11.0	30.7	17.7	40.2				
Green Ext Time (p_c), s	0.0	4.5	0.0	16.7	0.0	3.0	0.7	1.6				
Intersection Summary												
HCM 2010 Ctrl Delay			48.8									
HCM 2010 LOS			D									

Appendix D

Synchro Capacity Analysis Results Reports

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: EX-AM
Existing AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	12	77	18	6	4	188	305	73	11	293	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.937				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1309	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.750			0.748			0.950			0.533		
Satd. Flow (perm)	1383	1845	1568	1045	1309	0	1656	3312	1482	929	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			104		5				88			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	4	14	93	22	7	5	227	367	88	13	353	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	14	93	22	12	0	227	367	88	13	353	14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	33.0	33.0	33.0	33.0	33.0		20.0	67.0	67.0	47.0	47.0	47.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		20.0%	67.0%	67.0%	47.0%	47.0%	47.0%
Maximum Green (s)	26.5	26.5	26.5	26.5	26.5		14.0	60.5	60.5	40.5	40.5	40.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	10.2	10.2	10.2	10.2	10.2		21.6	81.4	81.4	52.6	52.6	52.6
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.22	0.81	0.81	0.53	0.53	0.53
v/c Ratio	0.03	0.07	0.37	0.21	0.09		0.64	0.14	0.07	0.03	0.20	0.02
Control Delay	40.7	41.6	11.4	46.2	33.4		41.8	1.7	0.2	14.6	14.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.7	41.6	11.4	46.2	33.4		41.8	1.7	0.2	14.6	14.5	0.0

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: EX-AM
Existing AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	B	B	A
Approach Delay		16.3			41.7			14.9			14.0	
Approach LOS		B			D			B			B	
Queue Length 50th (m)	0.8	2.6	0.0	4.2	1.3		42.7	9.4	0.6	1.3	20.6	0.0
Queue Length 95th (m)	3.8	7.9	9.9	11.0	6.3		59.6	2.2	0.0	4.7	29.4	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	366	488	491	276	350		357	2696	1223	488	1740	828
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.03	0.19	0.08	0.03		0.64	0.14	0.07	0.03	0.20	0.02

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 15.5

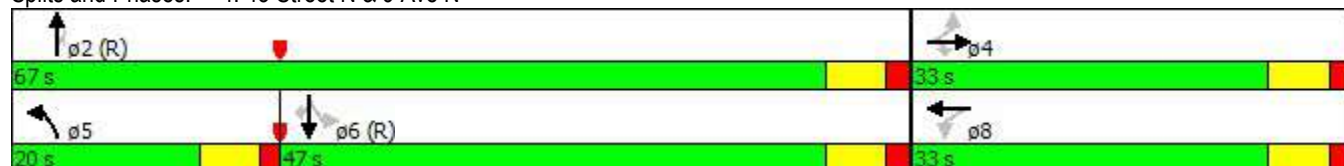
Intersection LOS: B

Intersection Capacity Utilization 49.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: EX-AM
Existing AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	19	142	237	585	396	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		163				30
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	22	163	272	672	455	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	163	272	672	455	30
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	25.0		22.0	75.0	53.0	53.0
Total Split (%)	25.0%		22.0%	75.0%	53.0%	53.0%
Maximum Green (s)	18.5		16.0	68.5	46.5	46.5
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	23.5	90.8	57.4	57.4
Actuated g/C Ratio	0.10	1.00	0.24	0.91	0.57	0.57
v/c Ratio	0.07	0.11	0.68	0.22	0.25	0.04
Control Delay	41.5	0.2	44.3	1.8	6.7	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	0.2	44.3	1.8	6.7	1.6

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: EX-AM
Existing AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	A	A
Approach Delay	5.1			14.1	6.3	
Approach LOS	A			B	A	
Queue Length 50th (m)	2.1	0.0	50.3	0.0	8.3	0.2
Queue Length 95th (m)	5.7	0.0	75.1	21.1	15.8	0.0
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	578	1442	399	3092	1787	812
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.11	0.68	0.22	0.25	0.04

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 10.7

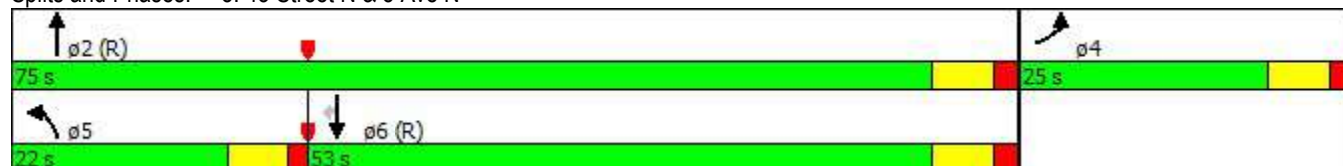
Intersection LOS: B

Intersection Capacity Utilization 49.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: EX-AM
Existing AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	273	585	8	236	569	355	251	534	170	346	356	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3246	0	1656	3312	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.261			0.290			0.478			0.193		
Satd. Flow (perm)	447	3246	0	506	3312	1482	1602	3282	1468	619	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				386			185			183
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	297	636	9	257	618	386	273	580	185	376	387	183
Shared Lane Traffic (%)												
Lane Group Flow (vph)	297	645	0	257	618	386	273	580	185	376	387	183
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	54.3	35.3		50.1	33.2	33.2	38.2	25.0	25.0	44.1	27.9	27.9
Actuated g/C Ratio	0.47	0.31		0.43	0.29	0.29	0.33	0.22	0.22	0.38	0.24	0.24
v/c Ratio	0.76	0.65		0.68	0.65	0.55	0.39	0.82	0.40	0.68	0.51	0.38
Control Delay	33.0	40.1		28.4	41.1	6.8	24.6	53.8	8.2	30.1	40.5	7.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	40.1		28.4	41.1	6.8	24.6	53.8	8.2	30.1	40.5	7.5
LOS	C	D		C	D	A	C	D	A	C	D	A
Approach Delay		37.9			28.0			38.0			30.0	
Approach LOS		D			C			D			C	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: EX-AM
Existing AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (m)	42.8	72.6		35.8	70.1	0.0	21.9	70.2	0.0	31.4	42.4	0.0
Queue Length 95th (m)	#83.6	102.9		60.6	97.5	26.2	31.3	95.4	19.1	43.1	59.8	18.2
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	407	992		423	951	701	984	829	509	775	838	509
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.65		0.61	0.65	0.55	0.28	0.70	0.36	0.49	0.46	0.36

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 115.5

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 33.1

Intersection LOS: C

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3

			
25 s	40 s	30 s	35 s
			
25 s	40 s	30 s	35 s

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: EX-PM

Existing PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	5	220	98	11	12	128	301	18	3	355	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.922				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1717	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.738			0.754			0.950			0.529		
Satd. Flow (perm)	1323	1792	1524	1405	1717	0	1597	3195	1429	939	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			275		15				38			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	16	6	275	122	14	15	160	376	22	4	444	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	6	275	122	29	0	160	376	22	4	444	24
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	33.0	33.0	33.0	33.0	33.0		20.0	67.0	67.0	47.0	47.0	47.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		20.0%	67.0%	67.0%	47.0%	47.0%	47.0%
Maximum Green (s)	26.5	26.5	26.5	26.5	26.5		14.0	60.5	60.5	40.5	40.5	40.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	14.4	14.4	14.4	14.4	14.4		15.5	72.6	72.6	51.1	51.1	51.1
Actuated g/C Ratio	0.14	0.14	0.14	0.14	0.14		0.16	0.73	0.73	0.51	0.51	0.51
v/c Ratio	0.08	0.02	0.61	0.61	0.11		0.65	0.16	0.02	0.01	0.26	0.03
Control Delay	35.8	34.2	10.6	52.2	22.8		48.4	3.5	1.1	16.3	15.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	34.2	10.6	52.2	22.8		48.4	3.5	1.1	16.3	15.7	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: EX-PM
Existing PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	B	D	C		D	A	A	B	B	A
Approach Delay		12.4			46.6			16.3			15.0	
Approach LOS		B			D			B			B	
90th %ile Green (s)	19.9	19.9	19.9	19.9	19.9		20.6	67.1	67.1	40.5	40.5	40.5
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	16.5	16.5	16.5	16.5	16.5		18.1	70.5	70.5	46.4	46.4	46.4
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	14.0	14.0	14.0	14.0	14.0		15.7	73.0	73.0	51.3	51.3	51.3
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	11.5	11.5	11.5	11.5	11.5		13.3	75.5	75.5	56.2	56.2	56.2
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		9.8	77.0	77.0	61.2	61.2	61.2
10th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	14	6	28	89	13		117	98	3	2	199	0
Fuel Used(l)	2	1	18	12	2		18	27	1	0	29	1
CO Emissions (g/hr)	30	12	337	223	39		341	503	28	5	545	19
NOx Emissions (g/hr)	6	2	65	43	8		66	97	5	1	105	4
VOC Emissions (g/hr)	7	3	78	51	9		79	116	6	1	126	4
Dilemma Vehicles (#)	0	0	0	0	0		0	10	0	0	18	0
Queue Length 50th (m)	2.9	1.1	0.0	23.8	2.5		31.3	2.7	0.2	0.4	25.5	0.0
Queue Length 95th (m)	7.5	4.0	13.2	35.1	8.7		43.9	18.7	1.5	2.3	38.6	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	350	474	605	372	466		263	2320	1048	479	1724	822
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.01	0.45	0.33	0.06		0.61	0.16	0.02	0.01	0.26	0.03

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 18.2

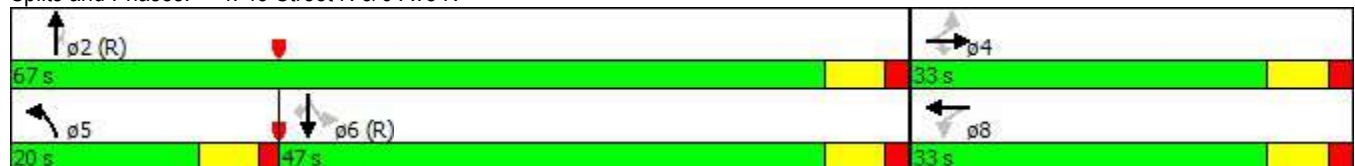
Intersection LOS: B

Intersection Capacity Utilization 53.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: EX-PM
Existing PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	27	243	204	496	798	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		270				40
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	30	270	227	551	887	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	30	270	227	551	887	40
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	25.0		22.0	75.0	53.0	53.0
Total Split (%)	25.0%		22.0%	75.0%	53.0%	53.0%
Maximum Green (s)	18.5		16.0	68.5	46.5	46.5
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	20.3	86.2	57.3	57.3
Actuated g/C Ratio	0.10	1.00	0.20	0.86	0.57	0.57
v/c Ratio	0.09	0.18	0.69	0.20	0.45	0.04
Control Delay	41.7	0.3	48.1	2.4	13.4	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.7	0.3	48.1	2.4	13.4	4.4

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: EX-PM
Existing PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	B	A
Approach Delay	4.4			15.8	13.0	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		24.5	77.0	46.5	46.5
90th %ile Term Code	Min		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		23.0	77.0	48.0	48.0
70th %ile Term Code	Min		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		21.1	77.0	49.9	49.9
50th %ile Term Code	Min		Gap	Coord	Coord	Coord
30th %ile Green (s)	0.0		18.5	93.5	69.0	69.0
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		14.4	93.5	73.1	73.1
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	25	0	184	86	458	5
Fuel Used(l)	3	17	25	31	84	3
CO Emissions (g/hr)	61	314	462	583	1565	57
NOx Emissions (g/hr)	12	61	89	113	302	11
VOC Emissions (g/hr)	14	72	107	134	361	13
Dilemma Vehicles (#)	0	0	0	17	33	0
Queue Length 50th (m)	2.9	0.0	42.8	13.2	68.9	0.2
Queue Length 95th (m)	7.5	0.0	66.1	17.9	53.4	m4.0
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	605	1509	332	2778	1951	890
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.18	0.68	0.20	0.45	0.04

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 12.8

Intersection LOS: B

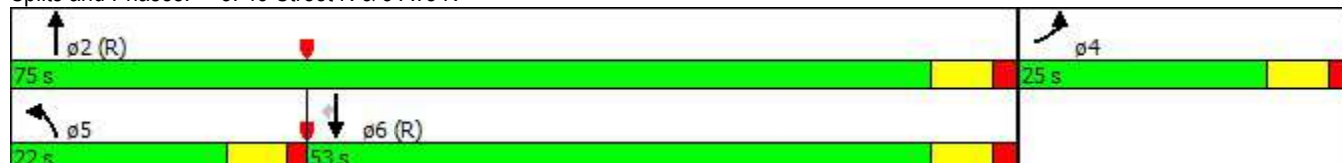
Intersection Capacity Utilization 57.5%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: EX-PM

Existing PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	557	5	256	694	226	344	292	278	245	470	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	3279	0	1687	3374	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.242			0.269			0.228			0.560		
Satd. Flow (perm)	418	3279	0	478	3374	1509	785	3374	1509	1860	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				246			302			176
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	164	605	5	278	754	246	374	317	302	266	511	176
Shared Lane Traffic (%)												
Lane Group Flow (vph)	164	610	0	278	754	246	374	317	302	266	511	176
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	47.2	33.3		53.4	36.4	36.4	43.3	26.5	26.5	35.6	22.6	22.6
Actuated g/C Ratio	0.42	0.30		0.48	0.32	0.32	0.39	0.24	0.24	0.32	0.20	0.20
v/c Ratio	0.52	0.63		0.69	0.69	0.38	0.57	0.40	0.51	0.36	0.78	0.41
Control Delay	23.6	39.1		28.2	38.5	6.0	26.5	37.7	7.3	24.0	51.8	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
Total Delay	23.6	39.1		28.2	38.5	6.0	26.5	37.7	7.3	24.0	51.8	8.7
LOS	C	D		C	D	A	C	D	A	C	D	A
Approach Delay		35.8			30.0			24.2			36.1	
Approach LOS		D			C			C			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: EX-PM
Existing PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	18.8	33.0		19.0	33.2	33.2	20.4	34.5	34.5	14.9	29.0	29.0
90th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Max	Max
70th %ile Green (s)	14.6	33.0		19.0	37.4	37.4	18.0	31.6	31.6	13.1	26.7	26.7
70th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
50th %ile Green (s)	11.9	33.0		17.3	38.4	38.4	16.1	27.2	27.2	11.7	22.8	22.8
50th %ile Term Code	Gap	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
30th %ile Green (s)	10.1	33.0		14.4	37.3	37.3	14.1	23.6	23.6	10.4	19.9	19.9
30th %ile Term Code	Gap	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	10.0	33.0		11.1	34.1	34.1	11.4	17.3	17.3	10.0	15.9	15.9
10th %ile Term Code	Min	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Min	Gap	Gap
Stops (vph)	89	472		151	575	23	221	232	27	166	430	20
Fuel Used(l)	13	64		30	96	16	28	27	13	24	59	11
CO Emissions (g/hr)	245	1186		556	1786	301	516	511	249	438	1094	200
NOx Emissions (g/hr)	47	229		107	345	58	100	99	48	85	211	39
VOC Emissions (g/hr)	57	274		128	412	69	119	118	57	101	252	46
Dilemma Vehicles (#)	0	25		0	30	0	0	13	0	0	20	0
Queue Length 50th (m)	20.2	64.8		36.9	78.2	0.0	30.1	32.7	0.0	20.7	59.8	0.0
Queue Length 95th (m)	39.4	97.3		66.6	#123.5	20.6	42.2	48.5	22.5	30.6	84.1	18.8
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	407	975		441	1096	656	872	926	633	1029	850	510
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.63		0.63	0.69	0.38	0.43	0.34	0.48	0.26	0.60	0.35

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 112

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 31.2

Intersection LOS: C

Intersection Capacity Utilization 73.7%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 125.4

70th %ile Actuated Cycle: 120.7

50th %ile Actuated Cycle: 113.2

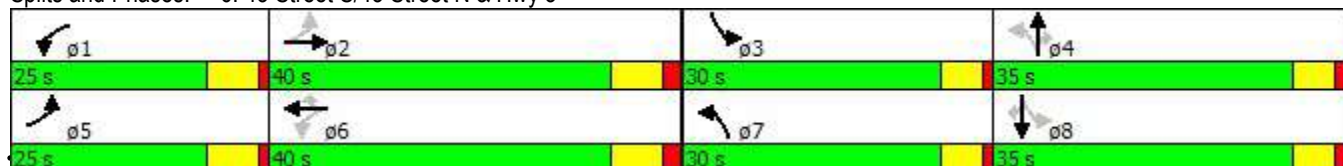
30th %ile Actuated Cycle: 105.4

10th %ile Actuated Cycle: 95.4

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2019-AM

Background 2019 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	13	81	19	7	5	198	381	77	12	320	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.936				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1308	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.748			0.747			0.950			0.488		
Satd. Flow (perm)	1380	1845	1568	1044	1308	0	1656	3312	1482	851	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			104		6				93			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	12	16	98	23	8	6	239	459	93	14	386	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	16	98	23	14	0	239	459	93	14	386	17
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	33.0	33.0	33.0	33.0	33.0		20.0	67.0	67.0	47.0	47.0	47.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		20.0%	67.0%	67.0%	47.0%	47.0%	47.0%
Maximum Green (s)	26.5	26.5	26.5	26.5	26.5		14.0	60.5	60.5	40.5	40.5	40.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	10.2	10.2	10.2	10.2	10.2		23.2	81.4	81.4	50.9	50.9	50.9
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.23	0.81	0.81	0.51	0.51	0.51
v/c Ratio	0.09	0.09	0.39	0.22	0.10		0.62	0.17	0.08	0.03	0.23	0.02
Control Delay	42.0	41.7	12.4	46.4	32.7		39.1	1.4	0.2	15.3	15.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.0	41.7	12.4	46.4	32.7		39.1	1.4	0.2	15.3	15.4	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2019-AM

Background 2019 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	B	B	A
Approach Delay		19.0			41.2			12.7			14.8	
Approach LOS		B			D			B			B	
90th %ile Green (s)	11.1	11.1	11.1	11.1	11.1		25.5	75.9	75.9	44.4	44.4	44.4
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		23.8	77.0	77.0	47.2	47.2	47.2
70th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		22.9	77.0	77.0	48.1	48.1	48.1
50th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		22.2	77.0	77.0	48.8	48.8	48.8
30th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	0.0	0.0	0.0	0.0	0.0		21.6	93.5	93.5	65.9	65.9	65.9
10th %ile Term Code	Skip	Skip	Skip	Skip	Skip		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	11	14	14	19	10		176	40	0	8	177	0
Fuel Used(l)	1	2	7	2	1		27	31	6	1	26	1
CO Emissions (g/hr)	24	31	128	42	24		499	575	110	19	489	14
NOx Emissions (g/hr)	5	6	25	8	5		96	111	21	4	94	3
VOC Emissions (g/hr)	6	7	29	10	5		115	133	25	4	113	3
Dilemma Vehicles (#)	0	0	0	0	0		0	11	0	0	16	0
Queue Length 50th (m)	2.3	3.0	0.0	4.4	1.5		39.0	3.0	0.0	1.5	23.4	0.0
Queue Length 95th (m)	7.2	8.7	11.3	11.3	6.8		62.1	3.6	0.2	4.9	32.6	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	365	488	491	276	351		384	2695	1223	432	1685	805
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03	0.20	0.08	0.04		0.62	0.17	0.08	0.03	0.23	0.02

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 14.7

Intersection LOS: B

Intersection Capacity Utilization 49.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2019-AM
Background 2019 AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	33	150	249	662	426	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		172				34
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	38	172	286	761	490	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	38	172	286	761	490	34
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	25.0		22.0	75.0	53.0	53.0
Total Split (%)	25.0%		22.0%	75.0%	53.0%	53.0%
Maximum Green (s)	18.5		16.0	68.5	46.5	46.5
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	24.8	86.2	52.8	52.8
Actuated g/C Ratio	0.10	1.00	0.25	0.86	0.53	0.53
v/c Ratio	0.12	0.12	0.68	0.26	0.30	0.05
Control Delay	42.1	0.2	43.4	2.6	7.4	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	0.2	43.4	2.6	7.4	1.4

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2019-AM
Background 2019 AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	A	A
Approach Delay	7.8			13.8	7.0	
Approach LOS	A			B	A	
90th %ile Green (s)	10.0		24.5	77.0	46.5	46.5
90th %ile Term Code	Min		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		24.5	77.0	46.5	46.5
70th %ile Term Code	Min		Max	Coord	Coord	Coord
50th %ile Green (s)	10.0		24.5	77.0	46.5	46.5
50th %ile Term Code	Min		Max	Coord	Coord	Coord
30th %ile Green (s)	0.0		25.1	93.5	62.4	62.4
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		25.2	93.5	62.3	62.3
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	30	0	223	121	89	1
Fuel Used(l)	4	10	29	42	38	2
CO Emissions (g/hr)	75	193	547	784	706	44
NOx Emissions (g/hr)	14	37	106	151	136	8
VOC Emissions (g/hr)	17	45	126	181	163	10
Dilemma Vehicles (#)	0	0	0	22	20	0
Queue Length 50th (m)	3.7	0.0	53.1	19.5	11.0	0.2
Queue Length 95th (m)	8.5	0.0	79.2	24.3	16.6	0.0
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	578	1442	421	2936	1644	751
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.12	0.68	0.26	0.30	0.05

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 11.1

Intersection LOS: B

Intersection Capacity Utilization 50.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2019-AM

Background 2019 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	306	615	9	248	598	381	264	581	179	366	378	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3246	0	1656	3312	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.229			0.256			0.459			0.163		
Satd. Flow (perm)	392	3246	0	446	3312	1482	1538	3282	1468	522	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				414			195			197
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	333	668	10	270	650	414	287	632	195	398	411	197
Shared Lane Traffic (%)												
Lane Group Flow (vph)	333	678	0	270	650	414	287	632	195	398	411	197
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	55.0	35.2		51.0	33.1	33.1	40.4	26.8	26.8	47.3	30.3	30.3
Actuated g/C Ratio	0.46	0.30		0.43	0.28	0.28	0.34	0.23	0.23	0.40	0.25	0.25
v/c Ratio	0.88	0.71		0.74	0.71	0.58	0.41	0.85	0.41	0.73	0.52	0.39
Control Delay	48.4	43.5		33.2	44.3	7.1	24.7	56.7	8.0	32.3	40.7	7.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	43.5		33.2	44.3	7.1	24.7	56.7	8.0	32.3	40.7	7.2
LOS	D	D		C	D	A	C	E	A	C	D	A
Approach Delay		45.1			30.5			40.0			30.8	
Approach LOS		D			C			D			C	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2019-AM

Background 2019 AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	15.7	29.0	29.0	20.3	33.6	33.6
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
70th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	13.7	29.0	29.0	17.7	33.0	33.0
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
50th %ile Green (s)	19.0	33.1		18.9	33.0	33.0	12.4	29.0	29.0	16.0	32.6	32.6
50th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
30th %ile Green (s)	19.0	35.9		16.1	33.0	33.0	11.3	26.5	26.5	14.3	29.5	29.5
30th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Gap	Gap	Gap	Gap	Hold	Hold
10th %ile Green (s)	19.0	39.9		12.1	33.0	33.0	10.0	21.1	21.1	12.1	23.2	23.2
10th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Min	Gap	Gap	Gap	Hold	Hold
Stops (vph)	181	544		156	526	37	176	532	21	239	312	20
Fuel Used(l)	33	74		30	87	28	21	65	9	37	43	12
CO Emissions (g/hr)	606	1379		566	1621	512	393	1217	165	692	799	218
NOx Emissions (g/hr)	117	266		109	313	99	76	235	32	134	154	42
VOC Emissions (g/hr)	140	318		131	374	118	91	281	38	160	184	50
Dilemma Vehicles (#)	0	26		0	25	0	0	24	0	0	16	0
Queue Length 50th (m)	52.1	81.9		40.2	77.5	0.0	23.1	78.7	0.0	33.6	45.5	0.0
Queue Length 95th (m)	#116.0	110.1		#64.8	104.3	27.4	32.7	#107.8	19.5	45.7	64.0	18.8
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	378	960		392	920	710	976	801	506	745	831	516
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.71		0.69	0.71	0.58	0.29	0.79	0.39	0.53	0.49	0.38

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 119

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 36.2

Intersection LOS: D

Intersection Capacity Utilization 80.1%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 125.3

70th %ile Actuated Cycle: 122.7

50th %ile Actuated Cycle: 121

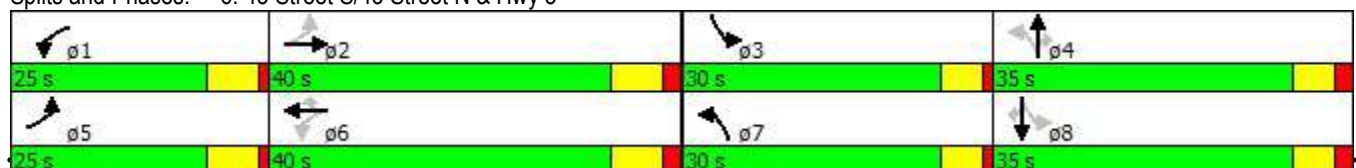
30th %ile Actuated Cycle: 116.8

10th %ile Actuated Cycle: 109.2

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2019-PM

Background 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	6	231	103	12	13	135	344	19	4	472	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.923				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1719	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.737			0.752			0.950			0.502		
Satd. Flow (perm)	1321	1792	1524	1401	1719	0	1597	3195	1429	891	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			289		16				38			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	20	8	289	129	15	16	169	430	24	5	590	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	8	289	129	31	0	169	430	24	5	590	36
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5		12.0	22.5	22.5	22.5	22.5	22.5
Total Split (s)	33.0	33.0	33.0	33.0	33.0		20.0	67.0	67.0	47.0	47.0	47.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		20.0%	67.0%	67.0%	47.0%	47.0%	47.0%
Maximum Green (s)	26.5	26.5	26.5	26.5	26.5		14.0	60.5	60.5	40.5	40.5	40.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	14.8	14.8	14.8	14.8	14.8		15.9	72.2	72.2	50.3	50.3	50.3
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15		0.16	0.72	0.72	0.50	0.50	0.50
v/c Ratio	0.10	0.03	0.61	0.62	0.12		0.67	0.19	0.02	0.01	0.35	0.04
Control Delay	35.7	33.7	10.4	52.4	22.4		49.1	4.0	1.2	16.5	17.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	33.7	10.4	52.4	22.4		49.1	4.0	1.2	16.5	17.2	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2019-PM

Background 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	B	D	C		D	A	A	B	B	A
Approach Delay		12.5			46.6			16.1			16.2	
Approach LOS		B			D			B			B	
90th %ile Green (s)	20.6	20.6	20.6	20.6	20.6		19.9	66.4	66.4	40.5	40.5	40.5
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	17.1	17.1	17.1	17.1	17.1		18.8	69.9	69.9	45.1	45.1	45.1
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	14.5	14.5	14.5	14.5	14.5		16.4	72.5	72.5	50.1	50.1	50.1
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	12.0	12.0	12.0	12.0	12.0		14.0	75.0	75.0	55.0	55.0	55.0
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		10.4	77.0	77.0	60.6	60.6	60.6
10th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	15	7	29	94	14		125	118	3	3	281	0
Fuel Used(l)	2	1	19	13	2		19	31	2	0	40	2
CO Emissions (g/hr)	36	14	353	235	43		362	581	29	7	745	28
NOx Emissions (g/hr)	7	3	68	45	8		70	112	6	1	144	5
VOC Emissions (g/hr)	8	3	81	54	10		84	134	7	2	172	7
Dilemma Vehicles (#)	0	0	0	0	0		0	12	0	0	24	0
Queue Length 50th (m)	3.6	1.4	0.0	25.1	2.7		33.0	3.5	0.2	0.5	36.6	0.0
Queue Length 95th (m)	8.7	4.8	13.2	36.5	8.9		46.5	22.3	1.8	2.7	51.7	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	350	474	616	371	467		265	2305	1041	447	1695	810
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.02	0.47	0.35	0.07		0.64	0.19	0.02	0.01	0.35	0.04

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 18.3

Intersection LOS: B

Intersection Capacity Utilization 53.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2019-PM
Background 2019 PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	35	256	215	542	916	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		284				66
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	39	284	239	602	1018	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	284	239	602	1018	66
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	25.0		22.0	75.0	53.0	53.0
Total Split (%)	25.0%		22.0%	75.0%	53.0%	53.0%
Maximum Green (s)	18.5		16.0	68.5	46.5	46.5
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	21.5	86.2	56.1	56.1
Actuated g/C Ratio	0.10	1.00	0.22	0.86	0.56	0.56
v/c Ratio	0.12	0.19	0.69	0.22	0.53	0.07
Control Delay	42.0	0.3	46.7	2.5	13.2	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.0	0.3	46.7	2.5	13.2	2.8

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2019-PM
Background 2019 PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	B	A
Approach Delay	5.3			15.1	12.6	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		24.5	77.0	46.5	46.5
90th %ile Term Code	Min		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		24.3	77.0	46.7	46.7
70th %ile Term Code	Min		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		22.4	77.0	48.6	48.6
50th %ile Term Code	Min		Gap	Coord	Coord	Coord
30th %ile Green (s)	0.0		20.3	93.5	67.2	67.2
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		16.2	93.5	71.3	71.3
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	32	0	193	96	462	6
Fuel Used(l)	4	18	26	34	94	5
CO Emissions (g/hr)	79	330	482	639	1756	90
NOx Emissions (g/hr)	15	64	93	123	339	17
VOC Emissions (g/hr)	18	76	111	147	405	21
Dilemma Vehicles (#)	0	0	0	19	39	0
Queue Length 50th (m)	3.8	0.0	44.7	14.7	83.8	0.3
Queue Length 95th (m)	9.0	0.0	69.8	19.7	53.9	3.6
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	605	1509	347	2778	1909	883
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.19	0.69	0.22	0.53	0.07

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 12.5

Intersection LOS: B

Intersection Capacity Utilization 61.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2019-PM
Background 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	167	585	6	269	729	242	362	316	292	272	528	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	3275	0	1687	3374	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.206			0.237			0.190			0.546		
Satd. Flow (perm)	356	3275	0	421	3374	1509	655	3374	1509	1813	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				263			317			218
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	182	636	7	292	792	263	393	343	317	296	574	218
Shared Lane Traffic (%)												
Lane Group Flow (vph)	182	643	0	292	792	263	393	343	317	296	574	218
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	48.3	33.3		54.5	36.4	36.4	46.3	28.7	28.7	38.6	24.9	24.9
Actuated g/C Ratio	0.42	0.29		0.47	0.31	0.31	0.40	0.25	0.25	0.33	0.21	0.21
v/c Ratio	0.60	0.68		0.76	0.75	0.40	0.62	0.41	0.52	0.40	0.82	0.45
Control Delay	27.4	42.6		34.0	42.7	6.2	27.4	38.3	7.1	24.2	54.7	8.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	42.6		34.0	42.7	6.2	27.4	38.3	7.1	24.2	54.7	8.3
LOS	C	D		C	D	A	C	D	A	C	D	A
Approach Delay		39.2			33.7			24.9			37.1	
Approach LOS		D			C			C			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2019-PM

Background 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	20.8	33.8	33.8	16.0	29.0	29.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Hold	Hold	Gap	Max	Max
70th %ile Green (s)	16.8	33.0		19.0	35.2	35.2	18.6	33.6	33.6	14.0	29.0	29.0
70th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Max	Max
50th %ile Green (s)	14.0	33.0		19.0	38.0	38.0	17.1	31.0	31.0	12.7	26.6	26.6
50th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
30th %ile Green (s)	11.1	33.0		16.4	38.3	38.3	15.0	26.4	26.4	11.2	22.6	22.6
30th %ile Term Code	Gap	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	10.0	33.0		12.7	35.7	35.7	12.0	20.0	20.0	10.0	18.0	18.0
10th %ile Term Code	Min	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Min	Gap	Gap
Stops (vph)	103	513		158	617	25	230	252	28	182	488	23
Fuel Used(l)	15	70		33	104	17	29	30	14	26	67	13
CO Emissions (g/hr)	285	1297		605	1933	323	546	556	261	486	1254	246
NOx Emissions (g/hr)	55	250		117	373	62	105	107	50	94	242	47
VOC Emissions (g/hr)	66	299		140	446	75	126	128	60	112	289	57
Dilemma Vehicles (#)	0	25		0	30	0	0	13	0	0	22	0
Queue Length 50th (m)	24.9	75.4		43.0	91.6	0.0	32.7	36.9	0.0	23.9	71.0	0.0
Queue Length 95th (m)	43.9	103.7		#83.7	#140.6	21.3	44.3	52.9	23.5	33.7	95.8	20.8
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	375	939		409	1058	653	836	912	639	1031	819	529
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.68		0.71	0.75	0.40	0.47	0.38	0.50	0.29	0.70	0.41

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 116

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 33.5

Intersection LOS: C

Intersection Capacity Utilization 76.5%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 125.8

70th %ile Actuated Cycle: 123.6

50th %ile Actuated Cycle: 119.7

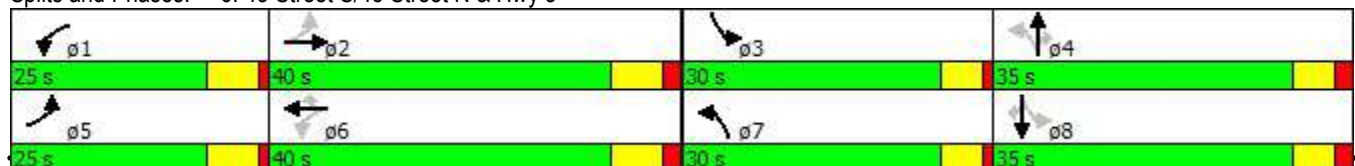
30th %ile Actuated Cycle: 111

10th %ile Actuated Cycle: 99.7

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Southland Industrial Subdivision TIA
EA

Synchro 8 Light Report
3/30/2018

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2022-AM
Background 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	14	87	21	7	5	212	404	83	13	342	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.936				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1308	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.748			0.746			0.950			0.475		
Satd. Flow (perm)	1380	1845	1568	1042	1308	0	1656	3312	1482	828	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			105		6				100			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	12	17	105	25	8	6	255	487	100	16	412	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	17	105	25	14	0	255	487	100	16	412	18
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	33.0	33.0	33.0	33.0	33.0		32.0	67.0	67.0	35.0	35.0	35.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		32.0%	67.0%	67.0%	35.0%	35.0%	35.0%
Maximum Green (s)	26.5	26.5	26.5	26.5	26.5		26.0	60.5	60.5	28.5	28.5	28.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	10.3	10.3	10.3	10.3	10.3		20.5	81.3	81.3	53.5	53.5	53.5
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10		0.20	0.81	0.81	0.54	0.54	0.54
v/c Ratio	0.08	0.09	0.41	0.23	0.10		0.75	0.18	0.08	0.04	0.23	0.02
Control Delay	41.9	41.6	13.6	46.9	32.5		47.6	1.4	0.3	15.8	14.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.9	41.6	13.6	46.9	32.5		47.6	1.4	0.3	15.8	14.9	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2022-AM
Background 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	B	B	A
Approach Delay		19.7			41.7			15.3			14.3	
Approach LOS		B			D			B			B	
90th %ile Green (s)	11.4	11.4	11.4	11.4	11.4		27.5	75.6	75.6	42.1	42.1	42.1
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		23.5	77.0	77.0	47.5	47.5	47.5
70th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		20.6	77.0	77.0	50.4	50.4	50.4
50th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		17.6	77.0	77.0	53.4	53.4	53.4
30th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	0.0	0.0	0.0	0.0	0.0		13.3	93.5	93.5	74.2	74.2	74.2
10th %ile Term Code	Skip	Skip	Skip	Skip	Skip		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	11	15	17	20	10		194	56	1	8	183	0
Fuel Used(l)	1	2	7	3	1		30	33	6	1	28	1
CO Emissions (g/hr)	24	33	139	47	24		563	618	119	20	516	15
NOx Emissions (g/hr)	5	6	27	9	5		109	119	23	4	100	3
VOC Emissions (g/hr)	5	8	32	11	5		130	142	27	5	119	3
Dilemma Vehicles (#)	0	0	0	0	0		0	8	0	0	17	0
Queue Length 50th (m)	2.3	3.2	0.0	4.8	1.5		49.7	2.7	0.1	1.6	24.0	0.0
Queue Length 95th (m)	7.2	9.0	12.7	11.9	6.8		64.7	3.2	0.0	5.6	36.3	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	365	488	492	276	351		435	2693	1224	443	1772	841
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03	0.21	0.09	0.04		0.59	0.18	0.08	0.04	0.23	0.02

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 16.1

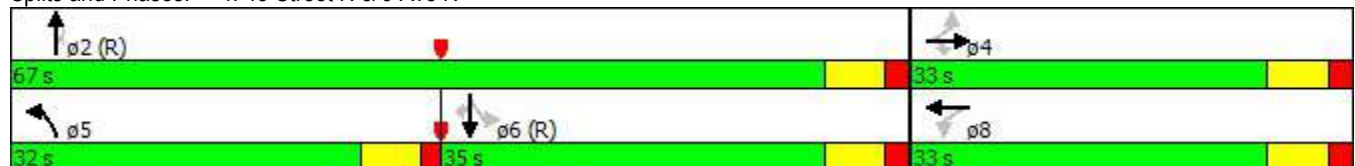
Intersection LOS: B

Intersection Capacity Utilization 49.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2022-AM

Background 2022 AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	35	160	267	706	456	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		184				37
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	40	184	307	811	524	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	40	184	307	811	524	37
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	18.0		42.0	82.0	40.0	40.0
Total Split (%)	18.0%		42.0%	82.0%	40.0%	40.0%
Maximum Green (s)	11.5		36.0	75.5	33.5	33.5
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	23.5	86.2	54.1	54.1
Actuated g/C Ratio	0.10	1.00	0.24	0.86	0.54	0.54
v/c Ratio	0.13	0.13	0.77	0.28	0.31	0.05
Control Delay	42.2	0.2	48.1	2.7	8.7	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	0.2	48.1	2.7	8.7	1.5

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2022-AM
Background 2022 AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	A	A
Approach Delay	7.7			15.2	8.2	
Approach LOS	A			B	A	
90th %ile Green (s)	10.0		31.3	77.0	39.7	39.7
90th %ile Term Code	Min		Gap	Coord	Coord	Coord
70th %ile Green (s)	10.0		26.8	77.0	44.2	44.2
70th %ile Term Code	Min		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		23.6	77.0	47.4	47.4
50th %ile Term Code	Min		Gap	Coord	Coord	Coord
30th %ile Green (s)	0.0		20.3	93.5	67.2	67.2
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		15.5	93.5	72.0	72.0
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	33	0	241	131	112	1
Fuel Used(l)	4	11	33	45	42	3
CO Emissions (g/hr)	80	206	605	838	774	47
NOx Emissions (g/hr)	15	40	117	162	149	9
VOC Emissions (g/hr)	18	48	140	193	178	11
Dilemma Vehicles (#)	0	0	0	24	21	0
Queue Length 50th (m)	3.9	0.0	58.6	21.2	12.3	0.2
Queue Length 95th (m)	8.8	0.0	77.2	26.1	19.3	0.0
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	359	1442	613	2936	1683	769
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.13	0.50	0.28	0.31	0.05

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 12.2

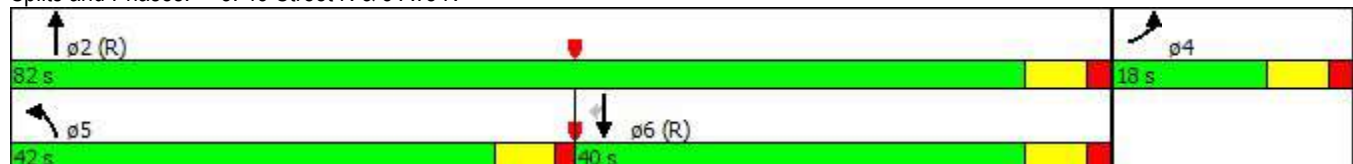
Intersection LOS: B

Intersection Capacity Utilization 51.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2022-AM
Background 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	327	659	9	266	641	408	283	621	192	392	405	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3246	0	1656	3312	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.200			0.193			0.446			0.135		
Satd. Flow (perm)	342	3246	0	336	3312	1482	1495	3282	1468	433	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				408			209			210
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	355	716	10	289	697	443	308	675	209	426	440	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	355	726	0	289	697	443	308	675	209	426	440	210
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	53.8	33.7		52.4	33.1	33.1	42.0	28.0	28.0	50.3	32.3	32.3
Actuated g/C Ratio	0.44	0.28		0.43	0.27	0.27	0.35	0.23	0.23	0.41	0.27	0.27
v/c Ratio	1.01	0.81		0.84	0.77	0.63	0.44	0.89	0.42	0.77	0.53	0.40
Control Delay	78.8	49.7		46.4	48.3	9.9	24.8	61.2	8.0	36.0	40.8	7.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.8	49.7		46.4	48.3	9.9	24.8	61.2	8.0	36.0	40.8	7.0
LOS	E	D		D	D	A	C	E	A	D	D	A
Approach Delay		59.3			36.0			42.5			32.3	
Approach LOS		E			D			D			C	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2022-AM

Background 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	16.5	29.0	29.0	23.3	35.8	35.8
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
70th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	14.4	29.0	29.0	19.5	34.1	34.1
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
50th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	13.0	29.0	29.0	17.0	33.0	33.0
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
30th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	11.7	29.0	29.0	15.1	32.4	32.4
30th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
10th %ile Green (s)	19.0	36.1		15.9	33.0	33.0	10.0	23.9	23.9	12.7	26.6	26.6
10th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Min	Gap	Gap	Gap	Hold	Hold
Stops (vph)	198	593		168	573	58	189	563	22	264	334	20
Fuel Used(l)	43	83		35	96	31	23	72	9	41	46	12
CO Emissions (g/hr)	795	1547		658	1784	583	421	1337	176	767	857	231
NOx Emissions (g/hr)	153	299		127	344	113	81	258	34	148	165	45
VOC Emissions (g/hr)	183	357		152	411	135	97	308	41	177	198	53
Dilemma Vehicles (#)	0	27		0	26	0	0	25	0	0	16	0
Queue Length 50th (m)	~67.2	90.7		44.7	85.7	6.6	25.0	86.4	0.0	36.5	49.6	0.0
Queue Length 95th (m)	#141.9	#130.1		#100.0	116.4	40.9	34.9	#128.0	20.8	54.1	69.1	19.0
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	352	901		353	901	700	972	784	510	721	847	532
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.01	0.81		0.82	0.77	0.63	0.32	0.86	0.41	0.59	0.52	0.39

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 121.5

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 42.0

Intersection LOS: D

Intersection Capacity Utilization 84.2%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 128.3

70th %ile Actuated Cycle: 124.5

50th %ile Actuated Cycle: 122

30th %ile Actuated Cycle: 120.1

10th %ile Actuated Cycle: 112.6

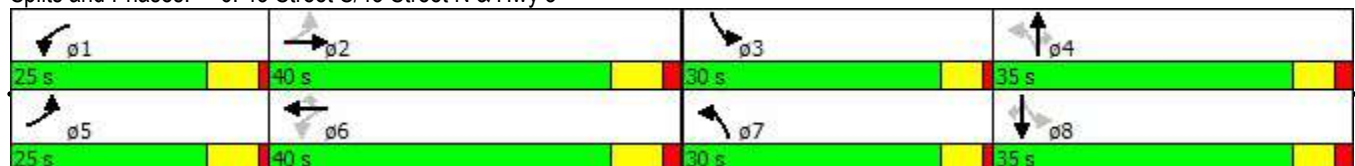
~ Volume exceeds capacity, queue is theoretically infinite.

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: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2022-PM
Background 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	6	248	111	13	14	144	366	21	4	499	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.921				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1716	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.735			0.752			0.950			0.488		
Satd. Flow (perm)	1317	1792	1524	1401	1716	0	1597	3195	1429	867	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			310		18				38			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	21	8	310	139	16	18	180	458	26	5	624	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	8	310	139	34	0	180	458	26	5	624	39
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5		12.0	22.5	22.5	22.5	22.5	22.5
Total Split (s)	31.0	31.0	31.0	31.0	31.0		29.0	69.0	69.0	40.0	40.0	40.0
Total Split (%)	31.0%	31.0%	31.0%	31.0%	31.0%		29.0%	69.0%	69.0%	40.0%	40.0%	40.0%
Maximum Green (s)	24.5	24.5	24.5	24.5	24.5		23.0	62.5	62.5	33.5	33.5	33.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	15.4	15.4	15.4	15.4	15.4		16.5	71.6	71.6	49.1	49.1	49.1
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15		0.16	0.72	0.72	0.49	0.49	0.49
v/c Ratio	0.10	0.03	0.62	0.64	0.12		0.69	0.20	0.03	0.01	0.38	0.05
Control Delay	35.1	33.0	10.1	52.8	21.3		48.9	4.0	0.5	18.0	18.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.1	33.0	10.1	52.8	21.3		48.9	4.0	0.5	18.0	18.5	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2022-PM

Background 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	C	B	D	C		D	A	A	B	B	A
Approach Delay		12.2			46.6			16.0			17.4	
Approach LOS		B			D			B			B	
90th %ile Green (s)	21.5	21.5	21.5	21.5	21.5		22.7	65.5	65.5	36.8	36.8	36.8
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	17.8	17.8	17.8	17.8	17.8		19.0	69.2	69.2	44.2	44.2	44.2
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	15.2	15.2	15.2	15.2	15.2		16.5	71.8	71.8	49.3	49.3	49.3
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	12.6	12.6	12.6	12.6	12.6		13.9	74.4	74.4	54.5	54.5	54.5
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		10.2	77.0	77.0	60.8	60.8	60.8
10th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	15	7	30	102	15		131	113	1	3	310	0
Fuel Used(l)	2	1	20	14	2		21	33	2	0	43	2
CO Emissions (g/hr)	37	14	377	254	46		385	611	31	7	804	30
NOx Emissions (g/hr)	7	3	73	49	9		74	118	6	1	155	6
VOC Emissions (g/hr)	9	3	87	59	11		89	141	7	2	186	7
Dilemma Vehicles (#)	0	0	0	0	0		0	17	0	0	25	0
Queue Length 50th (m)	3.7	1.4	0.0	27.0	2.8		25.7	6.4	0.2	0.5	40.1	0.0
Queue Length 95th (m)	8.9	4.8	13.1	38.5	9.3		47.6	14.4	0.3	2.9	58.8	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	322	439	607	343	434		367	2287	1033	426	1657	794
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.02	0.51	0.41	0.08		0.49	0.20	0.03	0.01	0.38	0.05

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 18.7

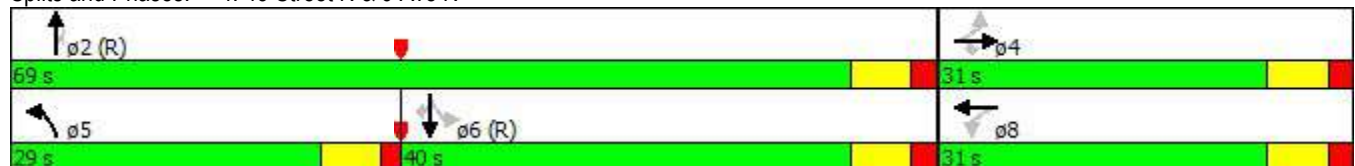
Intersection LOS: B

Intersection Capacity Utilization 54.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2022-PM

Background 2022 PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	37	274	230	579	976	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		304				69
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	41	304	256	643	1084	69
Shared Lane Traffic (%)						
Lane Group Flow (vph)	41	304	256	643	1084	69
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		32.0	83.5	51.5	51.5
Total Split (%)	16.5%		32.0%	83.5%	51.5%	51.5%
Maximum Green (s)	10.0		26.0	77.0	45.0	45.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	20.5	86.2	57.1	57.1
Actuated g/C Ratio	0.10	1.00	0.20	0.86	0.57	0.57
v/c Ratio	0.13	0.20	0.78	0.23	0.56	0.08
Control Delay	42.1	0.3	53.1	2.5	13.8	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	0.3	53.1	2.5	13.8	2.9

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2022-PM
Background 2022 PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	B	A
Approach Delay	5.3			17.0	13.1	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		26.0	77.0	45.0	45.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
70th %ile Term Code	Max		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		21.0	77.0	50.0	50.0
50th %ile Term Code	Max		Gap	Coord	Coord	Coord
30th %ile Green (s)	0.0		18.0	93.5	69.5	69.5
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		13.6	93.5	73.9	73.9
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	34	0	210	103	610	6
Fuel Used(l)	5	19	29	37	105	5
CO Emissions (g/hr)	84	354	539	683	1950	95
NOx Emissions (g/hr)	16	68	104	132	376	18
VOC Emissions (g/hr)	19	82	124	158	450	22
Dilemma Vehicles (#)	0	0	0	20	22	0
Queue Length 50th (m)	4.0	0.0	49.4	16.0	90.0	0.3
Queue Length 95th (m)	9.3	0.0	73.3	21.3	53.8	m3.7
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	327	1509	419	2778	1944	899
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.20	0.61	0.23	0.56	0.08

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 13.4

Intersection LOS: B

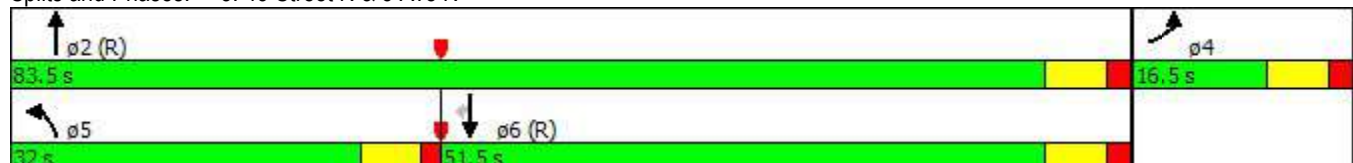
Intersection Capacity Utilization 63.9%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2022-PM
Background 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	627	6	288	781	259	387	338	313	290	563	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	3275	0	1687	3374	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.169			0.192			0.165			0.527		
Satd. Flow (perm)	292	3275	0	341	3374	1509	568	3374	1509	1750	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				282			340			232
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	193	682	7	313	849	282	421	367	340	315	612	232
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	689	0	313	849	282	421	367	340	315	612	232
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	48.7	33.1		56.3	37.2	37.2	49.4	30.9	30.9	40.7	26.5	26.5
Actuated g/C Ratio	0.41	0.28		0.47	0.31	0.31	0.41	0.26	0.26	0.34	0.22	0.22
v/c Ratio	0.68	0.76		0.85	0.81	0.43	0.67	0.42	0.53	0.42	0.85	0.46
Control Delay	34.1	47.1		46.0	46.9	6.3	28.8	38.9	7.0	24.6	57.5	8.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.1	47.1		46.0	46.9	6.3	28.8	38.9	7.0	24.6	57.5	8.2
LOS	C	D		D	D	A	C	D	A	C	E	A
Approach Delay		44.3			38.8			25.5			38.7	
Approach LOS		D			D			C			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2022-PM

Background 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	21.7	34.1	34.1	16.6	29.0	29.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Hold	Hold	Gap	Max	Max
70th %ile Green (s)	17.8	33.0		19.0	34.2	34.2	19.5	33.9	33.9	14.6	29.0	29.0
70th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Max	Max
50th %ile Green (s)	14.9	33.0		19.0	37.1	37.1	17.8	33.6	33.6	13.2	29.0	29.0
50th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Max	Max
30th %ile Green (s)	11.9	33.0		19.0	40.1	40.1	16.1	29.9	29.9	11.9	25.7	25.7
30th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	10.0	33.0		17.1	40.1	40.1	13.2	23.6	23.6	10.0	20.4	20.4
10th %ile Term Code	Min	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Min	Gap	Gap
Stops (vph)	113	564		170	665	26	247	271	29	194	517	24
Fuel Used(l)	17	78		38	114	19	32	32	15	28	73	14
CO Emissions (g/hr)	325	1446		699	2122	346	592	599	279	519	1357	260
NOx Emissions (g/hr)	63	279		135	410	67	114	116	54	100	262	50
VOC Emissions (g/hr)	75	334		161	489	80	136	138	64	120	313	60
Dilemma Vehicles (#)	0	26		0	31	0	0	14	0	0	23	0
Queue Length 50th (m)	28.1	85.3		49.3	105.7	0.0	35.4	40.0	0.0	25.6	77.4	0.0
Queue Length 95th (m)	50.7	113.4		#110.6	#159.2	22.2	47.5	57.0	24.4	35.9	#104.2	21.6
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	343	905		374	1045	662	802	903	652	1020	789	528
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.76		0.84	0.81	0.43	0.52	0.41	0.52	0.31	0.78	0.44

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 119.9

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 36.6

Intersection LOS: D

Intersection Capacity Utilization 80.1%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 126.7

70th %ile Actuated Cycle: 124.5

50th %ile Actuated Cycle: 122.8

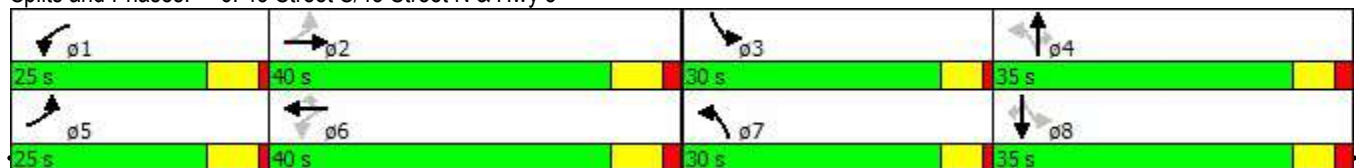
30th %ile Actuated Cycle: 117.8

10th %ile Actuated Cycle: 107.7

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-AM

Background 2037 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	18	116	27	9	6	282	518	110	17	452	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.942				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1316	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.746			0.743			0.950			0.415		
Satd. Flow (perm)	1376	1845	1568	1038	1316	0	1656	3312	1482	723	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			140		7				133			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	13	22	140	33	11	7	340	624	133	20	545	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	22	140	33	18	0	340	624	133	20	545	23
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		35.0	67.5	67.5	32.5	32.5	32.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		35.0%	67.5%	67.5%	32.5%	32.5%	32.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		29.0	61.0	61.0	26.0	26.0	26.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	10.6	10.6	10.6	10.6	10.6		25.4	76.4	76.4	45.0	45.0	45.0
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11		0.25	0.76	0.76	0.45	0.45	0.45
v/c Ratio	0.09	0.11	0.48	0.30	0.12		0.81	0.25	0.11	0.06	0.37	0.03
Control Delay	41.3	41.4	13.1	48.6	31.9		46.1	2.2	0.3	19.7	20.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	41.4	13.1	48.6	31.9		46.1	2.2	0.3	19.7	20.3	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-AM
Background 2037 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	B	C	A
Approach Delay		18.8			42.7			15.6			19.5	
Approach LOS		B			D			B			B	
90th %ile Green (s)	12.7	12.7	12.7	12.7	12.7		32.9	74.3	74.3	35.4	35.4	35.4
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	10.2	10.2	10.2	10.2	10.2		28.8	76.8	76.8	42.0	42.0	42.0
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		25.6	77.0	77.0	45.4	45.4	45.4
50th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		22.3	77.0	77.0	48.7	48.7	48.7
30th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		17.3	77.0	77.0	53.7	53.7	53.7
10th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	11	18	20	26	12		257	76	0	12	294	0
Fuel Used(l)	1	2	10	3	2		40	43	8	2	40	1
CO Emissions (g/hr)	26	42	184	61	29		742	800	157	29	749	19
NOx Emissions (g/hr)	5	8	35	12	6		143	154	30	6	144	4
VOC Emissions (g/hr)	6	10	42	14	7		171	185	36	7	173	4
Dilemma Vehicles (#)	0	0	0	0	0		0	25	0	0	23	0
Queue Length 50th (m)	2.5	4.2	0.0	6.4	2.1		59.9	5.2	0.0	2.2	37.0	0.0
Queue Length 95th (m)	7.6	10.4	13.9	14.6	8.0		80.7	6.0	0.0	7.5	54.7	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	357	479	511	269	347		493	2531	1163	325	1491	724
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.05	0.27	0.12	0.05		0.69	0.25	0.11	0.06	0.37	0.03

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 17.8

Intersection LOS: B

Intersection Capacity Utilization 52.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-AM

Background 2037 AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	42	213	356	925	604	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		245				47
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	48	245	409	1063	694	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	48	245	409	1063	694	47
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		43.0	83.5	40.5	40.5
Total Split (%)	16.5%		43.0%	83.5%	40.5%	40.5%
Maximum Green (s)	10.0		37.0	77.0	34.0	34.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	29.2	86.2	48.4	48.4
Actuated g/C Ratio	0.10	1.00	0.29	0.86	0.48	0.48
v/c Ratio	0.15	0.17	0.82	0.36	0.46	0.07
Control Delay	42.5	0.3	46.6	3.1	11.2	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.5	0.3	46.6	3.1	11.2	1.1

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-AM
Background 2037 AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	B	A
Approach Delay	7.2			15.1	10.5	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		37.0	77.0	34.0	34.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		33.1	77.0	37.9	37.9
70th %ile Term Code	Max		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		29.6	77.0	41.4	41.4
50th %ile Term Code	Max		Gap	Coord	Coord	Coord
30th %ile Green (s)	0.0		25.9	93.5	61.6	61.6
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		20.4	93.5	67.1	67.1
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	38	0	322	191	345	2
Fuel Used(l)	5	15	43	60	63	3
CO Emissions (g/hr)	95	275	800	1114	1164	60
NOx Emissions (g/hr)	18	53	154	215	225	12
VOC Emissions (g/hr)	22	63	184	257	269	14
Dilemma Vehicles (#)	0	0	0	31	28	0
Queue Length 50th (m)	4.6	0.0	77.0	30.7	15.5	0.2
Queue Length 95th (m)	10.0	0.0	97.5	37.1	23.0	0.4
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	312	1442	630	2936	1506	697
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.17	0.65	0.36	0.46	0.07

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 12.8

Intersection LOS: B

Intersection Capacity Utilization 60.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-AM
Background 2037 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	429	878	12	354	854	541	377	821	255	521	538	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3246	0	1656	3312	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.121			0.121			0.329			0.118		
Satd. Flow (perm)	207	3246	0	211	3312	1482	1102	3282	1468	378	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				384			232			278
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	466	954	13	385	928	588	410	892	277	566	585	278
Shared Lane Traffic (%)												
Lane Group Flow (vph)	466	967	0	385	928	588	410	892	277	566	585	278
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	53.0	33.0		53.0	33.0	33.0	46.1	29.0	29.0	56.9	35.1	35.1
Actuated g/C Ratio	0.42	0.26		0.42	0.26	0.26	0.36	0.23	0.23	0.45	0.28	0.28
v/c Ratio	1.56	1.15		1.27	1.08	0.88	0.62	1.19	0.54	0.89	0.68	0.47
Control Delay	298.6	122.6		177.1	99.2	31.5	27.3	142.1	13.2	51.0	46.0	7.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	298.6	122.6		177.1	99.2	31.5	27.3	142.1	13.2	51.0	46.0	7.1
LOS	F	F		F	F	C	C	F	B	D	D	A
Approach Delay		179.9			94.0			89.7			40.4	
Approach LOS		F			F			F			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-AM
Background 2037 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	20.7	29.0	29.0	25.0	33.3	33.3
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Max	Hold	Hold
70th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	17.5	29.0	29.0	25.0	36.5	36.5
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Max	Hold	Hold
50th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	16.0	29.0	29.0	23.8	36.8	36.8
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
30th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	14.4	29.0	29.0	20.6	35.2	35.2
30th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
10th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	12.1	29.0	29.0	16.7	33.6	33.6
10th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
Stops (vph)	258	746		223	734	201	257	676	50	393	469	26
Fuel Used(l)	129	158		83	160	58	31	144	14	62	64	17
CO Emissions (g/hr)	2391	2944		1538	2967	1073	578	2678	265	1156	1194	307
NOx Emissions (g/hr)	462	568		297	573	207	112	517	51	223	230	59
VOC Emissions (g/hr)	552	679		355	684	248	133	618	61	267	275	71
Dilemma Vehicles (#)	0	30		0	29	0	0	26	0	0	21	0
Queue Length 50th (m)	~162.7	~161.3		~115.2	~147.1	59.0	34.4	~152.6	9.7	60.2	72.3	0.0
Queue Length 95th (m)	#234.6	#207.5		#182.7	#192.4	#134.3	46.2	#197.5	37.7	#84.7	98.2	23.2
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	298	843		303	859	668	879	748	513	694	865	588
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.56	1.15		1.27	1.08	0.88	0.47	1.19	0.54	0.82	0.68	0.47

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 127.2

Natural Cycle: 130

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.56

Intersection Signal Delay: 100.3

Intersection LOS: F

Intersection Capacity Utilization 104.9%

ICU Level of Service G

Analysis Period (min) 15

90th %ile Actuated Cycle: 130

70th %ile Actuated Cycle: 130

50th %ile Actuated Cycle: 128.8

30th %ile Actuated Cycle: 125.6

10th %ile Actuated Cycle: 121.7

~ 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: 6: 43 Street S/43 Street N & Hwy 3

			
25 s	40 s	30 s	35 s
			
25 s	40 s	30 s	35 s

Lanes, Volumes, Timings
1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	99	252	23	84	6	89	111	26	6	51	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.908			0.993			0.984			0.985	
Flt Protected		0.998			0.990			0.981			0.995	
Satd. Flow (prot)	0	1656	0	0	1796	0	0	1714	0	0	1605	0
Flt Permitted		0.979			0.864			0.835			0.950	
Satd. Flow (perm)	0	1624	0	0	1567	0	0	1459	0	0	1533	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		226			6			12			9	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		697.6			744.1			520.4			321.7	
Travel Time (s)		50.2			53.6			26.8			16.5	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	7%	7%	7%	16%	16%	16%
Adj. Flow (vph)	22	129	327	30	109	8	116	144	34	8	66	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	478	0	0	147	0	0	294	0	0	83	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	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)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	32.0	32.0		32.0	32.0		28.0	28.0		28.0	28.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Maximum Green (s)	25.5	25.5		25.5	25.5		21.5	21.5		21.5	21.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.5			6.5			6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		14.3			14.3			13.8			13.8	
Actuated g/C Ratio		0.34			0.34			0.33			0.33	
v/c Ratio		0.68			0.27			0.60			0.16	
Control Delay		11.8			11.5			18.0			11.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		11.8			11.5			18.0			11.0	
LOS		B			B			B			B	
Approach Delay		11.8			11.5			18.0			11.0	
Approach LOS		B			B			B			B	

Lanes, Volumes, Timings
1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	25.0	25.0		25.0	25.0		21.5	21.5		21.5	21.5	
90th %ile Term Code	Gap	Gap		Hold	Hold		Max	Max		Hold	Hold	
70th %ile Green (s)	16.4	16.4		16.4	16.4		16.0	16.0		16.0	16.0	
70th %ile Term Code	Gap	Gap		Hold	Hold		Gap	Gap		Hold	Hold	
50th %ile Green (s)	12.2	12.2		12.2	12.2		12.5	12.5		12.5	12.5	
50th %ile Term Code	Gap	Gap		Hold	Hold		Gap	Gap		Hold	Hold	
30th %ile Green (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
30th %ile Term Code	Min	Min		Min	Min		Min	Min		Min	Min	
10th %ile Green (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
10th %ile Term Code	Min	Min		Hold	Hold		Min	Min		Min	Min	
Stops (vph)		157			68			165			39	
Fuel Used(l)		31			11			20			4	
CO Emissions (g/hr)		581			196			371			73	
NOx Emissions (g/hr)		112			38			72			14	
VOC Emissions (g/hr)		134			45			86			17	
Dilemma Vehicles (#)		0			0			26			7	
Queue Length 50th (m)		13.0			6.7			14.9			3.3	
Queue Length 95th (m)		30.8			16.8			37.1			11.4	
Internal Link Dist (m)		673.6			720.1			496.4			297.7	
Turn Bay Length (m)												
Base Capacity (vph)		1124			1008			795			834	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.43			0.15			0.37			0.10	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 41.7

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 13.5

Intersection LOS: B

Intersection Capacity Utilization 52.7%

ICU Level of Service A

Analysis Period (min) 15

90th %ile Actuated Cycle: 59.5

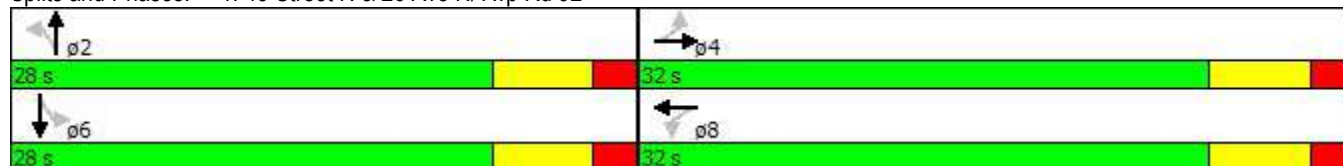
70th %ile Actuated Cycle: 45.4

50th %ile Actuated Cycle: 37.7

30th %ile Actuated Cycle: 33

10th %ile Actuated Cycle: 33

Splits and Phases: 1: 43 Street N & 26 Ave N/Twp Rd 92



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	18	116	27	9	6	282	518	110	17	452	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.942				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1316	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.746			0.743			0.950			0.415		
Satd. Flow (perm)	1376	1845	1568	1038	1316	0	1656	3312	1482	723	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			140		7				133			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	13	22	140	33	11	7	340	624	133	20	545	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	13	22	140	33	18	0	340	624	133	20	545	23
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		35.0	67.5	67.5	32.5	32.5	32.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		35.0%	67.5%	67.5%	32.5%	32.5%	32.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		29.0	61.0	61.0	26.0	26.0	26.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	10.6	10.6	10.6	10.6	10.6		25.4	76.4	76.4	45.0	45.0	45.0
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11		0.25	0.76	0.76	0.45	0.45	0.45
v/c Ratio	0.09	0.11	0.48	0.30	0.12		0.81	0.25	0.11	0.06	0.37	0.03
Control Delay	41.3	41.4	13.1	48.6	31.9		46.1	2.2	0.3	19.7	20.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	41.4	13.1	48.6	31.9		46.1	2.2	0.3	19.7	20.3	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	B	C	A
Approach Delay		18.8			42.7			15.6			19.5	
Approach LOS		B			D			B			B	
90th %ile Green (s)	12.7	12.7	12.7	12.7	12.7		32.9	74.3	74.3	35.4	35.4	35.4
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	10.2	10.2	10.2	10.2	10.2		28.8	76.8	76.8	42.0	42.0	42.0
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		25.6	77.0	77.0	45.4	45.4	45.4
50th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		22.3	77.0	77.0	48.7	48.7	48.7
30th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		17.3	77.0	77.0	53.7	53.7	53.7
10th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	11	18	20	26	12		257	76	0	12	294	0
Fuel Used(l)	1	2	10	3	2		40	43	8	2	40	1
CO Emissions (g/hr)	26	42	184	61	29		742	800	157	29	749	19
NOx Emissions (g/hr)	5	8	35	12	6		143	154	30	6	144	4
VOC Emissions (g/hr)	6	10	42	14	7		171	185	36	7	173	4
Dilemma Vehicles (#)	0	0	0	0	0		0	25	0	0	23	0
Queue Length 50th (m)	2.5	4.2	0.0	6.4	2.1		59.9	5.2	0.0	2.2	37.0	0.0
Queue Length 95th (m)	7.6	10.4	13.9	14.6	8.0		80.7	6.0	0.0	7.5	54.7	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	357	479	511	269	347		493	2531	1163	325	1491	724
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.05	0.27	0.12	0.05		0.69	0.25	0.11	0.06	0.37	0.03

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 17.8

Intersection LOS: B

Intersection Capacity Utilization 52.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	42	213	356	925	604	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		245				47
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	48	245	409	1063	694	47
Shared Lane Traffic (%)						
Lane Group Flow (vph)	48	245	409	1063	694	47
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		43.0	83.5	40.5	40.5
Total Split (%)	16.5%		43.0%	83.5%	40.5%	40.5%
Maximum Green (s)	10.0		37.0	77.0	34.0	34.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	29.2	86.2	48.4	48.4
Actuated g/C Ratio	0.10	1.00	0.29	0.86	0.48	0.48
v/c Ratio	0.15	0.17	0.82	0.36	0.46	0.07
Control Delay	42.5	0.3	46.6	3.1	11.2	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.5	0.3	46.6	3.1	11.2	1.1

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	B	A
Approach Delay	7.2			15.1	10.5	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		37.0	77.0	34.0	34.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		33.1	77.0	37.9	37.9
70th %ile Term Code	Max		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		29.6	77.0	41.4	41.4
50th %ile Term Code	Max		Gap	Coord	Coord	Coord
30th %ile Green (s)	0.0		25.9	93.5	61.6	61.6
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		20.4	93.5	67.1	67.1
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	38	0	322	191	345	2
Fuel Used(l)	5	15	43	60	63	3
CO Emissions (g/hr)	95	275	800	1114	1164	60
NOx Emissions (g/hr)	18	53	154	215	225	12
VOC Emissions (g/hr)	22	63	184	257	269	14
Dilemma Vehicles (#)	0	0	0	31	28	0
Queue Length 50th (m)	4.6	0.0	77.0	30.7	15.5	0.2
Queue Length 95th (m)	10.0	0.0	97.5	37.1	23.0	0.4
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	312	1442	630	2936	1506	697
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.17	0.65	0.36	0.46	0.07

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 12.8

Intersection LOS: B

Intersection Capacity Utilization 60.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	429	878	12	354	854	541	377	821	255	521	538	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	2		0	2		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3155	4664	0	3213	4759	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.186			0.169			0.322			0.142		
Satd. Flow (perm)	618	4664	0	571	4759	1482	1079	3282	1468	455	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				265			235			249
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	466	954	13	385	928	588	410	892	277	566	585	278
Shared Lane Traffic (%)												
Lane Group Flow (vph)	466	967	0	385	928	588	410	892	277	566	585	278
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	16.0	34.0		16.0	34.0	34.0	16.0	32.0	32.0	18.0	34.0	34.0
Total Split (%)	16.0%	34.0%		16.0%	34.0%	34.0%	16.0%	32.0%	32.0%	18.0%	34.0%	34.0%
Maximum Green (s)	10.0	27.0		10.0	27.0	27.0	11.0	26.0	26.0	13.0	28.0	28.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	38.0	27.0		38.0	27.0	27.0	37.8	26.0	26.0	42.2	28.2	28.2
Actuated g/C Ratio	0.38	0.27		0.38	0.27	0.27	0.38	0.26	0.26	0.42	0.28	0.28
v/c Ratio	0.95	0.77		0.80	0.72	0.99	0.64	1.05	0.50	1.07	0.66	0.48
Control Delay	53.4	38.3		33.0	36.9	56.4	23.2	80.4	10.0	86.0	36.1	8.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.4	38.3		33.0	36.9	56.4	23.2	80.4	10.0	86.0	36.1	8.5
LOS	D	D		C	D	E	C	F	A	F	D	A
Approach Delay		43.2			42.2			53.2			50.5	
Approach LOS		D			D			D			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-AM-Mit
Background 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	10.0	27.0		10.0	27.0	27.0	11.0	26.0	26.0	13.0	28.0	28.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	10.0	27.0		10.0	27.0	27.0	11.0	26.0	26.0	13.0	28.0	28.0
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
50th %ile Green (s)	10.0	27.0		10.0	27.0	27.0	11.0	26.0	26.0	13.0	28.0	28.0
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
30th %ile Green (s)	10.0	27.0		10.0	27.0	27.0	11.0	26.0	26.0	13.0	28.0	28.0
30th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
10th %ile Green (s)	10.0	27.0		10.0	27.0	27.0	10.2	26.0	26.0	13.0	28.8	28.8
10th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Max	Hold	Hold
Stops (vph)	265	795		223	750	279	251	715	50	326	463	42
Fuel Used(l)	48	103		43	120	73	30	106	14	74	60	17
CO Emissions (g/hr)	893	1922		808	2223	1350	552	1977	253	1377	1113	322
NOx Emissions (g/hr)	172	371		156	429	261	107	382	49	266	215	62
VOC Emissions (g/hr)	206	443		186	513	311	127	456	58	318	257	74
Dilemma Vehicles (#)	0	44		0	43	0	0	37	0	0	27	0
Queue Length 50th (m)	31.3	66.3		25.1	62.8	73.9	26.4	~104.5	6.6	~51.5	55.5	4.4
Queue Length 95th (m)	#60.3	82.8		#43.1	78.6	#149.3	37.2	#144.1	29.3	#86.3	75.0	26.2
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	488	1260		481	1284	593	641	853	555	528	883	574
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	0.77		0.80	0.72	0.99	0.64	1.05	0.50	1.07	0.66	0.48

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 47.0

Intersection LOS: D

Intersection Capacity Utilization 86.5%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 100

70th %ile Actuated Cycle: 100

50th %ile Actuated Cycle: 100

30th %ile Actuated Cycle: 100

10th %ile Actuated Cycle: 100

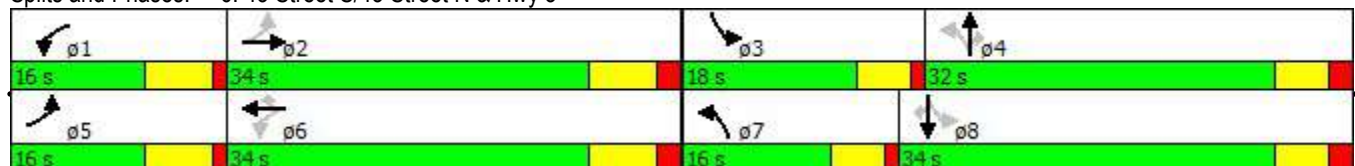
~ Volume exceeds capacity, queue is theoretically infinite.

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: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-PM

Background 2037 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	8	330	147	17	18	192	479	27	5	632	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.923				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1719	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.729			0.751			0.950			0.426		
Satd. Flow (perm)	1307	1792	1524	1399	1719	0	1597	3195	1429	756	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			412		22				38			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	28	10	412	184	21	22	240	599	34	6	790	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	10	412	184	43	0	240	599	34	6	790	48
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		29.0	67.5	67.5	38.5	38.5	38.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		29.0%	67.5%	67.5%	38.5%	38.5%	38.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		23.0	61.0	61.0	32.0	32.0	32.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	18.4	18.4	18.4	18.4	18.4		19.3	68.6	68.6	43.3	43.3	43.3
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.19	0.69	0.69	0.43	0.43	0.43
v/c Ratio	0.12	0.03	0.67	0.72	0.13		0.78	0.27	0.03	0.02	0.54	0.07
Control Delay	32.4	30.1	9.2	53.3	19.2		51.1	5.0	0.7	22.0	24.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.4	30.1	9.2	53.3	19.2		51.1	5.0	0.7	22.0	24.8	0.2

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-PM

Background 2037 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	A	D	B		D	A	A	C	C	A
Approach Delay		11.1			46.8			17.5			23.4	
Approach LOS		B			D			B			C	
90th %ile Green (s)	25.5	25.5	25.5	25.5	25.5		23.5	61.5	61.5	32.0	32.0	32.0
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	21.4	21.4	21.4	21.4	21.4		23.0	65.6	65.6	36.6	36.6	36.6
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	18.4	18.4	18.4	18.4	18.4		20.1	68.6	68.6	42.5	42.5	42.5
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	15.4	15.4	15.4	15.4	15.4		17.2	71.6	71.6	48.4	48.4	48.4
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	11.1	11.1	11.1	11.1	11.1		12.9	75.9	75.9	57.0	57.0	57.0
10th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	18	8	35	134	17		177	161	2	5	468	0
Fuel Used(l)	3	1	27	18	3		28	44	2	1	60	2
CO Emissions (g/hr)	47	17	495	337	56		520	814	40	9	1121	37
NOx Emissions (g/hr)	9	3	96	65	11		100	157	8	2	216	7
VOC Emissions (g/hr)	11	4	114	78	13		120	188	9	2	259	9
Dilemma Vehicles (#)	0	0	0	0	0		0	23	0	0	32	0
Queue Length 50th (m)	4.8	1.7	0.0	35.6	3.6		39.2	10.5	0.3	0.7	62.1	0.0
Queue Length 95th (m)	10.3	5.1	12.5	47.3	10.1		62.0	27.4	0.3	3.4	82.9	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	339	465	701	363	463		369	2192	992	327	1460	712
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.02	0.59	0.51	0.09		0.65	0.27	0.03	0.02	0.54	0.07

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 21.1

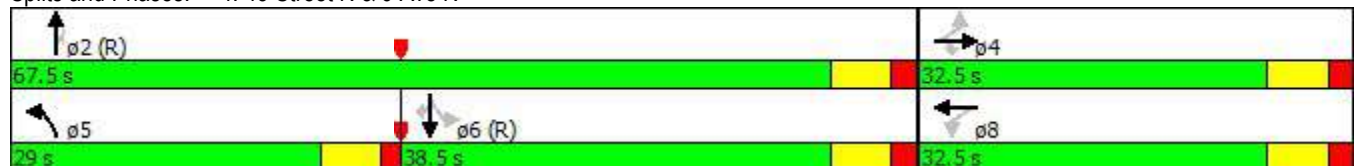
Intersection LOS: C

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-PM

Background 2037 PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	47	365	306	765	1275	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		406				83
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	52	406	340	850	1417	83
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	406	340	850	1417	83
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		30.0	83.5	53.5	53.5
Total Split (%)	16.5%		30.0%	83.5%	53.5%	53.5%
Maximum Green (s)	10.0		24.0	77.0	47.0	47.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	23.1	81.6	51.2	51.2
Actuated g/C Ratio	0.10	1.00	0.23	0.82	0.51	0.51
v/c Ratio	0.16	0.27	0.91	0.32	0.81	0.10
Control Delay	42.5	0.4	67.6	3.5	22.1	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.5	0.4	67.6	3.5	22.1	2.6

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-PM
Background 2037 PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	E	A	C	A
Approach Delay	5.2			21.8	21.1	
Approach LOS	A			C	C	
90th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
70th %ile Term Code	Max		Max	Coord	Coord	Coord
50th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
50th %ile Term Code	Max		Max	Coord	Coord	Coord
30th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
30th %ile Term Code	Max		Max	Coord	Coord	Coord
10th %ile Green (s)	0.0		19.7	93.5	67.8	67.8
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	42	0	270	184	1064	5
Fuel Used(l)	6	25	42	51	154	6
CO Emissions (g/hr)	107	472	775	942	2860	113
NOx Emissions (g/hr)	21	91	150	182	552	22
VOC Emissions (g/hr)	25	109	179	217	660	26
Dilemma Vehicles (#)	0	0	0	33	31	0
Queue Length 50th (m)	5.1	0.0	67.1	23.0	145.5	0.4
Queue Length 95th (m)	11.0	0.0	#118.1	29.8	#187.6	m3.8
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	327	1509	386	2629	1742	820
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.27	0.88	0.32	0.81	0.10

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 19.0

Intersection LOS: B

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-PM
Background 2037 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	235	836	8	384	1041	343	516	447	417	382	739	273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	3279	0	1687	3374	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.132			0.095			0.114			0.400		
Satd. Flow (perm)	228	3279	0	169	3374	1509	393	3374	1509	1328	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				290			333			184
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	255	909	9	417	1132	373	561	486	453	415	803	297
Shared Lane Traffic (%)												
Lane Group Flow (vph)	255	918	0	417	1132	373	561	486	453	415	803	297
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	16.0	43.0		31.0	58.0	58.0	20.0	41.0	41.0	15.0	36.0	36.0
Total Split (%)	12.3%	33.1%		23.8%	44.6%	44.6%	15.4%	31.5%	31.5%	11.5%	27.7%	27.7%
Maximum Green (s)	10.0	36.0		25.0	51.0	51.0	15.0	35.0	35.0	10.0	30.0	30.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	47.0	36.0		68.0	51.0	51.0	51.0	35.0	35.0	41.0	30.0	30.0
Actuated g/C Ratio	0.36	0.28		0.52	0.39	0.39	0.39	0.27	0.27	0.32	0.23	0.23
v/c Ratio	1.34	1.01		1.10	0.86	0.49	1.15	0.54	0.70	0.74	1.07	0.62
Control Delay	210.5	79.1		111.7	43.8	9.0	123.1	43.1	17.6	39.8	100.6	23.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	210.5	79.1		111.7	43.8	9.0	123.1	43.1	17.6	39.8	100.6	23.0
LOS	F	E		F	D	A	F	D	B	D	F	C
Approach Delay		107.7			51.8			65.3			68.8	
Approach LOS		F			D			E			E	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-PM

Background 2037 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	10.0	36.0		25.0	51.0	51.0	15.0	35.0	35.0	10.0	30.0	30.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	10.0	36.0		25.0	51.0	51.0	15.0	35.0	35.0	10.0	30.0	30.0
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
50th %ile Green (s)	10.0	36.0		25.0	51.0	51.0	15.0	35.0	35.0	10.0	30.0	30.0
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
30th %ile Green (s)	10.0	36.0		25.0	51.0	51.0	15.0	35.0	35.0	10.0	30.0	30.0
30th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
10th %ile Green (s)	10.0	36.0		25.0	51.0	51.0	15.0	35.0	35.0	10.0	30.0	30.0
10th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
Stops (vph)	143	758		273	922	64	335	373	118	325	649	100
Fuel Used(l)	55	125		72	152	27	80	45	26	43	119	23
CO Emissions (g/hr)	1015	2321		1342	2821	503	1489	828	482	809	2220	433
NOx Emissions (g/hr)	196	448		259	544	97	287	160	93	156	429	84
VOC Emissions (g/hr)	234	535		309	651	116	343	191	111	187	512	100
Dilemma Vehicles (#)	0	30		0	40	0	0	17	0	0	26	0
Queue Length 50th (m)	~71.2	~133.1		~111.3	145.4	14.3	~75.8	59.1	27.6	39.9	~126.1	26.6
Queue Length 95th (m)	#127.5	#179.7		#178.4	176.4	41.3	#113.4	77.4	69.5	53.5	#167.4	59.2
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	191	908		380	1323	768	486	908	649	559	750	477
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.34	1.01		1.10	0.86	0.49	1.15	0.54	0.70	0.74	1.07	0.62

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Natural Cycle: 120

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.34

Intersection Signal Delay: 70.1

Intersection LOS: E

Intersection Capacity Utilization 99.8%

ICU Level of Service F

Analysis Period (min) 15

90th %ile Actuated Cycle: 130

70th %ile Actuated Cycle: 130

50th %ile Actuated Cycle: 130

30th %ile Actuated Cycle: 130

10th %ile Actuated Cycle: 130

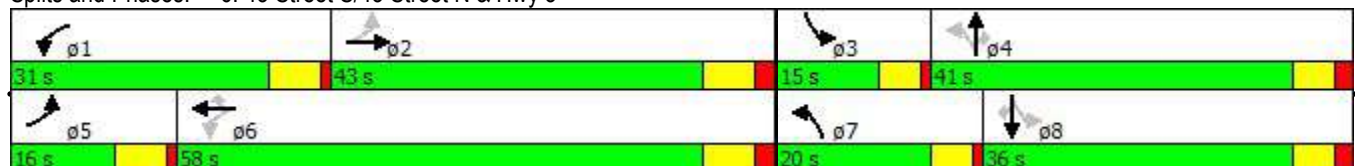
~ Volume exceeds capacity, queue is theoretically infinite.

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: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	51	242	12	108	0	335	75	54	12	172	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.893						0.984			0.978	
Flt Protected		0.998			0.995			0.965			0.997	
Satd. Flow (prot)	0	1628	0	0	1818	0	0	1686	0	0	1597	0
Flt Permitted		0.983			0.935			0.645			0.966	
Satd. Flow (perm)	0	1604	0	0	1708	0	0	1127	0	0	1547	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		260						16			23	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		697.6			744.1			520.4			321.7	
Travel Time (s)		50.2			53.6			26.8			16.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	7%	7%	7%	16%	16%	16%
Adj. Flow (vph)	12	55	260	13	116	0	360	81	58	13	185	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	327	0	0	129	0	0	499	0	0	236	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	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)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	23.0	23.0		23.0	23.0		37.0	37.0		37.0	37.0	
Total Split (%)	38.3%	38.3%		38.3%	38.3%		61.7%	61.7%		61.7%	61.7%	
Maximum Green (s)	16.5	16.5		16.5	16.5		30.5	30.5		30.5	30.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.5			6.5			6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		11.3			11.3			25.5			25.5	
Actuated g/C Ratio		0.23			0.23			0.51			0.51	
v/c Ratio		0.58			0.33			0.86			0.30	
Control Delay		9.9			20.6			28.4			7.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		9.9			20.6			28.4			7.5	
LOS		A			C			C			A	
Approach Delay		9.9			20.6			28.4			7.5	
Approach LOS		A			C			C			A	

Lanes, Volumes, Timings
1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	15.8	15.8		15.8	15.8		30.5	30.5		30.5	30.5	
90th %ile Term Code	Gap	Gap		Hold	Hold		Max	Max		Hold	Hold	
70th %ile Green (s)	10.8	10.8		10.8	10.8		30.5	30.5		30.5	30.5	
70th %ile Term Code	Gap	Gap		Hold	Hold		Max	Max		Hold	Hold	
50th %ile Green (s)	10.0	10.0		10.0	10.0		28.8	28.8		28.8	28.8	
50th %ile Term Code	Min	Min		Min	Min		Gap	Gap		Hold	Hold	
30th %ile Green (s)	10.0	10.0		10.0	10.0		22.7	22.7		22.7	22.7	
30th %ile Term Code	Min	Min		Min	Min		Gap	Gap		Hold	Hold	
10th %ile Green (s)	10.0	10.0		10.0	10.0		16.3	16.3		16.3	16.3	
10th %ile Term Code	Min	Min		Hold	Hold		Gap	Gap		Hold	Hold	
Stops (vph)		78			94			325			97	
Fuel Used(l)		24			12			44			11	
CO Emissions (g/hr)		450			232			820			209	
NOx Emissions (g/hr)		87			45			158			40	
VOC Emissions (g/hr)		104			54			189			48	
Dilemma Vehicles (#)		0			0			43			21	
Queue Length 50th (m)		5.6			11.1			32.4			9.4	
Queue Length 95th (m)		24.6			24.2			#101.7			24.5	
Internal Link Dist (m)		673.6			720.1			496.4			297.7	
Turn Bay Length (m)												
Base Capacity (vph)		712			574			706			970	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.46			0.22			0.71			0.24	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 50.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 18.3

Intersection LOS: B

Intersection Capacity Utilization 74.0%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 59.3

70th %ile Actuated Cycle: 54.3

50th %ile Actuated Cycle: 51.8

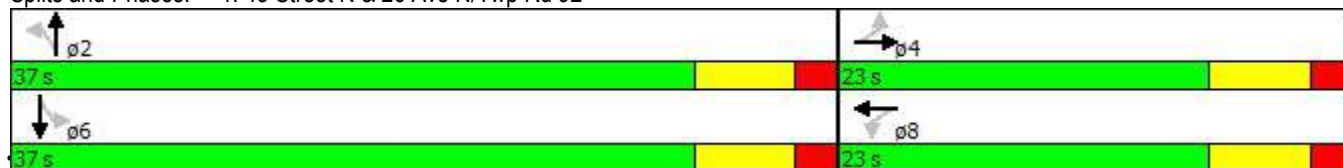
30th %ile Actuated Cycle: 45.7

10th %ile Actuated Cycle: 39.3

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: 43 Street N & 26 Ave N/Twp Rd 92



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	8	330	147	17	18	192	479	27	5	632	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.923				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1719	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.729			0.751			0.950			0.426		
Satd. Flow (perm)	1307	1792	1524	1399	1719	0	1597	3195	1429	756	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			412		22				38			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	28	10	412	184	21	22	240	599	34	6	790	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	10	412	184	43	0	240	599	34	6	790	48
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		29.0	67.5	67.5	38.5	38.5	38.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		29.0%	67.5%	67.5%	38.5%	38.5%	38.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		23.0	61.0	61.0	32.0	32.0	32.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	18.4	18.4	18.4	18.4	18.4		19.3	68.6	68.6	43.3	43.3	43.3
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.19	0.69	0.69	0.43	0.43	0.43
v/c Ratio	0.12	0.03	0.67	0.72	0.13		0.78	0.27	0.03	0.02	0.54	0.07
Control Delay	32.4	30.1	9.2	53.3	19.2		51.1	5.0	0.7	22.0	24.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.4	30.1	9.2	53.3	19.2		51.1	5.0	0.7	22.0	24.8	0.2

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	A	D	B		D	A	A	C	C	A
Approach Delay		11.1			46.8			17.5			23.4	
Approach LOS		B			D			B			C	
90th %ile Green (s)	25.5	25.5	25.5	25.5	25.5		23.5	61.5	61.5	32.0	32.0	32.0
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	21.4	21.4	21.4	21.4	21.4		23.0	65.6	65.6	36.6	36.6	36.6
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	18.4	18.4	18.4	18.4	18.4		20.1	68.6	68.6	42.5	42.5	42.5
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	15.4	15.4	15.4	15.4	15.4		17.2	71.6	71.6	48.4	48.4	48.4
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	11.1	11.1	11.1	11.1	11.1		12.9	75.9	75.9	57.0	57.0	57.0
10th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	18	8	35	134	17		177	161	2	5	468	0
Fuel Used(l)	3	1	27	18	3		28	44	2	1	60	2
CO Emissions (g/hr)	47	17	495	337	56		520	814	40	9	1121	37
NOx Emissions (g/hr)	9	3	96	65	11		100	157	8	2	216	7
VOC Emissions (g/hr)	11	4	114	78	13		120	188	9	2	259	9
Dilemma Vehicles (#)	0	0	0	0	0		0	23	0	0	32	0
Queue Length 50th (m)	4.8	1.7	0.0	35.6	3.6		39.2	10.5	0.3	0.7	62.1	0.0
Queue Length 95th (m)	10.3	5.1	12.5	47.3	10.1		62.0	27.4	0.3	3.4	82.9	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	339	465	701	363	463		369	2192	992	327	1460	712
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.02	0.59	0.51	0.09		0.65	0.27	0.03	0.02	0.54	0.07

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 21.1

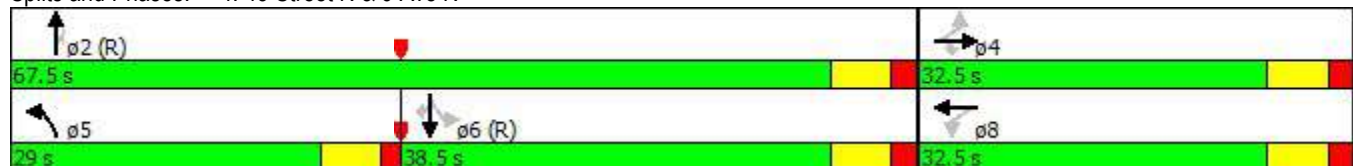
Intersection LOS: C

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	47	365	306	765	1275	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		406				83
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	52	406	340	850	1417	83
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	406	340	850	1417	83
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		30.0	83.5	53.5	53.5
Total Split (%)	16.5%		30.0%	83.5%	53.5%	53.5%
Maximum Green (s)	10.0		24.0	77.0	47.0	47.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	23.1	81.6	51.2	51.2
Actuated g/C Ratio	0.10	1.00	0.23	0.82	0.51	0.51
v/c Ratio	0.16	0.27	0.91	0.32	0.81	0.10
Control Delay	42.5	0.4	67.6	3.5	22.1	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.5	0.4	67.6	3.5	22.1	2.6

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	E	A	C	A
Approach Delay	5.2			21.8	21.1	
Approach LOS	A			C	C	
90th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
70th %ile Term Code	Max		Max	Coord	Coord	Coord
50th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
50th %ile Term Code	Max		Max	Coord	Coord	Coord
30th %ile Green (s)	10.0		24.0	77.0	47.0	47.0
30th %ile Term Code	Max		Max	Coord	Coord	Coord
10th %ile Green (s)	0.0		19.7	93.5	67.8	67.8
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	42	0	270	184	1064	5
Fuel Used(l)	6	25	42	51	154	6
CO Emissions (g/hr)	107	472	775	942	2860	113
NOx Emissions (g/hr)	21	91	150	182	552	22
VOC Emissions (g/hr)	25	109	179	217	660	26
Dilemma Vehicles (#)	0	0	0	33	31	0
Queue Length 50th (m)	5.1	0.0	67.1	23.0	145.5	0.4
Queue Length 95th (m)	11.0	0.0	#118.1	29.8	#187.6	m3.8
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	327	1509	386	2629	1742	820
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.27	0.88	0.32	0.81	0.10

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 19.0

Intersection LOS: B

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 5: 43 Street N & 5 Ave N



Southland Industrial Subdivision TIA
EA

Synchro 8 Light Report
3/30/2018

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	235	836	8	384	1041	343	516	447	417	382	739	273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	2		0	2		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3183	4711	0	3273	4848	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.174			0.190			0.174			0.370		
Satd. Flow (perm)	583	4711	0	655	4848	1509	599	3374	1509	1229	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				331			277			257
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	255	909	9	417	1132	373	561	486	453	415	803	297
Shared Lane Traffic (%)												
Lane Group Flow (vph)	255	918	0	417	1132	373	561	486	453	415	803	297
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	16.0	30.0		16.0	30.0	30.0	15.0	29.0	29.0	15.0	29.0	29.0
Total Split (%)	17.8%	33.3%		17.8%	33.3%	33.3%	16.7%	32.2%	32.2%	16.7%	32.2%	32.2%
Maximum Green (s)	10.0	23.0		10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	34.0	23.0		34.0	23.0	23.0	34.0	23.0	23.0	34.0	23.0	23.0
Actuated g/C Ratio	0.38	0.26		0.38	0.26	0.26	0.38	0.26	0.26	0.38	0.26	0.26
v/c Ratio	0.50	0.76		0.78	0.91	0.59	1.07	0.56	0.77	0.61	0.97	0.53
Control Delay	19.2	35.8		28.2	45.1	9.4	82.8	32.1	21.7	21.4	58.5	9.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.2	35.8		28.2	45.1	9.4	82.8	32.1	21.7	21.4	58.5	9.5
LOS	B	D		C	D	A	F	C	C	C	E	A
Approach Delay		32.2			34.5			47.9			38.7	
Approach LOS		C			C			D			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: BG2037-PM-Mit
Background 2037 PM Peak Hour - Mitigated

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	10.0	23.0		10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	10.0	23.0		10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	10.0	23.0		10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
30th %ile Green (s)	10.0	23.0		10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
30th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
10th %ile Green (s)	10.0	23.0		10.0	23.0	23.0	10.0	23.0	23.0	10.0	23.0	23.0
10th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
Stops (vph)	145	756		245	942	61	315	377	161	256	652	52
Fuel Used(l)	20	97		46	154	27	63	41	29	36	95	19
CO Emissions (g/hr)	374	1796		853	2862	501	1179	760	532	667	1776	351
NOx Emissions (g/hr)	72	347		165	552	97	228	147	103	129	343	68
VOC Emissions (g/hr)	86	414		197	660	116	272	175	123	154	410	81
Dilemma Vehicles (#)	0	47		0	56	0	0	24	0	0	38	0
Queue Length 50th (m)	13.9	56.5		24.1	73.4	5.9	~42.3	40.5	28.9	24.6	76.1	5.6
Queue Length 95th (m)	21.7	72.0		#40.3	#100.1	31.7	#75.9	56.8	#77.9	35.4	#115.2	28.0
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	509	1204		538	1238	632	523	862	591	678	831	563
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.76		0.78	0.91	0.59	1.07	0.56	0.77	0.61	0.97	0.53

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 38.4

Intersection LOS: D

Intersection Capacity Utilization 83.6%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 90

70th %ile Actuated Cycle: 90

50th %ile Actuated Cycle: 90

30th %ile Actuated Cycle: 90

10th %ile Actuated Cycle: 90

~ 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: 6: 43 Street S/43 Street N & Hwy 3

16 s	30 s	15 s	29 s
16 s	30 s	15 s	29 s

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	21	81	48	9	11	198	381	179	34	320	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.919				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1284	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.742			0.741			0.950			0.488		
Satd. Flow (perm)	1369	1845	1568	1035	1284	0	1656	3312	1482	851	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			104		13				216			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	12	25	98	58	11	13	239	459	216	41	386	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	25	98	58	24	0	239	459	216	41	386	17
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	33.0	33.0	33.0	33.0	33.0		32.0	67.0	67.0	35.0	35.0	35.0
Total Split (%)	33.0%	33.0%	33.0%	33.0%	33.0%		32.0%	67.0%	67.0%	35.0%	35.0%	35.0%
Maximum Green (s)	26.5	26.5	26.5	26.5	26.5		26.0	60.5	60.5	28.5	28.5	28.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	12.1	12.1	12.1	12.1	12.1		19.6	79.5	79.5	52.6	52.6	52.6
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.20	0.80	0.80	0.53	0.53	0.53
v/c Ratio	0.07	0.11	0.35	0.46	0.14		0.74	0.17	0.18	0.09	0.22	0.02
Control Delay	38.1	38.8	10.5	52.4	25.8		47.1	1.7	0.7	17.6	15.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.1	38.8	10.5	52.4	25.8		47.1	1.7	0.7	17.6	15.8	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	B	B	A
Approach Delay		18.2			44.6			13.3			15.4	
Approach LOS		B			D			B			B	
90th %ile Green (s)	16.6	16.6	16.6	16.6	16.6		26.4	70.4	70.4	38.0	38.0	38.0
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	13.2	13.2	13.2	13.2	13.2		22.5	73.8	73.8	45.3	45.3	45.3
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.9	10.9	10.9	10.9	10.9		19.6	76.1	76.1	50.5	50.5	50.5
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		16.7	77.0	77.0	54.3	54.3	54.3
30th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	0.0	0.0	0.0	0.0	0.0		12.6	93.5	93.5	74.9	74.9	74.9
10th %ile Term Code	Skip	Skip	Skip	Skip	Skip		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	10	20	13	44	12		180	69	12	21	177	0
Fuel Used(l)	1	3	7	6	2		28	32	14	3	26	1
CO Emissions (g/hr)	23	48	125	110	35		524	594	264	54	491	14
NOx Emissions (g/hr)	4	9	24	21	7		101	115	51	10	95	3
VOC Emissions (g/hr)	5	11	29	25	8		121	137	61	13	113	3
Dilemma Vehicles (#)	0	0	0	0	0		0	9	0	0	16	0
Queue Length 50th (m)	2.2	4.7	0.0	11.4	2.1		43.4	3.4	0.0	4.2	22.2	0.0
Queue Length 95th (m)	6.7	10.9	10.6	21.2	8.4		61.5	7.3	0.1	11.9	36.8	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	362	488	491	274	349		431	2631	1222	447	1742	828
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.05	0.20	0.21	0.07		0.55	0.17	0.18	0.09	0.22	0.02

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 16.0

Intersection LOS: B

Intersection Capacity Utilization 50.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	44	150	249	753	452	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		172				38
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	51	172	286	866	520	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	172	286	866	520	38
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	18.0		41.0	82.0	41.0	41.0
Total Split (%)	18.0%		41.0%	82.0%	41.0%	41.0%
Maximum Green (s)	11.5		35.0	75.5	34.5	34.5
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	22.2	81.6	52.1	52.1
Actuated g/C Ratio	0.10	1.00	0.22	0.82	0.52	0.52
v/c Ratio	0.16	0.12	0.76	0.31	0.32	0.05
Control Delay	42.6	0.2	48.8	3.4	9.8	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.6	0.2	48.8	3.4	9.8	2.4

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	A	A
Approach Delay	9.9			14.7	9.3	
Approach LOS	A			B	A	
90th %ile Green (s)	10.0		29.8	77.0	41.2	41.2
90th %ile Term Code	Min		Gap	Coord	Coord	Coord
70th %ile Green (s)	10.0		25.4	77.0	45.6	45.6
70th %ile Term Code	Min		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		22.3	77.0	48.7	48.7
50th %ile Term Code	Min		Gap	Coord	Coord	Coord
30th %ile Green (s)	10.0		19.1	77.0	51.9	51.9
30th %ile Term Code	Min		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		14.5	93.5	73.0	73.0
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	40	0	225	179	131	3
Fuel Used(l)	5	10	30	50	42	3
CO Emissions (g/hr)	100	193	567	925	787	50
NOx Emissions (g/hr)	19	37	109	178	152	10
VOC Emissions (g/hr)	23	45	131	213	181	12
Dilemma Vehicles (#)	0	0	0	32	20	0
Queue Length 50th (m)	5.0	0.0	54.8	23.1	14.5	0.0
Queue Length 95th (m)	10.4	0.0	73.2	28.4	21.8	1.8
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	359	1442	596	2779	1620	743
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.12	0.48	0.31	0.32	0.05

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 12.6

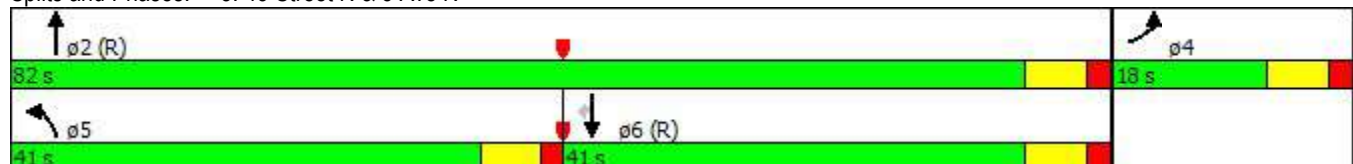
Intersection LOS: B

Intersection Capacity Utilization 50.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	335	615	9	248	598	415	264	609	179	376	386	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3246	0	1656	3312	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.226			0.250			0.462			0.145		
Satd. Flow (perm)	387	3246	0	436	3312	1482	1548	3282	1468	465	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				409			195			205
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	364	668	10	270	650	451	287	662	195	409	420	205
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	678	0	270	650	451	287	662	195	409	420	205
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	55.0	35.1		51.1	33.1	33.1	41.2	27.7	27.7	49.0	31.7	31.7
Actuated g/C Ratio	0.46	0.29		0.42	0.27	0.27	0.34	0.23	0.23	0.41	0.26	0.26
v/c Ratio	0.98	0.72		0.76	0.72	0.64	0.41	0.88	0.40	0.75	0.51	0.39
Control Delay	68.0	44.5		34.8	45.3	10.2	24.5	59.1	8.0	34.1	40.3	7.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.0	44.5		34.8	45.3	10.2	24.5	59.1	8.0	34.1	40.3	7.1
LOS	E	D		C	D	B	C	E	A	C	D	A
Approach Delay		52.7			31.7			41.7			31.2	
Approach LOS		D			C			D			C	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2019-AM
Future 2019 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	15.7	29.0	29.0	21.8	35.1	35.1
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
70th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	13.8	29.0	29.0	18.3	33.5	33.5
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
50th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	12.4	29.0	29.0	16.3	32.9	32.9
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Gap	Hold	Hold
30th %ile Green (s)	19.0	35.8		16.2	33.0	33.0	11.2	28.6	28.6	14.6	32.0	32.0
30th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Gap	Gap	Gap	Gap	Hold	Hold
10th %ile Green (s)	19.0	39.6		12.4	33.0	33.0	10.0	22.9	22.9	12.3	25.2	25.2
10th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Min	Gap	Gap	Gap	Hold	Hold
Stops (vph)	199	547		156	527	63	176	553	21	247	316	20
Fuel Used(l)	41	75		31	88	32	21	70	9	39	44	12
CO Emissions (g/hr)	759	1392		572	1630	600	392	1294	164	721	812	227
NOx Emissions (g/hr)	146	269		110	315	116	76	250	32	139	157	44
VOC Emissions (g/hr)	175	321		132	376	138	90	298	38	166	187	52
Dilemma Vehicles (#)	0	25		0	25	0	0	24	0	0	16	0
Queue Length 50th (m)	~62.6	82.3		40.4	77.8	7.9	23.1	83.7	0.0	34.6	46.7	0.0
Queue Length 95th (m)	#138.1	111.6		#71.0	105.8	43.4	32.7	#121.7	19.6	49.7	65.4	18.8
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	372	946		385	909	703	981	792	502	731	846	528
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.72		0.70	0.72	0.64	0.29	0.84	0.39	0.56	0.50	0.39

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 120.4

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 38.9

Intersection LOS: D

Intersection Capacity Utilization 82.8%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 126.8

70th %ile Actuated Cycle: 123.3

50th %ile Actuated Cycle: 121.3

30th %ile Actuated Cycle: 119.2

10th %ile Actuated Cycle: 111.2

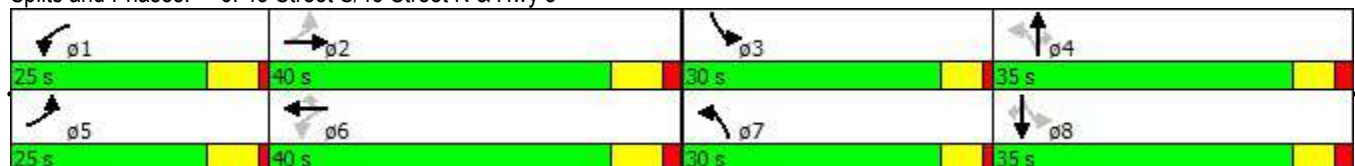
~ Volume exceeds capacity, queue is theoretically infinite.

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: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	9	231	195	19	33	135	344	51	11	472	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.905				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1686	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.715			0.750			0.950			0.502		
Satd. Flow (perm)	1282	1792	1524	1397	1686	0	1597	3195	1429	891	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			289		41				64			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	20	11	289	244	24	41	169	430	64	14	590	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	11	289	244	65	0	169	430	64	14	590	36
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5		12.0	22.5	22.5	22.5	22.5	22.5
Total Split (s)	35.0	35.0	35.0	35.0	35.0		27.0	65.0	65.0	38.0	38.0	38.0
Total Split (%)	35.0%	35.0%	35.0%	35.0%	35.0%		27.0%	65.0%	65.0%	38.0%	38.0%	38.0%
Maximum Green (s)	28.5	28.5	28.5	28.5	28.5		21.0	58.5	58.5	31.5	31.5	31.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	22.1	22.1	22.1	22.1	22.1		15.6	64.9	64.9	43.3	43.3	43.3
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22		0.16	0.65	0.65	0.43	0.43	0.43
v/c Ratio	0.07	0.03	0.51	0.79	0.16		0.68	0.21	0.07	0.04	0.40	0.05
Control Delay	28.6	27.4	7.0	54.4	14.5		49.8	6.9	1.5	22.0	22.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.6	27.4	7.0	54.4	14.5		49.8	6.9	1.5	22.0	22.6	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	A	D	B		D	A	A	C	C	A
Approach Delay		9.1			46.0			17.3			21.4	
Approach LOS		A			D			B			C	
90th %ile Green (s)	28.5	28.5	28.5	28.5	28.5		21.0	58.5	58.5	31.5	31.5	31.5
90th %ile Term Code	Hold	Hold	Hold	Max	Max		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	26.0	26.0	26.0	26.0	26.0		18.3	61.0	61.0	36.7	36.7	36.7
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	22.7	22.7	22.7	22.7	22.7		15.8	64.3	64.3	42.5	42.5	42.5
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	19.2	19.2	19.2	19.2	19.2		13.3	67.8	67.8	48.5	48.5	48.5
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	14.2	14.2	14.2	14.2	14.2		9.7	72.8	72.8	57.1	57.1	57.1
10th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	14	8	25	179	19		125	146	9	9	325	0
Fuel Used(l)	2	1	18	24	4		20	33	4	1	43	2
CO Emissions (g/hr)	34	19	340	451	79		364	612	79	20	808	28
NOx Emissions (g/hr)	6	4	66	87	15		70	118	15	4	156	5
VOC Emissions (g/hr)	8	4	78	104	18		84	141	18	5	186	7
Dilemma Vehicles (#)	0	0	0	0	0		0	16	0	0	24	0
Queue Length 50th (m)	3.2	1.8	0.0	46.9	3.9		33.3	7.6	0.0	1.6	43.0	0.0
Queue Length 95th (m)	7.7	5.2	11.8	60.0	11.4		46.0	27.6	3.3	6.0	60.4	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	365	510	640	398	509		335	2072	949	385	1459	711
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.02	0.45	0.61	0.13		0.50	0.21	0.07	0.04	0.40	0.05

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 21.9

Intersection LOS: C

Intersection Capacity Utilization 58.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	38	256	215	571	998	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		284				77
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	42	284	239	634	1109	77
Shared Lane Traffic (%)						
Lane Group Flow (vph)	42	284	239	634	1109	77
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		31.0	83.5	52.5	52.5
Total Split (%)	16.5%		31.0%	83.5%	52.5%	52.5%
Maximum Green (s)	10.0		25.0	77.0	46.0	46.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	19.5	86.2	58.1	58.1
Actuated g/C Ratio	0.10	1.00	0.20	0.86	0.58	0.58
v/c Ratio	0.13	0.19	0.76	0.23	0.56	0.08
Control Delay	42.1	0.3	53.1	2.5	15.7	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.1	0.3	53.1	2.5	15.7	4.2

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	B	A
Approach Delay	5.7			16.4	14.9	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		25.0	77.0	46.0	46.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		22.9	77.0	48.1	48.1
70th %ile Term Code	Max		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		20.0	77.0	51.0	51.0
50th %ile Term Code	Max		Gap	Coord	Coord	Coord
30th %ile Green (s)	0.0		17.0	93.5	70.5	70.5
30th %ile Term Code	Skip		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		12.8	93.5	74.7	74.7
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	34	0	197	103	661	8
Fuel Used(l)	5	18	27	36	110	6
CO Emissions (g/hr)	86	330	505	674	2043	107
NOx Emissions (g/hr)	17	64	97	130	394	21
VOC Emissions (g/hr)	20	76	116	156	471	25
Dilemma Vehicles (#)	0	0	0	20	15	0
Queue Length 50th (m)	4.0	0.0	46.2	15.6	98.8	0.9
Queue Length 95th (m)	9.4	0.0	69.3	21.0	64.1	m5.4
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	327	1509	403	2778	1977	917
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.19	0.59	0.23	0.56	0.08

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 14.2

Intersection LOS: B

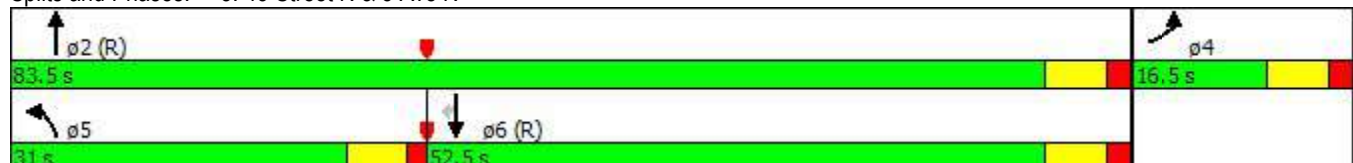
Intersection Capacity Utilization 63.7%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	176	585	6	269	729	253	362	325	292	303	553	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	3275	0	1687	3374	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.198			0.236			0.183			0.519		
Satd. Flow (perm)	342	3275	0	419	3374	1509	630	3374	1509	1723	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				275			317			247
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	191	636	7	292	792	275	393	353	317	329	601	247
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	643	0	292	792	275	393	353	317	329	601	247
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	25.0	40.0		25.0	40.0	40.0	30.0	35.0	35.0	30.0	35.0	35.0
Total Split (%)	19.2%	30.8%		19.2%	30.8%	30.8%	23.1%	26.9%	26.9%	23.1%	26.9%	26.9%
Maximum Green (s)	19.0	33.0		19.0	33.0	33.0	25.0	29.0	29.0	25.0	29.0	29.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	48.6	33.2		54.3	36.1	36.1	46.5	29.0	29.0	40.4	25.9	25.9
Actuated g/C Ratio	0.42	0.28		0.46	0.31	0.31	0.40	0.25	0.25	0.35	0.22	0.22
v/c Ratio	0.63	0.69		0.77	0.76	0.42	0.63	0.42	0.52	0.43	0.83	0.48
Control Delay	29.1	43.2		34.9	43.8	6.3	27.7	39.1	7.2	24.6	55.2	8.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	43.2		34.9	43.8	6.3	27.7	39.1	7.2	24.6	55.2	8.2
LOS	C	D		C	D	A	C	D	A	C	E	A
Approach Delay		40.0			34.3			25.4			36.7	
Approach LOS		D			C			C			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2019-PM
Future 2019 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	19.0	33.0		19.0	33.0	33.0	20.5	32.4	32.4	17.1	29.0	29.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Hold	Hold	Gap	Max	Max
70th %ile Green (s)	17.5	33.0		19.0	34.5	34.5	18.4	32.4	32.4	15.0	29.0	29.0
70th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Max	Max
50th %ile Green (s)	14.6	33.0		19.0	37.4	37.4	16.9	31.4	31.4	13.6	28.1	28.1
50th %ile Term Code	Gap	MaxR		Max	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
30th %ile Green (s)	11.6	33.0		16.8	38.2	38.2	15.2	28.2	28.2	12.0	25.0	25.0
30th %ile Term Code	Gap	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	10.0	33.0		12.8	35.8	35.8	12.1	21.3	21.3	10.0	19.2	19.2
10th %ile Term Code	Min	MaxR		Gap	Hold	Hold	Gap	Hold	Hold	Min	Gap	Gap
Stops (vph)	109	515		161	623	25	231	262	29	202	509	25
Fuel Used(l)	16	70		33	105	18	29	31	14	29	71	15
CO Emissions (g/hr)	305	1305		612	1951	337	548	577	262	542	1315	277
NOx Emissions (g/hr)	59	252		118	377	65	106	111	51	105	254	53
VOC Emissions (g/hr)	70	301		141	450	78	126	133	60	125	303	64
Dilemma Vehicles (#)	0	25		0	30	0	0	13	0	0	23	0
Queue Length 50th (m)	26.9	76.6		44.0	94.0	0.0	32.7	38.5	0.0	26.9	75.0	0.0
Queue Length 95th (m)	45.8	103.3		#84.0	#140.0	21.8	44.3	55.2	23.9	37.4	100.5	22.1
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	367	929		404	1039	655	829	891	631	1020	811	548
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.69		0.72	0.76	0.42	0.47	0.40	0.50	0.32	0.74	0.45

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 117

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 33.9

Intersection LOS: C

Intersection Capacity Utilization 77.2%

ICU Level of Service D

Analysis Period (min) 15

90th %ile Actuated Cycle: 125.5

70th %ile Actuated Cycle: 123.4

50th %ile Actuated Cycle: 121

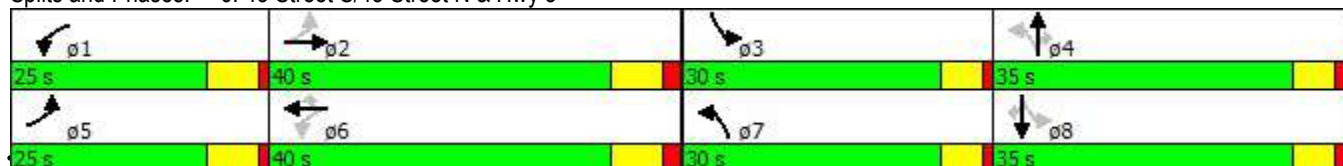
30th %ile Actuated Cycle: 114

10th %ile Actuated Cycle: 101.1

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	28	87	40	10	10	212	857	166	34	441	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.925				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1292	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.742			0.735			0.950			0.277		
Satd. Flow (perm)	1369	1845	1568	1027	1292	0	1656	3312	1482	483	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			105		12				200			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	46	34	105	48	12	12	255	1033	200	41	531	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	34	105	48	24	0	255	1033	200	41	531	25
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		27.0	67.5	67.5	40.5	40.5	40.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		27.0%	67.5%	67.5%	40.5%	40.5%	40.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		21.0	61.0	61.0	34.0	34.0	34.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	11.4	11.4	11.4	11.4	11.4		20.7	80.2	80.2	52.2	52.2	52.2
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11		0.21	0.80	0.80	0.52	0.52	0.52
v/c Ratio	0.29	0.16	0.39	0.41	0.15		0.75	0.39	0.16	0.16	0.31	0.03
Control Delay	44.9	40.8	12.2	51.4	27.6		44.2	2.3	0.4	19.7	16.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.9	40.8	12.2	51.4	27.6		44.2	2.3	0.4	19.7	16.7	0.0

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	B	B	A
Approach Delay		25.6			43.4			9.2			16.2	
Approach LOS		C			D			A			B	
90th %ile Green (s)	15.1	15.1	15.1	15.1	15.1		27.0	71.9	71.9	38.9	38.9	38.9
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	12.1	12.1	12.1	12.1	12.1		23.7	74.9	74.9	45.2	45.2	45.2
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		20.9	77.0	77.0	50.1	50.1	50.1
50th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		18.0	77.0	77.0	53.0	53.0	53.0
30th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	0.0	0.0	0.0	0.0	0.0		13.7	93.5	93.5	73.8	73.8	73.8
10th %ile Term Code	Skip	Skip	Skip	Skip	Skip		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	34	26	17	38	13		175	136	2	22	254	0
Fuel Used(l)	5	3	7	5	2		29	72	13	3	37	1
CO Emissions (g/hr)	89	64	138	91	36		541	1331	239	56	687	20
NOx Emissions (g/hr)	17	12	27	18	7		104	257	46	11	133	4
VOC Emissions (g/hr)	21	15	32	21	8		125	307	55	13	159	5
Dilemma Vehicles (#)	0	0	0	0	0		0	33	0	0	22	0
Queue Length 50th (m)	8.9	6.5	0.0	9.4	2.3		36.6	12.1	0.0	4.4	32.5	0.0
Queue Length 95th (m)	17.7	13.9	12.1	18.6	8.8		56.3	13.2	0.0	12.8	50.0	0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	355	479	485	267	344		376	2655	1227	251	1729	823
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.07	0.22	0.18	0.07		0.68	0.39	0.16	0.16	0.31	0.03

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 13.3

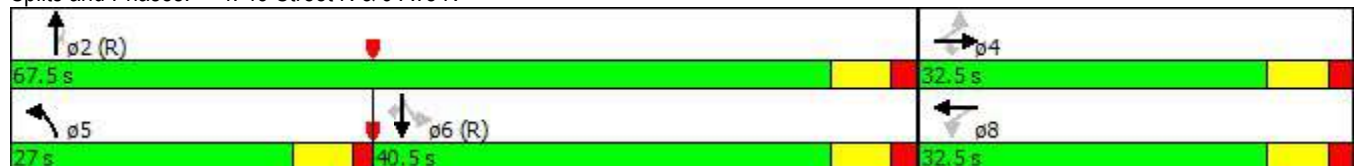
Intersection LOS: B

Intersection Capacity Utilization 61.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	91	160	267	1186	563	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		184				51
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	105	184	307	1363	647	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	184	307	1363	647	51
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		35.0	83.5	48.5	48.5
Total Split (%)	16.5%		35.0%	83.5%	48.5%	48.5%
Maximum Green (s)	10.0		29.0	77.0	42.0	42.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	22.8	81.6	51.5	51.5
Actuated g/C Ratio	0.10	1.00	0.23	0.82	0.52	0.52
v/c Ratio	0.34	0.13	0.79	0.49	0.40	0.07
Control Delay	45.2	0.2	50.9	4.5	8.5	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	0.2	50.9	4.5	8.5	1.2

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	D	A	A	A
Approach Delay	16.5			13.0	8.0	
Approach LOS	B			B	A	
90th %ile Green (s)	10.0		29.0	77.0	42.0	42.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		26.3	77.0	44.7	44.7
70th %ile Term Code	Max		Gap	Coord	Coord	Coord
50th %ile Green (s)	10.0		23.2	77.0	47.8	47.8
50th %ile Term Code	Max		Gap	Coord	Coord	Coord
30th %ile Green (s)	10.0		20.1	77.0	50.9	50.9
30th %ile Term Code	Max		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		15.4	93.5	72.1	72.1
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	83	0	244	351	211	3
Fuel Used(l)	11	11	33	82	54	4
CO Emissions (g/hr)	211	206	618	1517	998	65
NOx Emissions (g/hr)	41	40	119	293	193	13
VOC Emissions (g/hr)	49	48	142	350	230	15
Dilemma Vehicles (#)	0	0	0	50	25	0
Queue Length 50th (m)	10.4	0.0	58.9	45.3	13.4	0.0
Queue Length 95th (m)	18.2	0.0	80.0	53.6	19.7	1.3
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	312	1442	493	2779	1602	741
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.13	0.62	0.49	0.40	0.07

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 12.1

Intersection LOS: B

Intersection Capacity Utilization 54.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	480	659	9	266	641	589	283	750	192	432	438	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1626	3246	0	1656	3312	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.288			0.162			0.480			0.105		
Satd. Flow (perm)	493	3246	0	282	3312	1482	1608	3282	1468	337	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				288			199			247
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	522	716	10	289	697	640	308	815	209	470	476	247
Shared Lane Traffic (%)												
Lane Group Flow (vph)	522	726	0	289	697	640	308	815	209	470	476	247
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	17.0	43.0		23.0	49.0	49.0	15.0	39.0	39.0	25.0	49.0	49.0
Total Split (%)	13.1%	33.1%		17.7%	37.7%	37.7%	11.5%	30.0%	30.0%	19.2%	37.7%	37.7%
Maximum Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	48.0	36.0		60.0	42.0	42.0	44.0	33.0	33.0	57.5	41.5	41.5
Actuated g/C Ratio	0.37	0.28		0.47	0.33	0.33	0.34	0.26	0.26	0.45	0.32	0.32
v/c Ratio	1.86	0.80		0.92	0.64	0.94	0.46	0.97	0.40	0.87	0.47	0.40
Control Delay	424.7	50.8		61.6	40.4	47.0	25.3	71.5	8.5	49.7	36.5	5.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	424.7	50.8		61.6	40.4	47.0	25.3	71.5	8.5	49.7	36.5	5.7
LOS	F	D		E	D	D	C	E	A	D	D	A
Approach Delay		207.2			46.8			50.9			35.3	
Approach LOS		F			D			D			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-AM
Future 2022 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
70th %ile Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
50th %ile Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
30th %ile Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	18.2	41.2	41.2
30th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Gap	Hold	Hold
10th %ile Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	14.6	37.6	37.6
10th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Gap	Hold	Hold
Stops (vph)	279	605		158	535	324	196	675	26	309	340	21
Fuel Used(l)	190	84		38	90	76	23	93	10	51	48	14
CO Emissions (g/hr)	3531	1570		705	1671	1412	428	1723	180	941	887	266
NOx Emissions (g/hr)	682	303		136	323	273	83	333	35	182	171	51
VOC Emissions (g/hr)	814	362		163	385	326	99	397	41	217	204	61
Dilemma Vehicles (#)	0	26		0	25	0	0	27	0	0	17	0
Queue Length 50th (m)	~206.3	96.1		50.7	84.6	106.2	25.4	115.4	2.1	48.4	53.1	0.0
Queue Length 95th (m)	#285.2	120.8		#106.6	106.7	#188.9	35.4	#159.0	22.6	#73.7	70.1	19.1
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	280	909		313	1082	678	673	842	525	572	1050	634
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.86	0.80		0.92	0.64	0.94	0.46	0.97	0.40	0.82	0.45	0.39

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 128.6

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.86

Intersection Signal Delay: 82.3

Intersection LOS: F

Intersection Capacity Utilization 99.6%

ICU Level of Service F

Analysis Period (min) 15

90th %ile Actuated Cycle: 130

70th %ile Actuated Cycle: 130

50th %ile Actuated Cycle: 130

30th %ile Actuated Cycle: 128.2

10th %ile Actuated Cycle: 124.6

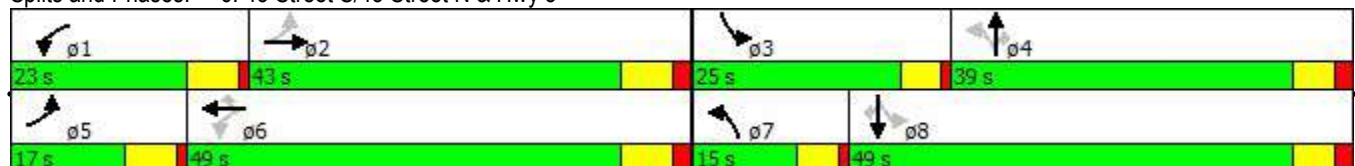
~ Volume exceeds capacity, queue is theoretically infinite.

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: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
2: 43 Street N & 18 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	35	112	54	8	6	187	179	243	28	298	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.904			0.987			0.946			0.995	
Flt Protected		0.997			0.962			0.985			0.996	
Satd. Flow (prot)	0	1529	0	0	1640	0	0	1609	0	0	1828	0
Flt Permitted		0.980			0.633			0.731			0.901	
Satd. Flow (perm)	0	1503	0	0	1079	0	0	1194	0	0	1654	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		120			5			61			3	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		716.1			196.5			496.3			520.4	
Travel Time (s)		51.6			14.1			25.5			26.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.78	0.92	0.92	0.92	0.78	0.78	0.78	0.78	0.78	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	12%	12%	12%	10%	10%	10%	10%	10%	10%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	14	45	144	59	9	7	240	229	312	36	382	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	203	0	0	75	0	0	781	0	0	433	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	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)	22.5	22.5		22.5	22.5		26.5	26.5		22.5	22.5	
Total Split (s)	33.0	33.0		33.0	33.0		67.0	67.0		67.0	67.0	
Total Split (%)	33.0%	33.0%		33.0%	33.0%		67.0%	67.0%		67.0%	67.0%	
Maximum Green (s)	26.5	26.5		26.5	26.5		60.5	60.5		60.5	60.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.5			6.5			6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

Lanes, Volumes, Timings
2: 43 Street N & 18 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		26.5			26.5			60.5			60.5	
Actuated g/C Ratio		0.26			0.26			0.60			0.60	
v/c Ratio		0.42			0.26			1.05			0.43	
Control Delay		15.7			30.0			45.8			12.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.7			30.0			45.8			12.2	
LOS		B			C			D			B	
Approach Delay		15.7			30.0			45.8			12.2	
Approach LOS		B			C			D			B	
Queue Length 50th (m)		13.2			11.3			~168.4			43.4	
Queue Length 95th (m)		25.1			24.0			#184.1			52.7	
Internal Link Dist (m)		692.1			172.5			472.3			496.4	
Turn Bay Length (m)												
Base Capacity (vph)		486			289			746			1001	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.42			0.26			1.05			0.43	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 86 (86%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 31.1

Intersection LOS: C

Intersection Capacity Utilization 91.5%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: 43 Street N & 18 Ave N



Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	7	21	53	2	6	76	582	236	28	421	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.912			0.986			0.957			0.995	
Flt Protected		0.994			0.959		0.950				0.997	
Satd. Flow (prot)	0	1111	0	0	1633	0	1641	1653	0	0	1778	0
Flt Permitted		0.971			0.733		0.432				0.669	
Satd. Flow (perm)	0	1086	0	0	1248	0	746	1653	0	0	1193	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			5			41			4	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		748.5			168.6			405.2			496.3	
Travel Time (s)		53.9			12.1			20.8			25.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.81	0.81	0.81	0.81	0.81	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	55%	55%	55%	10%	10%	10%	10%	10%	10%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	9	26	58	2	7	94	719	291	35	520	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	40	0	0	67	0	94	1010	0	0	575	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	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)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	29.0	29.0		29.0	29.0		71.0	71.0		71.0	71.0	
Total Split (%)	29.0%	29.0%		29.0%	29.0%		71.0%	71.0%		71.0%	71.0%	
Maximum Green (s)	22.5	22.5		22.5	22.5		64.5	64.5		64.5	64.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.5			6.5		6.5	6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		22.5			22.5		64.5	64.5			64.5	
Actuated g/C Ratio		0.22			0.22		0.64	0.64			0.64	
v/c Ratio		0.15			0.24		0.20	0.94			0.75	
Control Delay		17.9			32.0		6.3	27.9			20.3	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		17.9			32.0		6.3	27.9			20.3	
LOS		B			C		A	C			C	
Approach Delay		17.9			32.0			26.0			20.3	
Approach LOS		B			C			C			C	
Queue Length 50th (m)		2.3			10.4		4.8	177.3			75.4	
Queue Length 95th (m)		9.6			22.7		7.9	203.9			96.6	
Internal Link Dist (m)		724.5			144.6			381.2			472.3	
Turn Bay Length (m)							75.0					
Base Capacity (vph)		264			284		481	1080			770	
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		0.15			0.24		0.20	0.94			0.75	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 63 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 24.2

Intersection LOS: C

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: 43 Street N & 14 Ave N



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	28	87	40	10	10	212	857	166	34	441	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt			0.850		0.925				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1292	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.742			0.735			0.950			0.277		
Satd. Flow (perm)	1369	1845	1568	1027	1292	0	1656	3312	1482	483	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			105		12				200			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	46	34	105	48	12	12	255	1033	200	41	531	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	34	105	48	24	0	255	1033	200	41	531	25
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		31.0	67.5	67.5	36.5	36.5	36.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		31.0%	67.5%	67.5%	36.5%	36.5%	36.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		25.0	61.0	61.0	30.0	30.0	30.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0		18.0	18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0	0	0	0	0
Act Effect Green (s)	11.4	11.4	11.4	11.4	11.4		20.4	80.2	80.2	52.4	52.4	52.4
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11		0.20	0.80	0.80	0.52	0.52	0.52
v/c Ratio	0.29	0.16	0.39	0.41	0.15		0.75	0.39	0.16	0.16	0.31	0.03
Control Delay	44.9	40.8	12.2	51.4	27.6		47.9	2.8	0.5	24.0	19.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.9	40.8	12.2	51.4	27.6		47.9	2.8	0.5	24.0	19.2	0.0
LOS	D	D	B	D	C		D	A	A	C	B	A
Approach Delay	25.6				43.4		10.2		18.8			
Approach LOS	C				D		B		B			
Queue Length 50th (m)	8.9	6.5	0.0	9.4	2.3		42.8	19.5	0.0	5.1	34.8	0.0
Queue Length 95th (m)	17.7	13.9	12.1	18.6	8.8		47.2	21.6	0.6	m9.7	54.9	m0.0
Internal Link Dist (m)	726.2				627.0		858.4		174.2			
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		
Base Capacity (vph)	355	479	485	267	344		422	2655	1227	252	1736	826
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.07	0.22	0.18	0.07		0.60	0.39	0.16	0.16	0.31	0.03

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 87 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 14.6

Intersection LOS: B

Intersection Capacity Utilization 61.3%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	91	160	267	1186	563	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		184				51
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	105	184	307	1363	647	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	105	184	307	1363	647	51
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		35.0	83.5	48.5	48.5
Total Split (%)	16.5%		35.0%	83.5%	48.5%	48.5%
Maximum Green (s)	10.0		29.0	77.0	42.0	42.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0		3.0	3.0	3.0	3.0

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	EBL	EBR	NBL	NBT	SBT	SBR
Time Before Reduce (s)	0.0		0.0	0.0	0.0	0.0						
Time To Reduce (s)	0.0		0.0	0.0	0.0	0.0						
Recall Mode	None		None	C-Max	C-Max	C-Max						
Walk Time (s)				8.0								
Flash Dont Walk (s)				14.0								
Pedestrian Calls (#/hr)				0								
Act Effect Green (s)	10.0	100.0	22.8	81.6	51.5	51.5						
Actuated g/C Ratio	0.10	1.00	0.23	0.82	0.52	0.52						
v/c Ratio	0.34	0.13	0.79	0.49	0.40	0.07						
Control Delay	45.2	0.2	50.9	4.5	11.1	1.6						
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0						
Total Delay	45.2	0.2	50.9	4.5	11.1	1.6						
LOS	D	A	D	A	B	A						
Approach Delay	16.5			13.0	10.4							
Approach LOS	B			B	B							
Queue Length 50th (m)	10.4	0.0	58.9	45.3	50.8	0.4						
Queue Length 95th (m)	18.2	0.0	80.0	53.6	17.7	1.3						
Internal Link Dist (m)	704.0			316.2	858.4							
Turn Bay Length (m)		100.0	140.0			100.0						
Base Capacity (vph)	312	1442	493	2779	1602	741						
Starvation Cap Reductn	0	0	0	0	0	0						
Spillback Cap Reductn	0	0	0	0	0	0						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.34	0.13	0.62	0.49	0.40	0.07						

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 12.7

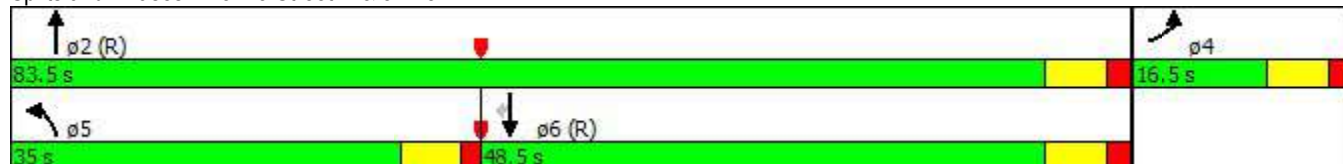
Intersection LOS: B

Intersection Capacity Utilization 54.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	480	659	9	266	641	589	283	750	192	432	438	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	2		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Ped Bike Factor												
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3155	3246	0	1656	3312	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.288			0.162			0.480			0.105		
Satd. Flow (perm)	956	3246	0	282	3312	1482	1608	3282	1468	337	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				288			199			247
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	522	716	10	289	697	640	308	815	209	470	476	247
Shared Lane Traffic (%)												
Lane Group Flow (vph)	522	726	0	289	697	640	308	815	209	470	476	247
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	17.0	43.0		23.0	49.0	49.0	15.0	39.0	39.0	25.0	49.0	49.0
Total Split (%)	13.1%	33.1%		17.7%	37.7%	37.7%	11.5%	30.0%	30.0%	19.2%	37.7%	37.7%
Maximum Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-AM-Mit
Future 2022 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)	48.0	36.0		60.0	42.0	42.0	44.0	33.0	33.0	57.5	41.5	41.5
Actuated g/C Ratio	0.37	0.28		0.47	0.33	0.33	0.34	0.26	0.26	0.45	0.32	0.32
v/c Ratio	0.96	0.80		0.92	0.64	0.94	0.46	0.97	0.40	0.87	0.47	0.40
Control Delay	57.8	50.8		61.6	40.4	47.0	25.3	71.5	8.5	49.7	36.5	5.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.8	50.8		61.6	40.4	47.0	25.3	71.5	8.5	49.7	36.5	5.7
LOS	E	D		E	D	D	C	E	A	D	D	A
Approach Delay		53.7			46.8			50.9			35.3	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	45.8	96.1		50.7	84.6	106.2	25.4	115.4	2.1	48.4	53.1	0.0
Queue Length 95th (m)	#78.5	120.8		#106.6	106.7	#188.9	35.4	#159.0	22.6	#73.7	70.1	19.1
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	545	909		313	1082	678	673	842	525	572	1050	634
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.80		0.92	0.64	0.94	0.46	0.97	0.40	0.82	0.45	0.39

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 128.6

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 46.9

Intersection LOS: D

Intersection Capacity Utilization 86.7%

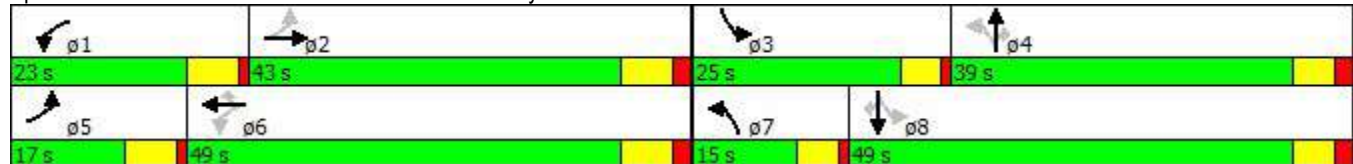
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	9	248	186	25	33	144	477	42	9	904	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.915				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1704	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.710			0.750			0.950			0.427		
Satd. Flow (perm)	1273	1792	1524	1397	1704	0	1597	3195	1429	758	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			310		41				52			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	29	11	310	232	31	41	180	596	52	11	1130	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	11	310	232	72	0	180	596	52	11	1130	70
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5		12.0	22.5	22.5	22.5	22.5	22.5
Total Split (s)	30.0	30.0	30.0	30.0	30.0		24.0	70.0	70.0	46.0	46.0	46.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%		24.0%	70.0%	70.0%	46.0%	46.0%	46.0%
Maximum Green (s)	23.5	23.5	23.5	23.5	23.5		18.0	63.5	63.5	39.5	39.5	39.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	20.3	20.3	20.3	20.3	20.3		15.3	66.7	66.7	45.4	45.4	45.4
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20		0.15	0.67	0.67	0.45	0.45	0.45
v/c Ratio	0.11	0.03	0.56	0.82	0.19		0.74	0.28	0.05	0.03	0.74	0.09
Control Delay	31.9	30.1	7.9	60.5	17.3		54.3	6.1	1.5	18.8	27.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	30.1	7.9	60.5	17.3		54.3	6.1	1.5	18.8	27.6	1.9

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	A	E	B		D	A	A	B	C	A
Approach Delay		10.6			50.2			16.3			26.0	
Approach LOS		B			D			B			C	
90th %ile Green (s)	23.5	23.5	23.5	23.5	23.5		18.0	63.5	63.5	39.5	39.5	39.5
90th %ile Term Code	Hold	Hold	Hold	Max	Max		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	23.5	23.5	23.5	23.5	23.5		18.0	63.5	63.5	39.5	39.5	39.5
70th %ile Term Code	Hold	Hold	Hold	Max	Max		Max	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	22.0	22.0	22.0	22.0	22.0		16.4	65.0	65.0	42.6	42.6	42.6
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	18.7	18.7	18.7	18.7	18.7		13.9	68.3	68.3	48.4	48.4	48.4
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	13.9	13.9	13.9	13.9	13.9		10.2	73.1	73.1	56.9	56.9	56.9
10th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	19	9	29	171	24		135	205	8	6	722	3
Fuel Used(l)	3	1	20	24	5		21	45	4	1	90	3
CO Emissions (g/hr)	49	20	369	446	91		398	845	66	15	1672	58
NOx Emissions (g/hr)	9	4	71	86	18		77	163	13	3	323	11
VOC Emissions (g/hr)	11	5	85	103	21		92	195	15	3	386	13
Dilemma Vehicles (#)	0	0	0	0	0		0	22	0	0	45	0
Queue Length 50th (m)	4.8	1.8	0.0	44.5	5.1		35.4	28.5	0.5	1.3	102.2	0.0
Queue Length 95th (m)	10.9	5.6	12.7	61.4	13.9		50.5	34.3	2.1	4.5	114.3	2.2
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	299	421	595	328	431		287	2130	970	343	1531	741
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.03	0.52	0.71	0.17		0.63	0.28	0.05	0.03	0.74	0.09

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 23.8

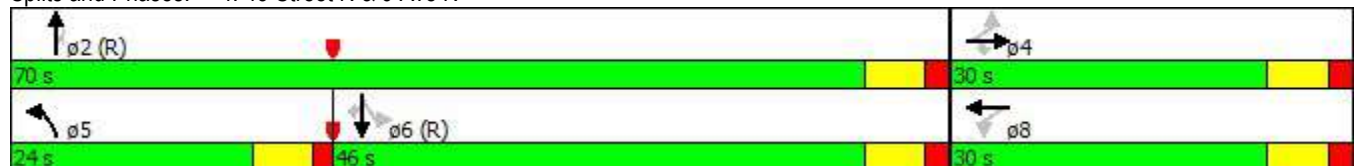
Intersection LOS: C

Intersection Capacity Utilization 66.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	51	274	230	697	1406	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		304				124
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	57	304	256	774	1562	124
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	304	256	774	1562	124
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		28.0	83.5	55.5	55.5
Total Split (%)	16.5%		28.0%	83.5%	55.5%	55.5%
Maximum Green (s)	10.0		22.0	77.0	49.0	49.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	19.5	81.6	54.8	54.8
Actuated g/C Ratio	0.10	1.00	0.20	0.82	0.55	0.55
v/c Ratio	0.17	0.20	0.82	0.29	0.84	0.14
Control Delay	42.7	0.3	59.0	3.3	15.2	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	0.3	59.0	3.3	15.2	1.2

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	E	A	B	A
Approach Delay	7.0			17.2	14.2	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		22.0	77.0	49.0	49.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		22.0	77.0	49.0	49.0
70th %ile Term Code	Max		Max	Coord	Coord	Coord
50th %ile Green (s)	10.0		21.3	77.0	49.7	49.7
50th %ile Term Code	Max		Gap	Coord	Coord	Coord
30th %ile Green (s)	10.0		18.3	77.0	52.7	52.7
30th %ile Term Code	Max		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		13.9	93.5	73.6	73.6
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	46	0	210	162	804	5
Fuel Used(l)	6	19	30	46	150	9
CO Emissions (g/hr)	116	354	559	853	2793	165
NOx Emissions (g/hr)	22	68	108	165	539	32
VOC Emissions (g/hr)	27	82	129	197	644	38
Dilemma Vehicles (#)	0	0	0	30	54	0
Queue Length 50th (m)	5.5	0.0	49.2	20.3	46.5	0.1
Queue Length 95th (m)	11.8	0.0	#83.5	26.6	#201.4	m2.3
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	327	1509	354	2629	1866	891
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.20	0.72	0.29	0.84	0.14

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 14.4

Intersection LOS: B

Intersection Capacity Utilization 75.8%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	216	627	6	288	781	303	387	374	313	452	694	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	1		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1641	3275	0	1687	3374	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.250			0.203			0.120			0.418		
Satd. Flow (perm)	432	3275	0	360	3374	1509	413	3374	1509	1388	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				329			313			204
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	235	682	7	313	849	329	421	407	340	491	754	380
Shared Lane Traffic (%)												
Lane Group Flow (vph)	235	689	0	313	849	329	421	407	340	491	754	380
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	16.0	43.0		29.0	56.0	56.0	19.0	40.0	40.0	18.0	39.0	39.0
Total Split (%)	12.3%	33.1%		22.3%	43.1%	43.1%	14.6%	30.8%	30.8%	13.8%	30.0%	30.0%
Maximum Green (s)	10.0	36.0		23.0	49.0	49.0	14.0	34.0	34.0	13.0	33.0	33.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	50.3	39.3		65.6	49.0	49.0	48.3	33.3	33.3	46.3	32.3	32.3
Actuated g/C Ratio	0.39	0.30		0.51	0.38	0.38	0.37	0.26	0.26	0.36	0.25	0.25
v/c Ratio	0.90	0.69		0.82	0.66	0.42	0.91	0.47	0.55	0.73	0.93	0.74
Control Delay	60.8	44.8		38.3	36.5	4.6	56.3	42.6	9.4	35.8	65.9	29.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.8	44.8		38.3	36.5	4.6	56.3	42.6	9.4	35.8	65.9	29.6
LOS	E	D		D	D	A	E	D	A	D	E	C
Approach Delay		48.9			29.8			37.9			48.3	
Approach LOS		D			C			D			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-PM
Future 2022 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	10.0	36.0		23.0	49.0	49.0	14.0	34.0	34.0	13.0	33.0	33.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
70th %ile Green (s)	10.0	36.0		23.0	49.0	49.0	14.0	34.0	34.0	13.0	33.0	33.0
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
50th %ile Green (s)	10.0	38.3		20.7	49.0	49.0	14.0	34.0	34.0	13.0	33.0	33.0
50th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
30th %ile Green (s)	10.0	41.0		18.0	49.0	49.0	14.0	34.0	34.0	13.0	33.0	33.0
30th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
10th %ile Green (s)	10.0	45.1		13.9	49.0	49.0	14.0	30.5	30.5	13.0	29.5	29.5
10th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Hold	Hold	Max	Gap	Gap
Stops (vph)	138	551		172	633	24	261	308	42	350	638	162
Fuel Used(l)	26	76		36	106	21	40	37	16	49	94	33
CO Emissions (g/hr)	477	1411		669	1972	390	753	687	297	910	1757	608
NOx Emissions (g/hr)	92	272		129	381	75	145	133	57	176	339	117
VOC Emissions (g/hr)	110	326		154	455	90	174	159	68	210	405	140
Dilemma Vehicles (#)	0	24		0	30	0	0	14	0	0	26	0
Queue Length 50th (m)	35.4	87.2		49.5	99.5	0.0	41.8	48.7	5.5	47.3	104.4	44.5
Queue Length 95th (m)	#79.3	113.1		#80.0	123.0	19.4	#72.4	65.3	33.2	62.1	#141.6	84.6
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	261	996		419	1278	776	463	887	627	674	830	523
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.69		0.75	0.66	0.42	0.91	0.46	0.54	0.73	0.91	0.73

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 129.3

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 40.8

Intersection LOS: D

Intersection Capacity Utilization 83.8%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 130

70th %ile Actuated Cycle: 130

50th %ile Actuated Cycle: 130

30th %ile Actuated Cycle: 130

10th %ile Actuated Cycle: 126.5

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
2: 43 Street N & 18 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	9	179	218	31	25	106	338	60	7	279	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.883			0.988			0.984			0.994	
Flt Protected		0.995			0.962			0.990			0.999	
Satd. Flow (prot)	0	1531	0	0	1642	0	0	1698	0	0	1747	0
Flt Permitted		0.949			0.581			0.825			0.986	
Satd. Flow (perm)	0	1461	0	0	992	0	0	1415	0	0	1724	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		208			6			10			3	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		716.1			264.9			496.3			520.4	
Travel Time (s)		51.6			19.1			25.5			26.8	
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	9%	9%	9%	10%	10%	10%	9%	9%	9%	8%	8%	8%
Adj. Flow (vph)	23	10	208	237	34	27	123	393	70	8	324	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	241	0	0	298	0	0	586	0	0	347	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		26.5	26.5		22.5	22.5	
Total Split (s)	43.2	43.2		43.2	43.2		56.8	56.8		56.8	56.8	
Total Split (%)	43.2%	43.2%		43.2%	43.2%		56.8%	56.8%		56.8%	56.8%	
Maximum Green (s)	36.7	36.7		36.7	36.7		50.3	50.3		50.3	50.3	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.5			6.5			6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		36.7			36.7			50.3			50.3	
Actuated g/C Ratio		0.37			0.37			0.50			0.50	
v/c Ratio		0.36			0.81			0.82			0.40	
Control Delay		6.4			47.3			18.8			17.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		6.4			47.3			18.8			17.1	
LOS		A			D			B			B	
Approach Delay		6.4			47.3			18.8			17.1	
Approach LOS		A			D			B			B	
Stops (vph)		33			227			228			177	
Fuel Used(l)		16			22			38			24	
CO Emissions (g/hr)		295			408			700			452	
NOx Emissions (g/hr)		57			79			135			87	
VOC Emissions (g/hr)		68			94			162			104	
Dilemma Vehicles (#)		0			0			38			15	
Queue Length 50th (m)		4.3			53.1			17.8			41.8	
Queue Length 95th (m)		18.3			#100.8			100.1			60.1	

Lanes, Volumes, Timings
2: 43 Street N & 18 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		692.1			240.9			472.3			496.4	
Turn Bay Length (m)												
Base Capacity (vph)		667			367			716			868	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.36			0.81			0.82			0.40	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 86 (86%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Pretimed

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 22.1

Intersection LOS: C

Intersection Capacity Utilization 92.7%

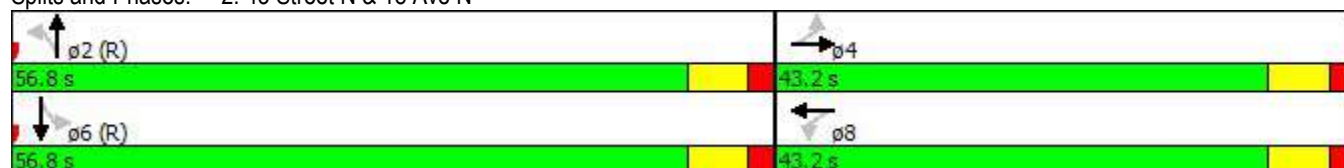
ICU Level of Service F

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: 43 Street N & 18 Ave N



Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	2	89	212	6	25	17	489	58	7	653	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.885			0.986			0.986			0.999	
Flt Protected		0.993			0.958		0.950					
Satd. Flow (prot)	0	1621	0	0	1632	0	1656	1719	0	0	1726	0
Flt Permitted		0.937			0.684		0.307				0.993	
Satd. Flow (perm)	0	1530	0	0	1165	0	535	1719	0	0	1713	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		107			6			9			1	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		748.5			244.9			405.2			496.3	
Travel Time (s)		53.9			17.6			20.8			25.5	
Peak Hour Factor	0.83	0.92	0.83	0.92	0.92	0.92	0.83	0.83	0.92	0.92	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	10%	10%	10%	9%	9%	9%	10%	10%	10%
Adj. Flow (vph)	17	2	107	230	7	27	20	589	63	8	787	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	126	0	0	264	0	20	652	0	0	800	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	36.0	36.0		36.0	36.0		64.0	64.0		64.0	64.0	
Total Split (%)	36.0%	36.0%		36.0%	36.0%		64.0%	64.0%		64.0%	64.0%	
Maximum Green (s)	29.5	29.5		29.5	29.5		57.5	57.5		57.5	57.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.5			6.5		6.5	6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		29.5			29.5		57.5	57.5			57.5	
Actuated g/C Ratio		0.30			0.30		0.58	0.58			0.58	
v/c Ratio		0.24			0.76		0.07	0.66			0.81	
Control Delay		8.5			47.3		8.6	16.2			22.1	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		8.5			47.3		8.6	16.2			22.1	
LOS		A			D		A	B			C	
Approach Delay		8.5			47.3			15.9			22.1	
Approach LOS		A			D			B			C	
Stops (vph)		23			206		6	342			473	
Fuel Used(l)		9			19		1	49			59	
CO Emissions (g/hr)		161			355		23	906			1096	
NOx Emissions (g/hr)		31			69		4	175			212	
VOC Emissions (g/hr)		37			82		5	209			253	

Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Dilemma Vehicles (#)		0			0		0	24			57	
Queue Length 50th (m)		2.8			47.7		1.4	53.2			108.0	
Queue Length 95th (m)		16.3			#88.2		3.4	62.7			147.7	
Internal Link Dist (m)		724.5			220.9			381.2			472.3	
Turn Bay Length (m)							75.0					
Base Capacity (vph)		526			347		307	992			985	
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		0.24			0.76		0.07	0.66			0.81	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 63 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 70

Control Type: Pretimed

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 22.5

Intersection LOS: C

Intersection Capacity Utilization 71.3%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: 43 Street N & 14 Ave N



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	9	248	186	25	33	144	477	42	9	904	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.915				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1792	1524	1770	1704	0	1597	3195	1429	1687	3374	1509
Flt Permitted	0.710			0.750			0.950			0.427		
Satd. Flow (perm)	1273	1792	1524	1397	1704	0	1597	3195	1429	758	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			310		41				52			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	13%	13%	13%	7%	7%	7%
Adj. Flow (vph)	29	11	310	232	31	41	180	596	52	11	1130	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	11	310	232	72	0	180	596	52	11	1130	70
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5		12.0	22.5	22.5	22.5	22.5	22.5
Total Split (s)	30.0	30.0	30.0	30.0	30.0		24.0	70.0	70.0	46.0	46.0	46.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	30.0%		24.0%	70.0%	70.0%	46.0%	46.0%	46.0%
Maximum Green (s)	23.5	23.5	23.5	23.5	23.5		18.0	63.5	63.5	39.5	39.5	39.5
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0			11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	20.3	20.3	20.3	20.3	20.3		15.3	66.7	66.7	45.4	45.4	45.4
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20		0.15	0.67	0.67	0.45	0.45	0.45
v/c Ratio	0.11	0.03	0.56	0.82	0.19		0.74	0.28	0.05	0.03	0.74	0.09
Control Delay	31.9	30.1	7.9	60.5	17.3		54.3	6.1	1.5	20.8	25.4	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	30.1	7.9	60.5	17.3		54.3	6.1	1.5	20.8	25.4	2.9

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	A	E	B		D	A	A	C	C	A
Approach Delay		10.6			50.2			16.3			24.1	
Approach LOS		B			D			B			C	
90th %ile Green (s)	23.5	23.5	23.5	23.5	23.5		18.0	63.5	63.5	39.5	39.5	39.5
90th %ile Term Code	Hold	Hold	Hold	Max	Max		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	23.5	23.5	23.5	23.5	23.5		18.0	63.5	63.5	39.5	39.5	39.5
70th %ile Term Code	Hold	Hold	Hold	Max	Max		Max	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	22.0	22.0	22.0	22.0	22.0		16.4	65.0	65.0	42.6	42.6	42.6
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	18.7	18.7	18.7	18.7	18.7		13.9	68.3	68.3	48.4	48.4	48.4
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	13.9	13.9	13.9	13.9	13.9		10.2	73.1	73.1	56.9	56.9	56.9
10th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	19	9	29	171	24		135	205	8	7	638	7
Fuel Used(l)	3	1	20	24	5		21	45	4	1	86	3
CO Emissions (g/hr)	49	20	369	446	91		398	845	66	16	1593	61
NOx Emissions (g/hr)	9	4	71	86	18		77	163	13	3	307	12
VOC Emissions (g/hr)	11	5	85	103	21		92	195	15	4	367	14
Dilemma Vehicles (#)	0	0	0	0	0		0	22	0	0	59	0
Queue Length 50th (m)	4.8	1.8	0.0	44.5	5.1		35.4	28.5	0.5	1.2	80.1	0.1
Queue Length 95th (m)	10.9	5.6	12.7	61.4	13.9		50.5	34.3	2.1	m2.3	104.1	m0.8
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	299	421	595	328	431		287	2130	970	343	1531	741
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.03	0.52	0.71	0.17		0.63	0.28	0.05	0.03	0.74	0.09

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 85 (85%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 22.9

Intersection LOS: C

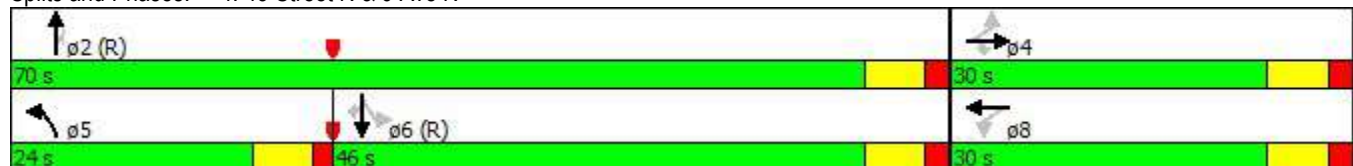
Intersection Capacity Utilization 66.9%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	51	274	230	697	1406	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3273	1509	1612	3223	3406	1524
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3273	1509	1612	3223	3406	1524
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		304				124
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			240.1	882.4	
Travel Time (s)	52.4			14.4	52.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	7%	7%	12%	12%	6%	6%
Adj. Flow (vph)	57	304	256	774	1562	124
Shared Lane Traffic (%)						
Lane Group Flow (vph)	57	304	256	774	1562	124
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		28.0	83.5	55.5	55.5
Total Split (%)	16.5%		28.0%	83.5%	55.5%	55.5%
Maximum Green (s)	10.0		22.0	77.0	49.0	49.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	19.5	81.6	54.8	54.8
Actuated g/C Ratio	0.10	1.00	0.20	0.82	0.55	0.55
v/c Ratio	0.17	0.20	0.82	0.29	0.84	0.14
Control Delay	42.7	0.3	59.0	3.3	15.2	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	0.3	59.0	3.3	15.2	1.2

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	E	A	B	A
Approach Delay	7.0			17.2	14.2	
Approach LOS	A			B	B	
90th %ile Green (s)	10.0		22.0	77.0	49.0	49.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		22.0	77.0	49.0	49.0
70th %ile Term Code	Max		Max	Coord	Coord	Coord
50th %ile Green (s)	10.0		21.3	77.0	49.7	49.7
50th %ile Term Code	Max		Gap	Coord	Coord	Coord
30th %ile Green (s)	10.0		18.3	77.0	52.7	52.7
30th %ile Term Code	Max		Gap	Coord	Coord	Coord
10th %ile Green (s)	0.0		13.9	93.5	73.6	73.6
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Stops (vph)	46	0	210	162	770	5
Fuel Used(l)	6	19	30	46	149	9
CO Emissions (g/hr)	116	354	559	853	2773	165
NOx Emissions (g/hr)	22	68	108	165	535	32
VOC Emissions (g/hr)	27	82	129	197	639	38
Dilemma Vehicles (#)	0	0	0	30	61	0
Queue Length 50th (m)	5.5	0.0	49.2	20.3	47.5	0.1
Queue Length 95th (m)	11.8	0.0	#83.5	26.6	#201.3	m2.3
Internal Link Dist (m)	704.0			216.1	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	327	1509	354	2629	1866	891
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.20	0.72	0.29	0.84	0.14

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 14.3

Intersection LOS: B

Intersection Capacity Utilization 75.8%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 5: 43 Street N & 5 Ave N



Chinook Industrial Park TIA
EA

Synchro 8 Light Report
8/13/2018

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	216	627	6	288	781	303	387	374	313	452	694	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	2		0	1		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3183	3275	0	1687	3374	1509	3273	3374	1509	3155	3252	1455
Flt Permitted	0.245			0.190			0.136			0.407		
Satd. Flow (perm)	821	3275	0	337	3374	1509	469	3374	1509	1352	3252	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				329			315			202
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			401.6	
Travel Time (s)		20.2			35.0			27.3			24.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	10%	10%	10%	7%	7%	7%	7%	7%	7%	11%	11%	11%
Adj. Flow (vph)	235	682	7	313	849	329	421	407	340	491	754	380
Shared Lane Traffic (%)												
Lane Group Flow (vph)	235	689	0	313	849	329	421	407	340	491	754	380
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	16.0	41.0		29.0	54.0	54.0	19.0	41.0	41.0	19.0	41.0	41.0
Total Split (%)	12.3%	31.5%		22.3%	41.5%	41.5%	14.6%	31.5%	31.5%	14.6%	31.5%	31.5%
Maximum Green (s)	10.0	34.0		23.0	47.0	47.0	14.0	35.0	35.0	14.0	35.0	35.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	47.9	36.9		63.6	47.0	47.0	48.3	33.3	33.3	48.3	33.3	33.3
Actuated g/C Ratio	0.37	0.29		0.50	0.37	0.37	0.38	0.26	0.26	0.38	0.26	0.26
v/c Ratio	0.48	0.73		0.83	0.69	0.43	0.87	0.47	0.54	0.70	0.89	0.72
Control Delay	22.9	47.6		41.7	38.2	4.8	48.5	41.9	9.1	32.7	59.9	28.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	47.6		41.7	38.2	4.8	48.5	41.9	9.1	32.7	59.9	28.2
LOS	C	D		D	D	A	D	D	A	C	E	C
Approach Delay		41.3			31.6			34.7			44.3	
Approach LOS		D			C			C			D	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2022-PM-Mit
Future 2022 PM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	10.0	34.0		23.0	47.0	47.0	14.0	35.0	35.0	14.0	35.0	35.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
70th %ile Green (s)	10.0	34.0		23.0	47.0	47.0	14.0	35.0	35.0	14.0	35.0	35.0
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
50th %ile Green (s)	10.0	34.7		22.3	47.0	47.0	14.0	35.0	35.0	14.0	35.0	35.0
50th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Hold	Hold	Max	Max	Max
30th %ile Green (s)	10.0	38.5		18.5	47.0	47.0	14.0	33.9	33.9	14.0	33.9	33.9
30th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Hold	Hold	Max	Gap	Gap
10th %ile Green (s)	10.0	43.1		13.9	47.0	47.0	14.0	27.8	27.8	14.0	27.8	27.8
10th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Hold	Hold	Max	Gap	Gap
Stops (vph)	139	562		178	647	24	256	306	41	329	640	161
Fuel Used(l)	19	78		37	108	21	38	37	16	47	91	32
CO Emissions (g/hr)	361	1448		689	2006	391	706	682	295	877	1699	601
NOx Emissions (g/hr)	70	280		133	387	75	136	132	57	169	328	116
VOC Emissions (g/hr)	83	334		159	463	90	163	157	68	202	392	139
Dilemma Vehicles (#)	0	25		0	30	0	0	14	0	0	26	0
Queue Length 50th (m)	17.4	91.0		51.2	102.2	0.0	38.6	48.2	5.0	45.9	102.1	44.1
Queue Length 95th (m)	25.3	115.7		#90.8	126.4	19.9	#66.9	64.5	32.2	60.4	#134.2	83.3
Internal Link Dist (m)		425.3			752.8			430.3			377.6	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	490	943		410	1236	761	482	920	640	705	887	544
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.73		0.76	0.69	0.43	0.87	0.44	0.53	0.70	0.85	0.70

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 128.3

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 38.0

Intersection LOS: D

Intersection Capacity Utilization 83.7%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 130

70th %ile Actuated Cycle: 130

50th %ile Actuated Cycle: 130

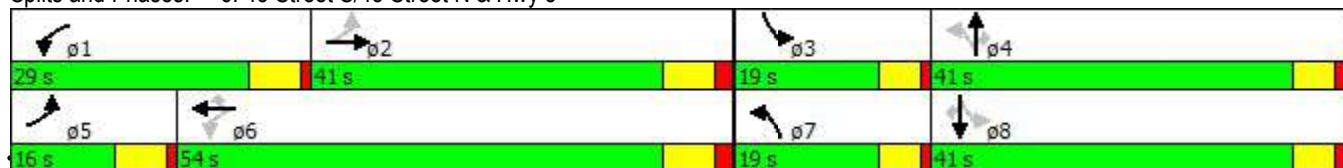
30th %ile Actuated Cycle: 128.9

10th %ile Actuated Cycle: 122.8

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

Queue shown is maximum after two cycles.

Splits and Phases: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
2: 43 Street N & 18 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	35	149	54	8	6	249	212	243	28	376	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.898			0.987			0.953			0.995	
Flt Protected		0.997			0.962			0.983			0.997	
Satd. Flow (prot)	0	1519	0	0	1640	0	0	1618	0	0	1830	0
Flt Permitted		0.980			0.595			0.645			0.905	
Satd. Flow (perm)	0	1493	0	0	1014	0	0	1062	0	0	1661	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		155			5			46			3	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		716.1			196.5			496.3			520.4	
Travel Time (s)		51.6			14.1			25.5			26.8	
Peak Hour Factor	0.78	0.78	0.78	0.92	0.92	0.92	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	12%	12%	12%	10%	10%	10%	10%	10%	10%	3%	3%	3%
Adj. Flow (vph)	17	45	191	59	9	7	319	272	312	36	482	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	253	0	0	75	0	0	903	0	0	537	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		26.5	26.5		22.5	22.5	
Total Split (s)	35.0	35.0		35.0	35.0		65.0	65.0		65.0	65.0	
Total Split (%)	35.0%	35.0%		35.0%	35.0%		65.0%	65.0%		65.0%	65.0%	
Maximum Green (s)	28.5	28.5		28.5	28.5		58.5	58.5		58.5	58.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.5			6.5			6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		28.5			28.5			58.5			58.5	
Actuated g/C Ratio		0.28			0.28			0.58			0.58	
v/c Ratio		0.47			0.26			1.41			0.55	
Control Delay		14.8			28.6			204.0			15.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		14.8			28.6			204.0			15.4	
LOS		B			C			F			B	
Approach Delay		14.8			28.6			204.0			15.4	
Approach LOS		B			C			F			B	
Stops (vph)		66			49			351			247	
Fuel Used(l)		17			4			154			34	
CO Emissions (g/hr)		318			73			2871			624	
NOx Emissions (g/hr)		61			14			554			120	
VOC Emissions (g/hr)		73			17			662			144	
Dilemma Vehicles (#)		0			0			33			21	
Queue Length 50th (m)		15.3			11.0			~243.2			62.3	
Queue Length 95th (m)		28.0			23.5			m#233.4			73.2	

Lanes, Volumes, Timings 2: 43 Street N & 18 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)		692.1			172.5			472.3			496.4	
Turn Bay Length (m)												
Base Capacity (vph)		536			292			640			972	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.47			0.26			1.41			0.55	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 86 (86%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 110

Control Type: Pretimed

Maximum v/c Ratio: 1.41

Intersection Signal Delay: 112.2

Intersection LOS: F

Intersection Capacity Utilization 101.6%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

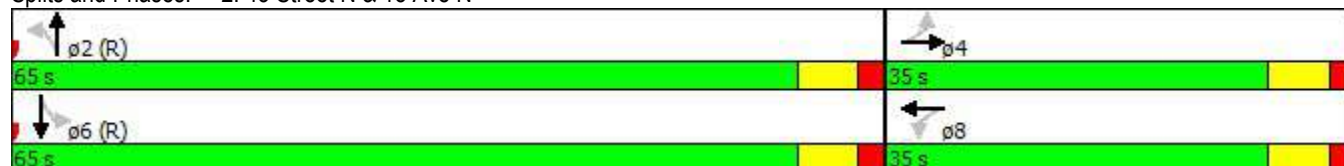
Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 2: 43 Street N & 18 Ave N



Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	7	27	53	2	6	101	670	236	28	532	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.905			0.986			0.961			0.995	
Flt Protected		0.995			0.959		0.950				0.998	
Satd. Flow (prot)	0	1104	0	0	1633	0	1641	1660	0	0	1780	0
Flt Permitted		0.975			0.728		0.368				0.501	
Satd. Flow (perm)	0	1082	0	0	1240	0	636	1660	0	0	894	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33			5			36			4	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		748.5			168.6			405.2			496.3	
Travel Time (s)		53.9			12.1			20.8			25.5	
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	55%	55%	55%	10%	10%	10%	10%	10%	10%	6%	6%	6%
Adj. Flow (vph)	5	9	33	58	2	7	125	827	291	35	657	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	47	0	0	67	0	125	1118	0	0	718	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	29.0	29.0		29.0	29.0		71.0	71.0		71.0	71.0	
Total Split (%)	29.0%	29.0%		29.0%	29.0%		71.0%	71.0%		71.0%	71.0%	
Maximum Green (s)	22.5	22.5		22.5	22.5		64.5	64.5		64.5	64.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.5			6.5		6.5	6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		22.5			22.5		64.5	64.5			64.5	
Actuated g/C Ratio		0.22			0.22		0.64	0.64			0.64	
v/c Ratio		0.17			0.24		0.30	1.03			1.24	
Control Delay		16.7			32.1		7.8	49.3			146.6	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		16.7			32.1		7.8	49.3			146.6	
LOS		B			C		A	D			F	
Approach Delay		16.7			32.1			45.2			146.6	
Approach LOS		B			C			D			F	
Stops (vph)		15			47		27	613			428	
Fuel Used(l)		4			4		7	106			108	
CO Emissions (g/hr)		66			67		126	1968			2008	
NOx Emissions (g/hr)		13			13		24	380			388	
VOC Emissions (g/hr)		15			15		29	454			463	

Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Dilemma Vehicles (#)		0			0		0	37			38	
Queue Length 50th (m)		2.3			10.4		7.3	~182.5			~177.2	
Queue Length 95th (m)		10.1			22.7		11.0	#130.1			#213.5	
Internal Link Dist (m)		724.5			144.6			381.2			472.3	
Turn Bay Length (m)							75.0					
Base Capacity (vph)		269			282		410	1083			578	
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		0.17			0.24		0.30	1.03			1.24	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 63 (63%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 79.2

Intersection LOS: E

Intersection Capacity Utilization 73.1%

ICU Level of Service D

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: 43 Street N & 14 Ave N



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	32	116	46	12	11	282	971	193	38	551	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.928				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1296	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.740			0.732			0.950			0.242		
Satd. Flow (perm)	1365	1845	1568	1023	1296	0	1656	3312	1482	422	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			140		13				233			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	47	39	140	55	14	13	340	1170	233	46	664	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	47	39	140	55	27	0	340	1170	233	46	664	30
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		27.0	67.5	67.5	40.5	40.5	40.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		27.0%	67.5%	67.5%	40.5%	40.5%	40.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		21.0	61.0	61.0	34.0	34.0	34.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	12.0	12.0	12.0	12.0	12.0		28.0	75.0	75.0	41.0	41.0	41.0
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.28	0.75	0.75	0.41	0.41	0.41
v/c Ratio	0.29	0.18	0.45	0.45	0.16		0.73	0.47	0.20	0.27	0.49	0.04
Control Delay	43.9	40.4	11.6	52.3	27.1		35.5	3.0	0.4	29.8	28.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.9	40.4	11.6	52.3	27.1		35.5	3.0	0.4	29.8	28.7	0.0

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	C	C	A
Approach Delay		23.3			44.0			9.0			27.6	
Approach LOS		C			D			A			C	
90th %ile Green (s)	16.2	16.2	16.2	16.2	16.2		30.8	70.8	70.8	34.0	34.0	34.0
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Max	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	12.9	12.9	12.9	12.9	12.9		29.8	74.1	74.1	38.3	38.3	38.3
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.7	10.7	10.7	10.7	10.7		28.6	76.3	76.3	41.7	41.7	41.7
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		27.1	77.0	77.0	43.9	43.9	43.9
30th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		23.9	77.0	77.0	47.1	47.1	47.1
10th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
Stops (vph)	34	29	18	42	13		211	162	2	26	387	0
Fuel Used(l)	5	4	10	6	2		36	82	15	4	54	1
CO Emissions (g/hr)	90	73	181	105	39		672	1523	277	69	996	24
NOx Emissions (g/hr)	17	14	35	20	8		130	294	54	13	192	5
VOC Emissions (g/hr)	21	17	42	24	9		155	351	64	16	230	6
Dilemma Vehicles (#)	0	0	0	0	0		0	45	0	0	39	0
Queue Length 50th (m)	9.0	7.4	0.0	10.8	2.6		44.2	16.6	0.0	6.9	53.3	0.0
Queue Length 95th (m)	17.7	15.2	13.3	20.4	9.4		68.2	17.8	0.2	m6.8	m45.8	m0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	354	479	511	265	346		464	2485	1170	172	1357	668
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.08	0.27	0.21	0.08		0.73	0.47	0.20	0.27	0.49	0.04

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 87 (87%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 16.1

Intersection LOS: B

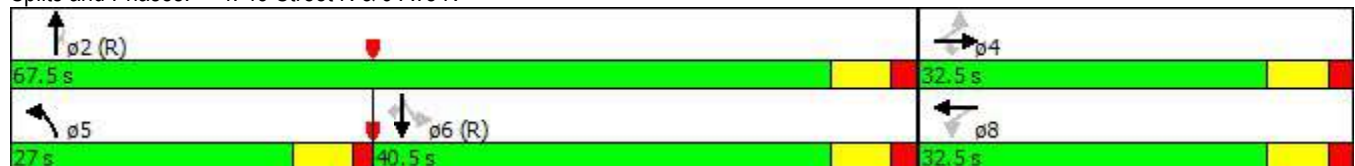
Intersection Capacity Utilization 64.8%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	98	213	356	1405	711	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		245				61
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	113	245	409	1615	817	61
Shared Lane Traffic (%)						
Lane Group Flow (vph)	113	245	409	1615	817	61
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		35.0	83.5	48.5	48.5
Total Split (%)	16.5%		35.0%	83.5%	48.5%	48.5%
Maximum Green (s)	10.0		29.0	77.0	42.0	42.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	100.0	26.9	77.0	44.1	44.1
Actuated g/C Ratio	0.10	1.00	0.27	0.77	0.44	0.44
v/c Ratio	0.36	0.17	0.89	0.62	0.60	0.09
Control Delay	45.6	0.3	58.0	6.3	9.6	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	0.3	58.0	6.3	9.6	1.0

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	D	A	E	A	A	A
Approach Delay	14.6			16.7	9.0	
Approach LOS	B			B	A	
90th %ile Green (s)	10.0		29.0	77.0	42.0	42.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		29.0	77.0	42.0	42.0
70th %ile Term Code	Max		Max	Coord	Coord	Coord
50th %ile Green (s)	10.0		29.0	77.0	42.0	42.0
50th %ile Term Code	Max		Max	Coord	Coord	Coord
30th %ile Green (s)	10.0		26.4	77.0	44.6	44.6
30th %ile Term Code	Max		Gap	Coord	Coord	Coord
10th %ile Green (s)	10.0		21.2	77.0	49.8	49.8
10th %ile Term Code	Max		Gap	Coord	Coord	Coord
Stops (vph)	88	0	319	553	283	3
Fuel Used(l)	12	15	46	103	69	4
CO Emissions (g/hr)	227	275	856	1914	1281	78
NOx Emissions (g/hr)	44	53	165	369	247	15
VOC Emissions (g/hr)	52	63	197	442	296	18
Dilemma Vehicles (#)	0	0	0	70	21	0
Queue Length 50th (m)	11.2	0.0	77.8	61.3	15.7	0.2
Queue Length 95th (m)	19.4	0.0	#120.9	71.7	21.8	1.6
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	312	1442	493	2622	1371	647
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.17	0.83	0.62	0.60	0.09

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

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

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 14.4

Intersection LOS: B

Intersection Capacity Utilization 63.5%

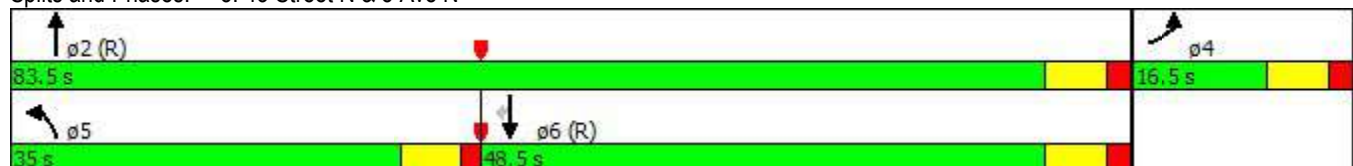
ICU Level of Service B

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	582	878	12	354	854	722	377	967	255	561	571	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	2		0	2		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3155	4664	0	3213	4759	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.220			0.154			0.375			0.105		
Satd. Flow (perm)	731	4664	0	521	4759	1482	1257	3282	1468	337	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				280			202			233
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	633	954	13	385	928	785	410	1051	277	610	621	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	633	967	0	385	928	785	410	1051	277	610	621	315
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	17.0	43.0		23.0	49.0	49.0	15.0	39.0	39.0	25.0	49.0	49.0
Total Split (%)	13.1%	33.1%		17.7%	37.7%	37.7%	11.5%	30.0%	30.0%	19.2%	37.7%	37.7%
Maximum Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	50.3	38.3		57.7	42.0	42.0	44.0	33.0	33.0	59.0	43.0	43.0
Actuated g/C Ratio	0.39	0.29		0.44	0.32	0.32	0.34	0.25	0.25	0.45	0.33	0.33
v/c Ratio	1.30	0.70		0.72	0.60	1.18	0.72	1.26	0.53	1.07	0.60	0.51
Control Delay	175.2	44.5		29.7	39.0	120.1	33.5	167.7	15.9	94.5	39.2	12.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	175.2	44.5		29.7	39.0	120.1	33.5	167.7	15.9	94.5	39.2	12.4
LOS	F	D		C	D	F	C	F	B	F	D	B
Approach Delay		96.2			67.6			111.8			55.6	
Approach LOS		F			E			F			E	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-AM
Future 2037 AM Peak Hour - (With BG2037 Mitigation)

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	11.0	36.0		17.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
70th %ile Green (s)	11.0	36.3		16.7	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
70th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
50th %ile Green (s)	11.0	38.0		15.0	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
50th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
30th %ile Green (s)	11.0	39.5		13.5	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
30th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
10th %ile Green (s)	11.0	41.6		11.4	42.0	42.0	10.0	33.0	33.0	20.0	43.0	43.0
10th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
Stops (vph)	350	776		212	699	418	297	787	67	395	465	68
Fuel Used(l)	119	106		42	118	135	34	188	15	85	64	21
CO Emissions (g/hr)	2215	1980		779	2194	2508	636	3503	285	1577	1191	393
NOx Emissions (g/hr)	428	382		150	423	484	123	676	55	304	230	76
VOC Emissions (g/hr)	511	457		180	506	578	147	808	66	364	275	91
Dilemma Vehicles (#)	0	34		0	33	0	0	29	0	0	22	0
Queue Length 50th (m)	~79.3	85.2		32.1	76.9	~198.8	35.0	~187.0	16.0	~79.0	73.3	15.7
Queue Length 95th (m)	#122.9	104.5		43.4	92.5	#278.5	47.0	#230.6	44.6	#117.7	93.8	44.2
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	487	1374		592	1537	668	573	833	523	569	1038	620
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.30	0.70		0.65	0.60	1.18	0.72	1.26	0.53	1.07	0.60	0.51

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.30

Intersection Signal Delay: 82.5

Intersection LOS: F

Intersection Capacity Utilization 103.9%

ICU Level of Service G

Analysis Period (min) 15

90th %ile Actuated Cycle: 130

70th %ile Actuated Cycle: 130

50th %ile Actuated Cycle: 130

30th %ile Actuated Cycle: 130

10th %ile Actuated Cycle: 130

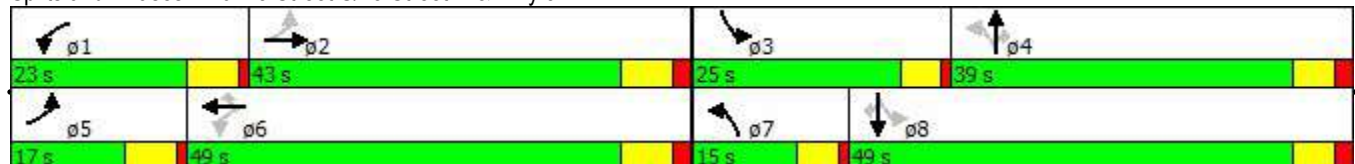
~ Volume exceeds capacity, queue is theoretically infinite.

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: 6: 43 Street S/43 Street N & Hwy 3



Lanes, Volumes, Timings
1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	99	299	44	84	6	100	113	31	6	58	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.903			0.994			0.983			0.987	
Flt Protected		0.998			0.984			0.980			0.996	
Satd. Flow (prot)	0	1646	0	0	1787	0	0	1711	0	0	1610	0
Flt Permitted		0.980			0.567			0.825			0.965	
Satd. Flow (perm)	0	1617	0	0	1030	0	0	1440	0	0	1560	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		285			5			17			9	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		697.6			744.1			520.4			321.7	
Travel Time (s)		50.2			53.6			26.8			16.5	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	7%	7%	7%	16%	16%	16%
Adj. Flow (vph)	22	129	388	57	109	8	130	147	40	8	75	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	539	0	0	174	0	0	317	0	0	92	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	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)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	24.0	24.0		24.0	24.0		26.0	26.0		26.0	26.0	
Total Split (%)	48.0%	48.0%		48.0%	48.0%		52.0%	52.0%		52.0%	52.0%	
Maximum Green (s)	17.5	17.5		17.5	17.5		19.5	19.5		19.5	19.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.5			6.5			6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		14.4			14.4			22.6			22.6	
Actuated g/C Ratio		0.29			0.29			0.45			0.45	
v/c Ratio		0.81			0.58			0.48			0.13	
Control Delay		18.0			22.3			12.2			9.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		18.0			22.3			12.2			9.4	
LOS		B			C			B			A	
Approach Delay		18.0			22.3			12.2			9.4	
Approach LOS		B			C			B			A	

Lanes, Volumes, Timings
1: 43 Street N & 26 Ave N/Twp Rd 92

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	17.5	17.5		17.5	17.5		19.5	19.5		19.5	19.5	
90th %ile Term Code	Max	Max		Hold	Hold		Coord	Coord		Coord	Coord	
70th %ile Green (s)	18.3	18.3		18.3	18.3		18.7	18.7		18.7	18.7	
70th %ile Term Code	Gap	Gap		Hold	Hold		Coord	Coord		Coord	Coord	
50th %ile Green (s)	14.9	14.9		14.9	14.9		22.1	22.1		22.1	22.1	
50th %ile Term Code	Gap	Gap		Hold	Hold		Coord	Coord		Coord	Coord	
30th %ile Green (s)	11.3	11.3		11.3	11.3		25.7	25.7		25.7	25.7	
30th %ile Term Code	Gap	Gap		Hold	Hold		Coord	Coord		Coord	Coord	
10th %ile Green (s)	10.0	10.0		10.0	10.0		27.0	27.0		27.0	27.0	
10th %ile Term Code	Min	Min		Hold	Hold		Coord	Coord		Coord	Coord	
Queue Length 50th (m)		19.5			13.1			19.2			4.3	
Queue Length 95th (m)		31.7			21.7			28.3			10.1	
Internal Link Dist (m)		673.6			720.1			496.4			297.7	
Turn Bay Length (m)												
Base Capacity (vph)		755			366			664			714	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.71			0.48			0.48			0.13	

Intersection Summary

Area Type: Other

Cycle Length: 50

Actuated Cycle Length: 50

Offset: 35 (70%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 16.3

Intersection LOS: B

Intersection Capacity Utilization 56.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: 43 Street N & 26 Ave N/Twp Rd 92



Lanes, Volumes, Timings
2: 43 Street N & 18 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	35	149	54	8	6	249	212	243	28	376	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.898			0.987			0.920			0.995	
Flt Protected		0.997			0.962		0.950				0.997	
Satd. Flow (prot)	0	1519	0	0	1640	0	1641	1589	0	0	1830	0
Flt Permitted		0.973			0.315		0.470				0.939	
Satd. Flow (perm)	0	1482	0	0	537	0	812	1589	0	0	1723	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		142			5			118			4	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		716.1			196.5			496.3			520.4	
Travel Time (s)		51.6			14.1			25.5			26.8	
Peak Hour Factor	0.78	0.78	0.78	0.92	0.92	0.92	0.78	0.78	0.78	0.78	0.78	0.78
Heavy Vehicles (%)	12%	12%	12%	10%	10%	10%	10%	10%	10%	3%	3%	3%
Adj. Flow (vph)	17	45	191	59	9	7	319	272	312	36	482	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	253	0	0	75	0	319	584	0	0	537	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	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)	22.5	22.5		22.5	22.5		26.5	26.5		22.5	22.5	
Total Split (s)	28.5	28.5		28.5	28.5		71.5	71.5		71.5	71.5	
Total Split (%)	28.5%	28.5%		28.5%	28.5%		71.5%	71.5%		71.5%	71.5%	
Maximum Green (s)	22.0	22.0		22.0	22.0		65.0	65.0		65.0	65.0	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.5			6.5		6.5	6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effect Green (s)		14.9			14.9		72.1	72.1			72.1	
Actuated g/C Ratio		0.15			0.15		0.72	0.72			0.72	
v/c Ratio		0.74			0.89		0.55	0.50			0.43	
Control Delay		30.9			111.2		13.9	8.6			6.7	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		30.9			111.2		13.9	8.6			6.7	
LOS		C			F		B	A			A	
Approach Delay		30.9			111.2			10.4			6.7	
Approach LOS		C			F			B			A	
90th %ile Green (s)	22.0	22.0		22.0	22.0		65.0	65.0		65.0	65.0	
90th %ile Term Code	Max	Max		Max	Max		Coord	Coord		Coord	Coord	
70th %ile Green (s)	17.5	17.5		17.5	17.5		69.5	69.5		69.5	69.5	

Lanes, Volumes, Timings
2: 43 Street N & 18 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
70th %ile Term Code	Hold	Hold		Gap	Gap		Coord	Coord		Coord	Coord	
50th %ile Green (s)	14.1	14.1		14.1	14.1		72.9	72.9		72.9	72.9	
50th %ile Term Code	Hold	Hold		Gap	Gap		Coord	Coord		Coord	Coord	
30th %ile Green (s)	10.8	10.8		10.8	10.8		76.2	76.2		76.2	76.2	
30th %ile Term Code	Hold	Hold		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	10.0	10.0		10.0	10.0		77.0	77.0		77.0	77.0	
10th %ile Term Code	Min	Min		Hold	Hold		Coord	Coord		Coord	Coord	
Queue Length 50th (m)		21.5			14.4		27.8	37.8			44.8	
Queue Length 95th (m)		34.0			#34.8		m74.6	80.7			59.0	
Internal Link Dist (m)		692.1			172.5			472.3			496.4	
Turn Bay Length (m)												
Base Capacity (vph)		436			122		585	1178			1243	
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		0.58			0.61		0.55	0.50			0.43	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 16.5

Intersection LOS: B

Intersection Capacity Utilization 87.9%

ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 2: 43 Street N & 18 Ave N



Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	7	27	53	2	6	101	670	236	28	532	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	1		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.905			0.986			0.961			0.995	
Flt Protected		0.995			0.959		0.950				0.998	
Satd. Flow (prot)	0	1104	0	0	1633	0	1641	1660	0	0	1780	0
Flt Permitted		0.957			0.721		0.402				0.884	
Satd. Flow (perm)	0	1062	0	0	1228	0	694	1660	0	0	1577	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33			7			22			2	
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		748.5			168.6			405.2			496.3	
Travel Time (s)		53.9			12.1			20.8			25.5	
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles (%)	55%	55%	55%	10%	10%	10%	10%	10%	10%	6%	6%	6%
Adj. Flow (vph)	5	9	33	58	2	7	125	827	291	35	657	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	47	0	0	67	0	125	1118	0	0	718	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	13.5	13.5		13.5	13.5		16.5	16.5		16.5	16.5	
Total Split (s)	50.0	50.0		50.0	50.0		50.0	50.0		50.0	50.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	43.5	43.5		43.5	43.5		43.5	43.5		43.5	43.5	
Yellow Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.5			6.5		6.5	6.5			6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Act Effect Green (s)		10.4			10.4		80.6	80.6			80.6	
Actuated g/C Ratio		0.10			0.10		0.81	0.81			0.81	
v/c Ratio		0.34			0.50		0.22	0.83			0.56	
Control Delay		25.5			50.3		4.5	17.8			9.5	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		25.5			50.3		4.5	17.8			9.5	
LOS		C			D		A	B			A	
Approach Delay		25.5			50.3			16.4			9.5	
Approach LOS		C			D			B			A	

Lanes, Volumes, Timings
3: 43 Street N & 14 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	15.0	15.0		15.0	15.0		72.0	72.0		72.0	72.0	
90th %ile Term Code	Hold	Hold		Gap	Gap		Coord	Coord		Coord	Coord	
70th %ile Green (s)	12.0	12.0		12.0	12.0		75.0	75.0		75.0	75.0	
70th %ile Term Code	Hold	Hold		Gap	Gap		Coord	Coord		Coord	Coord	
50th %ile Green (s)	10.0	10.0		10.0	10.0		77.0	77.0		77.0	77.0	
50th %ile Term Code	Hold	Hold		Gap	Gap		Coord	Coord		Coord	Coord	
30th %ile Green (s)	8.0	8.0		8.0	8.0		79.0	79.0		79.0	79.0	
30th %ile Term Code	Hold	Hold		Gap	Gap		Coord	Coord		Coord	Coord	
10th %ile Green (s)	0.0	0.0		0.0	0.0		93.5	93.5		93.5	93.5	
10th %ile Term Code	Skip	Skip		Skip	Skip		Coord	Coord		Coord	Coord	
Queue Length 50th (m)		2.7			11.8		5.5	74.1			68.8	
Queue Length 95th (m)		11.2			24.7		12.0	113.8			78.7	
Internal Link Dist (m)		724.5			144.6			381.2			472.3	
Turn Bay Length (m)							75.0					
Base Capacity (vph)		480			538		559	1342			1271	
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		0.10			0.12		0.22	0.83			0.56	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 74 (74%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 15.3

Intersection LOS: B

Intersection Capacity Utilization 73.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 3: 43 Street N & 14 Ave N



Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	32	116	46	12	11	282	971	193	38	551	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		50.0	100.0		0.0	100.0		50.0	125.0		50.0
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850		0.928				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1327	1296	0	1656	3312	1482	1656	3312	1482
Flt Permitted	0.740			0.732			0.950			0.242		
Satd. Flow (perm)	1365	1845	1568	1023	1296	0	1656	3312	1482	422	3312	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			140		13				233			104
Link Speed (k/h)		50			50			60			60	
Link Distance (m)		750.2			651.0			882.4			198.2	
Travel Time (s)		54.0			46.9			52.9			11.9	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%	36%	36%	36%	9%	9%	9%	9%	9%	9%
Adj. Flow (vph)	47	39	140	55	14	13	340	1170	233	46	664	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	47	39	140	55	27	0	340	1170	233	46	664	30
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8					2	6		6
Detector Phase	4	4	4	8	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		6.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.5	32.5	32.5	32.5	32.5		12.0	32.5	32.5	32.5	32.5	32.5
Total Split (s)	32.5	32.5	32.5	32.5	32.5		32.0	67.5	67.5	35.5	35.5	35.5
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		32.0%	67.5%	67.5%	35.5%	35.5%	35.5%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		26.0	61.0	61.0	29.0	29.0	29.0
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.0	6.5	6.5	6.5	6.5	6.5
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
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
Recall Mode	None	None	None	None	None		None	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)	8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0
Flash Dont Walk (s)	18.0	18.0	18.0	18.0	18.0			18.0	18.0	18.0	18.0	18.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0	0	0	0	0
Act Effect Green (s)	12.0	12.0	12.0	12.0	12.0		25.7	75.0	75.0	43.3	43.3	43.3
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12		0.26	0.75	0.75	0.43	0.43	0.43
v/c Ratio	0.29	0.18	0.45	0.45	0.16		0.80	0.47	0.20	0.25	0.46	0.04
Control Delay	43.9	40.4	11.6	52.3	27.1		48.5	5.8	1.0	20.6	17.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.9	40.4	11.6	52.3	27.1		48.5	5.8	1.0	20.6	17.2	0.1

Lanes, Volumes, Timings
4: 43 Street N & 9 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	D	B	D	C		D	A	A	C	B	A
Approach Delay		23.3			44.0			13.5			16.7	
Approach LOS		C			D			B			B	
90th %ile Green (s)	16.2	16.2	16.2	16.2	16.2		32.4	70.8	70.8	32.4	32.4	32.4
90th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
70th %ile Green (s)	12.9	12.9	12.9	12.9	12.9		29.2	74.1	74.1	38.9	38.9	38.9
70th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
50th %ile Green (s)	10.7	10.7	10.7	10.7	10.7		26.2	76.3	76.3	44.1	44.1	44.1
50th %ile Term Code	Hold	Hold	Hold	Gap	Gap		Gap	Coord	Coord	Coord	Coord	Coord
30th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		22.9	77.0	77.0	48.1	48.1	48.1
30th %ile Term Code	Min	Min	Min	Min	Min		Gap	Coord	Coord	Coord	Coord	Coord
10th %ile Green (s)	10.0	10.0	10.0	10.0	10.0		18.0	77.0	77.0	53.0	53.0	53.0
10th %ile Term Code	Min	Min	Min	Hold	Hold		Gap	Coord	Coord	Coord	Coord	Coord
Queue Length 50th (m)	9.0	7.4	0.0	10.8	2.6		64.5	37.4	0.0	3.4	27.1	0.0
Queue Length 95th (m)	17.7	15.2	13.3	20.4	9.4		80.3	54.6	4.7	m10.9	57.2	m0.0
Internal Link Dist (m)		726.2			627.0			858.4			174.2	
Turn Bay Length (m)			50.0	100.0			100.0		50.0	125.0		50.0
Base Capacity (vph)	354	479	511	265	346		462	2485	1170	182	1434	700
Starvation Cap Reductn	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
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.08	0.27	0.21	0.08		0.74	0.47	0.20	0.25	0.46	0.04

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 89 (89%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 16.1

Intersection LOS: B

Intersection Capacity Utilization 64.8%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 4: 43 Street N & 9 Ave N



Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 			 	 	
Volume (vph)	98	213	356	1405	711	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	100.0	140.0			100.0
Storage Lanes	2	1	1			1
Taper Length (m)	7.5		7.5			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3127	1442	1703	3406	3112	1392
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3127	1442	1703	3406	3112	1392
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		245				61
Link Speed (k/h)	50			60	60	
Link Distance (m)	728.0			340.2	882.4	
Travel Time (s)	52.4			20.4	52.9	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	12%	12%	6%	6%	16%	16%
Adj. Flow (vph)	113	245	409	1615	817	61
Shared Lane Traffic (%)						
Lane Group Flow (vph)	113	245	409	1615	817	61
Turn Type	Prot	Free	Prot	NA	NA	Perm
Protected Phases	4		5	2	6	
Permitted Phases		Free				6
Detector Phase	4		5	2	6	6
Switch Phase						
Minimum Initial (s)	10.0		6.0	15.0	15.0	15.0
Minimum Split (s)	16.5		12.0	28.5	21.5	21.5
Total Split (s)	16.5		25.0	53.5	28.5	28.5
Total Split (%)	23.6%		35.7%	76.4%	40.7%	40.7%
Maximum Green (s)	10.0		19.0	47.0	22.0	22.0
Yellow Time (s)	4.5		4.5	4.5	4.5	4.5
All-Red Time (s)	2.0		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5		6.0	6.5	6.5	6.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	None		None	C-Max	C-Max	C-Max
Walk Time (s)				8.0		
Flash Dont Walk (s)				14.0		
Pedestrian Calls (#/hr)				0		
Act Effect Green (s)	10.0	70.0	18.5	51.6	25.8	25.8
Actuated g/C Ratio	0.14	1.00	0.26	0.74	0.37	0.37
v/c Ratio	0.25	0.17	0.91	0.64	0.71	0.11
Control Delay	28.4	0.3	52.4	7.9	25.4	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.4	0.3	52.4	7.9	25.4	5.9

Lanes, Volumes, Timings
5: 43 Street N & 5 Ave N

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
LOS	C	A	D	A	C	A
Approach Delay	9.1			16.9	24.1	
Approach LOS	A			B	C	
90th %ile Green (s)	10.0		19.0	47.0	22.0	22.0
90th %ile Term Code	Max		Max	Coord	Coord	Coord
70th %ile Green (s)	10.0		19.0	47.0	22.0	22.0
70th %ile Term Code	Max		Max	Coord	Coord	Coord
50th %ile Green (s)	10.0		19.0	47.0	22.0	22.0
50th %ile Term Code	Max		Max	Coord	Coord	Coord
30th %ile Green (s)	10.0		19.0	47.0	22.0	22.0
30th %ile Term Code	Max		Max	Coord	Coord	Coord
10th %ile Green (s)	0.0		16.4	63.5	41.1	41.1
10th %ile Term Code	Skip		Gap	Coord	Coord	Coord
Queue Length 50th (m)	7.2	0.0	53.9	61.3	54.4	0.0
Queue Length 95th (m)	13.7	0.0	#97.7	77.6	#75.7	7.1
Internal Link Dist (m)	704.0			316.2	858.4	
Turn Bay Length (m)		100.0	140.0			100.0
Base Capacity (vph)	446	1442	462	2510	1148	552
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.17	0.89	0.64	0.71	0.11

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 18.0

Intersection LOS: B

Intersection Capacity Utilization 63.5%

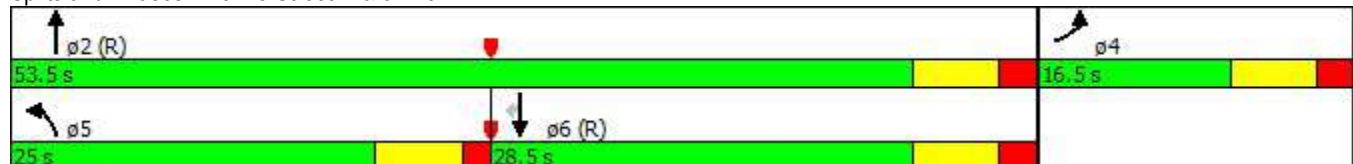
ICU Level of Service B

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: 43 Street N & 5 Ave N



Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	582	878	12	354	854	722	377	967	255	561	571	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	140.0		0.0	125.0		150.0	100.0		80.0	80.0		80.0
Storage Lanes	2		0	2		1	2		1	2		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.998				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3155	4664	0	3213	4759	1482	3183	3282	1468	3045	3139	1404
Flt Permitted	0.198			0.127			0.302			0.090		
Satd. Flow (perm)	658	4664	0	429	4759	1482	1012	3282	1468	288	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				266			189			222
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		449.3			776.8			454.3			301.5	
Travel Time (s)		20.2			35.0			27.3			18.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	11%	11%	11%	9%	9%	9%	10%	10%	10%	15%	15%	15%
Adj. Flow (vph)	633	954	13	385	928	785	410	1051	277	610	621	315
Shared Lane Traffic (%)												
Lane Group Flow (vph)	633	967	0	385	928	785	410	1051	277	610	621	315
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases	2			6		6	4		4	8		8
Detector Phase	5	2		1	6	6	7	4	4	3	8	8
Switch Phase												
Minimum Initial (s)	10.0	20.0		10.0	20.0	20.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	16.0	27.0		16.0	27.0	27.0	15.0	16.0	16.0	15.0	22.0	22.0
Total Split (s)	16.0	40.0		20.0	44.0	44.0	22.0	49.0	49.0	21.0	48.0	48.0
Total Split (%)	12.3%	30.8%		15.4%	33.8%	33.8%	16.9%	37.7%	37.7%	16.2%	36.9%	36.9%
Maximum Green (s)	10.0	33.0		14.0	37.0	37.0	17.0	43.0	43.0	16.0	42.0	42.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	7.0		6.0	7.0	7.0	5.0	6.0	6.0	5.0	6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	None
Act Effect Green (s)	44.3	33.3		51.7	37.0	37.0	58.8	43.0	43.0	61.2	44.2	44.2
Actuated g/C Ratio	0.34	0.26		0.40	0.28	0.28	0.45	0.33	0.33	0.47	0.34	0.34
v/c Ratio	1.52	0.81		0.83	0.69	1.28	0.58	0.97	0.45	1.28	0.58	0.50
Control Delay	273.5	51.7		43.7	44.4	165.6	22.5	63.7	13.4	176.2	38.3	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
Total Delay	273.5	51.7		43.7	44.4	165.6	22.5	63.7	13.4	176.2	38.3	13.5
LOS	F	D		D	D	F	C	E	B	F	D	B
Approach Delay		139.4			89.7			46.0			87.7	
Approach LOS		F			F			D			F	

Lanes, Volumes, Timings
6: 43 Street S/43 Street N & Hwy 3

Timing Plan: FU2037-AM-Mit
Future 2037 AM Peak Hour - Mitigated

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
90th %ile Green (s)	10.0	33.0		14.0	37.0	37.0	17.0	43.0	43.0	16.0	42.0	42.0
90th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Max	Max	Max	Max	Hold	Hold
70th %ile Green (s)	10.0	33.0		14.0	37.0	37.0	16.6	43.0	43.0	16.0	42.4	42.4
70th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Max	Hold	Hold
50th %ile Green (s)	10.0	33.0		14.0	37.0	37.0	15.1	43.0	43.0	16.0	43.9	43.9
50th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Max	Hold	Hold
30th %ile Green (s)	10.0	33.0		14.0	37.0	37.0	13.6	43.0	43.0	16.0	45.4	45.4
30th %ile Term Code	Max	MaxR		Max	MaxR	MaxR	Gap	Max	Max	Max	Hold	Hold
10th %ile Green (s)	10.0	34.5		12.5	37.0	37.0	11.5	43.0	43.0	16.0	47.5	47.5
10th %ile Term Code	Max	Hold		Gap	MaxR	MaxR	Gap	Max	Max	Max	Hold	Hold
Queue Length 50th (m)	~96.4	90.2		35.1	81.6	~214.9	31.8	146.4	16.9	~93.5	72.5	17.7
Queue Length 95th (m)	#137.2	108.0		#57.7	98.1	#294.5	42.6	#193.4	42.7	#133.4	95.0	47.9
Internal Link Dist (m)		425.3			752.8			430.3			277.5	
Turn Bay Length (m)	140.0			125.0		150.0	100.0		80.0	80.0		80.0
Base Capacity (vph)	416	1195		471	1354	612	758	1085	612	475	1068	624
Starvation Cap Reductn	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
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.52	0.81		0.82	0.69	1.28	0.54	0.97	0.45	1.28	0.58	0.50

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.52

Intersection Signal Delay: 89.8

Intersection LOS: F

Intersection Capacity Utilization 103.9%

ICU Level of Service G

Analysis Period (min) 15

90th %ile Actuated Cycle: 130

70th %ile Actuated Cycle: 130

50th %ile Actuated Cycle: 130

30th %ile Actuated Cycle: 130

10th %ile Actuated Cycle: 130

~ 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: 6: 43 Street S/43 Street N & Hwy 3



Appendix E

Synchro Software Capacity Analyses Files

Appendix F

TAC – Traffic Signal Warrant Worksheets



City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North
Side Street (name)	26 Avenue/Twp Rd 92
Quadrant / Int #	3
	CHECK SHEET

for Warrant Calculation
Results, please hit 'Page
Down'

Direction (EW or NS)	NS
Direction (EW or NS)	EW
Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2018 Aug 12, Sun
Count Date:	Future 2037 with Site Traffic
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,650	1
43 Street North	SB	0	0	0	1	0	0	5,000	1
26 Avenue/Twp Rd 92	WB	1	0	0	0	1	0		
26 Avenue/Twp Rd 92	EB	0	1	0	0	0	1		

Are the 26 Avenue/Twp Rd 92 WB right turns significantly impeded by through movements? (y/n)

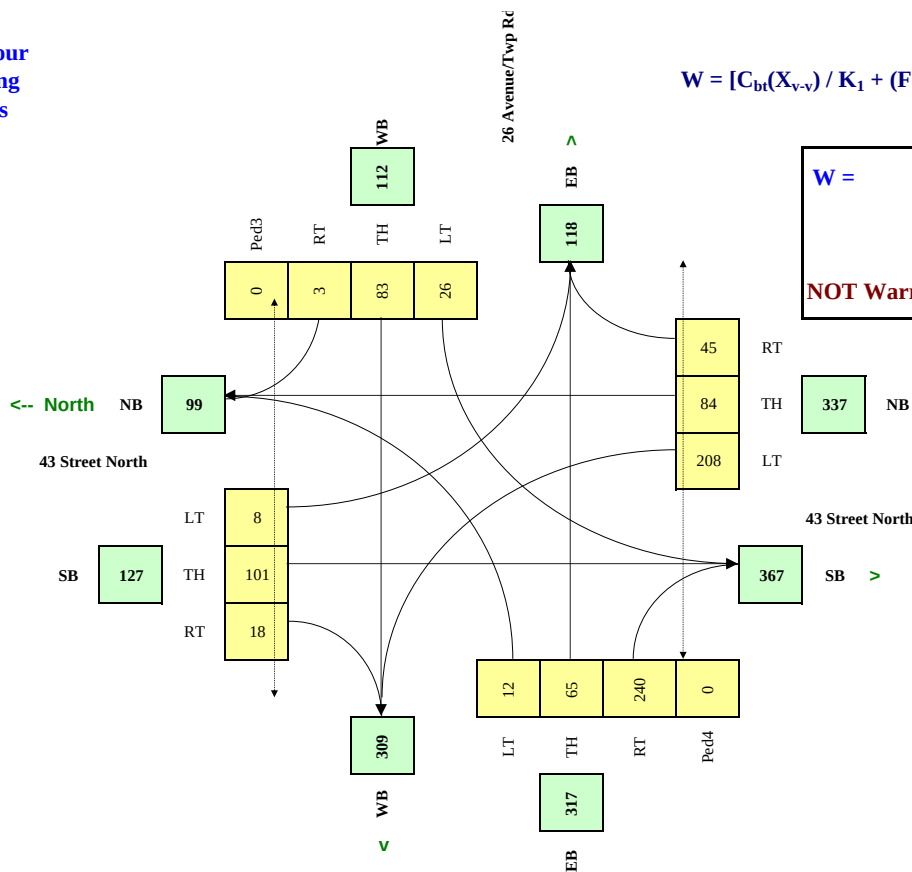
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	12.0%	n	0.0
26 Avenue/Twp Rd 92	EW	60	4.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours													Ped1	Ped2	Ped3	Ped4
Traffic Input	NB			SB			WB			EB			NS	NS	EW	EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:00 - 8:00	100	113	31	6	58	7	44	84	6	17	99	299				
8:00 - 9:00	100	113	31	6	58	7	44	84	6	17	99	299				
11:00 - 12:00	60	68	19	4	35	4	26	50	4	10	59	180				
12:00 - 13:00	227	49	44	7	104	21	10	65	0	7	31	152				
16:00 - 17:00	379	81	73	12	174	35	17	108	0	11	51	254				
17:00 - 18:00	379	81	73	12	174	35	17	108	0	11	51	254				
Total (6-hour peak)	1,245	505	271	47	603	109	158	499	16	73	390	1,438	0	0	0	0
Average (6-hour peak)	208	84	45	8	101	18	26	83	3	12	65	240	0	0	0	0

Average 6-hour
Peak Turning
Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p})L) / K_2] \times C_i$$



W =	89	89	0
		Veh	Ped
NOT Warranted			

RESET SHEET



City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North	Direction (EW or NS)	NS
Side Street (name)	26 Avenue/Twp Rd 92	Direction (EW or NS)	EW
Quadrant / Int #	3	Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM
CHECK SHEET			

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2018 Aug 12, Sun
Count Date:	Future 2022 wth Site Traffic
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,650	1
43 Street North	SB	0	0	0	1	0	0	5,000	1
26 Avenue/Twp Rd 92	WB	1	0	0	0	1	0		
26 Avenue/Twp Rd 92	EB	0	1	0	0	0	1		

Are the 26 Avenue/Twp Rd 92 WB right turns significantly impeded by through movements? (y/n)

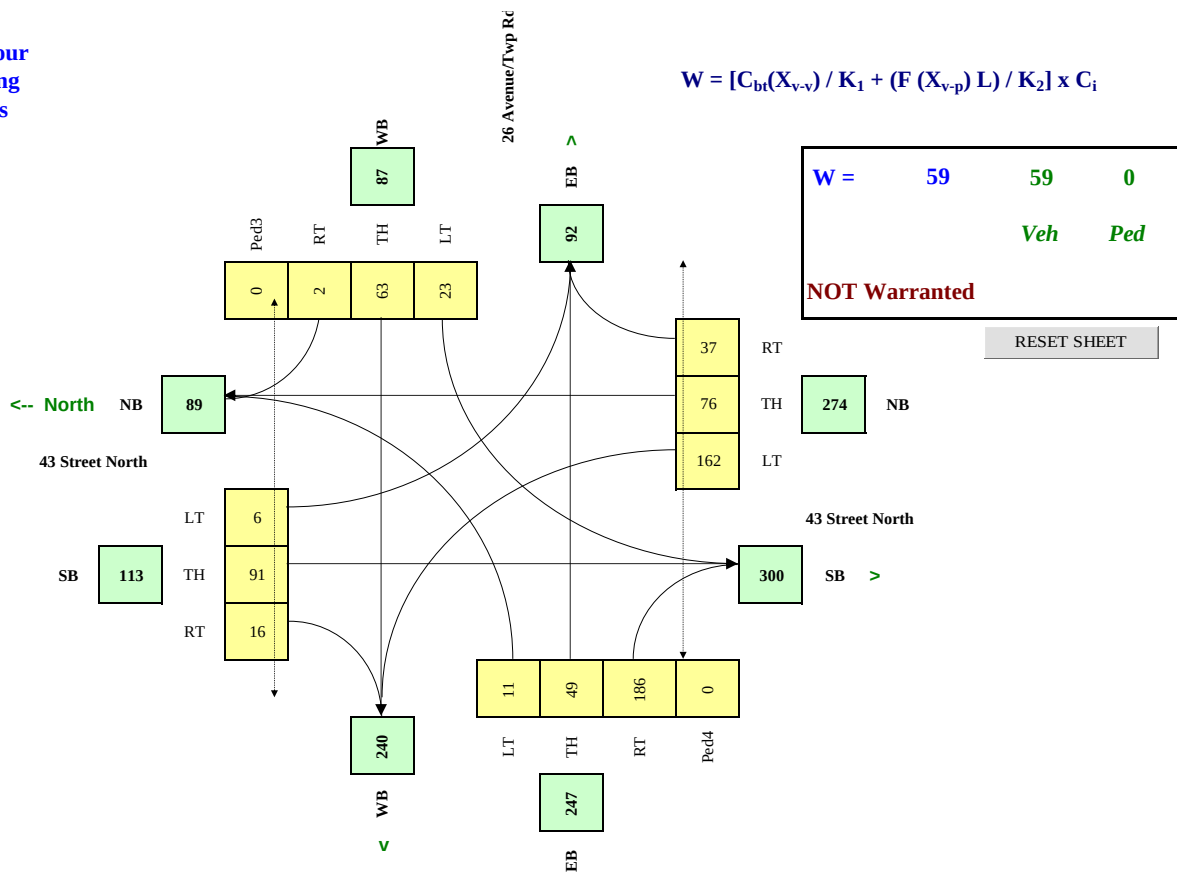
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	12.0%	n	0.0
26 Avenue/Twp Rd 92	EW	60	4.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1	Ped2	Ped3	Ped4
Traffic Input														NS	NS	EW	EW
	NB			SB			WB			EB				W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
7:00 - 8:00	78	104	25	5	49	6	38	63	5	16	75	236					
8:00 - 9:00	78	104	25	5	49	6	38	63	5	16	75	236					
11:00 - 12:00	47	63	15	3	29	4	23	38	3	10	45	142					
12:00 - 13:00	177	42	36	5	97	19	8	49	0	6	23	116					
16:00 - 17:00	295	70	60	9	161	31	14	81	0	10	39	194					
17:00 - 18:00	295	70	60	9	161	31	14	81	0	10	39	194					
Total (6-hour peak)	970	453	221	36	546	97	135	375	13	68	296	1,118	0	0	0	0	0
Average (6-hour peak)	162	76	37	6	91	16	23	63	2	11	49	186	0	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p}) L) / K_2] \times C_i$$





City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North
Side Street (name)	18 Avenue/Site Access
Quadrant / Int #	3
	CHECK SHEET

for Warrant Calculation
Results, please hit 'Page
Down'

Direction (EW or NS)	NS
Direction (EW or NS)	EW
Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2017 Nov 02, Thu
Count Date:	Background 2037 (Without Site Traffic)
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,350	1
43 Street North	SB	0	0	0	1	0	0	5,200	1
18 Avenue/Site Access	WB	1	0	0	0	1	0		
18 Avenue/Site Access	EB	0	1	0	0	0	1		

Are the 18 Avenue/Site Access WB right turns significantly impeded by through movements? (y/n)

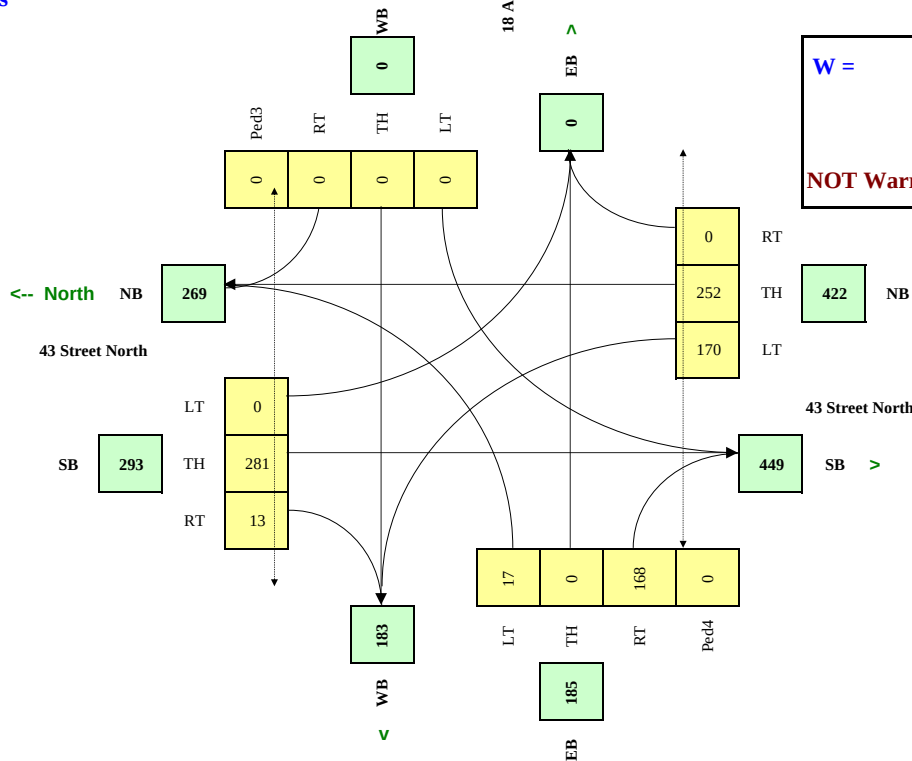
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	10.0%	n	0.0
18 Avenue/Site Access	EW	50	10.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours													Ped1	Ped2	Ped3	Ped4
Traffic Input	NB			SB			WB			EB			NS	NS	EW	EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:00 - 8:00	249	199	0	0	329	15	0	0	0	13	0	149				
8:00 - 9:00	249	199	0	0	329	15	0	0	0	13	0	149				
11:00 - 12:00	149	119	0	0	197	9	0	0	0	8	0	89				
12:00 - 13:00	86	230	0	0	191	8	0	0	0	16	0	143				
16:00 - 17:00	144	383	0	0	319	14	0	0	0	26	0	239				
17:00 - 18:00	144	383	0	0	319	14	0	0	0	26	0	239				
Total (6-hour peak)	1,021	1,513	0	0	1,684	75	0	0	0	102	0	1,008	0	0	0	0
Average (6-hour peak)	170	252	0	0	281	13	0	0	0	17	0	168	0	0	0	0

Average 6-hour
Peak Turning
Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p})L) / K_2] \times C_i$$



W =	61	61	0
		Veh	Ped
NOT Warranted			

RESET SHEET



City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North	Direction (EW or NS)	NS
Side Street (name)	18 Avenue/Site Access	Direction (EW or NS)	EW
Quadrant / Int #	3	Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM
CHECK SHEET			

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2018 Aug 12, Sun
Count Date:	Future 2022 with Site Traffic
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,350	1
43 Street North	SB	0	0	0	1	0	0	5,200	1
18 Avenue/Site Access	WB	1	0	0	0	1	0		
18 Avenue/Site Access	EB	0	1	0	0	0	1		

Are the 18 Avenue/Site Access WB right turns significantly impeded by through movements? (y/n)

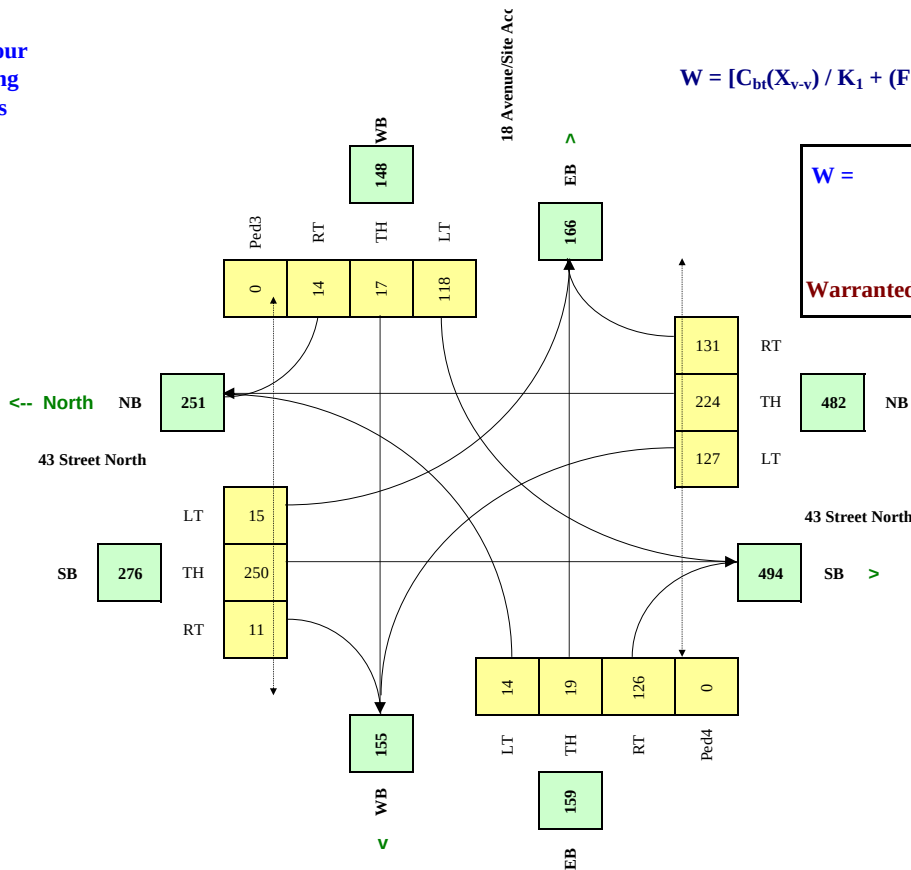
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	10.0%	n	0.0
18 Avenue/Site Access	EW	50	10.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1	Ped2	Ped3	Ped4
Traffic Input														NS	NS	EW	EW
	NB			SB			WB			EB				W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
7:00 - 8:00	187	179	243	28	298	12	54	8	6	11	35	112					
8:00 - 9:00	187	179	243	28	298	12	54	8	6	11	35	112					
11:00 - 12:00	112	107	146	17	179	7	32	5	4	7	21	67					
12:00 - 13:00	64	203	36	4	167	8	131	19	15	12	5	107					
16:00 - 17:00	106	338	60	7	279	13	218	31	25	20	9	179					
17:00 - 18:00	106	338	60	7	279	13	218	31	25	20	9	179					
Total (6-hour peak)	762	1,344	788	91	1,500	65	707	102	81	81	114	756	0	0	0	0	0
Average (6-hour peak)	127	224	131	15	250	11	118	17	14	14	19	126	0	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p})L) / K_2] \times C_i$$



W =	131	131	0
		Veh	Ped

Warranted

RESET SHEET



City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North	Direction (EW or NS)	NS
Side Street (name)	18 Avenue/Site Access	Direction (EW or NS)	EW
Quadrant / Int #	3	Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM
CHECK SHEET			

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2018 Aug 12, Sun
Count Date:	Future 2037 with Site Traffic
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,350	1
43 Street North	SB	0	0	0	1	0	0	5,200	1
18 Avenue/Site Access	WB	1	0	0	0	1	0		
18 Avenue/Site Access	EB	0	1	0	0	0	1		

Are the 18 Avenue/Site Access WB right turns significantly impeded by through movements? (y/n)

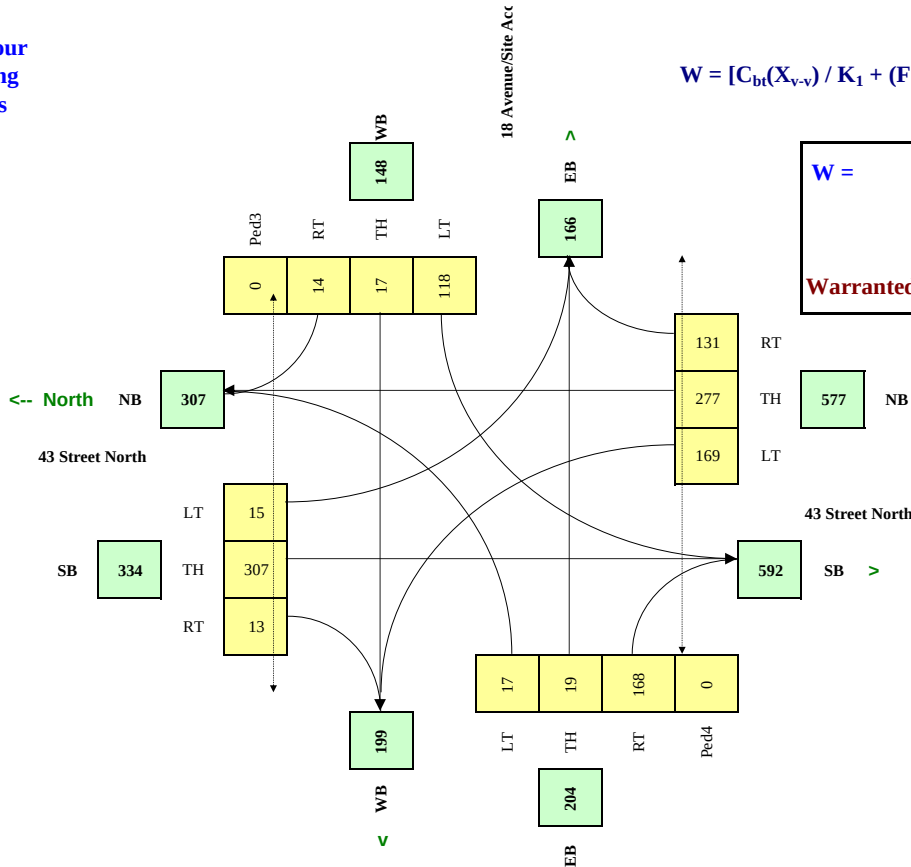
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	10.0%	n	0.0
18 Avenue/Site Access	EW	50	10.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours													Ped1	Ped2	Ped3	Ped4
Traffic Input													NS	NS	EW	EW
	NB			SB			WB			EB			W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT				
7:00 - 8:00	249	212	243	28	376	15	54	8	6	13	35	149				
8:00 - 9:00	249	212	243	28	376	15	54	8	6	13	35	149				
11:00 - 12:00	149	127	146	17	226	9	32	5	4	8	21	89				
12:00 - 13:00	85	256	36	4	199	8	131	19	15	16	5	143				
16:00 - 17:00	141	426	60	7	331	14	218	31	25	26	9	239				
17:00 - 18:00	141	426	60	7	331	14	218	31	25	26	9	239				
Total (6-hour peak)	1,014	1,659	788	91	1,839	75	707	102	81	102	114	1,008	0	0	0	0
Average (6-hour peak)	169	277	131	15	307	13	118	17	14	17	19	168	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p}) L) / K_2] \times C_i$$



W =	182	182	0
		Veh	Ped

Warranted

RESET SHEET



City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North	Direction (EW or NS)	NS
Side Street (name)	14 Avenue/Site Access	Direction (EW or NS)	EW
Quadrant / Int #	3	Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM
	CHECK SHEET		

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2017 Nov 02, Thu
Count Date:	Background 2037 (Without Site Traffic)
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,350	1
43 Street North	SB	0	0	0	1	0	0	5,200	1
14 Avenue/Site Access	WB	1	0	0	0	1	0		
14 Avenue/Site Access	EB	0	1	0	0	0	1		

Are the 14 Avenue/Site Access WB right turns significantly impeded by through movements? (y/n)

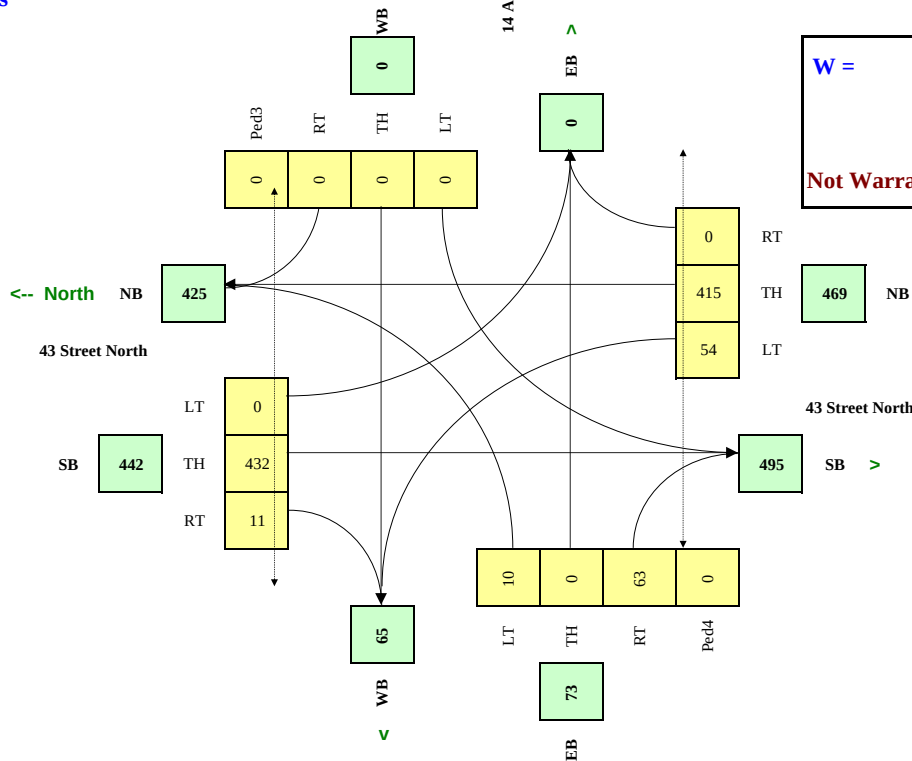
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	10.0%	n	0.0
14 Avenue/Site Access	EW	50	10.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1	Ped2	Ped3	Ped4
Traffic Input														NS	NS	EW	EW
	NB			SB			WB			EB				W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
7:00 - 8:00	101	420	0	0	459	21	0	0	0	4	0	27					
8:00 - 9:00	101	420	0	0	459	21	0	0	0	4	0	27					
11:00 - 12:00	61	252	0	0	275	13	0	0	0	2	0	16					
12:00 - 13:00	14	323	0	0	322	2	0	0	0	11	0	71					
16:00 - 17:00	23	538	0	0	537	4	0	0	0	18	0	119					
17:00 - 18:00	23	538	0	0	537	4	0	0	0	18	0	119					
Total (6-hour peak)	323	2,491	0	0	2,589	65	0	0	0	57	0	379	0	0	0	0	0
Average (6-hour peak)	54	415	0	0	432	11	0	0	0	10	0	63	0	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p}) L) / K_2] \times C_i$$



W =	34	34	0
		Veh	Ped

Not Warranted - Vs < 75

RESET SHEET



City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North	Direction (EW or NS)	NS
Side Street (name)	14 Avenue/Site Access	Direction (EW or NS)	EW
Quadrant / Int #	3	Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM
CHECK SHEET			

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2018 Aug 12, Sun
Count Date:	Future 2022 (With Site Traffic)
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,350	1
43 Street North	SB	0	0	0	1	0	0	5,200	1
14 Avenue/Site Access	WB	1	0	0	0	1	0		
14 Avenue/Site Access	EB	0	1	0	0	0	1		

Are the 14 Avenue/Site Access WB right turns significantly impeded by through movements? (y/n)

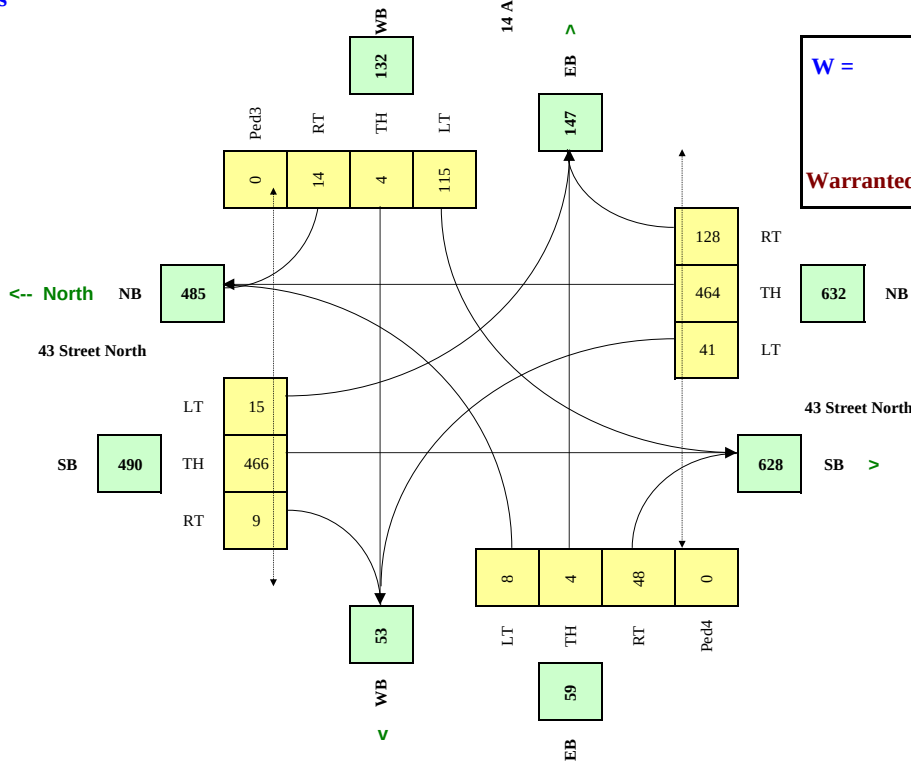
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	10.0%	n	0.0
14 Avenue/Site Access	EW	50	10.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1	Ped2	Ped3	Ped4
Traffic Input														NS	NS	EW	EW
	NB			SB			WB			EB				W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
7:00 - 8:00	76	582	236	28	421	16	53	2	6	4	7	21					
8:00 - 9:00	76	582	236	28	421	16	53	2	6	4	7	21					
11:00 - 12:00	46	349	142	17	253	10	32	1	4	2	4	13					
12:00 - 13:00	11	293	35	4	392	3	127	4	15	9	1	53					
16:00 - 17:00	17	489	58	7	653	4	212	6	25	14	2	89					
17:00 - 18:00	17	489	58	7	653	4	212	6	25	14	2	89					
Total (6-hour peak)	243	2,784	765	91	2,793	53	689	21	81	47	23	286	0	0	0	0	0
Average (6-hour peak)	41	464	128	15	466	9	115	4	14	8	4	48	0	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p})L) / K_2] \times C_i$$



W =	133	133	0
		Veh	Ped

Warranted

RESET SHEET



City of Lethbridge/Lethbridge County - Traffic Signal Warrant Analysis

Main Street (name)	43 Street North	Direction (EW or NS)	NS
Side Street (name)	14 Avenue/Site Access	Direction (EW or NS)	EW
Quadrant / Int #	3	Comments	60% of AM peak hour utilized for the period from 11:00 AM to 12:00 PM and 60% of PM peak hour utilized for the period from 12:00 PM to 01:00 PM
CHECK SHEET			

Road Authority:	City of Lethbridge/Lethbridge County
City:	Lethbridge
Analysis Date:	2018 Aug 12, Sun
Count Date:	Future 2037 (With Site Traffic)
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
43 Street North	NB	0	0	0	1	0	0	1,350	1
43 Street North	SB	0	0	0	1	0	0	5,200	1
14 Avenue/Site Access	WB	1	0	0	0	1	0		
14 Avenue/Site Access	EB	0	1	0	0	0	1		

Are the 14 Avenue/Site Access WB right turns significantly impeded by through movements? (y/n)

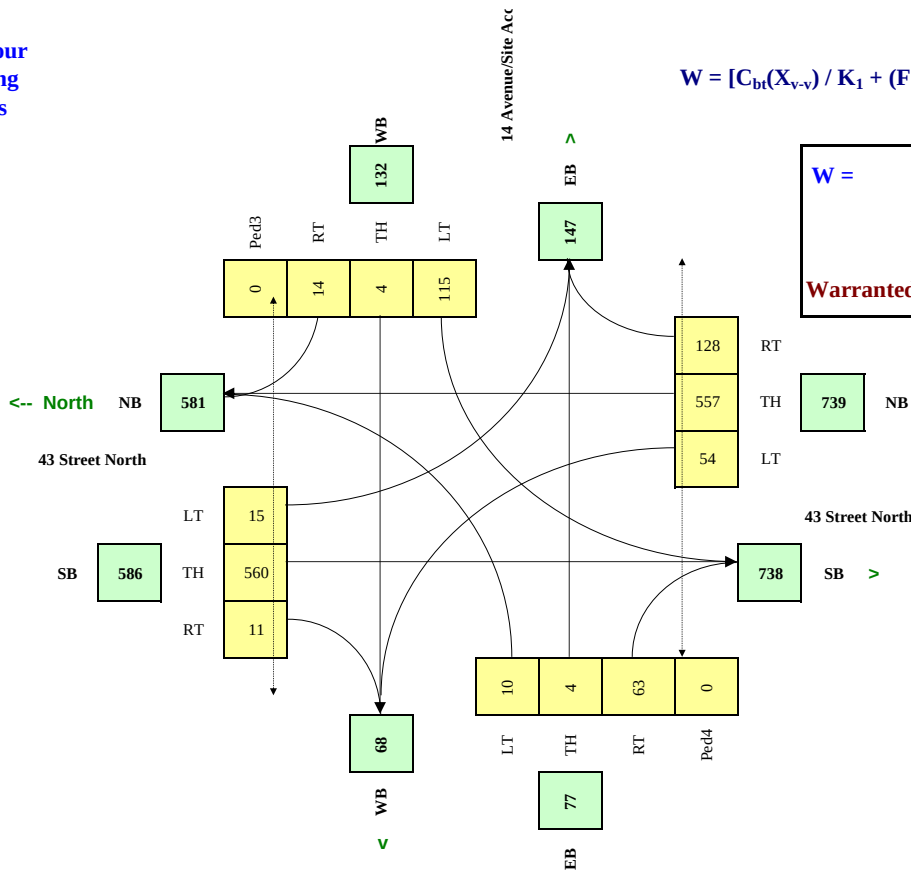
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
43 Street North	NS	70	10.0%	n	0.0
14 Avenue/Site Access	EW	50	10.0%	n	0.0

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,000
Central Business District	(y/n)	n

Set Peak Hours													Ped1	Ped2	Ped3	Ped4
Traffic Input													NS	NS	EW	EW
	NB			SB			WB			EB			W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT				
7:00 - 8:00	101	670	236	28	532	21	53	2	6	4	7	27				
8:00 - 9:00	101	670	236	28	532	21	53	2	6	4	7	27				
11:00 - 12:00	61	402	142	17	319	13	32	1	4	3	4	16				
12:00 - 13:00	14	370	35	4	456	3	127	4	15	11	1	71				
16:00 - 17:00	23	616	58	7	760	4	212	6	25	18	2	119				
17:00 - 18:00	23	616	58	7	760	4	212	6	25	18	2	119				
Total (6-hour peak)	323	3,344	765	91	3,359	66	689	21	81	58	23	379	0	0	0	0
Average (6-hour peak)	54	557	128	15	560	11	115	4	14	10	4	63	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F(X_{v-p}) L) / K_2] \times C_i$$



W =	174	174	0
		Veh	Ped

Warranted

RESET SHEET

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APPENDIX D

SITE DRAINAGE ANALYSIS

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SITE DRAINAGE ANALYSIS

Proposed Chinook Industrial Subdivision
Located in W ½ of 10-9-21-W4 in Lethbridge County
& Bordering 43 Street North, Lethbridge



PREPARED FOR:
Kirkham Holdings Ltd.

PREPARED BY:
Hasegawa Engineering
A Division of 993997 Alberta Ltd.
330, 3120 – 32nd Street South
Lethbridge, Alberta T1K 7B4

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APPENDICES

APPENDIX A-FIGURES

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1.0 Introduction

On behalf of Kirkham Holdings Ltd., Hasegawa Engineering (HE) has completed this preliminary hydrological analysis of the subject site. The hydrological analysis includes the following major aspects:

1. On-site layout, topography and conditions
2. Offsite topography
3. Precipitation and runoff analysis
4. Retention Pond storage size calculations

The site is in Lethbridge County bordering The City of Lethbridge along 43 Street between 9th and 26th Avenue North as shown in Figure 1 (Appendix A.)

2.0 Site Conditions

Currently, the site consists mostly of relatively flat cultivated land. It is bounded on the north by Township Road 9-2, on the west by 43rd Street, on the east by 9th Avenue and on the east by an irrigation canal. The south portion of the property has been graded and graveled for Southland International truck and trailer traffic. As part of this, a drainage study was done and a storm water management facility (SWMF) designed in the southeast corner of the site. Storm water from the existing pond is released into the nearby SMRID irrigation canal under an agreement which requires the SWMF have capacity to store a 100-year storm event. As per the Storm Water Management Plan for this facility dated July 25, 2013, the storm pond has a capacity of 37,270 m³, while design runoff volume is 29,925 m³ (12,925 m³ from the Southland International parking area and 17,000 m³ from the Rave Industrial Area) – therefore, there is about 7000 m³ of extra capacity in the existing SWMF.

Site drainage is generally to the east, but contouring does not permit runoff to enter the irrigation canal. Offsite drainage is intercepted by the surrounding road-side ditches before coming onto the property.

The proposed site would be zoned for a mix of highway commercial and business/industrial lots. The existing SWMF would be expanded and an additional storm retention area added on the north side of the site.

3.0 Runoff Design Criteria

3.1 Predevelopment

Predevelopment modeling divided the site into runoff catchments based on general drainage patterns and slope while assuming the graveled parking surfaces on the south are 70% impervious and the remaining cultivated land is 0% impervious. Modeling used SWMM, a storm runoff software program developed by the United States Environmental Protection Agency and widely accepted for runoff analysis. The storm event used in the model is a 100 year/24 hour Modified Chicago method synthetic storm using rainfall intensity data obtained from the Atmospheric Environment Service of Environment Canada for the City of Lethbridge

and accepted by the City of Lethbridge for modeling runoff. This rainfall data modeled in a Modified Chicago storm produces a peak intensity of 255mm/hour and 109mm of total rainfall (see Figure 4).

It may be possible to release storm water from the new north retention area into the roadside ditch of TWP Road 9-2 east of the irrigation canal. The tributary areas for this runoff were modeled with SWMM software to estimate the rate of predevelopment storm runoff. This predevelopment rate becomes the limit for release from the north retention area during post development modeling.

Storm water routed to the existing south retention facility is stored for release as permitted under the existing agreement. As such, an allowable release calculation is not required and predevelopment modeling of the tributary areas to the south retention is not necessary.

3.2 Post Development

The post development drainage model is shown in Figure 2 (Appendix A). As offsite runoff is intercepted on all sides, it has not been considered in modeling. The post development model is again divided into catchments - flow paths are dictated by design, but flow generally still follows existing ground topography to the east. The existing Southland International graveled parking area and SWMF were modeled with presently designed elevations and drainage but with increased impervious area to account for added streets and buildings. Remaining areas were assigned slopes based on existing topography except where this resulted in road slopes less than 0.6%; at these locations, road-side drainage was assigned a slope of 0.6%. At this point, no minor system is designed and all runoff is routed along 20-metre road rights-of-way. To accommodate runoff volume in the road right-of-way, the boulevard on either side of the asphalt slopes up at 5% to the property line.

The model routes run off from existing development (Southland International parking and Rave Industrial area) into the existing south SWMF using currently designed flow paths. The majority of storm water from proposed development will be routed south to the existing SWMF. This will require enlarging the existing SWMF eastward to about 5 metres from the property line. Routing storm water to the south SWMF will require some long flow paths that, coupled with the topography in some areas, presents design challenges. The majority of runoff from the new development will be routed to this SWMF via a proposed major ditch running south along the east side of the development. The proposed major ditch runs through long sections with very little to no slope in the existing ground - it generates minimal slopes by starting with a depth of 1 metre and gradually deepening to match the elevation of the bottom of pond where it enters the SWMF. At this point in the design, the proposed SWMF extension continues the 0.5% slope of the existing pond floor from the maximum depth of 3.4 metres in the existing pond to a minimum depth of approximately 2.2 metres at the northeast corner. At the northeast corner, the pond bottom drops 0.2 metres and the major ditch flows in this flatter rip-rapped channel that passes runoff through to the deeper existing pond - the extended storage only fills during major events. Note that in the model, ditch capacity is only modeled as a ditch 1 metre deep with 5h:1v side slopes and 5 metres across the bottom – in reality, ditch capacity increases as the ditch deepens. A profile of this ditch in the model is included as Figure 3 of Appendix A. Final design may change these proposed elevations.

The remainder of runoff from new development is routed north to retention in the northeast corner of the development. As this is a low spot, it will need to be pumped out. One possible option has this runoff pumped into the ditch of Twp Road 9-2.

The proposed lots were modeled with building sizes as shown on the proposed ASP – the building footprints were considered 100% impervious surface with the remainder of the lot assumed to be graveled at 70% impervious. Typical values for infiltration used for City of Lethbridge modeling were used with 5mm assumed for depression storage in both pervious and impervious (graveled) surfaces.

4.0 Surface Runoff Results

The predevelopment 100-year storm as modeled produces peak runoff at the north storage area of about $0.88 \text{ m}^3/\text{second}$ and generates 7055 m^3 of total volume. This increases to $2.9 \text{ m}^3/\text{second}$ and 10460 m^3 after development. The predevelopment peak flow is usually considered in limiting post-development release; however, it is assumed not relevant in this case as it is anticipated the north storage will need to be pumped out and the pumps will not generate predevelopment flow rates. At this stage of design, storage for this area (labeled “S1” in the model) is modeled as a pond 9700 m^2 in area and 2 metres deep including freeboard. When modeled using a simple pump curve at a constant $0.04 \text{ m}^3/\text{sec}$ (approx. 600 U.S. gal/min) with pumping beginning when the pond starts filling, the pond fills to a depth of 1.3 metres (58% full including freeboard) and would require about 3 days to pump out.

The proposed south retention facility collects all southbound runoff and will be enlarged to accommodate increased runoff from development. Note that the July 2013 storm water management report estimated about $13,000 \text{ m}^3$ of post-development runoff after developing the Southland International parking area. That degree of development is modeled by the current predevelopment model but the current model estimates about $17,000 \text{ m}^3$ of runoff volume for this same area. Given the extra 7000 m^3 in the existing SWMF capacity mentioned previously, extensive comparisons were not attempted to resolve the difference in reported volumes. The 2013 report also estimates runoff from the Rave Industrial area to be $17,000 \text{ m}^3$ - as a runoff profile for the Rave Industrial area is not available, the south SWMF in the current model is given an initial 1.27-metre stored depth of runoff which closely approximates the volume coming from the Rave Industrial Area.

The post development model estimate of $87,183 \text{ m}^3$ of total runoff (including $17,000 \text{ m}^3$ for the Rave Industrial area) – $10,464 \text{ m}^3$ of this is routed to the north storage area leaves $76,718 \text{ m}^3$ going to the south retention pond. The proposed south SWMF stores $70,752 \text{ m}^3$ of this, filling to 78% capacity at 2.87 metres maximum depth. The remainder of runoff is accounted for in that the model assumes storage occurs in the ditch grading into the south pond; however, the pond does not require this ditch capacity and has sufficient storage for the 100-year storm with no release. Final design may change depths in the SWMF extension and so change the footprint of the SWMF. There is flooding in three areas (53 m^3 , 435 m^3 and 517 m^3) which will be resolved as final grades and road profiles are finalized and lot level storage will be designed if required.

The flow paths and tributary areas substantially change with development and make a direct comparison between pre- and post-development runoff difficult except at a system-wide level which does not necessarily reflect final flows into the retention areas, nevertheless the storage areas and a system-wide overview are listed in Table 1 below. The north retention is the only area where release occurs during the storm and although the tributary area changes after development, the reduction in outflow achieved by storage and controlled release can be seen. The existing south storage area is provided for comparison only and, in reality, does not exist separately after development.

Table 1 – Predevelopment vs. Post Development Runoff / Retention Pond Capacity

	Predevelopment Inflow Vol/ Rate	Post- development Inflow Vol/Rate	Post- development Outflow	Retention Pond Maximums Volume/Depth/% Capacity
North Storage	7055 m ³ 0.882 m ³ /sec	10,464 m ³ 2.893 m ³ /sec	Pumped - 0.04m ³ /sec assumed	8723 m ³ /1.3 m/58% ^a
Existing South Storage ^b	34,016 m ³ 5.951 m ³ /sec	NA	NA	NA
Proposed South Storage ^b	Not Applicable	76,718 m ³ 8.226 m ³ /sec	0 (delayed release)	69,690 m ³ /2.87 m/78%
System-wide Runoff ^b	53423 m ³ 9.874 m ³ /sec	87182 m ³ 25.71 m ³ /sec	Pumped - 0.04m ³ /sec assumed	NA

^a Pond statistics for the north storage pond are based on assumed pumping rate of 40 l/sec into the outflow throughout the storm. Capacity shown includes 0.6m freeboard.

^b The Rave Industrial Area Runoff model is not available – these volume figures include 17,000 m³ to account for reported Rave volume but runoff rates do not include Rave contributions.

The model shows a pump draining the south retention area – this is to estimate drain-down times after the event and is not active during the simulation. It estimates that pump capacity will need to be approximately 235 l/sec (3750 US gal/min) to empty the south SWMF within 3 days. Retention depths and volumes prior to pumping as well as a rainfall profile are graphed in Figure 4 of Appendix A – in viewing Figure 4, note again that the south retention areas are modeled separately but are actually one retention area. Detailed results of runoff models along with key input parameters for SWMM analysis are attached in Appendix B.

5.0 Conclusion

Computer modeling of the proposed subdivision shows that the post-development increase in storm runoff is stored through a combination of ditches and retention areas. The existing SWMF is enlarged to store and accommodate increased post development runoff volumes - the added retention area is not as deep as the existing pond and runoff drains through to the existing deeper section during smaller, more frequent events. Larger storms will cause runoff to back up into the extended storage area and into the main collection ditch running on the east side of the development. All runoff into this retention during the 100-year storm is stored under the assumption that storm water release into the SMRID canal would only be as permitted. When pumping from this pond is permitted, achieving drain down times in the order of 3 days will require upgrading existing pump and force main capacity.

There is also a proposed retention area to accept runoff heading north from the development – it is assumed that this will be pumped to existing drainage along nearby roadside ditches. A constant pumping rate of $0.04 \text{ m}^3/\text{sec}$ was assumed, which is well below the predevelopment runoff rate of $0.88 \text{ m}^3/\text{sec}$ and results in drain down times of about 3 days. Final design should keep in mind that after the 100-year storm, there is limited capacity in all retention areas should subsequent storms occur before retention areas are drained.

APPENDICES

APPENDIX A-FIGURES

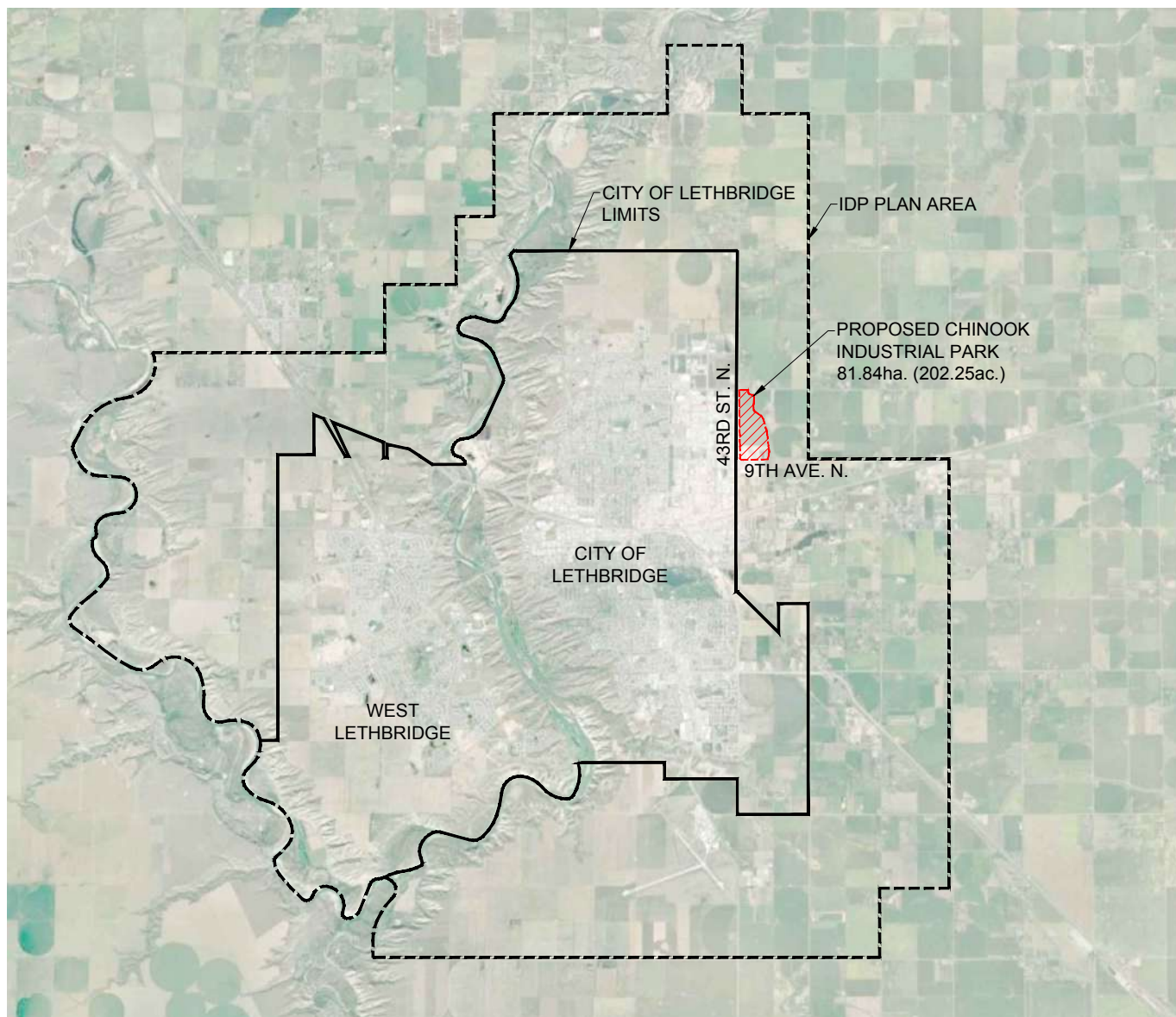
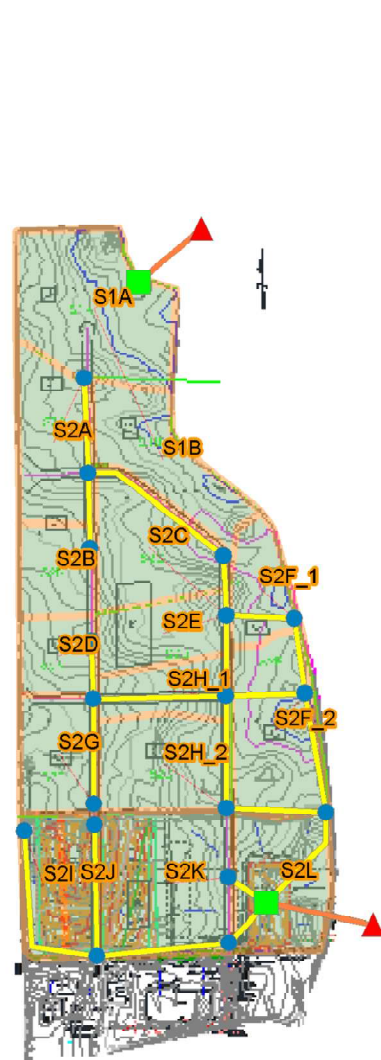


FIGURE 1 - LOCATION PLAN

	330 3120-32ND ST. S. LETHBRIDGE, AB T1K 7B4 PH: 403-328-2686 FAX: 403-328-2728 EMAIL: office@hasegawa.ca	This is a copyright drawing and shall not be reproduced in any form without written permission of Engineer.	SHEET NO. FIG. 1	PROJECT NO. 17-006
DRAWN MDO	SCALE NTS	DATE DRAWN DEC 4, 2017		
CLIENT GEORGE KIRKHAM & ED FRIESEN	PROJECT TITLE CHINOOK INDUSTRIAL PARK - ASP			



Legend
 S1A - Subcatchment
 S1B - Subcatchment
 S2A - Subcatchment
 S2B - Subcatchment
 S2C - Subcatchment
 S2D - Subcatchment
 S2E - Subcatchment
 S2F_1 - Subcatchment
 S2F_2 - Subcatchment
 S2G - Subcatchment
 S2H_1 - Subcatchment
 S2H_2 - Subcatchment
 S2I - Subcatchment
 S2J - Subcatchment
 S2K - Subcatchment
 S2L - Subcatchment

FIGURE 2 - POST
DEVELOPMENT MODEL



LEGEND

- Subcatchments
- Pumps
- Conduits
- Storages
- Outfalls
- Junctions

Figure 3 - Profile of Major Ditch & South Retention Area After Storm

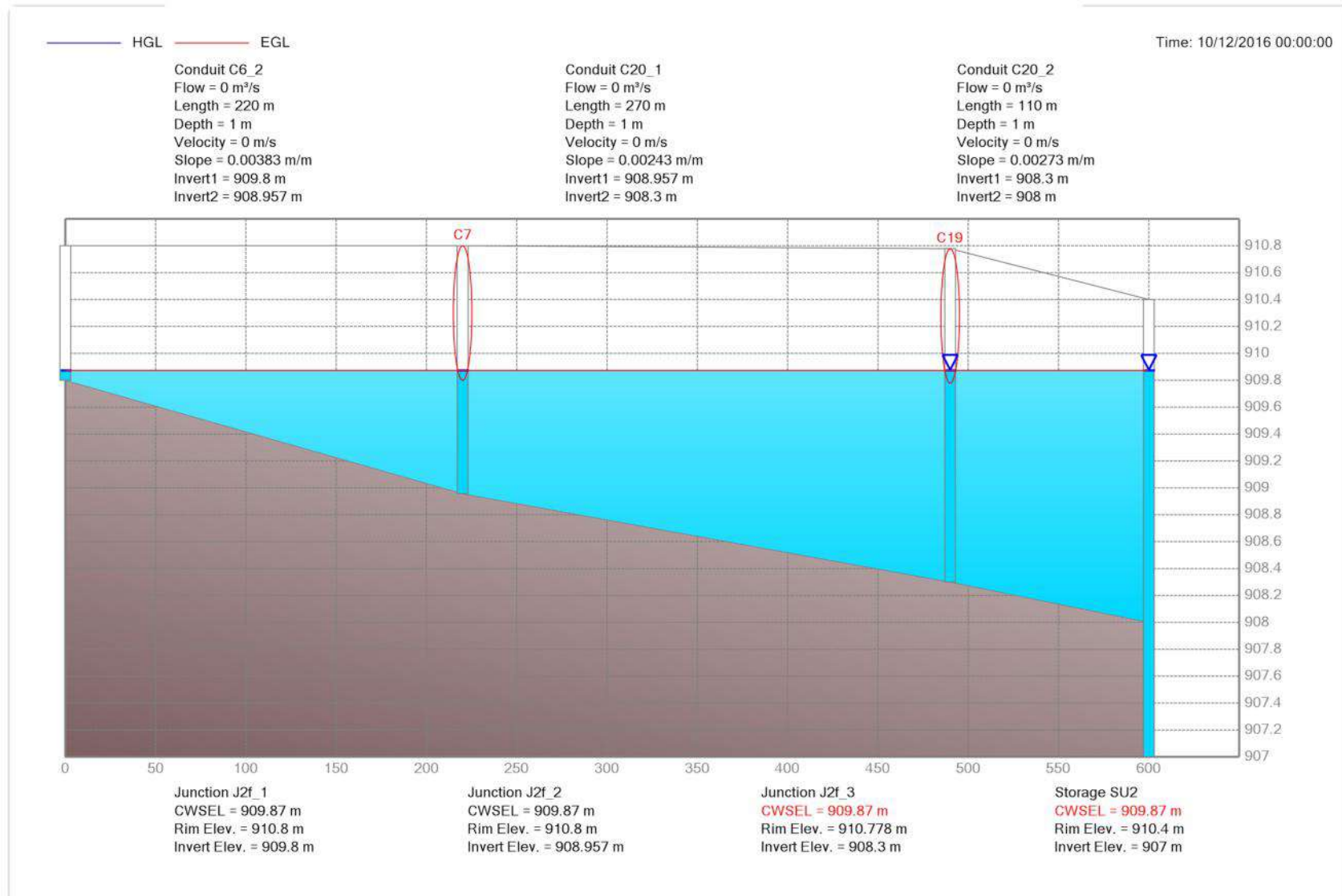
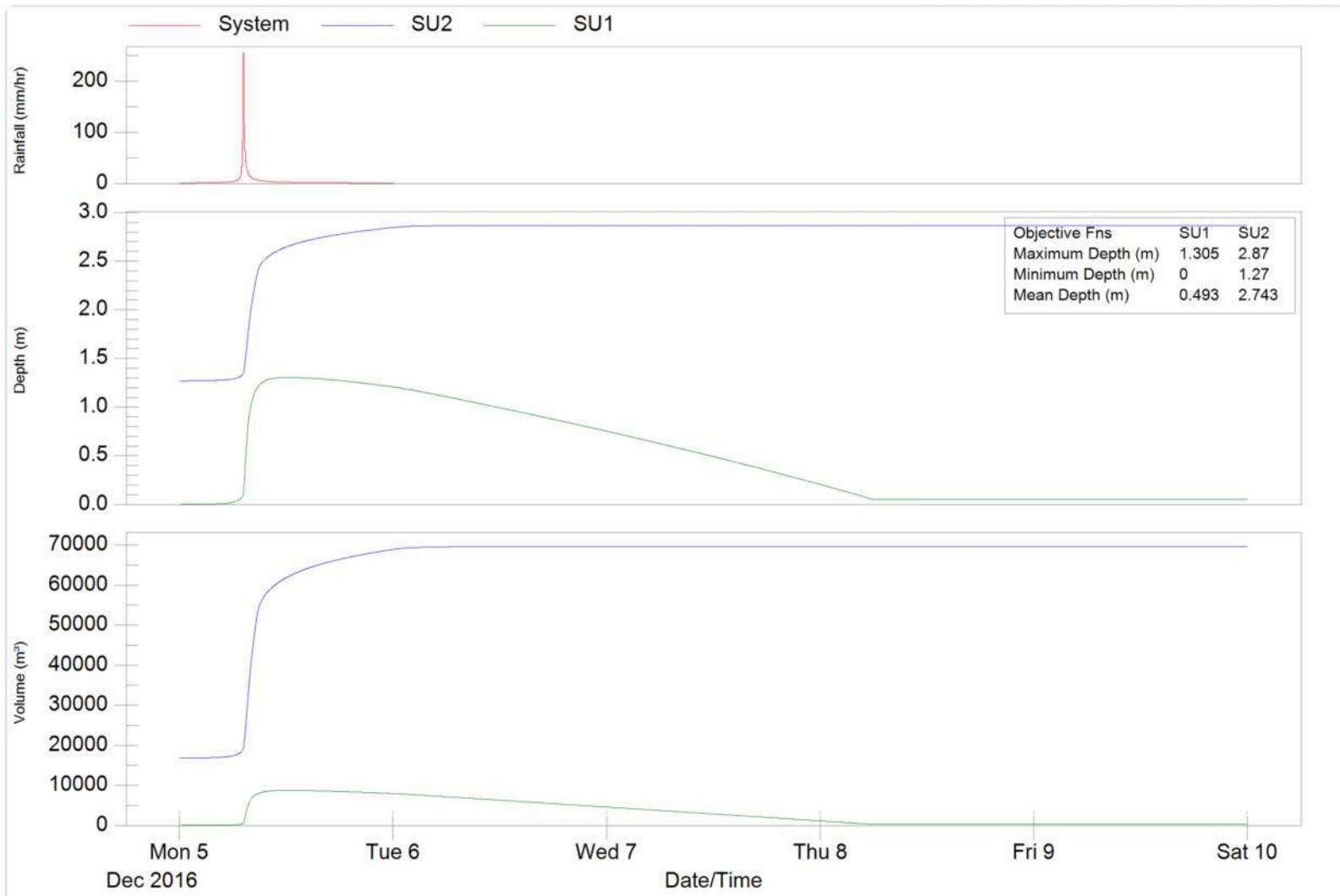


Figure 4 - Post Development Rainfall and Retention Profiles



APPENDIX B-SWMM SUMMARIES

17-006 Predevelopment 100yr/24hr

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units CMS
Process Models:
Rainfall/Runoff YES
Snowmelt NO
Groundwater NO
Flow Routing YES
Ponding Allowed NO
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method DYNWAVE
Starting Date DEC-05-2016 00:00:00
Ending Date DEC-06-2016 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	9.367	109.858
Evaporation Loss	0.000	0.000
Infiltration Loss	5.649	66.250
Surface Runoff	3.644	42.736
Final Surface Storage	0.100	1.167
Continuity Error (%)	-0.268	

Volume


```
Flow Routing Continuity
*****
Dry Weather Inflow ..... 0.000
Wet Weather Inflow ..... 36.423
Groundwater Inflow ..... 0.000
RDII Inflow ..... 0.000
External Inflow ..... 0.000
External Outflow ..... 36.235
Internal Outflow ..... 0.099
Storage Losses ..... 0.000
Initial Stored Volume .... 0.000
Final Stored Volume ..... 0.007
Continuity Error (%) ..... 0.062

10^6 ltr
-----
```

```
hectare-m
-----
```

```
*****
Highest Continuity Errors
*****
Node J2 (2.78%)
```

```
*****
Time-Step Critical Elements
*****
None
```

```
*****
Highest Flow Instability Indexes
*****
All links are stable.
```

```
*****
Routing Time Step Summary
*****
Minimum Time Step : 5.00 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
```

```
*****
Subcatchment Runoff Summary
*****
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S1	109.86	89.75	0.00	84.81	115.02	7.06	0.88	0.576
S2	109.86	100.47	0.00	82.24	128.38	5.51	0.89	0.610
S3	109.86	0.00	0.00	77.91	32.12	4.31	0.92	0.292
S4	109.86	0.00	0.00	80.56	29.41	5.86	1.01	0.268
S5	109.86	0.00	0.00	80.27	29.71	6.30	1.11	0.270
S_2L	109.86	0.00	0.00	16.29	92.61	5.92	4.02	0.843
S_2I	109.86	0.00	0.00	22.34	82.79	2.11	1.15	0.754
S_2J	109.86	0.00	0.00	22.28	83.03	1.86	1.09	0.756
S_2K	109.86	0.00	0.00	23.22	80.52	7.34	2.12	0.733

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J1	JUNCTION	0.11	1.20	914.36	0 07:19
J2	JUNCTION	0.19	1.20	913.40	0 07:31
OF1	OUTFALL	0.00	0.00	849.90	0 00:00
OF4	OUTFALL	0.00	0.00	845.80	0 00:00
OF3	OUTFALL	0.00	0.00	845.95	0 00:00
OF5	OUTFALL	0.00	0.00	0.00	0 00:00
OFpond	OUTFALL	0.00	0.00	907.00	0 00:00

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
J1	JUNCTION	1.148	1.148	0 07:15	2.106	2.106

J2	JUNCTION	1.092	1.435	0	07:18	1.855	3.949
OF1	OUTFALL	0.882	0.882	0	08:05	7.055	7.055
OF4	OUTFALL	2.126	2.126	0	07:35	12.163	12.163
OF3	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
OF5	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
OFPond	OUTFALL	5.831	5.951	0	07:15	13.243	17.016

Node Surcharge Summary

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height		Min. Depth	
			Above Crown Meters		Below Rim Meters	
J1	JUNCTION	0.07	0.000		0.000	
J2	JUNCTION	0.14	0.000		0.000	

Node Flooding Summary

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum		Time of Max		Total	
		Rate CMS		Occurrence days hr:min		Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J1	0.07	0.285		0	07:19	0.033	1.20
J2	0.13	0.294		0	07:31	0.066	1.20

Outfall Loading Summary

Outfall Node	Flow		Avg.		Max.		Total	
	Freq. Pcnt.		Flow CMS		Flow CMS		Volume 10^6 ltr	

OF1	24.96	0.327	0.882	7.055
OF4	20.88	0.674	2.126	12.163
OF3	0.00	0.000	0.000	0.000
OF5	0.00	0.000	0.000	0.000
OFFond	99.64	0.198	5.951	17.016

System	29.09	1.199	7.115	36.234

Link Flow Summary

Link	Type	Maximum Flow CMS		Time of Max Occurrence days hr:min		Maximum Veloc m/sec		Max/ Full Flow		Max/ Full Depth	
		Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
C1	CHANNEL	0.680	0	07:24	0	0.36	0.95	0.95	0.95	0.95	0.95
C2	CHANNEL	0.594	0	07:31	0	0.51	0.51	0.51	0.62	0.62	0.62

Flow Classification Summary

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---				Avg. Froude Number		Avg. Flow Change	
		Dry	Dry	Up	Down	Up	Down	Up	Down
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.0001
C2	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.15	0.0001

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Dec 05 10:53:33 2017
Analysis ended on: Tue Dec 05 10:53:34 2017
Total elapsed time: 00:00:01

[TITLE]
17-006 Predevelopment 100yr/24hr

[OPTIONS]
FLOW_UNITS CMS
INFILTRATION GREEN_AMPT
FLOW_ROUTING DYNWAVE
START_DATE 12/05/2016
START_TIME 00:00:00
REPORT_START_DATE 12/05/2016
REPORT_START_TIME 00:00:00
END_DATE 12/06/2016
END_TIME 00:00:00
SWEEP_START 01/01
SWEEP_END 12/31
DRY_DAYS 0
REPORT_STEP 0:01:00
WET_STEP 0:05:00
DRY_STEP 0:05:00
ROUTING_STEP 5
ALLOW_PONDING NO
INERTIAL_DAMPING PARTIAL
VARIABLE_STEP 0.75
LENGTHENING_STEP 0
MIN_SURFAREA 0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS DEPTH
MIN_SLOPE 0

[EVAPORATION]
;;Type Parameters
;;-----
CONSTANT 0.0
DRY_ONLY NO

[RAINGAGES]
;;
;;Name Rain Type Time Intrvl Snow Catch Data Source
;;-----
100yr24hr INTENSITY 0:05 1.0 TIMESERIES 100yr24hr

[SUBCATCHMENTS]
;;
;;Name Raingage Outlet Total Area Pcnt. Imperv Width Pcnt. Slope Curb Length Snow Pack

```
;;-----
S1      100yr24hr      OF1      6.134      0      201.776      0.9      0
S2      100yr24hr      S1       4.288      0      209.171      0.6      0
S3      100yr24hr      S2      13.412      0      396.805      0.7      0
S4      100yr24hr      OF4     19.924      0      427.554      0.6      0
S5      100yr24hr      OF4     21.219      0      439.317      0.7      0
S_2L    100yr24hr      OFPond    6.389      78      709.889      1.4      0
S_2I    100yr24hr      J1       2.546      70      385.758      0.6      0
S_2J    100yr24hr      J2       2.236      70      414.074      0.6      0
S_2K    100yr24hr      OFPond    9.113      70      332.591      0.6      0
```

```
[SUBAREAS]
;;Subcatchment  N-Imperv  N-Perv  S-Imperv  S-Perv  PctZero  RouteTo  PctRouted
;;-----
S1      0.01      0.1      2      10      25      OUTLET
S2      0.01      0.1      2      10      25      OUTLET
S3      0.01      0.1      2      10      25      OUTLET
S4      0.01      0.1      2      10      25      OUTLET
S5      0.01      0.1      2      10      25      OUTLET
S_2L    0.01      0.1      10     10      78      OUTLET
S_2I    0.05      0.1      10     10      25      OUTLET
S_2J    0.05      0.1      10     10      25      OUTLET
S_2K    0.05      0.1      10     10      25      OUTLET
```

```
[INFILTRATION]
;;Subcatchment  Suction  HydCon  IMDmax
;;-----
S1      253      3.5      0.15
S2      253      3.5      0.15
S3      253      3.5      0.15
S4      253      3.5      0.15
S5      253      3.5      0.15
S_2L    253      3.5      0.25
S_2I    253      3.5      0.25
S_2J    253      3.5      0.25
S_2K    253      3.5      0.25
```

```
[JUNCTIONS]
;;
;;Name
;;-----
J1      913.16      1.2      0      0      0      0
J2      912.2      1.2      0      0      0      0
```

```
[OUTFALLS]
;;
Invert  Outfall  Stage/Table  Tide
```


;;Name		Elev.	Type	Time Series	Gate				
;;		-----							
;;		;;							
OF1		849.9	FREE		NO				
OF4		845.8	FREE		NO				
OF3		845.95	FREE		NO				
OF5		0	FREE		NO				
OFFPond		907	FREE		NO				
[CONDUITS]									
;;									
;;Name		Inlet Node	Outlet Node	Length	Manning N	Inlet Offset	Outlet Offset	Init. Flow	Max. Flow
;;		-----							
;;		;;							
C1		J1	J2	400	0.01	0	0	0	0
C2		J2	OFFPond	400	0.01	0	2.6	0	0
[XSECTIONS]									
;;Link		Shape	Geom1	Geom2	Geom3	Geom4	Barrels		
;;		-----							
;;		;;							
C1		IRREGULAR	exist_ditch	0	0	0	1		
C2		IRREGULAR	exist_ditch	0	0	0	1		
[TRANSECTS]									
NC 0.1 0.1									
X1 exist_ditch		4	0.0	0.0	0.0	0.0	0.0	0.0	
GR 0		-1.2	0.6	-1.2	1.8	0	2.4		
NC 0.1 0.1									
X1 Proposed		4	0.0	0.0	0.0	0.0	0.0	0.0	
GR 0		-1.05	3	-1.05	4	0	7		
[LOSSES]									
;;Link		Inlet	Out let	Average	Flap	Gate			
;;		-----							
;;		;;							
[CURVES]									
;;Name		Type	X-Value	Y-Value					
;;		-----							
;;		;;							
Exist_Dugout		Storage	0	.25					
Exist_Dugout			.5	9.3					
Exist_Dugout			1	31					
Exist_Dugout			1.5	66					
Exist_Dugout			2	114					
Exist_Dugout			2.5	173					
Exist_Dugout			3	245					
Exist_Dugout			3.5	329					

Exist_Dugout	4	424
Exist_Dugout	4.5	531
[TIMESERIES]		
;;Name	Date	Time
;;-----	-----	-----
100yr24hr	0:00	0
100yr24hr	0:05	0.763
100yr24hr	0:10	0.771
100yr24hr	0:15	0.779
100yr24hr	0:20	0.787
100yr24hr	0:25	0.796
100yr24hr	0:30	0.804
100yr24hr	0:35	0.813
100yr24hr	0:40	0.822
100yr24hr	0:45	0.831
100yr24hr	0:50	0.841
100yr24hr	0:55	0.851
100yr24hr	1:00	0.861
100yr24hr	1:05	0.871
100yr24hr	1:10	0.881
100yr24hr	1:15	0.892
100yr24hr	1:20	0.903
100yr24hr	1:25	0.914
100yr24hr	1:30	0.926
100yr24hr	1:35	0.938
100yr24hr	1:40	0.95
100yr24hr	1:45	0.963
100yr24hr	1:50	0.976
100yr24hr	1:55	0.99
100yr24hr	2:00	1.004
100yr24hr	2:05	1.018
100yr24hr	2:10	1.033
100yr24hr	2:15	1.048
100yr24hr	2:20	1.064
100yr24hr	2:25	1.08
100yr24hr	2:30	1.097
100yr24hr	2:35	1.114
100yr24hr	2:40	1.132
100yr24hr	2:45	1.151
100yr24hr	2:50	1.17
100yr24hr	2:55	1.191
100yr24hr	3:00	1.211
100yr24hr	3:05	1.233
100yr24hr	3:10	1.256
100yr24hr	3:15	1.279

100yr24hr	3:20	1.304
100yr24hr	3:25	1.329
100yr24hr	3:30	1.356
100yr24hr	3:35	1.384
100yr24hr	3:40	1.413
100yr24hr	3:45	1.443
100yr24hr	3:50	1.475
100yr24hr	3:55	1.509
100yr24hr	4:00	1.544
100yr24hr	4:05	1.581
100yr24hr	4:10	1.62
100yr24hr	4:15	1.661
100yr24hr	4:20	1.705
100yr24hr	4:25	1.751
100yr24hr	4:30	1.8
100yr24hr	4:35	1.853
100yr24hr	4:40	1.908
100yr24hr	4:45	1.967
100yr24hr	4:50	2.031
100yr24hr	4:55	2.099
100yr24hr	5:00	2.172
100yr24hr	5:05	2.251
100yr24hr	5:10	2.337
100yr24hr	5:15	2.43
100yr24hr	5:20	2.532
100yr24hr	5:25	2.643
100yr24hr	5:30	2.765
100yr24hr	5:35	2.9
100yr24hr	5:40	3.051
100yr24hr	5:45	3.219
100yr24hr	5:50	3.409
100yr24hr	5:55	3.625
100yr24hr	6:00	3.873
100yr24hr	6:05	4.159
100yr24hr	6:10	4.496
100yr24hr	6:15	4.897
100yr24hr	6:20	5.383
100yr24hr	6:25	5.985
100yr24hr	6:30	6.748
100yr24hr	6:35	7.75
100yr24hr	6:40	9.123
100yr24hr	6:45	11.117
100yr24hr	6:50	14.266
100yr24hr	6:55	19.931
100yr24hr	7:00	32.779
100yr24hr	7:05	83.515

100yr24hr	7:10	255.206
100yr24hr	7:15	114.934
100yr24hr	7:20	63.946
100yr24hr	7:25	43.017
100yr24hr	7:30	31.998
100yr24hr	7:35	25.321
100yr24hr	7:40	20.889
100yr24hr	7:45	17.754
100yr24hr	7:50	15.429
100yr24hr	7:55	13.641
100yr24hr	8:00	12.226
100yr24hr	8:05	11.08
100yr24hr	8:10	10.134
100yr24hr	8:15	9.34
100yr24hr	8:20	8.665
100yr24hr	8:25	8.083
100yr24hr	8:30	7.577
100yr24hr	8:35	7.133
100yr24hr	8:40	6.74
100yr24hr	8:45	6.39
100yr24hr	8:50	6.077
100yr24hr	8:55	5.794
100yr24hr	9:00	5.538
100yr24hr	9:05	5.304
100yr24hr	9:10	5.091
100yr24hr	9:15	4.895
100yr24hr	9:20	4.714
100yr24hr	9:25	4.547
100yr24hr	9:30	4.392
100yr24hr	9:35	4.248
100yr24hr	9:40	4.114
100yr24hr	9:45	3.989
100yr24hr	9:50	3.871
100yr24hr	9:55	3.761
100yr24hr	10:00	3.657
100yr24hr	10:05	3.559
100yr24hr	10:10	3.467
100yr24hr	10:15	3.38
100yr24hr	10:20	3.297
100yr24hr	10:25	3.219
100yr24hr	10:30	3.144
100yr24hr	10:35	3.073
100yr24hr	10:40	3.006
100yr24hr	10:45	2.941
100yr24hr	10:50	2.88
100yr24hr	10:55	2.821

100yr24hr	11:00	2.765
100yr24hr	11:05	2.711
100yr24hr	11:10	2.659
100yr24hr	11:15	2.61
100yr24hr	11:20	2.562
100yr24hr	11:25	2.516
100yr24hr	11:30	2.472
100yr24hr	11:35	2.43
100yr24hr	11:40	2.389
100yr24hr	11:45	2.35
100yr24hr	11:50	2.312
100yr24hr	11:55	2.275
100yr24hr	12:00	2.24
100yr24hr	12:05	2.205
100yr24hr	12:10	2.172
100yr24hr	12:15	2.14
100yr24hr	12:20	2.109
100yr24hr	12:25	2.079
100yr24hr	12:30	2.05
100yr24hr	12:35	2.021
100yr24hr	12:40	1.994
100yr24hr	12:45	1.967
100yr24hr	12:50	1.941
100yr24hr	12:55	1.916
100yr24hr	13:00	1.892
100yr24hr	13:05	1.868
100yr24hr	13:10	1.845
100yr24hr	13:15	1.822
100yr24hr	13:20	1.8
100yr24hr	13:25	1.779
100yr24hr	13:30	1.758
100yr24hr	13:35	1.738
100yr24hr	13:40	1.718
100yr24hr	13:45	1.699
100yr24hr	13:50	1.68
100yr24hr	13:55	1.661
100yr24hr	14:00	1.643
100yr24hr	14:05	1.626
100yr24hr	14:10	1.609
100yr24hr	14:15	1.592
100yr24hr	14:20	1.576
100yr24hr	14:25	1.56
100yr24hr	14:30	1.544
100yr24hr	14:35	1.529
100yr24hr	14:40	1.514
100yr24hr	14:45	1.499

100yr24hr	14:50	1.485
100yr24hr	14:55	1.47
100yr24hr	15:00	1.457
100yr24hr	15:05	1.443
100yr24hr	15:10	1.43
100yr24hr	15:15	1.417
100yr24hr	15:20	1.404
100yr24hr	15:25	1.392
100yr24hr	15:30	1.38
100yr24hr	15:35	1.368
100yr24hr	15:40	1.356
100yr24hr	15:45	1.344
100yr24hr	15:50	1.333
100yr24hr	15:55	1.322
100yr24hr	16:00	1.311
100yr24hr	16:05	1.3
100yr24hr	16:10	1.289
100yr24hr	16:15	1.279
100yr24hr	16:20	1.269
100yr24hr	16:25	1.259
100yr24hr	16:30	1.249
100yr24hr	16:35	1.239
100yr24hr	16:40	1.23
100yr24hr	16:45	1.221
100yr24hr	16:50	1.211
100yr24hr	16:55	1.202
100yr24hr	17:00	1.193
100yr24hr	17:05	1.185
100yr24hr	17:10	1.176
100yr24hr	17:15	1.168
100yr24hr	17:20	1.159
100yr24hr	17:25	1.151
100yr24hr	17:30	1.143
100yr24hr	17:35	1.135
100yr24hr	17:40	1.127
100yr24hr	17:45	1.119
100yr24hr	17:50	1.112
100yr24hr	17:55	1.104
100yr24hr	18:00	1.097
100yr24hr	18:05	1.089
100yr24hr	18:10	1.082
100yr24hr	18:15	1.075
100yr24hr	18:20	1.068
100yr24hr	18:25	1.061
100yr24hr	18:30	1.055
100yr24hr	18:35	1.048

100yr24hr	18:40	1.041
100yr24hr	18:45	1.035
100yr24hr	18:50	1.028
100yr24hr	18:55	1.022
100yr24hr	19:00	1.015
100yr24hr	19:05	1.01
100yr24hr	19:10	1.004
100yr24hr	19:15	0.998
100yr24hr	19:20	0.992
100yr24hr	19:25	0.986
100yr24hr	19:30	0.98
100yr24hr	19:35	0.974
100yr24hr	19:40	0.969
100yr24hr	19:45	0.963
100yr24hr	19:50	0.958
100yr24hr	19:55	0.952
100yr24hr	20:00	0.947
100yr24hr	20:05	0.942
100yr24hr	20:10	0.936
100yr24hr	20:15	0.931
100yr24hr	20:20	0.926
100yr24hr	20:25	0.921
100yr24hr	20:30	0.916
100yr24hr	20:35	0.911
100yr24hr	20:40	0.908
100yr24hr	20:45	0.901
100yr24hr	20:50	0.897
100yr24hr	20:55	0.892
100yr24hr	21:00	0.887
100yr24hr	21:05	0.883
100yr24hr	21:10	0.878
100yr24hr	21:15	0.874
100yr24hr	21:20	0.869
100yr24hr	21:25	0.865
100yr24hr	21:30	0.861
100yr24hr	21:35	0.856
100yr24hr	21:40	0.852
100yr24hr	21:45	0.848
100yr24hr	21:50	0.844
100yr24hr	21:55	0.84
100yr24hr	22:00	0.835
100yr24hr	22:05	0.831
100yr24hr	22:10	0.827
100yr24hr	22:15	0.823
100yr24hr	22:20	0.82
100yr24hr	22:25	0.816

100yr24hr	22:30	0.812
100yr24hr	22:35	0.808
100yr24hr	22:40	0.804
100yr24hr	22:45	0.801
100yr24hr	22:50	0.797
100yr24hr	22:55	0.793
100yr24hr	23:00	0.79
100yr24hr	23:05	0.786
100yr24hr	23:10	0.783
100yr24hr	23:15	0.779
100yr24hr	23:20	0.776
100yr24hr	23:25	0.772
100yr24hr	23:30	0.769
100yr24hr	23:35	0.766
100yr24hr	23:40	0.762
100yr24hr	23:45	0.759
100yr24hr	23:50	0.756
100yr24hr	23:55	0.752
100yr24hr	24:00	0.749

[REPORT]
INPUT NO
CONTROLS NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]			
DIMENSIONS	0	0	10000
UNITS	None		

[COORDINATES]			
;;Node	X-Coord	Y-Coord	
;;-----	-----	-----	
J1	738.703	-494.86	
J2	780.75	-495.507	
OF1	833.083	-162.424	
OF4	882.731	-287.979	
OF3	834.185	-246.694	
OF5	897.621	-384.833	
OFPond	841.8	-465.42	

[VERTICES]

```
;;Link      X-Coord      Y-Coord
;;-----
[Polygons]
;;Subcatchment      X-Coord      Y-Coord
;;-----
S1      725.101      -159.524
S1      728.196      -156.852
S1      774.759      -156.289
S1      774.618      -166.417
S1      776.447      -172.326
S1      782.496      -178.234
S1      793.047      -182.736
S1      800.221      -184.846
S1      799.658      -194.834
S1      759.285      -198.069
S1      737.621      -203.133
S1      726.086      -208.198
S1      725.101      -159.524
S2      725.805      -208.901
S2      737.504      -202.889
S2      752.251      -200.038
S2      772.79       -197.506
S2      799.518      -195.256
S2      796.845      -231.127
S2      770.68       -231.69
S2      758.019      -224.797
S2      748.875      -222.406
S2      737.762      -216.216
S2      731.713      -211.433
S2      725.805      -208.901
S3      725.664      -209.042
S3      732.276      -212.136
S3      744.233      -220.014
S3      748.312      -222.406
S3      758.722      -225.36
S3      770.82       -231.971
S3      796.845      -231.268
S3      796.986      -251.525
S3      800.502      -258.559
S3      821.041      -272.767
S3      838.625      -287.96
S3      826.246      -293.164
S3      810.209      -285.146
S3      806.27       -284.161
S3      795.016      -284.161
```

S3	788.404	-280.926
S3	766.6	-280.645
S3	762.38	-285.849
S3	761.254	-285.849
S3	750.141	-296.681
S3	745.077	-304.278
S3	742.826	-311.733
S3	727.071	-333.397
S3	725.664	-209.042
S4	726.745	-334
S4	732.767	-325.531
S4	742.93	-310.287
S4	746.129	-302.947
S4	761.373	-286.198
S4	767.396	-280.928
S4	788.474	-281.493
S4	795.249	-284.316
S4	806.164	-284.127
S4	826.866	-292.973
S4	838.722	-288.268
S4	845.309	-299.183
S4	856.036	-341.527
S4	821.22	-349.996
S4	801.647	-356.771
S4	787.721	-362.794
S4	767.207	-365.052
S4	741.048	-381.99
S4	727.874	-382.743
S4	726.745	-334
S5	726.745	-382.743
S5	740.672	-381.613
S5	767.396	-364.676
S5	788.474	-362.417
S5	819.902	-349.996
S5	856.224	-341.339
S5	862.811	-369.381
S5	866.011	-394.034
S5	869.775	-423.581
S5	844.744	-428.851
S5	795.813	-425.275
S5	732.203	-425.275
S5	729.192	-420.57
S5	726.745	-382.743
S5	824.966	-489.172
S5	822.447	-427.291
S5	842.398	-428.893

S_2L	868.746	-423.803
S_2L	872.039	-451.947
S_2L	867.249	-489.073
S_2L	824.966	-489.172
S_2I	757.727	-425.6
S_2I	760.205	-489.324
S_2I	739.403	-489.373
S_2I	736.409	-486.379
S_2I	735.212	-425.6
S_2I	757.727	-425.6
S_2J	777.037	-425.6
S_2J	779.659	-489.279
S_2J	760.205	-489.324
S_2J	757.727	-425.6
S_2J	777.037	-425.6
S_2K	822.447	-427.291
S_2K	824.966	-489.172
S_2K	779.659	-489.279
S_2K	777.037	-425.6
S_2K	801.38	-425.6
S_2K	822.447	-427.291

[SYMBOLS]

;;Gage

;;

X-Coord

Y-Coord

17-006 100 Yr/24 Hr Post Develop
STATUS REPORT

NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.

Analysis Options

Flow Units CMS
Process Models:
 Rainfall/Runoff YES
 Snowmelt NO
 Groundwater NO
 Flow Routing YES
 Ponding Allowed YES
 Water Quality NO
 Infiltration Method GREEN_AMPT
 Flow Routing Method DYNWAVE
 Starting Date DEC-05-2016 00:00:00
 Ending Date DEC-10-2016 00:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00
 Routing Time Step 5.00 sec

WARNING 02: maximum depth increased for Node J2e
WARNING 02: maximum depth increased for Node J2h_1
WARNING 02: maximum depth increased for Node J2f_2
WARNING 02: maximum depth increased for Node J2h_2
WARNING 02: maximum depth increased for Node J2f_3

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	9.043	109.858
Evaporation Loss	0.000	0.000
Infiltration Loss	1.866	22.672

Surface Runoff 7.018 85.255
Final Surface Storage ... 0.202 2.454
Continuity Error (%) -0.476

	Volume hectare-m -----	Volume 10^6 ltr -----
Flow Routing Continuity		
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	7.018	70.182
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.020	10.196
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	1.687	16.875
Final Stored Volume	7.478	74.783
Continuity Error (%)	2.388	

Highest Continuity Errors

Node J2f_3 (8.99%)
Node J2f_2 (5.37%)
Node J2h_2 (2.15%)
Node J2j_2 (-2.00%)
Node SU2 (1.51%)

Time-Step Critical Elements

None

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 5.00 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S2L	109.86	0.00	0.00	15.17	94.68	6.05	3.24	0.862
S2K	109.86	0.00	0.00	19.43	88.04	8.02	2.27	0.801
S2E	109.86	0.00	0.00	15.55	92.19	4.13	2.10	0.839
S2D	109.86	0.00	0.00	18.30	89.18	2.47	0.76	0.812
S2B	109.86	0.00	0.00	19.02	88.50	2.99	0.94	0.806
S1A	109.86	53.98	0.00	49.56	113.02	10.46	2.89	0.690
S1B	109.86	0.00	0.00	23.81	84.09	5.00	1.88	0.765
S2A	109.86	0.00	0.00	17.82	89.62	4.79	1.44	0.816
S2C	109.86	0.00	0.00	17.73	89.79	5.96	1.99	0.817
S2G	109.86	0.00	0.00	17.27	90.30	3.62	1.31	0.822
S2J	109.86	0.00	0.00	16.54	91.34	2.04	1.17	0.831
S2I	109.86	0.00	0.00	20.79	87.28	2.22	1.22	0.795
S2H_1	109.86	0.00	0.00	16.87	90.51	2.59	0.77	0.824
S2H_2	109.86	0.00	0.00	20.11	87.41	5.73	1.69	0.796
S2F_1	109.86	0.00	0.00	24.32	83.65	2.62	1.04	0.761
S2F_2	109.86	0.00	0.00	23.38	84.55	6.48	2.56	0.770

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
J2a_1	JUNCTION	0.01	0.20	916.15	0 07:18
J2G_2	JUNCTION	0.02	0.20	913.67	0 07:32
J2a_2	JUNCTION	0.01	0.23	914.96	0 07:26

J2b	JUNCTION	0.01	0.17	915.52	0	07:16
J2d	JUNCTION	0.01	0.17	914.72	0	07:20
J2g_1	JUNCTION	0.01	0.20	915.14	0	07:20
J2I	JUNCTION	0.02	1.23	914.39	0	07:23
J2K_1	JUNCTION	0.02	0.69	911.39	0	07:20
J2k_2	JUNCTION	0.02	0.90	911.24	0	07:43
J2c	JUNCTION	0.02	0.22	912.54	0	07:33
J2e	JUNCTION	0.06	1.07	911.83	0	07:32
J2h_1	JUNCTION	0.04	0.91	911.51	0	07:28
J2f_2	JUNCTION	0.85	1.84	910.80	0	07:53
J2f_1	JUNCTION	0.08	1.15	910.95	0	07:54
J2j_1	JUNCTION	0.01	0.18	914.55	0	07:23
J2J_2	JUNCTION	0.03	1.15	913.35	0	07:34
J2h_2	JUNCTION	0.03	0.92	911.22	0	07:31
J2f_3	JUNCTION	1.45	1.57	909.87	4	23:53
OF_North	OUTFALL	0.00	0.00	909.00	0	00:00
OF1	OUTFALL	0.00	0.00	908.00	0	00:00
SU2	STORAGE	2.74	2.87	909.87	5	00:00
SU1	STORAGE	0.49	1.31	909.51	0	12:25

Node Inflow Summary

Node	Type	Maximum		Maximum		Time of Max Occurrence days hr:min	Lateral		Total	
		Lateral Inflow CMS	Total Inflow CMS	Lateral Inflow CMS	Total Inflow CMS		Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr		
J2a_1	JUNCTION	1.439	1.439	1.439	1.439	0 07:20	4.789	4.789		
J2G_2	JUNCTION	0.000	2.111	2.111	2.111	0 07:21	0.000	6.144		
J2a_2	JUNCTION	0.000	2.415	2.415	2.415	0 07:19	0.000	7.806		
J2b	JUNCTION	0.937	0.937	0.937	0.937	0 07:20	2.990	2.990		
J2d	JUNCTION	0.764	0.764	0.764	0.764	0 07:20	2.472	2.472		
J2g_1	JUNCTION	1.315	1.315	1.315	1.315	0 07:15	3.616	3.616		
J2I	JUNCTION	1.218	1.218	1.218	1.218	0 07:15	2.222	2.222		
J2K_1	JUNCTION	2.272	2.272	2.272	2.272	0 07:20	8.023	8.023		
J2K_2	JUNCTION	0.000	1.010	1.010	1.010	0 07:38	0.000	4.235		
J2c	JUNCTION	0.000	2.072	2.072	2.072	0 07:29	0.000	7.819		
J2e	JUNCTION	4.034	4.201	4.201	4.201	0 07:15	10.085	17.939		
J2h_1	JUNCTION	1.693	1.693	1.693	1.693	0 07:20	5.734	5.734		
J2f_2	JUNCTION	2.561	7.091	7.091	7.091	0 07:27	6.485	35.653		
J2f_1	JUNCTION	1.039	3.239	3.239	3.239	0 07:40	2.618	18.439		
J2j_1	JUNCTION	1.169	1.169	1.169	1.169	0 07:15	2.042	2.042		

J2J_2	JUNCTION	0.000	1.442	0	07:29	0.000	4.152
J2h_2	JUNCTION	0.769	3.204	0	07:30	2.594	11.001
J2f_3	JUNCTION	0.000	5.739	0	07:27	0.000	39.216
OF_North	OUTFALL	0.000	0.040	0	07:10	0.000	10.196
OF1	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
SU2	STORAGE	3.236	7.800	0	07:37	6.049	70.752
SU1	STORAGE	2.893	2.893	0	07:25	10.464	10.464

Node Surcharge Summary

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height		Min. Depth Below Rim Meters
			Above Crown Meters		
J2f_1	JUNCTION	0.01	0.154	0.000	
SU1	STORAGE	120.00	1.305	0.695	

Node Flooding Summary

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CMS	Time of Max Occurrence days hr:min	Total Maximum	
				Flood Volume 10^6 ltr	Ponded Depth Meters
J2I	0.16	0.397	0 07:19	0.053	1.23
J2e	0.42	1.061	0 07:18	0.435	1.07
J2f_1	0.53	1.031	0 07:41	0.517	1.15

Storage Volume Summary

Average Volume	Avg Pcnt	E&I Pcnt	Maximum Volume	Max Pcnt	Time of Max Occurrence	Maximum Outflow

Storage Unit	1000 m3	Full	Loss	1000 m3	Full	days	hr:min	CMS
SU2	65.439	74	0	69.692	78	5	00:00	0.000
SU1	3.108	21	0	8.723	58	0	12:25	0.040

 Outfall Loading Summary

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
OF_North	59.01	0.040	0.040	10.196
OF1	0.00	0.000	0.000	0.000
System	29.50	0.040	0.040	10.196

 Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Occurrence days	Max Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CHANNEL	2.900	0 07:40	0.60	1.02	1.00
C2	CHANNEL	1.489	0 07:19	0.72	0.64	0.90
C3	CHANNEL	2.072	0 07:29	0.85	0.89	0.94
C5	CHANNEL	0.817	0 07:21	0.56	0.38	0.74
C20_1	CHANNEL	4.666	0 07:27	0.47	1.13	1.00
C7	CHANNEL	3.491	0 07:36	0.52	0.75	0.84
C16	CHANNEL	1.287	0 07:32	0.73	0.55	0.77
C9	CHANNEL	0.991	0 07:43	1.01	0.41	0.54
C10	CHANNEL	0.960	0 07:17	0.62	0.41	0.84
C18	CHANNEL	2.253	0 07:20	1.17	0.31	0.58
C12	CHANNEL	0.726	0 07:29	0.49	0.39	0.70
C13	CHANNEL	0.750	0 07:27	0.40	0.98	0.96
C15	CHANNEL	1.010	0 07:38	0.59	0.79	0.85
C11	CHANNEL	1.294	0 07:21	0.85	0.56	0.78
C19	CHANNEL	1.075	0 07:28	0.50	0.41	0.62
C6_2	CHANNEL	2.918	0 07:26	0.36	0.56	1.00

C20_2	CHANNEL	5.217	0	07:49	0.63	1.19	1.00
C6	CHANNEL	1.920	0	07:33	0.73	0.83	0.96
C8	CHANNEL	1.164	0	07:31	0.57	0.74	0.84
C14	CHANNEL	0.254	0	07:28	0.23	0.24	0.63
P1	PUMP	0.040	0	07:10		1.00	
P2	PUMP	0.000	0	00:00		0.00	

Flow Classification Summary

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---						Avg. Flow Change	
		Dry	Up	Down	Sub	Sup	Up	Down	Avg. Froude Number
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number
C1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.05
C2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.33
C3	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.30
C5	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.18
C20_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01
C7	1.00	0.00	0.00	0.00	0.84	0.00	0.00	0.16	0.03
C16	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.44
C9	1.00	0.02	0.00	0.00	0.93	0.00	0.00	0.06	0.02
C10	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.24
C18	1.00	0.00	0.00	0.00	0.93	0.00	0.00	0.07	0.03
C12	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.42
C13	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04
C15	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.11
C11	1.00	0.00	0.00	0.00	0.99	0.01	0.00	0.00	0.19
C19	1.00	0.00	0.00	0.00	0.83	0.00	0.00	0.17	0.04
C6_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01
C20_2	1.00	0.00	0.01	0.00	0.99	0.00	0.00	0.00	0.00
C6	1.00	0.01	0.00	0.00	0.01	0.00	0.00	0.98	0.43
C8	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.00
C14	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Conduit Surge Summary

-----	Hours Full	-----	Hours Above Full	Hours Capacity

Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C1	0.06	0.06	0.06	0.04	0.02
C20_1	1.23	1.23	1.23	1.15	1.10
C6_2	0.53	0.53	0.53	0.01	0.01
C20_2	111.97	111.97	111.97	0.74	0.23

Pumping Summary

Pump	Percent Utilized	Max Flow CMS	Avg Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Curve
P1	59.01	0.04	0.04	10.196	9.34	32.37
P2	0.00	0.00	0.00	0.000	0.00	0.00

Analysis begun on: Fri Mar 23 16:33:20 2018
Analysis ended on: Fri Mar 23 16:33:27 2018
Total elapsed time: 00:00:07

[TITLE]
17-006 100 Yr/24 Hr Post Develop
DETAILS REPORT

[OPTIONS]
FLOW_UNITS CMS
INFILTRATION GREEN_AMPT
FLOW_ROUTING DYNWAVE
START_DATE 12/05/2016
START_TIME 00:00:00
REPORT_START_DATE 12/05/2016
REPORT_START_TIME 00:00:00
END_DATE 12/10/2016
END_TIME 00:00:00
SWEEP_START 01/01
SWEEP_END 12/31
DRY_DAYS 0
REPORT_STEP 0:01:00
WET_STEP 0:05:00
DRY_STEP 0:05:00
ROUTING_STEP 5
ALLOW_PONDING YES
INERTIAL_DAMPING PARTIAL
VARIABLE_STEP 0.75
LENGTHENING_STEP 0
MIN_SURFAREA 0
NORMAL_FLOW_LIMITED BOTH
SKIP_STEADY_STATE NO
FORCE_MAIN_EQUATION H-W
LINK_OFFSETS DEPTH
MIN_SLOPE 0

[EVAPORATION]
;;Type Parameters
;;-----
CONSTANT 0.0
DRY_ONLY NO

[RAINGAGES]
;;
;;Name Rain Type Time Intrvl Snow Catch Data Source
;;-----
100yr24hr INTENSITY 0:05 1.0 TIMESERIES 100yr24hr

[SUBCATCHMENTS]
;;
Total Pcnt. Pcnt. Curb Snow

;;Name	Rainage	Outlet	Area	Imperv	Width	Slope	Length	Pack
;;-----	-----	-----	-----	-----	-----	-----	-----	-----
S2L	100yr24hr	SU2	6.389	78	709.889	1.38	0	
S2K	100yr24hr	J2K_1	9.113	73	332.591	0.6	0	
S2E	100yr24hr	J2e	4.4748	77.5	588.789	0.66	0	
S2D	100yr24hr	J2d	2.7719	74.3	123.196	0.62	0	
S2B	100yr24hr	J2b	3.378	73.3	160.095	0.57	0	
S1A	100yr24hr	SU1	9.258	44.6	331.828	0.73	0	
S1B	100yr24hr	S1A	5.943	66.4	358.012	0.74	0	
S2A	100yr24hr	J2a_1	5.344	75	242.909	0.53	0	
S2C	100yr24hr	J2e	6.637	74.9	319.087	0.81	0	
S2G	100yr24hr	J2g_1	4.004	75.4	317.778	0.44	0	
S2J	100yr24hr	J2j_1	2.236	76	414.074	0.6	0	
S2I	100yr24hr	J2I	2.546	70	385.758	0.6	0	
S2H_1	100yr24hr	J2h_2	2.8655	76.3	101.254	0.85	0	
S2H_2	100yr24hr	J2h_1	6.5596	72	231.788	0.75	0	
S2F_1	100yr24hr	J2f_1	3.13	65.6	204.575	0.76	0	
S2F_2	100yr24hr	J2f_2	7.67	66.9	501.307	0.76	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
;;-----	-----	-----	-----	-----	-----	-----	-----
S2L	0.05	0.1	5	5	78	OUTLET	
S2K	0.05	0.1	5	5	25	OUTLET	
S2E	0.05	0.1	5	5	25	OUTLET	
S2D	0.05	0.1	5	5	25	OUTLET	
S2B	0.05	0.1	5	5	25	OUTLET	
S1A	0.05	0.1	5	5	25	OUTLET	
S1B	0.05	0.1	5	5	25	OUTLET	
S2A	0.05	0.1	5	5	25	OUTLET	
S2C	0.05	0.1	5	5	25	OUTLET	
S2G	0.05	0.1	5	5	25	OUTLET	
S2J	0.05	0.1	5	5	25	OUTLET	
S2I	0.05	0.1	5	5	25	OUTLET	
S2H_1	0.05	0.1	5	5	25	OUTLET	
S2H_2	0.05	0.1	5	5	25	OUTLET	
S2F_1	0.05	0.1	5	5	25	OUTLET	
S2F_2	0.05	0.1	5	5	25	OUTLET	

[INFILTRATION]

;;Subcatchment	Suction	HydCon	IMDmax
;;-----	-----	-----	-----
S2L	253	3.5	0.25
S2K	253	3.5	0.25
S2E	253	3.5	0.25
S2D	253	3.5	0.25

;;	SU2	907	3.4	1.27	TABULAR	SouthStorageMar2018		0	0
;;	SU1	908.2	2	0	TABULAR	NorthStorage		1000	0

[CONDUITS]									
;;	;;Name	Inlet Node	Outlet Node	Length	Manning N	Inlet Offset	Outlet Offset	Init. Flow	Max. Flow
;;	-----								
C1	J2e	J2f_1		160	0.01	0	0	0	0
C2	J2a_1	J2a_2		205	0.01	0	0	0	0
C3	J2a_2	J2c		400	0.1	0	0	0	0
C5	J2d	J2G_2		211	0.01	0	0	0	0
C20_1	J2f_2	J2f_3		270	0.1	0	0	0	0
C7	J2h_2	J2f_2		163	0.1	0	0.843	0	0
C16	J2G_2	J2h_2		400	0.01	0	0.765	0	0
C9	J2K_2	SU2		50	0.01	0	2.2	0	0
C10	J2b	J2a_2		104	0.01	0	0	0	0
C18	J2K_1	SU2		50	0.01	0	1.8	0	0
C12	J2j_1	J2J_2		305	0.01	0	0.965	0	0
C13	J2I	J2J_2		429	0.01	0	0	0	0
C15	J2J_2	J2K_2		300	0.01	0	0	0	0
C11	J2g_1	J2G_2		245	0.01	0	0	0	0
C19	J2h_1	J2f_3		163	0.1	0	1.478	0	0
C6_2	J2f_1	J2f_2		220	0.1	0	0	0	0
C20_2	J2f_3	SU2		110	0.1	0	1	0	0
C6	J2c	J2e		134	0.01	0	0.765	0	0
C8	J2e	J2h_2		166	0.01	0.765	0.765	0	0
C14	J2h_1	J2h_2		245	0.01	0.765	0.765	0	0

[PUMPS]									
;;	;;Name	Inlet Node	Outlet Node	Pump Curve	Init. Status	Startup Depth	Shutoff Depth		
;;	-----								
P1	SU1		OF_North	North_Discharge	OFF	0.1	0.05		
P2	SU2		OF1	South_Discharge	OFF	5	0.1		

[XSECTIONS]									
;;	;;Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels		
;;	-----								
C1	IRREGULAR	major_swale		0	0	0	1		
C2	IRREGULAR	Road_ROW		0	0	0	1		
C3	IRREGULAR	Road_ROW		0	0	0	1		
C5	IRREGULAR	Road_ROW		0	0	0	1		
C20_1	IRREGULAR	ProposedEastDitch		0	0	0	1		
C7	IRREGULAR	ProposedEastDitch		0	0	0	1		
C16	IRREGULAR	Road_ROW		0	0	0	1		

C9	IRREGULAR	exist_ditch	0	0	0	0	0	0	1
C10	IRREGULAR	Road_ROW	0	0	0	0	0	0	1
C18	IRREGULAR	major_swale	0	0	0	0	0	0	1
C12	IRREGULAR	Road_ROW	0	0	0	0	0	0	1
C13	IRREGULAR	exist_ditch	0	0	0	0	0	0	1
C15	IRREGULAR	exist_ditch	0	0	0	0	0	0	1
C11	IRREGULAR	Road_ROW	0	0	0	0	0	0	1
C19	IRREGULAR	major_swale	0	0	0	0	0	0	1
C6_2	IRREGULAR	ProposedEastDitch	0	0	0	0	0	0	1
C20_2	IRREGULAR	ProposedEastDitch	0	0	0	0	0	0	1
C6	IRREGULAR	Road_ROW	0	0	0	0	0	0	1
C8	IRREGULAR	Road_ROW	0	0	0	0	0	0	1
C14	IRREGULAR	Road_ROW	0	0	0	0	0	0	1

[TRANSECTS]

NC 0.09	0.09	0.09							
X1 exist_ditch	4	0.09							
GR 1.2	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			0.6	0	1.8	1.2	2.4		
NC 0.09	0.09	0.09							
X1 ProposedEastDitch	4	0.09							
GR 1	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			5	0	10	1	15		
NC 0.01	0.01	0.01							
X1 Road	5	0.01							
GR 0.17	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			0.01	0.14	7.5	0	14.9	0.17	15
NC 0.025	0.025	0.025							
X1 Road_ROW	7	0.025							
GR 0.235	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR 0.125	17.8	0.235	2.2	0	2.8	0.144	10	0	17.2
			20						
NC 0.09	0.09	0.09							
X1 major_swale	4	0.09							
GR 1	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			4	0	5	1	9		

[LOSSES]
 ;;Link
 ;;-----

	Inlet	Outlet	Average	Flap Gate
	-----	-----	-----	-----

[CURVES]
 ;;Name
 ;;-----
 ;;-----
 North_Discharge Pump1
 North_Discharge
 0 1000 .04

North_Discharge	2000	.04	
North_Discharge	3000	.04	
North_Discharge	7000	.04	
South_Discharge	0	0	
South_Discharge	1000	.235	
South_Discharge	50000	.235	
Exist_Dugout	0	.25	
Exist_Dugout	.5	9.3	
Exist_Dugout	1	31	
Exist_Dugout	1.5	66	
Exist_Dugout	2	114	
Exist_Dugout	2.5	173	
Exist_Dugout	3	245	
Exist_Dugout	3.5	329	
Exist_Dugout	4	424	
Exist_Dugout	4.5	531	
NorthStorage	0	5302	
NorthStorage	.2	5715	
NorthStorage	.4	6134	
NorthStorage	.6	6560	
NorthStorage	.8	6992	
NorthStorage	1	7430	
NorthStorage	1.2	7874	
NorthStorage	1.4	8325	
NorthStorage	1.6	8782	
NorthStorage	1.8	9246	
NorthStorage	2	9715	
AdditionalSouthStorage	0	9776	
AdditionalSouthStorage	.2	9909	
AdditionalSouthStorage	.4	10198	
AdditionalSouthStorage	.6	10481	
AdditionalSouthStorage	.8	10778	
AdditionalSouthStorage	1	11073	
AdditionalSouthStorage	1.2	11372	
AdditionalSouthStorage	1.4	11689	
AdditionalSouthStorage	1.6	11998	
AdditionalSouthStorage	1.8	12323	
AdditionalSouthStorage	2	12648	
AdditionalSouthStorage	2.2	12980	
AdditionalSouthStorage	2.4	13321	
AdditionalSouthStorage	2.6	13664	
AdditionalSouthStorage	2.8	14013	

AdditionalSouthStorage			2.9	14378
ExistSouthStorage	Storage	0	0	
ExistSouthStorage		.3	2466	
ExistSouthStorage		.8	11534	
ExistSouthStorage		1.3	12482	
ExistSouthStorage		1.8	13455	
ExistSouthStorage		2.3	14453	
ExistSouthStorage		2.8	15476	
ExistSouthStorage		3.3	16102	
CombinedSouth	Storage	.2	1483	
CombinedSouth		.4	3780	
CombinedSouth		.5	8236	
CombinedSouth		.6	25911	
CombinedSouth		.8	26696	
CombinedSouth		1	27344	
CombinedSouth		1.2	27997	
CombinedSouth		1.4	28659	
CombinedSouth		1.6	29325	
CombinedSouth		1.8	30001	
CombinedSouth		2	30681	
CombinedSouth		2.2	31370	
CombinedSouth		2.4	32062	
CombinedSouth		2.6	32767	
CombinedSouth		2.8	33975	
CombinedSouth		3	34910	
CombinedSouth		3.2	35639	
CombinedSouth		3.4	36373	
SouthStorageMar2018	Storage	.2	477	
SouthStorageMar2018		.4	3673	
SouthStorageMar2018		.6	9448	
SouthStorageMar2018		.8	17790	
SouthStorageMar2018		1	26710	
SouthStorageMar2018		1.2	30369	
SouthStorageMar2018		1.4	31189	
SouthStorageMar2018		1.6	31742	
SouthStorageMar2018		1.8	32300	
SouthStorageMar2018		2	32863	
SouthStorageMar2018		2.2	33430	
SouthStorageMar2018		2.4	34001	
SouthStorageMar2018		2.6	34577	
SouthStorageMar2018		2.8	35156	
SouthStorageMar2018		3	35740	
SouthStorageMar2018		3.2	36328	

```
[TIMESERIES]
;;Name      Date      Time      Value
;;-----
100yr24hr   0:00      0
100yr24hr   0:05      0.763
100yr24hr   0:10      0.771
100yr24hr   0:15      0.779
100yr24hr   0:20      0.787
100yr24hr   0:25      0.796
100yr24hr   0:30      0.804
100yr24hr   0:35      0.813
100yr24hr   0:40      0.822
100yr24hr   0:45      0.831
100yr24hr   0:50      0.841
100yr24hr   0:55      0.851
100yr24hr   1:00      0.861
100yr24hr   1:05      0.871
100yr24hr   1:10      0.881
100yr24hr   1:15      0.892
100yr24hr   1:20      0.903
100yr24hr   1:25      0.914
100yr24hr   1:30      0.926
100yr24hr   1:35      0.938
100yr24hr   1:40      0.95
100yr24hr   1:45      0.963
100yr24hr   1:50      0.976
100yr24hr   1:55      0.99
100yr24hr   2:00      1.004
100yr24hr   2:05      1.018
100yr24hr   2:10      1.033
100yr24hr   2:15      1.048
100yr24hr   2:20      1.064
100yr24hr   2:25      1.08
100yr24hr   2:30      1.097
100yr24hr   2:35      1.114
100yr24hr   2:40      1.132
100yr24hr   2:45      1.151
100yr24hr   2:50      1.17
100yr24hr   2:55      1.191
100yr24hr   3:00      1.211
100yr24hr   3:05      1.233
100yr24hr   3:10      1.256
100yr24hr   3:15      1.279
100yr24hr   3:20      1.304
100yr24hr   3:25      1.329
```


100yr24hr	3:30	1.356
100yr24hr	3:35	1.384
100yr24hr	3:40	1.413
100yr24hr	3:45	1.443
100yr24hr	3:50	1.475
100yr24hr	3:55	1.509
100yr24hr	4:00	1.544
100yr24hr	4:05	1.581
100yr24hr	4:10	1.62
100yr24hr	4:15	1.661
100yr24hr	4:20	1.705
100yr24hr	4:25	1.751
100yr24hr	4:30	1.8
100yr24hr	4:35	1.853
100yr24hr	4:40	1.908
100yr24hr	4:45	1.967
100yr24hr	4:50	2.031
100yr24hr	4:55	2.099
100yr24hr	5:00	2.172
100yr24hr	5:05	2.251
100yr24hr	5:10	2.337
100yr24hr	5:15	2.43
100yr24hr	5:20	2.532
100yr24hr	5:25	2.643
100yr24hr	5:30	2.765
100yr24hr	5:35	2.9
100yr24hr	5:40	3.051
100yr24hr	5:45	3.219
100yr24hr	5:50	3.409
100yr24hr	5:55	3.625
100yr24hr	6:00	3.873
100yr24hr	6:05	4.159
100yr24hr	6:10	4.496
100yr24hr	6:15	4.897
100yr24hr	6:20	5.383
100yr24hr	6:25	5.985
100yr24hr	6:30	6.748
100yr24hr	6:35	7.75
100yr24hr	6:40	9.123
100yr24hr	6:45	11.117
100yr24hr	6:50	14.266
100yr24hr	6:55	19.931
100yr24hr	7:00	32.779
100yr24hr	7:05	83.515
100yr24hr	7:10	255.206
100yr24hr	7:15	114.934

100yr24hr	7:20	63.946
100yr24hr	7:25	43.017
100yr24hr	7:30	31.998
100yr24hr	7:35	25.321
100yr24hr	7:40	20.889
100yr24hr	7:45	17.754
100yr24hr	7:50	15.429
100yr24hr	7:55	13.641
100yr24hr	8:00	12.226
100yr24hr	8:05	11.08
100yr24hr	8:10	10.134
100yr24hr	8:15	9.34
100yr24hr	8:20	8.665
100yr24hr	8:25	8.083
100yr24hr	8:30	7.577
100yr24hr	8:35	7.133
100yr24hr	8:40	6.74
100yr24hr	8:45	6.39
100yr24hr	8:50	6.077
100yr24hr	8:55	5.794
100yr24hr	9:00	5.538
100yr24hr	9:05	5.304
100yr24hr	9:10	5.091
100yr24hr	9:15	4.895
100yr24hr	9:20	4.714
100yr24hr	9:25	4.547
100yr24hr	9:30	4.392
100yr24hr	9:35	4.248
100yr24hr	9:40	4.114
100yr24hr	9:45	3.989
100yr24hr	9:50	3.871
100yr24hr	9:55	3.761
100yr24hr	10:00	3.657
100yr24hr	10:05	3.559
100yr24hr	10:10	3.467
100yr24hr	10:15	3.38
100yr24hr	10:20	3.297
100yr24hr	10:25	3.219
100yr24hr	10:30	3.144
100yr24hr	10:35	3.073
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100yr24hr	10:45	2.941
100yr24hr	10:50	2.88
100yr24hr	10:55	2.821
100yr24hr	11:00	2.765
100yr24hr	11:05	2.711

100yr24hr	11:10	2.659
100yr24hr	11:15	2.61
100yr24hr	11:20	2.562
100yr24hr	11:25	2.516
100yr24hr	11:30	2.472
100yr24hr	11:35	2.43
100yr24hr	11:40	2.389
100yr24hr	11:45	2.35
100yr24hr	11:50	2.312
100yr24hr	11:55	2.275
100yr24hr	12:00	2.24
100yr24hr	12:05	2.205
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100yr24hr	12:20	2.109
100yr24hr	12:25	2.079
100yr24hr	12:30	2.05
100yr24hr	12:35	2.021
100yr24hr	12:40	1.994
100yr24hr	12:45	1.967
100yr24hr	12:50	1.941
100yr24hr	12:55	1.916
100yr24hr	13:00	1.892
100yr24hr	13:05	1.868
100yr24hr	13:10	1.845
100yr24hr	13:15	1.822
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100yr24hr	13:55	1.661
100yr24hr	14:00	1.643
100yr24hr	14:05	1.626
100yr24hr	14:10	1.609
100yr24hr	14:15	1.592
100yr24hr	14:20	1.576
100yr24hr	14:25	1.56
100yr24hr	14:30	1.544
100yr24hr	14:35	1.529
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100yr24hr	14:50	1.485
100yr24hr	14:55	1.47

100yr24hr	15:00	1.457
100yr24hr	15:05	1.443
100yr24hr	15:10	1.43
100yr24hr	15:15	1.417
100yr24hr	15:20	1.404
100yr24hr	15:25	1.392
100yr24hr	15:30	1.38
100yr24hr	15:35	1.368
100yr24hr	15:40	1.356
100yr24hr	15:45	1.344
100yr24hr	15:50	1.333
100yr24hr	15:55	1.322
100yr24hr	16:00	1.311
100yr24hr	16:05	1.3
100yr24hr	16:10	1.289
100yr24hr	16:15	1.279
100yr24hr	16:20	1.269
100yr24hr	16:25	1.259
100yr24hr	16:30	1.249
100yr24hr	16:35	1.239
100yr24hr	16:40	1.23
100yr24hr	16:45	1.221
100yr24hr	16:50	1.211
100yr24hr	16:55	1.202
100yr24hr	17:00	1.193
100yr24hr	17:05	1.185
100yr24hr	17:10	1.176
100yr24hr	17:15	1.168
100yr24hr	17:20	1.159
100yr24hr	17:25	1.151
100yr24hr	17:30	1.143
100yr24hr	17:35	1.135
100yr24hr	17:40	1.127
100yr24hr	17:45	1.119
100yr24hr	17:50	1.112
100yr24hr	17:55	1.104
100yr24hr	18:00	1.097
100yr24hr	18:05	1.089
100yr24hr	18:10	1.082
100yr24hr	18:15	1.075
100yr24hr	18:20	1.068
100yr24hr	18:25	1.061
100yr24hr	18:30	1.055
100yr24hr	18:35	1.048
100yr24hr	18:40	1.041
100yr24hr	18:45	1.035

100yr24hr	18:50	1.028
100yr24hr	18:55	1.022
100yr24hr	19:00	1.015
100yr24hr	19:05	1.01
100yr24hr	19:10	1.004
100yr24hr	19:15	0.998
100yr24hr	19:20	0.992
100yr24hr	19:25	0.986
100yr24hr	19:30	0.98
100yr24hr	19:35	0.974
100yr24hr	19:40	0.969
100yr24hr	19:45	0.963
100yr24hr	19:50	0.958
100yr24hr	19:55	0.952
100yr24hr	20:00	0.947
100yr24hr	20:05	0.942
100yr24hr	20:10	0.936
100yr24hr	20:15	0.931
100yr24hr	20:20	0.926
100yr24hr	20:25	0.921
100yr24hr	20:30	0.916
100yr24hr	20:35	0.911
100yr24hr	20:40	0.908
100yr24hr	20:45	0.901
100yr24hr	20:50	0.897
100yr24hr	20:55	0.892
100yr24hr	21:00	0.887
100yr24hr	21:05	0.883
100yr24hr	21:10	0.878
100yr24hr	21:15	0.874
100yr24hr	21:20	0.869
100yr24hr	21:25	0.865
100yr24hr	21:30	0.861
100yr24hr	21:35	0.856
100yr24hr	21:40	0.852
100yr24hr	21:45	0.848
100yr24hr	21:50	0.844
100yr24hr	21:55	0.84
100yr24hr	22:00	0.835
100yr24hr	22:05	0.831
100yr24hr	22:10	0.827
100yr24hr	22:15	0.823
100yr24hr	22:20	0.82
100yr24hr	22:25	0.816
100yr24hr	22:30	0.812
100yr24hr	22:35	0.808

100yr24hr	22:40	0.804
100yr24hr	22:45	0.801
100yr24hr	22:50	0.797
100yr24hr	22:55	0.793
100yr24hr	23:00	0.79
100yr24hr	23:05	0.786
100yr24hr	23:10	0.783
100yr24hr	23:15	0.779
100yr24hr	23:20	0.776
100yr24hr	23:25	0.772
100yr24hr	23:30	0.769
100yr24hr	23:35	0.766
100yr24hr	23:40	0.762
100yr24hr	23:45	0.759
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100yr24hr	23:55	0.752
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[REPORT]
INPUT NO
CONTROLS NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]			
DIMENSIONS	0	0	10000
UNITS	None		

[COORDINATES]			
;Node	X-Coord	Y-Coord	
;	-----	-----	-----
J2a_1	571.017	-219.277	
J2G_2	575.042	-360.075	
J2a_2	572.855	-261.121	
J2b	573.686	-294.073	
J2d	574.24	-334.779	
J2g_1	575.124	-406.057	
J2I	544.877	-418.125	
J2K_1	634.409	-438.439	
J2k_2	634.44	-467.463	
J2c	632.072	-297.433	
J2e	633.602	-323.425	

J2h_1	633.383	-408.009
J2f_2	668.025	-357.601
J2f_1	663.353	-324.705
J2j_1	575.59	-415.201
J2J_2	576.653	-473.149
J2h_2	633.308	-358.795
J2f_3	677.103	-410.032
OF_North	622.345	-153.808
OF1	697.65	-459.065
SU2	650.918	-449.514
SU1	594.789	-177.377

[VERTICES]		
::Link	X-Coord	Y-Coord
::		
C3	585.347	-261.094
C13	548.16	-469.212
C20_2	676.796	-423.595

[Polygons]		
::Subcatchment	X-Coord	Y-Coord
::		
S2L	636.294	-408.931
S2L	656.724	-412.433
S2L	677.542	-408.737
S2L	679.682	-446.482
S2L	675.791	-465.16
S2L	674.624	-470.414
S2L	636.878	-470.997
S2L	636.294	-408.931
S2K	577.147	-410.488
S2K	577.163	-409.911
S2K	636.198	-409.035
S2K	636.489	-471.192
S2K	577.342	-473.721
S2K	577.147	-410.488
S2E	576.609	-322.409
S2E	634.254	-312.033
S2E	635.196	-339.789
S2E	576.649	-351.334
S2E	576.609	-322.409
S2D	542.626	-324.463
S2D	576.243	-323.366
S2D	576.949	-358.739
S2D	542.885	-358.167
S2D	542.626	-324.463

S2B	576.243	-323.366
S2B	542.626	-324.463
S2B	542.532	-283.271
S2B	575.425	-283.947
S2B	576.243	-323.366
S1A	541.389	-154.943
S1A	586.304	-153.567
S1A	588.472	-158.903
S1A	588.805	-164.739
S1A	592.64	-173.742
S1A	598.642	-176.577
S1A	611.481	-180.245
S1A	609.186	-225.183
S1A	596.943	-224.295
S1A	572.102	-218.972
S1A	566.424	-218.795
S1A	555.955	-211.697
S1A	546.018	-204.777
S1A	541.405	-203.535
S1A	541.389	-154.943
S1B	574.053	-219.505
S1B	596.765	-224.118
S1B	609.186	-225.005
S1B	609.718	-243.281
S1B	612.557	-248.959
S1B	648.932	-278.236
S1B	638.285	-284.801
S1B	634.204	-312.304
S1B	634.027	-298.819
S1B	632.43	-293.673
S1B	627.817	-289.06
S1B	589.313	-260.492
S1B	585.764	-258.541
S1B	582.393	-258.718
S1B	575.295	-258.718
S1B	574.053	-219.505
S2A	541.374	-203.356
S2A	545.7	-204.411
S2A	566.483	-218.865
S2A	571.811	-218.971
S2A	573.64	-219.393
S2A	575.046	-283.678
S2A	542.82	-282.797
S2A	541.374	-203.356
S2C	634.254	-312.033
S2C	576.609	-322.409

S2C	575.425	-257.813
S2C	582.86	-258.263
S2C	586.239	-258.489
S2C	630.623	-292.283
S2C	633.101	-295.663
S2C	634.002	-298.141
S2C	634.254	-312.033
S2G	542.885	-357.451
S2G	576.806	-358.596
S2G	577.182	-409.967
S2G	542.874	-410.537
S2G	542.885	-357.451
S2J	563.166	-474.01
S2J	560.665	-410.238
S2J	577.163	-409.948
S2J	577.342	-473.721
S2J	563.166	-474.01
S2I	563.166	-474.01
S2I	548.741	-474.305
S2I	545.239	-470.414
S2I	542.876	-410.535
S2I	560.675	-410.228
S2I	563.166	-474.01
S2H_1	606.704	-366.477
S2H_1	576.565	-369.904
S2H_1	576.237	-350.715
S2H_1	634.578	-339.996
S2H_1	635.17	-369.99
S2H_1	606.704	-366.477
S2H_2	606.704	-366.477
S2H_2	635.17	-369.99
S2H_2	636.338	-408.93
S2H_2	577.163	-409.892
S2H_2	576.565	-369.904
S2H_2	606.704	-366.477
S2F_1	648.023	-336.929
S2F_1	635.055	-337.611
S2F_1	634.578	-311.087
S2F_1	637.764	-286.283
S2F_1	648.915	-278.318
S2F_1	654.148	-286.283
S2F_1	666.595	-329.957
S2F_1	654.938	-331.622
S2F_1	648.023	-336.929
S2F_2	654.938	-331.622
S2F_2	666.595	-329.957

S2F_2	667.119	-331.795
S2F_2	669.623	-349.317
S2F_2	678.042	-409.165
S2F_2	656.879	-412.351
S2F_2	636.626	-408.937
S2F_2	636.338	-408.895
S2F_2	635.055	-337.611
S2F_2	648.023	-336.929
S2F_2	654.938	-331.622

[SYMBOLS]		
;;Gage	X-Coord	Y-Coord
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APPENDIX E

GEOTECHNICAL INFORMATION

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PROJECT: Area Structure Plan - Southland Site		DRILLER: Chilako Drilling Services Ltd.		BOREHOLE NO: BH17-02	
CLIENT: Hasegawa Engineering		DRILL/METHOD: Truck Mounted C-1150 Drill/ SSA		PROJECT NO: BX30454	
LOCATION: E end of site. (See Figure 1)				ELEVATION: --	
SAMPLE TYPE		☐ No Recovery ☒ SPT Test (N) ☐ Grab Sample ☐ Split-Pen ☐ Core			
BACKFILL TYPE		☐ Bentonite ☐ Pea Gravel ☐ Slough ☐ Grout ☐ Drill Cuttings ☐ Sand			

Depth (m)		SOIL SYMBOL	SOIL DESCRIPTION	SPT (N)	SAMPLE TYPE	SAMPLE NO	SLOTTED PIEZOMETER	OTHER TESTS COMMENTS	Depth (m)
0			TOPSOIL (200mm)						0
0.2			SAND -fine to medium grained, light brown, damp						0.2
0.7			CLAY -low to medium plastic, silty, sandy, stiff, brown, moist ...white streaks from 0.7m to 1.4m depth			A1		Hydrometer Results (Sample A1): 9% Sand 65% Silt 26% Clay	0.7
1.4			...dark brown below 1.4m depth			A2			1.4
2.1			...coal inclusions below 2.1m depth			A3			2.1
2.2			CLAY TILL -low to medium plastic, silty, sandy, trace gravel, coal and oxide inclusions, stiff to very stiff, light brown, moist						2.2
3.2			...brown with trace gravel and occasional cobbles below 3.2m depth			A4			3.2
3.3						A5			3.3
4.8						A6			4.8
5.0						A7			5.0
6.2			...free water at 6.2m depth			A8			6.2
6.3						A9			6.3
8.2						A10			8.2
8.3						A11			8.3
9.8						A12		9.8	
10.0			End of Borehole at 10.0 m depth						10.0
10.5			Notes: 1. Borehole log to be read in conjunction with Amec Foster Wheeler report BX30454. For definitions of terms and symbols used on logs refer to sheets following logs. 2. Borehole open upon completion, seepage from 6.2m depth. 3. 25mm PVC standpipe installed upon completion of drilling, hand-slotted from 1.5m to 9.9m depth. Annular space backfilled with drill cuttings, bentonite cap at surface. 4. Groundwater measured at 3.29m at March 29, 2017.						10.5
11.0									11.0
12.0									12.0
12.5									12.5

Amec Foster Wheeler Environment & Infrastructure	LOGGED BY: BM	COMPLETION DEPTH: 10.00 m
	REVIEWED BY: JL	COMPLETION DATE: 21/3/17
	Page 1 of 1	

BX30454.GPJ 17/04/20 11:34 AM (BOREHOLE LOG)

PROJECT: Area Structure Plan - Southland Site		DRILLER: Chilako Drilling Services Ltd.		BOREHOLE NO: BH17-03	
CLIENT: Hasegawa Engineering		DRILL/METHOD: Truck Mounted C-1150 Drill/ SSA		PROJECT NO: BX30454	
LOCATION: W end of site near I/S of 43 St N and 14 Ave N. (See Figure 1)				ELEVATION: --	
SAMPLE TYPE		☒ Shelby Tube ☐ No Recovery ☒ SPT Test (N) ☐ Grab Sample ☐ Split-Pen ☐ Core			
BACKFILL TYPE		☐ Bentonite ☐ Pea Gravel ☐ Slough ☐ Grout ☐ Drill Cuttings ☐ Sand			

Depth (m)	STANDARD PEN (N) 20406080 PLASTICM.C.LIQUID 20406080	SOIL SYMBOL	SOIL DESCRIPTION	SPT (N)	SAMPLE TYPE	SAMPLE NO	SLOTTED PIEZOMETER	OTHER TESTS COMMENTS	Depth (m)
0			TOPSOIL (200mm)						
0.2	20		CLAY -low plastic, sandy, silty, very stiff, brown, moist		A1		Hydrometer Results (Sample A1): 14% Sand 58% Silt 28% Clay	0.2	
1.8	40		CLAY TILL -medium plastic, silty, sandy, trace gravel, coal and oxide inclusions, stiff to very stiff, brown, moist ...white streaks from 1.7m to 3.1m depth	20	A2			1.8	
2.2	40				A3			2.2	
3.5	40			17	A4			3.5	
3.8	40				A5			3.8	
4.8	40			14	A6			4.8	
5.2	40				A7			5.2	
6.5	40			15	A8			6.5	
6.8	40				A9			6.8	
8.2	40			15	A10			8.2	
8.5	40				A11			8.5	
9.8	40			15	A12			9.8	
10.0			End of Borehole at 10.0 m depth					10.0	
10.5			Notes:					10.5	
11.0			1. Borehole log to be read in conjunction with Amec Foster Wheeler report BX30454. For definitions of terms and symbols used on logs refer to sheets following logs.					11.0	
11.5			2. Borehole open and dry upon completion of drilling.					11.5	
12.0			3. 25mm PVC standpipe installed upon completion of drilling, hand-slotted from 1.5m to 9.9m depth. Annular space backfilled with drill cuttings, bentonite cap at surface.					12.0	
12.5			4. Groundwater measured at 9.01m on March 29, 2017.					12.5	

Amec Foster Wheeler Environment & Infrastructure	LOGGED BY: BM	COMPLETION DEPTH: 10.00 m
	REVIEWED BY: JL	COMPLETION DATE: 21/3/17
	Page 1 of 1	

BX30454.GPJ 17/04/20 11:34 AM (BOREHOLE LOG)

PROJECT: Area Structure Plan - Southland Site		DRILLER: Chilako Drilling Services Ltd.		BOREHOLE NO: BH17-04	
CLIENT: Hasegawa Engineering		DRILL/METHOD: Truck Mounted C-1150 Drill/ SSA		PROJECT NO: BX30454	
LOCATION: SE end of site. (See Figure 1)				ELEVATION: --	
SAMPLE TYPE		☒ Shelby Tube ☐ No Recovery ☒ SPT Test (N) ☐ Grab Sample ☐ Split-Pen ☐ Core			
BACKFILL TYPE		☐ Bentonite ☐ Pea Gravel ☐ Slough ☐ Grout ☐ Drill Cuttings ☐ Sand			

Depth (m)		SOIL SYMBOL	SOIL DESCRIPTION	SPT (N)	SAMPLE TYPE	SAMPLE NO	SLOTTED PIEZOMETER	OTHER TESTS COMMENTS	Depth (m)
0			TOPSOIL (200mm)						0
0.2			CLAY - medium plastic, silty, sandy, stiff, brown, damp to moist			A1		Hydrometer Results (Sample A1): 2% Sand 46% Silt 52% Clay	0.2
1.8			CLAY TILL - medium plastic, silty, sandy, trace gravel, coal and oxide inclusions, firm to very stiff, brown, moist	9		A2			1.8
2.2			...very moist below 2.3m depth			A3			2.2
3.2			...moist below 3.1m depth	9		A4			3.2
3.8						A5			3.8
4.8				12		A6			4.8
5.2						A7			5.2
6.2			...very moist from 6.1m to 7.6m depth	7		A8			6.2
6.8						A9			6.8
7.8			...moist below 7.6m depth	13		A10			7.8
8.2						A11			8.2
9.2				20		A12			9.2
10.0			End of Borehole at 10.0 m depth					10.0	
10.5			Notes: 1. Borehole log to be read in conjunction with Amec Foster Wheeler report BX30454. For definitions of terms and symbols used on logs refer to sheets following logs. 2. Borehole open and dry upon completion of drilling. 3. 25mm PVC standpipe installed upon completion of drilling, hand-slotted from 1.5m to 9.9m depth. Annular space backfilled with drill cuttings, bentonite cap at surface. 4. Groundwater measured at 6.90m on March 29, 2017.					10.5	
11.0								11.0	
12.0								12.0	
12.5								12.5	

Amec Foster Wheeler Environment & Infrastructure	LOGGED BY: BM	COMPLETION DEPTH: 10.00 m
	REVIEWED BY: JL	COMPLETION DATE: 21/3/17
	Page 1 of 1	

BX30454.GPJ 17/04/20 11:34 AM (BOREHOLE LOG)

EXPLANATION OF TERMS AND SYMBOLS

The terms and symbols used on the borehole logs to summarize the results of field investigation and subsequent laboratory testing are described in these pages.

It should be noted that materials, boundaries and conditions have been established only at the borehole locations at the time of investigation and are not necessarily representative of subsurface conditions elsewhere across the site.

TEST DATA

Data obtained during the field investigation and from laboratory testing are shown at the appropriate depth interval.

Abbreviations, graphic symbols, and relevant test method designations are as follows:

*C	Consolidation test	*ST	Swelling test
D _R	Relative density	TV	Torvane shear strength
*k	Permeability coefficient	VS	Vane shear strength
*MA	Mechanical grain size analysis and hydrometer test	w	Natural Moisture Content (ASTM D2216)
N	Standard Penetration Test (CSA A119.1-60)	w _l	Liquid limit (ASTM D 423)
N _d	Dynamic cone penetration test	w _p	Plastic Limit (ASTM D 424)
NP	Non plastic soil	E _f	Unit strain at failure
pp	Pocket penetrometer strength (kg/cm ²)	γ	Unit weight of soil or rock
*q	Triaxial compression test	γ _d	Dry unit weight of soil or rock
q _u	Unconfined compressive strength	ρ	Density of soil or rock
*SB	Shearbox test	ρ _d	Dry Density of soil or rock
SO ₄	Concentration of water-soluble sulphate	C _u	Undrained shear strength
		→	Seepage
		▼	Observed water level

* The results of these tests are usually reported separately

Soils are classified and described according to their engineering properties and behaviour.

The soil of each stratum is described using the Unified Soil Classification System¹ modified slightly so that an inorganic clay of "medium plasticity" is recognized.

The modifying adjectives used to define the actual or estimated percentage range by weight of minor components are consistent with the Canadian Foundation Engineering Manual².

Relative Density and Consistency:

<u>Cohesionless Soils</u>		<u>Cohesive Soils</u>		
Relative Density	SPT (N) Value	Consistency	Undrained Shear Strength c _u (kPa)	Approximate SPT (N) Value
Very Loose	0-4	Very Soft	0-12	0-2
Loose	4-10	Soft	12-25	2-4
Compact	10-30	Firm	25-50	4-8
Dense	30-50	Stiff	50-100	8-15
Very Dense	>50	Very Stiff	100-200	15-30
		Hard	>200	>30

Standard Penetration Resistance ("N" value)

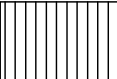
The number of blows by a 63.6kg hammer dropped 760 mm to drive a 50 mm diameter open sampler attached to "A" drill rods for a distance of 300 mm.

¹ "Unified Soil Classification System", Technical Memorandum 36-357 prepared by Waterways Experiment Station, Vicksburg, Mississippi, Corps of Engineers, U.S. Army. Vol. 1 March 1953.

² "Canadian Foundation Engineering Manual", 4th Edition, Canadian Geotechnical Society, 2006.

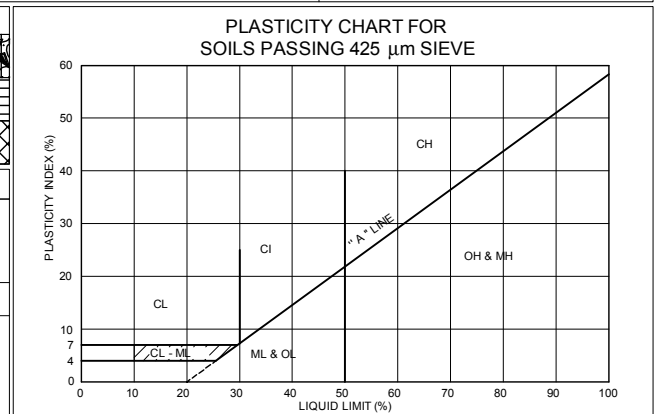
MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

MAJOR DIVISION			GROUP SYMBOL	GRAPH SYMBOL	COLOUR CODE	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm)	GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm	CLEAN GRAVELS (LITTLE OR NO FINES)	GW		RED	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > 4$; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			GP		RED	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY GRAVELS (WITH SOME FINES)	GM		YELLOW	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12 %	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			GC		YELLOW	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7
	SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm	CLEAN SANDS (LITTLE OR NO FINES)	SW		RED	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > 6$; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
			SP		RED	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY SANDS (WITH SOME FINES)	SM		YELLOW	SILTY SANDS, SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12 %	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			SC		YELLOW	CLAYEY SANDS, SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE "A" LINE P.I. MORE THAN 7

FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm)	SILTS BELOW "A" LINE NEGLEGIBLE ORGANIC CONTENT	$W_L < 50\%$	ML		GREEN	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)	
		$W_L < 50\%$	MH		BLUE	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDS OR SILTY SOILS		
	CLAYS ABOVE "A" LINE NEGLEGIBLE ORGANIC CONTENT	$W_L < 30\%$	CL		GREEN	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS		
		$30\% < W_L < 50\%$	CI		GREEN- BLUE	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS		
		$W_L > 50\%$	CH		BLUE	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
	ORGANIC SILTS & CLAYS BELOW "A" LINE	$W_L < 50\%$	OL		GREEN	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	WHENEVER THE NATURE OF THE FINES CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER "F". E.G. SF IS A MIXTURE OF SAND WITH SILT OR CLAY	
		$W_L > 50\%$	OH		BLUE	ORGANIC CLAYS OF HIGH PLASTICITY		
	HIGHLY ORGANIC SOILS			Pt		ORANGE	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR, AND OFTEN FIBEROUS TEXTURE

SPECIAL SYMBOLS			
LIMESTONE		OILSAND	
SANDSTONE		SHALE	
SILTSTONE		FILL (UNDIFFERENTIATED)	

SOIL COMPONENTS				
FRACTION	U.S. STANDARD SIEVE SIZE		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
GRAVEL	PASSING	RETAINED	PERCENT	DESCRIPTOR
COARSE	76mm	19mm	35-50	AND
FINE	19mm	4.75mm		
SAND			20-35	Y/EY
COARSE	4.75mm	2.00mm	10-20	SOME
MEDIUM	2.00mm	425µm		
FINE	425µm	75µm	1-10	TRACE
FINES (SILT OR CLAY BASED ON PLASTICITY)	75µm			



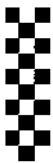
NOTES:

- ALL SIEVE SIZES MENTIONED ON THIS CHART ARE U.S. STANDARD A.S.T.M. E.11
- COARSE GRAIN SOILS WITH 5 TO 12% FINES GIVEN COMBINED GROUP SYMBOLS, E.G. GW-GC IS A WELL GRADED GRAVEL SAND MIXTURE WITH CLAY BINDER BETWEEN 5 AND 12% FINES.

OVERSIZED MATERIAL

ROUNDED OR SUBROUNDED: COBBLES 76mm TO 200mm BOULDERS > 200mm	NOT ROUNDED: ROCK FRAGMENTS > 76mm ROCKS > 0.76 CUBIC METRE IN VOLUME

AMEC TEST RESULTS - MARCH 2012



Hasegawa Engineering Ltd.
1220 31 Street North
Lethbridge, AB T1H 5J8

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469, 40 Street South
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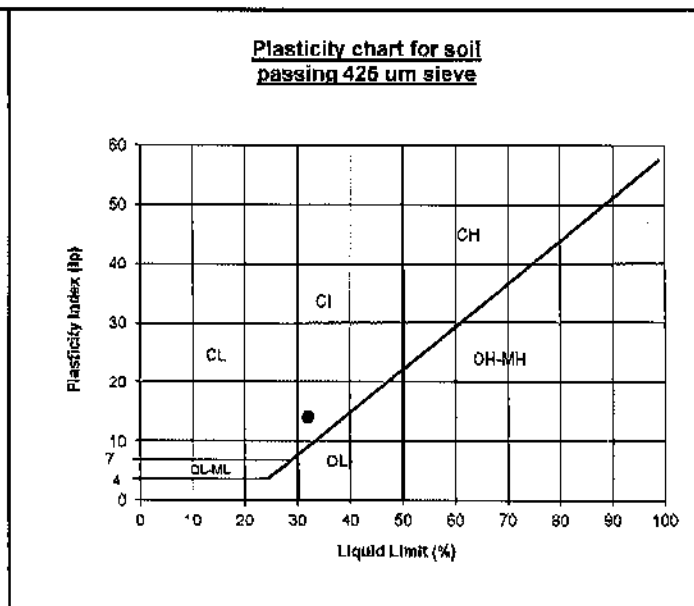
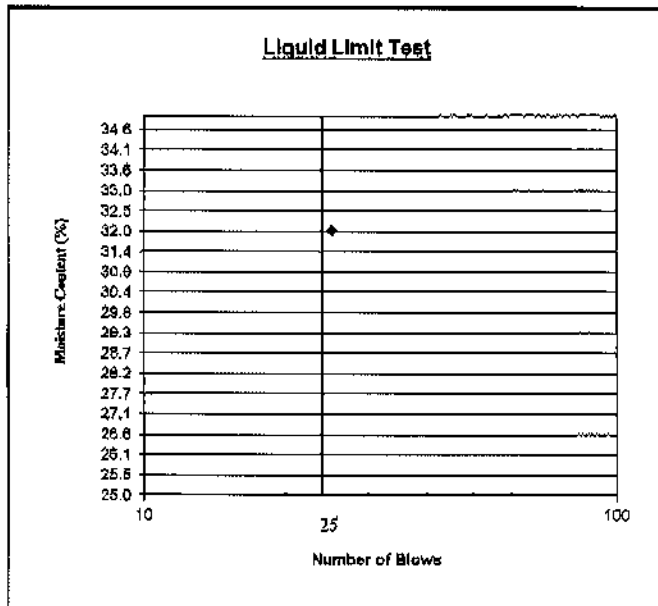
Project No: BX10749 - 300

Date: 6-Mar-12

CC:

Project: 11-014

Liquid Limit Test				Plastic Limit Test			
# of Blows	25						
Tare #	10			Tare #	43		
Wet Wt + Tare	27.0416			Wet Wt + Tare	22.0412		
Dry Wt + Tare	23.7716			Dry Wt + Tare	20.7695		
Wt of Tare	13.5511			Wt of Tare	13.6170		
% Moisture	32.0			% Moisture	17.8		

Liquid Limit (%): 32.0Plastic Limit (%): 17.8Plasticity Index: 14.2Classification: CIDepth: Sample ID: TP1Moisture Content (%) : 21.9

Per:



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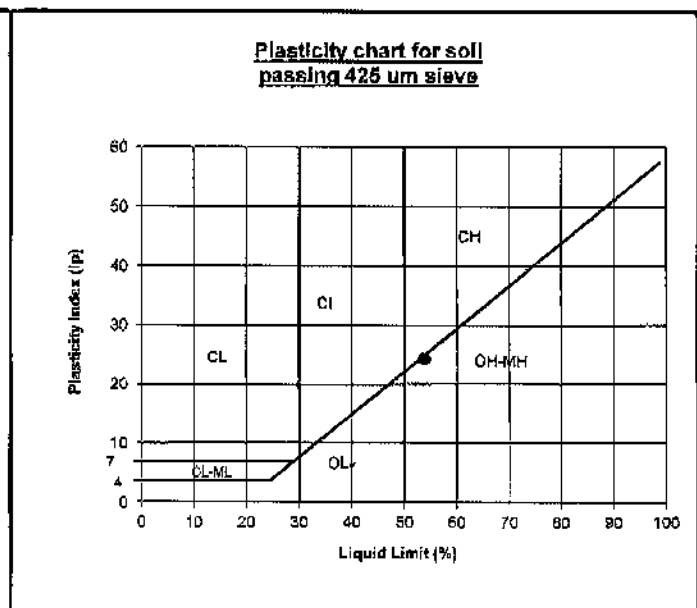
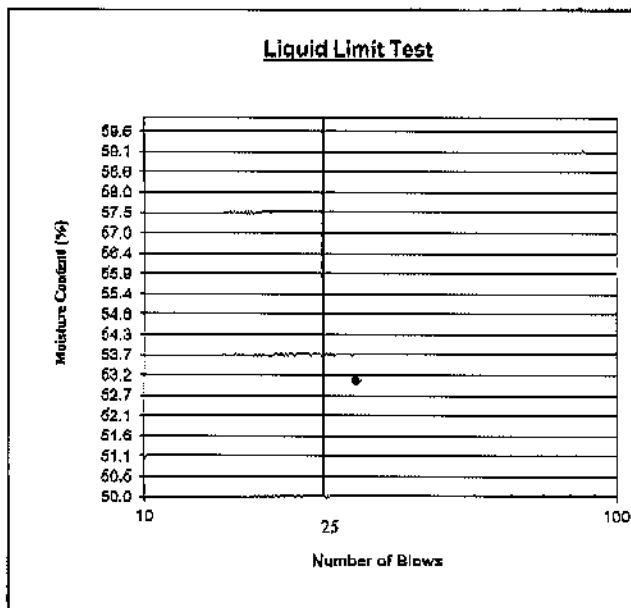
Project No: BX10749 - 300

Date: 6-Mar-12

CC:

Project: 11-014

Liquid Limit Test				Plastic Limit Test			
# of Blows	28						
Tare #	23			Tare #	23		
Wet Wt + Tare	23.4028			Wet Wt + Tare	17.2595		
Dry Wt + Tare	17.8205			Dry Wt + Tare	13.5722		
Wt of Tare	7.3022			Wt of Tare	13.5514		
% Moisture	53.1			% Moisture	29.4		



Liquid Limit (%): 53.8

Plastic Limit (%): 29.4

Plasticity Index: 24.4

Classification: CH

Depth:

Sample ID: TP2

Moisture Content (%): 31.5

Per:

HYDROMETER TEST

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COBBLES	GRAVEL		SAND			SILT	CLAY																																				
	Coarse	Fine	C	M	F																																						
8" 4" 2" 1" 1/2" #4 #10 #20 #40 #60 #100 #200 Percent Passing <table border="1" style="position: absolute; top: 0; right: 0; font-size: x-small;"> <caption>Grain Size Distribution Data</caption> <thead> <tr> <th>Grain Size (mm)</th> <th>Percent Passing (%)</th> </tr> </thead> <tbody> <tr><td>8"</td><td>100</td></tr> <tr><td>4"</td><td>100</td></tr> <tr><td>2"</td><td>100</td></tr> <tr><td>1"</td><td>100</td></tr> <tr><td>1/2"</td><td>100</td></tr> <tr><td>#4</td><td>100</td></tr> <tr><td>#10</td><td>100</td></tr> <tr><td>#20</td><td>100</td></tr> <tr><td>#40</td><td>98</td></tr> <tr><td>#60</td><td>88</td></tr> <tr><td>#100</td><td>78</td></tr> <tr><td>#200</td><td>65</td></tr> <tr><td>0.85</td><td>50</td></tr> <tr><td>0.425</td><td>40</td></tr> <tr><td>0.25</td><td>35</td></tr> <tr><td>0.15</td><td>33</td></tr> <tr><td>0.075</td><td>33</td></tr> </tbody> </table> Grain Size (mm)								Grain Size (mm)	Percent Passing (%)	8"	100	4"	100	2"	100	1"	100	1/2"	100	#4	100	#10	100	#20	100	#40	98	#60	88	#100	78	#200	65	0.85	50	0.425	40	0.25	35	0.15	33	0.075	33
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HYDROMETER TEST

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