

**102 Street (113 Avenue to 132  
Avenue) Traffic Study – FINAL  
REPORT**

Grande Prairie, AB



Prepared for:  
City of Grande Prairie

Prepared by:  
Stantec Consulting Ltd.  
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520 – 10014 99 Street  
Grande Prairie, AB T8V 3N4

Project No. 1162 39355  
December 3, 2014

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6. PUBLIC HEARINGS

7. UNFINISHED BUSINESS

8. REPORTS

9. COMMITTEE BUSINESS

9.1 Community Growth Committee Meeting - November 18, 2014

**MOVED** by Councillor O'Toole Council receive the minutes of the Community Growth Committee meeting held November 18, 2014.

**CARRIED.**

9.2 Community Living Committee Meeting - November 18, 2014

**MOVED** by Councillor Radbourne Council receive the minutes of the Community Living Committee meeting held November 18, 2014.

**CARRIED.**

9.2.1 2017 - 55+ Alberta Summer Games

**MOVED** by Councillor Radbourne Council support the Letter of Intent to bid on hosting the 2017 - 55+ Alberta Summer Games.

**CARRIED.**

9.2.2 Provincial Funding to Cultural Organizations

**MOVED** by Councillor Radbourne Council direct the Mayor write a letter to the Ministry of Culture regarding the Alberta Foundation for the Arts Funding (AFA).

**CARRIED.**

9.3 Community Safety Committee Meeting - November 25, 2014

**MOVED** by Councillor McLean Council receive the minutes of the Corporate Services Committee meeting held November 25, 2014.

**CARRIED.**


9.3.1 102 Street Traffic Study

**MOVED** by Councillor McLean Council adopt the 102 Street Traffic Study.

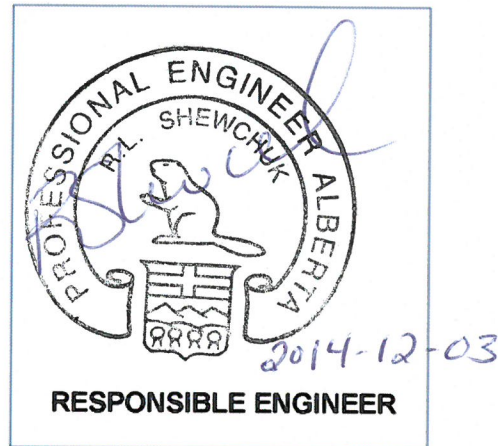
**CARRIED.**

## Sign-off Sheet

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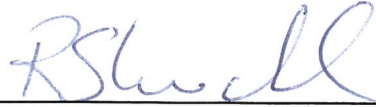
<b>PERMIT TO PRACTICE</b> <b>STANTEC CONSULTING LTD.</b>	
Signature	
Date	<u>DEC. 3, 2014</u>
<b>PERMIT NUMBER: P 0258</b>	
The Association of Professional Engineers Geologists and Geophysicists of Alberta	

**CORPORATE AUTHORIZATION**



Prepared by  2014-12-03  
(signature)

**Anthony Ng, P.Eng**

Reviewed by  2014-12-03  
(signature)

**Rhonda Shewchuk, P.Eng.**

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## 1.0 INTRODUCTION

### 1.1 BACKGROUND

In 2008 the City of Grande Prairie (City) opened up the portion of 102 Street from 116 Avenue to 113 Avenue. As a result, 102 Street became a major north-south corridor from 132 Avenue to south of 87 Avenue. Due to the roadway connection and the increased commercial development north of 116 Avenue, traffic has steadily increased on the roadway as 102 Street is acting as a parallel road to 100 Street (Highway 43). The intersections of 102 Street with 116 Avenue and 117 Avenue are noticeably congested during peak hours.

Traffic analysis was completed to determine future roadway upgrading requirements for the short-term (65,000 population), medium-term (78,000 population), and long-term (90,000) growth horizons. Consideration was given to existing and future accesses for the commercial lands located on the east side of 102 Street, north of 117 Avenue, along with addressing the transition from a four-lane to a two-lane roadway at the 102 Street / 113 Avenue intersection.

### 1.2 STUDY OBJECTIVES

An assessment of the study area was completed taking into account proposed and existing land uses, traffic volumes, levels of service, appropriate access locations, growth assumptions and long-term functionality of the roadway. Consideration was also given to existing and future accesses for the commercial lands located on the east side of 102 Street, north of 117 Avenue, along with proper transition from a four-lane to a two-lane roadway at the 102 Street / 113 Avenue intersection. The operations at the closely spaced intersections of 116 Avenue and 117 Avenue were also examined.

Detailed transportation analysis has been completed for the existing and proposed intersections to determine projected turning movement volumes, traffic signal warrants and turn bay requirements. Based on the results of the traffic modeling, geometric requirements and discussions with the City's project team, conceptual drawings have been prepared as outlined below:

- 102 Street, from 116 Avenue (Highway 43) to 117 Avenue;
- 102 Street / 124 Avenue intersection; and
- Overall project area.

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### 1.3 STUDY AREA

The study area for the 102 Street (113 Avenue to 132 Avenue) Traffic Study consists of eight (8) intersections which include:

- 102 Street / 113 Avenue;
- 102 Street / 116 Avenue (Highway 43);
- 102 Street / 117 Avenue;
- 102 Street / 121 Avenue;
- 102 Street / 124 Avenue;
- 102 Street / 128 Avenue;
- 102 Street / 130 Avenue; and
- 102 Street / 132 Avenue.

The project's location within the City is illustrated on **Figure 1.1**.

### 1.4 RELATED STUDIES

The "Transportation Master Plan (2009)" (ISL Engineering and Land Services, August 2011) includes analysis for the base (2009) year as well as for the 65,000 (65K) population, 78,000 (78K) population and 90,000 (90K) population horizons. As discussed in Section 1.2 of that report, the main objectives for the 2009 Transportation Master Plan (TMP) were:

- To prepare a new TMP for the City of Grande Prairie that enables the City to adapt to future growth within and outside its current boundaries, consistent with the 2001 Intermunicipal Development Plan (IDP);
- To develop an updated long term roadway network that enables the City to grow and accommodate growth in an orderly manner, consistent with good transportation planning principles and practices;
- Develop Grande Prairie's long term roadway network in recognition of the regional transportation network changes being undertaken by the County of Grande Prairie, as well as the provincial government;
- Assess the need for any changes to the City's goods movement network and any changes to the related noise attenuation requirements;
- To develop updated 5-year and 10-year roadway improvement capital plans that serve as input to Grande Prairie's capital budget planning activities;
- Gather input from the general public pertaining to transportation issues and concerns, as well as on the proposals and recommendations that will form part of a new TMP;
- Allow updates to the City's Transportation Levy database by providing recommended upgrades and associated costs, phasings and growth areas; ensure that transportation projects identified in the 5 and 10 year capital programs are included in the database; and



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4/3/2014 9:10 AM By: Campbell, Scott



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Client/Project

THE CITY OF GRANDE PRAIRIE

102 STREET TRAFFIC STUDY

Figure No.

1.1

Title

PROJECT LOCATION

## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

### INTRODUCTION

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- Develop an urban noise policy that identifies traffic noise thresholds for arterial roads; provide recommendations for calculation and forecasting traffic noise levels.

The **“102 Street Redesign Feasibility Study”** (Urban Systems Ltd., November 2010) included a conceptual design for 102 Street between 102 Avenue and 108 Avenue with the vision of 102 Street as “a vibrant, mixed-use corridor, redeveloped under the ‘Complete Streets’ model.” As outlined in the report, “the project’s central aims were to transform this corridor from its current form to a streetscape that would support both pedestrian and bicycle activity, encourage increased public transit use, reduce the dependency on the vehicle, and promote a vibrant community in a central, higher density neighborhood in close proximity to the city centre.”

The **“132 Avenue Functional Planning Study”** (Focus Corporation, October 2012) addresses the 132 Avenue corridor between 84 Street and 116 Street. The report proposes functional plans for the 65K, 78K and 90K population horizons for the study area and intersections analyzed including the intersection of 102 Street / 132 Avenue.

## 2.0 DATA COLLECTION

### 2.1 LAND USE PLANS

The land use data used in the City's Visum model from the 2009 TMP were reviewed and compared to the most up-to-date land use planning for areas surrounding the 102 Street (113 Avenue to 132 Avenue) corridor. Details relating to the revisions made to the existing Visum files are discussed in **Section 5.1.1** of this report.

Those neighbourhoods that are in the vicinity of the project area include:

- Northridge – west of 102 Street, north of 120 Avenue;
- Royal Oaks North – west of the Northridge neighbourhood, north of 128 Avenue;
- Arbour Hills – north of 132 Avenue, between 100 Street (Highway 43) and 116 Street; and
- Avondale – an existing residential community south of 116 Avenue.

### 2.2 TRANSPORTATION NETWORK

The future road network outlined in the 2009 TMP has formed the starting point for the analysis contained within this report. New information provided by the City regarding changes to the proposed road network has been incorporated, and is discussed in detail within **Section 5.1.1** of this report.

Exhibits illustrating road networks for the base (2009) year, 65K population, 78K population and 90K population horizons from the 2009 TMP are included in **Appendix A**.

### 2.3 TRAFFIC COUNTS

Intersection turning movement counts were supplied by the City for the study intersections except for 102 Street / 130 Avenue and 102 Street / 132 Avenue. The counts were conducted at various times between the years of 2010 to 2013. The provided turning movement counts can be found in **Appendix B**.

### 3.0 PUBLIC CONSULTATION

Two (2) public open houses were completed throughout the duration of the 102 Street (113 Avenue to 132 Avenue) Traffic Study project. For each of the public open houses, project boards illustrating the conceptual designs for the project were on display with a number of staff from both Stantec and the City in attendance to discuss the plan and answer questions.

Feedback received from the first public open house was taken into account when finalizing the concept plan for the 102 Street (113 Avenue to 132 Avenue) corridor, with the updated plan presented at the second open house.

#### 3.1 OPEN HOUSE #1 – NOVEMBER 21, 2013

Open House #1 for the 102 Street (113 Avenue to 132 Avenue) Traffic Study was held on November 21, 2013, from 4:30 to 6:30pm at Muskoseepi Park Pavilion. 23 members of the public attended the event and were encouraged to provide feedback to the project team by commenting on either the discussion boards or by submitting the feedback forms that were provided.

Copies of the discussion boards and feedback forms, along with additional feedback received following Open House #1, are included in **Appendix C**.

#### 3.2 OPEN HOUSE #2 – APRIL 9, 2014

Open House #2 for the 102 Street (113 Avenue to 132 Avenue) Traffic Study was held on April 9, 2014, from 4:00 to 6:00 pm at Muskoseepi Park Pavilion. 17 members of the public attended the event and were encouraged to provide feedback to the project team by commenting on either the discussion boards or by submitting the feedback forms that were provided.

Copies of the discussion boards and feedback forms are included in **Appendix D**.

#### 3.3 ADDITIONAL PUBLIC CONSULTATION

Meetings with landowners located east of 102 Street were conducted on August 29, 2014 to review the recommended plans. Based on the feedback received no major issues identified.

Following the second open house, additional consultation with the business owners located along 117 Avenue was conducted. Letters were sent to the registered property owners and hand delivered to the businesses in the area to inform them of the project and to invite them to an individual meeting with representatives from the City of Grande Prairie and our planning team. In total, three additional meetings involving six businesses located both east and west of 102 Street were conducted. In addition, a meeting was held with Alberta Transportation to

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### PUBLIC CONSULTATION

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review the recommendations by City staff. Engineering staff also met with the car dealership who indicated little concern for the proposed changes.

Meetings with the business owners located west of 102 Street were conducted on August 22, 2014 and September 17, 2014. During these meetings, business owners expressed concern regarding access as a result of the right-in/right-out at the intersection of 102 Avenue and 117 Street. Although additional strategies were considered, installation of general way finding signage to assist with providing direction to the businesses along 117 Avenue service roads is recommended.

Meetings with landowners located east of 102 Street were conducted on August 29, 2014 to review the recommended plans. Based on the feedback received no major issues identified.



## 4.0 EXISTING CONDITIONS TRANSPORTATION ANALYSIS

### 4.1 TRAFFIC MODELING CRITERIA

A summary of the traffic modeling criteria are presented in **Table 4.1 (Appendix E)**. Where possible, the traffic modeling criteria follow the requirements outlined in Section 19 (Traffic Signalization) of the City's Design Manual (V2013) – if the specific criteria are not defined in the Design Manual, then industry standards and engineering judgment have been applied.

#### 4.1.1 Volume to Capacity Ratio

The Volume to Capacity (V/C) Ratio is defined as the ratio of flow rate to capacity for a transportation facility. The higher the value, the more congestion is experienced by motorists. The maximum acceptable level of congestion for triggering roadway and/or intersection improvements for the City is typically a V/C Ratio of 0.85.

#### 4.1.2 Level of Service

The Level of Service (LOS) of each turning movement is based on the amount of delay experienced by vehicles making the movement. Based on the delay, a letter-grade ('A' through 'F') is assigned to the individual movements. The LOS criteria for a signalized and unsignalized intersection are summarized in **Table 4.2**, below.

**Table 4.2 – Level of Service Criteria**

Level of Service	Average Control Delay (Seconds/Vehicle)		Comments
	Signalized Intersection	Unsignalized Intersection	
A	10.0 or less	10.0 or less	Very good operation
B	10.1 to 20.0	10.1 to 15.0	Good operation
C	20.1 to 35.0	15.1 to 25.0	Acceptable operation
D	35.1 to 55.0	25.1 to 35.0	Congestion
E	55.1 to 80.0	35.1 to 50.0	Significant congestion
F	More than 80.0	More than 50.0	Unacceptable operations

The maximum acceptable level of service before triggering roadway and / or intersection improvements for the City is typically LOS-D.

## 4.2 105 STREET / 116 AVENUE INTERSECTION SIGNALIZATION

105 Street currently forms a stop controlled intersection with 116 Avenue (Highway 43) west of the study area. Signalization of this intersection is being considered, partly due to the difficulty in making a southbound left-turn from 105 Street onto 116 Avenue (Highway 43) due to the volume of traffic on 116 Avenue (Highway 43). Because of the difficulty in making the southbound left-turn movement, it is hypothesized that traffic is shortcutting along 117 Street and to make the southbound left-turn movement at 102 Street / 116 Avenue (Highway 43) where there are existing traffic signals.

Current traffic counts were reviewed together with the model to estimate the probability and magnitude of any diversion. The 2009 TMP's base year model has 274 vehicles turning left from 105 Avenue onto 116 Street (Highway 43); however, the 2010 traffic count by AT only shows 6 vehicles in the PM peak, indicating there may be some latent demand. The count also indicates that there are about ten times more vehicles making the westbound right-turn movement than the southbound left-turn movement at the intersection – an imbalance that indicates there may be some diversion.

However, counts at 102 Street / 116 Avenue do not reflect a similar imbalance that would represent traffic being diverted to 102 Street. In addition, AT maintains a permanent automated traffic recorder on 116 Avenue between 102 Street and 105 Street, which indicates that 2012 westbound average annual daily traffic (AADT) is only 145 vehicles higher than the eastbound and is insufficient to account for such a diversion. Without an origin-destination study (license plate survey) it is difficult to determine what a volume of traffic is actually diverting from 105 Street onto 102 Street in order to make the southbound left-turn movement at the 102 Street / 116 Avenue (Highway 43) signalized intersection.

Assuming some traffic is being diverted, the magnitude of diverted traffic appears to be modest. Diverted traffic would contribute to the eastbound right-turn at 117 Avenue / 102 Street, but volumes for this movement do not exceed 100 vehicles in either peak hour and some of these are generated by the existing commercial development along 117 Avenue. Signalizing 105 Street / 116 Avenue will likely have a minimal effect on the 102 Street corridor as diverted traffic volumes are not expected to be high enough to significantly impact operations.

## 4.3 102 STREET / 116 AVENUE SIGNAL TIMING REVIEW

### 4.3.1 Existing Operation

The existing signal timing plan for 102 Street / 116 Avenue (Highway 43) was reviewed, and is attached in **Appendix B**. At present there appear to be seven (7) active timing plans throughout the day, for the times listed below:

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### EXISTING CONDITIONS TRANSPORTATION ANALYSIS

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- Plan 1 – 6:00 am to 9:00 am;
- Plan 2 – 9:00 am to 10:30 am;
- Plan 3 – 10:30 am to 1:15 pm;
- Plan 4 – 1:15 pm to 3:30 pm;
- Plan 5 – 3:30 pm to 6:00 pm;
- Plan 6 – 6:00 pm to 10:00 pm; and
- Plan 7 – 10:00 pm to 6:00 am.

As current traffic counts are only available for 6 hours (7:00 am to 9:00 am, 11:00 am to 1:00 pm, and 4:00 pm to 6:00 pm), the signal timing plan review has been completed for the following timing plans:

- Plan 1 – AM Peak;
- Plan 3 – Mid-Day Peak; and
- Plan 5 – PM Peak.

Based on a review of the signal timing plans, the following observations have been made:

- Generally speaking, there is plenty of spare capacity within the signal timing plans and most vehicles should clear the intersection within one cycle;
- Cycle lengths (120 sec to 125 sec) are longer than required by the traffic volumes, resulting in higher delays and longer queues than would otherwise occur. As a result, the southbound left operates at LOS E during both peak hours and the southbound through and northbound left also operate at LOS E during the PM peak hour;
- The westbound left phase is not currently needed to achieve acceptable traffic modeling results (LOS-D or better and V/C Ratios not exceeding 0.85) and could be removed to provide additional capacity for other movements; and
- The number of signal timing plans could potentially be reduced to four (4) – AM, Mid-Day, PM and Off-Peak.

The various signal timing inputs for the current 102 Street / 116 Avenue (Highway 43) timing plans are compared to the City's Design Manual (V2013) in **Table 4.3**, below.

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### EXISTING CONDITIONS TRANSPORTATION ANALYSIS

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**Table 4.3 – Signal Timing Comparison**

Signal Timing Component	Existing Signal Timing Plan	City of Grande Prairie Standards
Minimum Green Time	116 Ave (Hwy 43) – 30 sec 102 Street – 12 sec	Highway Corridor – 20 sec Main Street – 15 sec Side Street – 12 Sec
Amber Time	116 Ave (Hwy 43) – 4.5 sec 102 Street – 3.5 sec Protected Left-Turns – 3.0 sec	Based on Posted Speed: <ul style="list-style-type: none"><li>• 70 km/h – 4.5 sec</li><li>• ≤ 50 km/h – 3.5 sec</li><li>• Left-turn – use 30 km/h</li></ul>
All-Red Time	Through Movements – 2.0 sec Protected Left-Turns – 1.0 sec	Minimum – 1.0 sec Protected Left-Turns – provide 1.0 sec if approach speed is 70 km/h or higher, or if left-turn arrow has poor sightlines
Walk Time	Crossing 116 Ave – 6 sec Crossing 102 Street – 10 sec	<ul style="list-style-type: none"><li>• 7 sec along Highway 43 or wide corridor with few pedestrians (&lt; 20 / hour)</li></ul>
Pedestrian Clearance (Flashing 'Don't Walk' Time)	Crossing 116 Ave – 17 sec Crossing 102 Street – 18-20 sec	Calculated based on a pedestrian's walking speed: <ul style="list-style-type: none"><li>• Default – 1.2 m/s</li><li>• High volume of seniors or elementary students in area – 1.0 m/s</li><li>• Locations with audible pedestrian signals – 0.9 m/s</li></ul>

Most of the timing parameters conform to the City's standards. Longer minimum green time is permitted for coordination purposes on highways and appears reasonable in this context.

### 4.3.2 Recommended Operation

One complaint that the City receives regarding the 102 Street / 116 Avenue (Highway 43) intersection is that there is not enough time to safely cross the road. In 2013 it was announced that TAC completed a study regarding pedestrian walking speeds at signalized intersection and that the results would result in revisions to the Manual of Uniform Traffic Control Devices for Canada. It was found that the common practice of using 1.2 m/s as the assumed walking speed for signal timing purposes excludes approximately one-third of older pedestrians and approximately 90% of pedestrians who used assistive devices such as walkers or canes. Therefore, the study recommends the use of a range of walking speeds between 0.8 and 1.0 m/s for traffic signal timing in Canada.

Using an assumed walking speed of 1.0 m/s combined with the current crosswalk lengths at the intersection of 102 Street / 116 Avenue (Highway 43) it is recommended that walk times be



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### EXISTING CONDITIONS TRANSPORTATION ANALYSIS

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normalized to 7.0 sec for all crossings and the following pedestrian clearance times (e.g. flashing 'don't walk' times) be implemented:

- North-South crosswalks (e.g. crossing 116 Avenue) – 35 seconds; and
- East-West crosswalks (e.g. crossing 102 Street) – 30 seconds.

Sensitivity analysis indicates that queues and delays can be improved so that no movement operates at LOS E in either peak hour if the cycle length can be reduced to 80 s in the AM peak hour and 90 s in the PM peak hour. Because the number of timing plans and cycle length is governed by the need for coordination with the adjacent 100 Street intersection to the east, timing plan changes should be reviewed with Alberta Transportation in the context of the overall Highway 43 corridor.

If changes to the cycle length are deemed to be inappropriate from the perspective of the overall Highway 43 corridor, a southbound protected-permitted left turn phase is recommended to reduce delays for this movement. While the northbound left turn operates at LOS E during the PM peak hour, a left turn phase is not recommended as this would increase delays for the higher volumes southbound movements. The through phases on 116 Avenue ( $\Phi 4$  and  $\Phi 8$ ) should be switched from maximum recall to minimum recall for all timing plans so that the signal phasing is more responsive to traffic on 102 Street.

## 4.4 116 AVENUE AND 117 AVENUE

A number of options were explored regarding how best to address the section of the 102 Street corridor between 116 Avenue (Highway 43) and 117 Avenue. At present, members of the public and City staff have observed significant southbound queuing at the intersection of 102 Street / 116 Avenue (Highway 43) which frequently blocks access to 117 Avenue, especially during the PM peak hour. Due to the short distance between the two roadways (approximately 50 m) and minimal right-of-way available without impacting the adjacent commercial developments, options are limited to address both safety concerns and traffic movement along 102 Street in this area.

Various signal timing and phasing plans were analyzed at 116 Avenue. Even confining the analysis to current traffic volumes with no consideration of future growth, the expected 95th percentile queue could not be consistently reduced to 50 m or less for the southbound movement; therefore, other options were considered.

Signalization of the 102 Street / 117 Avenue intersection was not selected as the preferred option due to the likelihood of the northbound direction queuing back and blocking 116 Avenue. If traffic signals were to be installed at the intersection of 102 Street / 117 Avenue, it would be recommended that they be coordinated with the 102 Street / 116 Avenue (Highway 43) traffic signals. Even with the north-south movements being coordinated, there is still a significant volume of westbound right-turning and eastbound left-turning traffic at 102 Street / 116 Avenue (Highway 43) that would face a red-light once they turn onto 102 Street. With only approximately



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50 m of storage between the two intersections, it would only take 6 – 8 passenger vehicles in any one travel lane to start blocking the intersection of 102 Street / 116 Avenue (Highway 43).

Similarly, the intersection of 102 Street / 117 Avenue would likely experience queues from the southbound movements at 116 Avenue (Highway 43) backing up and affecting its operations.

Construction of a roundabout at the 102 Street / 117 Avenue was not selected as the preferred option due to the right-of-way that would be required when taking into consideration that there are two northbound and three southbound lanes along 102 Street between 116 Avenue (Highway 43) and 117 Avenue. Due to the roadway cross-section at this section of the 102 Street corridor, two lanes would be required in the north and southbound directions, with single lanes in the east and westbound directions. The right-of-way required also increases beyond that of a conventional (e.g. signalized or stop-controlled) intersection because of the width of the splitter islands on all four legs of the roundabout and the need to accommodate WB-21 vehicles turning in all directions due to the proximity of commercial developments.

The preferred option converts the intersection of 102 Street / 117 Avenue to a right-in/right-out so that spillback from 116 Avenue becomes less of an issue. As southbound queuing has been observed in the field, it is recommended that conversion to a right-in/right-out occur in the near future. As a result, the future horizons analysis in Section 5.0 has been completed assuming that the right-in/right-out will already be in place.

## 5.0 FUTURE HORIZONS TRANSPORTATION ANALYSIS

### 5.1 TRAFFIC PROJECTIONS

Future traffic volumes on 102 Street were projected using the City's existing Visum models from the 2009 TMP. The City's future horizon models are calibrated to a base year of 2009 and project traffic at three population horizons corresponding to the study horizons for this project: 65K population, 78K population and 90K population horizons. As several years have passed since the models were completed, the model assumptions and outputs were reviewed against current information.

#### 5.1.1 TMP Model Review

The review of land use (dwelling unit and employment) inputs compared the total dwelling units projected in the Northridge and Royal Oaks Outline Plans against the model inputs. The traffic analysis zones (TAZ) that include Royal Oaks extend beyond the Outline Plan's boundaries. However, based on historical imagery it was assumed that there was no development within Royal Oaks in 2010 and all additional development within those zones is within the Royal Oaks Outline Plan area. As shown in **Table 5.1**, below, by the 90K population horizon all of Northridge and Royal Oaks fully built-out and approximately a quarter of Arbour Hills has been assumed to be complete. The TAZ system used for the 2009 TMP is included in **Appendix A**.

Model Horizon	Northridge (TAZ 4901, 4903, 4905)	Royal Oaks (TAZ 4701, 4702)	Arbour Hills (TAZ 15002)
Base Year (2009)	320	0	0
65K	403	269	0
78K	612	601	67
90K	804	834	584
Outline Plan (OP)	820	832	2211
Percentage of OP at 90K	98%	100%	26%

The Outline Plans do not include employment projections and thus no comparison to planned values is possible. However, between the base year and the 90K population horizon, employment in Northridge increased by 50, in Royal Oaks by 75, and by 600 in Arbour Hills. Employment in TAZ 4902, which consists of the area between 102 Street and 100 Street and bounded by 124 Avenue and 132 Avenue, increased by 375 and seems to account for the development of some currently empty lots.

The review of the 2009 TMP's land use inputs compared with most up-to-date planning information available indicated that the modeled land use inputs continue to be reasonable and no revisions were required.



## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

### FUTURE HORIZONS TRANSPORTATION ANALYSIS

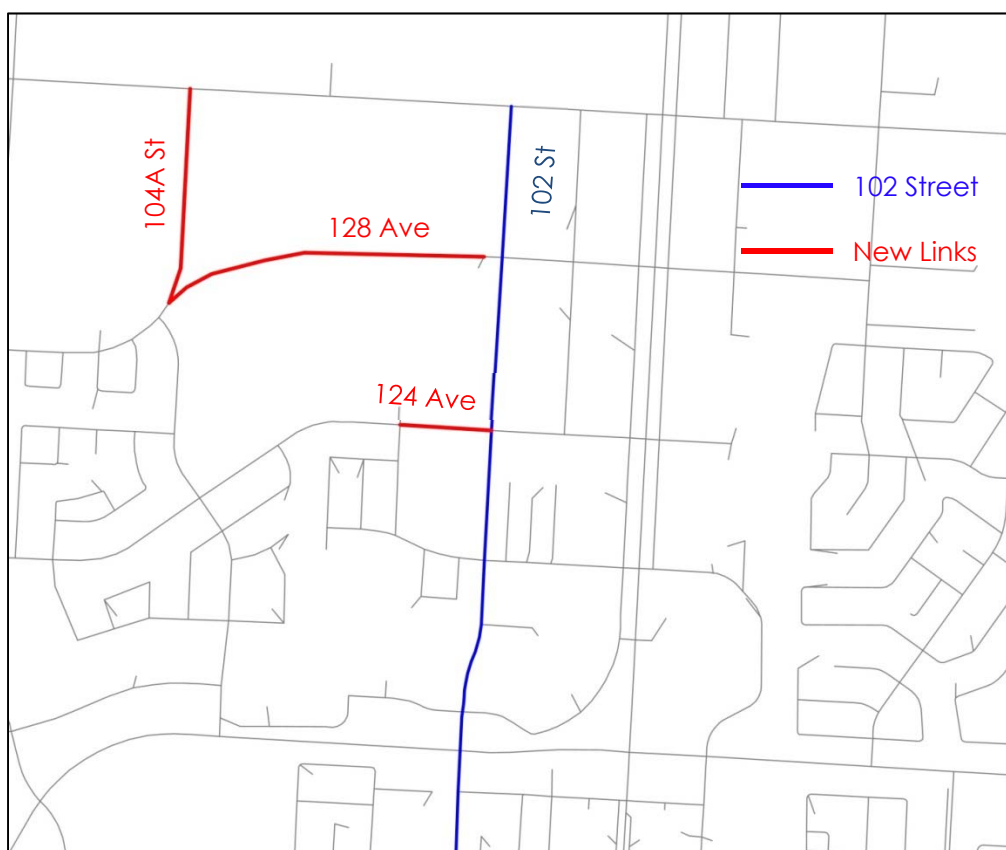
December 3, 2014

The road network for the model was also reviewed. Three differences were observed between the Royal Oaks and Northridge Outline Plans and the road network in the model:

- 124 Avenue remains a three legged intersection at all model horizons with no west leg;
- 128 Avenue remains a three legged intersection at all model horizons with no connection to the Royal Oaks Outline Plan; and
- 104A Street as shown in the Royal Oaks Outline Plan does not exist in any of the model horizons.

To more accurately model traffic volumes on 102 Street all three connections shown in **Figure 5.1** were added to the existing 65K, 78K, and 90K models.

**Figure 5.1 – New Network Connections**



Additionally, the City recently approved an application to construct 130 Avenue between 102 Street and 101 Street, which has also been included in the traffic models at the 65K population, 78K population and 90K population horizons. Also, the intersection of 132 Avenue / 101 Street was also converted to right-in/right-out at all model horizons.

The existing volumes assigned by the model onto the 102 Street corridor were also reviewed. Compared to more current traffic count data, the model assigns considerably less traffic onto





## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

FUTURE HORIZONS TRANSPORTATION ANALYSIS  
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102 Street than would be expected. For example, the 90K population horizon model assigns a two-way volume south of 121 Avenue of 585 vph; however, the 2012 count indicates that the present day volume is already 1012 vph. Therefore, turning movement volumes from the model were not used directly for the analysis contained within this report.

### 5.1.2 Design Traffic Volumes

The design traffic volumes used for analysis were derived by adding the current counts to the difference in traffic volumes between a future horizon model and the base year model – this allowed for the higher existing traffic volumes along 102 Street to be accounted for. The most current PM peak hour counts are shown in **Figure 5.2 (Appendix F)**. Turning movement counts were not available at the intersections with 130 Avenue or 132 Avenue, and thus traffic volumes were estimated based on the counts at 128 Avenue and the Alberta Transportation (AT) volume data at the 132 Avenue / 100 Street (Highway 43) intersection.

For a few turning movements, especially at 121 Avenue where traffic diverted to the new 124 Avenue connection, the above method resulted in traffic volumes less than zero. In those instances, the existing traffic counts were decreased by the ratio of future model volumes to base year model volumes. No attempts were made to balance traffic volumes between intersections so there is some discrepancy due to the counts having been completed at different times.

**Figures 5.3 to 5.5 (Appendix F)** show the design volumes for the 65K population, 78K population and 90K population horizons, respectively.

## 5.2 CAPACITY ANALYSIS

Intersection capacity analysis for the 65K population, 78K population and 90K population horizons has been completed using the software package of Synchro Studio 8, which is an industry-standard traffic analysis tool. Synchro is used to determine the anticipated LOS and V/C Ratios of the movements at an intersection.

The 2009 TMP only provided PM peak hour traffic volumes, which formed the basis for the analysis contained within this report. Synchro analysis has also been provided for the AM peak hour as well based on the assumption that the AM peak hour volumes equal 75% of the reversed PM peak hour flows (e.g. if the northbound through movement has 100 vph in the PM peak hour, then the southbound through movement in the AM peak hour is assumed to be 75 vph).

The results of the intersection capacity analysis are summarized in **Tables 5.3 – 5.8** and detailed Synchro outputs are included in Appendix G.

### 5.3 SIGNAL WARRANT ANALYSIS

The signal warrant analysis (SWA) was completed using the Transportation Association of Canada's (TAC) Traffic Signal Warrant Analysis Spreadsheet, v.3H (2007). When the spreadsheet yields a W-value equal to or greater than 100 points, signalization is warranted. No pedestrian movements have been included in the SWA as no pedestrian count data is available for the study intersections.

Although the capacity analysis was the primary consideration in deciding whether or not an intersection should be signalized, the signal warrant was used to identify intersections that should also be considered for signalization even if no movements are overcapacity. The results of the SWA for the intersections along the 102 Street corridor (113 Avenue to 132 Avenue) for all analyzed horizons can be found in **Appendix H**.

### 5.4 RECOMMENDED INTERSECTION CONFIGURATION

The results of the intersection analysis are summarized in the following **Table 5.9**. The table shows:

1. Capacity Analysis: the intersection control that was analyzed and whether any movements are overcapacity (exceed a V/C ratio of 0.85, or LOS-D) in the AM or PM peak hours. Stop controlled intersections that are overcapacity need to be signalized.
2. Signal Warrant: results of the TAC signal warrant analysis, where a value greater than 100 suggests that signalization should be considered even if no movements are overcapacity.

It should be noted that the intersection of 102 Street / 116 Avenue has not been included in the intersection analysis as it is presently a signalized intersection. In addition, the intersection of 102 Street / 117 Avenue has not been analyzed as it is assumed that will be converted into a right-in/right-out.

In order to mitigate driver confusion at the intersection of 102 Street / 113 Avenue and to address the southbound right-turn queuing related to the presence of schools west of the intersection, the geometry at the intersection has been revised to provide dedicated left-turn, through and right-turn lanes.

Table 5.3 - 65K AM Intersection Capacity Summary

Intersection Location Description			Intersection Movements																Overall Intersection	Comments/Critical Movements
			SB				NB				EB				WB					
			L	T	R	L	T	R	L	T	R	L	T	R	L	T	R			
102 St & 116 Ave			1	1	1	1	1	1	1	1	1	1	3	1	1	3	1	Signalized Cycle = 90 s		
Intersection / Laning Characteristics			59	72	146	42	113	23	212	733	41	56	874	85						
Volumes (veh/h)			0.3	0.23	0.39	0.19	0.36	0.07	0.54	0.25	0.04	0.19	0.37	0.11						
Volume / Capacity Ratio (v/c)			31.5	29.4	6.4	28.7	32.2	0.4	10.8	6.9	3.4	17.4	14.1	4.6						
Total Delay (s)			C	C	A	C	C	A	B	A	A	B	B	A						
Level of Service (LOS)			15.5	17.4	10.7	11.8	25	0.3	39.2	42.9	5.5	20.9	70.8	10.4			B			
Queue Length 95th (m)																				
102 St & 113 Ave																			Delay - 10s	Unsignalized
Intersection / Laning Characteristics			SH	1	1	1	1	SH	SH	1	SH	SH	1	SH	1	SH				
Volumes (veh/h)			4	176	14	17	232	19	20	11	19	14	8	20						
Volume / Capacity Ratio (v/c)			-	0.291	0.02	0.029	0.394	-	-	0.082	-	-	0.068	-						
Level of Service (LOS)			-	A	A	A	B	-	-	A	-	-	A	-						
Queue Length 95th (m)			-	9.6	0.8	0.8	15.2	-	-	2.4	-	-	1.6	-						
102 St & 121 Ave																			Delay - 6.4s	Unsignalized
Intersection / Laning Characteristics			1	1	SH	1	1	1	SH	1	1	SH	1	1	SH					
Volumes (veh/h)			53	176	9	29	325	36	54	57	43	113	8	26						
Volume / Capacity Ratio (v/c)			0.053	-	-	0.024	-	-	0.17	0.232	-	0.384	0.068	-						
Level of Service (LOS)			A			A			C	B		C	B							
Queue Length 95th (m)			1.6			0.8			4.8	7.2		14.4	1.6							
102 St & 124 Ave																			Delay - 3.6s	Unsignalized
Intersection / Laning Characteristics			1	1	SH	1	1	1	SH	1	1	SH	1	1	SH					
Volumes (veh/h)			11	145	1	3	242	79	4	74	3	47	31	10						
Volume / Capacity Ratio (v/c)			0.011	-	-	0.002	-	-	0.009	0.175	-	0.112	0.084	-						
Level of Service (LOS)			A	-	-	A	-	-	B	B	-	B	B	-						
Queue Length 95th (m)			0	-	-	0	-	-	0	4.8	-	3.2	2.4	-						
102 St & 128 Ave																			Delay - 6.7s	Unsignalized
Intersection / Laning Characteristics			1	1	SH	1	1	1	SH	1	3	SH	1	3	SH					
Volumes (veh/h)			14	140	29	19	281	41	74	108	14	16	125	5						
Volume / Capacity Ratio (v/c)			0.013	-	-	0.016	-	-	0.24	0.285	-	0.046	0.311	-						
Level of Service (LOS)			A	-	-	A	-	-	C	C	-	B	C	-						
Queue Length 95th (m)			0	-	-	0	-	-	7.2	9.6	-	0.8	10.4	-						
102 St & 130 Ave																			Delay - 0.2s	Unsignalized
Intersection / Laning Characteristics			SH	1	-	-	1	SH	-	-	-	SH	-	SH						
Volumes (veh/h)			4	155	-	-	311	3	-	-	-	1	-	4						
Volume / Capacity Ratio (v/c)			0.004	-	-	-	-	-	-	-	-	0.009	-	-						
Level of Service (LOS)			A	-	-	-	-	-	-	-	-	B	-	-						
Queue Length 95th (m)			0	-	-	-	-	-	-	-	-	0	-	-						
102 St & 132 Ave																			Delay - 8.2s	Unsignalized
Intersection / Laning Characteristics			-	-	-	SH	-	SH	-	1	SH	SH	1	-						
Volumes (veh/h)			-	-	-	43	-	311	-	77	27	137	19	-						
Volume / Capacity Ratio (v/c)			-	-	-	0.095	-	0.374	-	-	-	0.107	-	-						
Level of Service (LOS)			-	-	-	B	-	B	-	-	-	A	-	-						
Queue Length 95th (m)			-	-	-	2.4	-	13.6	-	-	-	3.2	-	-						



Table 5.5 - 78K AM Intersection Capacity Summary																			
Intersection Location		Intersection Movements														Overall Intersection	Comments/Critical Movements		
Description	SB				NB				EB				WB						
	L	T	R		L	T	R		L	T	R		L	T	R				
<b>102 St &amp; 116 Ave</b>		1	1	1	1	1	1	1	1	1	3	1	1	3	1		Signalized Cycle = 90 s		
Intersection / Lanning Characteristics		58	80	125	48	116	20	230	791	45	56	977	84						
Volumes (veh/h)		0.3	0.26	0.34	0.22	0.37	0.06	0.63	0.26	0.05	0.22	0.44	0.11						
Volume / Capacity Ratio (v/c)		31.4	29.9	6.4	29.3	32.4	0.3	16.5	6.4	3.1	19.8	16.5	4.9						
Total Delay (s)		C	C	A	C	C	A	B	A	A	B	B	A						
Level of Service (LOS)		15.4	18.8	10	13.1	25.8	0	#59.5	45	5.5	21.5	81.6	10.4						
Queue Length 95th (m)																Signalized Cycle = 75 s			
<b>102 St &amp; 121 Ave</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	1	SH				
Intersection / Lanning Characteristics		60	170	16	31	326	59	58	56	44	113	7	30						
Volumes (veh/h)		0.11	0.16	-	0.04	0.34	-	0.23	0.29	-	0.48	0.12	-						
Volume / Capacity Ratio (v/c)		6.8	5.9	-	6.4	7	-	24.5	15.3	-	30.9	9.7	-						
Total Delay (s)		A	A	-	A	A	-	C	B	-	C	A	-						
Level of Service (LOS)		11.4	26.3	-	6.5	57.4	-	14.6	16.3	-	25.8	6.7	-						
Queue Length 95th (m)																Signalized Cycle = 75 s			
<b>102 St &amp; 128 Ave</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	1	SH				
Intersection / Lanning Characteristics		14	142	89	35	280	41	241	206	38	16	172	5						
Volumes (veh/h)		0.05	0.37	-	0.09	0.5	-	0.62	0.4	-	0.04	0.29	-						
Volume / Capacity Ratio (v/c)		10.7	10.2	-	10.8	13.6	-	18.4	11.5	-	9.4	10.8	-						
Total Delay (s)		B	B	-	B	B	-	B	B	-	A	B	-						
Level of Service (LOS)		4.4	32.7	-	8.3	53	-	45	36.3	-	4.5	27.2	-						
Queue Length 95th (m)																Signalized Cycle = 75 s			
<b>102 St &amp; 132 Ave</b>		-	-	-	1	-	1	-	1	SH	1	1	-						
Intersection / Lanning Characteristics		-	-	-	45	-	441	-	56	27	143	42	-						
Volumes (veh/h)		-	-	-	0.04	-	0.43	-	0.23	-	0.58	0.12	-						
Volume / Capacity Ratio (v/c)		-	-	-	6.3	-	2.1	-	16.7	-	33.6	21.6	-						
Total Delay (s)		-	-	-	A	-	A	-	B	-	C	C	-						
Level of Service (LOS)		-	-	-	8	-	11.9	-	15.7	-	32.9	11.4	-						
Queue Length 95th (m)																Unsignalized			
<b>102 St &amp; 113 Ave</b>		SH	1	1	1	1	SH	SH	1	SH	SH	1	SH						
Intersection / Lanning Characteristics		4	185	15	17	233	19	20	11	17	13	8	21						
Volumes (veh/h)		-	0.306	0.021	0.029	0.396	-	0.08	-	-	-	0.069	-						
Volume / Capacity Ratio (v/c)		-	B	A	A	B	-	A	-	-	-	A	-						
Level of Service (LOS)		-	10.4	0.8	0.8	15.2	-	2.4	-	-	-	1.6	-						
Queue Length 95th (m)																Unsignalized			
<b>102 St &amp; 124 Ave</b>		1	1	SH	1	1	SH	1	1	SH	1	1	SH						
Intersection / Lanning Characteristics		11	180	1	5	252	74	7	113	7	26	43	10						
Volumes (veh/h)		0.011	-	-	0.004	-	-	0.017	0.279	-	0.071	0.011	-						
Volume / Capacity Ratio (v/c)		A	-	-	A	-	-	B	C	-	B	A	-						
Level of Service (LOS)		0	-	-	0	-	-	0.8	8.8	-	1.6	0	-						
Queue Length 95th (m)																Unsignalized			
<b>102 St &amp; 130 Ave</b>		SH	1	-	-	1	SH	-	-	-	SH	-	SH						
Intersection / Lanning Characteristics		5	165	-	-	412	116	-	-	-	80	-	74						
Volumes (veh/h)		0.006	-	-	-	-	-	-	-	-	0.191	-	0.155						
Volume / Capacity Ratio (v/c)		A	-	-	-	-	-	-	-	-	B	-	B						
Level of Service (LOS)		0	-	-	-	-	-	-	-	-	5.6	-	4						
Queue Length 95th (m)																			

Table 5.6 - 78K PM Intersection Capacity Summary																					
Intersection Location		Intersection Movements														Overall Intersection	Comments/Critical Movements				
Description		SB			NB				EB				WB								
		L	T	R	L	T	R	L	T	R	L	T	R								
<b>102 St &amp; 116 Ave</b>		1	1	1	1	1	1	1	1	3	1	1	3	1	ICU = 74.3%					Signalized Cycle = 90 s	
Intersection / Lanning Characteristics		127	177	328	88	99	54	186	1239	32	35	1091	73	Max = 0.62							
Volumes (veh/h)		0.52	0.48	0.62	0.46	0.27	0.15	0.57	0.41	0.03	0.21	0.46	0.09								
Volume / Capacity Ratio (v/c)		35.9	33	9.7	34.8	27.8	4.4	14.1	8.4	3.8	21.3	16.4	5.2								
Total Delay (s)		D	C	A	C	C	A	B	A	A	C	B	A	B							
Level of Service (LOS)		29.6	37	22.6	22.3	22	5.5	36	76.5	4.9	15.8	90	9.9								
Queue Length 95th (m)																					
<b>102 St &amp; 121 Ave</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	1	SH	ICU = 66.6%					Signalized Cycle = 75 s
Intersection / Lanning Characteristics		50	470	32	59	246	89	37	49	41	151	16	45	Max = 0.58							
Volumes (veh/h)		0.09	0.46	-	0.14	0.32	-	0.14	0.24	-	0.58	0.17	-								
Volume / Capacity Ratio (v/c)		7.1	9.2	-	7.7	7.1	-	21.7	13.9	-	33.1	9.6	-								
Total Delay (s)		A	A	-	A	A	-	C	B	-	C	A	-	B							
Level of Service (LOS)		9.5	81.1	-	11.6	45.8	-	10.2	14.8	-	33.5	9.3	-								
Queue Length 95th (m)																					
<b>102 St &amp; 128 Ave</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	1	SH	ICU = 79.4%					Signalized Cycle = 90 s
Intersection / Lanning Characteristics		7	373	321	50	189	21	119	229	46	54	274	18	Max = 0.83							
Volumes (veh/h)		0.01	0.83	-	0.3	0.24	-	0.52	0.54	-	0.22	0.57	-								
Volume / Capacity Ratio (v/c)		7.4	19.3	-	13.4	8.1	-	29.4	22.9	-	21.6	24	-								
Total Delay (s)		A	B	-	B	A	-	C	C	-	C	C	-	B							
Level of Service (LOS)		2.4	132.8	-	12.3	29.1	-	37.8	68.1	-	18.1	74.1	-								
Queue Length 95th (m)																					
<b>102 St &amp; 132 Ave</b>		-	-	-	1	-	1	-	1	SH	1	1	-	ICU = 58.8%					Signalized Cycle = 90 s		
Intersection / Lanning Characteristics		-	-	-	36	-	191	-	56	60	588	74	-	Max = 0.68							
Volumes (veh/h)		-	-	-	0.07	-	0.34	-	0.2	-	0.68	0.07	-								
Volume / Capacity Ratio (v/c)		-	-	-	20.7	-	5.5	-	12.9	-	12.4	5.8	-								
Total Delay (s)		-	-	-	C	-	A	-	B	-	B	A	-	B							
Level of Service (LOS)		-	-	-	12.2	-	15.2	-	22.3	-	#117.0	11.8	-								
Queue Length 95th (m)																					
<b>102 St &amp; 113 Ave</b>		SH	1	1	1	1	SH	SH	1	SH	SH	1	SH	Delay - 11.3s					Unsignalized		
Intersection / Lanning Characteristics		28	302	27	23	268	17	20	10	22	25	14	5	Delay - 6s							
Volumes (veh/h)		-	0.521	0.036	0.04	0.447	-	0.09	-	-	-	0.079	-	Delay - 4.9							
Volume / Capacity Ratio (v/c)		-	B	A	A	B	-	A	-	-	-	A	-								
Level of Service (LOS)		-	2.4	0.8	0.8	18.4	-	2.4	-	-	-	1.6	-								
Queue Length 95th (m)																					
<b>102 St &amp; 124 Ave</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	SH	Unsignalized						
Intersection / Lanning Characteristics		13	336	9	9	227	34	1	57	6	99	150	15	Delay - 6s							
Volumes (veh/h)		0.011	-	-	0.008	-	-	0.003	0.15	-	0.268	0.387	-	Delay - 4.9							
Volume / Capacity Ratio (v/c)		A	-	-	A	-	-	C	B	-	C	C	-								
Level of Service (LOS)		0	-	-	0	-	-	0.8	8.8	-	1.6	0	-								
Queue Length 95th (m)																					
<b>102 St &amp; 130 Ave</b>		SH	1	-	-	1	SH	-	-	-	SH	-	SH	Unsignalized							
Intersection / Lanning Characteristics		98	549	-	-	220	107	-	-	-	154	-	7	Delay - 4.9							
Volumes (veh/h)		0.089	-	-	-	-	-	-	-	-	0.551	-	0.01								
Volume / Capacity Ratio (v/c)		A	-	-	-	-	-	-	-	-	D	-	B								
Level of Service (LOS)		2.4	-	-	-	-	-	-	-	-	24.8	-	0								
Queue Length 95th (m)																					

Table 5.7 - 90K AM Intersection Capacity Summary																			
Intersection Location		Intersection Movements																Overall Intersection	Comments/Critical Movements
Description	SB				NB				EB				WB						
	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R				
<b>102 St &amp; 116 Ave.</b>		1	1	1	1	1	1	1	1	3	1	1	1	3	1		Signalized Cycle = 90 s		
Intersection / Laning Characteristics		55	94	126	55	120	19	268	954	48	56	1377	82						
Volumes (veh/h)		0.25	0.27	0.32	0.23	0.34	0.06	0.69	0.38	0.06	0.19	0.75	0.13						
Volume / Capacity Ratio (v/c)		29	29	5.9	28.4	30.4	0.3	30.1	12.8	4.9	8.9	25.2	4.8						
Total Delay (s)		C	C	A	C	C	A	C	B	A	A	C	A						
Level of Service (LOS)		14.6	21.6	10	14.4	26.4	0	#106.4	71.7	7.4	12.2	#130.5	9.8			C			
Queue Length 95th (m)																			
<b>102 St &amp; 121 Ave.</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	SH		Signalized Cycle = 75 s			
Intersection / Laning Characteristics		68	200	24	29	345	88	63	57	44	112	6	35						
Volumes (veh/h)		0.13	0.2	-	0.04	0.38	-	0.26	0.29	-	0.48	0.13	-						
Volume / Capacity Ratio (v/c)		7.1	6	-	6.4	7.4	-	25	15.3	-	30.9	9	-						
Total Delay (s)		A	A	-	A	A	-	C	B	-	C	A	-						
Level of Service (LOS)		12.9	31.5	-	6.2	66.7	-	15.7	16.4	-	25.5	6.9	-			B			
Queue Length 95th (m)																			
<b>102 St &amp; 128 Ave.</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	SH		Signalized Cycle = 75 s			
Intersection / Laning Characteristics		14	139	94	77	280	41	243	257	84	16	199	5						
Volumes (veh/h)		0.05	0.38	-	0.21	0.51	-	0.63	0.55	-	0.06	0.32	-						
Volume / Capacity Ratio (v/c)		11.7	10.9	-	12.8	14.6	-	18.4	13.1	-	9.4	10.9	-						
Total Delay (s)		B	B	-	B	B	-	B	B	-	A	B	-						
Level of Service (LOS)		4.8	35.8	-	16.9	57.9	-	45.4	51	-	4.5	30.9	-			B			
Queue Length 95th (m)																			
<b>102 St &amp; 132 Ave.</b>		-	-	-	1	-	1	-	2	1	1	2	-			Signalized Cycle = 90 s			
Intersection / Laning Characteristics		-	-	-	77	-	406	-	366	73	150	296	-						
Volumes (veh/h)		-	-	-	0.18	-	0.63	-	0.39	0.16	0.32	0.18	-						
Volume / Capacity Ratio (v/c)		-	-	-	15.5	-	7.2	-	17.9	6.1	10.2	8.3	-						
Total Delay (s)		-	-	-	B	-	A	-	B	A	B	A	-						
Level of Service (LOS)		-	-	-	17.5	-	21.8	-	43.3	9.9	29.9	26.4	-			B			
Queue Length 95th (m)																			
<b>102 St &amp; 130 Ave.</b>		SH	1	-	-	1	SH	-	-	-	1	-	SH			Signalized Cycle = 75 s			
Intersection / Laning Characteristics		52	172	-	-	398	132	-	-	-	74	-	86						
Volumes (veh/h)		-	0.25	-	-	0.5	-	-	-	-	0.48	-	-						
Volume / Capacity Ratio (v/c)		-	6.1	-	-	7.9	-	-	-	-	18.4	-	-						
Total Delay (s)		-	A	-	-	A	-	-	-	-	B	-	-						
Level of Service (LOS)		-	31.1	-	-	78.8	-	-	-	-	24.7	-	-			A			
Queue Length 95th (m)																			
<b>102 St &amp; 113 Ave.</b>		1	2	1	1	1	SH	SH	1	SH	SH	1	SH			Unsignalized			
Intersection / Laning Characteristics		2	201	14	23	268	17	20	10	22	25	14	5						
Volumes (veh/h)		-	0.521	0.036	0.04	0.447	-	0.09	-	-	-	0.079	-						
Volume / Capacity Ratio (v/c)		-	B	A	A	B	-	A	-	-	-	A	-						
Level of Service (LOS)		-	2.4	0.8	0.8	18.4	-	2.4	-	-	-	1.6	-						
Queue Length 95th (m)																			
<b>102 St &amp; 124 Ave.</b>		1	1	SH	1	1	SH	1	1	SH	1	1	SH			Unsignalized			
Intersection / Laning Characteristics		11	209	6	6	278	77	24	129	11	29	44	10						
Volumes (veh/h)		0.011	-	-	0.005	-	-	0.064	0.344	-	0.124	0.011	-						
Volume / Capacity Ratio (v/c)		A	-	-	A	-	-	B	C	-	C	B	-						
Level of Service (LOS)		0	-	-	0	-	-	1.6	12	-	2.4	3.2	-						
Queue Length 95th (m)																			

Table 5.8 - 90K PM Intersection Capacity Summary																
Intersection Location		Intersection Movements												Overall Intersection	Comments/Critical Movements	
Description	SB			NB			EB			WB						
	L	T	R	L	T	R	L	T	R	L	T	R				
<b>102 St. &amp; 116 Ave.</b>		1	1	1	1	1	1	1	3	1	1	3	1	Signalized Cycle = 90 s	ICU = 82.6%  Max = 0.76  C	
Intersection / Laning Characteristics		123	181	375	90	121	53	193	1773	43	34	1307	71			
Volumes (veh/h)		0.45	0.43	0.76	0.4	0.29	0.13	0.67	0.69	0.05	0.17	0.6	0.1			
Volume / Capacity Ratio (v/c)		31.2	29.3	23.4	30.6	26.5	4.7	25.4	18.8	3.8	10.4	20.1	5.2			
Total Delay (s)		C	C	C	C	C	A	C	B	A	B	C	A			
Level of Service (LOS)		29.1	38	52.1	22.8	26.5	6	#64.9	#179.8	5.4	8.5	106.7	9.2			
Queue Length 95th (m)																
<b>102 St. &amp; 121 Ave.</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	Signalized Cycle = 75 s	ICU = 70.3%  Max = 0.67  B	
Intersection / Laning Characteristics		56	496	39	59	285	87	48	47	38	191	16	56			
Volumes (veh/h)		0.11	0.51	-	0.15	0.36	-	0.17	0.21	-	0.67	0.18	-			
Volume / Capacity Ratio (v/c)		7.8	10.5	-	8.6	8.2	-	21.1	13.2	-	35.4	8.4	-			
Total Delay (s)		A	B	-	A	A	-	C	B	-	D	A	-			
Level of Service (LOS)		10.6	88.6	-	11.9	53	-	12.5	14.3	-	42.6	10	-			
Queue Length 95th (m)																
<b>102 St. &amp; 128 Ave.</b>		1	1	SH	1	1	SH	1	1	1	SH	1	1	Signalized Cycle = 75 s	ICU = 97.9%  Max = 0.85  C	
Intersection / Laning Characteristics		7	373	324	112	185	21	125	265	103	54	342	18			
Volumes (veh/h)		0.01	0.85	-	0.76	0.25	-	0.64	0.68	-	0.29	0.66	-			
Volume / Capacity Ratio (v/c)		8.3	22.6	-	47.1	9	-	34.8	23.9	-	21.3	24.3	-			
Total Delay (s)		A	C	-	D	A	-	C	C	-	C	C	-			
Level of Service (LOS)		2.5	#153.9	-	#44.5	28.6	-	#37.4	73.4	-	15.5	74.1	-			
Queue Length 95th (m)																
<b>102 St. &amp; 132 Ave.</b>		-	-	-	1	-	1	-	2	1	1	2	-	Signalized Cycle = 100 s	ICU = 69%  Max = 0.79  B	
Intersection / Laning Characteristics		-	-	-	97	-	200	-	394	103	541	488	-			
Volumes (veh/h)		-	-	-	0.26	-	0.42	-	0.5	0.25	0.79	0.24	-			
Volume / Capacity Ratio (v/c)		-	-	-	22.8	-	5.8	-	25.9	7.1	20.5	7.2	-			
Total Delay (s)		-	-	-	C	-	A	-	C	A	C	A	-			
Level of Service (LOS)		-	-	-	25.3	-	14.4	-	54.1	13.1	#159	41.6	-			
Queue Length 95th (m)																
<b>102 St. &amp; 130 Ave.</b>		SH	1	-	-	1	SH	-	-	-	1	-	SH	Signalized Cycle = 75 s	ICU = 80.5%  Max = 0.68  B	
Intersection / Laning Characteristics		115	530	-	-	229	98	-	-	-	176	-	68			
Volumes (veh/h)		-	0.68	-	-	0.31	-	-	-	-	0.67	-	-			
Volume / Capacity Ratio (v/c)		-	14.1	-	-	6.5	-	-	-	-	31.5	-	-			
Total Delay (s)		-	B	-	-	A	-	-	-	-	C	-	-			
Level of Service (LOS)		-	#131.9	-	-	39	-	-	-	-	49.5	-	-			
Queue Length 95th (m)																
<b>102 St. &amp; 113 Ave.</b>		1	2	1	1	1	SH	SH	1	SH	SH	1	SH	Unsignalized	Delay - 12.9s	
Intersection / Laning Characteristics		28	315	28	23	289	17	19	10	21	23	289	17			
Volumes (veh/h)		0.048	0.502	0.038	0.044	0.529	-	0.097	-	-	-	0.087	-			
Volume / Capacity Ratio (v/c)		A	B	A	A	B	-	A	-	-	-	B	-			
Level of Service (LOS)		1.6	22.4	0.8	0.8	24.8	-	2.4	-	-	-	2.4	-			
Queue Length 95th (m)																
<b>102 St. &amp; 124 Ave.</b>		1	1	SH	1	1	SH	1	1	SH	1	1	SH	Unsignalized	Delay - 6.8s	
Intersection / Laning Characteristics		13	371	32	14	278	38	8	59	8	103	172	15			
Volumes (veh/h)		0.012	-	-	0.014	-	-	0.032	0.175	-	0.317	0.492	-			
Volume / Capacity Ratio (v/c)		A	-	-	A	-	-	C	C	-	C	C	-			
Level of Service (LOS)		0	-	-	0	-	-	0.8	4.8	-	10.4	20.8	-			
Queue Length 95th (m)																



## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

FUTURE HORIZONS TRANSPORTATION ANALYSIS

December 3, 2014

**Table 5.9 – Intersection Analysis Summary**

65K Design Volumes			
Intersection	Capacity Analysis Results	Signal Warrant	Intersection Control
113 Ave	No issues as a stop control	20	Stop
121 Ave	No Issues as a stop control	82	Stop
124 Ave	No Issues as a stop control	49	Stop
128 Ave	No Issues as a stop control	88	Stop
130 Ave	No Issues as a stop control	7	Stop
132 Ave	No Issues as a stop control	28	Stop
78K Design Volumes			
Intersection	Capacity Analysis Results	Signal Warrant	Intersection Control
113 Ave	No Issues as a stop control	21	Stop
121 Ave	WBL fails at stop control	90	Stop → Signal
124 Ave	No Issues as a stop control	58	Stop
128 Ave	EBL, WBL, WBT fails at stop control	185	Stop → Signal
130 Ave	No Issues as a stop control	58	Stop
132 Ave	NBL fails at stop control	28	Stop → Signal
90K Design Volumes			
Intersection	Capacity Analysis Results	Signal Warrant	Intersection Control
113 Ave	No Issues as a stop control	59	Stop
121 Ave	No issues as signal controlled	108	Signal
124 Ave	No issues at stop control	75	Stop
128 Ave	No issues as signal controlled	220	Signal
130 Ave	WBL, WBR fails at stop control	64	Stop → Signal
132 Ave	No issues as signal controlled	132	Signal

### 5.4.1 Short-Term Horizon (65K Population)

All of the existing stop controlled intersections on the 102 Street corridor are expected to operate adequately under the projected traffic volumes. No signals or additional lanes or turn bays are required.

### 5.4.2 Medium-Term Horizon (78K Population)

Movements at three intersections are expected to be overcapacity at this horizon and those intersections should be signalized:

- 121 Avenue westbound left turn will operate at LOS-F during the PM peak hour.
- 128 Avenue eastbound left turn will operate at LOS-F in during the AM peak hour, all westbound movements are also expected to operate at LOS-F during the PM peak hour.
- 132 Avenue westbound left operates at LOS-F during the PM peak hour.

These three intersections were analyzed as signalized intersections for 90K horizon.

### 5.4.3 Long-Term Horizon (90K Population)

At this horizon, 130 Avenue will also need to be signalized as the westbound left will operate at LOS-F during the PM peak hour.

## 5.5 ROUNDABOUTS ANALYSIS

Modern roundabouts have been successfully implemented in countries throughout the world. Benefits realized by both transportation agencies and road users include reduction in severity of crashes, traffic calming, reductions in vehicular delays and reduced greenhouse gas emissions. Roundabouts provide opportunities to build more aesthetically pleasing junctions while also continuing to effectively move traffic during power outages.

A typical single lane roundabout has been shown as an alternative intersection treatment on the overall concept plan. Traffic modeling for the roundabout alternative was completed using SIDRA Intersection 6, and outputs for the above listed intersections are included in **Appendix I**. Only the 90K horizon was analyzed with a roundabout to demonstrate the viability of the intersection treatment in the long term as an alternative intersection treatment. **Table 5.10** below outlines the results of the roundabout analysis and identifies the intersections where a roundabout is anticipated to function acceptably at the 90K population horizon.

**Table 5.10: Roundabout Analysis**

Intersection	Roundabout
121 Ave	Single-lane
124 Ave	Single-lane
128 Ave	Single-lane with SBR bypass lane
130 Ave	Single-lane

## 6.0 CONCEPT PLAN

In addition to the traffic analysis contained within this report, the scope of work for the 102 Street (113 Avenue to 132 Avenue) Traffic Study included development of a conceptual plan for the 102 Street corridor taking into account proposed and existing land uses, traffic volumes, levels of service, appropriate access locations, growth assumptions and long-term functionality. The concept plan has been developed based on the results of the traffic analysis, geometric requirements, feedback received from the two public open houses and discussions with the City's project team.

### 6.1 CONCEPT PLAN DEVELOPMENT

The concept plan evolved throughout the duration of the 102 Street (113 Avenue to 132 Avenue) Traffic Study. The original concept, based primarily on the results of the traffic analysis and geometric requirements, was modified following feedback received from Open House #1 and subsequent discussions with the City's project team. The revised concept plan was then presented at Open House #2. The concept plan has been developed for the long-term scenario, that being the 90K population horizon. Correspondence relating to the concept plan development is included in **Appendix J**.

### 6.2 GEOMETRIC DESIGN CRITERIA

Geometric design criteria used in the development of the concept for the 102 Street corridor is discussed below. It is important to note that the scope of work for this project was for a concept development only, and so the geometric design criteria discussed below are not as detailed or numerous as what you would find in a Functional or Preliminary Design Report (e.g. vertical geometrics are not addressed in this report).

The design criteria used to develop the concept for the 102 Street corridor are summarized in **Table 6.1**, below. The design criterion is based on TAC standards and the City's Design Manual (V2013).

**Table 6.1 – Design Criteria**

Factors	Values
Road Classification	Urban Arterial Undivided (UAU 60)
Design Speed	60 km/h
Posted Speed	50 km/h
Lane Width	3.5 - 3.7 m
Design Vehicle	WB-21

### 6.2.1 Design Vehicle Turning Movements

The use of a design vehicle provides a means of properly designing the intersection. Design parameters such as curb return radii, left-turn radii, lane widths, median openings, turning roadways, and sight distances are affected based on the selection of the design vehicles. The WB-21 design vehicle has been used for all intersections along the 102 Street corridor.

### 6.2.2 Trails and Sidewalks

There is an existing 3.0 m asphalt trail along the west side of 102 Street from 116 Avenue (Highway 43) to 132 Avenue. To provide additional options for pedestrians and cyclists, a 2.0 m separate sidewalk is proposed for the east side of the roadway. Wherever possible, a consistent cross-section should be maintained for the corridor and as such the sidewalk has been shown 3.0 m from the back of curb.

The proposed sidewalk should tie-in to sidewalks and/or trails along each of the intersecting roadways. It is recommended that missing sidewalk connections be constructed to provide good connectivity between the residential areas west of 102 Street and the commercial areas adjacent to 100 Street (Highway 43).

## 6.3 PREFERRED CONCEPT PLAN

The preferred concept plan is illustrated on **Figure 6.1** (116 Avenue to 117 Avenue), **Figure 6.2** (124 Avenue) and the overall concept plan for the 90K population horizon is attached in **Appendix K**.

### 6.3.1 Median Fence – South of 116 Avenue

The preferred concept plan for the 102 Street corridor includes extension of the median that currently exists south of 116 Avenue (Highway 43) combined with installation of a median fence. This recommendation is to address two existing issues observed by City staff, as described below:

- Extension of the median further south of 115 Avenue is to address the U-turn movements that have been observed by residents traveling south on 102 Street trying to access 115 Avenue; and
- Installation of the median fence is to address jaywalking that is currently happening at two locations along 102 Street, south of 116 Avenue (Highway 43) – both where the trails that parallel 116 Avenue (Highway 43) line up, and where 115 Avenue lines up with the Public Utility Lot (PUL) that is located west of 102 Street.

The median fence is envisioned to be aesthetically pleasing without becoming a trap for garbage and other debris that the wind may carry. It should also be designed such that pedestrians are not able to easily climb over it, thus encouraging them to use the crosswalks provided at either 116 Avenue (Highway 43) or 113 Avenue.

## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

CONCEPT PLAN  
December 3, 2014

### 6.3.2 116 Avenue to 117 Avenue

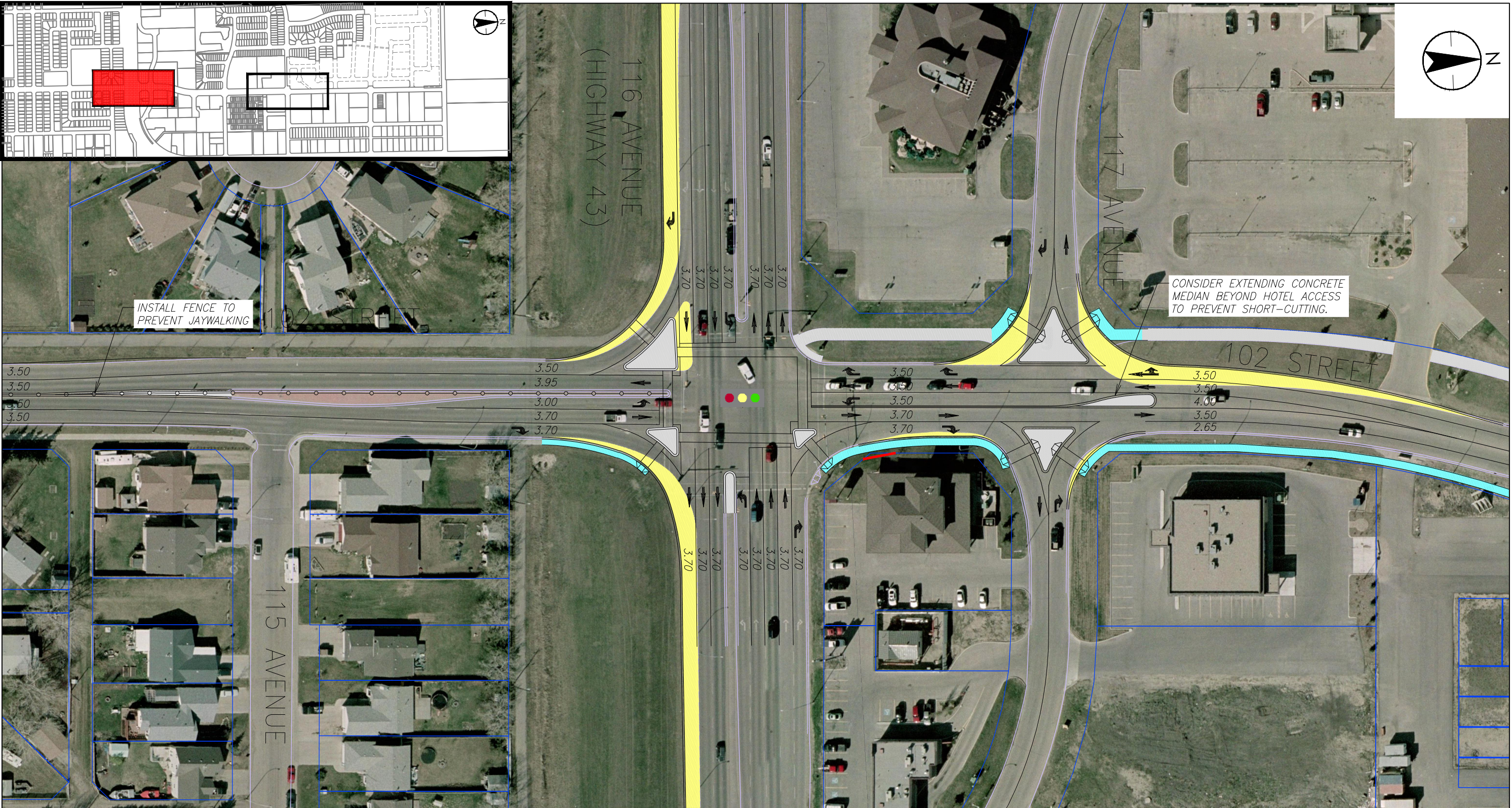
With conversion of 117 Avenue to right-in/right-out accesses on both sides, access for the existing commercial developments must be taken into consideration. A few specific considerations include the following:

- Northbound left-turning traffic at the intersection of 102 Street / 117 Avenue will use 105 Street to access commercial developments located along 117 Avenue between 102 Street and 105 Street. The difference in travel distance is roughly an extra 600 m when traveling from 102 Street / 116 Avenue (Highway 44) to the mid-point of 117 Avenue via 105 Street, as compared to the existing 102 Street route. As the turns onto 105 Street and onto 117 Avenue are both right-turns, the increase in travel time is anticipated to be minimal.
- Southbound left-turning traffic at the intersection of 102 Street / 117 Avenue will access the commercial developments located east of 102 Street via 121 Avenue and the 100 Street service road.
- Eastbound left-turning and through traffic at 102 Street / 117 Avenue will likely use 105 Street to Royal Oaks Drive (124 Avenue) if their end-destination is north of 117 Avenue, and 105 Street to 116 Avenue (Highway 43) if their end destination is south of 117 Avenue or east of 102 Street.
- Westbound left-turning and through traffic at 102 Street / 117 Avenue will likely use the 100 Street Service road to access 100 Street or 121 Avenue, depending on their end-destination.

When the right-in/right-out is implemented at 102 Street / 117 Avenue, the City discuss should the signalization of 105 Street / 116 Avenue (Highway 43) with AT as the volume of southbound left-turning traffic is expected to increase. In addition, there is also the potential for shortcutting through the existing hotel site on the northwest quadrant of the intersection. As a result, the City may want to consider extending the concrete median beyond the hotel access to prevent shortcutting traffic.



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ORIGINAL SHEET - ANSI B

JUNE 2014  
116239355



1100 - 4900 50th Street  
Red Deer AB Canada T4N 1X7  
www.stantec.com

Legend

- |  |                        |  |                                      |
|--|------------------------|--|--------------------------------------|
|  | EXISTING PROPERTY LINE |  | PROPOSED ROAD NETWORK                |
|  | PROPOSED EASEMENT LINE |  | PROPOSED LANDSCAPING                 |
|  | PROPOSED PROPERTY LINE |  | PROPOSED CONCRETE MEDIAN/ISLAND CAPS |
|  | EXISTING CURBLINE      |  | PROPOSED SIDEWALK/TRAIL              |
|  | PROPOSED CURBLINE      |  | PROPOSED BERM                        |
|  | PROPOSED FENCING       |  |                                      |

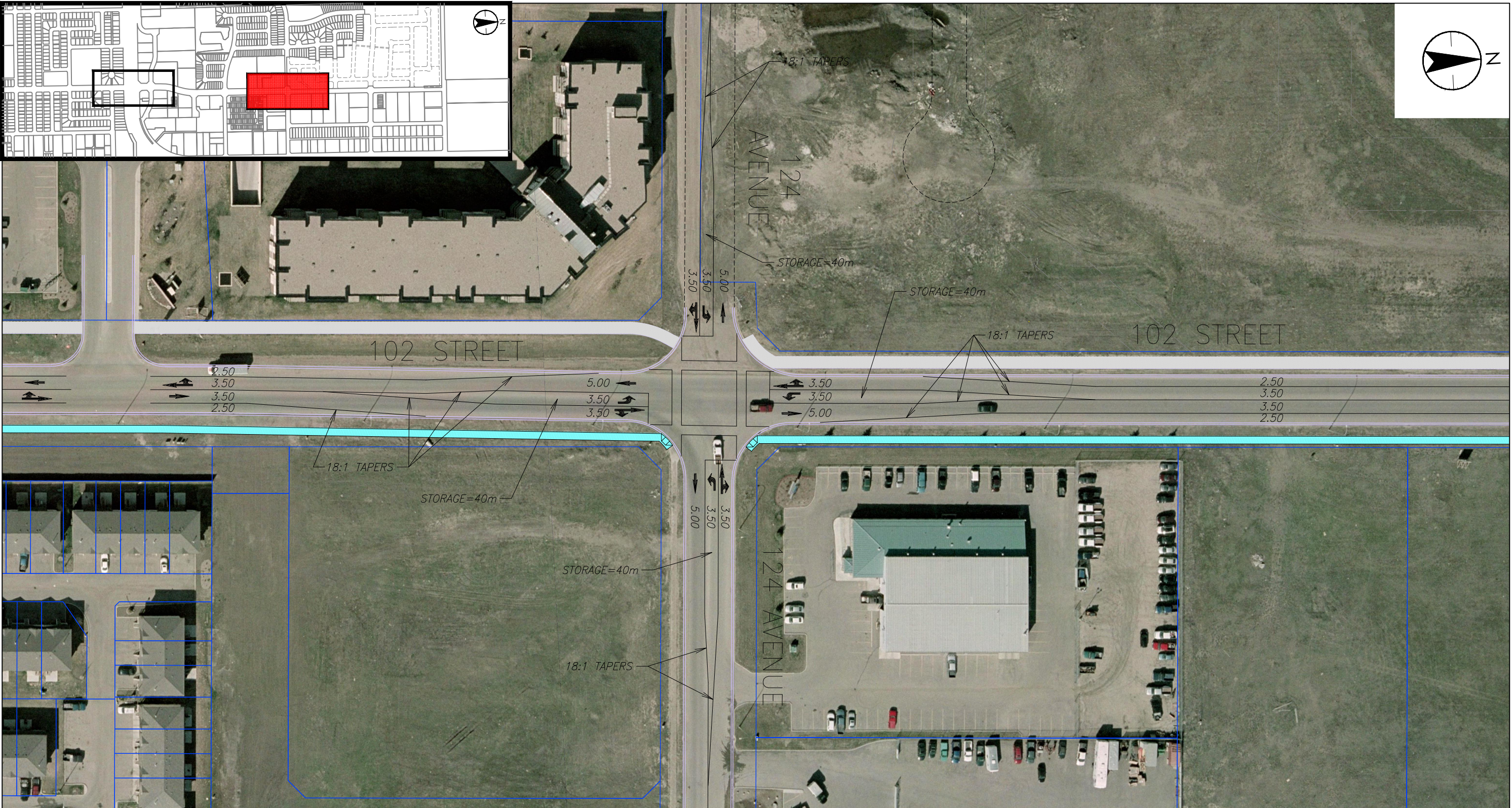


PRELIMINARY  
FOR DISCUSSION PURPOSES ONLY

Client/Project  
THE CITY OF GRANDE PRAIRIE  
102 STREET TRAFFIC STUDY  
Figure No. 6.1  
Title  
116 AVENUE TO 117 AVENUE CONFIGURATION



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ORIGINAL SHEET - ANSI B

JUNE 2014  
116239355



1100 - 4900 50th Street  
Red Deer AB Canada T4N 1X7  
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Legend

- EXISTING PROPERTY LINE
- PROPOSED EASEMENT LINE
- PROPOSED PROPERTY LINE
- EXISTING CURBLINE
- PROPOSED CURBLINE
- PROPOSED FENCING
- PROPOSED ROAD NETWORK
- PROPOSED LANDSCAPING
- PROPOSED CONCRETE MEDIAN/ISLAND CAPS
- PROPOSED SIDEWALK/TRAIL
- PROPOSED BERM



PRELIMINARY  
FOR DISCUSSION PURPOSES ONLY

Client/Project  
THE CITY OF GRANDE PRAIRIE  
102 STREET TRAFFIC STUDY  
Figure No. 6.2  
Title  
124 AVENUE INTERSECTION CONFIGURATION



## 7.0 CONCLUSION AND RECOMMENDATIONS

102 Street is a major north-south corridor from 132 Avenue to south of 87 Avenue. Due to the new connection from 116 Avenue to 113 Avenue, and the increased commercial development north of 116 Avenue, traffic has steadily increased on the roadway. Most noticeably, the intersections of 102 Street with 116 Avenue and 117 Avenue are congested during peak hours.

This report documents the traffic analysis completed for the existing and proposed intersections along 102 Street from 113 Avenue to 132 Avenue to determine the future intersection upgrades at the short-term (65,000 population), medium term (78,000 population) and long-term (90,000 population) growth horizons. In addition to the traffic analysis, an ultimate conceptual plan for the 102 Street corridor has been developed.

### 102 Street / 116 Avenue Signal Timing Review

Based on the signal time review, it appears that the majority of the timing parameters conform to the City Standards. It is recommended that walk times be normalized to 7.0 seconds for all crossings with the following pedestrian clearance times:

- North-South crosswalks – 35 seconds; and
- East-West crossing – 30 seconds.

In addition, a southbound protected-permitted left turn phase is recommended to reduce delays. No northbound left turn is recommended as this would increase the delays for the higher southbound volumes. Also, through traffic phases on 116 Avenue should be switched from maximum recall to minimum for all timing plans so that the signal phasing is more responsive to traffic on 102 Street.

### 116 Avenue and 117 Avenue

A number of options were explored regarding the significant southbound queuing at the intersection of 102 Street / 116 Avenue. Due to the short distance between 116 Avenue and 117 Avenue (approximately 50m), southbound queuing traffic frequently blocks access to 117 Avenue, especially during the PM peak hour.

It is recommended that the intersection of 102 Street / 117 Avenue be converted to a right-in/right-out. The analysis indicates that existing traffic volumes and operations warrant a right-in/right-out at the intersection of 102 Street and 117 Avenue.

### 102 Street / 113 Avenue

In order to mitigate driver confusion at the intersection of 102 Street / 113 Avenue and to address the southbound right-turn queuing related to the presence of schools west of the



## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

### CONCLUSION AND RECOMMENDATIONS

December 3, 2014

intersection, it is recommended that the geometry at the intersection be revised to provide a dedicated left-turn, through and right-turn lanes.

#### **Short-Term Horizon (65,000 population)**

At the 65K population horizon, all of the exiting stop controlled intersections on the 102 Street corridor are expected to operate adequately under the projected traffic volumes. No signals, additional lanes or turn bays are required.

#### **Medium-Term Horizon (78,000 population)**

Movements at three intersections are expected to be overcapacity at this horizon and those intersections should be signalized:

- 121 Avenue westbound left turn will operate at LOS-F during the PM peak hour.
- 128 Avenue eastbound left turn will operate at LOS-F in during the AM peak hour, all westbound movements are also expected to operate at LOS-F during the PM peak hour.
- 132 Avenue westbound left operates at LOS-F during the PM peak hour.

#### **Long-Term Horizon (90,000 population)**

At this horizon, 130 Avenue will also need to be signalized as the westbound left will operate at LOS-F during the PM peak hour.

#### **Roundabout Analysis**

Additional traffic modeling was completed to demonstrate the viability of implementing roundabouts along the 102 Street corridor. Based on the analysis, a typical single lane roundabout is anticipated to function acceptably at the 90K population horizon for the following intersections:

- 102 Street / 121 Avenue;
- 102 Street / 124 Avenue; and
- 102 Street / 130 Avenue.

A single lane roundabout with a southbound right-turn slip lane is anticipated to function acceptably at 102 Street / 128 Avenue.

#### **Preferred Concept Plan**

In addition to the traffic analysis, development of a conceptual plan for the 102 Street corridor taking into account proposed and existing land uses, traffic volumes, levels of service, appropriate access locations, growth assumptions, and long-term functionality was completed.



## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

### CONCLUSION AND RECOMMENDATIONS

December 3, 2014

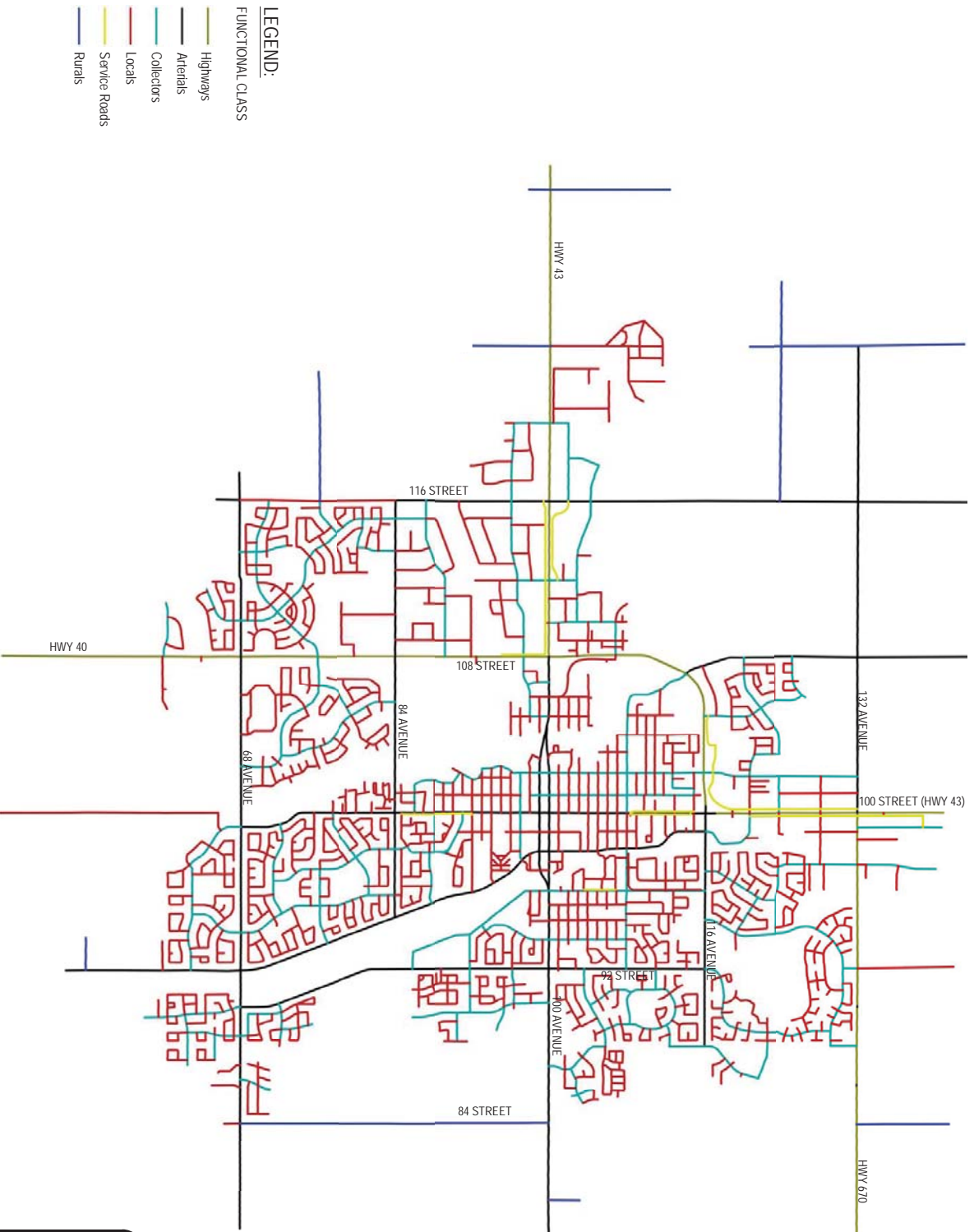
The preferred concept plan for the 102 Street corridor includes:

- Extension of the median further south of 115 Avenue is to address the U-turn movements that have been observed by residents traveling south on 102 Street trying to access 115 Avenue;
- Installation of the median fence is to address jaywalking that is currently happening at two locations along 102 Street, south of 116 Avenue (Highway 43) – both where the trails that parallel 116 Avenue (Highway 43) line up, and where 115 Avenue lines up with the Public Utility Lot (PUL) that is located west of 102 Street; and
- Conversion of the intersection of 102 Street / 117 Avenue to a right-in/right-out access. It should be noted that when the right-in/right-out is implemented, the City should discuss the signalization of 105 Street / 116 Avenue (Highway 43) with AT as the volume of southbound left-turning traffic is expected to increase at that intersection.

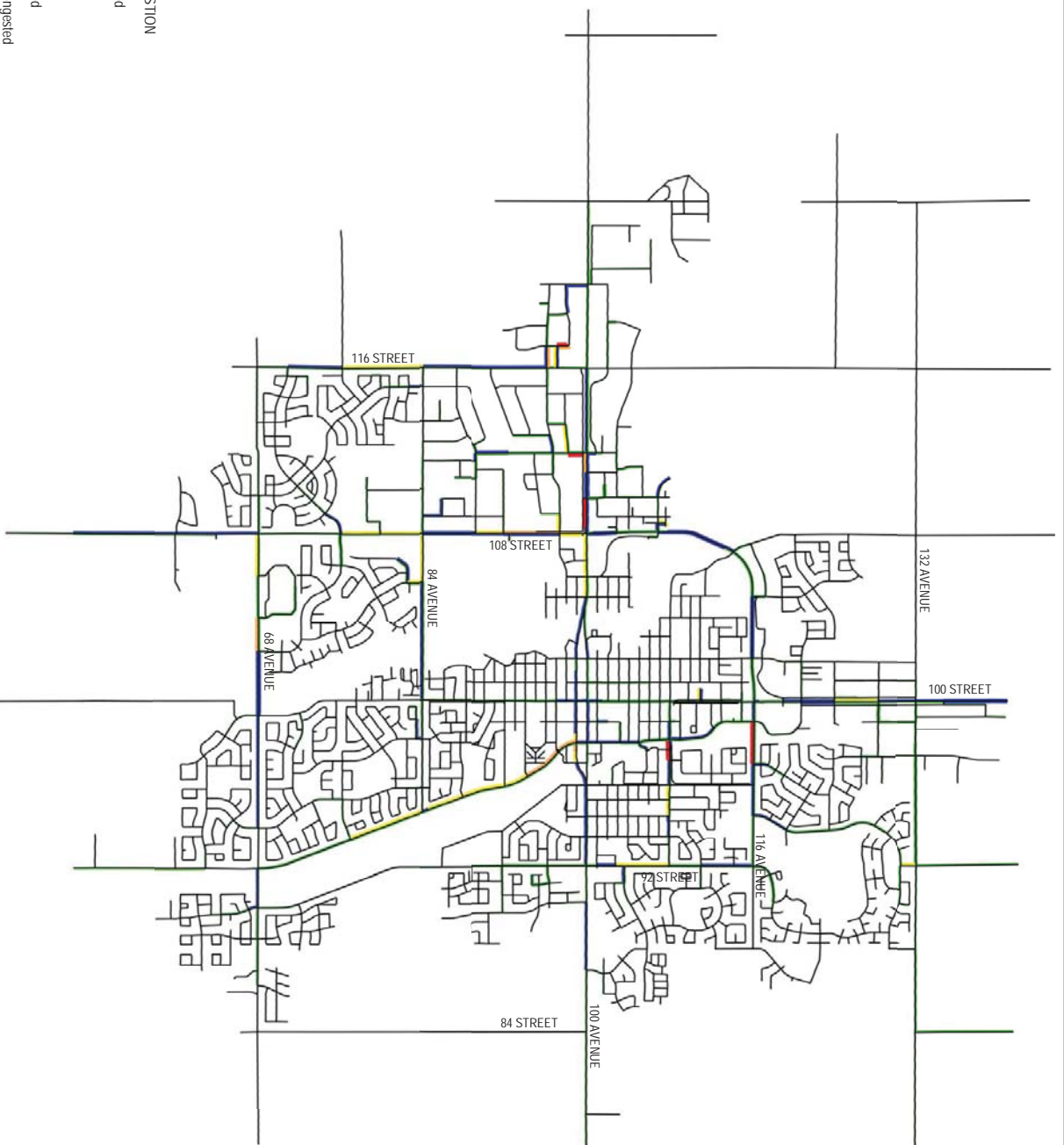
## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – FINAL REPORT

Appendix A 2009 Transportation Master Plan Exhibits  
December 3, 2014

### Appendix A 2009 TRANSPORTATION MASTER PLAN EXHIBITS



CITY of GRANDE PRAIRIE  
TRANSPORTATION MASTER PLAN  
Base Year (2010) Road Network

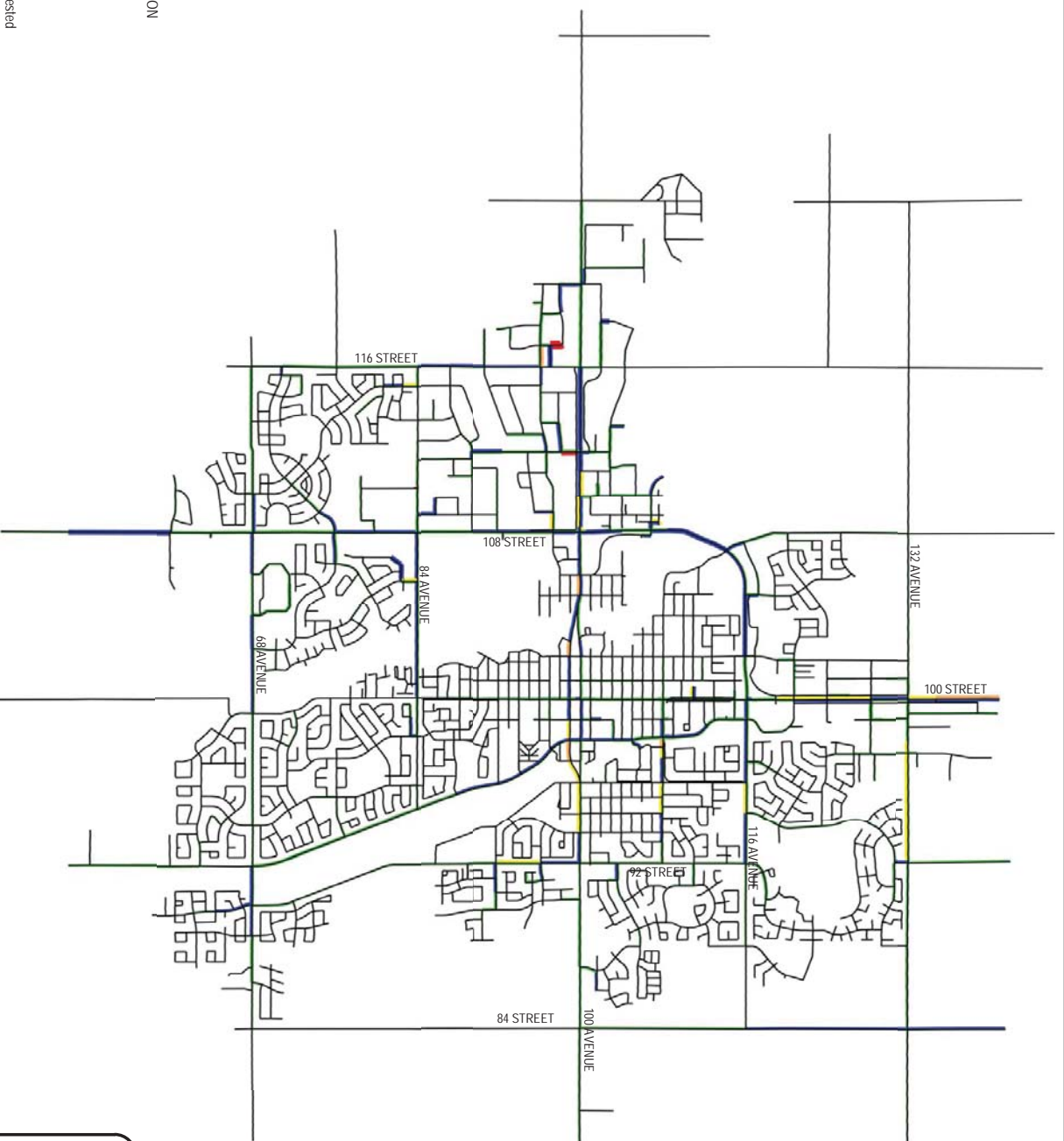


CITY of GRANDE PRAIRIE  
TRANSPORTATION MASTER PLAN  
PM Peak Hour Congestion  
65k Recommended Road Network

**LEGEND:**

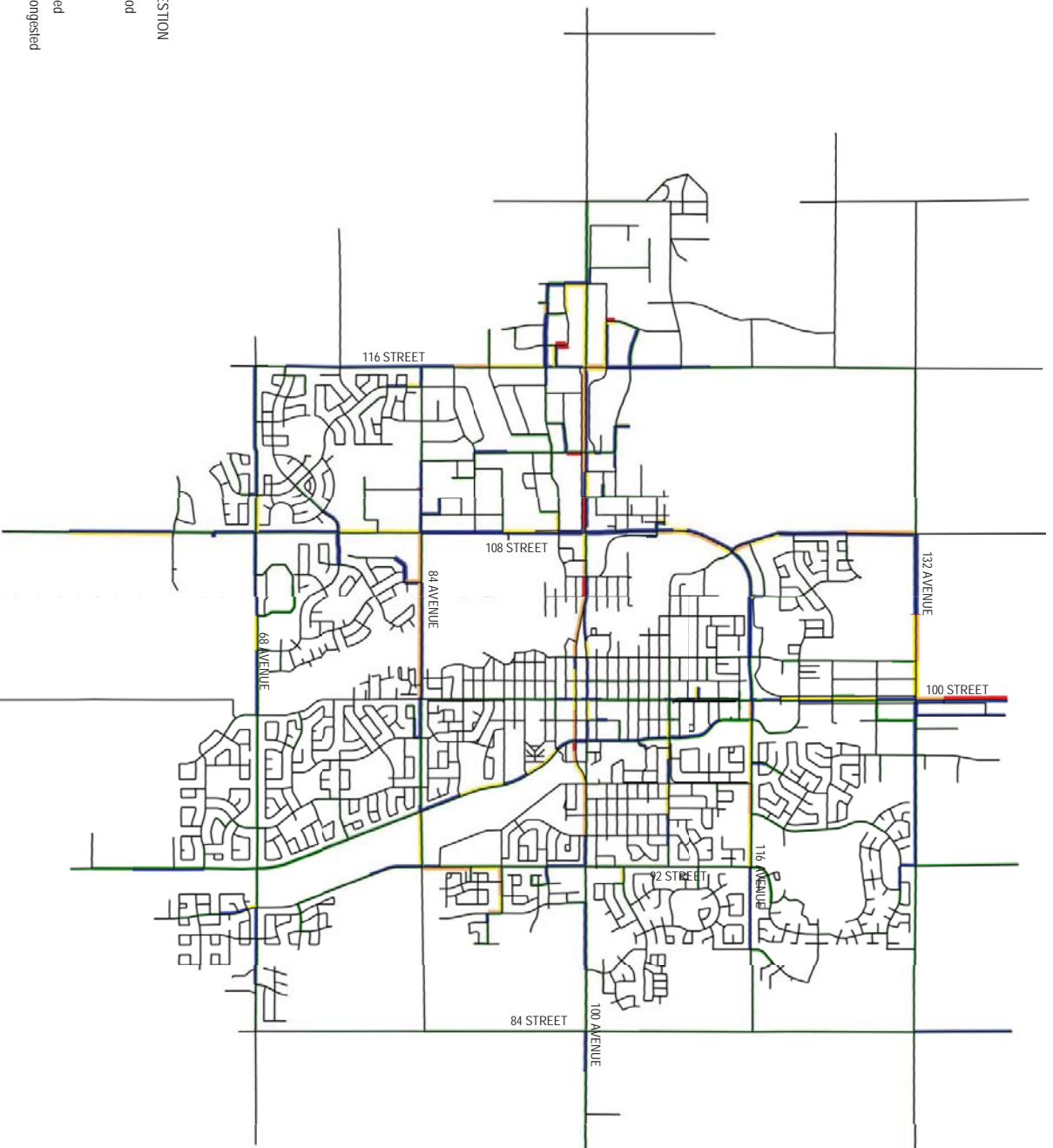
**LEVEL OF CONGESTION**

- Very Good
- Good
- Fair
- Congested
- Highly Congested



CITY of GRANDE PRAIRIE  
TRANSPORTATION MASTER PLAN  
PM Peak Hour Congestion  
78k Recommended Road Network





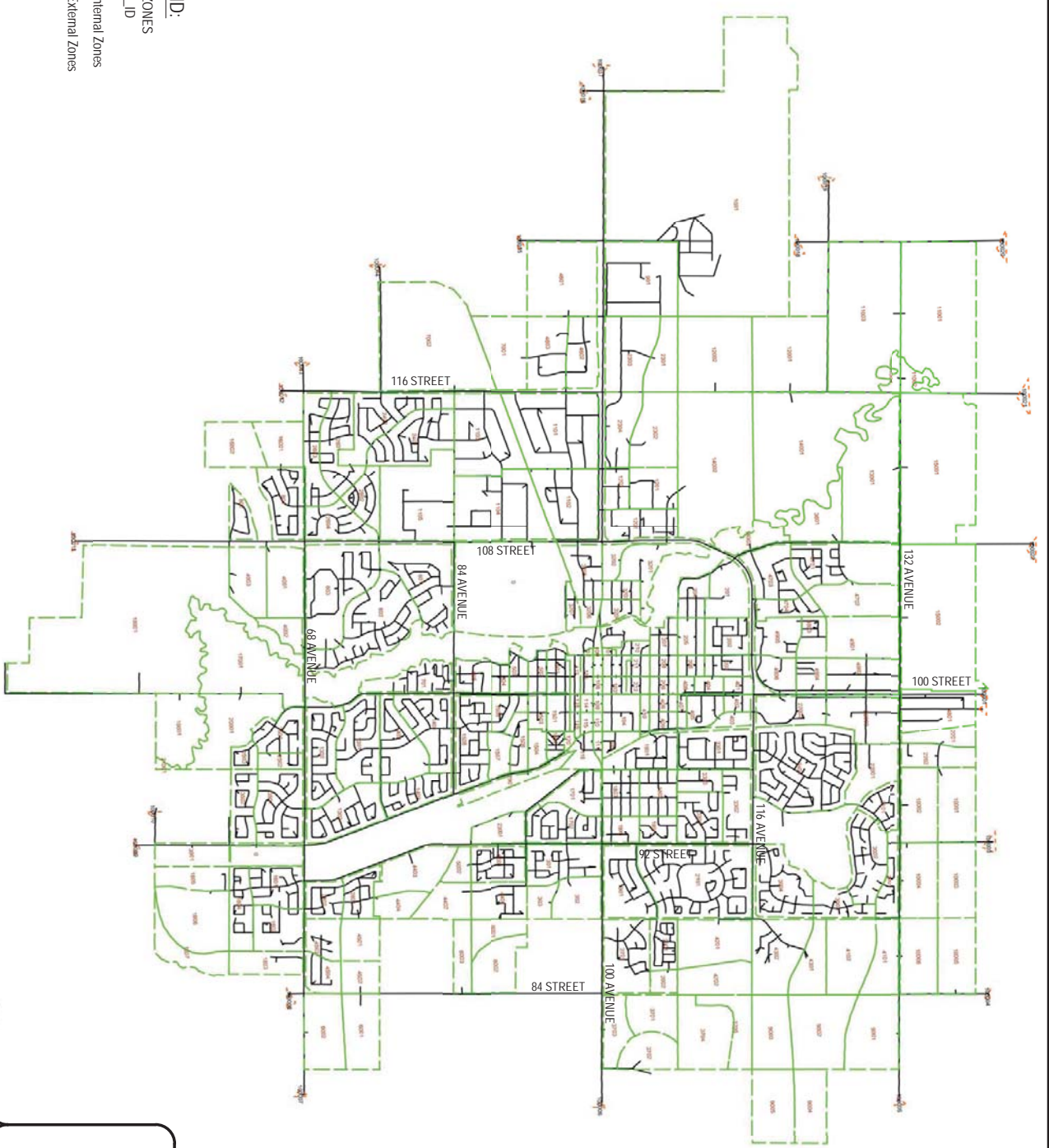
**LEGEND:**  
LEVEL OF CONGESTION

<span style="color: green;">■</span>	Very Good
<span style="color: blue;">■</span>	Good
<span style="color: yellow;">■</span>	Fair
<span style="color: orange;">■</span>	Congested
<span style="color: red;">■</span>	Highly Congested



**CITY of GRANDE PRAIRIE  
TRANSPORTATION MASTER PLAN**

PM Peak Hour Congestion  
90K Recommended Road Network



- LEGEND:**
- IMPORT ZONES
  - IMPT-1AZ\_ID
  - Internal Zones
  - External Zones



CITY OF GRANDE PRAIRIE  
TRANSPORTATION MASTER PLAN

Traffic Analysis Zone System



## Appendix B TURNING MOVEMENT COUNTS & SIGNAL TIMING PLANS

**City of Grande Prairie**  
City Service Centre - Engineering Department  
9505 112 Street  
City of Grande Prairie, Alberta, Canada

Intersection: 113 Ave & 102 St  
Counted By: RR  
Weather: Sunny  
Peak Period: AM, PM

File Name : 113 Ave & 102 St  
Site Code : 0015  
Start Date : 6/27/2013  
Page No : 1

Groups Printed- Regular - Trucks

102 ST From North					113 AVE From East					102 ST From South					113 AVE From West						
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	16	3	0	19	1	1	3	0	5	1	16	3	0	20	5	0	3	0	8	52
07:15 AM	3	16	0	1	20	1	0	1	1	3	1	19	1	0	21	6	1	8	0	15	59
07:30 AM	5	35	1	1	42	2	1	4	1	8	2	56	3	0	61	6	0	7	4	17	128
07:45 AM	6	41	1	1	49	1	4	5	0	10	0	62	7	2	71	12	1	12	7	32	162
Total	14	108	5	3	130	5	6	13	2	26	4	153	14	2	173	29	2	30	11	72	401
08:00 AM	7	59	0	1	67	0	4	5	1	10	0	43	3	0	46	9	1	6	0	16	139
08:15 AM	15	54	1	0	70	0	4	4	1	9	0	39	8	1	48	9	1	8	1	19	146
08:30 AM	10	48	0	1	59	1	5	10	0	16	1	49	11	1	62	7	1	14	1	23	160
08:45 AM	4	58	1	1	64	0	0	2	2	4	7	47	2	0	56	12	4	10	1	27	151
Total	36	219	2	3	260	1	13	21	4	39	8	178	24	2	212	37	7	38	3	85	596

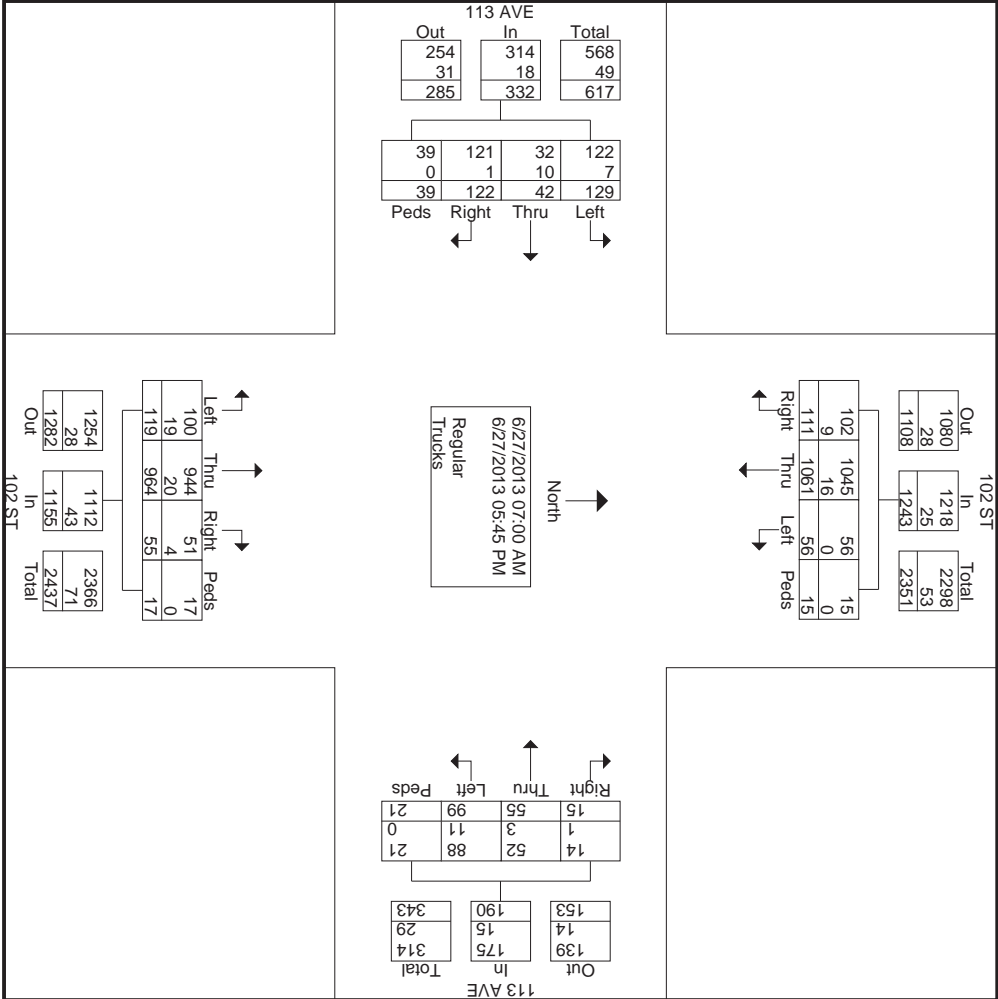
\*\*\* BREAK \*\*\*

03:00 PM	9	65	2	0	76	0	2	2	7	0	9	5	36	10	0	51	4	4	8	1	17	153
03:15 PM	6	54	1	0	61	1	2	1	1	5	2	50	7	7	0	59	7	7	7	2	23	148
03:30 PM	5	47	2	0	54	1	3	7	3	14	3	61	7	2	2	73	2	3	4	1	10	151
03:45 PM	1	47	3	2	53	1	0	8	1	10	5	41	10	2	58	3	2	9	4	18	139	
Total	21	213	8	2	244	3	7	23	5	38	15	188	34	4	241	16	16	28	8	68	591	
04:00 PM	5	48	5	0	58	2	5	8	1	16	1	48	10	5	64	5	1	5	2	13	151	
04:15 PM	5	54	3	0	62	0	1	3	1	5	3	51	4	1	59	6	4	2	1	13	139	
04:30 PM	5	63	5	0	73	0	1	5	0	6	3	78	6	0	87	3	0	5	1	9	175	
04:45 PM	9	76	2	0	87	2	4	8	2	16	1	54	5	0	60	9	3	6	1	19	182	
Total	24	241	15	0	280	4	11	24	4	43	8	231	25	6	270	23	8	18	5	54	647	
05:00 PM	4	76	9	0	89	0	5	7	3	15	5	70	10	1	86	7	3	5	6	21	211	
05:15 PM	6	89	10	3	108	1	4	5	2	12	9	52	6	1	68	4	4	2	0	10	198	
05:30 PM	4	56	2	2	64	1	4	4	0	9	2	47	2	0	51	3	1	3	3	10	134	
05:45 PM	2	59	5	2	68	0	5	2	1	8	4	45	4	1	54	3	1	5	3	12	142	
Total	16	280	26	7	329	2	18	18	6	44	20	214	22	3	259	17	9	15	12	53	685	
Grand Total	111	1061	56	15	1243	15	55	99	21	190	55	964	119	17	1155	122	42	129	39	332	2920	
Apprch %	8.9	85.4	4.5	1.2		7.9	28.9	52.1	11.1		4.8	83.5	10.3	1.5		36.7	12.7	38.9	11.7			
Total %	3.8	36.3	1.9	0.5	42.6	0.5	1.9	3.4	0.7	6.5	1.9	33	4.1	0.6	39.6	4.2	1.4	4.4	1.3	11.4		
Regular	102	1045	56	15	1218	14	52	88	21	175	51	944	100	17	1112	121	32	122	39	314	2819	
% Regular	91.9	98.5	100	100	98	93.3	94.5	88.9	100	92.1	92.7	97.9	84	100	96.3	99.2	76.2	94.6	100	94.6	96.5	
Trucks	9	16	0	0	25	1	3	11	0	15	4	20	19	0	43	1	10	7	0	18	101	
% Trucks	8.1	1.5	0	0	2	6.7	5.5	11.1	0	7.9	7.3	2.1	16	0	3.7	0.8	23.8	5.4	0	5.4	3.5	

*City of Grande Prairie*  
City Service Centre - Engineering Department  
9505 112 Street  
City of Grande Prairie, Alberta, Canada

Intersection: 113 Ave & 102 St  
Counted By: RR  
Weather: Sunny  
Peak Period: AM, PM

File Name : 113 Ave & 102 St  
Site Code : 0015  
Start Date : 6/27/2013  
Page No : 2



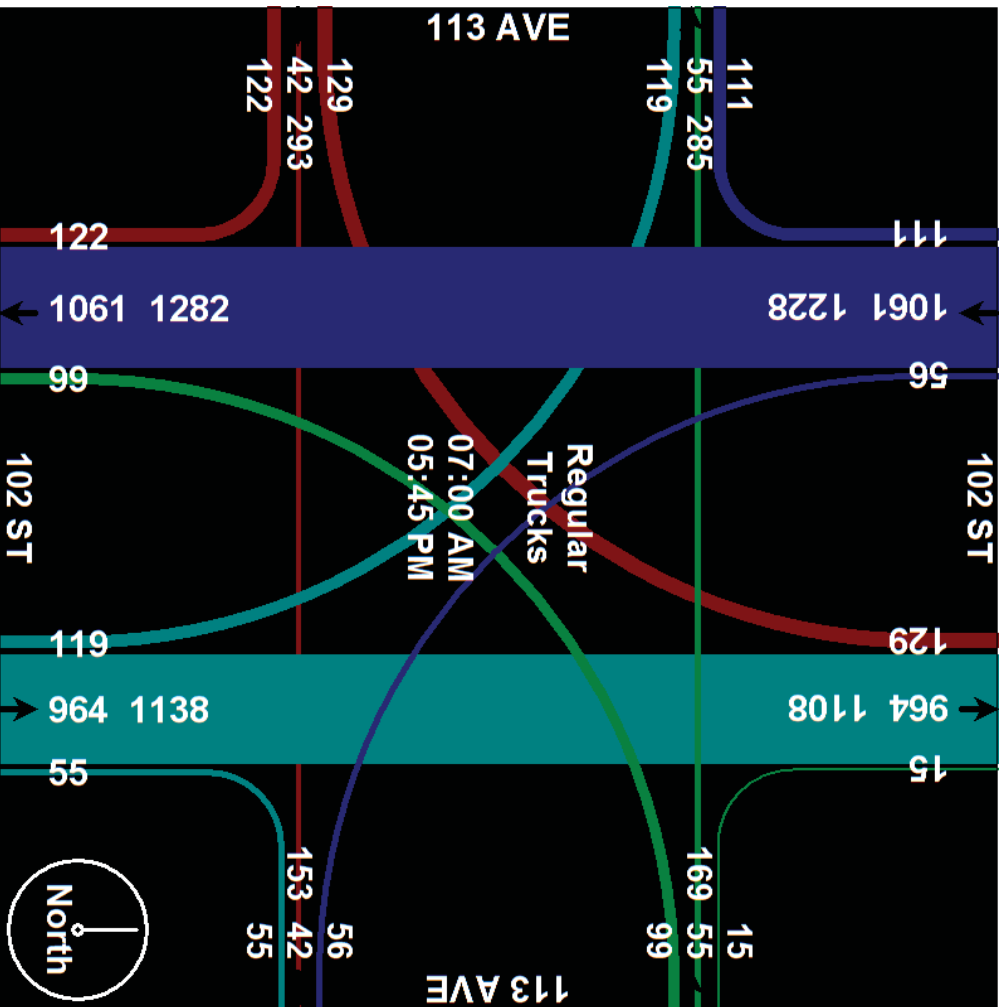
# City of Grande Prairie

City Service Centre - Engineering Department

9505 112 Street

City of Grande Prairie, Alberta, Canada

Intersection: 113 Ave & 102 St  
Counted By: RR  
Weather: Sunny  
Peak Period: AM, PM



File Name : 113 Ave & 102 St  
Site Code : 0015  
Start Date : 6/27/2013  
Page No : 3

# City of Grande Prairie

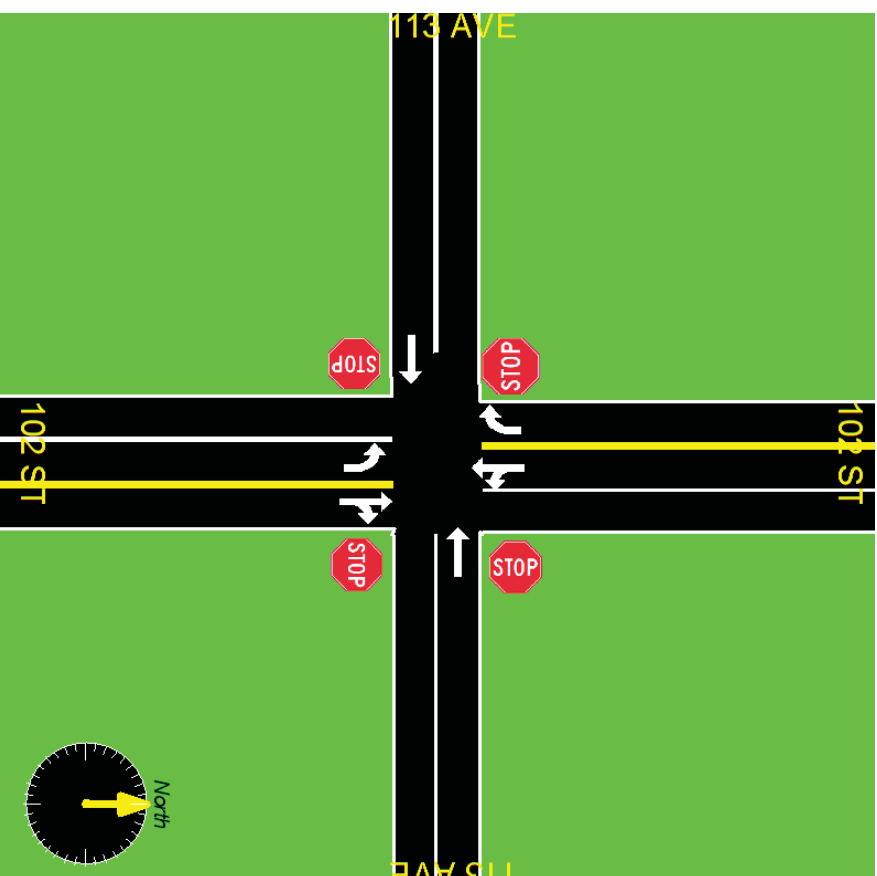
City Service Centre - Engineering Department

9505 112 Street

City of Grande Prairie, Alberta, Canada

Intersection: 113 Ave & 102 St  
Counted By: RR  
Weather: Sunny  
Peak Period: AM, PM

File Name : 113 Ave & 102 St  
Site Code : 0015  
Start Date : 6/27/2013  
Page No : 4



# TURNING MOVEMENT COUNTS

## 116 AVENUE AND 102 STREET

File Name: 102 St & 116 Ave  
 Start Date: Wednesday, June 23, 2010  
 Start Time: 7:00:00 AM  
 Site Code:  
 Comment 1:  
 Comment 2:  
 Comment 3:  
 Comment 4:

Start Time	102 St From North				116 Ave From East				102 St From South				116 Ave From West				Total (V <sub>15</sub> )
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM	3	0	0	0	2	14	0	0	0	0	0	0	0	9	0	0	28
7:15 AM	1	0	0	0	0	10	0	0	0	0	0	0	0	16	0	0	27
7:30 AM	0	2	0	0	0	23	0	0	0	0	0	0	2	19	1	0	47
7:45 AM	0	0	0	0	1	20	1	0	3	0	0	0	0	15	3	0	43
8:00 AM	4	0	1	0	0	15	0	0	1	0	0	0	0	17	0	0	38
8:15 AM	4	1	0	0	0	22	2	0	0	0	0	0	1	15	2	0	47
8:30 AM	2	1	0	0	0	16	0	0	1	2	0	0	0	12	0	0	34
8:45 AM	3	1	0	0	0	18	0	0	0	0	0	0	0	28	1	0	51
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	15	0	0	0	1	0	0	0	21	0	0	37
11:15 AM	1	2	0	0	0	28	1	0	0	0	0	0	0	19	3	0	54
11:30 AM	0	1	0	0	1	24	0	0	0	0	0	0	0	19	0	0	45
11:45 AM	1	1	0	0	0	15	1	0	0	1	0	0	0	16	0	0	35
12:00 PM	5	0	1	0	0	24	0	0	0	0	0	0	0	15	2	0	47
12:15 PM	2	0	0	0	2	17	0	0	0	2	0	0	0	18	0	0	41
12:30 PM	1	0	0	0	1	13	0	0	0	0	2	0	0	16	0	0	33
12:45 PM	0	0	0	0	0	11	1	0	0	0	0	0	0	21	0	0	33
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	4	0	0	0	0	28	0	0	0	1	0	0	0	27	1	0	61
4:15 PM	2	0	0	0	1	23	0	0	0	0	0	0	0	20	1	0	47
4:30 PM	2	0	0	0	0	23	0	0	0	0	0	0	0	10	0	0	35
4:45 PM	2	0	0	0	0	11	0	0	0	0	0	0	1	17	0	0	31
5:00 PM	0	0	0	0	0	21	0	0	0	0	0	0	0	14	1	0	36
5:15 PM	3	1	0	0	1	20	1	0	1	1	0	0	0	16	0	0	44
5:30 PM	1	1	0	0	1	27	1	0	1	0	0	0	0	13	0	0	45
5:45 PM	1	2	0	0	1	12	0	0	0	0	0	0	0	12	1	0	29
Total	42	13	2	0	11	450	8	0	7	8	2	0	4	405	16	0	968

# TURNING MOVEMENT COUNTS

## 116 AVENUE AND 102 STREET

File Name: 102 St & 116 Ave  
 Start Date: Wednesday, June 23, 2010  
 Start Time: 7:00:00 AM  
 Site Code:  
 Comment 1:  
 Comment 2:  
 Comment 3:  
 Comment 4:

Start Time	102 St From North				116 Ave From East				102 St From South				116 Ave From West				Total (V <sub>15</sub> )
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM	29	11	13	1	13	113	2	0	2	17	4	0	2	84	25	0	315
7:15 AM	55	12	11	1	11	138	5	0	6	13	7	0	5	135	49	0	447
7:30 AM	60	27	21	0	22	202	5	0	4	37	13	5	8	146	54	1	599
7:45 AM	49	25	10	4	31	218	11	2	11	35	5	1	5	170	56	0	626
8:00 AM	64	18	26	0	17	138	11	1	5	15	9	0	1	132	39	0	475
8:15 AM	57	27	19	2	15	166	27	0	9	22	11	1	6	138	39	0	536
8:30 AM	47	27	20	2	20	154	30	0	21	22	13	0	6	151	49	0	560
8:45 AM	42	30	19	0	29	148	5	0	15	29	7	0	8	157	52	1	541
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	72	21	12	0	16	172	2	2	16	25	5	2	3	188	49	0	581
11:15 AM	64	30	20	0	16	169	7	4	11	19	13	21	6	168	49	4	572
11:30 AM	60	37	20	12	15	173	6	4	19	30	15	6	11	160	43	0	589
11:45 AM	68	31	24	4	26	180	12	1	11	35	9	0	6	198	56	1	656
12:00 PM	107	46	28	2	29	197	6	1	11	28	12	2	4	195	70	0	733
12:15 PM	70	29	19	0	35	178	8	1	8	28	9	2	5	177	55	0	621
12:30 PM	71	33	19	3	22	198	17	0	9	29	17	1	7	192	64	0	678
12:45 PM	84	41	25	0	27	186	16	0	8	28	10	3	7	200	90	0	722
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	79	21	16	8	17	210	5	7	13	27	6	1	7	236	49	0	686
4:15 PM	74	23	17	1	22	191	1	0	7	21	13	0	7	237	61	0	674
4:30 PM	83	39	28	0	24	198	6	0	17	31	10	2	5	262	53	0	756
4:45 PM	77	31	31	0	15	194	4	0	14	26	8	1	12	248	56	0	716
5:00 PM	79	63	28	3	13	208	8	0	10	29	16	0	6	290	59	4	809
5:15 PM	80	38	37	1	35	233	9	0	12	29	17	0	11	244	65	0	810
5:30 PM	66	34	27	0	21	196	17	0	14	24	6	2	6	215	53	0	679
5:45 PM	53	31	25	3	18	201	9	0	12	26	13	1	5	159	41	0	593
Total	1590	725	515	47	509	4361	229	23	265	625	248	51	149	4482	1276	11	14974

Total Vehicles

=====

SYSTEM # 2 GPN Drop Name: 116 AVE. / 102 ST Drop # 9  
This report printed: 12:02:43 06-25-2013

(1)TOD CURRENT CALENDAR AND CLOCK

MNEM	DATA
YR CURRENT CALENDAR YEAR	13
MON CURRENT CALENDAR MONTH	6
DOM CURRENT DAY OF MONTH	25
HR CURRENT HOUR OF DAY	8
MIN CURRENT MINUTE	50
RTC REAL TIME CLK RTC ON = 1 DST ON = 2	.....21
SEC CURRENT SECOND	31
DOW DAY OF WEEK 1=SUNDAY	3
RSV RESERVED - DO NOT EDIT	0
CON 39=TMP390 DO NOT EDIT	39
REV REVISION 1=A 2=B ETC DO NOT EDIT	22
VER VERSION DISPLAY ONLY - DO NOT EDIT	4
IDH CONTROLLER I.E. HIGH BYTE	0
IDL CONTROLLER I.D. LOW BYTE	20

(2)390 MODE, PAGE 0, PHASE 0 - OPTION SELECTION

MNEM	DATA
USE PHASES IN USE	876.432.
PED PEDESTRIAN - ENABLE CONCURRENT PED MOVE	8.6.4.2.
FWK FLASHING WALK	.....
ARW ACTUATED REST IN WALK	.....
WCP WALK CLEARANCE PROTECT	..6...2.
DEN DENSITY - ENABLES DENSITY OPERATION	.....
LCP LAST CAR PASSAGE	.....
VN1 VEHICLE TO NON-ACTUATED NO. 1	.....
PN1 PEDESTRIAN TO NON-ACTUATED NO. 1	.....
VN2 VEHICLE TO NON-ACTUATED NO. 2	.....
PN2 PEDESTRIAN TO NON-ACTUATED NO. 2	.....
FGN CANADA FAST FLASH GREEN	.7.5.3.1
LAB SELECT LEFT TURN AMBER BLANK	.....
ABU SELECT ANTI-BACKUP PHASES	.7...3..

(3)390 MODE, PAGE 0, PHASES 1 TO 8 - PHASE TIMING

MNEM	PH 1	PH 2	PH 3	PH 4	PH 5	PH 6	PH 7	PH 8	Ped Timin
MIN MINIMUM GREEN INTERVAL	7	12	7	30	7	12	7	30	
WLK WALK INTERVAL	0	6	0	10	0	6	0	10	
WCL PEDESTRIAN CLEARANCE	0	17	0	20	0	17	0	18	
PSG PASSAGE TIME (PRESET GAP)	3.0	3.0	3.0	4.0	3.0	3.0	3.0	4.0	
MX1 MAXIMUM GREEN NO. 1	20	30	20	50	20	30	20	50	
MX2 MAXIMUM GREEN NO. 2	30	40	30	50	30	40	30	50	
YEL YELLOW CLEARANCE	3.0	3.5	3.0	4.5	3.0	3.5	3.0	4.5	
RED ALL RED CLEARANCE	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0	
RRT RED REVERT MIN TIME	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
ABA ACTUATIONS BEFORE ADDED INITIAL	0	0	0	0	0	0	0	0	
S/A SECS PER ACTUATION ADDED INITIAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
MXI MAXIMUM ADDED INITIAL TIME	0	0	0	0	0	0	0	0	
TBR TIME BEFORE REDUCTION	0	0	0	0	0	0	0	0	
TTR TIME TO REDUCE TO MINIMUM GAP	1	1	1	1	1	1	1	1	
MNG MINIMUM GAP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CMN CONDITIONAL MINIMUM	0	0	0	0	0	0	0	0	

=====



{4}390 MODE, PAGE 0, PHASE 9 - ADDITIONAL PARAMETERS

MNEM	DATA
PUF POWER UP FLASH	10
SAR START-UP ALL RED TIME	5
SUR START UP RED	.....
SUY START UP YELLOW	.....
SUG START UP GREEN	8...4...
MSF MAIN STREETS FOR MUTCD FLASH	8...4...
FMN MINIMUM MUTCD FLASH TIME	15
SGO SIMULTANEOUS GAP OUT	87654321
MNR MINIMUM RECALLS	8...4...
MNS FLAGS FOR SOFT MNR	.....
MXR MAXIMUM RECALLS	.....
PDR PEDESTRIAN RECALLS	.....
LKD LOCKING VEHICLE DETECTORS	..65..21
LCD LCD DISPLAY TEST	0
BLT DISPLAY BACKLIGHT ENABLE	1
1DE PHASE 1 DUAL ENTRY PHASE	0
2DE PHASE 2 DUAL ENTRY PHASE	6
3DE PHASE 3 DUAL ENTRY PHASE	0
4DE PHASE 4 DUAL ENTRY PHASE	8
5DE PHASE 5 DUAL ENTRY PHASE	0
6DE PHASE 6 DUAL ENTRY PHASE	2
7DE PHASE 7 DUAL ENTRY PHASE	0
8DE PHASE 8 DUAL ENTRY PHASE	4

=====

{5}390 MODE, PAGE 0, PHASES A TO D - OVERLAPS (IF FOE=0 THEN NEMA)

MNEM	OVERLAP A	OVERLAP B	OVERLAP C	OVERLAP D
STD STANDARD OVERLAPS	.....	.....	.....	.....
PRO PROTECTED OVERLAPS	.....	.....	.....	.....
PER PERMISSIVE OVERLAPS	.....	.....	.....	.....
AXG AUXILIARY GREEN	0	0	0	0
AXY AUXILIARY YELLOW	3.0	3.0	3.0	3.0
AXR AUXILIARY RED	0.0	0.0	0.0	0.0
FPP FOLLOW PARENT PHASES	.....	.....	.....	.....

=====

{6}390 MODE, PAGE 0, PHASE E - MISC. FUNCTION ENABLE

MNEM	
FOE FRTPNLOL 2=RT T 3=FST FLS 1=STD OL	1
SFE ENABLE PED CLEARS AS SPEC FUNCT OUTPUT	0
STE STE - ENB INTERVAL RESET AFTER STOP TIME	0
SQE SEQ ENABLE - 1=ENAB EXT ROTATION INPUTS	0
CSE CONDITIONAL SERVICE ENABLE	.....
NOE NEGATIVE OVERLAP ENABLE	0
DME DIMMING ENABLE	0
PFE PREEMPT FLASH ENABLE	.....
POM PREEMPT OUTPUT MODE	0
TOD TIME OF DAY ENABLE 1=ON 0=OFF	1
CRD COORDINATION ENABLE 1=ON 0=OFF	1
DIA DIAG ENAB 4=EEPROM 3=CPU 2=RAM 1=PROM	....4321
SCY SECURITY CODE ACCESS - DO NOT EDIT	0
CFG CONTROLLER CONFIGURATION	0
FLE DISABLE VOLTAGE MONITOR IN MUTCD FLASH	1
TBS START TBR AFTER INITIAL INTERVALS	0

=====

(7)390 MODE, PAGE 0, PHASE F - MORE DATA

MNEM	DATA
SQK FRONT PANEL SEQ SEL - PAGE 5-7 IN MANUAL	0
SQC PHASE SEQ SELECTED BY EXTERNAL INPUT	0
SQI EFFECTIVE PHASE SEQUENCE - DO NOT EDIT	0
DRD DIM REDS	.....
DYL DIM YELLOWS	.....
DGN DIM GREENS	.....
DWK DIM WALKS	.....
DDW DIM DON'T WALK	.....
DOR DIM OVERLAP REDS	.....
DOY DIM OVERLAP YELLOWS	.....
DOG DIM OVERLAP GREENS	.....
CLK TEST FUNCTION - DO NOT EDIT	10
NVR NON-VOLATILE RAM SELECT FOR DET REPORT	.....
ACT ACTIVE TOD PLAN 0=TOD OFF OR NO PLAN	1
AUD ENABLE AUDIBLE KEY	1

=====

(8)390 MODE, PAGE 1, PHASE 0 - RR PREEMPT TIMING

MNEM	DATA
PMG MINIMUM PHASE GREEN BEFORE PREEMPT	4
TPC PEDESTRIAN CLEARANCE	3
TY1 YELLOW 1	3.0
TR1 ALL RED 1	1.0
TM1 MINIMUM GREEN 1	3
TG1 GAP 1	0.0
TY2 YELLOW 2	3.0
TR2 ALL RED 2	1.0
TM2 MINIMUM GREEN 2	0
TG2 GAP 2	0.0
TY3 YELLOW 3	3.0
TR3 ALL RED 3	0.0
TPM PHASE MINIMUM	3
TPG PHASE GAP	3.0
TY4 YELLOW 4	3.0
TR4 ALL RED 4	1.0

=====

(9)390 MODE, PAGE 1, PHASE 1 - RR PREEMPT SEQUENCE SELECT

MNEM	DATA
CGR 1ST TRACK CLEAR GREENS	.....
COG 1ST TRACK CLEAR OVERLAPS (ABCD) 1=A, ETC	.....
TC2 2ND TRACK CLEAR GREENS	.....
T2O 2ND TRACK CLEAR OVERLAPS (ABCD) 1=A, ETC.	.....
TGR TRACK PREEMPT GREENS	.....
TOG TRACK PREEMPT OVERLAPS (ABCD) 1=A, ETC.	.....
TRG RETURN PHASE GREENS	..6...2.
TRO RETURN OVERLAP GREEN (ABCD) 1=A, ETC.	.....
PRR PREEMPT RED REVERT TIME	2.0
PPE PED CALLS AFTER PREEMPT	.....
PVE VEHICLE CALLS AFTER PREEMPT	.....
TVO VEHICLE OMITTED IN MINI CYCLE(ABCD)1=A,ETC	.....
TPO PED OMITTS FOR MINI CYCLE PHASES	.....
TOO OVERLAP OMITTED IN MINI CYCLE(ABCD)1=A,ETC	.....

=====

(10)390 MODE, PAGE 1, PHASES 2 TO 5 - EMERGENCY VEHICLE PREEMPT

MNEM	EMER.VEH. 1	EMER.VEH. 2	EMER.VEH. 3	EMER.VEH. 4
EDE DELAY	0	0	0	0
PMG MINIMUM PHASE GREEN BEFORE PREEMPT	4	4	0	4
EPC PED CLEAR	0	6	0	6
EY1 YELLOW 1	4.0	4.0	4.0	4.0
ER1 ALL RED 1	2.0	2.0	2.0	2.0
EMN MINIMUM PREEMPT DWELL GREEN	3	3	20	3
EPG GAP TIME	3.0	3.0	3.0	3.0
EY2 YELLOW 2	3.0	3.0	3.0	3.0
ER2 ALL RED 2	1.0	1.0	1.0	1.0
PRG PREEMPT GREENS	.....	.....	.....2.	.....
OLG PREEMPT DWELL OVERLAP GREEN(ABCD) A=1, ETC	.....	.....	.....	.....
ERG RETURN GREENS	.....	.....	8...4...	.....
PRM PREEMPT RETURN MODE TO COORDINATION	.....	.....	.....	.....
LOK PREEMPT CALL LOCKING	.....3.1	.....3.1	.....1	.....3.1
EMX PREEMPT MAXIMUM GREEN IN LOW PRIORITY	255	255	255	255

(11)CRD, PAGE 0, PHASE 0 - MANUAL SELECTIONS

MNEM	DATA
F/C FREE/COORDINATED - 1=COORDINATED	0
S/F SEMI/FULLY ACTUATED - 1=FULLY ACTUATED	0
DRQ DOWNLOAD REQUEST ENABLE	0
SYC SYNC TOLERANCE IN SECONDS	2
M/L MASTER/LOC CYCLE DISPLAY-1=LOCAL CYCLE	1
CP CYCLE PLAN NUMBER	0
OFF OFFSET SELECT	0
L/R LOCAL/REMOTE SWITCH - 0=LOCAL 1=REMOTE	1
TDP TIME OF DAY PLAN MANUAL SELECTION	0
SMP DETECTOR SAMPLING PERIOD IN MINUTES	15
DVV DIVIDER FOR DETECTOR REPORT VOLUMES	1
CME ENABLE MAX DURING CRD PHASES	.....2.
DPO DISABLE PED OMIT IN CRD PHASES	.....
SCP ENABLE SECONDARY COORDINATION PHASES	.....

(12)CYCLE PLANS 1 TO 6

MNEM	CP1	CP2	CP3	CP4	CP5	CP6
CYC CYCLE LENGTH	120	110	125	110	125	110
OF1 OFFSET 1	5	35	110	36	108	34
OF2 OFFSET 2	0	0	0	0	0	0
OF3 OFFSET 3	0	0	0	0	0	0
OF4 OFFSET 4	0	0	0	0	0	0
OF5 OFFSET 5	0	0	0	0	0	0
SON SPECIAL FUNCTION 3 ON	0	0	0	0	0	0
SOF SPECIAL FUNCTION 3 OFF	0	0	0	0	0	0
SHK MAXIMUM SHRINKAGE PER CYCLE	25	35	35	35	40	40
EXP MAXIMUM EXPANSION PER CYCLE	25	35	35	35	40	40
YLD YIELD PERIOD	5	10	10	10	10	10
SEQ PHASE SEQUENCE - PAGE 2-16 OF MANUAL	0	0	0	0	0	0
MSG MAIN STREET GREEN COORD PHASES(1/RING)	8...4...	8...4...	8...4...	8...4...	8...4...	8...4...
SD1 SPLIT DIVISION 1	0	0	0	0	0	0
SD2 SPLIT DIVISION 2	33	30	30	30	30	30
SD3 SPLIT DIVISION 3	15	20	20	20	20	20
SD4 SPLIT DIVISION 4	72	60	75	60	75	60
SD5 SPLIT DIVISION 5	0	0	0	0	0	0
SD6 SPLIT DIVISION 6	33	30	30	30	30	30
SD7 SPLIT DIVISION 7	15	15	15	15	15	15
SD8 SPLIT DIVISION 8	72	65	80	65	80	65

## (13)CYCLE PLANS 7 - 12

MNEM	CP7	CP8	CP9	CP10	CP11	CP12
CYC CYCLE LENGTH	0	0	0	0	0	0
OF1 OFFSET 1	42	0	0	0	0	0
OF2 OFFSET 2	0	0	0	0	0	0
OF3 OFFSET 3	0	0	0	0	0	0
OF4 OFFSET 4	0	0	0	0	0	0
OF5 OFFSET 5	0	0	0	0	0	0
SON SPECIAL FUNCTION 3 ON	0	0	0	0	0	0
SOF SPECIAL FUNCTION 3 OFF	0	0	0	0	0	0
SHK MAXIMUM SHRINKAGE PER CYCLE	25	40	0	0	0	0
EXP MAXIMUM EXPANSION PER CYCLE	25	40	0	0	0	0
YLD YIELD PERIOD	10	10	0	0	0	0
SEQ PHASE SEQUENCE - PAGE 2-16 OF MANUAL	0	0	0	0	0	0
MSG MAIN STREET GREEN COORD PHASES(1/RING)	8...4...	8...4...	.....	.....	.....	.....
SD1 SPLIT DIVISION 1	0	0	0	0	0	0
SD2 SPLIT DIVISION 2	0	0	0	0	0	0
SD3 SPLIT DIVISION 3	0	0	0	0	0	0
SD4 SPLIT DIVISION 4	0	0	0	0	0	0
SD5 SPLIT DIVISION 5	0	0	0	0	0	0
SD6 SPLIT DIVISION 6	0	0	0	0	0	0
SD7 SPLIT DIVISION 7	0	0	0	0	0	0
SD8 SPLIT DIVISION 8	0	0	0	0	0	0

## (14)CYCLE PLANS 13 - 18

MNEM	CP13	CP14	CP15	CP16	CP17	CP18
CYC CYCLE LENGTH	0	0	0	0	0	0
OF1 OFFSET 1	0	0	0	0	0	0
OF2 OFFSET 2	0	0	0	0	0	0
OF3 OFFSET 3	0	0	0	0	0	0
OF4 OFFSET 4	0	0	0	0	0	0
OF5 OFFSET 5	0	0	0	0	0	0
SON SPECIAL FUNCTION 3 ON	0	0	0	0	0	0
SOF SPECIAL FUNCTION 3 OFF	0	0	0	0	0	0
SHK MAXIMUM SHRINKAGE PER CYCLE	0	0	0	0	0	0
EXP MAXIMUM EXPANSION PER CYCLE	0	0	0	0	0	0
YLD YIELD PERIOD	0	0	0	0	0	0
SEQ PHASE SEQUENCE - PAGE 2-16 OF MANUAL	0	0	0	0	0	0
MSG MAIN STREET GREEN COORD PHASES(1/RING)	.....	.....	.....	.....	.....	.....
SD1 SPLIT DIVISION 1	0	0	0	0	0	0
SD2 SPLIT DIVISION 2	0	0	0	0	0	0
SD3 SPLIT DIVISION 3	0	0	0	0	0	0
SD4 SPLIT DIVISION 4	0	0	0	0	0	0
SD5 SPLIT DIVISION 5	0	0	0	0	0	0
SD6 SPLIT DIVISION 6	0	0	0	0	0	0
SD7 SPLIT DIVISION 7	0	0	0	0	0	0
SD8 SPLIT DIVISION 8	0	0	0	0	0	0



(15)CRD, PAGE 8, PHASE 0 - SYSTEM PARAMETERS

MNEM

SYE	SYSTEM ENABLE 0=OFF 1=TNET 2=2000 SYSTEM	0
SDT	ENABLE AUXILIARY DETS AS SYSTEM DETECTORS	.....
ADD	DROP ADDRESS FOR SYSTEM	8
IPL	INTERSECTION PLAN NUMBER - DISPLAY ONLY	0
IPM	INTERSECTION PLAN MODE 1=ON 2=WWV RECEIVE	1
DFT	DETECTOR FAILURE TIME	255
FDT	FAILED DETECTORS DISPLAY ONLY NO EDIT	.....
DFM	ENABLE LOCAL DET FAIL MONITORING	.....
SMV	FIVE MINUTE VOLUME DIV 10 DISPLAY ONLY	2
SHR	HOUR OF SYNCHRONIZATION	0
SMN	MINUTE OF SYNCHRONIZATION	0
EHR	HOUR TO SET CLOCK TO ON EXTERNAL INPUT	0
EMN	MINUTE TO SET CLOCK TO ON EXTERNAL INPUT	0
ONL	TIME (MINUTES) BEFORE TOD BACKUP	5
DSA	DYNAMIC SPLIT ADJUSTMENT GLOBAL ENABLE	1
DS%	MAX %CHANGE OF AVAILABLE TIME PER CYCLE	25
DBC	DATA BASE CHANGE FLAG DO NOT EDIT	1
DRP	DROP REQUEST FOR SERIES 2000	0

=====

## (16)TOD, PAGE 1, PHASE 0 - PLANS 1 THROUGH 6

MNEMS	PLAN 1	PLAN 2	PLAN 3	PLAN 4	PLAN 5	PLAN 6
ENB ENABLE PLAN = 1    DISABLE PLAN = 0	1	1	1	1	1	1
YR YEAR THIS PLAN CAN FIRST BE EFFECTIVE	8	8	8	8	8	8
MON MONTH THIS PLAN FIRST BE EFFECTIVE	8	8	8	8	8	8
DOM DAY OF MONTH PLAN FIRST EFFECTIVE	22	22	22	22	22	22
HR HOUR OF DAY PLAN FIRST EFFECTIVE	6	9	10	13	15	18
MIN MINUTE THIS PLAN FIRST EFFECTIVE	0	0	30	15	30	0
TYP TYPE OF PLAN - MANUAL PAGE 4-2	10	10	10	10	10	10
F/C FREE/COORDINATED - 1=COORDINATED	1	1	1	1	1	1
MDT 1=CNA1 2=CNA2 3=WRM 4,5,6,7,8 SEE MANUAL	.....	.....	.....	.....	.....	.....
DSA DYNAMIC SPLIT ADJUSTMENT ENABLE	0	0	0	0	0	0
CP CYCLE PLAN NUMBER	1	2	3	4	5	6
OFF TOD OFFSET SELECT	1	1	1	1	1	1
S/F SEMI/FULLY ACTUATED - 1=FULLY ACTUATED	0	0	0	0	0	0
FLA PROGRAMMED FLASH - 1=ENABLED	0	0	0	0	0	0
SPF SPECIAL FUNCTION	.....	.....	.....	.....	.....	.....
DIM DIMMING ENABLE	0	0	0	0	0	0
MNR MINIMUM RECALL PHASES	.....	.....	.....	.....3..	.....	.....
MXR MAXIMUM RECALL PHASES	8...4...	8...4...	8...4...	8...4...	8...4...	8...4...
PDR PEDESTRIAN RECALL	.....	.....	.....	.....	.....	.....
MX2 SELECT MAX 2 OPTION	.....	.....	.....	.....	.....	.....
DEN DENSITY - USE VOL DENSITY CALC	.....	.....	.....	.....	.....	.....
SEQ PHASE SEQUENCE. MANUAL TABLE 2-16.	0	0	0	0	0	0
CSV CONDITIONAL SERVICE	.....	.....	.....	.....	.....	.....
RRD REST IN RED	.....	.....	.....	.....	.....	.....
OMT PHASE OMIT	.....	.....	.....	.....	.....	.....
OMP PEDESTRIAN OMIT	.....	.....	.....	.....	.....	.....
OMR OMIT RED CLEAR	.....	.....	.....	.....	.....	.....

## (17)TOD, PAGE 1, PHASE 0 - PLANS 7 THROUGH 12

MNEMS	PLAN 7	PLAN 8	PLAN 9	PLAN 10	PLAN 11	PLAN 12
ENB ENABLE PLAN = 1    DISABLE PLAN = 0	1	0	0	0	0	0
YR YEAR THIS PLAN CAN FIRST BE EFFECTIVE	8	5	5	5	5	5
MON MONTH THIS PLAN FIRST BE EFFECTIVE	8	7	7	7	7	7
DOM DAY OF MONTH PLAN FIRST EFFECTIVE	22	8	8	8	8	8
HR HOUR OF DAY PLAN FIRST EFFECTIVE	22	9	11	14	16	18
MIN MINUTE THIS PLAN FIRST EFFECTIVE	0	0	30	0	0	0
TYP TYPE OF PLAN - MANUAL PAGE 4-2	10	9	9	9	9	9
F/C FREE/COORDINATED - 1=COORDINATED	1	1	1	1	1	1
MDT 1=CNA1 2=CNA2 3=WRM 4,5,6,7,8 SEE MANUAL	.....	.....	.....	.....	.....	.....
DSA DYNAMIC SPLIT ADJUSTMENT ENABLE	0	0	0	0	0	0
CP CYCLE PLAN NUMBER	6	2	3	2	2	5
OFF TOD OFFSET SELECT	1	1	1	1	1	1
S/F SEMI/FULLY ACTUATED - 1=FULLY ACTUATED	0	1	1	1	1	1
FLA PROGRAMMED FLASH - 1=ENABLED	0	0	0	0	0	0
SPF SPECIAL FUNCTION	.....	.....	.....	.....	.....	.....
DIM DIMMING ENABLE	0	0	0	0	0	0
MNR MINIMUM RECALL PHASES	8...4...	.....	.....	.....	.....	.....
MXR MAXIMUM RECALL PHASES	.....	.....	.....	.....	.....	.....
PDR PEDESTRIAN RECALL	.....	.....	.....	.....	.....	.....
MX2 SELECT MAX 2 OPTION	.....	.....	.....	.....	.....	.....
DEN DENSITY - USE VOL DENSITY CALC	.....	.....	.....	.....	.....	.....
SEQ PHASE SEQUENCE. MANUAL TABLE 2-16.	0	0	0	0	0	0
CSV CONDITIONAL SERVICE	.....	.....	.....	.....	.....	.....
RRD REST IN RED	.....	.....	.....	.....	.....	.....
OMT PHASE OMIT	.7...3..	.....	.....	.....	.....	.....
OMP PEDESTRIAN OMIT	.....	.....	.....	.....	.....	.....
OMR OMIT RED CLEAR	.....	.....	.....	.....	.....	.....

***City of Grande Prairie***  
City Service Centre - Engineering Department  
9505 112 Street  
City of Grande Prairie, Alberta, Canada

Intersection: 117 Ave & 102 St  
Counted By: EP  
Weather: Sunny  
Peak Period: AM, PM

File Name : 117 Ave & 102 St  
Site Code : 0016  
Start Date : 6/27/2013  
Page No : 1

Groups Printed- Regular - Trucks

	102 ST From North					117 AVE From East					102 ST From South					117 AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	6	32	1	0	39	1	2	13	0	16	14	32	2	0	48	5	5	5	0	15	118
07:15 AM	3	34	1	0	38	7	4	11	0	22	6	59	5	2	72	8	4	9	3	24	156
07:30 AM	13	67	3	0	83	11	5	17	1	34	23	81	10	1	115	23	6	9	2	40	272
07:45 AM	16	68	1	0	85	7	2	9	1	19	21	143	11	0	175	16	8	13	1	38	317
Total	38	201	6	0	245	26	13	50	2	91	64	315	28	3	410	52	23	36	6	117	863
08:00 AM	11	80	3	0	94	6	6	9	0	21	17	87	12	0	116	13	12	11	0	36	267
08:15 AM	12	75	2	2	91	6	4	19	0	29	20	81	19	0	120	13	2	13	0	28	268
08:30 AM	8	62	3	0	73	1	1	16	0	18	19	73	14	0	106	22	3	15	1	41	238
08:45 AM	7	77	2	0	86	5	7	11	0	23	16	107	13	0	136	41	5	8	1	55	300
Total	38	294	10	2	344	18	18	55	0	91	72	348	58	0	478	89	22	47	2	160	1073

\*\*\* BREAK \*\*\*

03:00 PM	14	89	3	0	106	9	5	11	0	25	24	58	9	0	91	35	5	11	1	52	274
03:15 PM	16	90	0	0	106	5	2	10	0	17	20	80	18	1	119	16	7	9	1	33	275
03:30 PM	10	86	1	0	97	6	3	10	1	20	17	72	14	0	103	36	4	9	0	49	269
03:45 PM	17	81	0	1	99	5	2	10	0	17	20	84	24	0	128	26	5	13	2	46	290
Total	57	346	4	1	408	25	12	41	1	79	81	294	65	1	441	113	21	42	4	180	1108
04:00 PM	17	90	0	0	107	10	2	13	0	25	20	62	31	0	113	23	9	10	2	44	289
04:15 PM	12	87	0	1	100	3	4	17	1	25	15	78	19	0	112	26	8	16	0	50	287
04:30 PM	11	96	2	1	110	8	1	5	0	14	20	95	22	0	137	21	2	6	4	33	294
04:45 PM	18	116	3	0	137	11	4	9	1	25	21	90	21	0	132	25	7	7	2	41	335
Total	58	389	5	2	454	32	11	44	2	89	76	325	93	0	494	95	26	39	8	168	1205
05:00 PM	21	127	1	0	149	6	4	7	0	17	16	90	27	0	133	21	6	8	6	41	340
05:15 PM	30	132	2	0	164	8	9	5	0	22	19	104	26	0	149	28	17	4	1	50	385
05:30 PM	22	97	4	0	123	10	12	11	2	35	21	68	13	0	102	22	16	14	0	52	312
05:45 PM	15	81	2	0	98	13	7	9	0	29	35	57	20	3	115	25	8	15	2	50	292
Total	88	437	9	0	534	37	32	32	2	103	91	319	86	3	499	96	47	41	9	193	1329
Grand Total	279	1667	34	5	1985	138	86	222	7	453	384	1601	330	7	2322	445	139	205	29	818	5578
Approch %	14.1	84	1.7	0.3	35.6	30.5	19	49	1.5	8.1	16.5	68.9	14.2	0.3	41.6	54.4	17	25.1	3.5	14.7	
Total %	5	29.9	0.6	0.1	1904	2.5	1.5	4	0.1	44.3	6.9	28.7	5.9	0.1	97	8	2.5	3.7	0.5	786	5386
Regular	260	1605	34	5	1904	135	86	215	7	443	374	1555	317	7	2253	431	133	193	29	786	
% Regular	93.2	96.3	100	100	95.9	97.8	100	96.8	100	97.8	97.4	97.1	96.1	100	96.9	96.9	95.7	94.1	100	96.1	96.6
Trucks	19	62	0	0	81	3	0	7	0	10	10	46	13	0	69	14	6	12	0	32	192
% Trucks	6.8	3.7	0	0	4.1	2.2	0	3.2	0	2.2	2.6	2.9	3.9	0	3	3.1	4.3	5.9	0	3.9	3.4

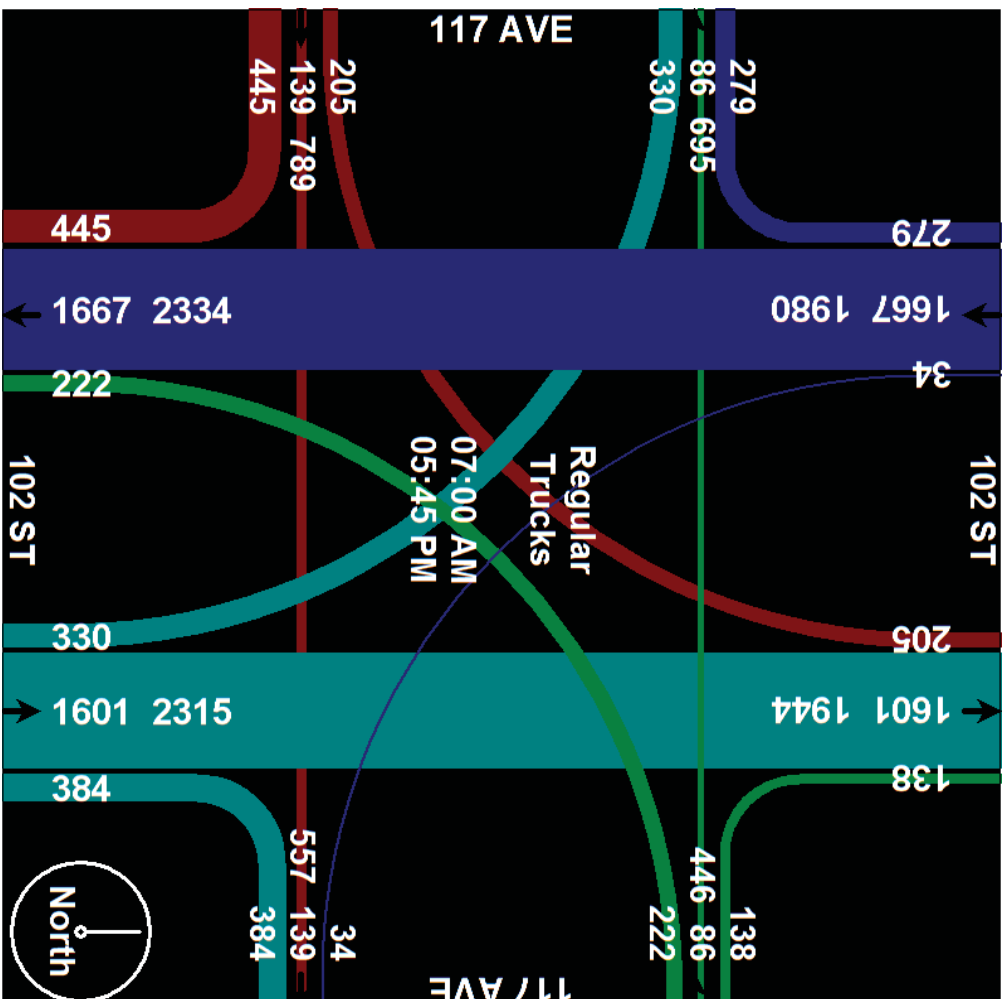




# City of Grande Prairie

City Service Centre - Engineering Department  
9505 112 Street  
City of Grande Prairie, Alberta, Canada

Intersection: 117 Ave & 102 St  
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Weather: Sunny  
Peak Period: AM, PM



File Name : 117 Ave & 102 St  
Site Code : 0016  
Start Date : 6/27/2013  
Page No : 3

# City of Grande Prairie

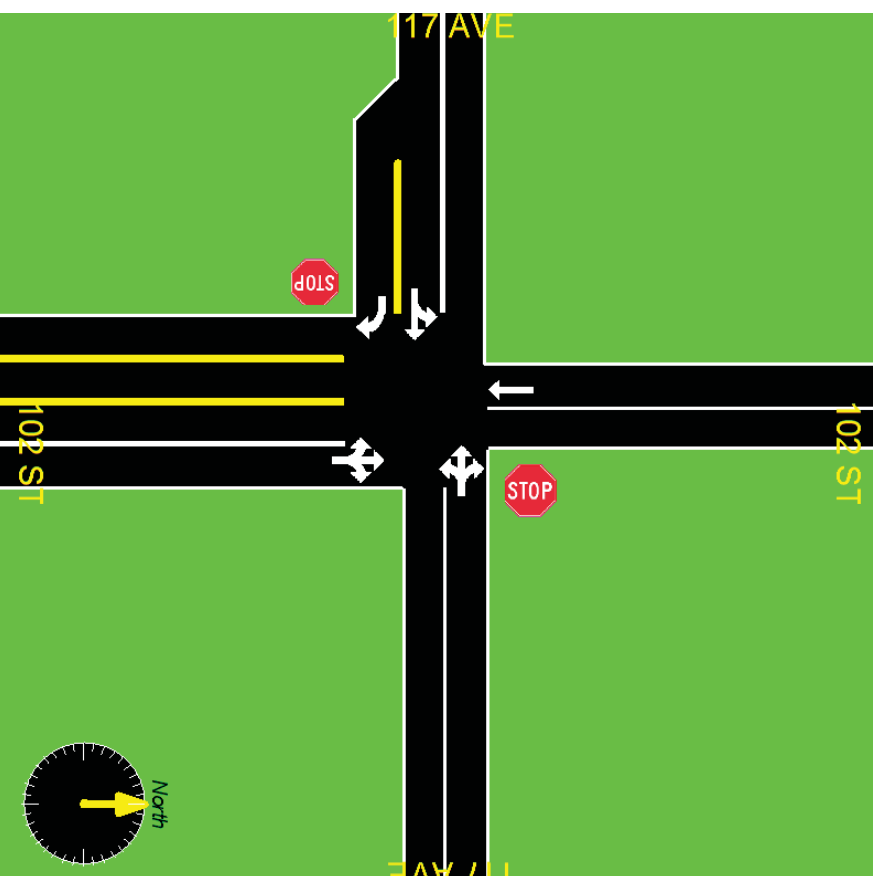
City Service Centre - Engineering Department

9505 112 Street

City of Grande Prairie, Alberta, Canada

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Page No : 4



# TURNING MOVEMENT COUNTS

## 121 AVENUE AND 102 STREET

File Name: 121 Avenue & 102 Street  
 Start Date: Thursday, May 31, 2012  
 Start Time: 7:00:00 AM  
 Site Code:  
 Comment 1:  
 Comment 2:  
 Comment 3:  
 Comment 4:

Start Time	102 ST From North				121 AVE From East				102 ST From South				121 AVE From West				Total (V <sub>15</sub> )
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 AM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
7:30 AM	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
8:00 AM	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3
8:15 AM	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
8:30 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	3
12:30 PM	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
12:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
4:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	6	0	0	1	0	6	0	8	3	2	0	2	0	0	0	28

# TURNING MOVEMENT COUNTS

## 121 AVENUE AND 102 STREET

File Name: 121 Avenue & 102 Street  
 Start Date: Thursday, May 31, 2012  
 Start Time: 7:00:00 AM  
 Site Code:  
 Comment 1:  
 Comment 2:  
 Comment 3:  
 Comment 4:

Start Time	102 ST From North				121 AVE From East				102 ST From South				121 AVE From West				Total (V <sub>15</sub> )
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM	0	29	4	1	4	2	8	0	8	29	5	1	10	8	0	2	107
7:15 AM	1	34	5	3	4	2	10	0	15	53	2	0	12	5	5	3	148
7:30 AM	3	74	15	0	9	0	7	0	14	99	6	0	16	9	3	2	255
7:45 AM	0	58	12	2	5	3	15	0	23	69	4	0	14	3	6	1	212
8:00 AM	1	89	6	2	7	1	14	0	9	47	5	0	11	4	1	0	195
8:15 AM	0	85	9	0	5	3	9	0	13	38	8	0	13	6	1	0	190
8:30 AM	2	79	8	2	1	0	21	0	12	49	7	1	16	6	0	0	201
8:45 AM	0	63	7	1	4	2	9	0	24	71	5	0	10	2	0	0	197
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	1	89	6	1	4	3	18	0	18	37	9	0	13	3	0	1	201
11:15 AM	1	74	10	1	6	3	19	0	21	46	14	1	10	6	1	0	211
11:30 AM	2	107	7	0	3	5	23	0	31	59	14	0	16	4	1	0	272
11:45 AM	4	61	9	2	10	2	25	0	17	55	8	1	14	2	3	7	210
12:00 PM	7	120	9	0	9	5	29	0	27	57	11	0	12	4	2	2	292
12:15 PM	1	84	3	0	9	3	25	0	17	57	9	0	10	2	1	0	221
12:30 PM	4	63	2	1	5	10	26	0	16	55	17	2	6	0	1	0	205
12:45 PM	4	69	9	3	5	2	29	0	34	74	10	2	11	7	7	0	261
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM	5	79	4	4	4	6	27	0	15	62	14	0	7	5	1	0	229
4:15 PM	3	73	8	2	3	2	19	0	9	46	9	0	5	0	4	1	181
4:30 PM	3	107	5	3	4	2	31	1	28	67	14	0	13	4	2	1	280
4:45 PM	7	110	9	2	4	8	31	0	28	67	13	0	9	4	5	0	295
5:00 PM	8	124	2	1	4	9	14	0	28	64	16	0	11	4	0	1	284
5:15 PM	6	115	12	4	15	3	21	0	27	50	17	1	7	4	3	0	280
5:30 PM	4	70	7	0	6	4	29	0	15	62	19	0	13	3	1	1	233
5:45 PM	3	74	7	2	6	10	19	0	21	44	18	0	7	4	2	1	215
Total	70	1930	175	37	136	90	478	1	470	1357	254	9	266	99	50	23	5375

Total Vehicles

# TURNING MOVEMENT COUNTS

## 124 AVENUE 102 STREET

File Name: 124 Ave & 102 St

Start Date: 7/6/2011

Start Time: 4:00:00 PM

Site Code:

Comment 1:

Comment 2:

Comment 3:

Comment 4:

Start Time	102ST From North				124AVE From East				102ST From South				124AVE From West				Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
4:00 PM	0	2	0	0	0	0	2	0	1	4	0	0	0	0	0	0	9
4:15 PM	0	3	0	0	0	0	1	0	0	2	0	0	0	0	0	0	6
4:30 PM	0	1	0	0	1	0	1	0	1	1	0	0	0	0	0	0	5
4:45 PM	0	3	0	0	0	0	0	0	2	1	0	0	0	0	0	0	6
5:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
5:15 PM	0	2	0	0	1	0	0	0	0	1	0	0	0	0	0	0	4
5:30 PM	0	3	1	0	0	0	0	0	1	1	0	0	0	0	0	0	6
5:45 PM	0	1	0	0	0	0	0	0	1	2	0	0	0	0	0	0	4
Total	0	15	1	0	2	0	5	0	6	13	0	0	0	0	0	0	42

# TURNING MOVEMENT COUNTS

## 124 AVENUE 102 STREET

File Name: 124 Ave & 102 St

Start Date: 7/6/2011

Start Time: 4:00:00 PM

Site Code:

Comment 1:

Comment 2:

Comment 3:

Comment 4:

Start Time	102ST From North				124AVE From East				102ST From South				124AVE From West				Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
4:00 PM	0	50	3	0	4	0	21	0	15	57	0	0	0	0	0	0	150
4:15 PM	2	55	4	1	1	0	14	0	17	36	0	0	0	0	2	0	131
4:30 PM	0	50	2	1	5	0	26	0	17	49	0	0	0	1	0	0	150
4:45 PM	0	73	4	2	3	0	18	0	17	35	0	0	0	0	0	0	150
5:00 PM	1	107	5	1	3	0	32	0	6	53	0	0	0	0	0	2	207
5:15 PM	1	70	2	0	4	0	23	0	13	38	0	1	0	0	1	2	152
5:30 PM	0	60	2	2	0	0	16	0	12	41	2	0	2	0	0	1	135
5:45 PM	0	60	1	0	3	1	27	1	9	19	0	0	0	0	0	0	120
Total	4	525	23	7	23	1	177	1	106	328	2	1	2	1	3	5	1195

Total Vehicles

# TURNING MOVEMENT COUNTS

## 128 AVENUE AND 102 STREET

File Name: 128 Avenue & 102 Street  
 Start Date: Wednesday, July 04, 2012  
 Start Time: 7:00:00 AM  
 Site Code:  
 Comment 1:  
 Comment 2:  
 Comment 3:  
 Comment 4:

Start Time	116 From North				84 From East				116 From South				84 From West				Total (V <sub>15</sub> )
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM		1	0		0		0		1	0							2
7:15 AM		0	0		0		0		0	0							0
7:30 AM		0	0		0		0		0	0							0
7:45 AM		2	0		0		1		0	2							5
8:00 AM		1	0		0		0		0	0							1
8:15 AM		2	1		1		0		0	1							5
8:30 AM		0	0		0		0		0	0							0
8:45 AM		2	0		0		0		1	0							3
9:00 AM																	0
9:15 AM																	0
9:30 AM																	0
9:45 AM																	0
10:00 AM																	0
10:15 AM																	0
10:30 AM																	0
10:45 AM																	0
11:00 AM																	0
11:15 AM																	0
11:30 AM																	0
11:45 AM																	0
12:00 PM																	0
12:15 PM																	0
12:30 PM																	0
12:45 PM																	0
1:00 PM																	0
1:15 PM																	0
1:30 PM																	0
1:45 PM																	0
2:00 PM																	0
2:15 PM																	0
2:30 PM																	0
2:45 PM																	0
3:00 PM		2	0		0		1		1	1							5
3:15 PM		2	0		0		0		2	3							7
3:30 PM		3	0		0		1		0	0							4
3:45 PM		0	0		0		0		0	1							1
4:00 PM		5	1		0		0		0	3							9
4:15 PM		3	0		0		2		0	5							10
4:30 PM		1	0		0		0		0	3							4
4:45 PM		0	0		0		0		0	1							1
5:00 PM		3	0		0		1		0	1							5
5:15 PM		0	0		1		1		0	4							6
5:30 PM		0	0		0		1		0	2							3
5:45 PM		2	0		0		0		0	4							77
Total	0	29	2	0	2	0	8	0	5	31	0	0	0	0	0	0	148

# TURNING MOVEMENT COUNTS

## 128 AVENUE AND 102 STREET

File Name: 128 Avenue & 102 Street  
 Start Date: Wednesday, July 04, 2012  
 Start Time: 7:00:00 AM  
 Site Code:  
 Comment 1:  
 Comment 2:  
 Comment 3:  
 Comment 4:

Start Time	116 From North				84 From East				116 From South				84 From West				Total (V <sub>15</sub> )
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM	0	21	1	0	1	0	0	0	3	21	0	0	0	0	0	0	47
7:15 AM	0	16	0	4	0	0	4	0	4	40	0	0	0	0	0	0	64
7:30 AM	0	30	2	0	0	0	4	0	16	95	0	0	0	0	0	0	147
7:45 AM	0	42	6	0	3	0	6	0	14	72	0	0	0	0	0	0	143
8:00 AM	0	44	2	0	1	0	3	2	23	58	0	0	0	0	0	0	131
8:15 AM	0	39	4	0	1	0	11	0	10	46	0	0	0	0	0	0	111
8:30 AM	0	34	2	0	2	0	5	0	8	33	0	0	0	0	0	0	84
8:45 AM	0	40	0	0	0	0	4	0	7	44	0	0	0	0	0	0	95
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	49	1	0	0	0	6	0	6	35	0	0	0	0	0	0	97
3:15 PM	0	47	2	0	3	0	8	0	6	34	0	1	0	0	0	0	100
3:30 PM	0	36	1	0	5	0	3	0	11	17	0	0	0	0	0	0	73
3:45 PM	0	41	2	0	6	0	10	0	7	32	0	0	0	0	0	0	98
4:00 PM	0	48	5	0	2	0	8	0	4	41	0	0	0	0	0	0	108
4:15 PM	0	45	2	0	1	0	12	0	6	41	0	1	0	0	0	0	107
4:30 PM	0	57	2	0	4	0	9	0	2	48	0	0	0	0	0	0	122
4:45 PM	0	90	4	0	5	0	16	0	7	47	0	1	0	0	0	0	169
5:00 PM	0	92	1	0	8	0	16	0	4	51	0	1	0	0	0	0	172
5:15 PM	0	120	1	0	3	0	15	0	5	43	0	0	0	0	0	0	187
5:30 PM	0	73	1	0	2	0	7	0	5	46	0	0	0	0	0	0	134
5:45 PM	0	52	0	0	0	0	7	0	4	43	0	0	0	0	0	0	2189
Total	0	964	39	4	47	0	147	2	148	844	0	4	0	0	0	0	4378

Total Vehicles



## Appendix C OPEN HOUSE #1 FEEDBACK

# 102 Street Traffic Study

How would you propose to accommodate pedestrians and/or cyclists along the 102 Street (113 Avenue to 132 Avenue) corridor?

— LET THEM USE THE EXISTING SIDEWALKS

AS

ABOVE

I would favour the use of special cycle lanes that are divided from 102 St so that cyclists remain safe.

— ADD ANOTHER CONC OR ASPHALT WALK ALL ALONG THE EAST SIDE AS PROPOSED.

— there's a great trail on West side of 102nd!! ... tell them to use it!! How spoiled/picky can we be that we need one on both sides!!

# 102 Street Traffic Study

How would you propose to accommodate vehicular traffic along the 102 Street (113 Avenue to 132 Avenue) corridor?

- ELIMINATE ON STREET PARKING
- NO MORE BUNKERS (PLANTERS) ✓✓✓✓✓!

Proper cyclepaths both side from 100<sup>th</sup> - 132 Ave

I would favour a lot more planters in order to make this city as green as possible.

Please - no traffic circles

- ADD A RIGHT HAND TURNING LANE GOING SOUTH @ 113<sup>th</sup> AVE & 102 STREET!

- IF YOU USE TRAFFIC CIRCLES YOU WILL NEED TO PUT UP SIGNS EXPLAINING THE RULES OF HOW THEY WORK! & MAKE THEM 18" HIGH <sup>in center with new</sup> ALL HARD-SURFACE for OUTER 2.5-3.0 M FOR LARGER TRUCKS/BUSES THAT NEED LARGER TURNING RADIUS.

- just repaint the lines back the way they were!! (or a Right turn lane!) - with 2 High Schools, a leisure center, and a large park on West side of 102<sup>nd</sup> St there is WAY more traffic turning right (or going straight) than turning left.

# 102 Street Traffic Study

What is your biggest concern as a pedestrian and/or cyclist along the 102 Street (113 Avenue to 132 Avenue) corridor?

INTERSECTION AT 102<sup>nd</sup> & 113 AVE - FOUR WAY STOP - ....

... DRIVERS IGNORE THIS.

Need sidewalks both sides all the way to 132 Ave

My biggest concern as a cyclist is the aggressive driving that seems to go unchecked in Grande Prairie.

- crossing the road as a pedestrian - give us more time!
- line-up the lanes for drivers! = less confusion, distraction  
= less 'do whatever'  
= more attention to pedestrians



# 102 Street Traffic Study

What is your biggest concern as a motorist along the 102 Street (113 Avenue to 132 Avenue) corridor?

- INTERSECTION 113 AVE + 102 ST  
Need Turn Lane on 113 from N. going S. ✓ I agree too
- 113 Ave / 102 st south bound / Right turn Lane
- Kios crossing from 114 A Ave.
- Right turn off 102 St to 116 Ave need an acceleration lane
- What about a circle (small one) instead of 4 stop signs?
- remove pedestrian trail between the houses (114 A Ave)
- If add traffic circles make sure school buses can handle it, + that pedestrians can still cross safely.
- 117 Ave intersection is BAD! traffic circle?
- can add advance turn west when facing north on 102 ST @ 116 Ave?

# 102 Street Traffic Study

What is your biggest concern along the 102 Street (113 Avenue to 132 Avenue) corridor?

INTERSECTION : 113 AVE + 102 ST  
↑ & walking access to NO SIDEWALK on either side esp. East side

SIDEWALKS - BOTH SIDES, OVERHEAD  
Flashing lights across 102 so you can get  
across street

LANES NOT LINING UP & DRIVERS IMPROVISING!

117 Ave & 116 Ave Intersections

Intersection 102nd St / 113 Ave - much more traffic turning Right than Left.

Intersection 102nd St / 116 Ave - there's a Left turn lane AND advance green arrow for  
North/West bound traffic.... turn it on!! ... please ☺



If you have any comments in regards to the 102 Street Traffic Study (113 Ave to 132 Ave) following today's discussions, please take a moment to write them down before you leave.

The information you provide will be reviewed and taken into consideration in further discussions on this matter.

## COMMENTS

Lights 102 Ave / 116 Ave / 124 / 132  
only

1) 116 Ave to 132 Ave - Right turn / Right out only  
on 102 st  
on all intersection except -  
@ 124 is lights with left  
turns Right turn  
- NO Roundabouts \*

2) 105 Street + 116 Ave - Lights.

3) ~~113 Ave~~ 113 Ave - 116 Ave / - eliminate walk trough  
102 st. 114 Ave  
- fence in median (maybe)  
- for blind spot at beam 116 Ave

4) No parking on 102 st ever

You may wish to provide the following information as applicable; this is strictly optional.

The personal information contained on this form is collected to solely be used for the purpose(s) of identifying issues from the various stakeholders and the public for the planning of 102 Street (113 Ave to 132 Ave).

Name: Dan Rickman

Company/Organization:

Phone: 814-2132

Email: danjorik@telus.net

Thank you for attending the Open House and for providing us with your valuable feedback. Please leave your completed form with an Open House facilitator today, or return via fax or email by no later than December 12, 2013 to:

Attn: Niki Burkinshaw | Stantec Consulting Ltd.  
Tel: (403) 341-3320 | Fax: (403) 342-0969  
Email: [niki.burkinshaw@stantec.com](mailto:niki.burkinshaw@stantec.com)





If you have any comments in regards to the 102 Street Traffic Study (113 Ave to 132 Ave) following today's discussions, please take a moment to write them down before you leave.

The information you provide will be reviewed and taken into consideration in further discussions on this matter.

## COMMENTS

- keep 102 st. road allowance wide  
Some day the City will need it for another N-S artery.
- Use roundabouts/traffic circles
- Walk/bike trails (7-8' wide) on both sides of 102 St. & clear them in the winter!

You may wish to provide the following information as applicable; this is strictly optional.

The personal information contained on this form is collected to solely be used for the purpose(s) of identifying issues from the various stakeholders and the public for the planning of 102 Street (113 Ave to 132 Ave).

Name:

Steven Shavers

Company/Organization:

Phone:

Email: [stevenshavers@gmail.com](mailto:stevenshavers@gmail.com)

Thank you for attending the Open House and for providing us with your valuable feedback. Please leave your completed form with an Open House facilitator today, or return via fax or email by no later than December 12, 2013 to:

Attn: Niki Burkinshaw | Stantec Consulting Ltd.  
Tel: (403) 341-3320 | Fax: (403) 342-0969  
Email: [niki.burkinshaw@stantec.com](mailto:niki.burkinshaw@stantec.com)



## Burkinshaw, Niki

---

**From:** Norman Kyle <nkyle@cityofgp.com>  
**Sent:** Tuesday, November 19, 2013 2:39 PM  
**To:** Burkinshaw, Niki  
**Cc:** Aquisha Khan  
**Subject:** FW: Facebook Post

[Another one for the appendix...](#)

---

**From:** Jody Klassen  
**Sent:** November-19-13 8:53 AM  
**To:** Traffic Signals  
**Subject:** Facebook Post

Just an FYI, you don't have to respond:

Barb Schonewille-Hawkes

I'd like to point out an issue with the traffic lights at 102 St & 116 Ave, specifically the North/South bound lights. For the amount of traffic that passes north/south through this intersection the length of the green light is way too short. And not only that but there is no turn arrow which causes traffic to back up extremely far north - this in turn makes every intersection on 102 St north of 116 Avenue hazardous. Last night it took me 15 MINUTES to get from 117 Avenue onto 116 Avenue. It is ridiculous and something needs to be changed. For the sanity of all drivers who go through that intersection I suggest the timing of these lights be reviewed immediately. Thank you.

**Jody Klassen**  
**Marketing and Communications Department**  
**City of Grande Prairie**  
**780.538.0300**

[jklassen@cityofgp.com](mailto:jklassen@cityofgp.com)



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This message, and any attached documents, may include proprietary or protected information. If you are not the intended recipient, please notify me, delete this message, and do not further communicate the information contained herein without my express written consent.

## Burkinshaw, Niki

---

**From:** Norman Kyle <nkyle@cityofgp.com>  
**Sent:** Tuesday, November 19, 2013 1:34 PM  
**To:** Burkinshaw, Niki  
**Cc:** Aquisha Khan; Vander Heyden, Brad  
**Subject:** FW: 102 St & Crystal Landing

FYI.

[Feedback on 102 St for the appendix....](#)

---

**From:** Tim Conrad [<mailto:tconrad@aquatera.ca>]  
**Sent:** November-19-13 12:18 PM  
**To:** Norman Kyle  
**Subject:** 102 St & Crystal Landing

Hey Norm,

I can't make it tonight or Thursday. Not sure if you have anything you can send by email that I can see plans.

My main feedback would be that 102 St. have bike lanes all the way to 132 Ave. as there is no safe way to reach the north of the city from the west besides 102 St. It also would open up the Muskoseepi and east/west trails.

Not sure what the markings are for bike lanes, but the green style being tried in Edmonton and used in San Francisco is really effective. I felt quite safe on those, and when driving a car, I had a better understanding of where the bike lane was. In some places, it's two way for cyclists with their own light – but GP is far from needing that. If anything I'd recommend is a button that cyclists can reach which will activate the light in their direction. Although you mentioned the new sensors should work better.

I'm hoping you have some magic to work at the Mr. Mike's intersection. What a messy spot driving, walking or cycling. Add a fire truck to that and it's hell.

In Crystal Landing, the main feedback I have is the Landing Drive needs to have no parking on at least one side of the road. It is too narrow through the entire roadway – not enough for parking on both sides – it is a real challenge in the winter, and cycling in the summer. I'm always afraid somebody will pop out between vehicles when meeting another vehicle. Very little room to spare.

Hope all is well. Good job getting the lights switched out downtown. I'm through there every day – and barely noticed. Took a couple weeks to get the timing back on track, but it's smooth now.

Much obliged,

**Tim Conrad**  
Communications Manager

[tconrad@aquatera.ca](mailto:tconrad@aquatera.ca)

Tel: 780.513.5220

Fax: 780.830.7430

11101 104 Avenue

## Burkinshaw, Niki

---

**From:** Norman Kyle <nkyle@cityofgp.com>  
**Sent:** Friday, November 22, 2013 7:40 PM  
**To:** Burkinshaw, Niki  
**Subject:** Fwd: 102 street

More feedback.

Norman Kyle P.L. Eng., P. Tech. (Eng.)  
Sr. Transportation Analyst  
[nkyle@cityofgp.com](mailto:nkyle@cityofgp.com)<<mailto:nkyle@cityofgp.com>>

Begin forwarded message:

From: Dan and Joan Kirkham <[danjoank@telus.net](mailto:danjoank@telus.net)<<mailto:danjoank@telus.net>>>  
Date: 22 November, 2013 2:43:06 PM MST  
To: <[nkyle@cityofgp.com](mailto:nkyle@cityofgp.com)<<mailto:nkyle@cityofgp.com>>>  
Subject: 102 street

Talked to 4 neighbours today plus 6 seniors @ coffee from this area in Mac Donalds this morning about 102 street. the feedback is as follows:

1. no round about what so ever.
2. lights @ 102 st. / 121 Ave only ; all other intersections right in and right out period.
3. new light @ 116 ave. and 105 street
4. bikes on one side and walk on other side all the way north.
5. no on street parking, everyone was very very very vocal on that. (Inverness estates, off street provided now @ cost, enforce it)
6. right lane on 102 st. and 113 ave. coming from north for high school traffic.
7. foot traffic, no solution, many options, walkway closed, fence from lights south in meridian ?????

thanks Dan Kirkham

-----  
This message, and any attached documents, may include proprietary or protected information. If you are not the intended recipient, please notify me, delete this message, and do not further communicate the information contained herein without my express written consent.



Canadian Paraplegic Association (Alberta)  
#10 Knowledge Way  
Grande Prairie, AB T8W 2V9  
Main: (780) 532-3305  
Fax: (780) 539-3567  
[www.cpa-ab.org](http://www.cpa-ab.org)

**To empower persons with spinal cord injuries and other physical disabilities to achieve independence and full community participation.**

Norman Kyle, Senior Transportation Analyst, Engineering Services [nkyle@cityofgp.com](mailto:nkyle@cityofgp.com)  
Tel: 780 830 7448 Fax: 780 830 7440

In regards to the 102 St Traffic Study (113Ave to 132 Ave)

Hello Norman,

First of all, thank you for the opportunity to provide input with respect to the general expansion of Grande Prairie while we are in transition from small city to large city planning. My role with the Canadian Paraplegic Association (Alberta) [CPA] encompasses collaborative efforts with various agencies in both client services and community development. This mix is wonderful as we feel we can increase awareness on behalf of individuals who may not otherwise raise their voices in regards to a fully inclusive community for all.

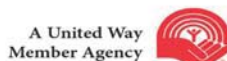
Secondly, I realize that the city's mandate to create a walkable and wheelchair friendly environment is timely and complicated where private ownership meets municipal and provincial mandates. To consider development planning for growth encompassing approximately 30,000 people is an incredible undertaking and clearly necessary with the development rate of our city.

The mission statement of the Canadian Paraplegic Association (Alberta) is *to empower persons with spinal cord injuries and other physical disabilities to achieve independence and full community participation*. Our focus on the environment benefits people who have mobility challenges as well as those with strollers and babes in arms; this merges nicely with the City of Grande Prairie's mandate to be "Walkable".

One of the challenges we mutually face is that support outlined within the provincial Barrier-Free Guidelines can be challenging to apply to an inaccessible landscape. Presumably, planning well into the future will alleviate this challenge, as the construction will need to meet and exceed the contemporary guidelines. Our concern therefore is that we need to anticipate who will be living in the un-built residential section and how to make pedestrian ways safer for local residents and business patrons.

The open house provided me with the opportunity to talk about the roadway and traffic flow. I recognize there is a broad array of information to be reviewed however I would like to provide some further thoughts to ensure certain facets for optimal inclusion are not overlooked:

1. There is currently a significant deficit in the number of affordable and accessible homes in our region, and the residential area adjacent to the 102 Avenue Corridor can potentially address this concern;



2. The catchment area for Grande Prairie businesses is very large. However, many people north of Fairview, south of Fox Creek and east of Grande Cache choose to not shop in Grande Prairie, nor do they return to their region after disabilities because of the lack of accessibility;
3. It is reasonable to assume there will be an increasing number of people who choose to age-in-place including families whose loved ones with mobility issues require user-friendly space;
4. Our vision is that a proportionate number of new residential units and commercial properties will be designed to accommodate appropriate access when it comes to the personal and professional lives of individuals with physical disabilities;
5. Pedestrian ways and parking (with signage) throughout the city must exceed the provincial expectations as outlined in the barrier-free guidelines;
6. With a surge in active living for people requiring recumbent bicycles, power chairs, scooters and vehicles such as runners' strollers or bicycle trailers, pedestrian ways need to consider the safety of people passing one another. This can be achieved by ensuring the path of travel is wide enough to accommodate any of the aforementioned;
7. Materials for pathways need to have few seams and preferably a weather conducive surface that is easy to keep clean and repair;
8. The design for the 113 Avenue to 132 Avenue Corridor should include exceptional drainage and smooth transitions between pedestrian/bikeways and the road surface;
9. The current parking stall requirement of one accessible per ten regular spaces will not be enough for the future of that location. With the consideration of parallel parking on the corridor, how will accessible stalls be determined and accommodated for safe loading and unloading?

The Canadian Paraplegic Association (Alberta) has spearheaded a community based Accessibility Committee consisting of service providers and people who have firsthand real life experience to build awareness on behalf of people with physical disabilities and mobility issues. If you are interested, I will be pleased to arrange a meeting with representatives of the Accessibility Committee to explore these suggestions further. We look forward to meeting with you to discuss how we can best help the City of Grande Prairie to insure full inclusion for all citizens.  
Sincerely,

---

Mieke de Groot, RSW  
Client Services Coordinator  
Email: [mieke.de.groot@cpa-ab.org](mailto:mieke.de.groot@cpa-ab.org) Direct Line: 780 831 1091

## Appendix D OPEN HOUSE #2 FEEDBACK

# 102 Street Traffic Study

What changes, if any, would you recommend to the 102 Street (113 Avenue to 132 Avenue) corridor concept plan?

- 113<sup>+</sup>  
102
- NEED A BETTER METHOD TO / BIGGER STOP SIGNS @ 113 AVE  
NOTIFY NORTHBOUND & SOUTHBOUND  
DRIVERS THAT IT IS A 4-WAY  
STOP OR ELIMINATE THE  
NORTHBOUND/SOUTHBOUND STOP SIGNS  
& INSTALL FLASHING RED FOR  
EAST + WEST BOUND TRAFFIC.



# 102 Street Traffic Study

What is your biggest concern as a motorist along the 102 Street (113 Avenue to 132 Avenue) corridor?

- 113 AVE & 102 ST IS A DANGEROUS INTERSECTION (4 WAY STOP BUT MANY DRIVERS NORTHBOUND & SOUTHBOUND DO NOT STOP.
- eliminate parking on 102st from 121st to 124 Ave. Very Dangerous in winter.
- no Round about / Lights!!
- 117 Ave. intersection congestion needs to be addressed now.

YOUR NEW SOLUTION for 117 AVE & 102 ST WILL NEGATIVELY IMPACT THE BUSINESSES TO THE WEST ON 117 AVE : "Less Vehicle Traffic = Less Income!"

Have you talked to Mr. Mikes, hotels, car dealers?  
They pay taxes - lots of taxes!

WILL ROUNDABOUTS WORK ON 102 ST IF IT STAYS/GETS BUSY? WILL THEY MAKE TURNING LEFT ONTO 102 ST EASIER?



# 102 Street Traffic Study

What is your biggest concern as a pedestrian and/or cyclist along the 102 Street (113 Avenue to 132 Avenue) corridor?

- need a bicycle/pedestrian path on both sides of road.
- more time needed to walk across 116 Ave.
- \* more time needed to cross 116 Ave: especially now that you are proposing to block off pedestrian access to <sup>8<sup>th</sup> St</sup> 115 Ave (kids people preferred to walk to Ernie's & cross 100 St there, & then cross 116 Ave on east side of intersection)
- walkways on both sides; pedestrian ~~we~~ crosswalks MARKED ~~and~~ & signed all along 102 St.

# 102 Street Traffic Study

What is your biggest concern along the 102 Street (113 Avenue to 132 Avenue) corridor?

PREFER  
THAT YOU ~~DO~~ DO NOT ADD 5 TRAFFIC LIGHTS... unless timing is excellent.

-ALL THE CARS PARKED IN FRONT OF THE APTS + CONDOS ON 102 ST - shouldn't this be a "No PARKING ZONE?"



If you have any comments in regards to the 102 Street Traffic Study (113 Ave to 132 Ave) following today's discussions, please take a moment to write them down before you leave.

The information you provide will be reviewed and taken into consideration in further discussions on this matter.

### COMMENTS

Flower/Tree Planters removed from  
108-~~113~~ 113 Ave on 102 St.

**You may wish to provide the following information as applicable; this is strictly optional.**

The personal information contained on this form is collected to solely be used for the purpose(s) of identifying issues from the various stakeholders and the public for the planning of 102 Street (113 Ave to 132 Ave).

**Name:**

**Company/Organization:**

**Phone:**

**Email:**

**Thank you for attending the Open House and for providing us with your valuable feedback. Please leave your completed form with an Open House facilitator today, or return via fax or email by no later than April 23, 2014, to:**

Attn: Niki Burkinshaw | Stantec Consulting Ltd.  
Tel: (403) 341-3320 | Fax: (403) 342-0969  
Email: [niki.burkinshaw@stantec.com](mailto:niki.burkinshaw@stantec.com)



## PUBLIC OPEN HOUSE #2

102 Street Traffic Study (113 Ave to 132 Ave)  
April 9, 2014



If you have any comments in regards to the 102 Street Traffic Study (113 Ave to 132 Ave) following today's discussions, please take a moment to write them down before you leave.

The information you provide will be reviewed and taken into consideration in further discussions on this matter.

### COMMENTS

Really like the plans for 117 Ave  
by Mr. Mike's.

You may wish to provide the following information as applicable; this is strictly optional.

The personal information contained on this form is collected to solely be used for the purpose(s) of identifying issues from the various stakeholders and the public for the planning of 102 Street (113 Ave to 132 Ave).

Name: Cynthia Kelly Company/Organization: City of GP  
Phone: 780 518 3968 Email: Kelly.Cynthia@yahoo.ca

Thank you for attending the Open House and for providing us with your valuable feedback. Please leave your completed form with an Open House facilitator today, or return via fax or email by no later than April 23, 2014, to:

Attn: Niki Burkinshaw | Stantec Consulting Ltd.  
Tel: (403) 341-3320 | Fax: (403) 342-0969  
Email: [niki.burkinshaw@stantec.com](mailto:niki.burkinshaw@stantec.com)

## Appendix E TRAFFIC MODELING CRITERIA

## 102 STREET (113 AVENUE TO 132 AVENUE) TRAFFIC STUDY – DRAFT REPORT

Appendix E Traffic Modeling Criteria  
July 23, 2014

**Table 4.1 – Traffic Modeling Criteria**

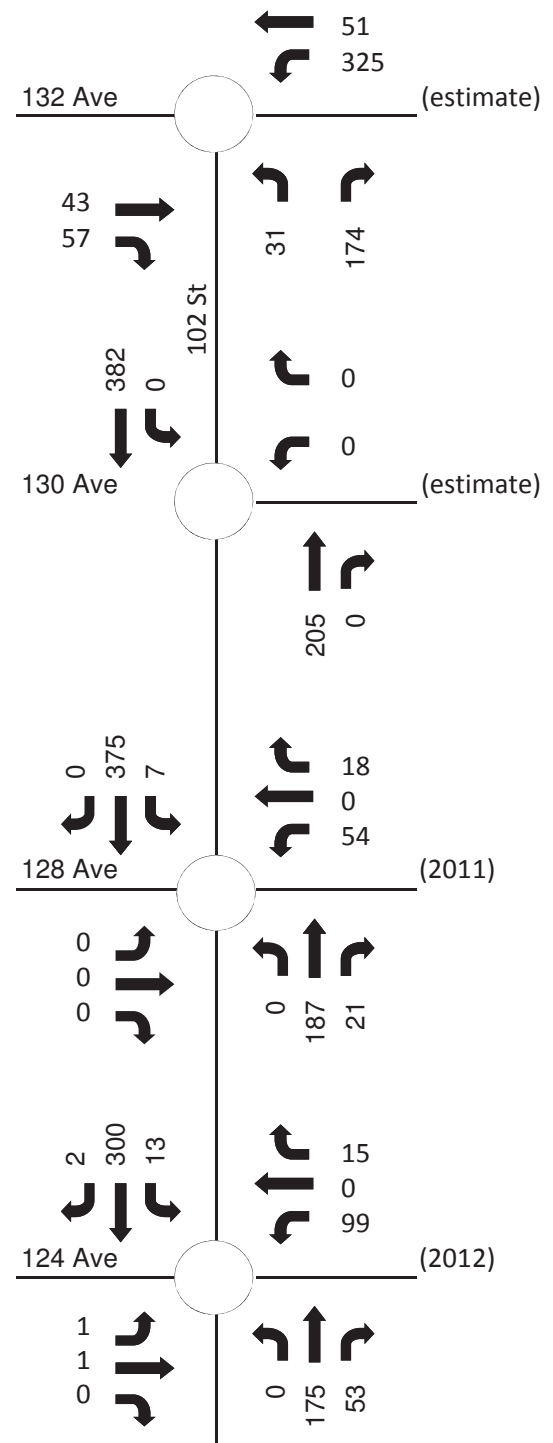
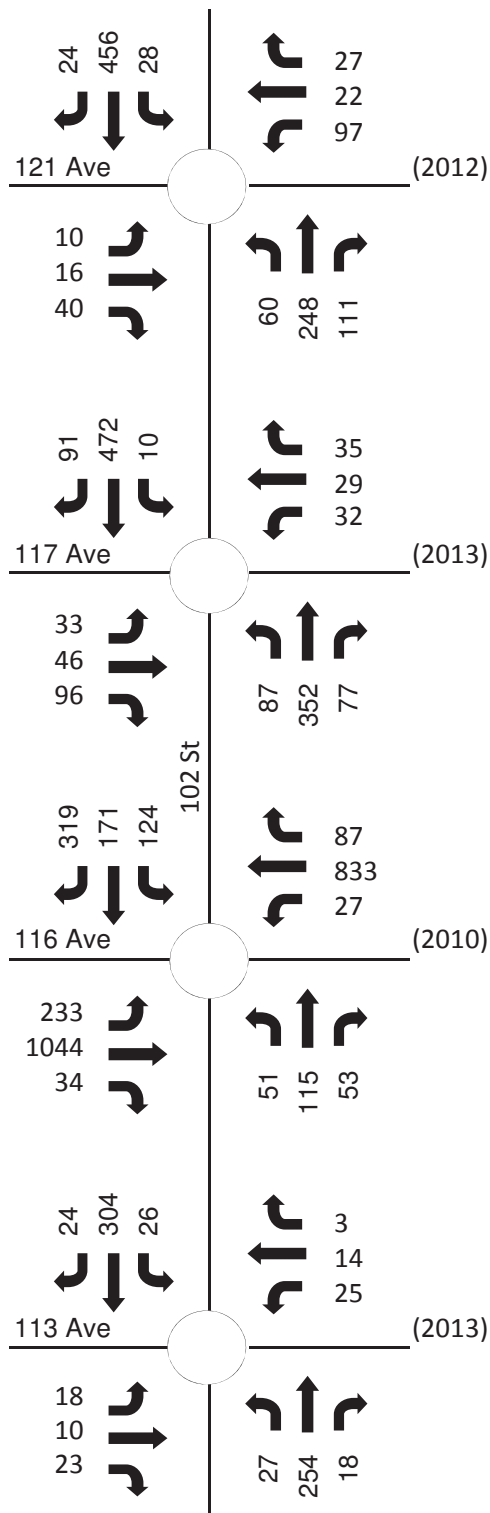
FACTORS	VALUES
Cycle Length	120 s or less
PHF	0.88 in the AM, 0.92 in the PM
Minimum Green Time*	15 sec for main street through movements 12 sec for side street through movements 7 sec for left-turn phases
Amber Time*	3.5 sec for 50 km/h posted speed
All Red Period*	1.0 sec
Pedestrian "Walk" Time*	7 sec
Pedestrian Flashing "Don't Walk" Time	Calculated based on 1.0 m/s walking speed
Ideal Saturation Flow Rate	1900 vph for all movements
HV	3.5% (except for EB and WB through traffic at 102 Street / 116 Avenue, which has 7%)
V/C Ratio	Maximum of 0.85
LOS	Maximum of LOS-D

\*Based on the City of Grade Prairie's Design Manual (V2013)

Note that amber and all red times at 116 Avenue are based on the existing timings.

## Appendix F DESIGN VOLUMES





Legend

(2010) Year of Count

Client/Project

City of Grande Prairie  
102 Street Traffic Study

Figure No.

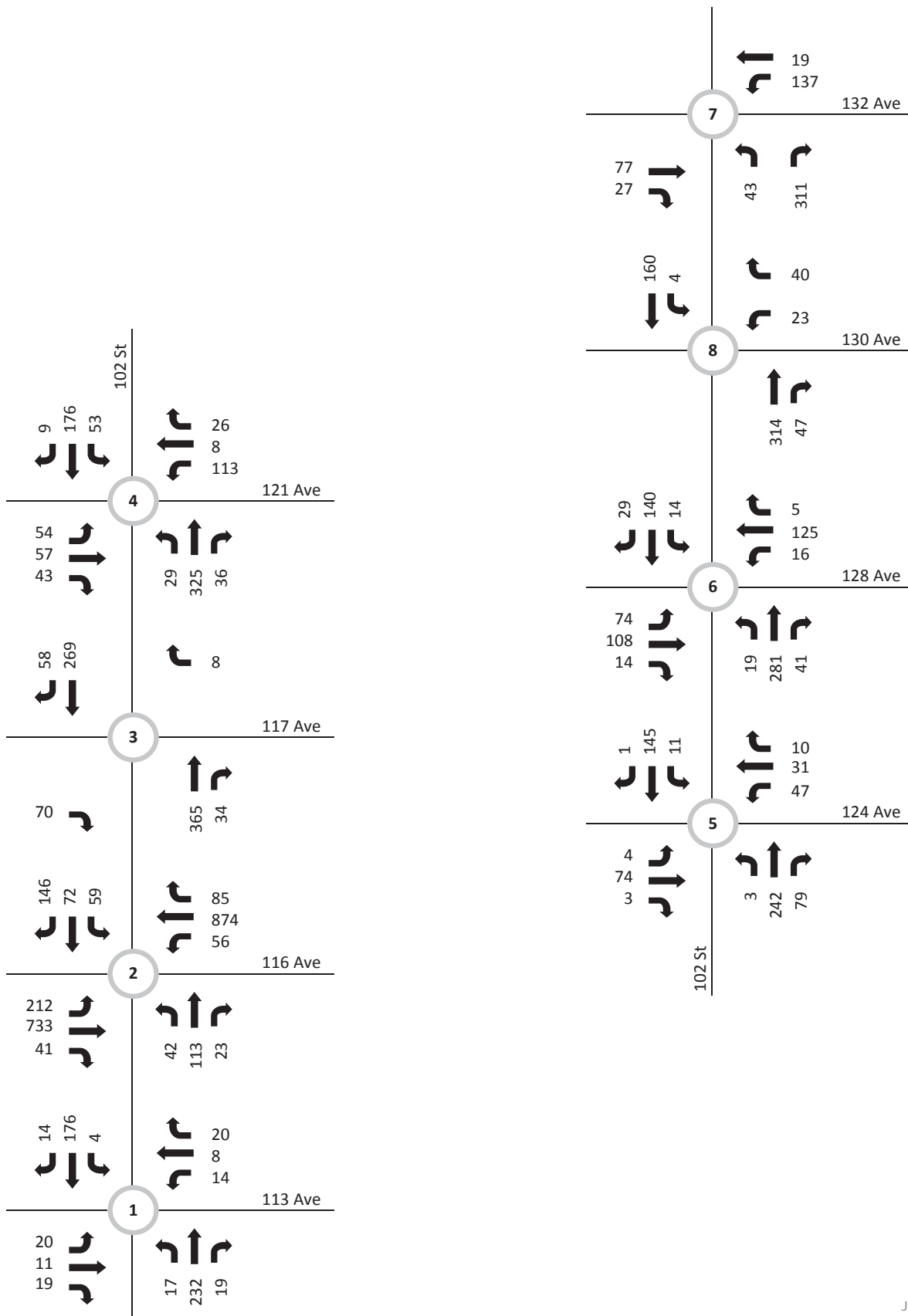
5.2

Title

Existing Traffic Counts  
PM Peak Hour



7/23/2014



July, 2014  
1162 39355

Client/Project  
City of Grande Prairie  
102 Street Traffic Study

Figure No.

**5.3A**

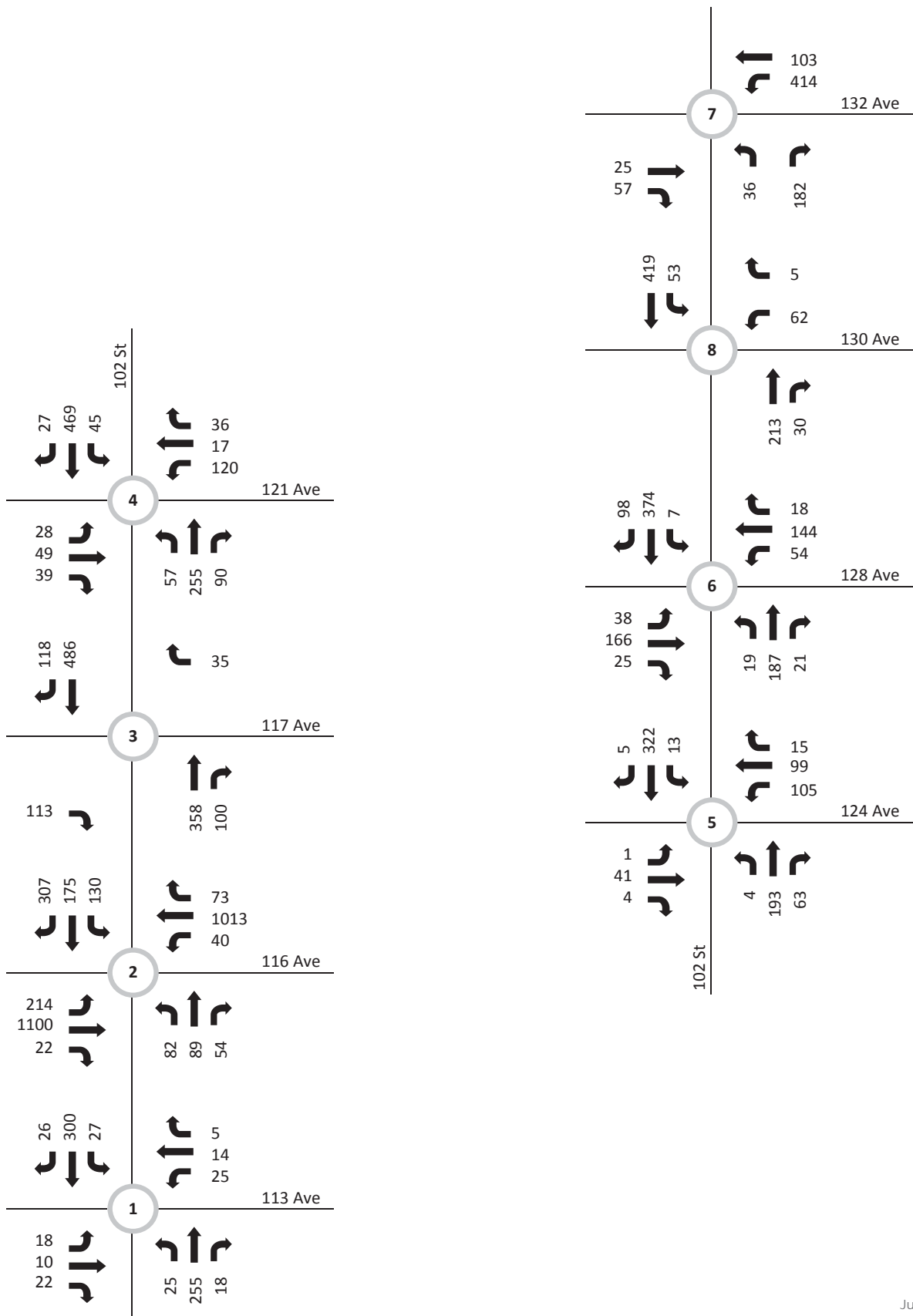
Title

**65K Design Volumes  
AM Peak Hour**



10160 - 112th Street  
Edmonton AB

7/23/2014



July, 2014  
1162 39355



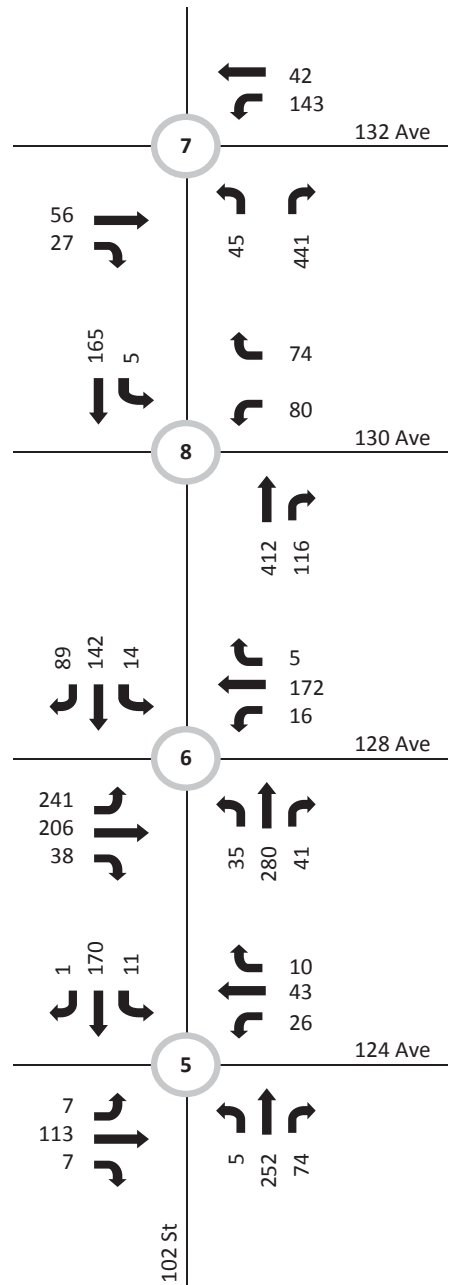
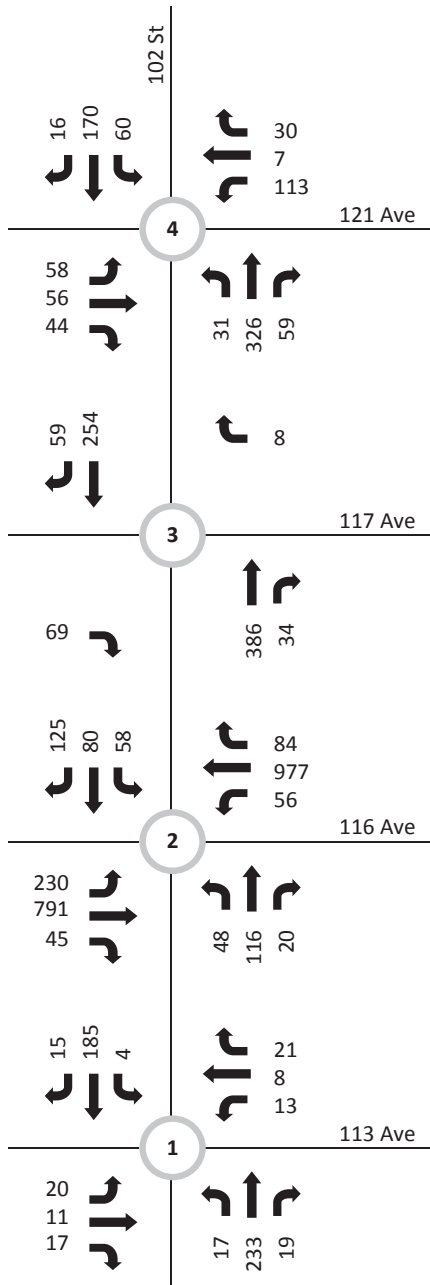
10160 - 112th Street  
Edmonton AB

Client/Project  
City of Grande Prairie  
102 Street Traffic Study

Figure No.  
**5.3B**

Title  
**65K Design Volumes  
PM Peak Hour**

7/23/2014



July, 2014  
1162 39355

Client/Project  
City of Grande Prairie  
102 Street Traffic Study

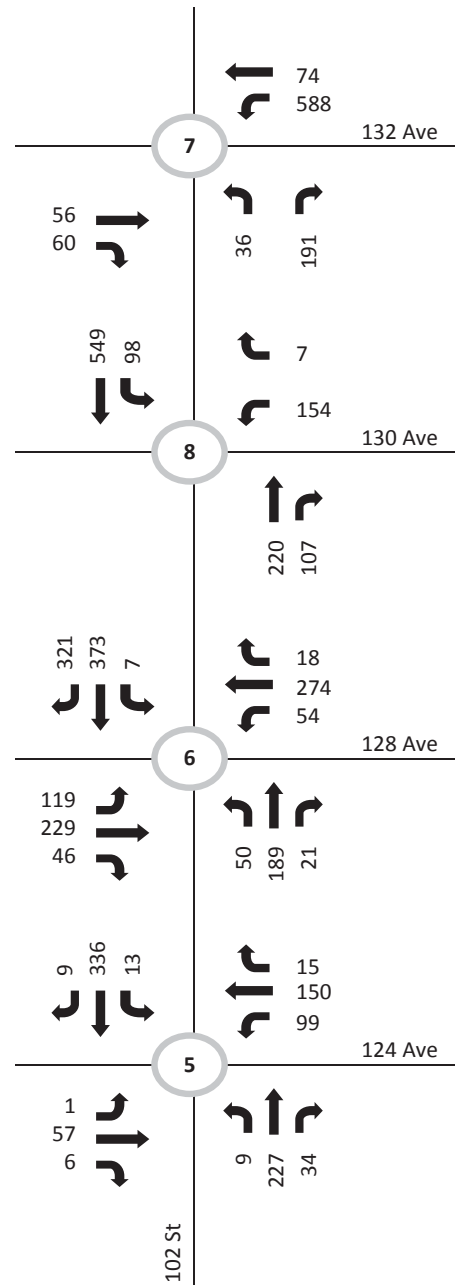
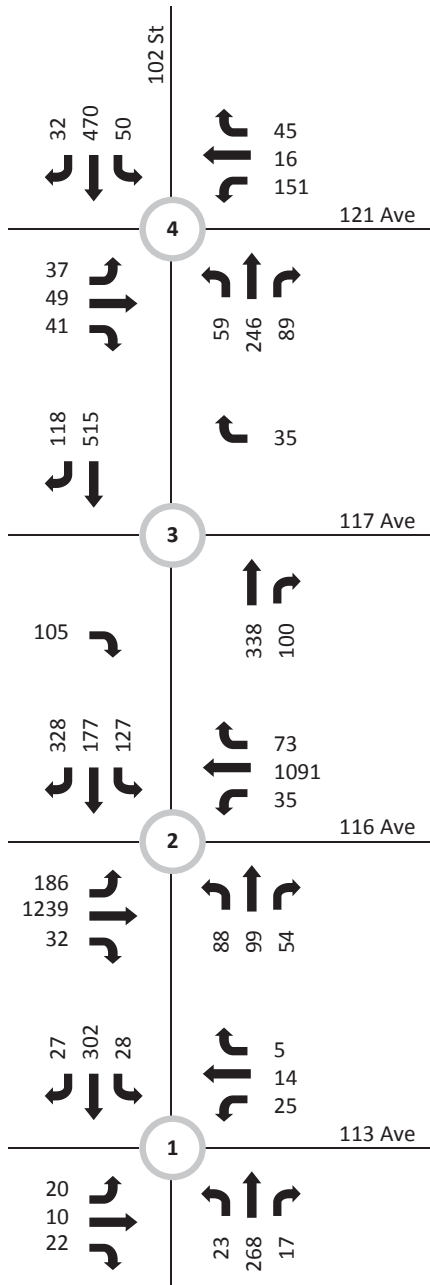
Figure No.  
**5.4A**

Title  
**78K Design Volumes  
AM Peak Hour**



10160 - 112th Street  
Edmonton AB

7/23/2014



July, 2014  
1162 39355

Client/Project  
City of Grande Prairie  
102 Street Traffic Study

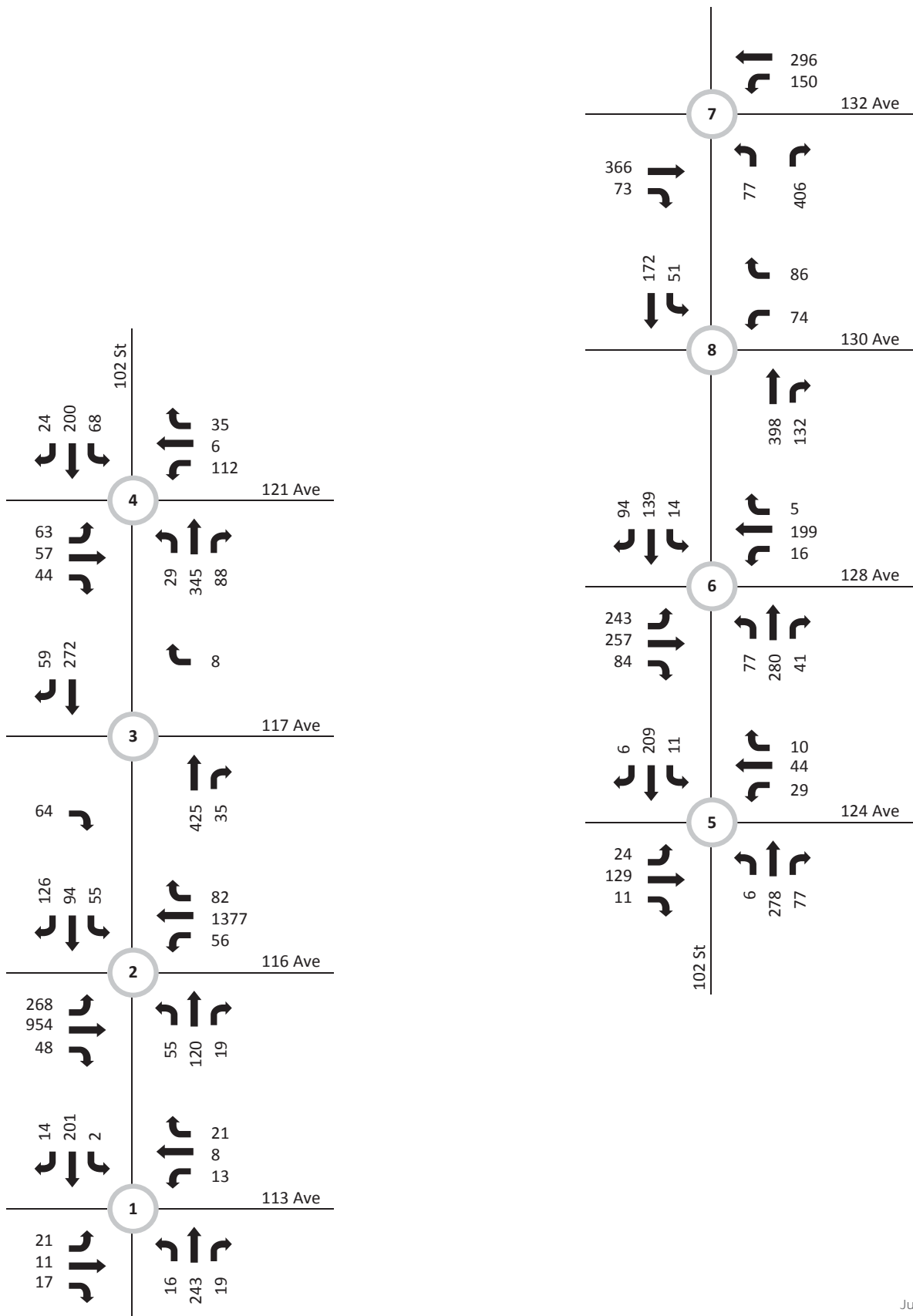
Figure No.  
**5.4B**

Title  
**78K Design Volumes  
PM Peak Hour**



10160 - 112th Street  
Edmonton AB

7/23/2014



July, 2014  
1162 39355



10160 - 112th Street  
Edmonton AB

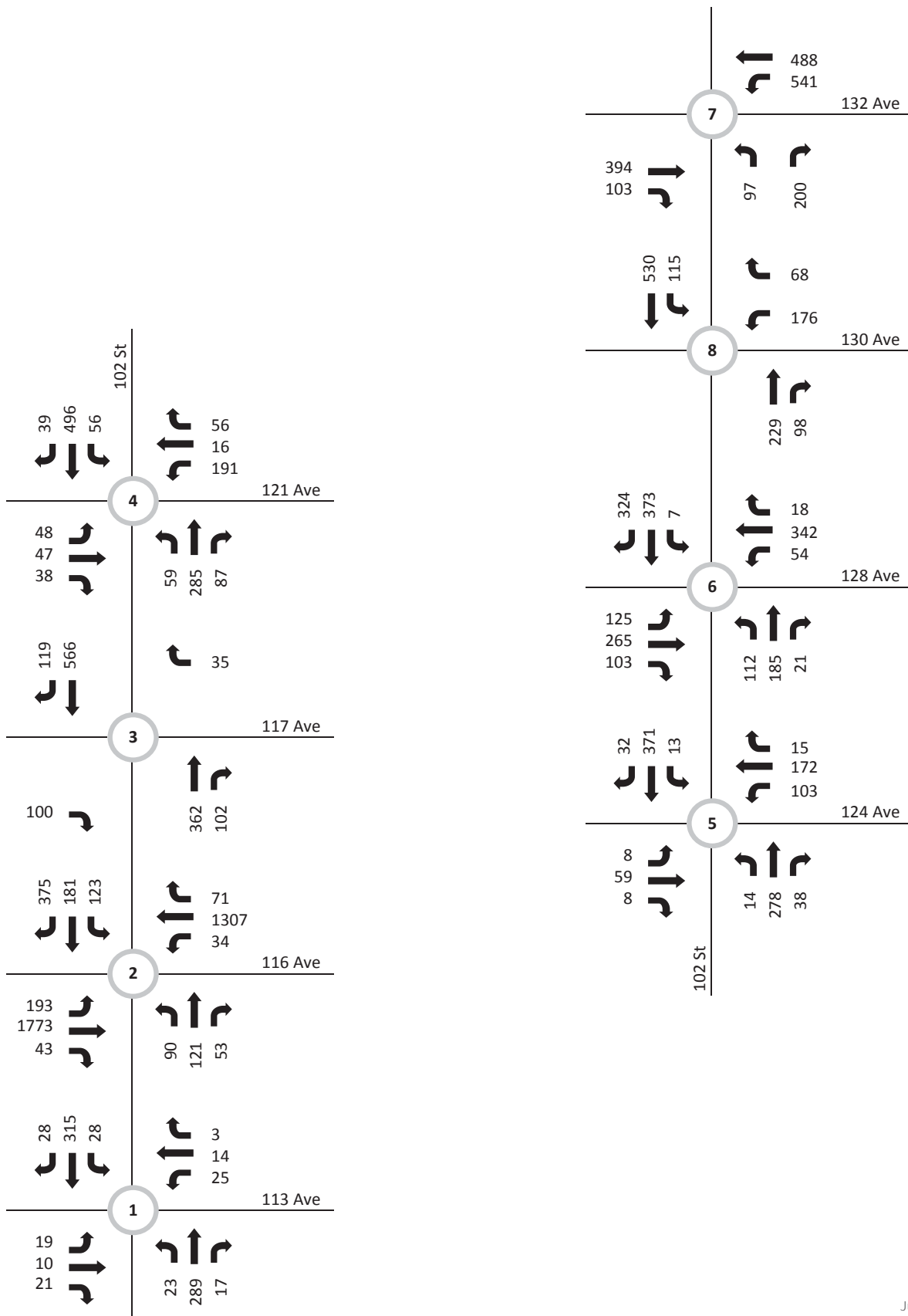
Client/Project  
City of Grande Prairie  
102 Street Traffic Study

Figure No.  
**5.5A**

Title  
**90K Design Volumes  
AM Peak Hour**



7/23/2014



July, 2014  
1162 39355

Client/Project  
City of Grande Prairie  
102 Street Traffic Study

Figure No.  
**5.5B**

Title  
**90K Design Volumes  
PM Peak Hour**



10160 - 112th Street  
Edmonton AB

## Appendix G SYNCHRO MODELLING OUTPUTS





























## **Synchro Outputs:**

**65K Population Horizon  
AM Peak Hour**

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave













7/22/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  							
Volume (vph)	212	733	41	56	874	85	42	113	23	59	72	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		80.0	70.0		80.0	50.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	4848	1553	1736	4848	1553	1736	1827	1553	1736	1827	1553
Flt Permitted	0.237			0.326			0.704			0.634		
Satd. Flow (perm)	433	4848	1526	595	4848	1526	1282	1827	1529	1155	1827	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47			97			67			166
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		261.2			310.8			341.8			80.2	
Travel Time (s)		13.4			16.0			24.6			5.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	7%	4%	4%	7%	4%	4%	4%	4%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	241	833	47	64	993	97	48	128	26	67	82	166
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	10.0	31.5	31.5	31.5	31.5	31.5	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (s)	15.0	47.5	47.5	32.5	32.5	32.5	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (%)	16.7%	52.8%	52.8%	36.1%	36.1%	36.1%	47.2%	47.2%	47.2%	47.2%	47.2%	47.2%
Yellow Time (s)	3.0	4.5	4.5	4.5	4.5	4.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	5.5	5.5	5.5	5.5	5.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Recall Mode	None	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None	None
Act Effct Green (s)	65.0	62.5	62.5	50.0	50.0	50.0	17.5	17.5	17.5	17.5	17.5	17.5
Actuated g/C Ratio	0.72	0.69	0.69	0.56	0.56	0.56	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.54	0.25	0.04	0.19	0.37	0.11	0.19	0.36	0.07	0.30	0.23	0.39
Control Delay	10.8	6.9	3.4	17.4	14.1	4.6	28.7	32.2	0.4	31.5	29.4	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.8	6.9	3.4	17.4	14.1	4.6	28.7	32.2	0.4	31.5	29.4	6.4
LOS	B	A	A	B	B	A	C	C	A	C	C	A
Approach Delay		7.6			13.5			27.3			17.7	
Approach LOS		A			B			C			B	
Queue Length 50th (m)	8.4	13.1	0.0	4.5	28.5	0.0	8.0	22.0	0.0	11.4	13.7	0.0

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave

7/22/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	39.2	42.9	5.5	20.9	70.8	10.4	11.8	25.0	0.3	15.5	17.4	10.7
Internal Link Dist (m)	237.2			286.8			317.8			56.2		
Turn Bay Length (m)	80.0		80.0	70.0		80.0	50.0					
Base Capacity (vph)	486	3366	1074	330	2691	890	541	771	684	487	771	741
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.25	0.04	0.19	0.37	0.11	0.09	0.17	0.04	0.14	0.11	0.22

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 12.6






Intersection LOS: B

Intersection Capacity Utilization 60.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 2: 102 St & 116 Ave

 $\phi 2$	 $\phi 4 (R)$
42.5 s	47.5 s
 $\phi 6$	 $\phi 7$
42.5 s	15 s
	 $\phi 8 (R)$
	32.5 s

Intersection										
Int Delay, s/veh	6.4									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	54	57	43	113	8	26	29	325	36	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	61	65	49	128	9	30	33	369	41	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	801	802	205	838	787	390	210	0	0	
Stage 1	326	326	-	456	456	-	-	-	-	
Stage 2	475	476	-	382	331	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	300	315	831	283	321	654	1349	-	-	
Stage 1	682	645	-	580	565	-	-	-	-	
Stage 2	567	553	-	636	642	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	265	291	831	218	297	654	1349	-	-	
Mov Cap-2 Maneuver	361	374	-	334	392	-	-	-	-	
Stage 1	665	611	-	566	551	-	-	-	-	
Stage 2	519	539	-	507	608	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	15.4			19.9			0.6			
HCM LOS	C			C						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1349	-	-	361	490	334	565	1138	-	-
HCM Lane V/C Ratio	0.024	-	-	0.17	0.232	0.384	0.068	0.053	-	-
HCM Control Delay (s)	7.7	-	-	17	14.6	22.4	11.8	8.3	-	-
HCM Lane LOS	A	-	-	C	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.9	1.8	0.2	0.2	-	-



<b>Intersection</b>			
Int Delay, s/veh			
<b>Movement</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
Vol, veh/h	53	176	9
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	4	4	4
Mvmt Flow	60	200	10
<b>Major/Minor</b>	<b>Major2</b>		
Conflicting Flow All	410	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1138	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1138	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
<b>Approach</b>	<b>SB</b>		
HCM Control Delay, s	1.9		
HCM LOS			
<b>Minor Lane/Major Mvmt</b>			

Intersection										
Int Delay, s/veh	3.6									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	4	74	3	47	31	10	3	242	79	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	5	84	3	53	35	11	3	275	90	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	540	562	165	561	518	320	166	0	0	
Stage 1	190	190	-	327	327	-	-	-	-	
Stage 2	350	372	-	234	191	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	450	433	874	435	459	716	1400	-	-	
Stage 1	807	739	-	681	644	-	-	-	-	
Stage 2	662	615	-	765	739	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	416	427	874	373	453	716	1400	-	-	
Mov Cap-2 Maneuver	494	491	-	477	516	-	-	-	-	
Stage 1	805	731	-	680	643	-	-	-	-	
Stage 2	614	614	-	667	731	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	13.6			12.8			0.1			
HCM LOS	B			B						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1400	-	-	494	500	477	554	1183	-	-
HCM Lane V/C Ratio	0.002	-	-	0.009	0.175	0.112	0.084	0.011	-	-
HCM Control Delay (s)	7.6	-	-	12.4	13.7	13.5	12.1	8.1	-	-
HCM Lane LOS	A	-	-	B	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.6	0.4	0.3	0	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	11	145	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	4	4	4
Mvmt Flow	12	165	1

Major/Minor	Major2		
Conflicting Flow All	365	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1183	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1183	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.6
HCM LOS	

Minor Lane/Major Mvmt

Intersection										
Int Delay, s/veh	6.7									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	74	108	14	16	125	5	19	281	41	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	84	123	16	18	142	6	22	319	47	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	667	616	176	663	610	343	192	0	0	
Stage 1	207	207	-	386	386	-	-	-	-	
Stage 2	460	409	-	277	224	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	370	403	862	372	407	695	1370	-	-	
Stage 1	790	727	-	633	607	-	-	-	-	
Stage 2	577	593	-	725	715	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	275	391	862	284	395	695	1370	-	-	
Mov Cap-2 Maneuver	350	461	-	398	469	-	-	-	-	
Stage 1	777	717	-	623	597	-	-	-	-	
Stage 2	429	583	-	582	705	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	16.5			15.8			0.4			
HCM LOS	C			C						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1370	-	-	350	487	398	475	1182	-	-
HCM Lane V/C Ratio	0.016	-	-	0.24	0.285	0.046	0.311	0.013	-	-
HCM Control Delay (s)	7.7	-	-	18.5	15.3	14.5	16	8.1	-	-
HCM Lane LOS	A	-	-	C	C	B	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.9	1.2	0.1	1.3	0	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	14	140	29
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	4	4	4
Mvmt Flow	16	159	33

Major/Minor	Major2		
Conflicting Flow All	366	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1182	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1182	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.6
HCM LOS	

Minor Lane/Major Mvmt

Intersection	
Int Delay, s/veh	8.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	77	27	137	19	43	311
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	500	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	88	31	156	22	49	353

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	436
Stage 1	-	-	103
Stage 2	-	-	333
Critical Hdwy	-	4.14	6.44
Critical Hdwy Stg 1	-	-	5.44
Critical Hdwy Stg 2	-	-	5.44
Follow-up Hdwy	-	2.236	3.536
Pot Cap-1 Maneuver	-	1458	574
Stage 1	-	-	916
Stage 2	-	-	722
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1458	512
Mov Cap-2 Maneuver	-	-	512
Stage 1	-	-	916
Stage 2	-	-	644

Approach	EB	WB	NB
HCM Control Delay, s	0	6.8	11.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	512	946	-	-	1458	-
HCM Lane V/C Ratio	0.095	0.374	-	-	0.107	-
HCM Control Delay (s)	12.8	11.1	-	-	7.8	0
HCM Lane LOS	B	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	1.7	-	-	0.4	-



Intersection							
Int Delay, s/veh	0.2						
Movement	WBL	WBR		NBT	NBR	SBL	SBT
Vol, veh/h	1	4		311	3	4	155
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, #	1	-		0	-	-	0
Grade, %	0	-		0	-	-	0
Peak Hour Factor	88	88		88	88	88	88
Heavy Vehicles, %	4	4		4	4	4	4
Mvmt Flow	1	5		353	3	5	176
Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	540	355		0	0	357	0
Stage 1	355	-		-	-	-	-
Stage 2	185	-		-	-	-	-
Critical Hdwy	6.44	6.24		-	-	4.14	-
Critical Hdwy Stg 1	5.44	-		-	-	-	-
Critical Hdwy Stg 2	5.44	-		-	-	-	-
Follow-up Hdwy	3.536	3.336		-	-	2.236	-
Pot Cap-1 Maneuver	499	684		-	-	1191	-
Stage 1	705	-		-	-	-	-
Stage 2	842	-		-	-	-	-
Platoon blocked, %				-	-		-
Mov Cap-1 Maneuver	497	684		-	-	1191	-
Mov Cap-2 Maneuver	572	-		-	-	-	-
Stage 1	705	-		-	-	-	-
Stage 2	838	-		-	-	-	-
Approach	WB			NB	SB		
HCM Control Delay, s	10.5			0	0.2		
HCM LOS	B						
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT		
Capacity (veh/h)	-	-	658	1191	-		
HCM Lane V/C Ratio	-	-	0.009	0.004	-		
HCM Control Delay (s)	-	-	10.5	8	0		
HCM Lane LOS	-	-	B	A	A		
HCM 95th %tile Q(veh)	-	-	0	0	-		

Intersection												
Intersection Delay, s/veh	10											
Intersection LOS	A											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	11	19	0	14	8	20	0	17	232	19
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	23	12	22	0	16	9	23	0	19	264	22
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	1
HCM Control Delay	8.7	8.5	10.7
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	40%	33%	2%	0%
Vol Thru, %	0%	92%	22%	19%	98%	0%
Vol Right, %	0%	8%	38%	48%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	17	251	50	42	180	14
LT Vol	0	232	11	8	176	0
Through Vol	0	19	19	20	0	14
RT Vol	17	0	20	14	4	0
Lane Flow Rate	19	285	57	48	205	16
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.03	0.394	0.081	0.068	0.29	0.019
Departure Headway (Hd)	5.527	4.971	5.151	5.095	5.109	4.393
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	648	724	693	701	704	813
Service Time	3.262	2.706	3.198	3.143	2.846	2.131
HCM Lane V/C Ratio	0.029	0.394	0.082	0.068	0.291	0.02
HCM Control Delay	8.4	10.9	8.7	8.5	9.9	7.2
HCM Lane LOS	A	B	A	A	A	A
HCM 95th-tile Q	0.1	1.9	0.3	0.2	1.2	0.1

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Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	4	176	14
Peak Hour Factor	0.88	0.88	0.88	0.88
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	5	200	16
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	9.7
HCM LOS	A

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Lane





























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## **Synchro Outputs:**

**65K Population Horizon  
PM Peak Hour**

Lanes, Volumes, Timings  
2: 102 St & 116 Ave













7/22/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  							
Volume (vph)	214	1100	22	40	1013	73	82	89	54	130	175	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		80.0	70.0		80.0	50.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	4848	1553	1736	4848	1553	1736	1827	1553	1736	1827	1553
Flt Permitted	0.185			0.224			0.523			0.694		
Satd. Flow (perm)	338	4848	1526	409	4848	1526	953	1827	1529	1264	1827	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			24			79			79			334
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		261.2			310.8			341.8			80.2	
Travel Time (s)		13.4			16.0			24.6			5.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
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 (%)	4%	7%	4%	4%	7%	4%	4%	4%	4%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	233	1196	24	43	1101	79	89	97	59	141	190	334
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	11.0	31.5	31.5	30.0	30.0	30.0	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (s)	17.0	47.5	47.5	30.5	30.5	30.5	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (%)	18.9%	52.8%	52.8%	33.9%	33.9%	33.9%	47.2%	47.2%	47.2%	47.2%	47.2%	47.2%
Yellow Time (s)	3.0	4.5	4.5	3.0	3.0	3.0	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	5.5	5.5	4.0	4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Recall Mode	None	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	None	None	None
Act Effct Green (s)	61.0	59.5	59.5	46.9	46.9	46.9	20.5	20.5	20.5	20.5	20.5	20.5
Actuated g/C Ratio	0.68	0.66	0.66	0.52	0.52	0.52	0.23	0.23	0.23	0.23	0.23	0.23
v/c Ratio	0.60	0.37	0.02	0.20	0.44	0.09	0.41	0.23	0.14	0.49	0.46	0.55
Control Delay	14.7	8.7	4.5	20.6	16.3	5.4	33.1	27.3	3.5	34.4	32.0	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	8.7	4.5	20.6	16.3	5.4	33.1	27.3	3.5	34.4	32.0	6.2
LOS	B	A	A	C	B	A	C	C	A	C	C	A
Approach Delay		9.6			15.7			23.7			19.5	
Approach LOS		A			B			C			B	
Queue Length 50th (m)	10.6	24.8	0.0	3.3	36.1	0.0	15.0	15.7	0.0	24.3	32.4	0.0

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave

7/22/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	41.2	67.2	4.2	16.9	83.1	10.1	20.9	20.3	4.9	30.2	36.7	15.5
Internal Link Dist (m)	237.2			286.8			317.8			56.2		
Turn Bay Length (m)	80.0		80.0	70.0		80.0	50.0					
Base Capacity (vph)	430	3206	1017	213	2527	833	402	771	691	533	771	838
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.37	0.02	0.20	0.44	0.09	0.22	0.13	0.09	0.26	0.25	0.40

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 14.5

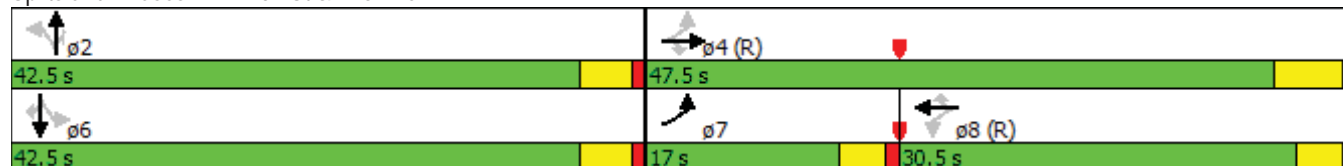
Intersection LOS: B

Intersection Capacity Utilization 81.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 2: 102 St & 116 Ave





Intersection										
Int Delay, s/veh	7.1									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	28	49	39	120	17	36	57	255	90	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	30	53	42	130	18	39	62	277	98	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	1101	1121	524	1120	1087	326	539	0	0	
Stage 1	622	622	-	450	450	-	-	-	-	
Stage 2	479	499	-	670	637	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	188	204	549	182	214	711	1019	-	-	
Stage 1	471	476	-	585	568	-	-	-	-	
Stage 2	564	540	-	443	468	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	156	184	549	134	193	711	1019	-	-	
Mov Cap-2 Maneuver	271	293	-	223	289	-	-	-	-	
Stage 1	442	456	-	549	533	-	-	-	-	
Stage 2	483	507	-	346	448	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	18.6			33			1.2			
HCM LOS	C			D						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1019	-	-	271	369	223	484	1173	-	-
HCM Lane V/C Ratio	0.061	-	-	0.112	0.259	0.585	0.119	0.042	-	-
HCM Control Delay (s)	8.8	-	-	20	18.1	41.6	13.4	8.2	-	-
HCM Lane LOS	A	-	-	C	C	E	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	1	3.3	0.4	0.1	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	45	469	27
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	4	4	4
Mvmt Flow	49	510	29

Major/Minor	Major2		
Conflicting Flow All	375	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1173	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1173	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.7
HCM LOS	

Minor Lane/Major Mvmt

Intersection										
Int Delay, s/veh	4.7									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	1	41	4	105	99	15	4	193	63	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	1	45	4	114	108	16	4	210	68	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	696	668	353	658	637	244	355	0	0	
Stage 1	381	381	-	253	253	-	-	-	-	
Stage 2	315	287	-	405	384	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	353	377	686	375	392	790	1193	-	-	
Stage 1	637	610	-	747	694	-	-	-	-	
Stage 2	692	671	-	618	608	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	281	372	686	341	386	790	1193	-	-	
Mov Cap-2 Maneuver	398	456	-	440	466	-	-	-	-	
Stage 1	635	603	-	744	692	-	-	-	-	
Stage 2	570	669	-	562	601	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	13.5			15.3			0.1			
HCM LOS	B			C						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1193	-	-	398	470	440	493	1273	-	-
HCM Lane V/C Ratio	0.004	-	-	0.003	0.104	0.259	0.251	0.011	-	-
HCM Control Delay (s)	8	-	-	14.1	13.5	16	14.7	7.9	-	-
HCM Lane LOS	A	-	-	B	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	1	1	0	-	-

<b>Intersection</b>			
Int Delay, s/veh			
<b>Movement</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
Vol, veh/h	13	322	5
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	4	4	4
Mvmt Flow	14	350	5
<b>Major/Minor</b>	<b>Major2</b>		
Conflicting Flow All	278	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1273	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1273	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
<b>Approach</b>	<b>SB</b>		
HCM Control Delay, s	0.3		
HCM LOS			
<b>Minor Lane/Major Mvmt</b>			

Intersection										
Int Delay, s/veh	8									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	38	166	25	54	144	18	19	187	21	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	41	180	27	59	157	20	21	203	23	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	819	742	460	835	784	215	513	0	0	
Stage 1	475	475	-	256	256	-	-	-	-	
Stage 2	344	267	-	579	528	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	292	341	597	285	323	820	1042	-	-	
Stage 1	567	554	-	744	692	-	-	-	-	
Stage 2	667	684	-	497	524	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	194	332	597	178	315	820	1042	-	-	
Mov Cap-2 Maneuver	324	423	-	251	399	-	-	-	-	
Stage 1	556	551	-	729	678	-	-	-	-	
Stage 2	491	670	-	317	521	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	19.9			20.5			0.7			
HCM LOS	C			C						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1042	-	-	324	440	251	423	1331	-	-
HCM Lane V/C Ratio	0.02	-	-	0.127	0.472	0.234	0.416	0.006	-	-
HCM Control Delay (s)	8.5	-	-	17.7	20.3	23.7	19.4	7.7	-	-
HCM Lane LOS	A	-	-	C	C	C	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	2.5	0.9	2	0	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	7	374	98
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	4	4	4
Mvmt Flow	8	407	107

Major/Minor	Major2		
Conflicting Flow All	226	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1331	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1331	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach SB

HCM Control Delay, s 0.1

HCM LOS

Minor Lane/Major Mvmt



Intersection	
Int Delay, s/veh	7.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	25	57	414	103	36	182
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	500	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	27	62	450	112	39	198

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	89	1070
Stage 1	-	-	58
Stage 2	-	-	1012
Critical Hdwy	-	4.14	6.44
Critical Hdwy Stg 1	-	-	5.44
Critical Hdwy Stg 2	-	-	5.44
Follow-up Hdwy	-	2.236	3.536
Pot Cap-1 Maneuver	-	1494	243
Stage 1	-	-	959
Stage 2	-	-	348
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1494	165
Mov Cap-2 Maneuver	-	-	165
Stage 1	-	-	959
Stage 2	-	-	236

Approach	EB	WB	NB
HCM Control Delay, s	0	6.8	13.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	165	1002	-	-	1494	-
HCM Lane V/C Ratio	0.237	0.197	-	-	0.301	-
HCM Control Delay (s)	33.5	9.5	-	-	8.4	0
HCM Lane LOS	D	A	-	-	A	A
HCM 95th %tile Q(veh)	0.9	0.7	-	-	1.3	-

Intersection						
Int Delay, s/veh	0.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	4	5	206	1	5	415
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, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	4	5	224	1	5	451
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	686	224	0	0	225	0
Stage 1	224	-	-	-	-	-
Stage 2	462	-	-	-	-	-
Critical Hdwy	6.44	6.24	-	-	4.14	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	-	-	2.236	-
Pot Cap-1 Maneuver	410	810	-	-	1332	-
Stage 1	809	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	408	810	-	-	1332	-
Mov Cap-2 Maneuver	502	-	-	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	627	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10.7	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT	
Capacity (veh/h)	-	-	636	1332	-	
HCM Lane V/C Ratio	-	-	0.015	0.004	-	
HCM Control Delay (s)	-	-	10.7	7.7	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

Intersection												
Intersection Delay, s/veh	11.8											
Intersection LOS	B											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	18	10	22	0	25	14	5	0	25	255	18
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, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	20	11	24	0	27	15	5	0	27	277	20
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	1
HCM Control Delay	9.1	9.4	11.4
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	36%	57%	8%	0%
Vol Thru, %	0%	93%	20%	32%	92%	0%
Vol Right, %	0%	7%	44%	11%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	25	273	50	44	327	26
LT Vol	0	255	10	14	300	0
Through Vol	0	18	22	5	0	26
RT Vol	25	0	18	25	27	0
Lane Flow Rate	27	297	54	48	355	28
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.043	0.424	0.083	0.077	0.512	0.035
Departure Headway (Hd)	5.692	5.142	5.531	5.78	5.181	4.435
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	627	697	642	615	693	803
Service Time	3.445	2.895	3.614	3.864	2.932	2.185
HCM Lane V/C Ratio	0.043	0.426	0.084	0.078	0.512	0.035
HCM Control Delay	8.7	11.7	9.1	9.4	13.3	7.3
HCM Lane LOS	A	B	A	A	B	A
HCM 95th-tile Q	0.1	2.1	0.3	0.2	2.9	0.1

### Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	27	300	26
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	29	326	28
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	12.9
HCM LOS	B






























### Lane

## **Synchro Outputs:**

**78K Population Horizon  
AM Peak Hour**

Lanes, Volumes, Timings  
2: 102 St & 116 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  						 	
Volume (vph)	230	791	45	56	977	84	48	116	20	58	80	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		80.0	70.0		80.0	50.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	4848	1553	1736	4848	1553	1736	1827	1553	1736	1827	1553
Flt Permitted	0.178			0.305			0.698			0.625		
Satd. Flow (perm)	325	4848	1526	556	4848	1526	1271	1827	1529	1138	1827	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			51			95			79			142
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		261.2			310.8			341.8			80.2	
Travel Time (s)		13.4			16.0			24.6			5.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	7%	4%	4%	7%	4%	4%	4%	4%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	261	899	51	64	1110	95	55	132	23	66	91	142
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	12.5	30.0	30.0	30.0	30.0	30.0	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (s)	17.0	47.5	47.5	30.5	30.5	30.5	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (%)	18.9%	52.8%	52.8%	33.9%	33.9%	33.9%	47.2%	47.2%	47.2%	47.2%	47.2%	47.2%
Yellow Time (s)	4.5	3.0	3.0	3.0	3.0	3.0	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Recall Mode	None	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	Min	Min	Min
Act Effct Green (s)	62.5	64.0	64.0	46.6	46.6	46.6	17.5	17.5	17.5	17.5	17.5	17.5
Actuated g/C Ratio	0.69	0.71	0.71	0.52	0.52	0.52	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.63	0.26	0.05	0.22	0.44	0.11	0.22	0.37	0.06	0.30	0.26	0.34
Control Delay	16.5	6.4	3.1	19.8	16.5	4.9	29.3	32.4	0.3	31.4	29.9	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	6.4	3.1	19.8	16.5	4.9	29.3	32.4	0.3	31.4	29.9	6.4
LOS	B	A	A	B	B	A	C	C	A	C	C	A
Approach Delay		8.4			15.8			28.1			19.1	
Approach LOS		A			B			C			B	
Queue Length 50th (m)	10.9	13.0	0.0	5.3	38.4	0.0	9.2	22.8	0.0	11.2	15.3	0.0

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	#59.5	45.0	5.5	21.5	81.6	10.4	13.1	25.8	0.0	15.4	18.8	10.0
Internal Link Dist (m)	237.2			286.8			317.8			56.2		
Turn Bay Length (m)	80.0		80.0	70.0		80.0	50.0					
Base Capacity (vph)	421	3445	1099	287	2507	835	536	771	691	480	771	727
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.26	0.05	0.22	0.44	0.11	0.10	0.17	0.03	0.14	0.12	0.20

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 14.0

Intersection LOS: B

Intersection Capacity Utilization 59.4%

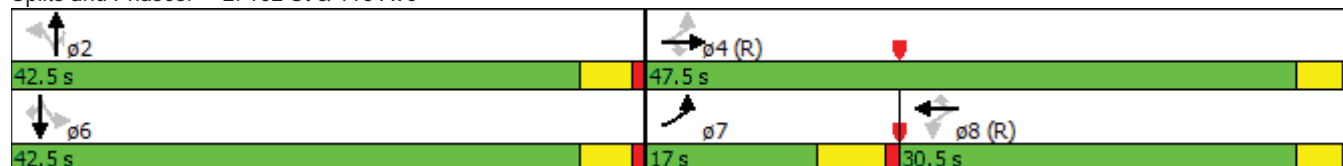
ICU Level of Service B

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: 102 St & 116 Ave

























# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	56	44	113	7	30	31	326	59	60	170	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	0.98		0.99	1.00		1.00	1.00	
Frt		0.934			0.879			0.977			0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1694	0	1736	1571	0	1736	1777	0	1736	1799	0
Flt Permitted	0.730			0.684			0.626			0.483		
Satd. Flow (perm)	1325	1694	0	1245	1571	0	1138	1777	0	879	1799	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50			34			18			9	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		111.7			168.7			383.3			329.7	
Travel Time (s)		8.0			12.1			27.6			23.7	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	114	0	128	42	0	35	437	0	68	211	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	32.0	32.0		32.0	32.0		31.0	31.0		31.0	31.0	
Total Split (s)	32.0	32.0		32.0	32.0		43.0	43.0		43.0	43.0	
Total Split (%)	42.7%	42.7%		42.7%	42.7%		57.3%	57.3%		57.3%	57.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)	15.9	15.9		15.9	15.9		54.3	54.3		54.3	54.3	
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.72	0.72		0.72	0.72	
v/c Ratio	0.23	0.29		0.48	0.12		0.04	0.34		0.11	0.16	
Control Delay	24.5	15.3		30.9	9.7		6.4	7.0		6.8	5.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.5	15.3		30.9	9.7		6.4	7.0		6.8	5.9	
LOS	C	B		C	A		A	A		A	A	
Approach Delay		18.6			25.7			6.9			6.1	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	8.7	8.3		17.8	1.0		1.3	19.5		2.6	8.1	
Queue Length 95th (m)	14.6	16.3		25.8	6.7		6.5	57.4		11.4	26.3	

# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	87.7			144.7			359.3			305.7		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	485	652		456	597		824	1291		636	1304	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.14	0.17		0.28	0.07		0.04	0.34		0.11	0.16	

### Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 11.5





Intersection LOS: B

Intersection Capacity Utilization 59.8%

ICU Level of Service B





















Analysis Period (min) 15

### Splits and Phases: 4: 102 St & 121 Ave

 ø2 (R)	 ø4
43 s	32 s
 ø6 (R)	 ø8
43 s	32 s

Lanes, Volumes, Timings  
6: 102 St & 128 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	241	206	38	16	172	5	35	280	41	14	142	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Frt		0.977			0.996			0.981			0.942	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1777	0	1736	1818	0	1736	1786	0	1736	1703	0
Flt Permitted	0.632			0.576			0.597			0.478		
Satd. Flow (perm)	1149	1777	0	1048	1818	0	1086	1786	0	870	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			3			13			53	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		331.3			207.9			431.9			207.4	
Travel Time (s)		23.9			15.0			31.1			14.9	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	274	277	0	18	201	0	40	365	0	16	262	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		32.5	32.5		32.5	32.5	
Total Split (s)	38.0	38.0		38.0	38.0		37.0	37.0		37.0	37.0	
Total Split (%)	50.7%	50.7%		50.7%	50.7%		49.3%	49.3%		49.3%	49.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effect Green (s)	17.2	17.2		17.2	17.2		17.9	17.9		17.9	17.9	
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.40	0.40		0.40	0.40	
v/c Ratio	0.62	0.40		0.04	0.29		0.09	0.50		0.05	0.37	
Control Delay	18.4	11.5		9.4	10.8		10.8	13.6		10.7	10.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.4	11.5		9.4	10.8		10.8	13.6		10.7	10.2	
LOS	B	B		A	B		B	B		B	B	
Approach Delay		14.9			10.6			13.4			10.2	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	14.4	12.2		0.8	8.9		1.6	17.1		0.6	9.3	
Queue Length 95th (m)	45.0	36.3		4.5	27.2		8.3	53.0		4.4	32.7	

# Lanes, Volumes, Timings

6: 102 St & 128 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	307.3			183.9			407.9			183.4		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	911	1413		831	1443		836	1378		669	1323	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.30	0.20		0.02	0.14		0.05	0.26		0.02	0.20	

## Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 44.6

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 12.9





Intersection LOS: B

Intersection Capacity Utilization 65.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 6: 102 St & 128 Ave

 ø2	 ø4
37 s	38 s
 ø6	 ø8
37 s	38 s

Intersection										
Int Delay, s/veh	4.3									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	7	113	7	26	43	10	5	252	74	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	8	128	8	30	49	11	6	286	84	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	589	601	194	627	559	328	194	0	0	
Stage 1	219	219	-	340	340	-	-	-	-	
Stage 2	370	382	-	287	219	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	417	411	842	393	435	709	1367	-	-	
Stage 1	779	718	-	671	636	-	-	-	-	
Stage 2	646	609	-	716	718	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	375	405	842	305	428	709	1367	-	-	
Mov Cap-2 Maneuver	462	476	-	418	498	-	-	-	-	
Stage 1	776	710	-	668	633	-	-	-	-	
Stage 2	584	606	-	575	710	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	15.1			13.2			0.1			
HCM LOS	C			B						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1367	-	-	462	488	418	528	1178	-	-
HCM Lane V/C Ratio	0.004	-	-	0.017	0.279	0.071	0.114	0.011	-	-
HCM Control Delay (s)	7.6	-	-	12.9	15.2	14.3	12.7	8.1	-	-
HCM Lane LOS	A	-	-	B	C	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	1.1	0.2	0.4	0	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	11	170	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	4	4	4
Mvmt Flow	12	193	1

Major/Minor	Major2		
Conflicting Flow All	370	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1178	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1178	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.5
HCM LOS	

Minor Lane/Major Mvmt

Intersection						
Int Delay, s/veh	2.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	80	74	412	116	5	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	500	0	-	-	-	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	91	84	468	132	6	188
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	733	534	0	0	600	0
Stage 1	534	-	-	-	-	-
Stage 2	199	-	-	-	-	-
Critical Hdwy	6.44	6.24	-	-	4.14	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	-	-	2.236	-
Pot Cap-1 Maneuver	385	542	-	-	967	-
Stage 1	584	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	382	542	-	-	967	-
Mov Cap-2 Maneuver	475	-	-	-	-	-
Stage 1	584	-	-	-	-	-
Stage 2	824	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	13.7	0	0.3			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	475	542	967	-
HCM Lane V/C Ratio	-	-	0.191	0.155	0.006	-
HCM Control Delay (s)	-	-	14.4	12.9	8.7	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.5	0	-



Intersection												
Intersection Delay, s/veh	10.1											
Intersection LOS	B											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	11	17	0	13	8	21	0	17	233	19
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	23	12	19	0	15	9	24	0	19	265	22
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	1
HCM Control Delay	8.7	8.5	10.8
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	42%	31%	2%	0%
Vol Thru, %	0%	92%	23%	19%	98%	0%
Vol Right, %	0%	8%	35%	50%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	17	252	48	42	189	15
LT Vol	0	233	11	8	185	0
Through Vol	0	19	17	21	0	15
RT Vol	17	0	20	13	4	0
Lane Flow Rate	19	286	55	48	215	17
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.03	0.396	0.079	0.068	0.305	0.021
Departure Headway (Hd)	5.532	4.976	5.195	5.098	5.104	4.39
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	647	722	687	700	702	813
Service Time	3.269	2.713	3.248	3.152	2.843	2.128
HCM Lane V/C Ratio	0.029	0.396	0.08	0.069	0.306	0.021
HCM Control Delay	8.4	11	8.7	8.5	10.1	7.2
HCM Lane LOS	A	B	A	A	B	A
HCM 95th-tile Q	0.1	1.9	0.3	0.2	1.3	0.1

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Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	4	185	15
Peak Hour Factor	0.88	0.88	0.88	0.88
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	5	210	17
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	9.9
HCM LOS	A

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Lane

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



## **Synchro Outputs:**

**78K Population Horizon  
PM Peak Hour**

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  						 	
Volume (vph)	186	1239	32	35	1091	73	88	99	54	127	177	328
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		80.0	70.0		80.0	50.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	4848	1553	1736	4848	1553	1736	1827	1553	1736	1827	1553
Flt Permitted	0.167			0.191			0.513			0.671		
Satd. Flow (perm)	305	4848	1526	349	4848	1526	935	1827	1529	1222	1827	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			35			79			73			310
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		261.2			310.8			341.8			80.2	
Travel Time (s)		13.4			16.0			24.6			5.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
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 (%)	4%	7%	4%	4%	7%	4%	4%	4%	4%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	202	1347	35	38	1186	79	96	108	59	138	192	357
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	8	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	11.5	31.0	31.0	31.0	31.0	31.0	43.0	43.0	43.0	43.0	43.0	43.0
Total Split (s)	15.2	47.0	47.0	31.8	31.8	31.8	43.0	43.0	43.0	43.0	43.0	43.0
Total Split (%)	16.9%	52.2%	52.2%	35.3%	35.3%	35.3%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Recall Mode	None	C-Min	C-Min	C-Min	C-Min	C-Min	None	None	None	Min	Min	Min
Act Effect Green (s)	61.4	61.4	61.4	47.6	47.6	47.6	20.1	20.1	20.1	19.6	19.6	19.6
Actuated g/C Ratio	0.68	0.68	0.68	0.53	0.53	0.53	0.22	0.22	0.22	0.22	0.22	0.22
v/c Ratio	0.57	0.41	0.03	0.21	0.46	0.09	0.46	0.27	0.15	0.52	0.48	0.62
Control Delay	14.1	8.4	3.8	21.3	16.4	5.2	34.8	27.8	4.4	35.9	33.0	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.1	8.4	3.8	21.3	16.4	5.2	34.8	27.8	4.4	35.9	33.0	9.7
LOS	B	A	A	C	B	A	C	C	A	D	C	A
Approach Delay		9.0			15.8			25.1			21.5	
Approach LOS		A			B			C			C	
Queue Length 50th (m)	9.8	29.3	0.0	3.1	42.2	0.0	16.0	17.1	0.0	23.4	32.3	7.3

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	36.0	76.5	4.9	15.8	90.0	9.9	22.3	22.0	5.5	29.6	37.0	22.6
Internal Link Dist (m)	237.2			286.8			317.8			56.2		
Turn Bay Length (m)	80.0		80.0	70.0		80.0	50.0					
Base Capacity (vph)	381	3308	1052	184	2562	843	405	791	703	522	781	831
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.41	0.03	0.21	0.46	0.09	0.24	0.14	0.08	0.26	0.25	0.43

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 14.7

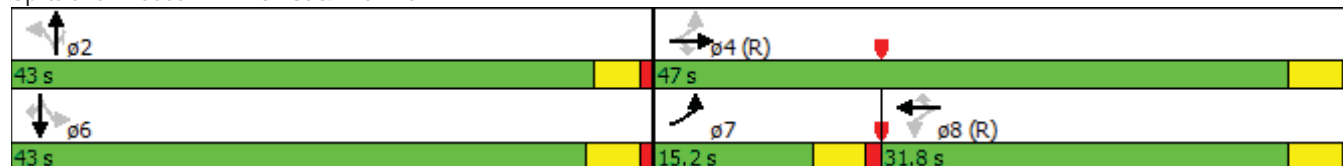
Intersection LOS: B

Intersection Capacity Utilization 74.3%

ICU Level of Service D

Analysis Period (min) 15





















### Splits and Phases: 2: 102 St & 116 Ave



# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	49	41	151	16	45	59	246	89	50	470	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	0.98		1.00	0.99		1.00	1.00	
Frt		0.931			0.889			0.960			0.990	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1688	0	1736	1592	0	1736	1741	0	1736	1806	0
Flt Permitted	0.714			0.694			0.397			0.522		
Satd. Flow (perm)	1296	1688	0	1263	1592	0	723	1741	0	950	1806	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45			49			36			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		111.7			168.7			383.3			329.7	
Travel Time (s)		8.0			12.1			27.6			23.7	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	98	0	164	66	0	64	364	0	54	546	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	32.0	32.0		32.0	32.0		31.0	31.0		31.0	31.0	
Total Split (s)	32.0	32.0		32.0	32.0		43.0	43.0		43.0	43.0	
Total Split (%)	42.7%	42.7%		42.7%	42.7%		57.3%	57.3%		57.3%	57.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Act Effect Green (s)	16.8	16.8		16.8	16.8		49.2	49.2		49.2	49.2	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.66	0.66		0.66	0.66	
v/c Ratio	0.14	0.24		0.58	0.17		0.14	0.32		0.09	0.46	
Control Delay	21.7	13.9		33.1	9.6		7.7	7.1		7.1	9.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.7	13.9		33.1	9.6		7.7	7.1		7.1	9.2	
LOS	C	B		C	A		A	A		A	A	
Approach Delay		16.2			26.4			7.2			9.0	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	5.0	6.6		22.6	2.1		2.8	16.3		2.3	31.0	
Queue Length 95th (m)	10.2	14.8		33.5	9.3		11.6	45.8		9.5	81.1	

# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	87.7			144.7			359.3			305.7		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	475	647		463	614		473	1154		623	1186	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.15		0.35	0.11		0.14	0.32		0.09	0.46	

### Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 12.0





Intersection LOS: B

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15





















### Splits and Phases: 4: 102 St & 121 Ave

 ø2 (R)	 ø4
43 s	32 s
 ø6 (R)	 ø8
43 s	32 s



Lanes, Volumes, Timings  
6: 102 St & 128 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	229	46	54	274	18	50	189	21	7	373	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.99	0.99	
Frt		0.975			0.991			0.985			0.931	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1773	0	1736	1807	0	1736	1794	0	1736	1679	0
Flt Permitted	0.443			0.470			0.193			0.616		
Satd. Flow (perm)	806	1773	0	855	1807	0	352	1794	0	1119	1679	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			4			11			83	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		331.3			207.9			431.9			208.4	
Travel Time (s)		23.9			15.0			31.1			15.0	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	129	299	0	59	318	0	54	228	0	8	754	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		32.5	32.5		32.5	32.5	
Total Split (s)	33.0	33.0		33.0	33.0		57.0	57.0		57.0	57.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%		63.3%	63.3%		63.3%	63.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	18.0	18.0		18.0	18.0		30.4	30.4		30.4	30.4	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.52	0.52		0.52	0.52	
v/c Ratio	0.52	0.54		0.22	0.57		0.30	0.24		0.01	0.83	
Control Delay	29.4	22.9		21.6	24.0		13.4	8.1		7.4	19.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.4	22.9		21.6	24.0		13.4	8.1		7.4	19.3	
LOS	C	C		C	C		B	A		A	B	
Approach Delay		24.8			23.6			9.1			19.2	
Approach LOS		C			C			A			B	
Queue Length 50th (m)	10.9	24.3		4.5	26.9		2.7	10.3		0.4	49.0	
Queue Length 95th (m)	37.8	68.1		18.1	74.1		12.3	29.1		2.4	132.8	

# Lanes, Volumes, Timings

6: 102 St & 128 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	307.3			183.9			407.9			184.4		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	438	969		464	984		303	1546		963	1457	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.29	0.31		0.13	0.32		0.18	0.15		0.01	0.52	

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 58.5

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 19.9

Intersection LOS: B

Intersection Capacity Utilization 79.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 6: 102 St & 128 Ave



Lanes, Volumes, Timings  
7: 102 St & 132 Ave

7/23/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰		↱	↲	↳	↴
Volume (vph)	56	60	588	74	36	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	50.0		50.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.99		0.99	0.97
Frt	0.930					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1675	0	1736	1827	1736	1553
Flt Permitted			0.506		0.950	
Satd. Flow (perm)	1675	0	919	1827	1723	1510
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	65					208
Link Speed (k/h)	50			50	50	
Link Distance (m)	172.2			175.7	170.3	
Travel Time (s)	12.4			12.7	12.3	
Confl. Peds. (#/hr)		5	5		5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	126	0	639	80	39	208
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	20.0		8.0	20.0	20.0	20.0
Total Split (s)	20.0		8.0	20.0	20.0	20.0
Total Split (%)	41.7%		16.7%	41.7%	41.7%	41.7%
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None		None	None	Min	Min
Act Effct Green (s)	6.9		11.1	11.1	6.8	6.8
Actuated g/C Ratio	0.26		0.42	0.42	0.26	0.26
v/c Ratio	0.26		1.17	0.10	0.09	0.38
Control Delay	7.1		110.2	4.6	9.8	4.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	7.1		110.2	4.6	9.8	4.5
LOS	A		F	A	A	A
Approach Delay	7.1			98.5	5.3	
Approach LOS	A			F	A	
Queue Length 50th (m)	2.3		~21.3	1.5	1.5	0.0
Queue Length 95th (m)	10.1		#89.2	5.7	5.6	8.9

# Lanes, Volumes, Timings

7: 102 St & 132 Ave

7/23/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Internal Link Dist (m)	148.2			151.7	146.3	
Turn Bay Length (m)			50.0		50.0	
Base Capacity (vph)	1102		545	1582	1118	1046
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	0.11		1.17	0.05	0.03	0.20

## Intersection Summary

Area Type: Other

Cycle Length: 48

Actuated Cycle Length: 26.3

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.17

Intersection Signal Delay: 66.9

Intersection LOS: E

Intersection Capacity Utilization 50.8%

ICU Level of Service A

Analysis Period (min) 15

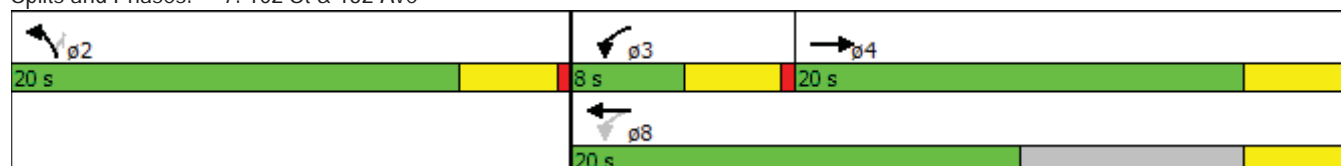
~ Volume exceeds capacity, queue is theoretically infinite.

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: 7: 102 St & 132 Ave



Intersection										
Int Delay, s/veh	4.3									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	7	113	7	26	43	10	5	252	74	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	8	128	8	30	49	11	6	286	84	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	589	601	194	627	559	328	194	0	0	
Stage 1	219	219	-	340	340	-	-	-	-	
Stage 2	370	382	-	287	219	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	417	411	842	393	435	709	1367	-	-	
Stage 1	779	718	-	671	636	-	-	-	-	
Stage 2	646	609	-	716	718	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	375	405	842	305	428	709	1367	-	-	
Mov Cap-2 Maneuver	462	476	-	418	498	-	-	-	-	
Stage 1	776	710	-	668	633	-	-	-	-	
Stage 2	584	606	-	575	710	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	15.1			13.2			0.1			
HCM LOS	C			B						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1367	-	-	462	488	418	528	1178	-	-
HCM Lane V/C Ratio	0.004	-	-	0.017	0.279	0.071	0.114	0.011	-	-
HCM Control Delay (s)	7.6	-	-	12.9	15.2	14.3	12.7	8.1	-	-
HCM Lane LOS	A	-	-	B	C	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	1.1	0.2	0.4	0	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	11	170	1
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	4	4	4
Mvmt Flow	12	193	1

Major/Minor	Major2		
Conflicting Flow All	370	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1178	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1178	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.5
HCM LOS	

Minor Lane/Major Mvmt

Intersection						
Int Delay, s/veh	2.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	80	74	412	116	5	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	500	0	-	-	-	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	91	84	468	132	6	188
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	733	534	0	0	600	0
Stage 1	534	-	-	-	-	-
Stage 2	199	-	-	-	-	-
Critical Hdwy	6.44	6.24	-	-	4.14	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	-	-	2.236	-
Pot Cap-1 Maneuver	385	542	-	-	967	-
Stage 1	584	-	-	-	-	-
Stage 2	830	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	382	542	-	-	967	-
Mov Cap-2 Maneuver	475	-	-	-	-	-
Stage 1	584	-	-	-	-	-
Stage 2	824	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	13.7		0		0.3	
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	475	542	967	-
HCM Lane V/C Ratio	-	-	0.191	0.155	0.006	-
HCM Control Delay (s)	-	-	14.4	12.9	8.7	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.5	0	-



Intersection												
Intersection Delay, s/veh	12											
Intersection LOS	B											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	10	22	0	25	14	5	0	23	268	17
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, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	22	11	24	0	27	15	5	0	25	291	18
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	1
HCM Control Delay	9.2	9.4	11.8
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	100%	0%	38%	57%	8%	0%
Vol Thru, %	0%	94%	19%	32%	92%	0%
Vol Right, %	0%	6%	42%	11%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	23	285	52	44	330	27
LT Vol	0	268	10	14	302	0
Through Vol	0	17	22	5	0	27
RT Vol	23	0	20	25	28	0
Lane Flow Rate	25	310	57	48	359	29
Geometry Grp	7	7	2	2	7	7
Degree of Util (X)	0.04	0.444	0.088	0.077	0.518	0.036
Departure Headway (Hd)	5.703	5.157	5.582	5.821	5.199	4.452
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	625	694	636	610	689	799
Service Time	3.462	2.916	3.669	3.911	2.955	2.207
HCM Lane V/C Ratio	0.04	0.447	0.09	0.079	0.521	0.036
HCM Control Delay	8.7	12	9.2	9.4	13.5	7.4
HCM Lane LOS	A	B	A	A	B	A
HCM 95th-tile Q	0.1	2.3	0.3	0.2	3	0.1

### Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	28	302	27
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	30	328	29
Number of Lanes	0	0	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	13
HCM LOS	B

### Lane






























## **Synchro Outputs:**

**90K Population Horizon  
AM Peak Hour**

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  						 	
Volume (vph)	268	954	48	56	1377	82	55	120	19	55	94	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		80.0	70.0		80.0	50.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	4848	1553	1736	4848	1553	1736	1827	1553	1736	1827	1553
Flt Permitted	0.095			0.251			0.688			0.627		
Satd. Flow (perm)	174	4848	1526	458	4848	1526	1253	1827	1529	1142	1827	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			55			93			67			143
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		261.2			310.8			341.8			80.2	
Travel Time (s)		13.4			16.0			24.6			5.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	4%	7%	4%	4%	7%	4%	4%	4%	4%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	305	1084	55	64	1565	93	62	136	22	62	107	143
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	10.0	31.5	31.5	10.0	31.5	31.5	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (s)	12.0	37.5	37.5	10.0	35.5	35.5	42.5	42.5	42.5	42.5	42.5	42.5
Total Split (%)	13.3%	41.7%	41.7%	11.1%	39.4%	39.4%	47.2%	47.2%	47.2%	47.2%	47.2%	47.2%
Yellow Time (s)	3.0	4.5	4.5	3.0	4.5	4.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	5.5	5.5	3.0	5.5	5.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Act Effct Green (s)	62.7	52.4	52.4	48.4	38.9	38.9	19.6	19.6	19.6	19.6	19.6	19.6
Actuated g/C Ratio	0.70	0.58	0.58	0.54	0.43	0.43	0.22	0.22	0.22	0.22	0.22	0.22
v/c Ratio	0.69	0.38	0.06	0.19	0.75	0.13	0.23	0.34	0.06	0.25	0.27	0.32
Control Delay	30.1	12.8	4.9	8.9	25.2	4.8	28.4	30.4	0.3	29.0	29.0	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.1	12.8	4.9	8.9	25.2	4.8	28.4	30.4	0.3	29.0	29.0	5.9
LOS	C	B	A	A	C	A	C	C	A	C	C	A
Approach Delay		16.1			23.5			26.9			18.4	
Approach LOS		B			C			C			B	
Queue Length 50th (m)	30.7	32.9	0.0	2.4	76.8	0.0	10.0	22.5	0.0	10.1	17.4	0.0

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	#106.4	71.7	7.4	12.2	#130.5	9.8	14.4	26.4	0.0	14.6	21.6	10.0
Internal Link Dist (m)	237.2			286.8			317.8			56.2		
Turn Bay Length (m)	80.0		80.0	70.0		80.0	50.0					
Base Capacity (vph)	442	2822	911	345	2095	712	529	771	684	482	771	728
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.38	0.06	0.19	0.75	0.13	0.12	0.18	0.03	0.13	0.14	0.20

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 20.4

Intersection LOS: C

Intersection Capacity Utilization 68.6%







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: 2: 102 St & 116 Ave

 ϕ2	 ϕ3	 ϕ4 (R)
42.5 s	10 s	37.5 s
 ϕ6	 ϕ7	 ϕ8 (R)
42.5 s	12 s	35.5 s

# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	57	44	112	6	35	29	345	88	68	200	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	0.98		1.00	0.99		1.00	1.00	
Frt		0.935			0.872			0.970			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1696	0	1736	1557	0	1736	1762	0	1736	1793	0
Flt Permitted	0.726			0.683			0.602			0.447		
Satd. Flow (perm)	1318	1696	0	1243	1557	0	1094	1762	0	814	1793	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50			40			24			11	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		111.7			168.7			383.3			329.7	
Travel Time (s)		8.0			12.1			27.6			23.7	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	115	0	127	47	0	33	492	0	77	254	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	32.0	32.0		32.0	32.0		31.0	31.0		31.0	31.0	
Total Split (s)	34.0	34.0		34.0	34.0		41.0	41.0		41.0	41.0	
Total Split (%)	45.3%	45.3%		45.3%	45.3%		54.7%	54.7%		54.7%	54.7%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)	15.9	15.9		15.9	15.9		54.3	54.3		54.3	54.3	
Actuated g/C Ratio	0.21	0.21		0.21	0.21		0.72	0.72		0.72	0.72	
v/c Ratio	0.26	0.29		0.48	0.13		0.04	0.38		0.13	0.20	
Control Delay	25.0	15.3		30.9	9.0		6.4	7.4		7.1	6.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.0	15.3		30.9	9.0		6.4	7.4		7.1	6.0	
LOS	C	B		C	A		A	A		A	A	
Approach Delay		19.1			25.0			7.3			6.3	
Approach LOS		B			C			A			A	
Queue Length 50th (m)	9.5	8.4		17.6	0.9		1.2	22.5		3.0	10.0	
Queue Length 95th (m)	15.7	16.4		25.5	6.9		6.2	66.7		12.9	31.5	

# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	87.7			144.7			359.3			305.7		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	518	697		488	636		792	1282		589	1301	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.14	0.16		0.26	0.07		0.04	0.38		0.13	0.20	

### Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 11.4





Intersection LOS: B

Intersection Capacity Utilization 61.7%

ICU Level of Service B

Analysis Period (min) 15

### Splits and Phases: 4: 102 St & 121 Ave





















 $\phi 2$ (R)	 $\phi 4$
41 s	34 s
 $\phi 6$ (R)	 $\phi 8$
41 s	34 s



# Lanes, Volumes, Timings

6: 102 St & 128 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	257	84	16	199	5	77	280	41	14	139	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Frt		0.963			0.996			0.981			0.939	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1748	0	1736	1818	0	1736	1786	0	1736	1697	0
Flt Permitted	0.614			0.447			0.590			0.472		
Satd. Flow (perm)	1116	1748	0	814	1818	0	1073	1786	0	859	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			2			12			56	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		331.3			207.9			431.9			197.4	
Travel Time (s)		23.9			15.0			31.1			14.2	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	276	387	0	18	232	0	88	365	0	16	265	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		32.5	32.5		32.5	32.5	
Total Split (s)	39.0	39.0		39.0	39.0		36.0	36.0		36.0	36.0	
Total Split (%)	52.0%	52.0%		52.0%	52.0%		48.0%	48.0%		48.0%	48.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	18.1	18.1		18.1	18.1		18.1	18.1		18.1	18.1	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.40	0.40		0.40	0.40	
v/c Ratio	0.63	0.55		0.06	0.32		0.21	0.51		0.05	0.38	
Control Delay	18.4	13.1		9.4	10.9		12.8	14.6		11.7	10.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.4	13.1		9.4	10.9		12.8	14.6		11.7	10.9	
LOS	B	B		A	B		B	B		B	B	
Approach Delay		15.3			10.8			14.3			10.9	
Approach LOS		B			B			B			B	
Queue Length 50th (m)	14.7	18.0		0.8	10.6		3.9	18.0		0.7	9.8	
Queue Length 95th (m)	45.4	51.0		4.5	30.9		16.9	57.9		4.8	35.8	

# Lanes, Volumes, Timings

6: 102 St & 128 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	307.3			183.9			407.9			173.4		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	895	1407		652	1458		812	1355		650	1298	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.31	0.28		0.03	0.16		0.11	0.27		0.02	0.20	

## Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 45.8

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 13.6





Intersection LOS: B

Intersection Capacity Utilization 75.1%

ICU Level of Service D







Analysis Period (min) 15

Splits and Phases: 6: 102 St & 128 Ave

 ø2	 ø4
36 s	39 s
 ø6	 ø8
36 s	39 s

Lanes, Volumes, Timings  
7: 102 St & 132 Ave

7/23/2014

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	↑
Volume (vph)	366	73	150	296	77	406
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	50.0		50.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.97	1.00		1.00	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3471	1553	1736	3471	1736	1553
Flt Permitted			0.387		0.950	
Satd. Flow (perm)	3471	1509	704	3471	1730	1529
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		83				411
Link Speed (k/h)	50			50	50	
Link Distance (m)	172.2			175.7	181.3	
Travel Time (s)	12.4			12.7	13.1	
Confl. Peds. (#/hr)		5	5		5	5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)						
Lane Group Flow (vph)	416	83	170	336	88	461
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	12.0	12.0
Minimum Split (s)	30.5	30.5	11.5	30.5	43.5	43.5
Total Split (s)	30.5	30.5	14.2	44.7	45.3	45.3
Total Split (%)	33.9%	33.9%	15.8%	49.7%	50.3%	50.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	None	None	None	None	Min	Min
Act Effct Green (s)	17.3	17.3	30.4	30.4	16.2	16.2
Actuated g/C Ratio	0.31	0.31	0.54	0.54	0.29	0.29
v/c Ratio	0.39	0.16	0.32	0.18	0.18	0.63
Control Delay	17.9	6.1	10.2	8.3	15.5	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	6.1	10.2	8.3	15.5	7.2
LOS	B	A	B	A	B	A
Approach Delay	15.9			8.9	8.5	
Approach LOS	B			A	A	
Queue Length 50th (m)	15.0	0.0	6.3	6.5	6.2	3.5
Queue Length 95th (m)	43.3	9.9	29.9	26.4	17.5	21.8

# Lanes, Volumes, Timings

7: 102 St & 132 Ave

7/23/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Internal Link Dist (m)	148.2			151.7	157.3	
Turn Bay Length (m)		50.0	50.0		50.0	
Base Capacity (vph)	1707	784	570	2639	1340	1274
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	0.24	0.11	0.30	0.13	0.07	0.36

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 56.1

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 11.0





Intersection LOS: B

Intersection Capacity Utilization 48.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: 102 St & 132 Ave

 ϕ2	 ϕ3	 ϕ4
45.3 s	14.2 s	30.5 s
	 ϕ8	
	44.7 s	

# Lanes, Volumes, Timings

23: 102 St & 130 Ave

7/23/2014



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	74	86	398	132	52	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0		0.0	0.0	
Storage Lanes	0	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98		0.99			1.00
Frt	0.927		0.966			
Flt Protected	0.977					0.989
Satd. Flow (prot)	1630	0	1753	0	0	1807
Flt Permitted	0.977					0.812
Satd. Flow (perm)	1624	0	1753	0	0	1483
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	83		36			
Link Speed (k/h)	50		50			50
Link Distance (m)	167.5		197.4			181.3
Travel Time (s)	12.1		14.2			13.1
Confl. Peds. (#/hr)	5	5		5	5	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Shared Lane Traffic (%)						
Lane Group Flow (vph)	182	0	602	0	0	254
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	12.0		15.0		15.0	15.0
Minimum Split (s)	28.5		28.5		28.5	28.5
Total Split (s)	29.0		46.0		46.0	46.0
Total Split (%)	38.7%		61.3%		61.3%	61.3%
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.5		4.5			4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Max		C-Max	C-Max
Act Effect Green (s)	14.5		51.5			51.5
Actuated g/C Ratio	0.19		0.69			0.69
v/c Ratio	0.48		0.50			0.25
Control Delay	18.4		7.9			6.1
Queue Delay	0.0		0.0			0.0
Total Delay	18.4		7.9			6.1
LOS	B		A			A
Approach Delay	18.4		7.9			6.1
Approach LOS	B		A			A
Queue Length 50th (m)	13.4		28.1			10.3
Queue Length 95th (m)	24.7		78.8			31.1

# Lanes, Volumes, Timings

23: 102 St & 130 Ave

7/23/2014



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Internal Link Dist (m)	143.5		173.4			157.3
Turn Bay Length (m)	50.0					
Base Capacity (vph)	588		1215			1018
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	0.31		0.50			0.25

## Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 9.3

Intersection LOS: A

Intersection Capacity Utilization 64.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 23: 102 St & 130 Ave



Intersection										
Int Delay, s/veh	4.8									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	24	129	11	29	44	10	6	278	77	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	27	147	12	33	50	11	7	316	88	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	670	683	241	718	642	360	244	0	0	
Stage 1	266	266	-	373	373	-	-	-	-	
Stage 2	404	417	-	345	269	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	368	369	793	342	390	680	1311	-	-	
Stage 1	735	685	-	644	615	-	-	-	-	
Stage 2	619	588	-	666	683	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	328	363	793	248	384	680	1311	-	-	
Mov Cap-2 Maneuver	427	446	-	367	466	-	-	-	-	
Stage 1	731	677	-	641	612	-	-	-	-	
Stage 2	556	585	-	508	675	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	16.4			14.2			0.1			
HCM LOS	C			B						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1311	-	-	427	462	367	495	1145	-	-
HCM Lane V/C Ratio	0.005	-	-	0.064	0.344	0.09	0.124	0.011	-	-
HCM Control Delay (s)	7.8	-	-	14	16.8	15.8	13.3	8.2	-	-
HCM Lane LOS	A	-	-	B	C	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1.5	0.3	0.4	0	-	-



Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	11	209	6
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	4	4	4
Mvmt Flow	12	238	7

Major/Minor	Major2		
Conflicting Flow All	403	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1145	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1145	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SB
HCM Control Delay, s	0.4
HCM LOS	

Minor Lane/Major Mvmt

Intersection												
Intersection Delay, s/veh	11											
Intersection LOS	B											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	21	11	17	0	13	8	21	0	16	243	19
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	24	12	19	0	15	9	24	0	18	276	22
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	3
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	3	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	3	1
HCM Control Delay	9.4	9.1	12.1
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	43%	31%	100%	0%	0%
Vol Thru, %	0%	93%	22%	19%	0%	100%	0%
Vol Right, %	0%	7%	35%	50%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	262	49	42	2	201	14
LT Vol	0	243	11	8	0	201	0
Through Vol	0	19	17	21	0	0	14
RT Vol	16	0	21	13	2	0	0
Lane Flow Rate	18	298	56	48	2	228	16
Geometry Grp	8	8	7	7	7	7	7
Degree of Util (X)	0.03	0.443	0.092	0.077	0.004	0.328	0.02
Departure Headway (Hd)	5.908	5.355	5.968	5.817	5.665	5.162	4.458
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	604	670	596	611	630	694	799
Service Time	3.666	3.112	3.752	3.602	3.416	2.912	2.208
HCM Lane V/C Ratio	0.03	0.445	0.094	0.079	0.003	0.329	0.02
HCM Control Delay	8.9	12.3	9.4	9.1	8.4	10.4	7.3
HCM Lane LOS	A	B	A	A	A	B	A
HCM 95th-tile Q	0.1	2.3	0.3	0.2	0	1.4	0.1

### Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	2	201	14
Peak Hour Factor	0.88	0.88	0.88	0.88
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	2	228	16
Number of Lanes	0	1	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	10.2
HCM LOS	B





























### Lane

## **Synchro Outputs:**

**90K Population Horizon  
PM Peak Hour**

Lanes, Volumes, Timings  
2: 102 St & 116 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  							
Volume (vph)	193	1773	43	34	1307	71	90	121	53	123	181	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		80.0	70.0		80.0	50.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98			0.98	1.00		0.98	1.00		0.98
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	4848	1553	1736	4848	1553	1736	1827	1553	1736	1827	1553
Flt Permitted	0.113			0.091			0.528			0.648		
Satd. Flow (perm)	206	4848	1526	166	4848	1526	962	1827	1529	1180	1827	1529
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			61			77			67			205
Link Speed (k/h)		70			70			50			50	
Link Distance (m)		261.2			310.8			341.8			80.2	
Travel Time (s)		13.4			16.0			24.6			5.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
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 (%)	4%	7%	4%	4%	7%	4%	4%	4%	4%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	1927	47	37	1421	77	98	132	58	134	197	408
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	10.5	31.0	31.0	10.5	31.0	31.0	43.0	43.0	43.0	43.0	43.0	43.0
Total Split (s)	11.3	36.5	36.5	10.5	35.7	35.7	43.0	43.0	43.0	43.0	43.0	43.0
Total Split (%)	12.6%	40.6%	40.6%	11.7%	39.7%	39.7%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.5	4.5	4.5	3.5	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None	None
Act Effect Green (s)	58.8	52.0	52.0	52.3	43.7	43.7	22.6	22.6	22.6	22.6	22.6	22.6
Actuated g/C Ratio	0.65	0.58	0.58	0.58	0.49	0.49	0.25	0.25	0.25	0.25	0.25	0.25
v/c Ratio	0.67	0.69	0.05	0.17	0.60	0.10	0.40	0.29	0.13	0.45	0.43	0.76
Control Delay	25.4	18.8	3.8	10.4	20.1	5.2	30.6	26.5	4.7	31.2	29.3	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	18.8	3.8	10.4	20.1	5.2	30.6	26.5	4.7	31.2	29.3	23.4
LOS	C	B	A	B	C	A	C	C	A	C	C	C
Approach Delay		19.1			19.2			23.5			26.4	
Approach LOS		B			B			C			C	
Queue Length 50th (m)	12.4	88.0	0.0	1.9	63.6	0.0	15.5	20.1	0.0	21.4	31.3	35.5

# Lanes, Volumes, Timings

## 2: 102 St & 116 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (m)	#64.9	#179.8	5.4	8.5	106.7	9.2	22.8	26.5	6.0	29.1	38.0	52.1
Internal Link Dist (m)	237.2			286.8			317.8			56.2		
Turn Bay Length (m)	80.0		80.0	70.0		80.0	50.0					
Base Capacity (vph)	315	2799	906	220	2355	781	411	781	692	504	781	771
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.69	0.05	0.17	0.60	0.10	0.24	0.17	0.08	0.27	0.25	0.53

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 20.5

Intersection LOS: C

Intersection Capacity Utilization 82.6%







ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.





















Splits and Phases: 2: 102 St & 116 Ave

		
ø2	ø3	ø4 (R)
43 s	10.5 s	36.5 s
		
ø6	ø7	ø8 (R)
43 s	11.3 s	35.7 s

# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	47	38	191	16	56	59	285	87	56	496	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		1.00	0.98		1.00	0.99		1.00	1.00	
Frt		0.933			0.883			0.965			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1692	0	1736	1579	0	1736	1752	0	1736	1803	0
Flt Permitted	0.706			0.697			0.365			0.486		
Satd. Flow (perm)	1282	1692	0	1269	1579	0	665	1752	0	885	1803	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			61			30			8	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		111.7			168.7			383.3			329.7	
Travel Time (s)		8.0			12.1			27.6			23.7	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	92	0	208	78	0	64	405	0	61	581	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		30.5	30.5		30.5	30.5	
Total Split (s)	32.0	32.0		32.0	32.0		43.0	43.0		43.0	43.0	
Total Split (%)	42.7%	42.7%		42.7%	42.7%		57.3%	57.3%		57.3%	57.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Act Effct Green (s)	18.4	18.4		18.4	18.4		47.6	47.6		47.6	47.6	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.63	0.63		0.63	0.63	
v/c Ratio	0.17	0.21		0.67	0.18		0.15	0.36		0.11	0.51	
Control Delay	21.1	13.2		35.4	8.4		8.6	8.2		7.8	10.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.1	13.2		35.4	8.4		8.6	8.2		7.8	10.5	
LOS	C	B		D	A		A	A		A	B	
Approach Delay		16.1			28.1			8.3			10.3	
Approach LOS		B			C			A			B	
Queue Length 50th (m)	6.2	6.0		28.4	2.0		3.3	21.9		3.0	38.6	
Queue Length 95th (m)	12.5	14.3		42.6	10.0		11.9	53.0		10.6	88.6	

# Lanes, Volumes, Timings

## 4: 102 St & 121 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	87.7			144.7			359.3			305.7		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	470	646		465	617		422	1123		562	1147	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.14		0.45	0.13		0.15	0.36		0.11	0.51	

### Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 13.5





Intersection LOS: B

Intersection Capacity Utilization 70.3%

ICU Level of Service C

Analysis Period (min) 15





















### Splits and Phases: 4: 102 St & 121 Ave

 $\phi 2$ (R)	 $\phi 4$
43 s	32 s
 $\phi 6$ (R)	 $\phi 8$
43 s	32 s



Lanes, Volumes, Timings  
6: 102 St & 128 Ave













7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	265	103	54	342	18	112	185	21	7	373	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Frt		0.958			0.992			0.985			0.930	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1737	0	1736	1810	0	1736	1795	0	1736	1678	0
Flt Permitted	0.358			0.348			0.174			0.619		
Satd. Flow (perm)	652	1737	0	634	1810	0	317	1795	0	1125	1678	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			4			11			87	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		331.3			207.9			431.9			199.4	
Travel Time (s)		23.9			15.0			31.1			14.4	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
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
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	400	0	59	392	0	122	224	0	8	757	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)	12.0	12.0		12.0	12.0		15.0	15.0		15.0	15.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		32.5	32.5		32.5	32.5	
Total Split (s)	31.6	31.6		31.6	31.6		43.4	43.4		43.4	43.4	
Total Split (%)	42.1%	42.1%		42.1%	42.1%		57.9%	57.9%		57.9%	57.9%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Act Effct Green (s)	19.3	19.3		19.3	19.3		29.7	29.7		29.7	29.7	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.64	0.68		0.29	0.66		0.76	0.25		0.01	0.85	
Control Delay	34.8	23.9		21.3	24.3		47.1	9.0		8.3	22.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.8	23.9		21.3	24.3		47.1	9.0		8.3	22.6	
LOS	C	C		C	C		D	A		A	C	
Approach Delay		26.7			23.9			22.4			22.4	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	14.6	40.3		5.5	41.9		9.9	12.1		0.4	58.7	
Queue Length 95th (m)	#37.4	73.4		15.5	74.1		#44.5	28.6		2.5	#153.9	

# Lanes, Volumes, Timings

6: 102 St & 128 Ave

7/23/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	307.3			183.9			407.9			175.4		
Turn Bay Length (m)	50.0			50.0			50.0			50.0		
Base Capacity (vph)	325	880		316	904		222	1264		790	1204	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.42	0.45		0.19	0.43		0.55	0.18		0.01	0.63	

## Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 58.7

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 23.8

Intersection LOS: C

Intersection Capacity Utilization 97.9%





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: 6: 102 St & 128 Ave

 p2	 p4
43.4 s	31.6 s
 p6	 p8
43.4 s	31.6 s

Lanes, Volumes, Timings  
7: 102 St & 132 Ave

7/23/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↗
Volume (vph)	394	103	541	488	97	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		50.0	50.0		50.0	0.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor		0.97	1.00		1.00	0.98
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3471	1553	1736	3471	1736	1553
Flt Permitted			0.331		0.950	
Satd. Flow (perm)	3471	1507	602	3471	1729	1528
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		112				217
Link Speed (k/h)	50			50	50	
Link Distance (m)	172.2			175.7	179.3	
Travel Time (s)	12.4			12.7	12.9	
Confl. Peds. (#/hr)		5	5		5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	428	112	588	530	105	217
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases		4	8			2
Detector Phase	4	4	3	8	2	2
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	12.0	12.0
Minimum Split (s)	30.5	30.5	11.5	30.5	43.5	43.5
Total Split (s)	30.5	30.5	26.0	56.5	43.5	43.5
Total Split (%)	30.5%	30.5%	26.0%	56.5%	43.5%	43.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	None	None	None	None	Min	Min
Act Effct Green (s)	17.1	17.1	44.1	44.1	16.2	16.2
Actuated g/C Ratio	0.25	0.25	0.63	0.63	0.23	0.23
v/c Ratio	0.50	0.25	0.79	0.24	0.26	0.42
Control Delay	25.9	7.1	20.5	7.2	22.8	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	7.1	20.5	7.2	22.8	5.8
LOS	C	A	C	A	C	A
Approach Delay	22.0			14.2	11.4	
Approach LOS	C			B	B	
Queue Length 50th (m)	23.4	0.0	29.7	11.0	10.9	0.0
Queue Length 95th (m)	54.1	13.1	#159.6	41.6	25.3	14.4

# Lanes, Volumes, Timings

7: 102 St & 132 Ave

7/23/2014



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Internal Link Dist (m)	148.2			151.7	155.3	
Turn Bay Length (m)		50.0	50.0		50.0	
Base Capacity (vph)	1344	652	744	2690	1009	978
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	0.32	0.17	0.79	0.20	0.10	0.22

## Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 69.6

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 15.9

Intersection LOS: B

Intersection Capacity Utilization 68.6%





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: 7: 102 St & 132 Ave

 ϕ2	 ϕ3	 ϕ4
43.5 s	26 s	30.5 s
	 ϕ8	
	56.5 s	

# Lanes, Volumes, Timings

23: 102 St & 130 Ave

7/23/2014



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	176	68	229	98	115	530
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	50.0	0.0		0.0	0.0	
Storage Lanes	0	0		0	0	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.99			1.00
Frt	0.962		0.959			
Flt Protected	0.965					0.991
Satd. Flow (prot)	1684	0	1738	0	0	1810
Flt Permitted	0.965					0.875
Satd. Flow (perm)	1676	0	1738	0	0	1598
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	58		64			
Link Speed (k/h)	50		50			50
Link Distance (m)	190.0		199.4			179.3
Travel Time (s)	13.7		14.4			12.9
Confl. Peds. (#/hr)	5	5		5	5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	265	0	356	0	0	701
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	4.0		4.0		4.0	4.0
Minimum Split (s)	20.0		20.0		20.0	20.0
Total Split (s)	20.0		20.0		20.0	20.0
Total Split (%)	50.0%		50.0%		50.0%	50.0%
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	0.5		0.5		0.5	0.5
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.0		4.0			4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		Min		Min	Min
Act Effct Green (s)	9.7		21.2			21.2
Actuated g/C Ratio	0.27		0.59			0.59
v/c Ratio	0.54		0.34			0.75
Control Delay	12.3		6.4			19.8
Queue Delay	0.0		0.0			0.0
Total Delay	12.3		6.4			19.8
LOS	B		A			B
Approach Delay	12.3		6.4			19.8
Approach LOS	B		A			B
Queue Length 50th (m)	10.1		9.0			32.0
Queue Length 95th (m)	21.7		27.1			#101.8

# Lanes, Volumes, Timings

23: 102 St & 130 Ave

7/23/2014



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Internal Link Dist (m)	166.0		175.4			155.3
Turn Bay Length (m)	50.0					
Base Capacity (vph)	779		1048			939
Starvation Cap Reductn	0		0			0
Spillback Cap Reductn	0		0			0
Storage Cap Reductn	0		0			0
Reduced v/c Ratio	0.34		0.34			0.75

## Intersection Summary

Area Type: Other

Cycle Length: 40

Actuated Cycle Length: 36.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 14.7

Intersection LOS: B

Intersection Capacity Utilization 76.5%

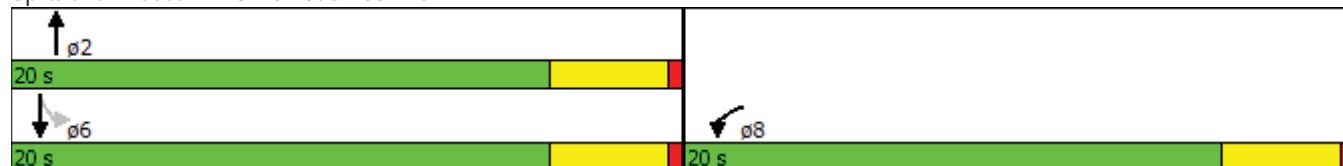
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 23: 102 St & 130 Ave



Intersection										
Int Delay, s/veh	6.8									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	8	59	8	103	172	15	14	278	38	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	500	-	-	500	-	-	500	-	-	
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	9	64	9	112	187	16	15	302	41	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	904	823	421	838	819	323	438	0	0	
Stage 1	449	449	-	353	353	-	-	-	-	
Stage 2	455	374	-	485	466	-	-	-	-	
Critical Hdwy	7.14	6.54	6.24	7.14	6.54	6.24	4.14	-	-	
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	2.236	-	-	
Pot Cap-1 Maneuver	256	306	628	283	308	713	1111	-	-	
Stage 1	585	569	-	660	627	-	-	-	-	
Stage 2	581	614	-	560	559	-	-	-	-	
Platoon blocked, %								-	-	
Mov Cap-1 Maneuver	155	298	628	240	300	713	1111	-	-	
Mov Cap-2 Maneuver	274	399	-	353	398	-	-	-	-	
Stage 1	577	562	-	651	619	-	-	-	-	
Stage 2	391	606	-	484	553	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	15.8			21.2			0.4			
HCM LOS	C			C						
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1111	-	-	274	417	353	413	1205	-	-
HCM Lane V/C Ratio	0.014	-	-	0.032	0.175	0.317	0.492	0.012	-	-
HCM Control Delay (s)	8.3	-	-	18.6	15.5	19.9	21.9	8	-	-
HCM Lane LOS	A	-	-	C	C	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.6	1.3	2.6	0	-	-

<b>Intersection</b>			
Int Delay, s/veh			
<b>Movement</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
Vol, veh/h	13	371	32
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	500	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	4	4	4
Mvmt Flow	14	403	35
<b>Major/Minor</b>	<b>Major2</b>		
Conflicting Flow All	343	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	-
Pot Cap-1 Maneuver	1205	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1205	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
<b>Approach</b>	<b>SB</b>		
HCM Control Delay, s	0.3		
HCM LOS			
<b>Minor Lane/Major Mvmt</b>			



Intersection												
Intersection Delay, s/veh	12.9											
Intersection LOS	B											
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	19	10	21	0	25	14	3	0	23	289	17
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, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	0	21	11	23	0	27	15	3	0	25	314	18
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	3
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	3	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	3	1
HCM Control Delay	9.9	10.2	14.3
HCM LOS	A	B	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	38%	60%	100%	0%	0%
Vol Thru, %	0%	94%	20%	33%	0%	100%	0%
Vol Right, %	0%	6%	42%	7%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	23	306	50	42	28	315	28
LT Vol	0	289	10	14	0	315	0
Through Vol	0	17	21	3	0	0	28
RT Vol	23	0	19	25	28	0	0
Lane Flow Rate	25	333	54	46	30	342	30
Geometry Grp	8	8	7	7	7	7	7
Degree of Util (X)	0.043	0.525	0.098	0.087	0.049	0.498	0.038
Departure Headway (Hd)	6.228	5.686	6.479	6.85	5.738	5.235	4.53
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	570	629	556	526	619	681	781
Service Time	4.026	3.483	4.182	4.553	3.519	3.015	2.31
HCM Lane V/C Ratio	0.044	0.529	0.097	0.087	0.048	0.502	0.038
HCM Control Delay	9.3	14.7	9.9	10.2	8.8	13.2	7.5
HCM Lane LOS	A	B	A	B	A	B	A
HCM 95th-tile Q	0.1	3.1	0.3	0.3	0.2	2.8	0.1

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Intersection

Intersection Delay, s/veh

Intersection LOS

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	28	315	28
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	4	4	4	4
Mvmt Flow	0	30	342	30
Number of Lanes	0	1	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	12.4
HCM LOS	B

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Lane

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## Appendix H SIGNAL WARRANT SPREADSHEETS



## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	113 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	65K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Jun 09, Mon
Count Date:	65 K Horizon
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
102 Street	NB	1				1		80	1
102 Street	SB		1				1	340	1
113 Avenue	WB				1				
113 Avenue	EB				1				

Are the 113 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 113 Avenue EB right turns significantly impeded by through movements? (y/n)

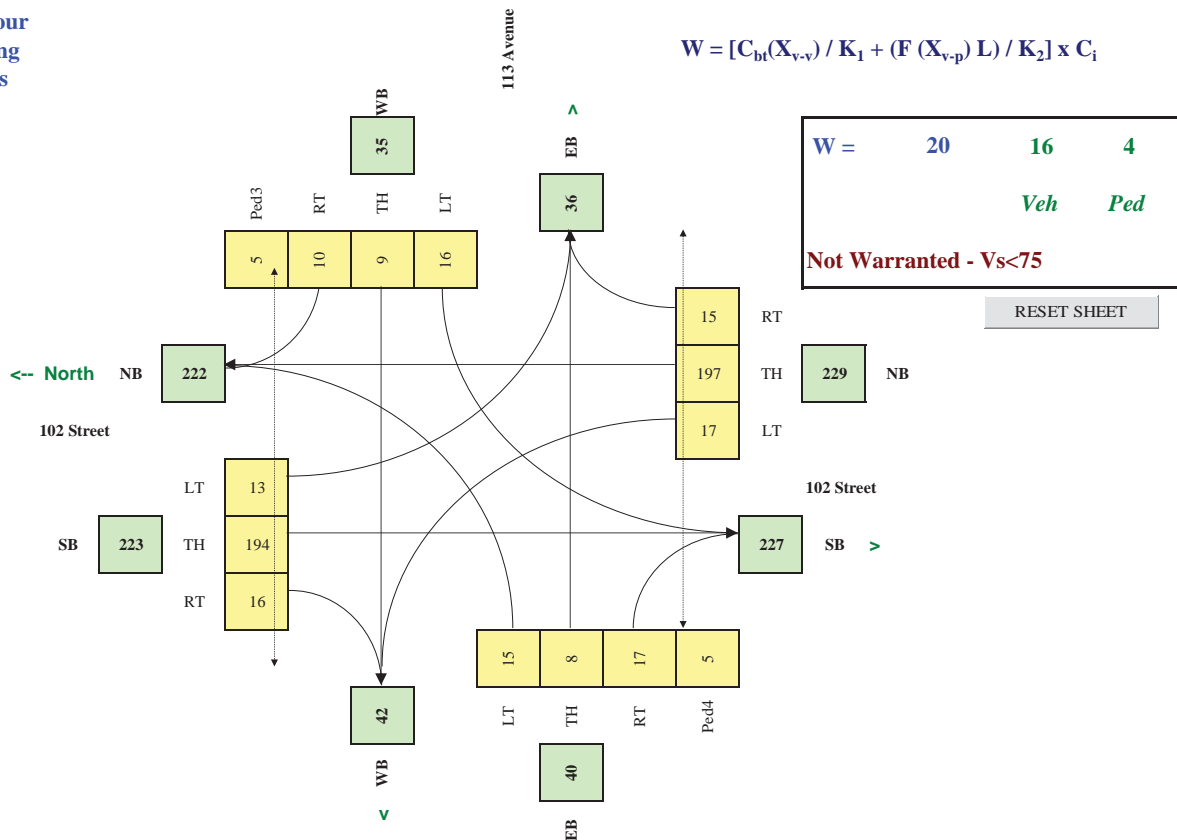
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
113 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population (#)	(#)	65,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input														W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th
press 'Set Peak Hours' Button to set the peak hour periods	12	167	14	3	127	10	10	6	14	14	8	14	5	5	5	5	5
	17	232	19	4	176	14	14	8	20	20	11	19	5	5	5	5	5
	10	139	11	2	106	8	8	5	12	12	7	11	5	5	5	5	5
	15	153	11	16	180	16	15	8	3	11	6	13	5	5	5	5	5
	25	255	18	27	300	26	25	14	5	18	10	22	5	5	5	5	5
	23	235	17	25	276	24	23	13	5	17	9	20	5	5	5	5	5
Total (6-hour peak)	102	1,181	89	77	1,164	98	95	54	59	92	51	100	30	30	30	30	30
Average (6-hour peak)	17	197	15	13	194	16	16	9	10	15	8	17	5	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	121 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	65K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 28, Fri
Count Date:	65 K Horizon
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
102 Street	NB	1				1		380	1
102 Street	SB	1				1		320	1
121 Avenue	WB	1				1			
121 Avenue	EB	1				1			

Are the 121 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 121 Avenue EB right turns significantly impeded by through movements? (y/n)

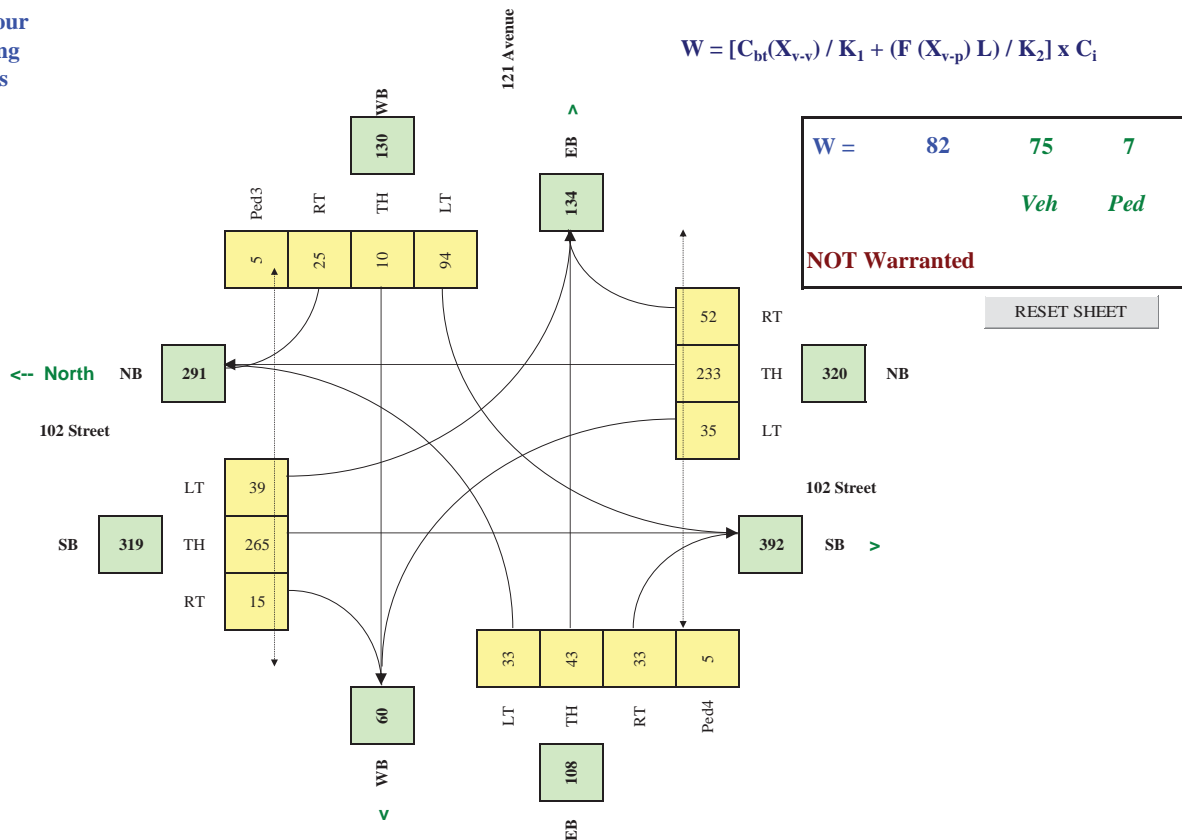
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
121 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	65,000
Central Business District	(y/n)	n

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
	21	234	26	38	127	6	81	6	19	39	41	31	5	5	5	5
press 'Set Peak Hours' Button to set the peak hour periods	29	325	36	53	176	9	113	8	26	54	57	43	5	5	5	5
	17	195	22	32	106	5	68	5	16	32	34	26	5	5	5	5
	34	153	54	27	281	16	72	10	22	17	29	23	5	5	5	5
	57	255	90	45	469	27	120	17	36	28	49	39	5	5	5	5
	52	235	83	41	431	25	110	16	33	26	45	36	5	5	5	5
Total (6-hour peak)	211	1,397	310	236	1,590	89	565	61	151	196	256	198	30	30	30	30
Average (6-hour peak)	35	233	52	39	265	15	94	10	25	33	43	33	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	124 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	65K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Jun 09, Mon
Count Date:	65 K Horizon
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
102 Street	NB	1				1		700	1
102 Street	SB	1				1		2,500	1
124 Avenue	WB	1				1			
124 Avenue	EB	1				1			

Are the 124 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 124 Avenue EB right turns significantly impeded by through movements? (y/n)

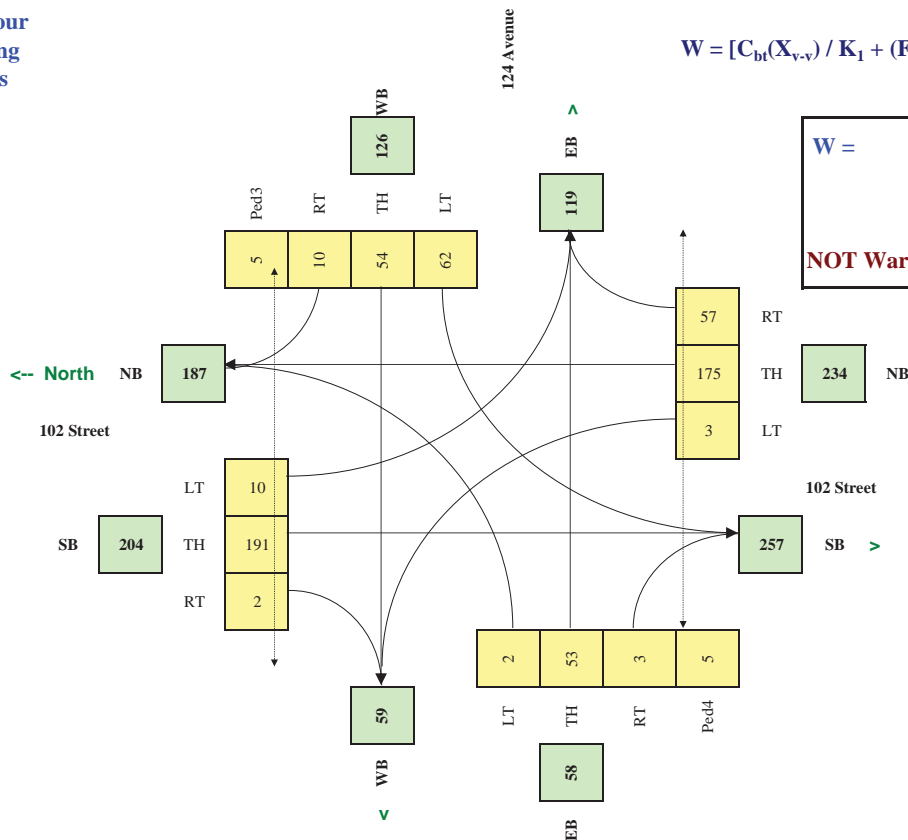
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
124 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population (#)	(#)	65,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input	NB			SB			WB			EB				W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
press 'Set Peak Hours' Button to set the peak hour periods	2	174	57	8	104	1	34	22	7	3	53	2		5	5	5	5
	3	242	79	11	145	1	47	31	10	4	74	3		5	5	5	5
	2	145	47	7	87	1	28	19	6	2	44	2		5	5	5	5
	2	116	38	8	193	3	63	59	9	1	25	2		5	5	5	5
	4	193	63	13	322	5	105	99	15	1	41	4		5	5	5	5
	4	178	58	12	296	5	97	91	14	1	79	7		5	5	5	5
Total (6-hour peak)	17	1,048	342	58	1,148	15	374	321	61	12	316	20		30	30	30	30
Average (6-hour peak)	3	175	57	10	191	2	62	54	10	2	53	3		5	5	5	5

### 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 =	49	44	5
		Veh	Ped
NOT Warranted			

RESET SHEET



## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	128 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	65K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Apr 08, Tue
Count Date:	65K Horizon
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
102 Street	NB	1				1		430	1
102 Street	SB	1				1		380	1
128 Avenue	WB	1				1			
128 Avenue	EB	1				1			

Are the 128 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 128 Avenue EB right turns significantly impeded by through movements? (y/n)

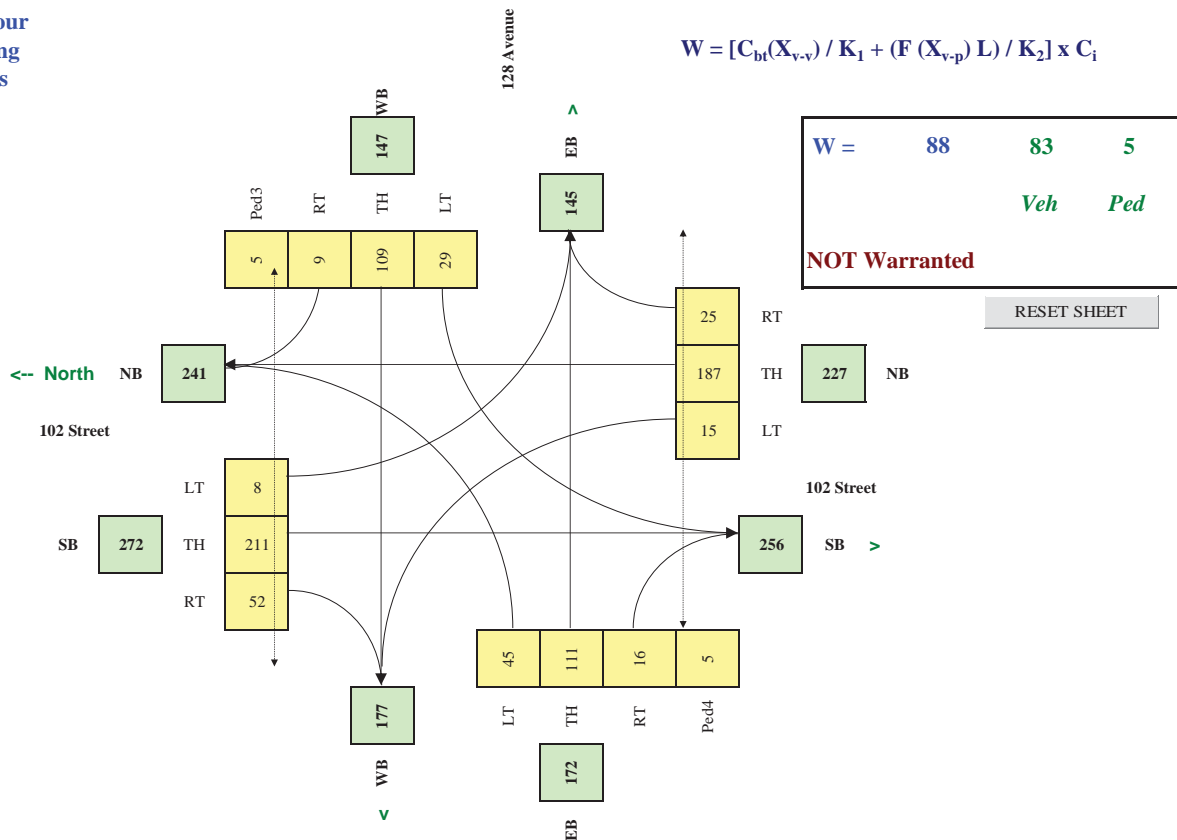
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
128 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	65,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input														W Side	E Side	N Side	S Side
	NB			SB			WB			EB							
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
press 'Set Peak Hours' Button to set the peak hour periods	14	202	30	10	101	21	12	90	4	53	78	10	5	5	5	5	5
	19	281	41	14	140	29	16	125	5	74	108	14	5	5	5	5	5
	11	169	25	8	84	17	10	75	3	44	65	8	5	5	5	5	5
	11	112	13	4	224	59	32	86	11	23	100	15	5	5	5	5	5
	19	187	21	7	374	98	54	144	18	38	166	25	5	5	5	5	5
	17	172	19	6	344	90	50	132	17	35	153	23	5	5	5	5	5
Total (6-hour peak)	92	1,123	148	50	1,267	314	173	653	57	267	669	95	30	30	30	30	30
Average (6-hour peak)	15	187	25	8	211	52	29	109	9	45	111	16	5	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	130 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	65K Horizon AM = 75% PM;
CHECK SHEET			

for Warrant Calculation  
Results, please hit 'Page  
Down'

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Jun 09, Mon
Count Date:	65K Horizon
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
102 Street NB						1		950	1
102 Street SB			1					2,500	1
130 Avenue WB					1				
130 Avenue EB									

Are the 130 Avenue WB right turns significantly impeded by through movements? (y/n)

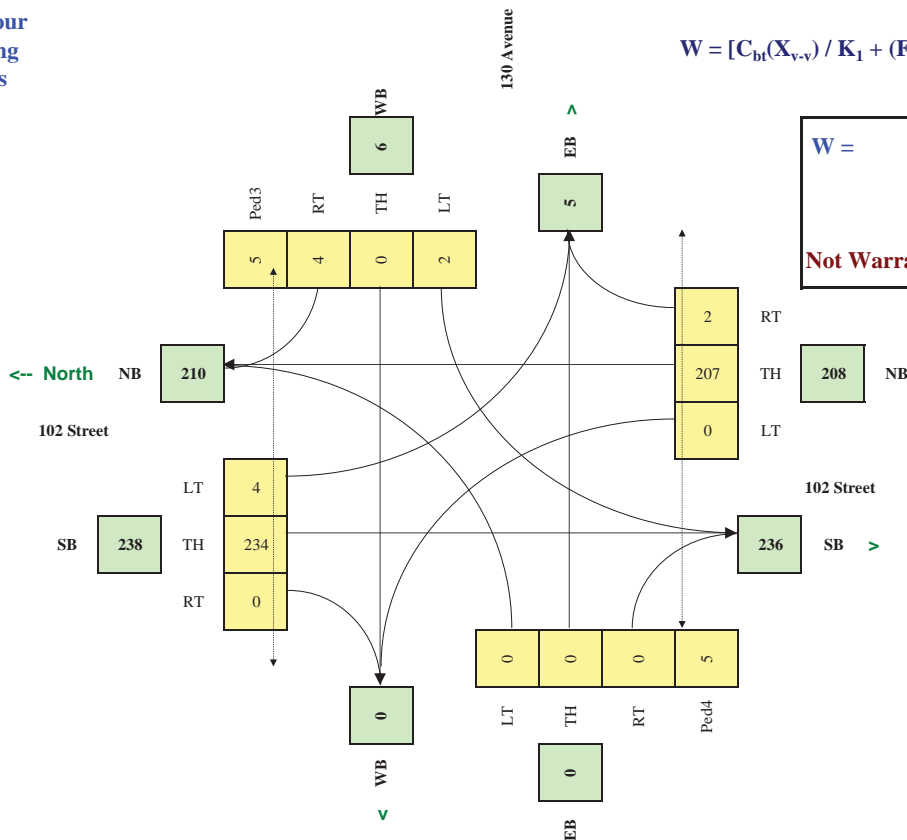
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
130 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population (#)	(#)	65,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
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					
press 'Set Peak Hours' Button to set the peak hour periods	0	224	2	3	112	0	1	0	3	0	0	0	5	5	5	5	5
	0	311	3	4	155	0	1	0	4	0	0	0	5	5	5	5	5
	0	187	2	2	93	0	1	0	2	0	0	0	5	5	5	5	5
	0	124	1	3	249	0	2	0	3	0	0	0	5	5	5	5	5
	0	206	1	5	415	0	4	0	5	0	0	0	5	5	5	5	5
	0	190	1	5	382	0	4	0	5	0	0	0	5	5	5	5	5
Total (6-hour peak)	0	1,241	9	22	1,405	0	12	0	22	0	0	0	30	30	30	30	30
Average (6-hour peak)	0	207	2	4	234	0	2	0	4	0	0	0	5	5	5	5	5

### 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 =	7	2	5
		Veh	Ped

Not Warranted -  $V_s < 75$

RESET SHEET





## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	132 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	65K Horizon AM = 75% PM;
CHECK SHEET			

for Warrant Calculation Results, please hit 'Page Down'

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Jun 09, Mon
Count Date:	65K Horizon
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
102 Street	NB	1					1	1,150	0
102 Street	SB							2,500	0
132 Avenue	WB					1			
132 Avenue	EB		1						

Are the 132 Avenue WB right turns significantly impeded by through movements? (y/n)

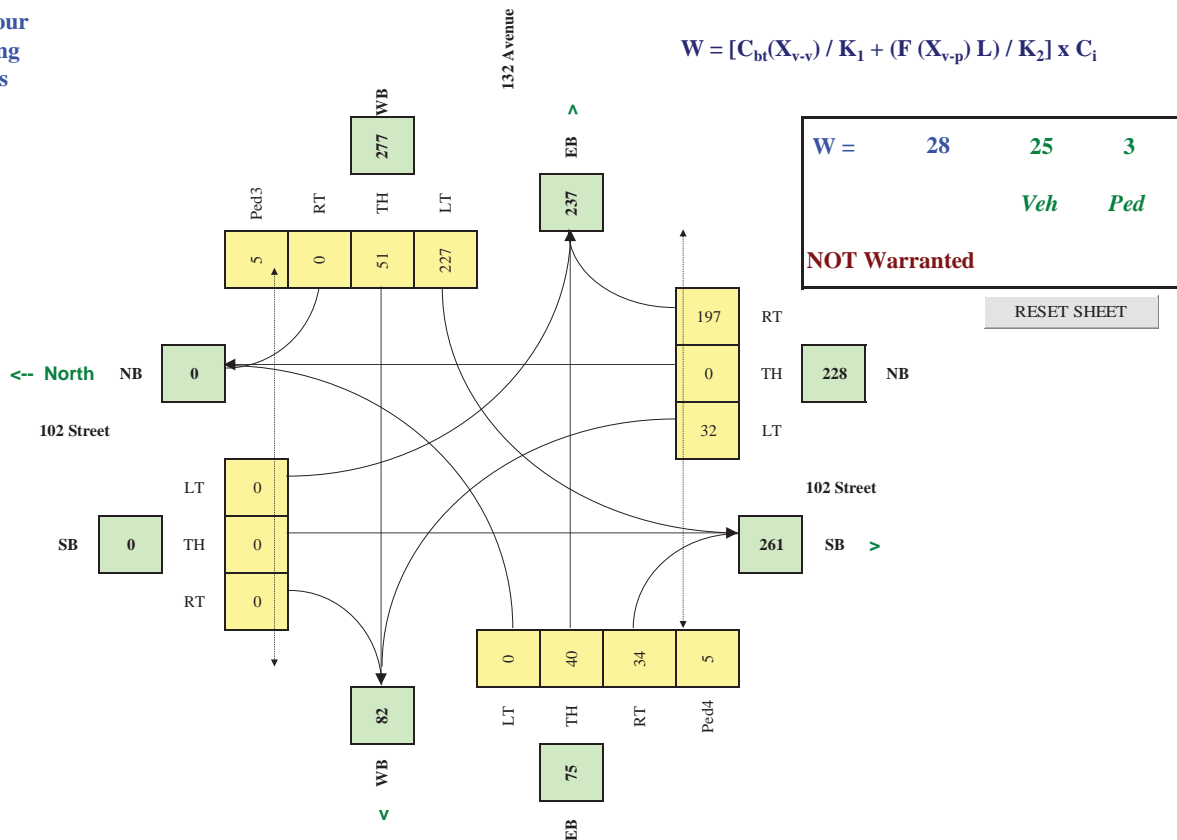
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	65,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
132 Avenue	EW	50	3.5%	n	

Set Peak Hours													Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input													W Side	E Side	N Side	S Side
	NB			SB			WB			EB						
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT				
press 'Set Peak Hours' Button to set the peak hour periods	31	0	224	0	0	0	99	14	0	0	55	19	5	5	5	5
	43	0	311	0	0	0	137	19	0	0	77	27	5	5	5	5
	26	0	187	0	0	0	82	11	0	0	46	16	5	5	5	5
	22	0	109	0	0	0	248	62	0	0	15	34	5	5	5	5
	36	0	182	0	0	0	414	103	0	0	25	57	5	5	5	5
	33	0	167	0	0	0	381	95	0	0	23	52	5	5	5	5
Total (6-hour peak)	190	0	1,180	0	0	0	1,361	304	0	0	242	206	30	30	30	30
Average (6-hour peak)	32	0	197	0	0	0	227	51	0	0	40	34	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	113 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	78K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 28, Fri
Count Date:	78K Horizon
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
102 Street	NB	1				1		80	1
102 Street	SB		1				1	340	1
113 Avenue	WB				1				
113 Avenue	EB				1				

Are the 113 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 113 Avenue EB right turns significantly impeded by through movements? (y/n)

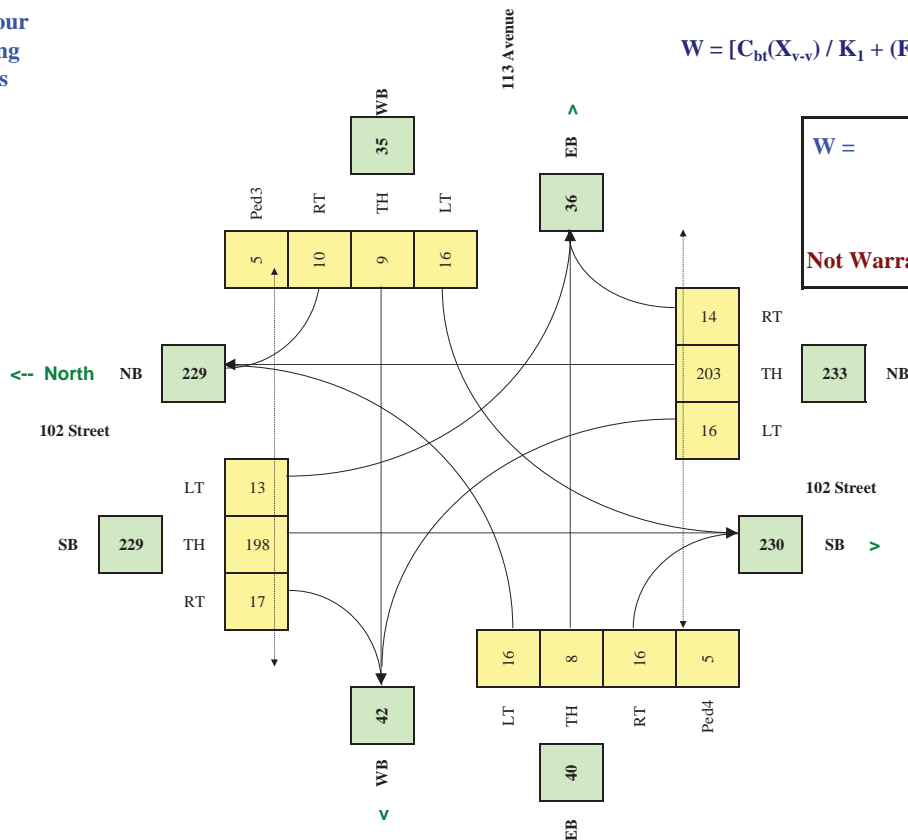
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
113 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population (#)	(#)	78,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input														W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th
press 'Set Peak Hours' Button to set the peak hour periods	12	168	14	3	133	11	9	6	15	14	8	12	5	5	5	5	5
	17	233	19	4	185	15	13	8	21	20	11	17	5	5	5	5	5
	10	140	11	2	111	9	8	5	13	12	7	10	5	5	5	5	5
	14	161	10	17	181	16	15	8	3	12	6	13	5	5	5	5	5
	23	268	17	28	302	27	25	14	5	20	10	22	5	5	5	5	5
	21	247	16	26	278	25	23	13	5	18	9	20	5	5	5	5	5
Total (6-hour peak)	97	1,216	87	80	1,190	103	93	54	61	97	51	95	30	30	30	30	30
Average (6-hour peak)	16	203	14	13	198	17	16	9	10	16	8	16	5	5	5	5	5

### 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 =	21	16	5
		Veh	Ped

Not Warranted - Vs<75

RESET SHEET



## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	121 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	78K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 31, Mon
Count Date:	78K Horizon
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
102 Street	NB	1				1		380	1
102 Street	SB	1				1		320	1
121 Avenue	WB	1				1			
121 Avenue	EB	1				1			

Are the 121 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 121 Avenue EB right turns significantly impeded by through movements? (y/n)

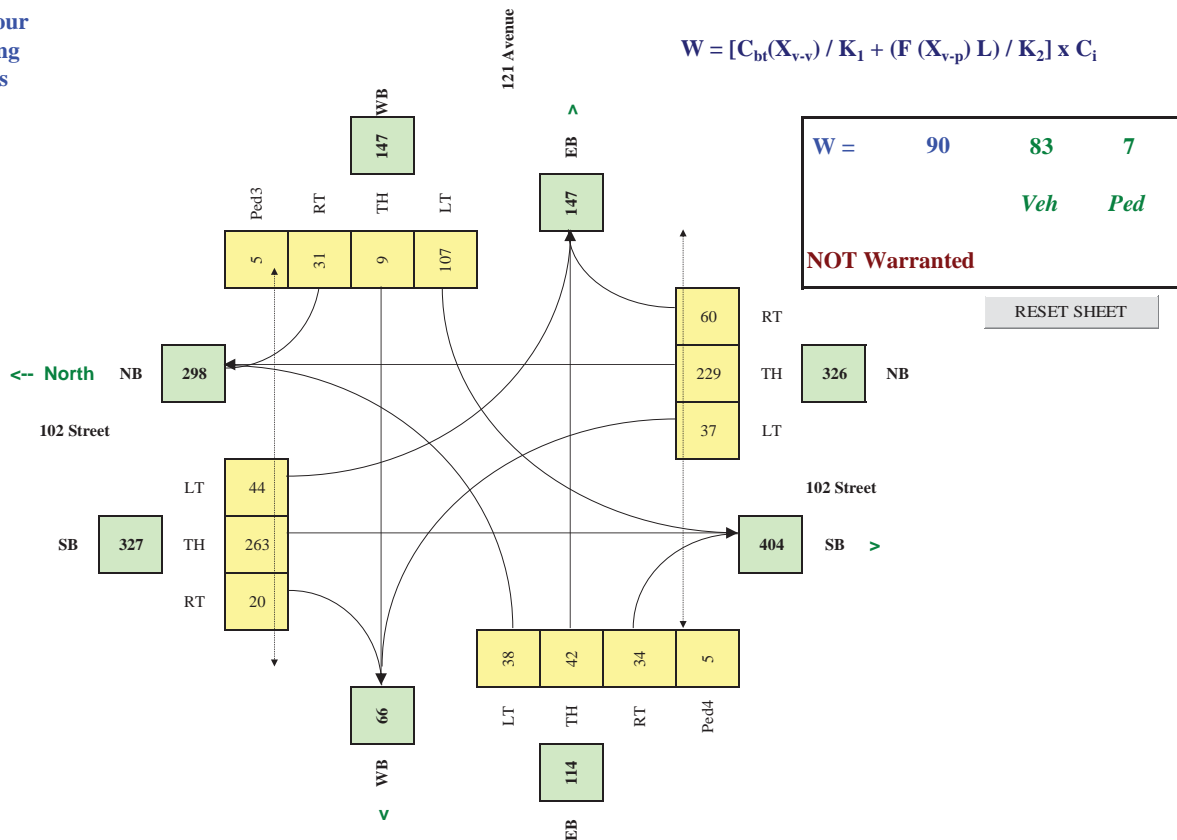
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
121 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	78,000
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					
press 'Set Peak Hours' Button to set the peak hour periods	22	235	42	43	122	12	81	5	22	42	40	32		5	5	5	5
	31	326	59	60	170	16	113	7	30	58	56	44		5	5	5	5
	19	196	35	36	102	10	68	4	18	35	34	26		5	5	5	5
	35	148	53	30	282	19	91	10	27	22	29	25		5	5	5	5
	59	246	89	50	470	32	151	16	45	37	49	41		5	5	5	5
	54	226	82	46	432	29	139	15	41	34	45	38		5	5	5	5
Total (6-hour peak)	221	1,376	361	265	1,579	118	643	57	183	228	253	205		30	30	30	30
Average (6-hour peak)	37	229	60	44	263	20	107	9	31	38	42	34		5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	124 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	78K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 28, Fri
Count Date:	78K Horizon
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
102 Street	NB	1				1		1,220	1
102 Street	SB	1				1		380	1
124 Avenue	WB	1				1			
124 Avenue	EB	1				1			

Are the 124 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 124 Avenue EB right turns significantly impeded by through movements? (y/n)

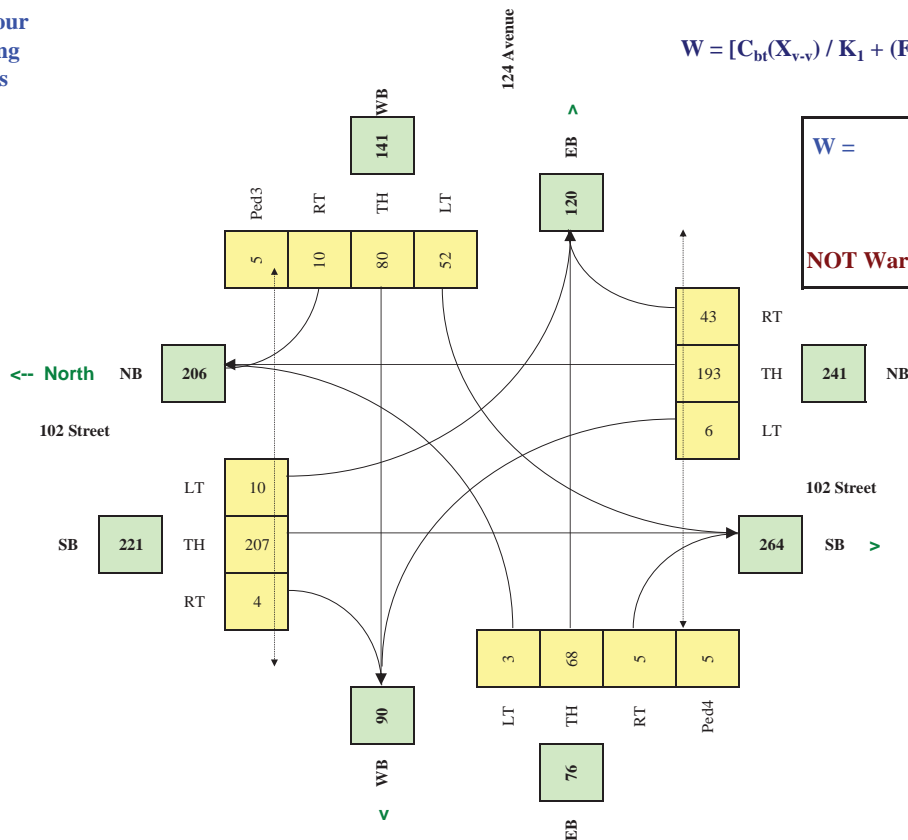
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
124 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	78,000
Central Business District	(y/n)	n

Set Peak Hours														Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input	NB			SB			WB			EB				W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
press 'Set Peak Hours' Button to set the peak hour periods	4	181	53	8	122	1	19	31	7	5	81	5		5	5	5	5
	5	252	74	11	170	1	26	43	10	7	113	7		5	5	5	5
	3	151	44	7	102	1	16	26	6	4	68	4		5	5	5	5
	5	136	20	8	202	5	59	90	9	1	34	4		5	5	5	5
	9	227	34	13	336	9	99	150	15	1	57	6		5	5	5	5
	8	209	31	12	309	8	91	138	14	1	52	6		5	5	5	5
Total (6-hour peak)	34	1,157	257	58	1,241	25	310	478	61	19	406	31		30	30	30	30
Average (6-hour peak)	6	193	43	10	207	4	52	80	10	3	68	5		5	5	5	5

### 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 =	58	53	5
		Veh	Ped
NOT Warranted			

RESET SHEET



## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	128 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	78K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 28, Fri
Count Date:	78K Horizon
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
102 Street	NB	1				1		1,220	1
102 Street	SB	1				1		380	1
128 Avenue	WB	1				1			
128 Avenue	EB	1				1			

Are the 128 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 128 Avenue EB right turns significantly impeded by through movements? (y/n)

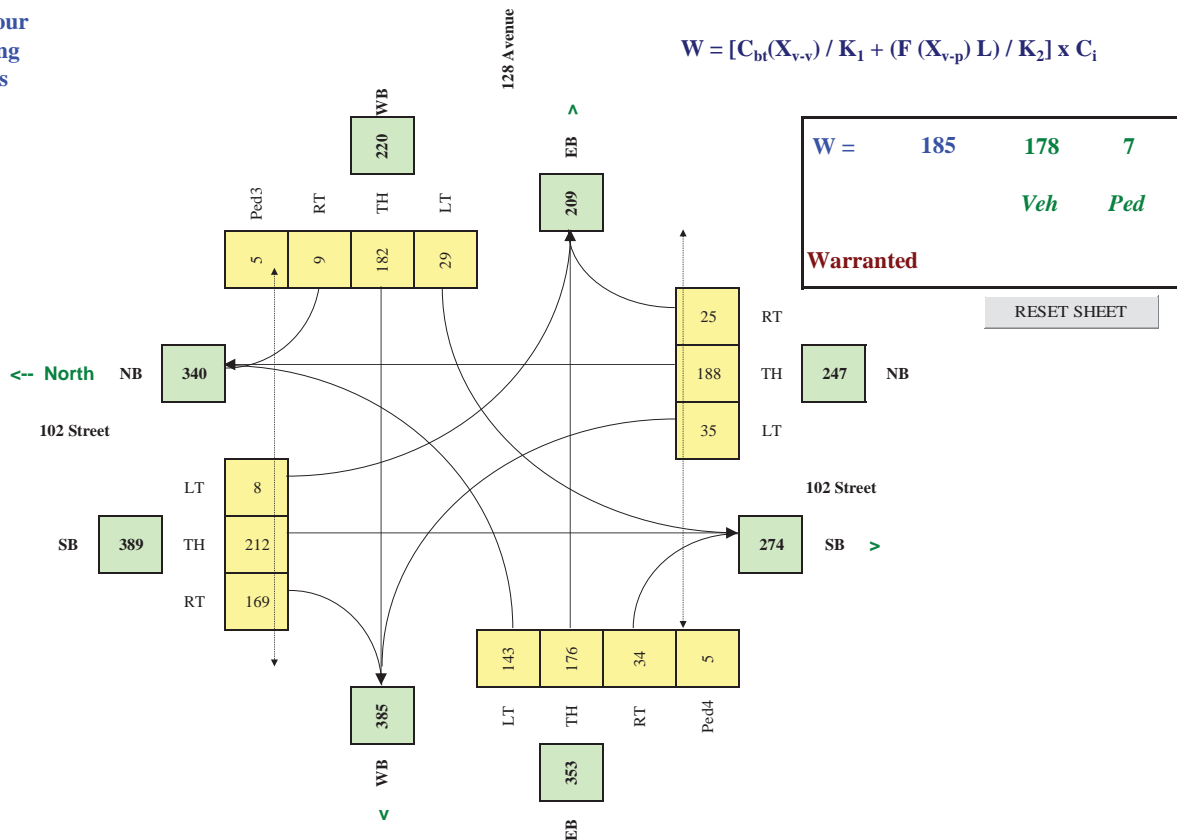
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
128 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	78,000
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				
press 'Set Peak Hours' Button to set the peak hour periods	25	202	30	10	102	64	12	124	4	174	148	27	5	5	5	5
	35	280	41	14	142	89	16	172	5	241	206	38	5	5	5	5
	21	168	25	8	85	53	10	103	3	145	124	23	5	5	5	5
	30	113	13	4	224	193	32	164	11	71	137	28	5	5	5	5
	50	189	21	7	373	321	54	274	18	119	229	46	5	5	5	5
	46	174	19	6	343	295	50	252	17	109	211	42	5	5	5	5
Total (6-hour peak)	207	1,126	148	50	1,269	1,015	173	1,090	57	859	1,055	204	30	30	30	30
Average (6-hour peak)	35	188	25	8	212	169	29	182	9	143	176	34	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	130 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	78K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 28, Fri
Count Date:	78K Horizon
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
102 Street NB						1		210	1
102 Street SB			1					170	1
130 Avenue WB					1				
130 Avenue EB									

Are the 130 Avenue WB right turns significantly impeded by through movements? (y/n)

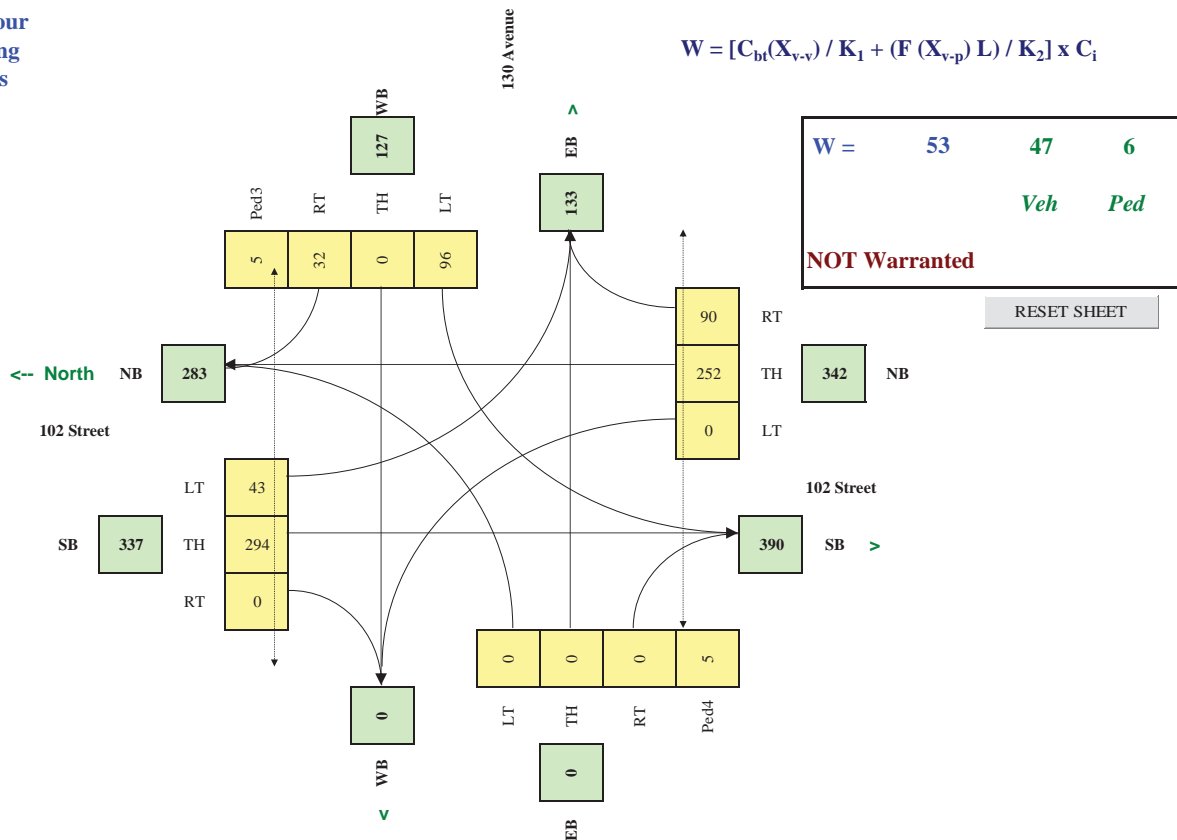
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
130 Avenue	EW	50	3.5%	y	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population (#)	(#)	78,000
Central Business District	(y/n)	n

Set Peak Hours													Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input	NB			SB			WB			EB			W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT				
press 'Set Peak Hours' Button to set the peak hour periods	0	297	84	4	119	0	58	0	53	0	0	0	5	5	5	5
	0	412	116	5	165	0	80	0	74	0	0	0	5	5	5	5
	0	247	70	3	99	0	48	0	44	0	0	0	5	5	5	5
	0	132	64	59	329	0	92	0	4	0	0	0	5	5	5	5
	0	220	107	98	549	0	154	0	7	0	0	0	5	5	5	5
	0	202	98	90	505	0	142	0	6	0	0	0	5	5	5	5
Total (6-hour peak)	0	1,510	539	259	1,766	0	574	0	189	0	0	0	30	30	30	30
Average (6-hour peak)	0	252	90	43	294	0	96	0	32	0	0	0	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	132 Avenue	Direction (EW or NS)	EW
Side Street (name)	102 Street	Direction (EW or NS)	NS
Quadrant / Int #		Comments	78K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 31, Mon
Count Date:	78K Horizon
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
132 Avenue	WB					1		370	1
132 Avenue	EB	1		1				9,999	1
102 Street	NB	1				1			
102 Street	SB								
Are the 102 Street NB right turns significantly impeded by through movements? (y/n)									n

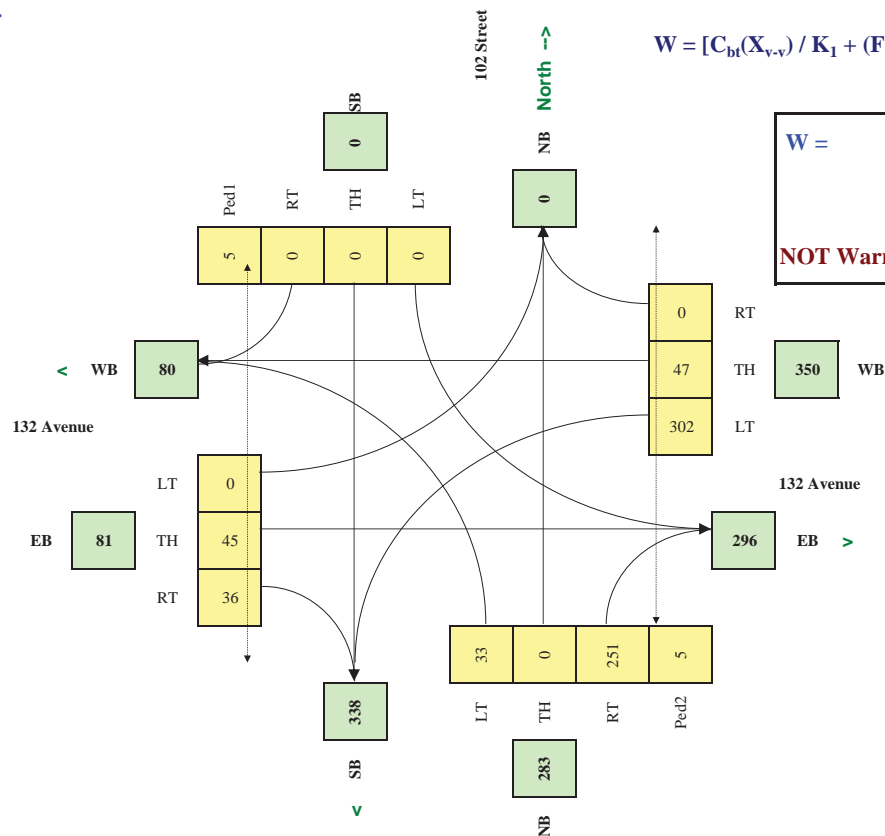
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	78,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
132 Avenue	EW	50	3.5%	y	
102 Street	NS	50	3.5%	y	

Set Peak Hours													Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
NB				SB				WB				EB				
LT	Th	RT		LT	Th	RT		LT	Th	RT		LT	Th	RT		
32	0	318	0	0	0	0	103	30	0	0	40	19	5	5	5	5
45	0	441	0	0	0	0	143	42	0	0	56	27	5	5	5	5
27	0	265	0	0	0	0	86	25	0	0	34	16	5	5	5	5
22	0	115	0	0	0	0	353	44	0	0	34	36	5	5	5	5
36	0	191	0	0	0	0	588	74	0	0	56	60	5	5	5	5
33	0	176	0	0	0	0	541	68	0	0	52	55	5	5	5	5
Total (6-hour peak)	195	0	1,504	0	0	0	1,814	284	0	0	271	214	30	30	30	30
Average (6-hour peak)	33	0	251	0	0	0	302	47	0	0	45	36	5	5	5	5

### 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 =	28	24	4
		Veh	Ped
NOT Warranted			

RESET SHEET



## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name) 102 Street  
Side Street (name) 113 Avenue  
Quadrant / Int #  
CHECK SHEET

for Warrant Calculation  
Results, please hit 'Page  
Down'

Direction (EW or NS) NS  
Direction (EW or NS) EW  
Comments 90K Horizon  
AM = 75% PM;

Road Authority: City of Grande Prairie  
City: Grande Prairie  
Analysis Date: 2013 Sep 13, Fri  
Count Date: 90K Horizon  
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
102 Street	NB	1				1		9,999	1
102 Street	SB		1				1	330	1
113 Avenue	WB				1				
113 Avenue	EB				1				

Are the 113 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 113 Avenue EB right turns significantly impeded by through movements? (y/n)

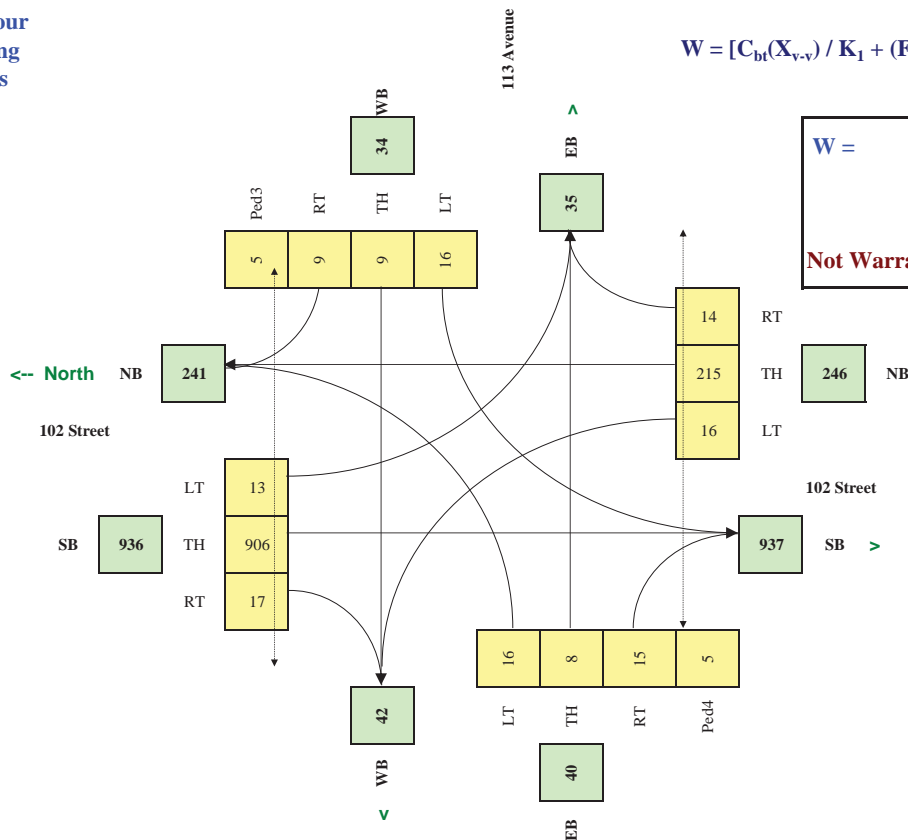
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
113 Avenue	EW	50	3.5%	n	

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

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	12	175	14	1	1441	10	9	6	15	15	8	12	5	5	5	5
	16	243	19	2	2001	14	13	8	21	21	11	17	5	5	5	5
	10	146	11	1	1201	8	8	5	13	13	7	10	5	5	5	5
	14	173	10	17	189	17	15	8	2	11	6	13	5	5	5	5
	23	289	17	28	315	28	25	14	3	19	10	21	5	5	5	5
	21	266	16	26	290	26	23	13	3	17	9	19	5	5	5	5
Total (6-hour peak)	95	1,292	87	75	5,436	103	93	54	56	97	51	92	30	30	30	30
Average (6-hour peak)	16	215	14	13	906	17	16	9	9	16	8	15	5	5	5	5

### 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 = 59 47 12  
Veh Ped  
Not Warranted - Vs<75

RESET SHEET





## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	121 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	90K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 31, Mon
Count Date:	90K Horizon
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
102 Street	NB	1				1		380	1
102 Street	SB	1				1		320	1
121 Avenue	WB	1				1			
121 Avenue	EB	1				1			

Are the 121 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 121 Avenue EB right turns significantly impeded by through movements? (y/n)

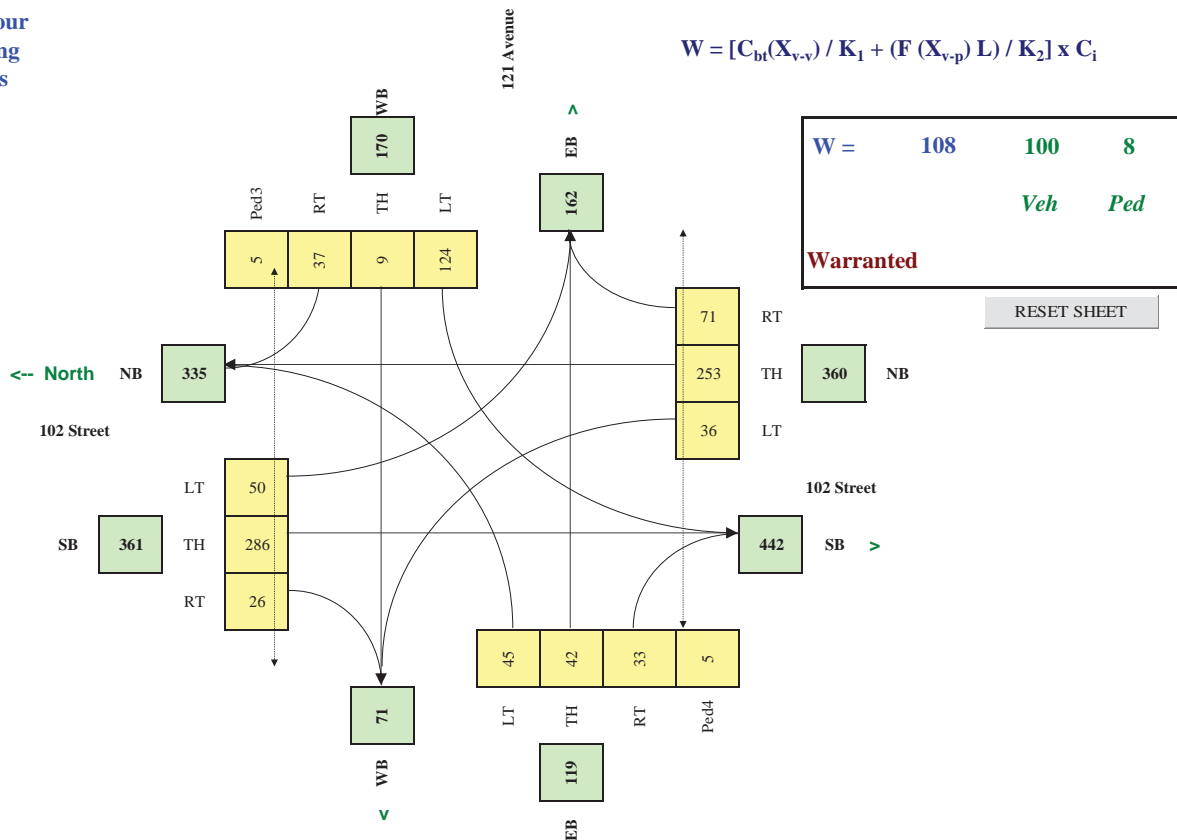
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
121 Avenue	EW	50	3.5%	n	

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					
press 'Set Peak Hours' Button to set the peak hour periods	21	248	63	49	144	17	81	4	25	45	41	32		5	5	5	5
	29	345	88	68	200	24	112	6	35	63	57	44		5	5	5	5
	17	207	53	41	120	14	67	4	21	38	34	26		5	5	5	5
	35	171	52	34	298	23	115	10	34	29	28	23		5	5	5	5
	59	285	87	56	496	39	191	16	56	48	47	38		5	5	5	5
	54	262	80	52	456	36	176	15	52	44	43	35		5	5	5	5
Total (6-hour peak)	216	1,519	423	299	1,714	154	741	54	222	267	251	198		30	30	30	30
Average (6-hour peak)	36	253	71	50	286	26	124	9	37	45	42	33		5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street
Side Street (name)	124 Avenue
Quadrant / Int #	
	CHECK SHEET

for Warrant Calculation  
Results, please hit 'Page  
Down'

Direction (EW or NS)	NS
Direction (EW or NS)	EW
Comments	90K Horizon AM = 75% PM;

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 31, Mon
Count Date:	90K Horizon
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
102 Street	NB	1				1		320	1
102 Street	SB	1				1		430	1
124 Avenue	WB	1				1			
124 Avenue	EB	1				1			

Are the 124 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 124 Avenue EB right turns significantly impeded by through movements? (y/n)

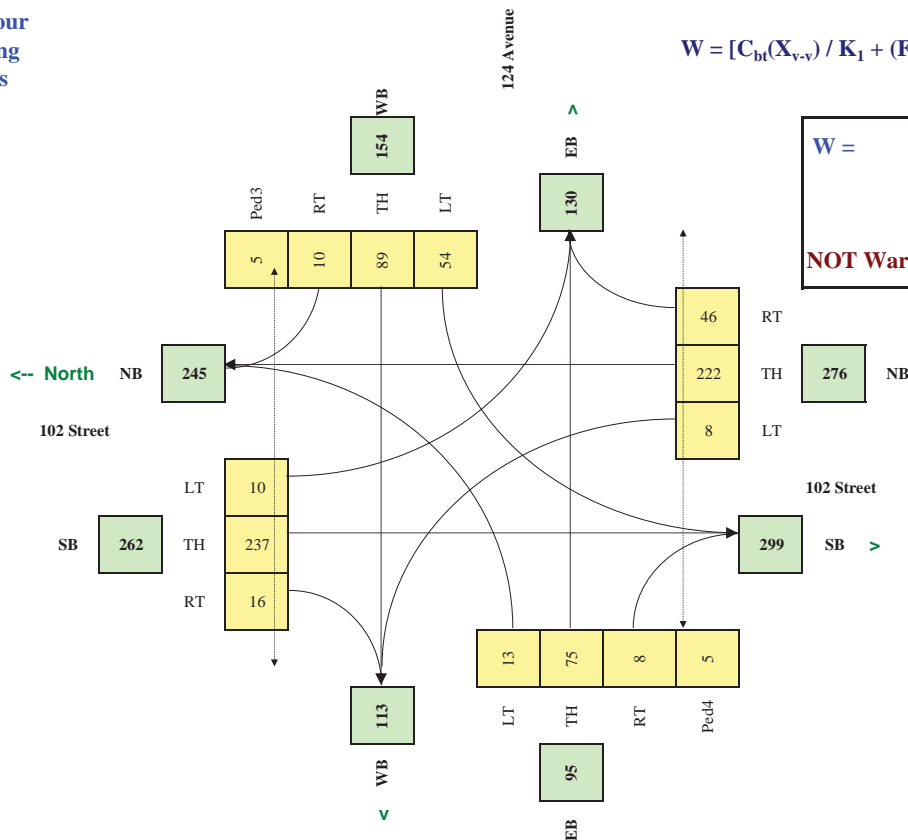
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
124 Avenue	EW	50	3.5%	n	

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 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input	NB			SB			WB			EB				W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT					
press 'Set Peak Hours' Button to set the peak hour periods	4	196	55	8	150	4	21	32	7	17	93	8	5	5	5	5	5
	6	272	77	11	209	6	29	44	10	24	129	11	5	5	5	5	5
	4	163	46	7	125	4	17	26	6	14	77	7	5	5	5	5	5
	8	167	23	8	223	19	62	103	9	5	35	5	5	5	5	5	5
	14	278	38	13	371	32	103	172	15	8	59	8	5	5	5	5	5
	13	256	35	12	341	29	95	158	14	7	54	7	5	5	5	5	5
Total (6-hour peak)	49	1,332	274	58	1,420	95	327	536	61	76	448	46	30	30	30	30	30
Average (6-hour peak)	8	222	46	10	237	16	54	89	10	13	75	8	5	5	5	5	5

### 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 =	75	69	6
		Veh	Ped
NOT Warranted			

RESET SHEET



## City of Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	128 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	90K Horizon AM = 75% PM;
for Warrant Calculation Results, please hit 'Page Down'		CHECK SHEET	

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 31, Mon
Count Date:	90K Horizon
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
102 Street	NB	1				1		200	1
102 Street	SB	1				1		750	1
128 Avenue	WB	1				1			
128 Avenue	EB	1				1			

Are the 128 Avenue WB right turns significantly impeded by through movements? (y/n)  
Are the 128 Avenue EB right turns significantly impeded by through movements? (y/n)

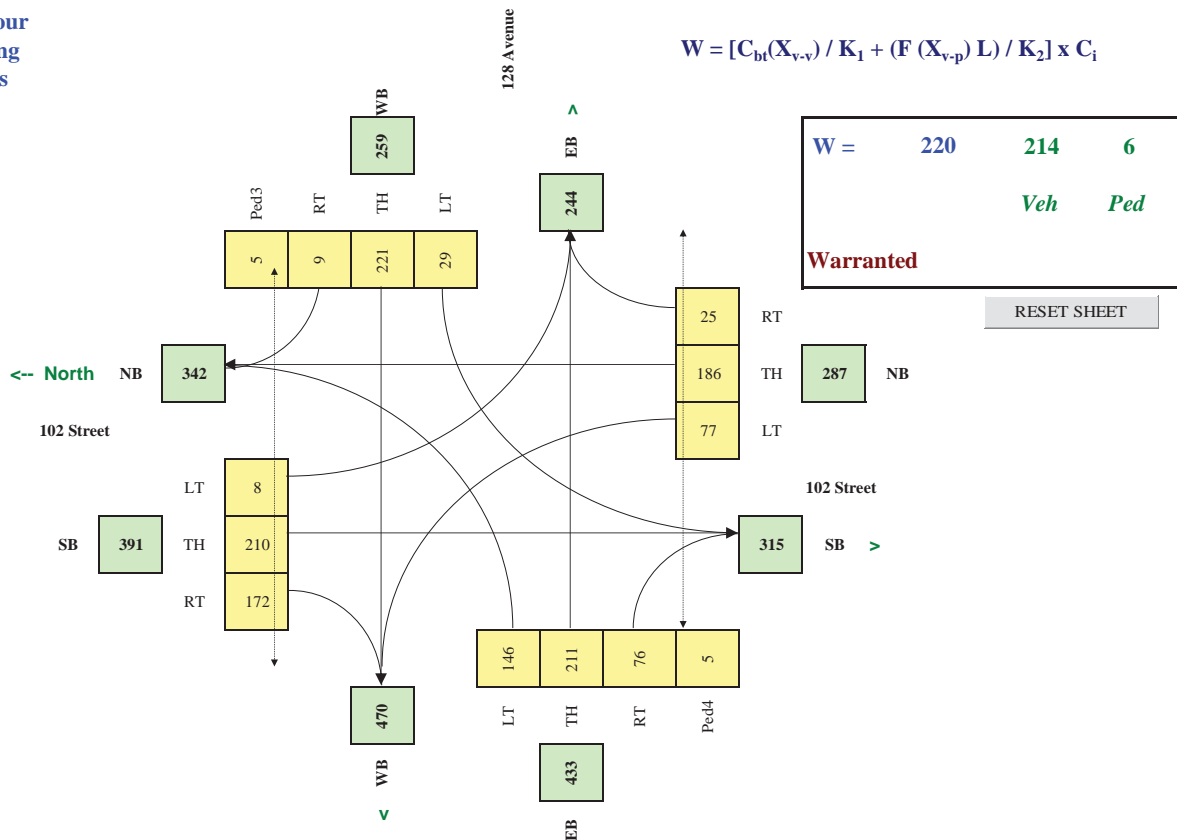
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
128 Avenue	EW	50	3.5%	n	

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population (#)	(y/n)	90,000
Central Business District	(y/n)	n

Set Peak Hours													Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input													W Side	E Side	N Side	S Side
	NB			SB			WB			EB						
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT				
press 'Set Peak Hours' Button to set the peak hour periods	55	202	30	10	100	68	12	143	4	175	185	60	5	5	5	5
	77	280	41	14	139	94	16	199	5	243	257	84	5	5	5	5
	46	168	25	8	83	56	10	119	3	146	154	50	5	5	5	5
	67	111	13	4	224	194	32	205	11	75	159	62	5	5	5	5
	112	185	21	7	373	324	54	342	18	125	265	103	5	5	5	5
	103	170	19	6	343	298	50	315	17	115	244	95	5	5	5	5
Total (6-hour peak)	461	1,116	148	50	1,262	1,035	173	1,324	57	879	1,264	454	30	30	30	30
Average (6-hour peak)	77	186	25	8	210	172	29	221	9	146	211	76	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	102 Street	Direction (EW or NS)	NS
Side Street (name)	130 Avenue	Direction (EW or NS)	EW
Quadrant / Int #		Comments	90K Horizon AM = 75% PM;
CHECK SHEET			

for Warrant Calculation Results, please hit 'Page Down'

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 31, Mon
Count Date:	90K Horizon
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
102 Street NB						1		200	1
102 Street SB			1					180	1
130 Avenue WB					1				
130 Avenue EB									

Are the 130 Avenue WB right turns significantly impeded by through movements? (y/n)

n

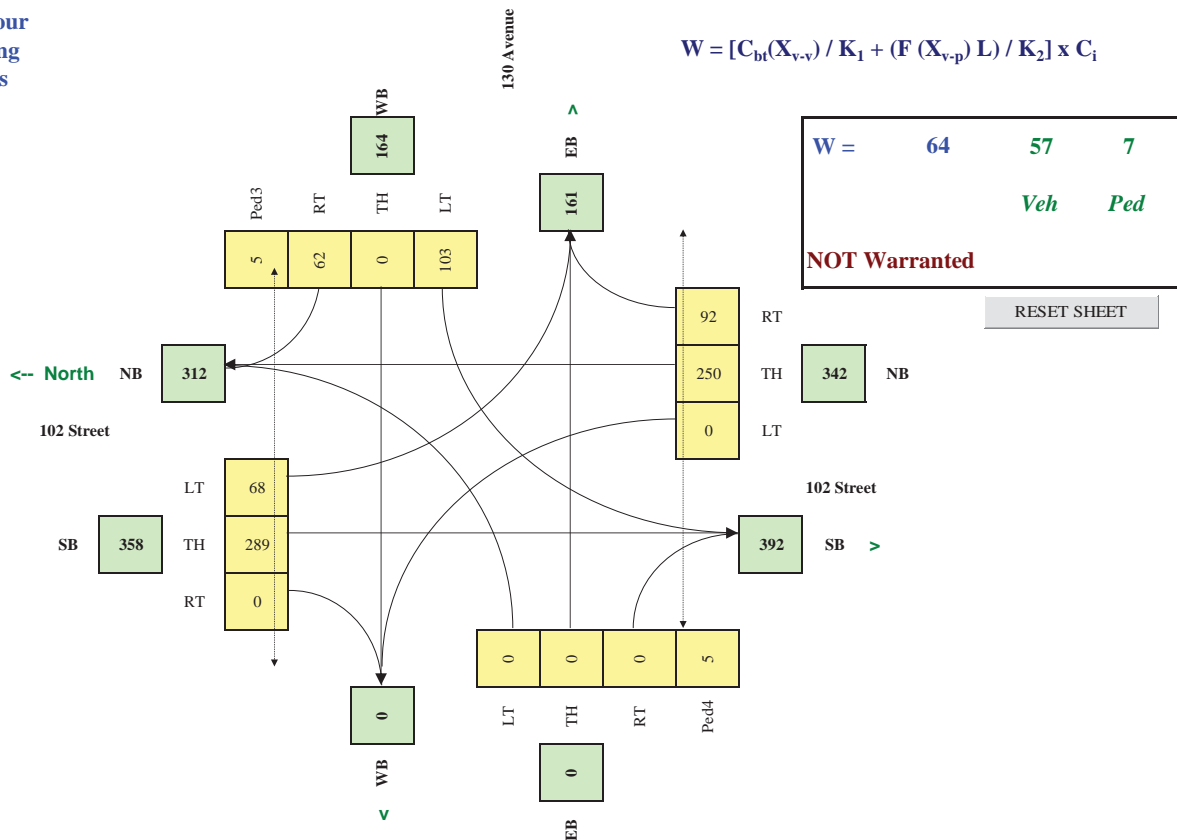
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population (#)		90,000
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
102 Street	NS	50	3.5%	y	
130 Avenue	EW	50	3.5%	n	

Set Peak Hours													Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
NB				SB				WB				EB				
LT	Th	RT		LT	Th	RT		LT	Th	RT		LT	Th	RT		
0	287	95	37	124	0	53	0	62	0	0	0	0	5	5	5	5
0	398	132	52	172	0	74	0	86	0	0	0	0	5	5	5	5
0	239	79	31	103	0	44	0	52	0	0	0	0	5	5	5	5
0	137	59	69	318	0	106	0	41	0	0	0	0	5	5	5	5
0	229	98	115	530	0	176	0	68	0	0	0	0	5	5	5	5
0	211	90	106	488	0	162	0	63	0	0	0	0	5	5	5	5
Total (6-hour peak)	0	1,500	553	410	1,735	0	615	0	371	0	0	0	30	30	30	30
Average (6-hour peak)	0	250	92	68	289	0	103	0	62	0	0	0	5	5	5	5

### 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 Grande Prairie - Traffic Signal Warrant Analysis

Main Street (name)	132 Avenue
Side Street (name)	102 Street
Quadrant / Int #	
	CHECK SHEET

for Warrant Calculation  
Results, please hit 'Page  
Down'

Direction (EW or NS)	EW
Direction (EW or NS)	NS
Comments	90K Horizon AM = 75% PM;

Road Authority:	City of Grande Prairie
City:	Grande Prairie
Analysis Date:	2014 Mar 31, Mon
Count Date:	90K Horizon
Date Entry Format:	(yyyy-mm-dd)

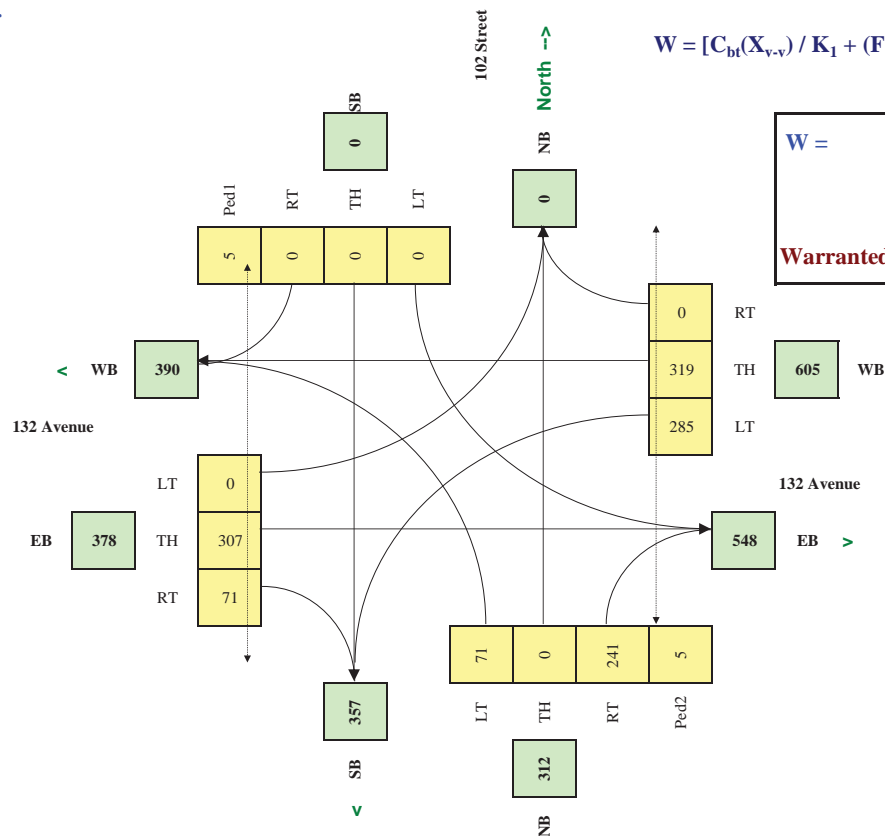
Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
132 Avenue	WB	1		1				370	1
132 Avenue	EB					1		9,999	1
102 Street	NB	1					1		
102 Street	SB								

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
132 Avenue	EW	50	3.5%	y	
102 Street	NS	50	3.5%	y	

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 NS	Ped2 NS	Ped3 EW	Ped4 EW
Traffic Input	NB			SB			WB			EB			W Side	E Side	N Side	S Side
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT				
press 'Set Peak Hours' Button to set the peak hour periods	55	0	292	0	0	0	108	213	0	0	264	53	5	5	5	5
	77	0	406	0	0	0	150	296	0	0	366	73	5	5	5	5
	46	0	244	0	0	0	90	178	0	0	220	44	5	5	5	5
	58	0	120	0	0	0	325	293	0	0	236	62	5	5	5	5
	97	0	200	0	0	0	541	488	0	0	394	103	5	5	5	5
	89	0	184	0	0	0	498	449	0	0	362	95	5	5	5	5
Total (6-hour peak)	423	0	1,446	0	0	0	1,711	1,916	0	0	1,842	429	30	30	30	30
Average (6-hour peak)	71	0	241	0	0	0	285	319	0	0	307	71	5	5	5	5

### 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 =	132	122	10
		Veh	Ped
Warranted			

RESET SHEET

## Appendix I SIDRA INTERSECTION MODELLING OUTPUTS

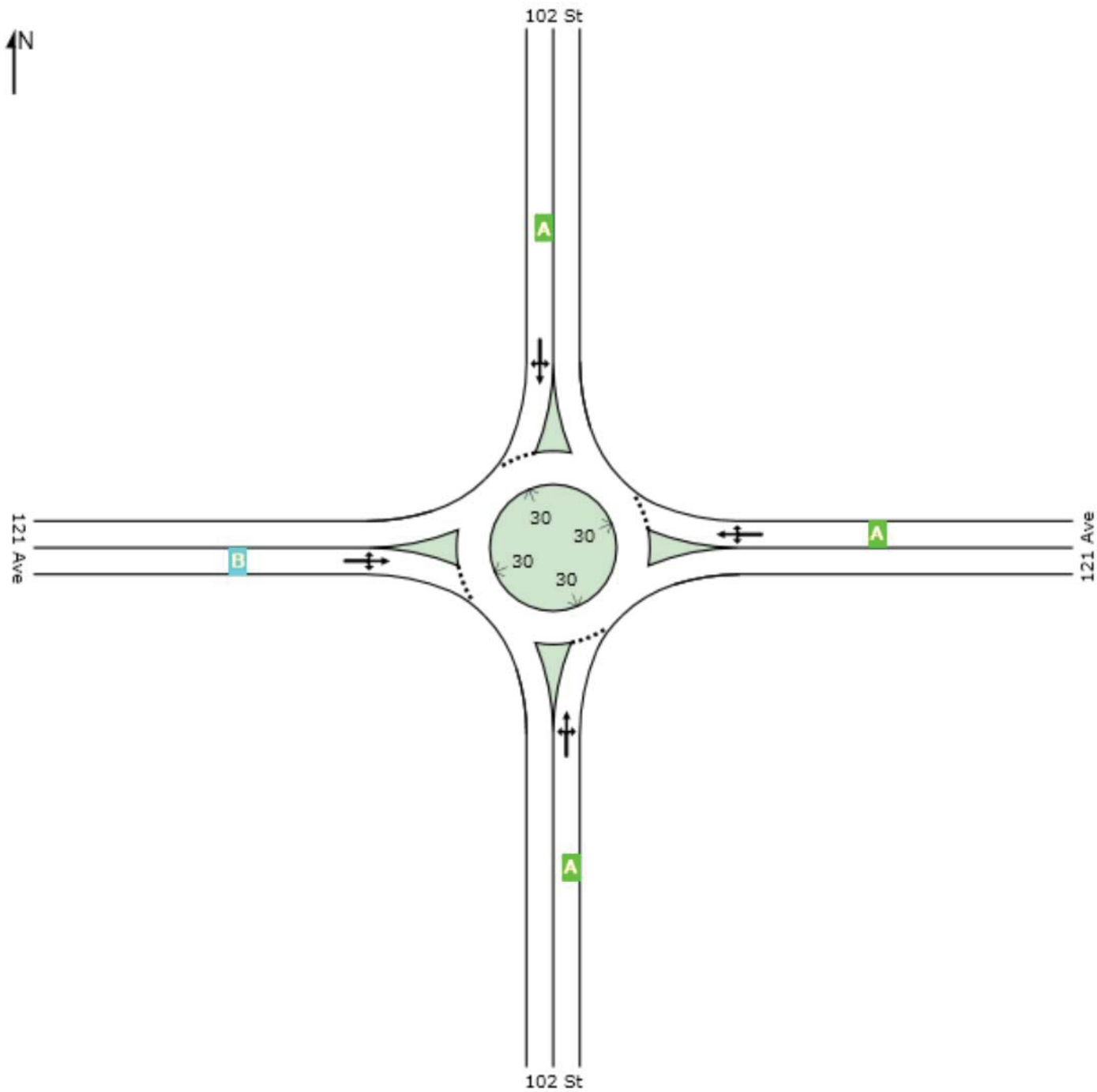
# LEVEL OF SERVICE

 **Site: 90K PM - 102 St & 121 Ave**

102 St & 121 Ave  
90K Horizon - PM Peak Hour  
Roundabout

## All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	A	B	A



Level of Service (LOS) Method: Delay (HCM 2000).  
Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.  
Intersection and Approach LOS values are based on average delay for all lanes.  
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Processed: Tuesday, July 22, 2014 12:06:11 PM  
SIDRA INTERSECTION 6.0.22.4722

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[www.sidrasolutions.com](http://www.sidrasolutions.com)

Project: \\cd1206-f09\shared\_projects\116239355\04\_design\SIDRA\sid\_102st\_2014-07-22.sip6  
8001103, STANTEC CONSULTING LTD., PLUS / 1PC

**SIDRA**  
**INTERSECTION 6**



# MOVEMENT SUMMARY



Site: 90K PM - 102 St & 121 Ave

102 St & 121 Ave  
90K Horizon - PM Peak Hour  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: 102 St											
1	L2	64	3.5	0.401	10.3	LOS B	2.9	20.9	0.47	0.51	55.7
2	T1	310	3.5	0.401	4.4	LOS A	2.9	20.9	0.47	0.51	55.5
3	R2	95	3.5	0.401	4.6	LOS A	2.9	20.9	0.47	0.51	53.9
Approach		468	3.5	0.401	5.3	LOS A	2.9	20.9	0.47	0.51	55.2
East: 121 Ave											
4	L2	208	3.5	0.323	10.4	LOS B	2.0	14.6	0.65	0.73	46.6
5	T1	17	3.5	0.323	4.7	LOS A	2.0	14.6	0.65	0.73	46.1
6	R2	61	3.5	0.323	5.2	LOS A	2.0	14.6	0.65	0.73	45.0
Approach		286	3.5	0.323	8.9	LOS A	2.0	14.6	0.65	0.73	46.2
North: 102 St											
7	L2	61	3.5	0.625	12.5	LOS B	6.1	43.7	0.74	0.71	54.4
8	T1	539	3.5	0.625	6.6	LOS A	6.1	43.7	0.74	0.71	54.2
9	R2	42	3.5	0.625	6.8	LOS A	6.1	43.7	0.74	0.71	52.7
Approach		642	3.5	0.625	7.2	LOS A	6.1	43.7	0.74	0.71	54.1
West: 121 Ave											
10	L2	52	3.5	0.249	13.6	LOS B	1.6	11.7	0.83	0.85	46.0
11	T1	51	3.5	0.249	8.0	LOS A	1.6	11.7	0.83	0.85	45.5
12	R2	41	3.5	0.249	8.5	LOS A	1.6	11.7	0.83	0.85	44.3
Approach		145	3.5	0.249	10.1	LOS B	1.6	11.7	0.83	0.85	45.3
All Vehicles		1541	3.5	0.625	7.2	LOS A	6.1	43.7	0.65	0.67	51.8

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Tuesday, July 22, 2014 12:06:11 PM

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Project: \\cd1206-f09\shared\_projects\116239355\04\_design\SIDRA\sid\_102st\_2014-07-22.sip6

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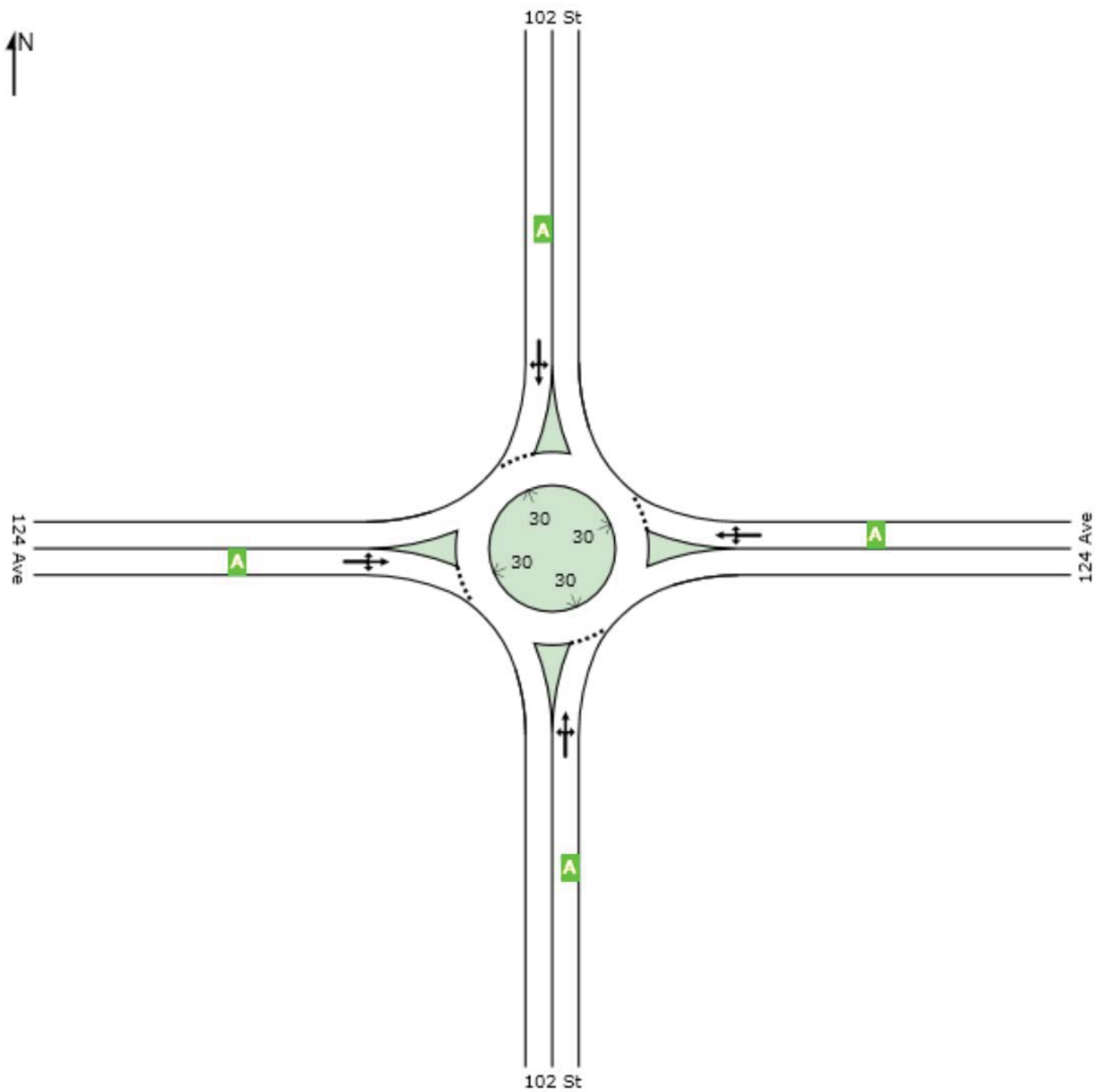
# LEVEL OF SERVICE

 **Site: 90K PM - 102 St & 124 Ave**

102 St & 124 Ave  
90K Horizon - PM Peak Hour  
Roundabout

## All Movement Classes

	South	East	North	West	Intersection
LOS	A	A	A	A	A



Level of Service (LOS) Method: Delay (HCM 2000).  
Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.  
Intersection and Approach LOS values are based on average delay for all lanes.  
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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# MOVEMENT SUMMARY



Site: 90K PM - 102 St & 124 Ave

102 St & 124 Ave  
90K Horizon - PM Peak Hour  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: 102 St											
1	L2	15	5.0	0.281	11.7	LOS B	1.9	13.6	0.31	0.86	50.8
2	T1	302	5.0	0.281	4.7	LOS A	1.9	13.6	0.31	0.86	50.8
3	R2	41	5.0	0.281	6.0	LOS A	1.9	13.6	0.31	0.86	50.8
Approach		359	5.0	0.281	5.2	LOS A	1.9	13.6	0.31	0.43	50.8
East: 124 Ave											
4	L2	112	5.0	0.327	11.1	LOS B	2.0	14.7	0.57	1.25	42.2
5	T1	187	5.0	0.327	4.5	LOS A	2.0	14.7	0.57	1.25	42.2
6	R2	16	5.0	0.327	5.8	LOS A	2.0	14.7	0.57	1.25	42.2
Approach		315	5.0	0.327	6.9	LOS A	2.0	14.7	0.57	0.62	42.2
North: 102 St											
7	L2	14	5.0	0.469	13.7	LOS B	3.4	24.9	0.66	1.26	48.3
8	T1	403	5.0	0.469	6.7	LOS A	3.4	24.9	0.66	1.26	48.3
9	R2	35	5.0	0.469	8.0	LOS A	3.4	24.9	0.66	1.26	48.3
Approach		452	5.0	0.469	7.0	LOS A	3.4	24.9	0.66	0.63	48.3
West: 124 Ave											
10	L2	9	5.0	0.104	11.9	LOS B	0.6	4.3	0.64	1.24	42.7
11	T1	64	5.0	0.104	5.3	LOS A	0.6	4.3	0.64	1.24	42.7
12	R2	9	5.0	0.104	6.7	LOS A	0.6	4.3	0.64	1.24	42.7
Approach		82	5.0	0.104	6.2	LOS A	0.6	4.3	0.64	0.62	42.7
All Vehicles		1208	5.0	0.469	6.4	LOS A	3.4	24.9	0.53	0.57	46.9

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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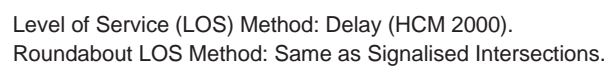
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### All Movement Classes



Lane LOS values are based on average delay per lane.  
Intersection and Approach LOS values are based on average delay for all lanes.  
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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# MOVEMENT SUMMARY



Site: 90K PM - 102 St & 128 Ave

102 St & 128 Ave  
90K Horizon - PM Peak Hour  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: 102 St											
1	L2	122	5.0	0.422	14.4	LOS B	3.0	22.2	0.75	1.51	46.3
2	T1	201	5.0	0.422	7.4	LOS A	3.0	22.2	0.75	1.51	46.3
3	R2	23	5.0	0.422	8.7	LOS A	3.0	22.2	0.75	1.51	46.3
Approach		346	5.0	0.422	10.0	LOS A	3.0	22.2	0.75	0.75	46.3
East: 128 Ave											
4	L2	59	5.0	0.539	13.6	LOS B	4.5	33.0	0.79	1.65	41.7
5	T1	372	5.0	0.539	7.0	LOS A	4.5	33.0	0.79	1.65	41.7
6	R2	20	5.0	0.539	8.4	LOS A	4.5	33.0	0.79	1.65	41.7
Approach		450	5.0	0.539	7.9	LOS A	4.5	33.0	0.79	0.82	41.7
North: 102 St											
7	L2	8	5.0	0.433	14.5	LOS B	3.3	24.1	0.79	1.39	47.6
8	T1	405	5.0	0.433	7.5	LOS A	3.3	24.1	0.79	1.39	47.6
9	R2	352	5.0	0.349	8.1	LOS A	2.5	18.1	0.71	1.43	47.5
Approach		765	5.0	0.433	7.9	LOS A	3.3	24.1	0.75	0.70	47.5
West: 128 Ave											
10	L2	136	5.0	0.665	15.9	LOS B	7.2	52.5	0.90	1.97	39.4
11	T1	288	5.0	0.665	9.4	LOS A	7.2	52.5	0.90	1.97	39.4
12	R2	112	5.0	0.665	10.7	LOS B	7.2	52.5	0.90	1.97	39.4
Approach		536	5.0	0.665	11.3	LOS B	7.2	52.5	0.90	0.98	39.4
All Vehicles		2097	5.0	0.665	9.1	LOS A	7.2	52.5	0.80	0.81	43.8

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LEVEL OF SERVICE



**Site: 90K PM - 102 St & 130 Ave**

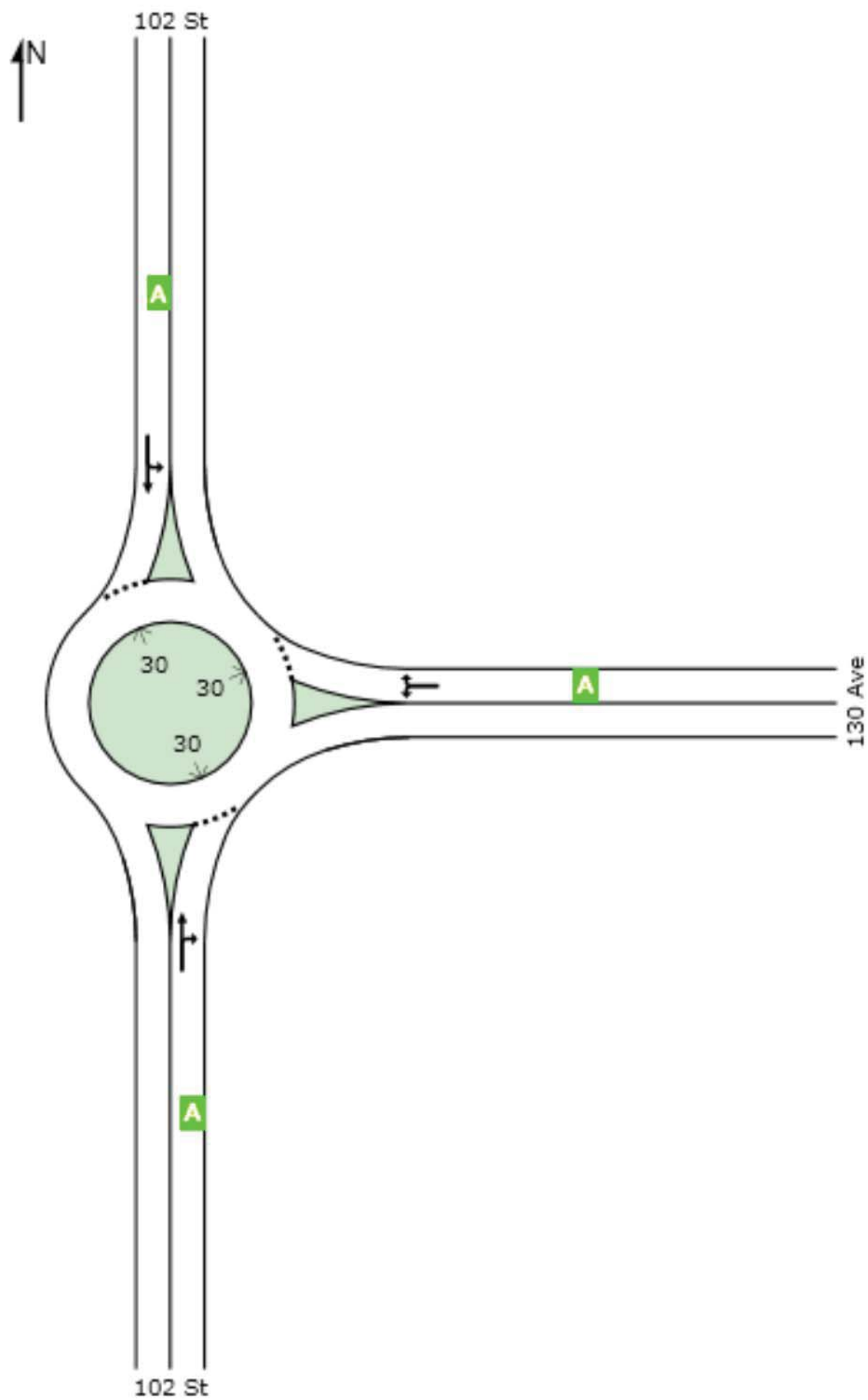
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102 St & 130 Ave  
90K Horizon - PM Peak Hour  
Roundabout

**All Movement Classes**

	South	East	North	Intersection
LOS	A	A	A	A





Level of Service (LOS) Method: Delay (HCM 2000).  
Roundabout LOS Method: Same as Signalised Intersections.  
Lane LOS values are based on average delay per lane.  
Intersection and Approach LOS values are based on average delay for all lanes.  
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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# MOVEMENT SUMMARY



Site: 90K PM - 102 St & 130 Ave

102 St & 130 Ave  
90K Horizon - PM Peak Hour  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: 102 St											
2	T1	249	5.0	0.297	5.0	LOS A	2.0	14.6	0.39	0.93	50.3
3	R2	107	5.0	0.297	6.3	LOS A	2.0	14.6	0.39	0.93	50.3
Approach		355	5.0	0.297	5.4	LOS A	2.0	14.6	0.39	0.46	50.3
East: 130 Ave											
4	L2	191	5.0	0.259	10.4	LOS B	1.5	11.3	0.49	1.29	41.0
6	R2	74	5.0	0.259	5.2	LOS A	1.5	11.3	0.49	1.29	41.0
Approach		265	5.0	0.259	8.9	LOS A	1.5	11.3	0.49	0.64	41.0
North: 102 St											
7	L2	125	5.0	0.611	13.0	LOS B	5.6	40.8	0.64	1.19	48.0
8	T1	576	5.0	0.611	6.0	LOS A	5.6	40.8	0.64	1.19	48.0
Approach		701	5.0	0.611	7.3	LOS A	5.6	40.8	0.64	0.59	48.0
All Vehicles		1322	5.0	0.611	7.1	LOS A	5.6	40.8	0.54	0.57	47.0

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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## Appendix J CONCEPT PLAN DEVELOPMENT NOTES

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To:	Norman Kyle City of Grande Prairie	From:	Niki Burkinshaw Red Deer AB Office
File:	116239355-01a	Date:	January 7, 2014

---

**Reference: 102 Street Traffic Study – Open House Summary Notes**

An open house was held in Grand Prairie on November 21, 2013, to present the draft 102 Street (113 Avenue to 132 Avenue) concept to the public. Those that attended the open house (23 attendees, excluding City of Grande Prairie and Stantec staff) were given the opportunity to discuss concerns and ways to improve 102 Street. The comments listed on the poster-sized boards, feedback forms and additional feedback received regarding the project is summarized below.

**GEOMETRIC IMPROVEMENTS**

- Sidewalks on both sides (3)
- Line up lanes better so drivers won't improvise, be confused, and pay more attention to pedestrians (2)
- Intersection of 102 Street / 113 Avenue – Need turn lane on 113 Avenue from N going S. (2)
- Right turn off 102 Street to 116 Avenue need acceleration lane.
- Suggestion to implement circle (small one) instead of four stop signs.
- If a traffic circle is added make sure school buses can handle it and that pedestrians can still cross safely.
- 117 Avenue intersection is bad. Suggestion to install traffic circle.
- If you use traffic circles you will need to put up signs explaining the rules of how they work and make them 18" high in the center with all hard-surfaces for outer 2.5-3m for larger trucks/buses that need larger turning radii.
- Just repaint the lines back the way they were (or a right-turn lane). With two High Schools, a leisure center, and a large park on west side of 102<sup>nd</sup> Street there is way more traffic turning right (or going straight) than turning left. (113 Avenue)
- 116 Avenue to 132 Avenue – right turn / right out only on all intersection except at 124 Avenue is lights with left turn and right turn
- Keep 102 Street road allowance wide (someday the City will need it for another N-S artery)
- Use roundabouts / traffic circles

**SIGNAL TIMING IMPROVEMENTS**

- Overhead flashing lights across 102 Street so you can get across the street
- Intersection of 102 Street / 116 Avenue – there's a left turn lane AND advance green arrow for North/West bound traffic – turn it on!
- Add advance turn west when facing north on 102 Street @ 116 Avenue.
- 116 Avenue / 105 Street – lights.
- North-south phases at 102 Street and 116 Avenue don't have enough greentime.
- Need southbound left-turn arrow at 102 Street and 116 Avenue.

**Reference: 102 Street Traffic Study – Open House Summary Notes**

**PEDESTRIAN/CYCLISTS IMPROVEMENTS**

- More time to cross the road as pedestrian.
- Proper cycle paths on both sides to 132 Avenue (2)
- Let pedestrians and cyclists use existing sidewalks (2).
- Add another concrete or asphalt walk all along the east side as proposed.
- Remove pedestrian trail between the houses at 114 Avenue (2)
- Walk / bike trails (7-8' wide) on both sides of 102 Street, and clear them in the winter.
- Consider using the green paint for bike lanes, as being tried in Edmonton and is used in san Francisco, to make is more clear where the bike lane is.

**AREAS OF CONCERN**

- 117 Avenue / 116 Avenue intersections are biggest concern along 102 Street.
- Kids crossing from 114 Avenue.
- Drivers ignore four way stop at the intersection of 102 Street / 113 Avenue.
- The aggressive driving that seems to go unchecked in Grand Prairie.
- No traffic circles (2)
- There's a great trail on west side of 102nd! Tell them to use it! How spoiled/picky can we be that we need one on BOTH sides!!
- Eliminate on street parking (2)
- Work some magic at the Mr. Mike's intersection – a messy spot driving, walking or cycling.
- Pedestrian ways and parking (with signage) throughout the city must exceed the provincial expectation as outlined in the barrier-free guidelines.
- The design for 113 Avenue to 132 Avenue corridor should include exceptional drainage and smooth transitions between pedestrian / bikeways and the road surface.

**AESTHETICS**

- No more bunkers (Planters) (6).
- More planters to make the city as green as possible.
- Fence in median at 114 Avenue, maybe.

*Note: (#) beside the entry indicates how many times it was mentioned.*

Please note that this summary list does not include the email comments from Dan Kirkham, as he and his wife attended the open houses and emailed the same comments that were written on the poster-sized sheets.

**Reference: 102 Street Traffic Study – Open House Summary Notes**

There are a number of conflicting comments, as typical with any public open house, such as sidewalks / paths on both sides vs. sidewalks / paths only on the one (existing) side; install roundabouts vs. no roundabouts; etc. As such, when we meet via teleconference to discuss finalization of the concept the City will need to make decisions regarding specific design elements. Once those decisions are made, the concept can be finalized and we can move onto creating the report for the project.

I look forward to reviewing the open house feedback with you and moving forward in finalizing the 102 Street (113 Avenue to 132 Avenue) concept plan.

Regards,

**STANTEC CONSULTING LTD.**



Niki Burkinshaw, P.Eng.  
Project Engineer  
Phone: (403) 356-3412  
Fax: (403) 342-0969  
[niki.burkinshaw@stantec.com](mailto:niki.burkinshaw@stantec.com)

c. Aquisha Khan, Kristine Donnelly

To: Norman Kyle  
City of Grande Prairie  
File: 116239355-01a

From: Niki Burkinshaw  
Red Deer AB Office  
Date: January 23, 2014

---

**Reference: 102 Street Traffic Study – Concept Finalization**

Further to the memo sent on January 7, 2014, summarizing the Open House #1 feedback for the 102 Street (113 Avenue – 132 Avenue) Traffic Study and our discussion held on January 13, 2014, the decision items for finalizing the concept plan are as follows:

- Trails / Sidewalks –
  - 2.0 m separate sidewalk for the east side of 102 Street, maintaining 3.0m from the back of curb wherever possible (maintaining a consistent cross-section is important):
    - Do not need to weave around existing trees; and
    - If needed, it can go in the gas easement behind the trees.
  - Will shade the existing trail on the west side of 102 Street where it doesn't show on the aerial photo to make it more visible.
- Roundabouts –
  - The roundabout will remain shown as an option, as is currently shown on the plan; and
  - The report will include traffic modeling results and a discussion of the pros / cons for roundabouts vs. conventional intersections (cost, land acquisition, pedestrian accommodation, etc.).
- Intersection of 102 Street / 113 Avenue –
  - Southbound lane configuration revised to show dedicated left-turn, through and right-turn lanes; and
  - Northbound configuration revised to show the current configuration of a dedicated left-turn lane with a shared through / right-turn lane.
- Pedestrian Jaywalking South of 116 Avenue –
  - Look to extend the median further to the south (a reduction in the southbound left-turn storage at 113 Avenue may help accommodate this); and
  - Include a median fence.
- Intersection of 102 Street / 116 Avenue (Highway 43) –
  - Comparison of traffic modeling results with and without north and southbound left-turn arrows to be included in report;
  - Compare signal timing plan to the City's minimum standards;
  - Check the 'Flashing Don't Walk' times based on the pedestrian crossing speed of 1.0 m/s (TAC's new standard); and
  - Extend the line work on the east side of the intersection beyond the viewport.
- Intersection of 102 Street / 117 Avenue –
  - Show the intersection with a median, converting it to two right-in/right-out intersections;
  - Report to include discussion as to why traffic signals or a roundabout are not feasible options; and



January 23, 2014

Norman Kyle

Page 2 of 2

**Reference: 102 Street Traffic Study – Concept Finalization**

- Report to include a discussion of the potential shortcutting that may occur with this change and ways to address it.
- Bulb-Outs Along 102 Street –
  - Bulb-outs to remain, as shown on the current plan; and
  - Report to include a discussion of signage options and operational (e.g. snow removal) challenges).

Based on discussions with our design /drafting coordinator, the concept plan for the 102 Street (113 Avenue to 132 Avenue) Traffic Study can be revised with the drafting-related changes noted above within 1 week of receiving direction to move forward. If you could please provide your agreement with the above noted changes as soon as possible, we will move forward with finalizing the concept plan.

Regards,

**STANTEC CONSULTING LTD.**



Niki Burkinshaw, P.Eng.  
Project Manager  
Phone: (403) 356-3412  
Fax: (403) 342-0969  
niki.burkinshaw@stantec.com

c. Aquisha Khan, Kristine Donnelly

## Burkinshaw, Niki

---

**From:** Norman Kyle <nkyle@cityofgp.com>  
**Sent:** Thursday, May 08, 2014 8:24 AM  
**To:** Burkinshaw, Niki; Aquisha Khan  
**Cc:** Kristine Donnelly; Daskewich, Frank  
**Subject:** RE: 102 Street Traffic Study - Follow Up to Open House #2

**Categories:** (a) My Projects (PM)

I don't recall anything major to change.

I would like to get the last draft and post it on the web.

I also plan on contacting the affected businesses that never showed up to make them aware of the project and its implications.

Could we PDF or download the last open house presentation for posting to the City's webpage?

---

**From:** Burkinshaw, Niki [<mailto:Niki.Burkinshaw@stantec.com>]  
**Sent:** April-25-14 10:26 AM  
**To:** Aquisha Khan  
**Cc:** Kristine Donnelly; Norman Kyle; Daskewich, Frank  
**Subject:** FW: 102 Street Traffic Study - Follow Up to Open House #2

Aquisha,

My apologies for not cc'ing you on this email earlier this week.

As we discussed on the phone, you are not aware of any additional feedback that has been received following Open House #2 for the 102 Street Traffic Study. At this point, it is likely simplest for me to be in touch as soon as I am back from vacation (May 6) and touch base with you regarding whether or not the concept is considered finalized, or if there is any final changes to be made. Following that I can provide a schedule for submitting the draft report.

Regards,  
Niki Burkinshaw

---

**From:** Burkinshaw, Niki  
**Sent:** Monday, April 21, 2014 2:01 PM  
**To:** Norman Kyle ([nkyle@cityofgp.com](mailto:nkyle@cityofgp.com))  
**Subject:** 102 Street Traffic Study - Follow Up to Open House #2

Norm,

I wanted to follow up with you quickly following Open House #2 for the 102 Street Traffic Study, and thought I'd send an email since I recall you saying you were on the road a lot until May.

Based on the feedback from the second open house, is there anything you were thinking of revising on the 102 Street concept plan? If there is, let me know and we can discuss it further. If not, then I will provide you with a schedule for submitting the draft report – just a heads up, I will be out of the office from April 26 – May 5.

Regards,

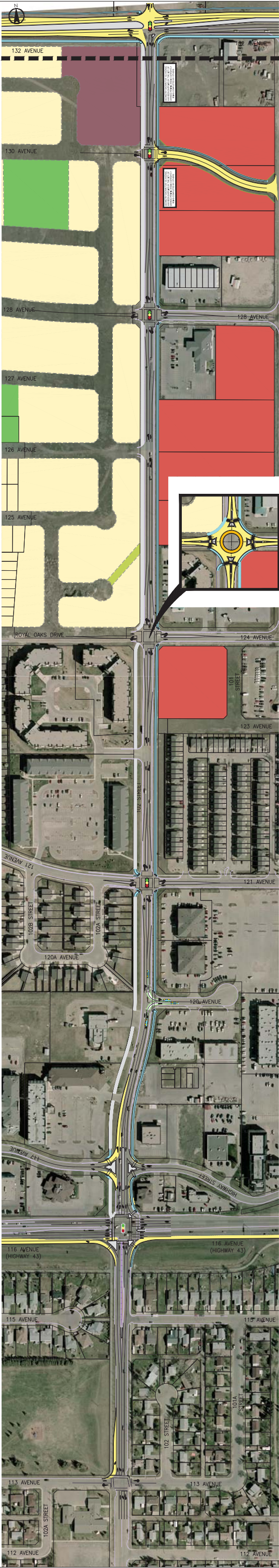
Niki Burkinshaw, P.Eng.

## Appendix K PREFERRED CONCEPT PLAN





EXISTING CONDITIONS  
1:500



TYPICAL ROUNDABOUT DETAIL  
1:500

90.00 POPULATION HORIZON  
1:500