Final Report

The City of Cold Lake

Cold Lake Transportation Study

February 2012



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Introduction

The City of Cold Lake (City) is located 287 km northeast of the City of Edmonton and was formed by merging three municipalities, namely Cold Lake, Grand Centre and Medley (Canadian Forces Base W4) in 1996. Grand Centre was subsequently renamed Cold Lake South (CLS) and the original Cold Lake is now known as Cold Lake North (CLN).

The City has experienced noticeable growth in recent years. According to municipal census the City had a population of 11,991 in 2006 and 13,924 in 2009. This corresponds to a 5.4% linear growth annually. Current transportation improvements within the City have been based on the previous transportation study completed in 2000 and is no longer considered representative of the actual transportation network required to address current and future transportation needs.

In light of the continuing accelerated pace of development in the region and the need to rationalize and identify the transportation network requirements for the City, including surrounding rural municipalities and counties, the existing transportation plan requires a comprehensive update.

1.1 PROJECT BACKGROUND

Associated Engineering (AE) was retained by the City to update the 2000 transportation study. The purpose of the transportation study is to provide a comprehensive long range plan that integrates the transportation infrastructure requirements of the existing and future land uses. The transportation study will provide the City with a blueprint on which to plan and implement specific transportation network improvement projects over the next 20 years, in 5-year, 10-year, 15-year and 20-year planning horizons. The transportation study will consider municipal roads, traffic calming, parking, traffic safety, traffic signal coordination, school zones, transit, truck routes, traffic management, and transportation system operations.

This report compiles the major findings from the different components of the transportation study; detailed information regarding the analysis and results can be referenced in the full technical memorandum.

1.2 PROJECT STUDY AREA

The transportation study encompassed the area bounded by the current City limits, including Cold Lake North, Cold Lake South and Medley. Figure 1.1 presents the study area.







PROJECT NO:	2010-3050
DATE:	MARCH 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

CITY OF COLD LAKE TRANSPORTATION STUDY

FIGURE 1.1 TRANSPORTATION STUDY - STUDY AREA

1.3 **PROJECT COMPONENTS**

The transportation study was broken down into the following three stages:

- Stage 1 Study preparation, model development and traffic volume forecasting
- Stage 2 Operational analysis and various transportation studies
- Stage 3 Reporting.

Table 1.1 summarizes the various tasks that were proposed and approved as part of the transportation study.

Project	Project Task	Broject Task Description
Stage	Number	
	1A.1	Project Initiation Meeting
	1A.2	Data Collection and Review
	1A.3	Stakeholder Discussions/Meetings
	1A.4	Supplemental Data Collection (Optional)
	1A.5	Land Use Data
	1A.6	Planned Developments
	1A.7	Traffic Analysis Zones
	1A.8	Base Road Network
1	1A.9	Traffic Volumes
	1A.10	Study Review Meetings
	1B.1A	Model Development - VISUM Model
	1B.1B	Model Development - EMME Model
	1B.1C	Model Development - Spreadsheet Model
	1B.2	Existing (2010) Traffic Operations
	1B.3	Traffic Volume Forecasting
	1B.4	Transportation Policies and Strategies
	1B.5	Study Review Meeting
	2A.1	Capacity Analysis for Planning Horizons
	2A.2	Development and Evaluation of Roadway Improvements
	2A.3	Traffic Calming
	2A.4	Parking Management
2	2A.5	In-Service Safety Reviews
Z	2A.6	Coordination of Traffic Signals
	2A.7	Highway 28 Functional Review
	2A.8	Truck and Dangerous Goods Routes Review
	2A.9	School Zone Safety Analysis
	2A.10	Transit Services

Table 1.1Transportation Study Tasks



Project Stage	Project Task Number	Project Task Description
	2A.11	Sustainable Transportation
	2A.12	Develop Cost Estimates
	2A.13	Prioritize Transportation Infrastructure Capital Improvements
	2B.1	Determine Land Use and Utility Conflicts
	2B.2	Study Review Meeting
	2B.3	Acquire/Purchase Software
	2B.4	Provide Training to City Staff
	2B.5	Integration of Software to other Applications
	2B.6	Transportation Levy
	2B.7	Public Consultation Process
	3.1	Draft Report
	3.2	Plan Submission
3	3.3	Study Review Committee Meeting
	3.4	Final Report
	3.5	Presentation to Council

Tasks 1A.1 through 1B.1 were predominantly preparation work for the transportation study. Where the information was relevant and utilized for completion of a task, it was included as part of the appendix in the relevant technical memorandum. Therefore, Tasks 1A.1 through 1B.1 were not documented in a separate report and will not be summarized in this report.

At project initiation, some tasks were determined to be not applicable as a result of the traffic volume forecast model selected. The spreadsheet model was selected by the City; therefore Task 1A.7, Task 2B.3 and Task 2B.5 were not applicable. Additionally, as the study progressed, several tasks were determined to be unnecessary by the City. These tasks include Task 1B.4, Task 2A.2, Task 2A.13, Task 2B.1 and Task 3.2.

A technical memorandum was prepared for each task completed above. The traffic calming and in-service safety reviews were completed and documented together, as part of the in-service road safety review. Additionally, the study review meetings (Task 1A.10, Task 1B.5, Task 2B.2, and Task 3.3) were completed in a series of telephone conversations (weekly progress meetings) and several face-to-face meetings, and will not be documented in the report.

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2 Project Tasks

Each project task completed for the transportation study will be discussed as a separate section below. A summary of each project task will be provided along with guidance to the full report, which can be referenced for detailed information about the assumptions, methodology and complete results from each task.

2.1 EXISTING (2010) TRAFFIC OPERATIONS

Task 1B.2 (existing traffic operations) was completed and documented in the technical memorandum titled Existing (2010) Traffic Operational Analysis, included in **Appendix A**.

Only the major roadways (collector and arterial roads) were analyzed for the existing traffic operations. Traffic operational analyses were completed at the intersections between two collectors, between a collector and an arterial, and between two arterials, as per the 2000 transportation study road classification.

Overall, most of the intersections within the City are currently operating above acceptable levels (LOS C or better). The intersections which are not currently operating above acceptable LOS are:

- 8 Avenue and 16 Street
- Highway 28/55 with 75 Avenue
- 28/55 with 61/62 Avenue
- Highway 28/55 and 54 Avenue
- Highway 28/55 and 52 Avenue
- Highway 28/55 and 52 Street
- Highway 28/55 and 46 Avenue
- Centre Avenue and 59 Street
- Centre Avenue and 57 Street.

Several of the intersections listed above are currently being upgraded as part of the Highway 28 twinning project. These intersections include:

- 8 Avenue and 16 Street
- Highway 28/55 with 75 Avenue
- Highway 28/55 with 61/62 Avenue
- Highway 28/55 and 54 Avenue.

With the intersection improvements that will be implemented as part of the Highway 28 twinning project, the intersections of 8 Avenue and 16 Street, and Highway 28/55 and 54 Avenue will operate above acceptable LOS and with low minimum delays. However the intersections of Highway 28/55 with 75 Avenue and 61/62 Avenue will require additional improvements.



The following intersections will require additional improvements, above and beyond the Highway 28 Twinning project improvements:

- Highway 28/55 with 75 Avenue
- Highway 28/55 with 61/62 Avenue
- Highway 28/55 and 52 Avenue
- Highway 28/55 and 52 Street
- Highway 28/55 and 46 Avenue
- Centre Avenue and 59 Street
- Centre Avenue and 57 Street.

The recommended lane configuration and traffic control are presented in Figure 6.1 through Figure 6.4 in the Existing (2010) Traffic Operational Analysis technical memorandum.

2.2 COLLISION ANALYSIS

A collision analysis was completed as part of Task 1B.2 and documented in the technical memorandum titled Collision History Review and Analysis, included in **Appendix B**.

The collision history within the City was reviewed and used to identify high collision locations. AE also analyzed the collision data at the high collision locations to determine collision distribution patterns and provide the City with potential safety concerns at each location.

Between 2005 and 2009, a total of 2,071 collisions occurred within the City of Cold Lake. Intersections with 10 collisions or more within the 5-year timeframe were identified as high collision locations. The following intersections were identified as high collision locations:

- 1. Highway 28 and 54 Avenue
- 2. Highway 28 and Tri City Mall
- 3. Highway 28 and 50 Avenue
- 4. 55/55A Street and 54 Avenue
- 5. 50 Street and 50 Avenue
- 6. 50 Street and 46 Avenue
- 7. Highway 28 and 50 Street
- 8. 51 Street and 50 Avenue
- 9. 50 Street and 43 Avenue
- 10. 52 Street and 50 Avenue
- 11. 49 Street and 51 Avenue
- 12. Highway 28 and 43 Avenue
- 13. Highway 28 and 55 Avenue

At the intersections listed above, the following collision distribution patterns were analyzed:

- Temporal collision distributions By year, by month, by day, and by hour
- Type and cause distributions By type, by cause, and by severity
- Environmental distributions By weather conditions, by road surface condition, and by light condition.

The detailed collision analysis at each location is provided in Appendix B of the Collision History Review and Analysis technical memorandum. Potential safety concerns at each high collision location were identified, where possible, from the patterns identified from the collision analysis. In general, the potential safety issues identified in this section are non-conclusive since the collision data did not provide enough detail, with regards to travel direction and other factors, to identify the collision causes and the probable solutions.

The high collision locations identified in the Collision History and Analysis technical memorandum need further detailed analysis to identify the exact cause of the collisions and develop probable engineering solutions. AE recommends that the City conduct in-service safety assessments at each of the high collision locations to understand the underlying causes for the collisions. As part of the in-service safety assessments, the City should obtain the full collision reports from AT to obtain a better understanding of the collision events and to facilitate the identification of the safety issues.

The Chrysler intersection, located at Highway 28 and 50 Street, was identified by the City and by the collision analysis as a high collision location. Through discussions with the City, three options were considered to improve the operation of the Chrysler intersection: provide a roundabout at the service road intersection, provide a right-in-right-out at the service road intersection, or provide a cul-de-sac at the service road intersection. The roundabout option is not feasible due to the close proximity to Highway 28 and the limited right-of-way at the intersection. AE recommends that the City consider providing a right-in-right-out or a cul-de-sac at the service road intersection. Both the right-in-right-out and cul-de-sac would eliminate some, if not all, turning movements to and from the service road, thereby removing some conflict points and reducing driver confusion. A detailed traffic analysis should be completed at the study intersection, and the adjacent intersections, to determine the traffic impact of the right-in-right-out or cul-de-sac.

Seven of the thirteen high collision locations occurred at intersections with Highway 28 or the service roads (55/55A Street or 50 Street) that run parallel to the highway. The separation distance that are provided between Highway 28 and the service roads are typically within 30 m to 65 m. Multiple intersections located within a short distance generate more conflict points and significantly increases the driver workload; thus, resulting in a higher frequency of collisions. Similar to the Chrysler intersection, the City should consider closing or providing right-in-right-out, or cul-de-sacs, at the service road and complete a traffic analysis to determine which service road intersections to close and the impact of the road closure on the surrounding road network. Intersection closures typically shift traffic to the adjacent intersections. Traffic analysis is required to determine if any improvements would be required on the adjacent intersections to accommodate the additional traffic volumes.



2.3 TRAFFIC VOLUME FORECASTING AND ANALYSIS

Task 1B.3 (Traffic Volume Forecasting) and Task 2A.1 (Capacity Analysis for Planning Horizons) were completed together and documented in the technical memorandum titled Traffic Volume Forecast and Analysis, included in **Appendix C**.

Future traffic volumes were forecasted for the next 20 years (in the 5-year, 10-year, 15-year, and 20-year planning horizons) and analyzed to determine roadway classification and number of lanes required to accommodate the future traffic volumes.

A spreadsheet model, following a four-step planning process, was used to forecast the future traffic volumes in the City. To complete the spreadsheet model, a skeletal road network was developed for each planning horizon to represent the anticipated road network. The major road network (collectors and arterials) identified for each planning horizon in the 2000 transportation study were used to represent the skeletal road network for the respective planning horizon, with modification to reflect current roadway conditions.

Future traffic within the City will be comprised of background traffic and development traffic. Background traffic represents the existing traffic expanded to reflect future growth in the surrounding areas and in the City's existing subdivisions. Background traffic was generated by applying an annual non-compounded growth of 2% to the existing (2010) traffic volumes. Development traffic represents traffic generated by new subdivisions or area redevelopment. The information about future development or redevelopment within the City was obtained from the City's Area Structure Plans (ASP), Area Redevelopment Plans (ARP) and Outline Plans and from the Municipal District (MD) of Bonnyville's Intermunicipal Department Plan (IDP). To generate the development traffic, a four-step process was used:

- **Trip Generation**: Estimate the number of trips generated from and attracted to each development/redevelopment
- **Trip Distribution**: Estimate the origin and destination of trips to and from each development/redevelopment
- **Modal Split**: Not within the scope of the study
- **Trip Assignment**: Select the routes to and from the developments/redevelopments and assign the development traffic volumes to the City's road network.

A simplified gravity model was used to establish the trip distribution within the City. The results from the gravity model were revised, with discussions with the City, to reflect local travel patterns.

The development trips were assigned onto the future road network with consideration for the logical routes, on the basis of convenience and travel time, which would be taken by commuters between the origin and destinations. To capture worst-case traffic scenarios, the development trips were primarily assigned to the skeletal road network established for the planning horizons.

Figure 5.1 through Figure 5.4, in Traffic Volume Forecast and Analysis technical memorandum, presents the forecasted daily traffic volumes for the 5-year, 10-year, 15-year, and 20-year planning horizons respectively.

The forecasted total traffic volumes for each planning horizon were compared with the City's daily service volumes to determine the required roadway classification. The lane volumes were also compared with the lane capacity for the given road classification, to determine the number of lanes required along each roadway. The results of the analysis are summarized in Appendix D for each planning horizon, in Traffic Volume Forecast and Analysis technical memorandum.

The 20-year (2030) road classification and number of lanes will be used by the City to determine the rightof-way that should be retained to accommodate future expansion of the road network. The major corridors in the 20-year road network were reviewed independently to establish consistent road classification and numbers of lanes along the corridor, where possible. The recommended road classification and number of lanes is presented in Figure 6.1, in Traffic Volume Forecast and Analysis technical memorandum.

Table 6.4 in the Traffic Volume Forecast and Analysis technical memorandum summarizes the major road network in the 20-year planning horizon, along with a comparison of the existing and future road classification and number of lanes. The table also summarizes the improvements required to upgrade the corridors from the existing horizon to the 20-year planning horizon.

2.4 COLD LAKE NORTH PARKING STUDY

Task 2A.4 (Parking Management) was completed as two components: separate parking studies were completed for Cold Lake North (CLN) and Cold Lake South (CLS). This section presents the major findings from the Cold Lake North Parking Study, which is documented in the technical memorandum titled Cold Lake North - Parking Study, included in Appendix D.

From the existing parking conditions analysis, the following conclusions can be made:

- Overall, the existing on-street parking supply is able to accommodate the on-street parking demand.
- The existing off-street parking supply provided in the Marina Lot is unable to accommodate the off-street parking demand.
- The existing off-street parking supply provided in the 1 Avenue Lot is able to accommodate the off-street parking demand.
- The existing off-street parking supply provided in the Gravel Lot is able to accommodate the off-street parking demand but approaches capacity on July 1.
- For both on-street and off-street parking, the parking demand observed on July 1 (Canada Day) was higher than the parking demand on July 2 and 3, which represents a typical weekend period.
- The difference in parking demand between Canada Day and a typical weekend period was most noticeable in the areas surrounding the 1 Avenue corridor and Kinosoo Beach.



- Parking in "no parking" zones was observed at various locations along Lakeshore Drive and 1 Avenue.
- Illegal parking in the off-street lot was observed in the Marina lot.

The following parking strategies were developed to improve the existing parking condition in Cold Lake North:

- Provide summer overflow parking for the Marina Lot
- Provide marked (painted) on-street parking stalls
- Enhance current parking zones by delineating with concrete bulbs or pavement markings
- Enforce "no-parking" zones
- Pave and paint stalls in the Gravel Lot.

Opportunities exist to integrate streetscaping and landscaping in the Gravel Lot to coordinate with the beautification efforts for the Lakeshore Commercial and beachfront areas. Landscaped islands with shrubs and trees can be provided between and at the end of aisles to improve the aesthetics of the parking lot. Additionally good illumination and a designated pathway between the parking lot and Kinosoo Beach could increase the utilization of the gravel lot.

The City indicated that complaints have been received regarding illegal parking at various locations throughout Cold Lake. AE recommends that the City monitor the parking conditions throughout the City and determine the effect on traffic operations. Areas which have been specifically identified to have illegal parking issues include: 16 Street, roadways adjacent to schools and playgrounds, and snow removal routes.

2.5 COLD LAKE SOUTH PARKING STUDY

This section presents the major findings from the Cold Lake South Parking Study, which is documented in the technical memorandum titled Cold Lake South - Parking Study, included in **Appendix E**.

The City advised that the parking condition and parking policies within Cold Lake South has not significantly changed since the previous parking study conducted in 1985. For this reason, the current parking demand in the Downtown is expected to be similar to or less than the parking demand observed in 1985.

AE reviewed the 1985 Parking Study and conducted a verification study to determine if current parking utilization rates at select locations are similar to those observed in the 1985 parking study. A parking survey was conducted on October 20, 2010 to obtain current parking utilization rates at select locations.

The verification study indicated that the parking utilization has not significantly changed in the Downtown. Parking utilization along 51 Avenue and 52 Street (south of 50 Avenue) has decreased since 1985 while the parking utilization along 50 Avenue and 52 Street (north of 50 Avenue) has increased since 1985. The annual growth observed along 50 Avenue and 52 Street (north of 50 Avenue) is less than 2%. Even if the parking demand continues to grow at an annual growth rate of 2%, the current parking supply should be able to accommodate the parking demand for the next 30 years.

The City has experienced a trend of business relocation from the Downtown to the commercial area along Highway 28, south of 43 Avenue, in recent years. The trend is expected to continue as the commercial area develops and continues to draw more businesses. With the relocation of businesses outside Downtown, an annual parking growth rate of 2% for the Downtown may not be achieved. The actual growth in parking demand will be dependent on the future land use changes within the Downtown.

The City should monitor the land uses and parking conditions periodically within the Downtown and consider a detailed parking study if there is significant land use changes that would attract more trips into Downtown Cold Lake South.

2.6 IN-SERVICE SAFETY REVIEWS AND TRAFFIC CALMING

Task 2A.3 (Traffic Calming) and Task 2A.5 (In-Service Safety Reviews) were completed together and documented in the technical memorandum titled In-Service Road Safety Reviews, included in **Appendix F**.

In-service safety reviews were completed for the following four corridors:

- 1 Avenue, from the MD Campground (23 Street) to 2 Avenue/10 Street
- 10 Street, from 2 Avenue to 8 Avenue
- Lakeshore Drive, from 1 Avenue/10 Street to 8 Avenue
- 50 Avenue, from Highway 28 to 49 Street.

The purpose of the in-service road safety reviews was to identify potential safety issues along the corridors and propose improvement options that will reduce/eliminate the safety issues. The in-service road safety reviews were conducted based on the procedures outlined in the Transportation Association of Canada (TAC) Canadian Guide to In-Service Road Safety Reviews (TAC Safety Guideline). Potential safety issues were identified based on observations during the site reconnaissance and the results from the operational analysis for the Existing (2010) Traffic Operational Analysis.

No operational issues were identified as far as traffic flow and intersection capacity is concerned.

Table 2.1 summarizes the safety issues identified for each corridor and the improvement options developed to address each of the potential safety issues.



Study Corridor Safety Issues		Improvement Options			
	1 Avenue/2 Avenue/10 Street intersection configuration	Improve intersection configuration at 1 Avenue/2 Avenue/10 Street intersection. Roundabout option should be considered but requires further conceptual design.			
1 Avenue	Speeding problem	Conduct speed study to confirm speeding problem. Provide traffic calming measures.			
	Poor pavement conditions	Repave corridor.			
	19 Street pedestrian crosswalk	Provide pavement marking and signage at 19 Street crosswalk.			
	Vertical crest curve at 3 Avenue	Provide signage.			
10 Street	Poor pavement conditions	Repave corridor.			
Lakeshore Drive	Road width and alignment	Change lane configuration along corridor. Detailed traffic analysis is required to determine the impact of lane changes prior to implementation.			
	Poor pavement conditions	Repave corridor.			
	Pedestrian crosswalks	Improve pedestrian crosswalks.			

 Table 2.1

 Summary of Safety Issues and Improvement Options

Study Corridor	Safety Issues	Improvement Options
	Highway 29 interpretion	Complete detailed intersection analysis to review intersection geometry and lane configuration.
	righway zo intersection	Close 55 Street intersection.
		Conduct Main Street Analysis.
50 Avenue	Angle parking	Provide back-in angle or parallel parking stalls.
	Faded pavement markings	Repaint pavement markings.
	Multiple driveway accesses	If 50 Avenue remains an arterial roadway, close unnecessary driveway accesses.
	Pedestrian crosswalks	Provide curb extensions and signage at crosswalks.

Figure 7.1 and Figure 7.2, in the In-Service Road Safety Reviews technical memorandum; summarize the recommendations for the study corridors in Cold Lake North and Cold Lake South respectively.

The Lakeshore Redevelopment Plan (LRP) was finalized in March 2010 and provided a strategic direction for the revitalization of the Lakeshore Commercial District to a vibrant "urban village" that would attract residents and tourists. The LRP identified the need to improve the aesthetics of the Lakeshore Commercial District, given its beautiful setting and prominent location at the end of Highway 28. The opportunity exists to expand the scope of the LRP to include the 1 Avenue/beachfront area, to take advantage of the attractiveness of the area in the summer months.

1 Avenue and Lakeshore Drive were analyzed as part of the Cold Lake North Parking Study. The strategies presented by the parking study for these two corridors are presented in Section 2.4 above. The improvements in Table 2.1 for the 1 Avenue and Lakeshore Drive corridors should be coordinated with the visions presented in the LRP and the improvements recommended from the parking study. Integration of the recommendations from the various studies will provide for cost effectiveness and a unified vision for the revitalization/beautification of the area.



2.7 COORDINATION OF TRAFFIC SIGNALS

The City currently has traffic signals at twelve intersections, with six more recommended for the future. They are located on three of the City's busiest streets, along the north-south corridor of Highway 28, the east-west corridor of Kingsway, and on Centre Avenue.

Existing traffic signals operate as separate independent units and are neither coordinated nor hard-wired interconnected for efficiency and synchronization. Although less reliable than cable connection, if necessary, existing controllers can be coordinated through their built-in TBC (time base coordination) function and by using radio transmission devices.

If deemed desirable, traffic signals can be programmed for pre-emption by emergency vehicles so that the latter will receive priority right-of-way with a through green upon activation. This will require retrofitting of hardware and software to existing signal equipment and adding onto existing timing plans an emergency procedure. Emergency vehicles will be equipped with a transponder which throws a beam onto a receiver mounted on the signal pole arm. The receiver is in turn wired into the signal controller. Commercial vendors are available to retrofit existing equipment if authorized.

For a smoother progression of traffic stream along Highway 28 for future operations when traffic volume warrants, traffic signal coordination should be considered. With some exceptions, signal spacing between the majority of intersections along the highway corridor is mostly less than one kilometer, and are ideally suited for synchronization.

We recommend that traffic signals on Highway 28 should be considered for coordination in the future. Due to the relative low traffic volumes along the highway corridor (less than 800 trips in each direction during the p.m. peak hour), the need for immediate action is not necessary. Traffic congestion and travel speeds are good indicators of whether system operation would be beneficial and this should be monitored by Cold Lake as the City grows. To prepare for a possible future progression system, we would recommend that the City consider the purchase of any new or replacement of old signal equipment, in particular traffic signal controllers, with modern compatible NEMA or 170 types.

2.8 HIGHWAY 28 FUNCTIONAL REVIEW

Task 2A.7 (Highway 28 Functional Review) was completed and documented in the technical memorandum titled Highway 28 Functional Review, included in **Appendix G**.

Associated Engineering (AE) was retained by the City of Cold Lake (City) to undertake a review of the Highway 28 Functional Plan, from 52 Avenue to the south city limits. The purpose for the review was to provide the City with recommendations on intersection requirements and improvements along the Highway 28 corridor. After an in-depth discussion with the City, the scope of the Highway 28 Functional Review was revised to include the following:

- Select and analyze the traffic operations at a representative intersection under the 20-year planning horizon to determine the required traffic control and intersection configuration
- Develop a standard intersection template with designated turn lanes, storage lengths, and channelization, if required.

The intersection of Highway 28 and 43 Avenue currently experiences high traffic volumes and is expected to experience higher traffic volumes in the 20-year planning horizon; therefore, it was selected as the representative intersection. The afternoon (p.m.) traffic volumes, from the 20-year planning horizon, were analyzed to determine the required traffic control and intersection configuration. 20-year traffic volumes were forecasted as part of the future traffic volume forecasts.

Figure 4.1 in the Highway 28 Functional Review technical memorandum presents the intersection configuration required to accommodate the future traffic volumes anticipated at Highway 28 and 43 Avenue.

As per the City's requirements, a future standard intersection template was developed based on the capacity analysis results for Highway 28 and 43 Avenue. The City's design standards as outlined in the Municipal Engineering Servicing Standards and Standard Construction Specifications (2008) and the Transportation Association of Canada's Geometric Design Guide for Canadian Roads were referenced in the development of the template presented in Figure 5.1 in the Highway 28 Functional Review technical memorandum.

The intersection template was designed to accommodate the traffic volumes assumed for Highway 28 and 43 Avenue. For application at other intersection locations, the City should complete an intersection operational analysis to determine the designated turn lanes and storage lengths required, as well as geometric design to determine the actual land requirements. The template should be modified to reflect the requirements of the specific intersection. Figure 6.1 in the technical memorandum presents the 20-year road network classification along Highway 28, between 50 Avenue and 34 Avenue. The figure also highlights the potential locations for application of the intersection template and the intersection improvements required at 52 Street under the existing (2010) conditions.

2.9 TRUCK AND DANGEROUS GOODS ROUTE REVIEW

Due to the low volumes of truck traffic hauling dangerous goods within or passing through the City of Cold Lake to date, the City has not yet developed an official roadway network and there are no defined or designated truck routes for this purpose. There are trucks which carry jet fuel on a regular basis originating from the Edmonton area and destined to the airfield in Medley (CFB 4 Wing), west of Cold Lake. Beyond that, other dangerous goods truck traffic is insignificant.

Delivery of jet fuels to Medley currently uses Highway 28 and Highway 55, through a "front entrance" and a "back entrance". Both of these two routes present issues that need attention. The "front entrance" option passes several schools en-route. It also goes through a few residential neighbourhoods. The "back entrance" option via Highway 55 has steep vertical curves that make it difficult and dangerous for truck traffic. There are three possible solutions to address the problem:



- Build the dangerous goods route for jet fuel delivery as shown on the maps in the Municipal Development Plan. Improvements to the roadway need to be made and details have to be worked out. This option has a low probability of acceptance as residential sub-divisions have already been proposed for the area west of Highway 28 where the dangerous goods route is shown.
- 2. Allow the fuel trucks to continue to use the front entrance along Kingsway. This option requires the review of the intersection at Highway 28/50 Avenue, with particular attention paid to trucks turning left from Highway 28 northbound to 50 Avenue/Kingsway westbound. Mitigation measures may include geometric improvements and/or signalization.
- 3. Re-establish a rail line to Cold Lake. This will allow the delivery of jet fuel via rail cars. The rail line could also be used for the delivery of solid waste from the City to designations outside of the City (e.g., to Edmonton or Riley). As well, a rail line could possibly be used for tourism promotion through the use of steam engine locomotives for excursion trips in and around Cold Lake. This option needs to be carefully studied possibly requiring the development of a business plan to determine the concept's feasibility.

The absence of an acceptable truck route for the transport of dangerous goods within the City is unsatisfactory. It is recommended that a detailed study be conducted to examine the above and any other options for the safe delivery of jet fuel in the immediate near term.

Moving forward, and planning into the future, it will be necessary for the City to develop technical guidelines so that a rational and comprehensive dangerous goods route system can be established, eventually leading to the enactment of bylaws for enforcement. The law will be used to designate where, when and how hazardous materials may or should be transported on existing and future roads of the City. The resultant bylaw will also help to streamline the process, provide risk management, promulgate policies, and regulate/control the safe and efficient movement of dangerous goods within City limits.

It is not the purpose of this study to develop a comprehensive citywide dangerous goods truck route system. We recommend that the City of Cold Lake monitor the movement of dangerous goods (in volume and manner) and at the appropriate time (threshold as a function of activity level) initiate a full study process. A suggested framework for a detailed work plan is given in the Transportation Best Practices technical memorandum.

2.10 SCHOOL ZONE SAFETY ANALYSIS

Task 2A.9 (School Zone Safety Analysis) was completed and documented in the technical memorandum titled School Zone Safety Analysis, included in **Appendix H**.

The following tasks were completed as part of the School Zone Safety Analysis:

- Verify the existing school and playground areas and zones
- Observe existing operations at a representative school site for safety

• Determine the need to establish school/playground zone policy and guideline, and recommend the principles and best practices for establishing the guideline for the City.

Roadways adjacent to existing schools within Cold Lake were analyzed to verify the current school/playground areas and zones. Worksheets provided in TAC's School and Playground Areas and Zones: Guidelines for Application and Implementation were used for the verification and the results are summarized in Table 3.1 and Table 3.2, in the School Zone Safety Analysis technical memorandum. It should be noted that the worksheets from TAC are identical to the worksheets published in AT's Guidelines for School and Playground Zones and Areas, which is currently used by the City.

The existing signage and pavement markings at the school sites should be compared against the TAC or AT signage and pavement marking plans to ensure compliance with the standards.

Grand Centre Middle School was selected as the representative school site to observe the morning drop-off and afternoon pick-up periods. The school site was observed to identify any safety issues related to traffic operations and pedestrian movement. Overall, the morning and afternoon discharge periods operated well. AE did not observe anything that was considered unsafe.

In the 2010/2011 school year, Grand Centre Middle School was relocated south of Centre Avenue, to the building previously occupied by Grand Centre High School. The old location for Grand Centre Middle School, on 56 Street, currently is vacant and there are no immediate plans for redevelopment of the building. With the relocation of Grand Centre Middle School, student traffic across Highway 28 will shift from the pedestrian activated crosswalk at 51 Avenue to the intersection of Highway 28 and 50 Avenue. The pedestrian crosswalks at this intersection should be maintained to ensure maximum visibility.

Grand Centre Elementary School is still located on the previously shared lot with Grand Centre Middle School. To improve safety for the elementary school, AE recommends that the crosswalk currently provided at the horizontal curve transition between 56 Street and 51 Avenue be realigned to provide a north-south crosswalk across 51 Avenue. Signage should be provided on the west side of 51 Avenue to warn southbound drivers of the crosswalk, if it is relocated.

The City should consider the removal of the existing school zones at following locations:

- Highway 28, from 52 Avenue to 46 Avenue
- Service road parallel and west of Highway 28, from 52 Avenue to 50 Avenue
- Centre Avenue, from 57A Street to service road west of Highway 28.

There are no schools located on these roadways and unwarranted school zones can lead to driver frustration and non-compliance. Prior to the removal of these school zones, the City should undertake a speed study to determine the level of driver compliance within these school zones and review the collision history. If current driver compliance level is low, the City should remove the school zones immediately. If current driver compliance level is high, the City can delay the removal of the school zones. On the other hand, if the collision history indicates the presence of pedestrian related collisions on Highway 28 and



Centre Avenue/50 Street, the City may choose to maintain the 30 km/h zones. If the removal of the above school zones is not feasible, AE recommends re-designating the school zone to a school area. With a school area, motorists are warned to be cautious of the nearby school and the associated student traffic, but are not required to reduce their travel speeds.

AE recommends that the City continue to follow the policies outlined in the AT Guideline. An established guideline would help to promote uniformity in the establishment and signing and marking of schools and playground areas and zones within the City. It should be noted that the methodology established in the AT Guideline is similar to the methodology established in the TAC Guideline.

2.11 TRANSIT SERVICES

Given the size of the population, it is inconceivable that there is sufficient demand for a fully integrated bus network service to cover the entire City in the near future. Currently there are no formal or regular schedule public transit services in the City. There is a special-need bus service for para-transit that is available to senior citizens, people with temporary or long term disabilities, students and those with special needs. This service is provided on a request basis with advance booking necessary. Other minor community resources offering van and bus rides are run by various community agencies and support groups, but they are limited in nature. Taxi services are available on a commercial basis and the school board provides school bus services for those students who qualify.

Although a full scale public bus system within Cold Lake is probably not warranted now or anytime in the near future, given its green and sustainable transportation objective, the City may consider developing a limited service system focusing on specific routes or loops which may pose as viable options. At a conceptual level several routes stand out as potential candidates for bus services. These include:

- JJ Parr at 4 Wing
- Travel along Kingsway to Highway 28
- Highway 28 south to the Walmart shopping area
- Highway 28 north with stops at 50 Avenue, the Tri City Mall, the Energy Centre, the Senior's Centre/North Library, and the Marina
- Travel west along Lakeshore/1 Avenue with stops at Kinosoo Beach and the MD Campground
- 25 Street with a stop at the General Hospital
- Travel along 25 Street to access Highway 28 south, Kingsway west and return to JJ Parr.

To cover the above areas, as a start, the City may consider operating two buses along these routes in the opposite direction. Funding by the provincial government through its "GreenTrip" program should be explored.

2.12 SUSTAINABLE TRANSPORTATION

Achieving a green and sustainable transportation system is an important goal of the City of Cold Lake. The City is committed to consider seriously alternate modes of transportation such as pedestrian and bicycles. Given the population size, establishing a full bus transit system in Cold Lake is not feasible in the near future. The development of a transit system and promoting its use is therefore considered as a long term transportation objective.

The areas of immediate interest to the City for now are as follow:

- Developing and linking a network of paths and trail systems for pedestrians and cyclists between parks and other points of interest with existing residential subdivisions
- Exploring a sports vehicle transportation network. Quads in the summer time and snowmobiles in winter are very popular in Cold Lake. The need to establish a policy to define hiking and cycling trails and to establish how these can be easily accessed is considered a priority.

To reach the City's goals of developing a citywide trail system, we will recommend that a technical review committee (TRC) consisting of a city planner, a landscape architect, and an engineer be set up to finalize details. To be useful, these trails have to be conveniently connected to and easily accessible from residential homes. Accessibility to these trails could be promoted by planting at strategic locations within the City parking lots to allow users to leave their cars at safe locations and staging points to continue their journey on foot, by bicycle, or by any other non-motorized and non-traditional form of travel. Connectivity to the planned trails will also consider the possible use of back alleys as driveways for this purpose.

The goal to create a sustainable transportation system will mean a significant change in land use, partially converting from what is currently a predominantly vehicle-based society to a more pedestrian and bike friendly environment throughout the City. The result will be the generation of different traffic volumes (possibly different from what is predicted by our travel demand model), and a change in travel patterns. Under this scenario, as well as the inevitable growth of background vehicle traffic, a high volume of pedestrian and bicycle activities performing conflicting movements will occur in the more urbanized communities. Neighbourhoods in this category, especially in the downtown areas and the densely developed retail areas, will need to have a traffic management plan to allow for an orderly flow of mixed-use traffic, which must address the issues of commuter drop-off and pick-up, the free and safe flow of pedestrians and bicycles, bus stops (in the future), area businesses, downtown merchants and retail facilities. Such a plan will also call for the adequate provision of traffic mitigation measures such as proper signage, rest benches and chairs for weary travelers, shelters for commuters, on-street parking, creation of a liveable community, and the design of a roadway system that exemplifies a serene and "traffic calmed" environment.

Our suggested approach to the development of a sustainable transportation framework is to create traffic solution alternatives using a context sensitive design philosophy that engages a collaborative interdisciplinary effort, and that involves all stakeholders. Design solutions should be developed as a holistic transportation facility that fits its physical settings, and preserves the aesthetic, historic, cultural and



environmental resources, while maintaining safety and mobility, and that satisfies the development needs, goals and objectives of the City of Cold Lake. Sustainable transportation solutions and management plans should be designed as place-making solutions, using transportation means as a "catalytic process" to mobilize community partnerships, turning the place around and maintaining its vibrancy, while encouraging "non-traditional", yet beneficial activities, and in general, creating better communities through enhanced planning of its roadway network.

On sustainable development and transportation planning, coordination with the public is an essential component of a traffic management plan. A workable public involvement plan satisfying needs of the City and which is acceptable to the majority of communities and stakeholders is crucial. Opinion surveys, if appropriate, will be carried out.

2.13 COST ESTIMATES

The recommendations from the various project tasks were compiled to develop a cost estimate for the future roadway improvements. The cost estimate will include costs associated with the roadway upgrades required to accommodate traffic in the 20-year planning horizon, traffic signal installation, pavement markings to replace existing worn markings and delineate on-street parking stalls, Gravel Parking Lot (Kinosoo Beach) paving and painting, signage, re-paving sections of roadway (1 Street, 10 Street and Lakeshore Drive), and various pedestrian crosswalk improvements.

The City's Municipal Engineering Servicing Standards and Standard Construction Specifications (MESS, 2008) was reviewed to establish the pavement design for the roadway upgrades in the 20-year planning horizon. Unit rates were provided by the City of Cold Lake. Where City rates were not provided, 2010 weighted unit price averages were obtained from Alberta Transportation for the North Central Region and used to develop unit price rates for the recommended improvements. The unit price rates developed are summarized and also presented in Appendix I.

The conceptual cost estimates for the recommended improvements in the City of Cold Lake, for the 20-year planning horizon, are presented in Table 2.2.

Cold Lake Transportation Study Project No: 2010-3050 Date: April 14, 2011

Table 2.2: Conceptual Cost Estimates NOTE: - Prices do not include cost of land acquisition and utility relocation Prices refer 2010 unlines and do not include GST

- Prices reflect	t 2010 values a	and do not in	clude GST					
Corridor	Loca From	tion To	Intersection	Recommendation from	ltem	Quantity Unit	Unit Rate	Total Cost
8 Avenue	10 Street	Lakeshore Drive	-	Traffic Volume Forecast and Analysis	Widen to provide centre median and one additional travel lane in each direction (4-lane Divided Arterial with curb and gutter)	170 LM	\$2,131.63 lobilization Fee	\$362,377 \$10,000
					8 Avenue (10% Continger	orridor Improvem	ents - Subtotal eering/Testing	\$372,377 \$81,923
					6 AVEI	le Corridor Improv	ements - 1 otai	\$454,300
Corridor	Loca	tion To	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
Highway 28/55 Highway 28/55			75 Avenue 61/62 Avenue	Existing (2010) Traffic Operational Analysis Existing (2010) Traffic Operational Analysis	Provide traffic signal Provide traffic signal	1 LS 1 LS	\$350,000.00 \$350,000.00	\$350,000 \$350,000
Highway 28/55 Highway 28/55			61/62 Avenue 52 Avenue	Existing (2010) Traffic Operational Analysis Existing (2010) Traffic Operational Analysis	Channelize northbound right turn lane Provide traffic signal	1 LS 1 LS	\$116,960.56 \$350,000.00	\$116,961 \$350,000
Highway 28/55 Highway 28/55			52 Avenue 52 Street	Existing (2010) Traffic Operational Analysis Existing (2010) Traffic Operational Analysis	Channelize northbound right turn lane Provide traffic signal	1 LS 1 LS	\$116,960.56 \$350,000.00	\$116,961 \$350,000
Highway 28/55 Highway 28/55	53 Avenue	52 Avenue	52 Street	Existing (2010) Traffic Operational Analysis Traffic Volume Forecast and Analysis	Channelize northbound right turn lane Widen to provide centre median (4-lane Divided Expressway with curb and gutter)	1 LS 230 LM	\$85,761.64 \$1,258.04	\$85,762 \$289,350
Highway 28/55	52 Street	47 Avenue	-	Traffic Volume Forecast and Analysis	Widen to provide centre median (4-lane Divided Arterial with curb and gutter)	430 LM	\$1,258.04 lobilization Fee	\$540,958 \$10,000
					nigriway 2013 5 10% Contingen Hichway 28/	cy and 12% Engin	eering/Testing	\$2,559,991 \$563,198 \$2,122,180
					inginuy zu	o oornaor improv	cilicities rotal	\$3,123,105
Corridor	Local	tion To	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
1 Avenue 1 Avenue	25 Street 25 Street	10 Street 10 Street	-	Cold Lake North Parking Study Cold Lake North Parking Study	Provide marked (painted) on-street parallel parking stalls Pave and paint parking stalls in Gravel Lot at Kinosoo Beach. No beautification.	240 stalls 1 LS	\$4.80 \$205,273.50	\$1,153 \$205,273
1 Avenue 1 Avenue	25 Street 25 Street	10 Street 10 Street	- 2 Avenue/10 Stree	Cold Lake North Parking Study t In-Service Road Safety Reviews	Install parking control (RB-51, RB-52) signs Improve intersection configuration at 1 Avenue/2 Avenue/10 Street. Provide roundabout after further conceptual design. 1	1 LS 1 LS	\$988.08 \$250,000.00	\$988 \$250,000
1 Avenue 1 Avenue	25 Street 25 Street	10 Street 10 Street	- 19 Street	In-Service Road Safety Reviews In-Service Road Safety Reviews	Repave corridor Provide pavement marking and signage at 19 Street crosswalk	1,220 LM 1 LS	\$826.61 \$733.82	\$1,008,464 \$734
					1 Avenue (Norridor Improvem	ents - Subtotal	\$10,000 \$1,476,612
A Drive collecte size	la las a seus dab aut				10% Continger 1 Aven	e Corridor Improv	ements - Total	\$324,855 \$1,801,467
1. Price reliects singl	Loca	tion			·	I		
Corridor Highway 55	From 28 Street	To Hiphway 28	Intersection	Recommendation from	Item Build payement structure to Arterial standard (4-lane Divided Arterial with curb and outler)	Quantity Unit	Unit Rate \$2,990.14	S1 659 525
			1		Highway 55 (N Sorridor Improvem	tobilization Fee ents - Subtotal	\$10,000 \$1,669,525
					10% Continger Highway	cy and 12% Engin 5 Corridor Improv	eering/Testing ements - Total	\$417,381 \$2,086,906
Corridor	From	To	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
16 Avenue 16 Avenue	Highway 28 16 Street	16 Street 8 Street	-	Traffic Volume Forecast and Analysis Traffic Volume Forecast and Analysis	Build pavement structure to Arterial standard (4-lane Undivided Arterial with curb and gutter) Widen to provide one additional travel lane in each direction (4-lane Collector with curb and gutter)	1,430 LM 825 LM	\$2,214.01 \$1,201.39	\$3,166,037 \$991,146
					16 Avenue (10% Contineer	orridor Improvem	ents - Subtotal	\$10,000 \$4,167,183 \$016,780
					16 Aven	e Corridor Improv	ements - Total	\$5,083,963
	Loca	tion						
Corridor English Bay Road	From Lake Avenue	To Highway 28	Intersection	Recommendation from Traffic Volume Forecast and Analysis	Item Build pavement structure to Arterial standard (4-lane Divided Arterial with curb and autter)	Quantity Unit 2.345 LM	Unit Rate \$2.998.64	Total Cost \$7.031.800
					English Bay (N Corridor Improvem	tobilization Fee ents - Subtotal	\$10,000 \$7,041,800
					10% Continger English B	cy and 12% Engin y Corridor Improv	eering/Testing ements - Total	\$1,549,196 \$8,590,996
Corridor 28 Street	From	To History 28	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
28 Street	Lake Avenue	Highway 28 Highway 28		Traffic Volume Forecast and Analysis Traffic Volume Forecast and Analysis	Relicite stop signs Relocate stop signs Reloca	2 signs	\$331.88	\$664
20 Suber	Lake Avenue	Trigriwdy 20		Trailic Volume Polecast and Analysis	Realign 20 Street and build pavement subclure to Artenia standard (2-rane ondivided Artenia with curb and guiler) 28 Street (Sorridor Improvem	obilization Fee ents - Subtotal	\$10,000
					10% Continger 28 Stre	cy and 12% Engin et Corridor Improv	eering/Testing ements - Total	\$358,391 \$1,987,440.33
Corridor	From	tion To	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
To Street Future Arterial	75 Avenue	50 Avenue		Traffic Volume Forecast and Analysis Traffic Volume Forecast and Analysis	Build pavement structure to Artenai standard (2-lane Undivided Artenai) Build out as per 20-year horizon (2-lane Undivided Arterial)	1,625 LM 3,300 LM	\$1,295.08 \$1,052.58	\$2,104,507 \$3,473,518
					16 Street/Future Arterial (10% Contineet	orridor Improvem	ents - Subtotal	\$5,588,025
					16 Street/Future Arter	al Corridor Improv	ements - Total	\$6,817,390
	Loca	tion		Pasammandation from	ltom	Quantity Unit	Unit Pate	Total Cost
Corridor 10 Street	From 1 Avenue	To 8 Avenue	3 Avenue	In-Service Road Safety Reviews	Provide signage for vertical curve at 3 Avenue	1 LS	\$494.04	\$494
10 Street	1 Avenue	8 Avenue	-	In-Service Road Safety Reviews	Repave corridor	850 LM	\$959.12 Iobilization Fee	\$815,252 \$10,000
					10 Street (10% Continger	cy and 12% Engin	eering/Testing	\$825,746 \$181,664
					TO SUC	st comuor improv	ements - rotar	\$1,007,410
Corridor	Loca	tion To	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
8 Street	16 Avenue	75 Avenue		Traffic Volume Forecast and Analysis	Build pavement structure to Collector standard (2-lane Collector with curb and gutter)	1,630 LM	\$1,208.12 Iobilization Fee	\$1,969,240 \$10.000
					8 Street 1 10% Continger	orridor Improvem	ents - Subtotal eering/Testing	\$1,979,240 \$435,433
L					8 Stre	et Corridor Improv	ements - Total	\$2,414,673
Caraldan	Loca	tion	lates -1	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
20 Avenue	12 Street	8 Street	Intersection -	Traffic Volume Forecast and Analysis	Build as per 20-year horizon (2-lane Collector with curb and gutter)	550 LM	\$965.62	\$531,092
					20 Avenue (10% Continger	orridor Improvem	ents - Subtotal	\$541,092
					20 Aven	e Corridor Improv	ements - Total	\$660,133
	Loca	tion	-	Recommendation from	ltem	Quantity Unit	Unit Rate	Total Cost
Corridor Lakeshore Drive	From 10 Street	To 7 Street	Intersection -	Cold Lake North Parking Study	Provide marked (painted) on-street parallel parking stalls	117 stalls	\$4.80	\$562
Lakeshore Drive	10 Street	8 Avenue	-	In-Service Road Safety Reviews	Imstan parking control (KB-51, KB-52) signs Repare corridor (2-lane Local) Improve participal groups (2.6 Auguste pricipale) between 9 Auguste and 7 Auguste 2 Auguste 2 Auguste and 2 Aug	1 LS 1,055 LM	\$2,717.22 \$781.09	\$2,/17 \$824,046
Lakesnoré Drivé	IU STREET	o Avenue		In-Service Road Sale(V Reviews	jampiove peuesinan crosswarks (o Avenue, micolock between o Avenue and / Avenue, / Avenue, 6 Avenue and 2 Avenue)	LS LS	as,sd5.34 lobilization Fee ents - Subtotal	\$49,927 \$10,000 \$887,252
					10% Contingen Lakeshore Dri	cy and 12% Engin ve Corridor Improv	eering/Testing ements - Total	\$195,195 \$1,082,447
Corridor	Loca From	tion To	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
75 Avenue	Highway 28	8 Street	-	Traffic Volume Forecast and Analysis	Build pavement structure to Collector standard (4-lane Collector with curb and gutter)	2,430 LM	\$1,864.57 Iobilization Fee	\$4,530,912 \$10,000
					75 Avenue 10% Continge	cy and 12% Engin	ents - Subtotal eering/Testing	\$4,540,912 \$999,001
<u> </u>					75 Aven	e corrigor improv	ements - I otal	\$ 5,539,912
Corridor	Loca	tion	Intersection	Recommendation from	Item	Quantity Unit	Unit Rate	Total Cost
69 Avenue Arterial	Glenwood Drive	Highway 28	-	Traffic Volume Forecast and Analysis	Build out as per 20-year horizon (2-lane Undivided Arterial)	4,220 LM	\$1,052.58 Iobilization Fee	\$4,441,893 \$10,000
					69 Avenue (10% Continger	orridor Improvem cy and 12% Engin	ents - Subtotal eering/Testing	\$4,451,893 \$979,416
		-			69 Aven	e Corridor Improv	ements - Total	\$5,431,309

Cold Lake Transportation Study Project No: 2010-3050 Date: April 14, 2011

 Table 2.2: Conceptual Cost Estimates

 NOTE:

 - Prices do not include cost of land acquisition and utility relocation

 - Prices reflect 2010 values and do not include GST

	Loca	tion		Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	То	Intersection						
54 Avenue	56 Street	49 Street	-	Traffic Volume Forecast and Analysis	Widen to provide one additional travel lane in each direction (4-lane Collector with curb and gutter)	1,320	LM	\$1,201.39	\$1,585,834
54 Avenue	49 Street	Future Artenai		Trailic Volume Porecast and Analysis	Build out as per zo-year norizon (4-rane Collector with curb and guiter)	1,230	LM	obilization Fee	\$1,995,149
					54 Avenue (orridor Imr	roveme	ents - Subtotal	\$3 590 983
					10% Contingen	cy and 12%	Engine	erina/Testina	\$790.016
					54 Aven	e Corridor	mprove	ements - Total	\$4,380,999
		fl							-
Caraldan	Loca	tion T-	Internetien	Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
52 Avenue	57 Street	Highway 28	Intersection	Traffic Volume Forecast and Analysis	Widen to provide one additional travel lane in each direction (A-lane Collector with outh and outler)	305	LM	\$1.161.39	\$354 224
DE /Wende	01 011001	righting 20		Traile Volume Forecast and Analysis	mach to provide the database and and the cash and data for the database of the case and gates)	000	M	obilization Fee	\$10,000
					52 Avenue C	orridor Imp	roveme	ents - Subtotal	\$364,224
					10% Contingen	cy and 12%	Engine	ering/Testing	\$80,129
					52 Avenu	e Corridor	mprove	ements - Total	\$444,353
	Loca	tion					1		
Corridor	From	To	Intersection	Recommendation from	ltem	Quantity	Unit	Unit Rate	Total Cost
51 Avenue	56 Street	Service Road		School Zone Safety Analysis	Relocate crosswalk	1	LS	\$773.18	\$773
					1		M	obilization Fee	\$10,000
					51 Avenue C	orridor Imp	roveme	ents - Subtotal	\$10,773
					10% Continger	cy and 12%	Engine	ering/lesting	\$2,370
L					52 Avent	e corrigor	mprove	ements - i otal	\$13,143
	Loca	tion		Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	То	Intersection	neconnicilitation nom		adantity	onit	onin Rate	rout cost
Centre Avenue			59 Street	Existing (2010) Traffic Operational Analysis	Provide traffic signal	1	LS	\$350,000.00	\$350,000
Centre Avenue	E0 Street	E7 Street	57 Street	Existing (2010) Traffic Operational Analysis	Provide traffic signal Wides to provide control modion and one additional travel lane in each direction (4 lane Divided Attacia) with auth and autor)	220	LS	\$350,000.00	\$350,000
Centre Avenue	59 Street	Highway 28		Traffic Volume Forecast and Analysis Traffic Volume Forecast and Analysis	Widen to provide centre median and one additional raver lane in each direction (4-rane Divided Arterial with curb and gutter) Widen to provide centre median (Alapa Divided Arterial with curb and gutter)	440	LM	\$2,017.63	\$553,530
Contro / Wondo	01 011001	righting 20	1	Traile Volume Forecast and Analysis	meen to provide denice incluair (+ tane bivided Anteria: war dato and gater)	440	M	obilization Fee	\$10,000
					Centre Avenue C	orridor Imp	roveme	ents - Subtotal	\$1,929,357
					10% Contingen	cy and 12%	Engine	ering/Testing	\$424,458
					Centre Avenu	e Corridor	mprove	ements - Total	\$2,353,815
	Loca	tion							
Corridor	Loca	tion To	Intersection	Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor 50 Avenue	From Highway 28	tion To 49 Street	Intersection	Recommendation from In-Service Road Safety Reviews	Item Provide back-in angle parking stalls (back in angle parking pavement markings)	Quantity 76	Unit stalls	Unit Rate \$534.20	Total Cost \$40,599
Corridor 50 Avenue 50 Avenue	From Highway 28 Highway 28	tion To 49 Street 49 Street	Intersection -	Recommendation from In-Service Road Safety Reviews In-Service Road Safety Reviews	kem Provde back-in angle parking stalls (back in angle parking pavement markings) Repaint pavement markings	Quantity 76 1	Unit stalls LS	Unit Rate \$534.20 \$8,134.70	Total Cost \$40,599 \$8,135
Corridor 50 Avenue 50 Avenue 50 Avenue	From Highway 28 Highway 28 Highway 28	tion To 49 Street 49 Street 49 Street	Intersection - - -	Recommendation from In-Service Road Safety Reviews In-Service Road Safety Reviews In-Service Road Safety Reviews	Nem Provide badk-in angle parking stalls (back in angle parking pavement markings) Repart pavement markings Provide out beatrons and signage at crosswalks	Quantity 76 1 1	Unit stalls LS LS	Unit Rate \$534.20 \$8,134.70 \$57,834.21	Total Cost \$40,599 \$8,135 \$57,834
Corridor 50 Avenue 50 Avenue 50 Avenue	Loca From Highway 28 Highway 28 Highway 28	tion To 49 Street 49 Street 49 Street	Intersection - - -	Recommendation from In-Service Road Safety Reviews In-Service Road Safety Reviews In-Service Road Safety Reviews	kem Provše back in angle parking stalls (back in angle parking pavement markings) Repaint pavement markings Provše curb extensions and signage at crosswalks Provše curb extensions at signage at crosswalks Provše curb extensions Provše curb	Quantity 76 1 1	Unit stalls LS LS M	Unit Rate \$534.20 \$8,134.70 \$57,834.21 obilization Fee	Total Cost \$40,599 \$8,135 \$57,834 \$10,000
Corridor 50 Avenue 50 Avenue 50 Avenue	From Highway 28 Highway 28 Highway 28	tion 49 Street 49 Street 49 Street	Intersection - - -	Recommendation from In-Service Road Safety Reviews In-Service Road Safety Reviews In-Service Road Safety Reviews	ken Provide laad-ka ande parking pale (back in angle parking pavement makings) Provide public determined insidence Provide public extensions and storage at crosswalks Provide public extensions and storage at crosswalks 10 Annotes 10 Annotes 10 Annotes	Quantity 76 1 1 corridor Imp	Unit stalls LS M roveme Engine	Unit Rate \$534.20 \$8,134.70 \$57,834.21 obilization Fee ents - Subtotal sering/Testing	Total Cost \$40,599 \$8,135 \$57,834 \$10,000 \$116,568 \$26,645
Corridor 50 Avenue 50 Avenue 50 Avenue	Loca From Highway 28 Highway 28 Highway 28	tion To 49 Street 49 Street 49 Street	Intersection - - -	Recommendation from In-Service Road Safety Reviews In-Service Road Safety Reviews In-Service Road Safety Reviews	tem Provide back-in angle parking stalls (back in angle parking pavement markings) Repaint pavement markings Provide cuth extensions and signape at crosswalks for Avenue for Signape at crosswalks for Avenue for Signape for Avenue for Av	Quantity 76 1 corridor Imp cy and 12%	Unit stalls LS M roveme Engine	Unit Rate \$534.20 \$8,134.70 \$57,834.21 obilization Fee ents - Subtotal eering/Testing ements - Total	Total Cost \$40,599 \$8,135 \$57,834 \$10,000 \$116,568 \$25,645 \$142,213
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Improvement Costs = \$55,841,217 15% Contingency and 10% Engineering = \$12,335,153 Total Improvement Costs = \$68,176,370

Several studies and detailed traffic analysis were recommended as part of the transportation study update, which could not be captured in the conceptual cost estimates. The studies and detailed traffic analysis need to be completed in order to develop recommendations that could then be assigned a cost. Following is a summary of the studies and detailed traffic analysis recommended:

- Conduct a speed study and a collision review to validate the removal of existing school zones along Highway 28 and Centre Avenue.
- Conduct a speed study to confirm the speed problem along 1 Avenue.
- Complete a traffic calming study to determine and design the traffic calming measures to implement along 1 Avenue, between 25 Street and 10 Street. Consideration should be given to provide further delineation of the on-street parking lanes.
- Complete a detailed traffic analysis to determine the traffic impact of changing the lane configuration along Lakeshore Drive to a one-way roadway.
- Complete a detailed traffic analysis at Highway 28 and 50 Avenue and review the intersection geometry and lane configuration to improve safety.
- Conduct a "Main Street Analysis" to determine and establish the future function for 50 Avenue, between Highway 28 and 49 Street (CBD).
- Conduct a detailed traffic analysis to determine the traffic impact of providing cul-de-sacs/right-in-right-out along the service roads (55/55A Street and 50 Street).
- Conduct individual in-service safety assessments at the "High Collision Locations".
- Revise the school/playground zone/area, where required, and provide signage in compliance with AT or TAC standards.
- Determine the land ownership of all the driveways along 50 Avenue and identify whether the driveways are currently being used. Unnecessary driveways should be closed.
- Monitor parking conditions throughout the City and determine the effect on traffic operation. Particular attention should be given to areas where complaints have been received (i.e., 16 Street, roadways adjacent to schools/playgrounds, and snow removal routes).

The following items were also not incorporated into the cost estimate, as it requires further consideration by the City:

- Enforce "No Parking" zones in Cold Lake North, along 1 Avenue and Lakeshore Drive
- Provide overflow parking for the marina lot
- Close 55 Street and 50 Avenue intersection.

2.14 **STAFF TRAINING**

A Synchro training course was offered by AE for two (2) personnel from the City of Cold Lake, on June 23 and June 24, 2011.

Synchro is a software package for modeling, optimizing, managing and simulating transportation networks. This course and workshop covered both the Synchro signal timing and analysis software and the SimTraffic simulation and animation package. The main emphasis of this course focused on building, optimizing and



analyzing a network and simulating the results. At the end of the course, all attendees were able to:

- Create a map of street and intersections in Synchro with and without the use of a background map
- Enter the appropriate lane, volume, timing, simulation and detector information into Synchro
- Optimize individual intersection and network cycle length, splits, and offsets with Synchro
- Display and modify Synchro's time space diagrams
- Understand the results displayed in the Synchro program
- Create report to display timing information and measures of effectiveness
- Understand how Synchro performs an optimization
- Apply some workarounds for Synchro and SimTraffic.

2.15 TRANSPORTATION LEVY

Transportation fees levied on proposed developments is an established means for municipalities to recover some or all of the capital costs of providing such services, including the construction of infrastructures both within site boundaries and off-site.

Methods by which transportation levy are calculated are non-uniform amongst different jurisdiction. The basic choice open to municipalities is between uniform or average cost pricing, which tends to be supported by many smaller and growing municipalities, and site-specific pricing, which is a variant of marginal cost pricing that developers prefer and often advocate.

The City of Cold Lake uses a fixed fee approach and currently has a bylaw approving the charge to developers on an average acreage assessment fee for a proposed development. The method works well in a pro-development environment and for municipalities in a growing trend.

While we recommend that current practice be upheld for the time being, as the City grows, the future of development charge practice in Cold Lake may have to be adjusted both by magnitude and by method to allow for at least the rate of inflation, and to allow for impact fees levied to have a more defensible linkage, providing a rational nexus between traffic generated by the proposed development and any roadway improvements deemed necessary.

2.16 PUBLIC CONSULTATION & COUNCIL PRESENTATION

The success of any major transportation planning initiative is ultimately determined by how the public perceives value in the planned program, and how well they support it. A public consultation program was conducted to inform the stakeholders/public about the City's current and future transportation issues and requirements. In addition to the public consultation program, the draft report was reviewed with and presented to the City of Cold Lake's internal stakeholders including the Planning and Engineering departments before the public consultation.

The project team reviewed the City of Cold Lake Transportation Study draft report with the Planning as well as Engineering department to confirm the various components of the project, including:

- 20-year roadway network plan
- Existing traffic analysis results and recommendations
- Forecasted traffic volumes and analyses
- Cold Lake North parking study results
- Cold Lake South parking study results
- City of Cold Lake collision analysis and recommendations
- Highway 28 functional review
- In-Service Road Safety Review results and recommendations
- School & Playground Zone analyses and recommendations
- 20-year horizon roadway improvement cost estimates
- Truck and dangerous goods route considerations
- Transit service requirements and recommendations
- Sustainable transportation initiatives and policies
- Transportation policies and strategies
- Transportation levies.

Two public information sessions were conducted for the Cold Lake Transportation Study. During the day, on Monday, April 18, 2011, a public information session was held at Lakeland Inn in Cold Lake South. In the evening of the same day, a public information session was held at a Fire Hall in Cold Lake North. The information sessions were drop-in style format.

Public notification of the open houses was made through advertisements in the local newspaper, by street-side signs near City Hall, and/or through the City's website. Advertisements were placed well in advance of the open house so that all residents will have an opportunity to attend. AE and the City of Cold Lake project team members were present to inform the public and stakeholders about the City's current and future transportation infrastructure issues and requirements.

The information session displayed materials describing the ultimate roadway network, and the proposed roadway improvements at the four study horizons. The display boards included:

- 20-year roadway network plan
- Existing traffic analysis results and recommendations
- Forecasted traffic volumes and analyses
- Cold Lake North parking study results
- Cold Lake South parking study results
- City of Cold Lake collision analysis and recommendations
- Highway 28 recommended intersection template
- In-Service Road Safety Review results and recommendations
- School & Playground Zone analyses and recommendations
- Truck and dangerous goods route
- Transit service requirements and recommendations.

No major concerns/comments were received from the general public about the City of Cold Lake's current



transportation challenges and future transportation.

The final Cold Lake Transportation Study report was presented to the Council and Senior Management on Tuesday, April 19, 2011, at the Council Priorities Meeting. AE project team presented this report for discussion purposes and facilitate feedback from Council prior to the document being finalized and adopted by policy.

CERTIFICATION PAGE



as QUALIT	sociated engineering Y MANAGEMENT SIGN-OFF				
Signature	that				
Date:	Feb. 22, 2012				
APEG	APEGGA Permit to Practice P 3979				



A Appendix A - Transportation Study - Existing (2010) Traffic Operational Analysis

Technical Memorandum

The City of Cold Lake

Transportation Study - Existing (2010) Traffic Operational Analysis

April 2011



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Introduction

The City of Cold Lake (City) is located 287 km northeast of the City of Edmonton and was formed in 1996 by merging three municipalities, namely Grand Centre, Medley (Canadian Forces Base W4) and Cold Lake. Grand Centre was subsequently renamed Cold Lake South and the original Cold Lake is now known as Cold Lake North.

The City has experienced noticeable growth in recent years. According to municipal census the City had a population of 11,991 in 2006 and 13,924 in 2009. This corresponds to a 5.4% linear growth annually. Current transportation improvements within the City have been based on the previous transportation study completed in 2000 and is no longer considered representative of the actual transportation network required to address current and future transportation needs.

In light of the continuing accelerated pace of development in the region and the need to rationalize and identify the transportation network requirements for the City, including surrounding rural municipalities and counties, the existing transportation study requires a comprehensive update.

1.1 PROJECT BACKGROUND

Associated Engineering (AE) was retained by the City to update the transportation study. The purpose of the transportation study is to provide a comprehensive long range plan that integrates the transportation infrastructure requirements of the existing and future land uses. The study will provide the City with a master plan on which to plan and implement specific transportation network improvement projects related to municipal roads, traffic calming, parking, traffic safety, traffic signal coordination, school zones, transit, truck routes, traffic management and transportation system operations over the next 5, 10, 15 and 20 years.

The first task of the transportation study update was to evaluate the traffic operational conditions for the existing roadway system. This technical memorandum presents the traffic operational analysis completed for the existing (2010) horizon and the recommended improvements required.

1.2 STUDY AREA

The scope of the transportation study update encompasses the entire City of Cold Lake, including Cold Lake North, Cold Lake South and Medley. The City's boundaries are presented in Figure 1.1.



Upon discussion with the City, only the major roadways (collector and arterial roads) were analyzed for the transportation study. The existing roadway classification from the 2000 transportation study was used to identify the study roadways. Traffic operational analyses were completed at the intersections between two collectors, between a collector and an arterial, and between two arterials. Figure 1.2 presents the collector and arterial roadways within the City, as identified in the 2000 transportation study and the study intersections. Upon further discussion, traffic operations at some additional intersections along Highway 28/55 and along 50 Avenue in the Cold Lake South business zone were also analyzed. The additional study intersections are also presented in Figure 1.2.

The study area was broken down into the following areas:

- Cold Lake North Encompasses all of Cold Lake North, including the intersection of Highway 28 and Highway 55
- Highway 28/55 Corridor Encompasses the intersections along Highway 28/55 between the Energy Centre Access and 61/62 Avenue
- Cold Lake South Encompasses all of Cold Lake South
- Medley Encompasses all of Medley.

1.3 STUDY METHODOLOGY

The existing (2010) traffic operational analysis was completed using the following methodology:

- Conduct project initiation meeting
- Conduct site reconnaissance
- Collect background information and data
- Establish existing (2010) p.m. peak hour traffic volumes
- Complete operational intersection analysis for the p.m. peak hour
- Identify required intersection improvements for the p.m. peak hour
- Conduct client review meeting
- Produce draft and final reports.



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FIGURE 1.1 CITY OF COLD LAKE BOUNDARY



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FIGURE 1.2 STUDY CORRIDORS AND INTERSECTIONS **2** Existing Conditions - Data Collection

2.1 SITE RECONNAISSANCE

A site reconnaissance was conducted by AE over a period of two days, on May 4 and 5, 2010. The prevailing weather condition was cloudy with light flurries. The following information was collected during the site visit:

- Lane configuration and traffic control at the study intersections
- Posted speed limits along the study corridors
- Photographs and video log of the study corridors and intersections.

2.2 EXISTING LANE CONFIGURATIONS

The existing lane configuration, traffic control, and the posted speed limits at the study intersections are presented in Figure 2.1 through Figure 2.4 for Cold Lake North, the Highway 28/55 Corridor, Cold Lake South, and Medley, respectively.

2.3 EXISTING (2010) TRAFFIC VOLUMES

Traffic volume data was obtained from the following sources:

- 2009 intersection turning movement counts obtained from the Highway 28 Needs Assessment Report provided by the City of Cold Lake
- ATR link volumes provided by the City of Cold Lake
- 1999 forecasted intersection turning movement volumes and link volumes obtained from the 2000 transportation study provided by the City of Cold Lake.

Where traffic data was not available from the above sources, intersection turning movement counts were completed. The turning movement counts were conducted by City staff in the month of June 2010, at the following intersections:

- 1 Avenue and 28 Street
- 1 Avenue and 25 Street
- 1 Avenue and 16 Street
- 1 Avenue/10 Street and 2 Avenue
- 8 Avenue and Lakeshore Drive
- 16 Avenue and 10 Street
- 54 Avenue and 51 Street
- 50 Avenue and 53 Street
- 50 Avenue and 52 Street
- 50 Avenue and 50 Street



- 50 Avenue and 49 Street
- 50 Avenue and 45 Street
- 50 Avenue and 41 Street
- 50 Avenue and Baywood Road
- Highway 28 and 52 Street
- Highway 28 and 51 Street
- Highway 28 and 43 Avenue
- Kingsway and Medley Road
- Kingsway and Queensway
- Kingsway and Tennis Court Road
- Queensway and Tennis Court Road.

For clarity, traffic volumes collected through intersection turning movement counts and ATR counts will be referred to as 'field volumes' and traffic volumes generated through forecasting methods will be referred to as 'forecasted volumes'.

The existing (2010) p.m. peak hour traffic volumes were established using the following methodology:

- The most recent field volumes were used, where available. If the most recent field volumes were not collected in 2010, the volumes where grown using an annual growth rate of 2% (discussed in detail in the following section) to the 2010 horizon.
- Where field volumes were not available, the forecasted volumes were used and grown to the 2010 horizon.
- At locations where only forecasted volumes were available at the intersection and field volumes were available on the adjacent links, the intersection volumes were adjusted to match the link volumes while maintaining the intersection split from the forecast.

Figure 2.5 through Figure 2.8 present the p.m. peak hour traffic volumes used for the existing (2010) traffic operational analysis for Cold Lake North, the Highway 28/55 Corridor, Cold Lake South, and Medley, respectively.







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FIGURE 2.2 - HIGHWAY 28 / 55 CORRIDOR EXISTING LANE CONFIGURATION, TRAFFIC CONTROL AND POSTED SPEED LIMIT



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CITY OF COLD LAKE TRANSPORTATION STUDY FIGURE 2.4 - MEDLEY EXISTING LANE CONFIGURATION, TRAFFIC CONTROL AND POSTED SPEED LIMIT	Image: Signalization

2.4 ANNUAL GROWTH RATE

In order to develop the 2010 traffic volumes, a growth rate was applied to some of the traffic volumes provided by the City.

Table 2.1 presents the growth rate calculations performed on the data provided by the City of Cold Lake. The following four sources were reviewed in the calculation of the growth rate:

- Source 1: Historical 2003-2004 traffic counts along Highway 28 provided by the City
- Source 2: Cold Lake Halley Test 2009 (population growth)
- Source 3: City of Cold Lake, Municipal Development Plan (Page 7)
- Source 4: MD Bonnyville, Intermunicipal Development Plan (Page 16).

The information obtained from these sources is summarized below and is included in Appendix A.

Through discussion with the City and with consideration for the below information, an annual growth rate of 2.0% was selected and utilized for traffic growth in this report.



Roadway	Location	Direction	0	Source 1	0/ O ment	Source 2	Source 3	Source 4
-	North of		Oct 2003	June 2004	% Growth			
	Highway 55	Northbound	3,785	4,100				
	North of Highway 55	Southbound	3,890	4,386				
	North of Highway 55	Two-way Total	7,675	8,487	10.6%			
Highway 28	South of Highway 55	Northbound	5,796	4,796				
	South of Highway 55	Southbound	5,818	5,011		-		
	South of Highway 55	Two-way Total	11,614	9,897	-14.8%			
Highway 55	West of Highway 28	Two-way Total	3,212	4,713	46.7%			
16 Avenue	East of Highway 28	Two-way Total	2,735	1,958	-28.4%			
	North of Imperial Park Rd	Northbound	6,012	-				
	North of Imperial Park Rd	Southbound	6,032	-			1.5% Average Annual	5.5% in Five
Highway 29	North of Imperial Park Rd	Two-way Total	12,044	12,565	4.3%		Growth (1986 - 2001)	Years (1996- 2001)
nignway 20	South of Imperial Park Rd	Northbound	5,090	-			2.0% Assumed Annual Growth 3.0% Annual Growth if	2.5% - High Projected
	South of Imperial Park Rd	Southbound	6,069	-		17.0%		Growth
	South of Imperial Park Rd	Two-way Total	11,159	12,821	14.9%	3.0% Annu Growth i growth continues oil sands tourism ar service-bas industries		1.5% - Moderation Projected
	North of Mall Access	Northbound	5,860	4,678			growth continues in	Growth
	North of Mall Access	Southbound	5,512	6,441			oil sands, tourism and service-based industries.	0.5% - Low Projected
Highway 28	North of Mall Access	Two-way Total	11,372	11,209	-1.4%			Growth
riigiiway 20	South of Mall Access	Northbound	7,101	7,799				
	South of Mall Access	Southbound	6,917	7,694				
	South of Mall Access	Two-way Total	14,018	15,493	10.5%			
Imperial Park Rd (Energy Access Centre)	East of Highway 28	Two-way Total	126	282	123.8%			
Mall	East of Highway 28	Northbound	2,158	2,502				
(Tri-City)	East of Highway 28	Southbound	2,074	3,870				
A00633	East of Highway 28	Two-way Total	4,232	6,372	50.6%			
Average Annual Growth Rate					21.7%			

Table 2.1 Growth Rate Calculation







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FIGURE 2.6 - HIGHWAY 28 / 55 CORRIDOR EXISTING (2010) PM PEAK TRAFFIC VOLUMES





3

Traffic Operational Analysis

The Synchro 7.0 traffic analysis program based on the Highway Capacity Manual (HCM) was used to complete the capacity analysis of the study intersections. Synchro 7.0 applies the methodology established by the HCM to output a level of service (LOS) for study intersections, given the lane configuration, vehicular volumes, heavy vehicle percentages, signal timing, etc.

A design criteria was developed by AE at project initiation to set various parameters for the capacity analysis. The design criteria was submitted and approved by the City, and is included in Appendix B. Changes to the design criteria were made as the study progressed. The peak hour factor (PHF) was revised to 0.86 from a default value of 1.00; a PHF of 0.86 reflects the average calculated PHF from the traffic counts conducted by the City in June 2010. The PHF is a measure of traffic demand fluctuation within the peak hour and is calculated by taking the hourly volume during the peak hour of the day and dividing by the peak 15-min flow rate within the peak hour. Additionally, default signal timing parameters such as minimum green time and pedestrian walk/clearance time were revised to reflect those proposed as part of the Highway 28 Twinning project.

It should be noted that existing signal timing plans were used, where available, at current signalized intersections.

The operational capability of the study intersections were assessed using capacity, which is a measure of the sustainable flow rate at which vehicles can be expected to transverse a point. The critical measures used in the assessment were:

Volume to capacity (v/c) ratio provides the amount of congestion for each turning movement and for each lane group for signalized intersections. A v/c value over 1.00 indicates that the movement or lane group is over capacity.

Control delay is the amount of delay a vehicle experiences in seconds.

LOS is a qualitative measure describing operational conditions within a traffic stream and is based on service measures such as delay and congestion.

A LOS C was required for both the overall intersection and the individual intersection approaches to be operating above an acceptable level. The LOS definitions for unsignalized and signalized intersections were included in the design criteria under Appendix B.

A review of the operational analysis results is presented below and the detailed summary of the Synchro results is included in Appendix C.



3.1 COLD LAKE NORTH

Figure 3.1 presents the overall intersection capacity results for the study intersections in Cold Lake North. With the exception of the intersection at 8 Avenue and 16 Street, all the study intersections are currently operating well, with overall intersection LOS B or higher and intersection delays of 12.0 seconds or less.

The intersection of 8 Avenue and 16 Street is currently operating with an overall intersection LOS B, maximum v/c ratio of 0.59, and intersection delays of 12.0 seconds. While the intersection is operating well overall, the northbound and southbound approaches are operating poorly. The northbound approach is operating at LOS F with delays of 77.7 seconds and the southbound approach is operating at LOS D with delays of 30.1 seconds. The poor LOS on these approaches can be attributed to the stop control provided on these approaches. Vehicles on the northbound and southbound approaches experience considerable delays while waiting for acceptable gaps in successive platoons of traffic on 8 Avenue. This intersection is currently being upgraded as part of the Highway 28 Twinning project.

3.2 HIGHWAY 28/55 CORRIDOR

Figure 3.2 presents the overall intersection capacity results for the study intersections along the Highway 28/Highway 55 corridor.

The intersection of Highway 28/55 with the Energy Centre Access, 69 Avenue, and the Tri-City Mall Access are all operating well, with overall intersection LOS B and intersection delays of 14.3 seconds or less.

The intersection of Highway 28/55 with 75 Avenue is currently operating with an overall intersection LOS D, maximum v/c ratio of 1.61, and intersection delays of 26.8 seconds. The maximum v/c ratio is experienced by the westbound approach, which indicates that the existing volumes on this approach are exceeding the capacity of the single lane provided. The westbound approach is operating at LOS F with delays of 440.6 seconds. The long delays on this approach are compounded by the stop control provided for the eastbound and westbound approaches.

The intersection of Highway 28/55 with 61/62 Avenue is currently operating with an overall intersection LOS A, maximum v/c ratio of 0.58, and intersection delays of 2.9 seconds. While the intersection is operating well overall, the westbound left turn movement is operating poorly. This movement is operating at LOS F with delays of 106.5 seconds. The poor LOS on this movement can be attributed to the stop control provided on the westbound approach. Left turn vehicles on the westbound approach experience considerable delays while waiting for acceptable gaps in successive platoons of traffic on Highway 28/55.

Both the intersections at 75 Avenue and 61/62 Avenue are currently being upgraded as part of the Highway 28 Twinning project.





3.3 COLD LAKE SOUTH

Figure 3.3 presents the overall intersection capacity results for the study intersections in Cold Lake South.

With the exception of the following intersections, all the study intersections are currently operating well, with overall intersection LOS B or higher and intersection delays of 14.3 seconds or less:

- Highway 28/55 and 54 Avenue
- Highway 28/55 and 52 Avenue
- Highway 28/55 and 52 Street
- Highway 28/55 and 46 Avenue
- Centre Avenue and 59 Street
- Centre Avenue and 57 Street.

The intersection of Highway 28/55 with 54 Avenue is currently operating with an overall intersection LOS B, maximum v/c ratio of 0.86, and intersection delays of 19.5 seconds. While the intersection is operating well overall, the southbound left turn movement is operating below the acceptable threshold. This movement is operating at LOS D with delays of 52.5 seconds. The lower LOS on this movement can be attributed to delays while waiting for acceptable gaps in the opposing traffic on Highway 28/55. This intersection is currently being upgraded as part of the Highway 28 Twinning project.

The intersection of Highway 28/55 with 52 Avenue currently fails, with an overall intersection LOS F, maximum v/c ratio of 3.35, and intersection delays of 849.3 seconds. The intersection is failing due to the eastbound and westbound approaches. Both these approaches are operating at LOS F, with v/c ratios exceeding 1.00 (v/c = 2.25 on the eastbound approach and v/c = 3.35 on the westbound approach), and delays exceeding 812.5 seconds. The v/c ratios indicate that the existing volumes on these approaches are exceeding the capacity of the single lane provided. The long delays indicate that vehicles on these approaches are waiting a long time at the stop sign for acceptable gaps in successive platoons of traffic on Highway 28/55.

The intersection of Highway 28/55 and 52 Street is currently operating with an overall intersection LOS A, maximum v/c ratio of 0.47, and intersection delays of 5.1 seconds. While the intersection is operating well overall, the northbound and southbound approaches are operating poorly. The northbound approach is operating at LOS D with delays of 32.2 seconds and the southbound approach is operating at LOS E with delays of 42.6 seconds. The poor LOS on these approaches can be attributed to the stop control provided on 52 Street. Vehicles on the northbound and southbound approaches experience considerable delays while waiting for acceptable gaps in successive platoons of traffic on Highway 28/55.



The intersection of Highway 28/55 and 46 Avenue is currently operating with an overall intersection LOS A, maximum v/c ratio of 0.22, and intersection delays of 1.0 seconds. While the intersection is operating well overall, the eastbound left turn movement is operating below the acceptable threshold. This movement is operating at LOS D with delays of 33.2 seconds. The poor LOS on this movement can be attributed to the stop control provided on the eastbound approach. Left turn vehicles on the eastbound approach experience considerable delays while waiting for acceptable gaps in successive platoons of traffic on Highway 28/55.

The intersection of Centre Avenue and 59 Street is currently operating with an overall intersection LOS A, maximum v/c ratio of 0.26, and intersection delays of 2.3 seconds. While the intersection is operating well overall, the northbound and southbound approaches are operating poorly. The northbound approach is operating at LOS D with delays of 32.7 seconds and the southbound approach is operating at LOS E with delays of 44.5 seconds. The poor LOS on these approaches can be attributed to the stop control provided on 59 Street. Vehicles on the northbound and southbound approaches experience considerable delays while waiting for acceptable gaps in successive platoons of traffic on Centre Avenue.

The intersection of Centre Avenue and 57 Street is currently operating with an overall intersection LOS A, maximum v/c ratio of 0.59, and intersection delays of 5.3 seconds. While the intersection is operating well overall, the northbound and southbound approaches are operating poorly. The northbound approach is operating at LOS D with delays of 33.0 seconds and the southbound approach is failing at LOS F with delays of 81.7 seconds. The poor LOS on these approaches can be attributed to the stop control provided on 57 Street. Vehicles on the northbound and southbound approaches experience considerable delays while waiting for acceptable gaps in successive platoons of traffic on Centre Avenue.

3.4 MEDLEY

Figure 3.4 presents the overall intersection capacity results for the study intersections in Medley.

All the study intersections are operating well with overall intersection LOS B or higher and intersection delays of 13.6 seconds or less. Additionally, all the intersection approaches are operating above the acceptable LOS C.







Highway 28 Twinning

Highway 28 is currently undergoing construction to be twinned from 10 Street in Cold Lake North to 54 Avenue in Cold Lake South. The following study intersections will be upgraded as part of the Highway 28 Twinning project including intersection configuration improvements and signalization:

Cold Lake North

- 8 Avenue and 10 Street
- 8 Avenue and 16 Street
- Highway 28 and 25 Street
- Highway 28 and Highway 55/16 Avenue.

Highway 28/55 Corridor

- Highway 28/55 and Energy Centre Access
- Highway 28/55 and 75 Avenue
- Highway 28/55 and 69 Avenue
- Highway 28/55 and Tri-City Mall Access
- Highway 28/55 and 61/62 Avenue.

Cold Lake South

• Highway 28/55 and 54 Avenue.

The ultimate lane configuration at the above intersections and the ultimate signal timing plans for the signalized intersections were provided by the City. The ultimate signal timing plans were revised based on optimization using Synchro. Figure 4.1 presents the ultimate lane configuration and traffic control along Highway 28/55, from 10 Street to 54 Avenue, after the Highway 28 Twinning.

The upgraded intersections along Highway 28/55 were analyzed to determine the expected operational capacity, after the Highway 28 Twinning project. Figure 4.2 presents the overall intersection capacity results. A review of the operational analysis results is presented below and the detailed summary of the Synchro results is included in Appendix C.



4.1 COLD LAKE NORTH

All the intersections upgraded in Cold Lake North, as part of the Highway 28 Twinning project, are expected to operate at an acceptable LOS. The upgraded intersections are expected to operate with an overall intersection LOS B or higher and intersection delays of 18.1 seconds or less. Additionally, all the intersection approaches are expected to operate at LOS C or better.

4.2 HIGHWAY 28/55 CORRIDOR

After the Highway 28 Twinning project, the intersection of Highway 28/55 with the Energy Centre Access, 69 Avenue, and the Tri-City Mall Access are expected to continue operating well, with overall intersection LOS B or higher and intersection delays of 14.9 seconds or less.

The intersection of Highway 28/55 and 75 Avenue is expected to operate at an overall intersection LOS B, with a maximum v/c ratio of 1.00 and intersection delays of 10.2 seconds. With the intersection upgrades the maximum v/c ratio is expected to improve by 0.61; however, the westbound approach continues to fail and operate at LOS F with a v/c ratio of 1.00 and delays of 161.2 seconds. Additional intersection upgrades will be required for the intersection to operate at an acceptable level.

The intersection of Highway 28/55 and 61/62 Avenue is expected to operate at an overall intersection LOS A, with a maximum v/c ratio of 0.27 and intersection delays of 1.0 seconds. While the intersection is expected to operate well overall, the westbound left turn movement is expected to operate poorly. This movement is expected to operate at LOS E with delays of 36.2 seconds. The poor LOS on this movement can be attributed to the stop control provided on the westbound approach. Additional intersection upgrades will be required for the westbound left turn movement to operate at an acceptable level.

4.3 COLD LAKE SOUTH

Only the intersection of Highway 28/55 and 54 Avenue was upgraded as part of the Highway 28 Twinning project. With the upgrades, the intersection is expected to operate well with an overall intersection LOS C, maximum v/c ratio of 0.67, and intersection delays of 20.6 seconds. Additionally all the intersection approaches are expected to operate at LOS C or better.



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FIGURE 4.1 ULTIMATE LANE CONFIGURATION AND TRAFFIC CONTROL - POST HIGHWAY 28 TWINNING



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Engineering DWG	DWG NO:		2010 CAPACITY RESULTS - POST HIGHWAY 28 TWINNING

5

Gemetric/Operational Improvements

Despite the improvements being implemented as part of the Highway 28 Twinning, there are a number of intersections that require additional improvements in order for the intersection to operate above the acceptable level. The intersections which require further improvements are:

Highway 28/55 Corridor

- Highway 28/55 and 75 Avenue
- Highway 28/55 and 61/62 Avenue.

Cold Lake South

- Highway 28/55 and 52 Avenue
- Highway 28/55 and 52 Street
- Highway 23/55 and 46 Avenue
- Centre Avenue and 59 Street
- Centre Avenue and 57 Street.

The above intersections were analyzed to determine the improvements required. Figure 5.1 presents the required intersection improvements at the study intersections and Figure 5.2 presents the overall intersection capacity results for the required intersection improvements.

A review of the operational analysis results is presented below and the detailed summary of the Synchro results is included in Appendix C. The improvements described below are in addition to any improvements proposed for the Highway 28 Twinning.

5.1 HIGHWAY 28/55 AND 75 AVENUE

Traffic signals are recommended at the intersection of Highway 28/55 and 75 Avenue, to provide sufficient gaps between the successive platoons of traffic on Highway 28 and reduce the delays on the westbound approach. With the traffic signal, the intersection is expected to operate at an overall intersection LOS A, with a maximum v/c ratio of 0.37 and intersection delays of 7.6 seconds. All intersection approaches are expected to operate at LOS B or better.

5.2 HIGHWAY 28/55 AND 61/62 AVENUE

Traffic signals are recommended at the intersection of Highway 28/55 and 61/62 Avenue, to provide sufficient gaps between the successive platoons of traffic on Highway 28 traffic and reduce the delays on the westbound approach. Additionally, a channelized right turn lane is recommended on the northbound approach since the right turn volumes exceed 60 vehicles per hour in the p.m. peak hour. With the recommended improvements, the intersection is expected to operate at an overall intersection LOS A, with a maximum v/c ratio of 0.31 and intersection delays of 4.6 seconds. All intersection approaches are expected to operate at LOS B or better.



5.3 HIGHWAY 28/55 AND 52 AVENUE

Similar to 61/62 Avenue, traffic signals are recommended at the intersection of Highway 28/55 and 52 Avenue to provide sufficient gaps between the successive platoons of traffic on Highway 28 traffic and reduce the delays on the eastbound and westbound approaches. Additionally, a channelized right turn lane is recommended on the northbound approach since the right turn volumes exceed 60 vehicles per hour in the p.m. peak hour. With the recommended improvements, the intersection is expected to operate at an overall intersection LOS A, with a maximum v/c ratio of 0.70 and intersection delays of 13.3 seconds. All intersection approaches are expected to operate at LOS B.

5.4 HIGHWAY 28/55 AND 52 STREET

Two options were developed for the intersection of Highway 28/55 and 52 Street. Option one recommends converting the existing two-way stop intersection to a four-way (all-way) stop intersection. Option two recommends installing traffic signals at the intersection. Both options recommend a channelized right turn lane on the northbound approach since the right turn volumes exceed 60 vehicles per hour in the p.m. peak hour.

With the recommended Option 1, the intersection is expected to operate at LOS C, with a maximum v/c ratio of 0.71 and intersection delays of 16.5 seconds. All intersection approaches are expected to operate at LOS C or better.

With the recommended Option 2, the intersection is expected to operate at LOS B, with a maximum v/c ratio of 0.66 and intersection delays of 11.8 seconds. All intersection approaches are expected to operate at LOS B or better.

AE recommends Option 2 because a four-way stop is undesirable along Highway 28 and because a signalized intersection will result in a higher LOS.

5.5 HIGHWAY 28/55 AND 46 AVENUE

Highway 28/55 and 46 Avenue is currently operating well overall, at LOS A and with a maximum v/c ratio of 0.22. The intersection requires improvement because the eastbound left turn movement is currently operating at LOS D. To improve the operation of the eastbound left turn movement, traffic signals would be required to provide the crossing opportunities required to reduce the delays on the eastbound approach.

At this point in time, AE does not recommend installing traffic signals at this intersection. At LOS D, the eastbound left turn movement is operating fairly and is not actually failing. This intersection should be monitored and traffic signals should be installed when the eastbound left turn movement deteriorates to LOS F.



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FIGURE 5.1 REQUIRED LANE CONFIGURATION AND TRAFFIC CONTROL IMPROVEMENTS



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FIGURE 5.2 2010 CAPACITY RESULTS - REQUIRED LANE CONFIGURATION AND TRAFFIC CONTROL IMPROVEMENTS
5.6 CENTRE AVENUE AND 59 STREET

Two options were developed for the intersection of Centre Avenue and 59 Street. Option one recommends widening Centre Avenue, between 59 Street and Highway 28/55, to provide two lanes in each direction and converting the existing two-way stop control to a four-way (all-way) stop control at the intersection of Centre Avenue and 59 Street. Option two recommends maintaining the existing lane configuration along Centre Avenue but providing traffic signals at Centre Avenue and 59 Street.

With the recommended Option 1, the intersection is expected to operate at LOS C, with a maximum v/c ratio of 0.73 and intersection delays of 16.0 seconds. All intersection approaches are expected to operate at LOS C or better.

With the recommended Option 2, the intersection is expected to operate at LOS B, with a maximum v/c ratio of 0.87 and intersection delays of 17.6 seconds. All intersection approaches are expected to operate at LOS C or better.

AE recommends Option 2 because a four-way stop is undesirable along Centre Avenue and because a signalized intersection will result in a higher LOS.

5.7 CENTRE AVENUE AND 57 STREET

Similar to Centre Avenue and 59 Street, two options were developed for the intersection of Centre Avenue and 57 Street. Option one recommends widening Centre Avenue, between 57 Street and Highway 28/55, to provide two lanes in each direction and converting the existing two-way stop control to a four-way (all-way) stop control at the intersection of Centre Avenue and 57 Street. Option two recommends maintaining the existing lane configuration along Centre Avenue but providing traffic signals at Centre Avenue and 57 Street.

With the recommended Option 1, the intersection is expected to operate at LOS C, with a maximum v/c ratio of 0.81 and intersection delays of 19.8 seconds. With the exception of the eastbound left turn movement, all intersection approaches are expected to operate at LOS C or better. The eastbound left turn movement is expected to operate at LOS D.

With the recommended Option 2, the intersection is expected to operate at LOS B, with a maximum v/c ratio of 0.88 and intersection delays of 17.9 seconds. All intersection approaches are expected to operate at LOS C or better.

AE recommends Option 2 because a four-way stop is undesirable along Centre Avenue and because a signalized intersection will result in a higher LOS.



6

Summary and Recommendations

The following intersection improvements are recommended at the study intersections which are operating below the acceptable LOS level under the existing (2010) horizon. The recommendations at the study intersections along the Highway 28 corridor are above and beyond the upgrades that will be implemented as part of the Highway 28 twinning project.

6.1 HIGHWAY 28/55 CORRIDOR

- Highway 28/55 and 75 Avenue: Signalize intersection
- Highway 28/55 and 61/62 Avenue: Signalize intersection and provide channelized northbound right turn lane.

6.2 COLD LAKE SOUTH

- Highway 28/55 and 52 Avenue: Signalize intersection and provide channelized northbound right turn lane
- Highway 28/55 and 52 Street: Signalize intersection and provide channelized northbound right turn lane
- Centre Avenue and 59 Street: Signalize intersection
- Centre Avenue and 57 Street: Signalize intersection.

Figure 6.1 through Figure 6.4 presents the recommended lane configuration and traffic control for Cold Lake North, the Highway 28/55 Corridor, Cold Lake South and Medley, respectively.









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FIGURE 6.2 - HIGHWAY 28 / 55 CORRIDOR RECOMMENDED LANE CONFIGURATION AND TRAFFIC CONTROL





Conclusion

Associated Engineering was retained by the City of Cold Lake to complete an update to the City's transportation study. The first task completed for the transportation study update was to evaluate the operational conditions for the existing roadway system. This technical memorandum presented the operational analysis completed for the existing (2010) horizon and the recommended improvements.

Only the major roadways (collector and arterial roads) were analyzed for the transportation study. Traffic operational analyses were completed at the intersections between two collectors, between a collector and an arterial, and between two arterials.

Overall, most of the intersections within the City are currently operating above acceptable levels. The intersections which are not currently operating above acceptable LOS are:

- 8 Avenue and 16 Street
- Highway 28/55 with 75 Avenue
- 28/55 with 61/62 Avenue
- Highway 28/55 and 54 Avenue
- Highway 28/55 and 52 Avenue
- Highway 28/55 and 52 Street
- Highway 28/55 and 46 Avenue
- Centre Avenue and 59 Street
- Centre Avenue and 57 Street.

Several of the intersections listed above are currently being upgraded as part of the Highway 28 Twinning project. These intersections include:

- 8 Avenue and 16 Street
- Highway 28/55 with 75 Avenue
- Highway 28/55 with 61/62 Avenue
- Highway 28/55 and 54 Avenue.

With the intersection improvements that will be implemented as part of the Highway 28 twinning project, the intersections of 8 Avenue and 16 Street and Highway 28/55 and 54 Avenue will operate above acceptable LOS and with low minimum delays. However the intersections of Highway 28/55 with 75 Avenue and 61/62 Avenue will require additional improvements.



The following intersections will require additional improvements, above and beyond the Highway 28 Twinning project improvements:

- Highway 28/55 with 75 Avenue
- Highway 28/55 with 61/62 Avenue
- Highway 28/55 and 52 Avenue
- Highway 28/55 and 52 Street
- Highway 28/55 and 46 Avenue
- Centre Avenue and 59 Street
- Centre Avenue and 57 Street.

The recommended lane configuration and traffic control are presented in Figure 6.1 through 6.4 in Section 6 above.

Appendix A - Growth Rate Information



Source 1: Provided by City of Cold Lake, from 2006 Hwy 28 Traffic Count Summary

Table 1 – Comparison of October 2003 and June 2004 Weekday Counts, in vehicles per day								
Roadway	Location	Direction	October 2003	June 2004				
	North of Highway 55	Northbound	3,785	4,100				
	North of Highway 55	Southbound	3,890	4,386				
Highway 28 ¹	North of Highway 55	Two-way Total	7,675	8,487				
Thghway 20	South of Highway 55	Northbound	5,796	4,796				
	South of Highway 55	Southbound	5,818	5,011				
	South of Highway 55	Two-way Total	11,614	9,897				
Highway 55 ¹	West of Highway 28	Two-way Total	3,212	4,713				
16 th Avenue ¹	East of Highway 28	Two-way Total	2,735	1,958				
Highway 28 ²	North of Imperial Park Rd.	Northbound	6,012	-				
	North of Imperial Park Rd.	Southbound	6,032	-				
	North of Imperial Park Rd.	Two-way Total	12,044	12,565				
	South of Imperial Park Rd.	Northbound	5,090	-				
	South of Imperial Park Rd.	Southbound	6,069	-				
	South of Imperial Park Rd.	Two-way Total	11,159	12,821				
Highway 28 ⁻¹	North of Mall Access	Northbound	5,860	4,678				
	North of Mall Access	Southbound	5,512	6,441				
	North of Mall Access	Two-way Total	11,372	11,209				
	South of Mall Access	Northbound	7,101	7,799				
	South of Mall Access	Southbound	6,917	7,694				
	South of Mall Access	Two-way Total	14,018	15,493				
Imperial Park Rd. ²	East of Highway 28	Two-way Total	126	282				
Mall Access ²	East of Highway 28	Westbound (outbound)	2,158	2,502				
	East of Highway 28	Eastbound (Inbound)	2,074	3,870				
	East of Highway 28	Two-way Total	4,232	6,372				

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MALE 10-YI SURVIVAL BY AGE GR	EAR RATE ROUP	FEMALE 5-YEAR SURVIVAL RATE BY AGE GROUP	MALE 5-YEAR SURVIVAL RATE BY AGE GROUP		*** *** ***	
		_		EXACT AGE	***	(Enter
SM		SF -	SM	INTERVALS	*** ***	growth rate
10 x		5 X	5 X	x to x+n	*** ***	below in AJ13)
					· ^ ^ ^ ^	
					· ^^^^	
	ages 0-4	ares 0-4			***	GROWTH RATE
	1 0000	1 0000	1 0000	0-4	***	0 170000
	1.0000	1.0000	1.0000	5-9	***	0.170000
	1.0000	1.0000	1.0000	10-14	***	FEMALE
	1.0000	1.0000	1.0000	15-19	***	AGE DISCREPANCY
	1.0000	1.0000	1.0000	20-24	***	1.366568
	1.0000	1.0000	1.0000	25-29	***	
	1.0000	1.0000	1.0000	30-34	***	MALE
	0.9964	1.0000	1.0000	35-39	***	AGE DISCREPANCY
	0.9926	0.9999	0.9964	40-44	***	1.360108
	0.9853	0.9919	0.9962	45-49	***	
	0.9531	0.9919	0.9891	50-54	***	TOTAL
	0.9054	0.9836	0.9637	55-59	***	AGE DISCREPANCY
	0.8833	0.9617	0.9395	60-64	***	2.726676
	0.8249	0.9419	0.9402	65-69	***	
	0.7255	0.9645	0.8774	70-74	***	
	0.6838	1.0001	0.8269	75-79	***	
inde	terminate	0.9982	0.8443	80-84	***	
inde	terminate	indeterminate	indeterminate	85+	***	

2.0 HISTORIC AND PROJECTED POPULATION GROWTH

Overall, Cold Lake's population has experienced considerable growth in the past 15 years. This growth has been driven primarily by the 4 Wing Air Force Base, oil and gas exploration as well as tourism related to the lake. Between 1986 and 2001, the population of the three communities that now comprises the City of Cold Lake increased by approximately 23%, as shown in Figure 1 below. The community's average annual growth over those years was 1.5%. Assuming that growth rates increase to an average of 2% annual growth, and assuming the figures in the 2006 Federal Census as a base, a population of 14,909 is projected by 2017. This is estimated increase to 18,174 by 2027 and 22,154 by 2037. This growth rate is approximated by the centre growth line in Figure 2 below (based on 2% growth). If growth continues in the region's oil sands, tourism and service-based industries, Cold Lake could experience an annual growth rate closer to 3%, which could result an estimated population of 30,000 people by 2037.

	righter not. Only of bold Editer historie i opulation browth								
	1984	1986	1988	1990	1992	1994	1996	1996*	2001*
Town of Cold Lake	2,515	3,059	3,445	3,604	3,941	4,250	4,250		
Town of Grand Centre	3,195	3,506	3,655	3,715	3,877	3,990	3,990		
4 Wing	n/a	n/a	n/a	n/a	n/a	n/a	3,550		
City of Cold Lake (after amalgamation)								11,791	11,520

Figure 1.0: City of Cold Lake Historic Population Growth



Figure 2.0: City of Cold Lake Projected Population Growth 2007 – 2037

Based on 2006 census figures, for the purposes of this Municipal Development Plan the City of Cold Lake has established a target population of 30,000 by the year 2037.

Source: Ministry of Municipal Affairs, Official Population Lists * Statistics Canada 1996/2001 Federal Census

2.3.5 Historic Sites

Alberta Culture and Community Spirit (ACCS) classifies Heritage Resource Sites into one of six categories: archaeological, cultural, geological, historic period, natural and palaeontological. Within these classifications, the sites are given a Historical Resource Value (HRV). The highest level of protection (HRV 1) is afforded to lands that have been designated under the *Historical Resources Act* as Provincial Historic Resources. An HRV of 1 is also used to identify lands owned by ACCS for historic resource protection and promotion purposes.

Based on the inventory provided by the Historic Resource Management Branch at Alberta Community Development, there are four known archaeological sites within the in the IDP area and many areas of high archaeological resource sensitivity. The Historic Resource Management Branch maintain a listing of historic resources that is updated twice a year on our website:

http://culture.alberta.ca/heritage/resourcemanagement/landuseplanning/default.aspx.

2.4 Population and Growth Forecasts

In order to forecast the demand for land for expansion of existing usages and to accommodate proposed usages within the IDP area, a population projection was prepared. A high, moderate and low growth rates were assumed as shown in *Figure 1 - M.D. of Bonnyville # 87 Population Projection Chart based on 2006 Population Census* and *Figure 2 - City of Cold Lake Population Projection Chart based on 2006 Population Census*. Current population contained within the M.D. of Bonnyville (excluding the Town of Bonnyville) is approximately 22,200 people.

2.4.1 M.D. of Bonnyville #87

The M.D. of Bonnyville grew from 8,977 to 9,473 between 1996 and 2001, a growth rate of 5.5% in five years. According to the Federal Census, in 2006 the M.D. of Bonnyville had a population of 10,194. Three population projections have been prepared for the M.D. of Bonnyville. The high projection assumes a 2.5% annual growth rate, envisions the population rising to 17,122 by 2027. The moderate projection assumes a 1.5% annual growth rate resulting in a 2027 population of 13,936. The low projection for the IDP area assumes a 0.5% annual growth rate. This projection would result in a 2027 population of 11,320.



Figure 1 - M.D. of Bonnyville # 87 Population Projection Chart based on 2006 Federal Population Census

Based on the 2006 Federal Community Profile, the IDP area had an estimated population of 1% of the M.D. of Bonnyville total population. Without urban expansion of the City of Cold Lake, the population within the IDP area is likely to experience no significant increase in the short-term.

2.4.2 City of Cold Lake

The City of Cold Lake has experienced considerable growth in the past fifteen years, the average growth being 1.5 %. Three population projections have been prepared for the 20-year period ending in 2037. The high projection of 3% annual growth is consistent with the Cold Lake MDP. In this instance, the population is projected to rise to 22,307 by 2027, an increase of 9,956 people. The moderate projection assumes a growth rate of 2%. With this assumption the City's population is projected to increase to 18,174, an increase of 5,943. The low projection assumes an annual growth rate of 1%. Based on this assumption the City's population is projected to be 14,778 in 2027, an increase of 2,667.

It is likely that the IDP area growth rate would tend to be close to the City of Cold Lake's projections given its proximity to the City of Cold Lake.



Figure 2 - City of Cold Lake Population Projection Chart based on 2006 Federal Population Census.

2.4.3 Demand for Land to Accommodate Residential Growth

Land requirements need to assume a factor for grossing up the lot size to accommodate the need for roadways and municipal and environmental reserve requirements. Lots in the M.D. of Bonnyville will tend to be larger than in the City of Cold Lake. The resulting additional land required to accommodate residential growth within the IDP area will depend on urban expansion of the City of Cold Lake.

2.5 Existing Zoning

Map 4 – Existing Land Use shows land use within the IDP area as of June, 2006. They are summarized as follows.

2.5.1 City of Cold Lake Land Use Bylaw 301-LU-07

There are several land uses within the City of Cold Lake bordering the IDP boundary. *Map 4 - Existing Land Use* shows current land uses within the IDP area. The most important one is the Arterial Commercial (C2) for its location, primarily along Highway 28.

IDP - City of Cold Lake / MD of Bonnyville Intermunicipal Development Plan February 17, 2009

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B Appendix B - Design Criteria for Capacity Analysis

City of Cold Lake Transportation Study Project No: 2010-3050 Date: July 5, 2010

TRAFFIC ANALYSIS CRITERIA

A micro model using Synchro/SimTraffic 7.0 will be developed to identify and review intersection capacity needs. Level of service will be used as the common reference in terms of average delay times categorized into six general grades. Table 1.1 defines the LOS criteria for signalized intersections and unsignalized intersections.

Level of Service (LOS)	Overall Average Delay at Unsignalized Intersection	Overall Average Delay at Signalized Intersection
A	≤ 10 seconds	≤ 10 seconds
В	> 10 and ≤ 15 seconds	> 10 and \leq 20 seconds
С	> 15 and ≤ 25 seconds	> 20 and ≤ 35 seconds
D	> 25 and ≤ 35 seconds	> 35 and ≤ 55 seconds
E	> 35 and ≤ 50 seconds	> 55 and ≤ 80 seconds
F	> 50 seconds	> 80 seconds

Table 1.1 Level of Service Definitions

The minimum LOS criteria recommended by Associated Engineering (AE) is LOS C for the overall intersection. Additionally, each specific movement is targeted to achieve a LOS C or better in all cases. To achieve improved levels of service, the following criteria are proposed where applicable in the traffic network model:

- Right turn channelization (yield condition) provided when turning movements exceed 60 vehicles per hour.
- Right turn bays provided to satisfy LOS E or queuing issues in right or through movements.
- Left and right turn bay lengths provided based on 95th queue lengths from Synchro with a minimum storage length of 60 meters.
- Double left turn lanes provided when turning volumes significantly exceed 300 vehicles per hour and LOS or v/c ratios are above the stated minimums.

Table 2.2 presents the recommended traffic analysis assumptions that will be used in the Synchro model. The table also presents assumptions used by four different municipalities within Alberta including the Regional Municipality of Wood Buffalo (RMWB), the City of Calgary, the City of Lethbridge and the City of Medicine Hat. The assumptions used by the RMWB were developed by AE for a specific project.

	Traffic Analysis Parameters									
Parameter	Parameter RMWB* City of Calgary City of Lethbridge City of Medicine Hat		Recommended							
Link Speed	d Existing posted speed limits									
Lane Widths		3.7	7m		3.7m					
Storage Length		Minimu	ım 60m		Minimum 60m					
Adjacent Parking Lanes		Apply data where available								
Lane Window										
Ideal Saturation Flow (vphpl)	1900	1850	1750 1850 (throug 1650 (turnin		1850					
Lost Time	-	Default	Default	Default	Default					
Leading Detector	2m (turning) 10m (through)	8m (left turn) 4m (through)	Default	-	Default					
Trailing Detector	0	2m	Default	-	Default					
Turning Speed	-	Default	Default	Default	Default					
Lane Utilization	-	Default	Default	Default	Default					
Right Turn Factor	-	Default	Default	Default	Default					
Left Turn Factor (protected)	-	Default	ault Default Default		Default					
Saturated Flow Rate (protected)	-	Default	Default	Default	Default					

Table 2.2 Traffic Analysis Assumptions for Synchro

Left Turn Factor (permitted)	-	Default	Default	Default	Default
Saturated Flow Rate (permitted)	-	Default	Default	Default	Default
Saturated Flow Rate (RTOR)	-	Default	Default	Default	Default
Headway Factor	-	Default	Default	Default	Default
		Volume	Window		
Conflicting Pedestrian #	-	Apply data where available	Apply data where available	Apply data where available. Minimum = 5.	Apply data where available. Minimum = 5.
Conflicting Bikes #	-	Apply data where available	Apply data where available	Apply data where available. Minimum = 5.	Apply data where available. Minimum = 5.
Peak Hour Factor	1.00	1.00	0.88 1.00 (15 min data used)	0.95 – Congested Urban Conditions 0.92 – Current / Base Case Urban Conditions 0.88 – Current / Base Case Undeveloped areas 0.85 – Forecast Case, Local and Collector Roads 0.93 – Forecast Case, Congested Collectors and Minor Arterial Roads 0.95 – Forecast Case, Principal Arterials	0.86
Growth Factor	1.0	1.0	1.0	1.0	1.0

Heavy Vehicle (%) 5		Apply data where available. Default 5% (main street), 2% (side street) and 7.5% or greater in industrial areas.	Apply data where available. Default 5% (main street), 2% (side street) and 10% in industrial areas.	Apply data where available. Default 7.5% or greater in industrial areas.	Apply data where available. Default 5% (main street), 2% (side street) and 7.5% or greater in industrial areas.
Bus Blockage (#/hour)	0	Apply data where available	Apply data where available	Apply data where available	Apply data where available
Traffic from Mid- Block (%)	None	Apply data where available	Apply data where available	Apply data where available	Apply data where available
Link OD Volumes	-	Alterations must be documented in detail	Alterations must be documented in detail	Alterations must be documented in detail	Default
Lane Group Flow	-	Default	Default	Default	Default
Vehicle Clearance / Existing Timings	-	Contact City of Calgary - Traffic Signals	Contact City of Lethbridge – Traffic Operations	Minimum Green = 7 seconds on left turns, 10 seconds for through Maximum Time = 20 – 30 seconds on main road	Use existing signal timing where available
		Timing	Window		
Main Street Minimum Initial	-	20 seconds or pedestrian time, whichever is greater	20 seconds or pedestrian interval, whichever is greater	10 seconds or pedestrian time, whichever is greater	15 seconds or pedestrian interval, whichever is greater
Side Street Minimum Initial	-	10 seconds	10 seconds or minimum pedestrian interval, whichever is greater	10 seconds	12 seconds
Minimum Initial Arrows	-	5 seconds	5 seconds	7 seconds	7 seconds
Minimum Initial Split	-	Default	-	Default	Default

Recall - Generally used in Downtown / Beltline areas. Minor Street or Turns – No recall.		Main Street – Ped. / min. unless on fixed (pretimed) mode. Minor Street or Turns – No recall.	Main Street – Ped. / min. unless on fixed (pretimed) mode. Fixed mode generally used in Downtown area. Minor Street or Turns – No recall.	Main Street – Ped. / min. unless on fixed (pretimed) mode. Minor Street or Turns – No recall.	
		Phasing	Window		
Pedestrian Walk Time	8 seconds	Minimum 8 seconds	Minimum 6 seconds	20 seconds	7 seconds
Pedestrian Clearance Time (Don't Walk)	11 seconds	Contact City of Calgary – Traffic Signals	Minimum value derived from actual crossing distance (m) divided by walking speed of 1.2 m/s. In areas with high senior citizens, walking speed of 1.0 m/s should be used.	Pedestrian walk time plus 7 seconds (27 seconds)	17 seconds
Pedestrian Calls (#/hr)	5	Apply data where available	Apply data where available	Apply data where available. Minimum = 5.	Apply data where available. Minimum = 5.
Minimum Splits for Arrows	-	10 seconds plus clearance. In extreme cases 8 seconds plus clearance for prot / perm arrows, 9 seconds plus clearance for prot only arrows.	10 seconds plus clearance. In extreme cases 8 seconds plus clearance for prot / perm arrows, 9 seconds plus clearance for prot only arrows.	10 seconds plus vehicle clearance	10 seconds plus vehicle clearance
Dual Entry	Yes	Yes	Yes	Yes	Yes

Inhibit Max	Yes	Contact City of Calgary – Traffic Signals	Default	No. Contact City of Medicine Hat – Municipal Engineering.	Yes
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*Project specific to the West Loop Road Project

All other factors will be set at the default or calculated values.

General comments:

- If an arrow (protected) phase is found to be needed in one peak period, it will be included in the signal phasing in the analysis of all peak hours.
- Summary sheets will include v/c ratios, level of service values and 95th queue lengths.

C Appendix C - Synchro Results

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay	LOS	95th Queue
				Overall Interse	ction		0.13	5.1	Δ	(111)
		•			31011	11	0.13	11.9	R	2.2
			FB	Through	ITD	27	0.09	11.0	B	2.3
			LD	Pight	LIN	5	0.09	11.0	B	2.3
						ິ 11	0.09	10.5	B	2.3
		Linsignalized	W/B	Through	ITD	21	0.13	10.5	B	3.7
101	Street / English	Ston Control - EB/MB	WD	Pight	LIN	55	0.13	10.5	B	3.7
101	Bay Road					55	0.13	0.0	Δ	0.1
	Bay Road	Approactics	NB	Through	LTR	79	0.00	0.0	Δ	0.1
			11B	Right	LIIX	30	0.00	0.4	Δ	0.1
		•		Left		42	0.00	0.4	Δ	0.1
			SB	Through	I TR	62	0.03	3.1	A	0.0
Node # Intersection 101 1 Avenue & 2 Street / Englis Bay Road 102 1 Avenue & 2 Street 103 1 Avenue & 2 Street 103 1 Avenue & 1 Nelson Street 104 1 Avenue & 1 Street			02	Right	LIIX	5	0.03	3.1	A	0.8
				Overall Interse	ction	0	0.00	4 1	A	0.0
		•		Left			0.10			
			FB	Through	TR	81	0.06	0.0	Δ	0.0
				Right		11	0.06	0.0	A	0.0
				Left		66	0.05	0.0	A	1.3
		Unsignalized	WB	Through	IT	81	0.05	3.6	A	1.3
102	1 Avenue & 25	Stop Control - NB		Right						
	Street	Approach		Left		1	0.10	9.3	Α	2.8
			NB	Through	LR					
				Right		83	0.10	9.3	Α	2.8
		·		Left						
			SB	Through						
				Right						
				Overall Interse	ction		0.11	1.3	Α	
		•		Left						
			EB	Through	TR	116	0.11	0.0	Α	0.0
				Right		48	0.11	0.0	A	0.0
		·		Left		9	0.01	0.1	А	0.2
	1 Avenue & Nelson Street	Unsignalized	WB	Through	LT	127	0.01	0.6	A	0.2
103		Stop Control - NB		Right						
		Approach		Left		20	0.05	10.3	В	1.4
		-	NB	Through	LR					
				Right		13	0.05	10.3	В	1.4
			SB	Left						
				Through						
				Right						
				Overall Interse	ction		0.09	1.9	A	
				Left						
			EB	Through	TR	91	0.09	0.0	A	0.0
				Right		38	0.09	0.0	A	0.0
				Left		7	0.01	0.0	А	0.1
		Unsignalized	WB	Through	LT	100	0.01	0.5	A	0.1
104	Street	Stop Control - NB		Right						
	Olioot	Approach		Left		36	0.07	10.2	В	1.9
			NB	Through	LR					
				Right		12	0.07	10.2	В	1.9
				Left						
			SB	Through						
				Right						
				Overall Interse	ction		0.05	2.1	A	
				Left		12	0.01	0.1	A	0.2
			EB	Through	LT	95	0.01	0.9	A	0.2
				Right						
				Left						
	1 Avenue / 2	Unsignalized	WB	Through						
105	Avenue & 10	Yield Control - SB		Right						
	Street	Approach		Left		_	_	_		_
l			NB	Through	TR	75	0.05	0.0	A	0.0
				Right		4	0.05	0.0	A	0.0
				Left		0	-	-	-	-
			SB	Through	LR	-	_	_		
l				Right		41	0.05	9.2	A	1.3

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Interse	ction		0.07	4.3	A	
				Left		14	0.07	9.1	A	1.7
			EB	Through	LR				-	. =
				Right		40	0.07	9.1	A	1./
		Insignalized	\M/D	Lett						
106	8 Avenue &	Stop Control - EB	VVD	Pight					-	
100	Lakeshore Drive	Approach				27	0.02	0.2	Δ	0.5
		Approach	NB	Through	IT	39	0.02	3.1	A	0.5
				Right			0.01			0.0
				Left						
			SB	Through	TR	25	0.03	0.0	A	0.0
				Right		17	0.03	0.0	A	0.0
				Overall Interse	ction	-	0.21	6.6	A	
				Left		7	0.01	0.0	A	0.1
			EB	Through	LTR	61	0.01	0.6	A	0.1
				Right		29	0.01	0.6	A	0.1
		Lingiangling	WD	Left		37	0.03	0.2	A	0.7
107 8 Avenue & 1	8 Avenue & 10	Stop Control NR/SR	VVD	I nrougn Bight	LIR	55	0.03	2.7	A	0.7
107	Street	Approaches		Loft		17	0.03	2.7	R	0.7
		Approactics	NB	Through	I TR	52	0.21	11.4	B	6.3
			ne -	Right	2110	60	0.21	11.4	B	6.3
				Left		15	0.14	12.2	B	4.0
			SB	Through	LTR	51	0.14	12.2	В	4.0
				Right		5	0.14	12.2	В	4.0
				Overall Interse	ction	·	0.59	12.0	В	
				Left		319	0.27	2.9	A	8.7
			EB	Through	LTR	247	0.27	5.8	A	8.7
				Right		53	0.27	5.8	A	8.7
				Left		4	0.00	0.0	A	0.1
400	8 Avenue & 16	Unsignalized	WB	Through	LTR	110	0.00	0.3	A	0.1
108	Street	Approaches		Right		28	0.00	0.3	A	0.1
			NB	Through		32	0.59	77.7		22.5
			ND	Right	LIK	10	0.59	77.7	F	22.5
			SB	Left		27	0.03	30.1	D	19.1
				Through	LTR	8	0.47	30.1	D	19.1
				Right		74	0.47	30.1	D	19.1
				Overall Interse	ction		0.31	3.8	A	
				Left		119	0.12	1.4	A	3.2
			EB	Through	LT	422	0.12	2.9	A	3.2
				Right						
				Left						
	Highway 28 & 25	Unsignalized	WB	Through	TR	273	0.21	0.0	A	0.0
109	Street	Stop Control - SB		Right		30	0.21	0.0	A	0.0
		Approach	NB	Left						
			IND	Pight						
				Left		10	0.31	13.7	R	10.6
			SB	Through	IR	10	0.01	10.7		10.0
				Right		151	0.31	13.7	В	10.6
				Overall Interse	ction		0.12	1.8	A	
				Left		43	0.04	0.4	A	0.9
			EB	Through	LT	293	0.04	1.3	A	0.9
				Right						
				Left						
	Highway 55 & 28	Unsignalized	WB	Through	TR	150	0.12	0.0	A	0.0
110	Street/ English	Stop Control - SB		Right		23	0.12	0.0	A	0.0
	Bay Road	Approach		Left					ļ	
			NB	Ihrough						
				Right		20	0.40	10.6	P	26
			SR	Through	IP	32	0.10	13.0	L D	∠.0
			00	Right		7	0.10	13.6	R	26
L	L	1		Nyni	1	1	0.10	13.0	U U	2.0

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Intersed	ction		0.56	12.0	В	
				Left		145	-	-	-	-
			EB	Through	LT	31	0.43	15.0	В	29.8
				Right	R	149	0.24	3.3	A	8.5
				Left		133	-	-	-	-
	Highway 28 &		WB	Through	LTR	10	0.47	14.2	В	30.6
111	Highway 55 / 16	Signalized ¹		Right		51	-	-	-	-
	Avenue			Left	L	88	0.29	13.3	В	15.7
			NB	Through		345	0.56	15.4	В	50.0
				Right	R	118	0.20	3.2	A	7.3
			CD.	Len		45	0.17	11.6	В	9.0
			30	Bight		304	0.49	14.5		43.2
					rtion	75	0.13	2.0	A A	0.0
						17	0.04	2.0	Δ	0.3
			FB	Through	I TR	137	0.01	0.1	Δ	0.3
			LD	Right	EIIX	15	0.01	0.0	A	0.3
				Left		0	-	-	-	-
		Unsignalized	WB	Through	LTR	63	0.00	0.0	Α	0.0
112	16 Avenue & 16	Stop Control - NB/SB		Right		7	0.00	0.0	A	0.0
	Street	Approaches		Left		9	0.03	11.1	В	0.7
			NB	Through	LTR	5	0.03	11.1	В	0.7
				Right		0	-	-	-	-
				Left		12	0.04	10.1	В	1.0
			SB	Through	LTR	2	0.04	10.1	В	1.0
				Right		11	0.04	10.1	В	1.0
				Overall Intersed	ction	1	0.11	3.7	A	
				Left		8	0.01	0.1	A	0.2
			EB	Through	LIR	86	0.01	0.6	A	0.2
				Right		10	0.01	0.6	A	0.2
		Unsignalized	WB	Through	ITR	64	0.01	0.1	A	0.2
113	16 Avenue & 10	Stop Control - NB/SB	110	Right	LIK	34	0.01	0.9	A	0.2
	Street	Approaches		Left		6	0.04	10.3	B	0.9
			NB	Through	LTR	9	0.04	10.3	B	0.9
				Right		8	0.04	10.3	В	0.9
			SB	Left		38	0.11	10.8	В	2.9
				Through	LTR	11	0.11	10.8	В	2.9
				Right		16	0.11	10.8	В	2.9
				Overall Intersed	ction		0.70	12.6	В	
				Left		10	-	-	-	-
			EB	Through	LTR	10	0.09	12.5	В	7.1
				Right		10	-	-	-	-
	1.11 mb		W/D	Left		131	0.46	22.3	C	26.6
201	Righway 28 / 55	Oisse allian al 2	VVD	Inrough	IR	10	0.30	6.9	A	11.5
201		Signalized				10	-	-	-	-
	700633		NB	Through	IΤ	645	0.70	- 14.5	B	- #132.6
				Right	R	72	0.09	27	A	5.8
				Left		61	0.26	10.7	В	13.7
			SB	Through	L	526	0.57	10.8	B	88.4
				Right	TR	10	-	-	-	-
				Overall Intersed	ction	·	1.61	26.8	D	
				Left		0	-	-	-	-
			EB	Through	LTR	10	0.24	24.6	С	7.3
				Right		40	0.24	24.6	С	7.3
				Left		71	1.61	440.6	F	74.4
200	Highway 28 / 55	Unsignalized	WB	Through	LTR	10	1.61	440.6	F -	74.4
202	& 75 Avenue	Stop Control - EB/WB		Right		10	1.61	440.6	F	/4.4
		Approaches	NP	Lett		10	0.01	0.3	A	0.3
			IND	Right	LIK	20	0.01	0.4	A	0.3
			SB 1			20	0.01		A	0.3
				Through	LTR	657	0.00	0.0	A	0.0
				Right		10	0.00	0.0	A	0.0
5						-				

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Interse	ction	•	0.69	14.3	В	
				Left						
			EB	Through						
				Right	-	7	0.02	10.1	P	2.5
			WB	Through	L	1	0.02	10.1	D	3.3
203	Highway 28 / 55	Signalized ¹		Right	R	104	0.25	6.2	Α	10.7
	& 69 Avenue	5		Left						
			NB	Through	Т	644	0.69	14.8	В	102.4
				Right	R	26	0.03	3.4	A	3.2
			CD.	Left		118	0.50	17.3	В	27.1
			30	Right	I	000	0.69	15.0	Þ	103.8
				Overall Interse	ction		0.58	9.7	В	
				Left						
			EB	Through						
				Right						
				Left	L	83	0.30	18.9	В	17.6
204	Highway 28 / 55	Oissa alissa d <mark>2</mark>	WB	Through	P	10	0.04	0.0	^	2.0
204		Signalized			ĸ	10	0.04	0.0	A	3.0
	//00035		NB	Through	TR	659	0.58	10.3	В	#126.2
				Right		72	0.08	2.3	A	5.8
				Left		55	0.16	7.2	А	11.4
			SB	Through	LT	602	0.53	9.0	A	105.7
				Right						
				Overall Interse	ction		0.58	2.9	A	
			FB	Through						
			LD	Right						
				Left	L	37	0.58	106.5	F	20.2
	Highway 28 / 55 & 62 Avenue / 61 Avenue	Unsignalized	WB	Through						
205		Stop Control - WB		Right	R	8	0.03	15.9	С	0.7
		Approach		Left			. = .			
			NB	I hrough Bight	IR	723	0.54	0.0	A	0.0
			SB			9	0.04	0.0	Δ	0.0
				Through	LT	676	0.01	0.4	A	0.4
				Right				-		-
				Overall Intersed	ction	-	0.86	19.5	В	
				Left	L	51	0.16	20.2	С	14.0
			EB	Through	T	51	0.11	19.3	B	13.6
				Right	R	31	0.08	7.5	A	5./
			WB	Through	T	61	0.22	19.5	B	15.5
301	Highway 28 / 55	Signalized ¹		Right	R	153	0.34	8.5	A	16.9
	& 54 Avenue	U U		Left	L	31	0.15	9.1	Α	6.3
			NB	Through	TR	602	0.76	17.6	В	108.4
				Right		61	-	-	-	-
			CD.	Left		163	0.86	52.5	D	#57.3
			30	Right	IR		0.74	16.5	В	102.3
				Overall Interse	ction	01	3.35	849.3	F	_
				Left		30	2.25	812.5	F	72.3
			EB	Through	LTR	30	2.25	812.5	F	72.3
				Right		10	2.25	812.5	F	72.3
				Left	. ===	50	3.35	Error	F	Error
200	Highway 28 / 55	Unsignalized	WB	Through	LTR	30	3.35	Error	F	Error
302	& 52 Avenue			Right		55 70	3.35	Error	► ∧	Error
		Approacties	NB	Through	I TTR	615	0.09	1.1	A	∠.3 2.3
				Right	2.111	80	0.27	0.0	A	0.0
			SB T	Left		140	0.21	2.7	A	6.2
				Through	LTTR	510	0.21	2.8	A	6.2
				Right		40	0.20	0.0	A	0.0

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Interse	ction		0.76	14.3	В	
				Left	L	375	0.76	22.5	С	76.5
			EB	Through	Т	329	0.42	11.4	В	48.0
				Right	R [C]	135	0.19	2.3	A	7.1
				Left		9	-	-	-	-
000	Highway 28 / 55	o	WB	Through	LT	161	0.22	9.3	A	24.4
303	& 50 Avenue	Signalized -		Right	R[C]	155	0.21	2.2	A	7.5
			NB	Lett	2T	133	0.40	22.9		29.3
			ND	Right		162	0.23	10.8	B	22.0
				Left		116	0.01	23.5	C	33.1
			SB	Through	2T	232	0.28	17.6	B	26.7
				Right	R [C]	5	0.30	4.7	A	11.4
				Overall Intersed	ction	·	0.47	5.1	A	
				Left		16	0.02	0.2	A	0.5
			EB	Through	LTTR	486	0.20	0.4	A	0.5
				Right		50	0.20	0.0	A	0.0
				Left		98	0.12	1.4	A	3.2
204	Highway 28 / 55	Unsignalized	WB	Through	LTTR	523	0.21	1.8	A	3.2
304	& 52 Street			Right		42	0.21	0.0	A	0.0
		Approaches	NB	Through	ITD	23	0.47	32.2		10.7
			ND	Right	LIK	66	0.47	32.2	D	18.7
				Left		21	0.47	42.6	E	14.5
			SB	Through	LTR	8	0.41	42.6	E	14.5
				Right		27	0.41	42.6	E	14.5
				Overall Interse	ction		0.22	0.2	A	
				Left						
			EB	Through	2T	634	0.22	0.0	A	0.0
				Right						
				Left	_					
205	Highway 28 / 55	Unsignalized	WB	Through	2T	504	0.17	0.0	A	0.0
305	& 51 Street	Approach		Right	R [C]	23	0.02	0.0	A	0.0
			NB	Lett						
			ND	Right			-			
			SB	Left						
				Through						
				Right	R [C]	19	0.03	10.3	В	0.8
				Overall Intersed	ction		0.70	12.3	В	
				Left						
			EB	Through						
				Right						
				Left	L	239	0.43	16.3	В	44.6
	Highway 28 / 55		WB	Through						
306	& 50 Street	Signalized '		Right	R	144	0.25	4.0	A	9.9
			ND	Lett	<u>от</u>	202	0.00	10.4	D	00.0
			ND	Right	21 P	188	0.29	2.6		23.3
				Left	N N	215	0.20	2.0	-	- 0.2
			SB	Through	ITT	419	0 70	16.7	В	47.5
				Right			0.1.0		_	
				Overall Intersed	ction		0.22	1.0	А	
				Left	L	11	0.09	33.2	D	2.4
			EB	Through						
				Right	R	34	0.07	11.4	В	1.7
				Left						
0.07	Highway 28 / 55	Unsignalized	WB	Through		· · -	.		-	
307	& 46 Avenue	Stop Control - EB/WB		Right	R [C]	10	0.02	10.7	B	0.4
		Approaches	NP	Lett		33	0.05	0.6	A	1.2
			IND	Right		200	0.21	0.8	A	1.2
							U.21	0.0	A	0.0
			SB 1	Through	2T	649	0.22	0.0	Α	0.0
				Right	R	10	0.01	0.0	A	0.0
l										

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Interse	ction		0.38	9.9	A	
				Left	L	78	0.19	13.1	В	15.8
			EB	Through	TR	29	0.12	7.5	A	9.5
				Right		35	-	-	-	-
				Left	L	114	0.28	14.0	В	2.2
	Highway 28 / 55		WB	Through	Т	49	0.08	11.9	В	10.6
308	& 43 Avenue	Signalized ¹		Right	R	73	0.14	4.4	A	7.1
			ND	Left		19	0.05	8.9	A	4.2
			NB	Through	IIR	464	0.33	9.6	A	28.4
				Right		67	-	-	-	-
			SB.	Through	2T	137	0.38	14.2	B	23.0
			55	Pight	21 D	72	0.29	3.7	A	20.0
					rtion	12	0.10	4.2	Δ	5.0
			,				0.15	7.2		
			EB	Through						
				Right						
				Left		82	0.13	9.8	Α	3.5
	50 August 0 57	Unsignalized	WB	Through	LR					
309	52 Avenue & 57 Street (North)	Stop Control - WB		Right		13	0.13	9.8	A	3.5
	Sileet (Notiti)	Approach		Left						
			NB	Through	TR	31	0.08	0.0	A	0.0
				Right		82	0.08	0.0	A	0.0
				Left		9	0.01	0.1	A	0.2
			SB	Through	LT	20	0.01	2.4	A	0.2
				Right						
				Overall Interse	ction	10	0.07	2.5	A	
				Left		46	0.07	10.0	A	1.8
			ED	I nrougn Bight	LR	1	0.07	10.0	^	1 0
							0.07	10.0	A	1.0
		Unsignalized	WB	Through						
310	52 Avenue & 57	Stop Control - EB	NB	Right						
	Street (South)	Approach		Left		11	0.01	0.1	Α	0.2
			NB	Through	LT	66	0.01	1.1	A	0.2
				Right						
			SB	Left						
				Through	TR	46	0.07	0.0	A	0.0
				Right		55	0.07	0.0	A	0.0
				Overall Interse	ction	r	0.08	6.0	A	
				Left	. ===	2	0.00	0.0	A	0.0
			EB	Through	LTR	10	0.00	0.7	A	0.0
				Right		10	0.00	0.7	A	0.0
		Unsignalized	W/B	Lett	I TD	12	0.01	0.1	A	0.2
311	50 Avenue & 59	Ston Control - NB/SB	VD	Right	LIK	14	0.01	2.2	A	0.2
011	Street	Approaches		Left		22	0.01	9.5	Δ	2.2
		Approaction	NB	Through	I TR	22	0.00	9.5	A	2.2
				Right		19	0.08	9.5	A	2.2
				Left		6	0.02	9.6	A	0.5
			SB	Through	LTR	6	0.02	9.6	Α	0.5
				Right		1	0.02	9.6	A	0.5
				Overall Interse	ction		0.12	7.2	A	
				Left		22	0.02	0.1	A	0.4
			EB	Through	LTR	5	0.02	3.4	A	0.4
				Right		22	0.02	3.4	A	0.4
				Left	. ===	8	0.01	0.0	A	0.1
240	50 Avenue & 57	Unsignalized	WB	Ihrough	LIR	8	0.01	1.8	A	0.1
312	Street	Approaches		Right		18	0.01	1.8	A	0.1
		Approaches	NB	Through	ITD	37	0.12	10.4	B	3.4
			טאו	Right		37 8	0.12	10.4	R	3.4
				l eft		5	0.06	95	A	17
			SB	Through	LTR	21	0.06	9.5	A	1.7
			36	Right		21	0.06	9.5	A	1.7

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Interse	ction		0.26	2.3	A	
				Left		45	0.05	0.9	A	1.2
			EB	Through	LTR	775	0.05	1.3	A	1.2
				Right		17	0.05	1.3	A	1.2
				Left		1	0.00	0.0	A	0.0
	Centre Avenue &	Unsignalized	WB	Through	LTR	353	0.00	0.0	A	0.0
313	59 Street	Stop Control - NB/SB		Right		13	0.00	0.0	A	0.0
		Approaches		Left		5	0.13	32.7	D	3.6
			NB	Through	LTR	5	0.13	32.7	D	3.6
				Right		7	0.13	32.7	D	3.6
			0.0	Left	1.70	1/	0.26	44.5	E	7.9
			30	Inrougn	LIK	5	0.26	44.5	E	7.9
					otion	0	0.26	44.5		7.9
				Overall Interse		4.4	0.59	5.3	A	1.0
			ED	Lett		44	0.05	0.9	A	1.2
			ED	Bight	LIK	000 17	0.05	1.3	A	1.2
				Right		27	0.05	1.3	A	1.2
		Unsignalized	W/B	Through	1.7	37	0.06	0.0	A	1.0
314	Centre Avenue &	Stop Control - NB/SB	110	Right	R	32	0.00	0.0	Δ	0.0
011	57 Street	Approaches		Left		5	0.02	33.0	D	7.8
		Approactics	NB	Through	ITR	6	0.20	33.0	D	7.0
			NB	Right		27	0.20	33.0	D	7.0
				Left		26	0.20	81.7	F	22.5
			SB	Through	I TR	9	0.59	81.7	F	22.5
			02	Right	2110	17	0.59	81.7	F	22.5
				Overall Interse	ction		0.00	1.8	A	22.0
				Left			0.10			
			EB	Through	TR	143	0.13	0.0	Α	0.0
				Right		46	0.13	0.0	A	0.0
				Left		3	0.00	0.0	А	0.1
315	E4 A	Unsignalized	WB	Through	LT	114	0.00	0.2	A	0.1
	Street	Stop Control - NB		Right						
		Approach		Left		56	0.10	11.1	В	2.7
			NB	Through	LR					
				Right		1	0.10	11.1	В	2.7
			SB	Left						
				Through						
				Right						
				Overall Interse	ction		0.16	3.1	A	
				Left		71	0.07	0.7	A	1.8
			EB	Through	LTR	270	0.07	2.2	A	1.8
				Right		15	0.07	2.2	A	1.8
				Left		2	0.00	0.0	A	0.0
	50 Avenue & 53	Unsignalized	WB	Through	LTR	231	0.00	0.1	A	0.0
316	Street	Stop Control - NB/SB		Right		19	0.00	0.1	A	0.0
		Approach	ND	Left	1.70	14	0.09	18.2	C	2.3
			NB	Inrough	LIK	3	0.09	18.2	C	2.3
				Right		0	0.09	10.2		2.3
			CD.	Leit		21	0.16	15.9		4./
			30	Diabt	LIK	3	0.16	15.9	C	4.7
					otion	32	0.16	10.9		4.7
						10	0.45	12.0	D P	
			EB	Through	ITD	40	0.45	12.0	D	-
			ĽD	Right		<u>∠08</u>	0.45	12.0	P	-
					<u> </u>	20	0.40	14.0	P	-
		Unsignalized	WR	Through	I TR	178	0.30	11.1	B	-
317	50 Avenue & 52	Ston Control - All	uv	Right		1/0	0.30	11.1	B	-
517	Street	Annroaches				26	0.30	96	Δ	-
		1 pp vaules	NB	Through	ITR	31	0.15	9.0	Δ	-
				Right		24	0.15	9.6	A	_
				l eft	1	47	0.23	10.1	B	_
			SB 1	Through	LTR	35	0.23	10.1	B	-
				Right		48	0.23	10.1	B	-
L										

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Intersed	ction		0.47	11.2	В	
				Left		62	0.47	12.5	В	-
			EB	Through	LTR	211	0.47	12.5	В	-
				Right		19	0.47	12.5	В	-
				Left		8	0.33	10.6	В	-
24.0	50 Avenue & 51	Unsignalized	WB	Through	LIR	164	0.33	10.6	В	-
310	Street			Right		26	0.33	10.6	B	-
		Approaches	NB	Len	I TD	28	0.14	9.5	A	-
			ND	Pight	LIK	20	0.14	9.5	A	-
				Left		74	0.14	10.3	B	
			SB	Through	LTR	32	0.23	10.3	B	-
				Right		24	0.23	10.3	В	-
				Overall Intersed	ction		0.46	10.9	В	
				Left		0	-	-	-	-
			EB	Through	LTR	193	0.46	11.4	В	-
		Unsignalized		Right		114	0.46	11.4	В	-
		Ston Control -		Left		83	0.32	10.4	В	-
	50 Avenue & 50	EB/WB/NB	WB	Through	LTR	112	0.32	10.4	В	-
319	Street	Approaches		Right		0	-	-	-	-
		Assumed Yield Control		Left	. ===	83	0.31	10.4	В	-
		- SB Approach	NB	Through	LTR	0	-	-	-	-
				Right		109	0.31	10.4	В	-
			CD.	Left		0	-	-	-	-
			30	Inrough	LIR	0	-	-	-	-
					ation	0	-	-	-	-
						50	0.32	5.5	A	1 1
			FB	Through	I TR	253	0.04	1.5	Δ	1.1
			20	Right	LIIX	255	0.04	1.5	A	1.1
320				Left		23	0.02	0.2	A	0.5
		Unsignalized Stop Control - NB/SB Approaches	WB	Through	LTR	135	0.02	1.2	A	0.5
	Street			Right		29	0.02	1.2	A	0.5
				Left		10	0.19	15.5	С	5.5
			NB	Through	LTR	28	0.19	15.5	С	5.5
				Right		31	0.19	15.5	С	5.5
			SB	Left		40	0.32	17.6	С	10.9
				Through	LTR	23	0.32	17.6	C	10.9
				Right		53	0.32	17.6	C	10.9
				Overall Interse	ction		0.08	2.1	A	
			50	Left	1.70	34	0.03	0.3	A	0.7
			ED	Inrough	LIR	261	0.03	1.0	A	0.7
				Right		30	0.03	1.0	A	0.7
		Unsignalized	WB	Through	ITR	1/6	0.01	0.1	A	0.2
321	50 Avenue & 45	Stop Control - NB/SB	WB	Right	LIIX	4	0.01	0.4	A	0.2
02.	Street	Approaches		Left		14	0.08	13.6	B	2.1
			NB	Through	LTR	3	0.08	13.6	B	2.1
				Right	1	14	0.08	13.6	B	2.1
				Left		9	0.06	12.3	В	1.6
			SB	Through	LTR	4	0.06	12.3	В	1.6
				Right		15	0.06	12.3	В	1.6
				Overall Intersed	ction		0.08	2.9	A	
				Left		72	0.06	0.5	A	1.5
			EB	Through	LT	168	0.06	2.7	A	1.5
				Right						
				Left						
000	50 Avenue & 41	Unsignalized	WB	Through	TR	106	0.08	0.0	A	0.0
322	Street	Stop Control - SB		Right		8	0.08	0.0	A	0.0
		Approaches		Left						
			NB	Ihrough						
				Right			0.00	40.4	-	2.2
			SB	Leit	IP	14	0.08	10.4	В	۷.۷
				Diaht	LK	20	0.00	10.4	P	ე ე
				right		30	0.08	10.4	Þ	۷.۷

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Interse	ction		0.11	5.3	Α	
				Left		82	0.06	0.5	Α	1.5
			EB	Through	LT	69	0.06	4.3	A	1.5
				Right						
	50 Avenue / Twp			Left						
	Rd 630 &	Unsignalized	WB	Through	TR	26	0.03	0.0	A	0.0
323	"Baywood Road"	Stop Control - SB		Right		11	0.03	0.0	A	0.0
	/ RR 20	Approaches	ND	Left				-		
			IND	Inrough						
				Right		10	0.11	0.4	Λ	2.0
			SB	Through	IR	10	0.11	3.4	A	3.0
			02	Right	LIX	70	0.11	94	Δ	3.0
				Overall Intersed	ction	10	0.54	8.4	A	010
				Left						
			EB	Through	TR	657	0.54	9.4	Α	102.9
				Right		6	-	-	-	-
				Left	L	5	0.01	6.4	A	1.7
	Kingsway &		WB	Through	Т	268	0.22	5.8	A	31.5
401	Medley Road	Signalized ¹		Right						
				Left		16	0.11	10.9	В	8.0
			NB	Through	LR					
				Right		20	-	-	-	-
			SB.	Lett						
			30	Pight						
					∼tion		0.74	13.6	B	
						153	0.74	10.5	B	21.7
			EB	Through	Т	608	0.00	17.1	B	92.6
				Right			0.1.1		_	02.0
				Left						
402	Kingsway &	Signalized ¹	WB	Through	Т	261	0.32	9.4	Α	30.9
	Glenwood Drive (East)			Right	R [C]	107	0.15	2.0	A	5.4
				Left						
			NB	Through						
			SB	Right						
				Left		131	0.29	18.9	В	29.5
				Inrough	LR					
					ation	1	-	-	-	-
							0.51	0.4	A	
			FB	Through	TR	749	0.51	0.0	Δ	0.0
			20	Right		1	0.51	0.0	A	0.0
				Left	L	5	0.01	9.8	A	0.2
	Kingsway &	Unsignalized	WB	Through	T	257	0.18	0.0	A	0.0
403	Glenwood Drive	Stop Control - NB/SB		Right						
	(West)	Approaches		Left	L	6	0.04	20.6	С	1.1
			NB	Through						
				Right	R	11	0.04	20.6	С	1.1
			6 -	Left						
			SB	Through	_					
				Right	R	0	-	-	-	-
				Uverali Interse	ction	00	0.45	10.2	В	
			ED	Lett		20	0.05	9.7	A	4.4
			ED	Right	IK	10	0.45	13.4	В	37.0
					1	89	0.21	11.7	- B	- 11.2
			WB	Through	TR	161	0.21	11.7	B	25.7
404	Kingsway &	Signalized ¹		Right		49	-	-	-	-
	I imberline Drive	C.g. GILLOU		Left		6	-	-	-	-
			NB	Through	LT	5	0.02	9.3	A	3.0
				Right	R	161	0.27	3.1	A	8.1
				Left		51	-	-	-	-
			SB	Through	LTR	4	0.12	9.6	A	9.3
				Right		5	-	-	-	-

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Intersed	ction		0.26	8.7	A	
				Left		3	0.08	8.6	A	-
			EB	Through	LTR	45	0.08	8.6	A	-
				Right		0	-	-	-	-
				Left		24	0.23	8.8	A	-
	Kingeway 8	Unsignalized	WB	Through	LTR	61	0.23	8.8	A	-
405	Oueensway	Stop Control - All		Right		70	0.23	8.8	A	-
	Queensway	Approaches		Left		3	0.26	8.7	A	-
			NB	Through	LTR	57	0.26	8.7	A	-
				Right		127	0.26	8.7	A	-
				Left		89	0.16	8.8	A	-
			SB	Through	LTR	9	0.16	8.8	A	-
				Right		2	0.16	8.8	A	-
				Overall Intersed	ction		0.10	8.3	A	
				Left		14	0.10	9.9	A	2.8
			EB	Through	LTR	46	0.10	9.9	A	2.8
				Right		14	0.10	9.9	A	2.8
				Left		9	0.09	10.0	В	2.3
	Kingsway &	Unsignalized Stop Control - EB/WB Approaches	WB	Through	LTR	49	0.09	10.0	В	2.3
406	Tennis Court Road			Right		1	0.09	10.0	В	2.3
			NB	Left		24	0.02	0.1	A	0.4
				Through	LTR	7	0.02	4.0	A	0.4
				Right		13	0.02	4.0	A	0.4
				Left		0	-	-	-	-
			SB	Through	LTR	0	-	-	-	-
				Right		5	0.00	0.0	A	0.0
				Overall Intersed	ction		0.02	1.4	A	
				Left		1	0.00	0.0	A	0.0
			EB	Through	LTR	46	0.00	0.2	A	0.0
				Right		1	0.00	0.2	A	0.0
				Left		1	0.00	0.0	A	0.0
	Queensway &	Unsignalized	WB	Through	LTR	68	0.00	0.1	A	0.0
407	Tennis Court	Stop Control - EB/WB		Right		5	0.00	0.1	A	0.0
	Road	Approaches		Left		7	0.02	9.4	A	0.5
			NB	Through	LTR	3	0.02	9.4	A	0.5
				Right		5	0.02	9.4	A	0.5
			SB	Left		2	0.01	9.1	A	0.2
				Through	LTR	0	-	-	-	-
				Right		3	0.01	9.1	A	0.2

1. Assumed same timing plan as Highway 28 & 50 Avenue Timing Plan sent from City - August 31, 2010 2. Assume timing plan as per Timing Plan sent from City - August 31, 2010

Synchro Results - 2010 Horizon with Highway 28 Upgrades PHF = 0.86

101 1 Avenue & 28 Street English Bay Road Unsignalized Stop Control - ENG Approaches Overall intersection (English Bay Road) 0.13 (Figure 1) (Figure 1)	Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
101 1 Avenue & 25 Street / English Bay Road Left Stop Control - EAWS Approaches Left Right No 11 0.09 11.8 8 2.3 101 1 Avenue & 25 Street 1 Avenue & 25 Street Unsignation Stop Control - EAWS Approaches WB Through Through No 11 0.09 11.8 8 2.3 102 1 Avenue & 25 Street Stop Control - EAWS Stop Control - NB Approach NB Through Through ND 11 6.1 0.09 11.8 8 2.3 102 1 Avenue & 25 Street Stop Control - NB Approach NB Through Through ND 11 7.9 0.00 0.4 A 0.01 103 1 Avenue & 25 Street Stop Control - NB Approach NB Through Through ND 11 7.8 0.00 0.4 A 0.00 103 1 Avenue & 25 Street Unsignation Approach NB Through Through ND Through ND 11 7.8 A 2.8 103 1 Avenue & 16 Street Stop Control - NB Approach NB Through Through ND NB NB NB					Overall Inte	rsection		0.13	5.1	A	
1 Avenue & 28 Street / English Bay Road Lueignalized (Cortrol - EVR) Approaches/MA EB Through (LTR) LTR 27 0.09 11.8 8 2.3 101 1 Avenue & 28 Street / English Bay Road Unsignalized (Unsignalized Stop Cortrol - EVR) W8 Through (LTR) 11 0.01 10.5 8 37 102 1 Avenue & 25 Street Lueignalized (Unsignalized Stop Cortrol - NB Aproach Luft 6 0.01 0.0 A 0.01 A 2.01 0.01 A 1.02 A 2.23 A 2.23 A 2.23 A 2.23 A					Left		11	0.09	11.8	В	2.3
101 1 Avenue & 26 Street English Bay Road Uniposalized logs Control - EBWB Approaches WB Right Intender Ho				EB	Through	LTR	27	0.09	11.8	В	2.3
101 1 Avenue & 28 Street/ English Bay Road Unsignalized Stop Control - EMVIB Approaches WB Left Inrough Right 11 0.013 10.65 B 3.7 101 1 Avenue & 28 Street/ English Bay Road Unsignalized Stop Control - EMVIB NB Inrough Protoph 11 0.013 10.65 B 3.7 102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Interaction 0.000 0.04 A 0.01 102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Interaction 0.01 A.1 A 0.02 103 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Interaction 0.01 0.0 A 0.0 103 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Interaction 0.01 0.3 A 2.8 103 1 Avenue & NBston Stroet Unsignalized Stop Control - NB Approach Interaction 0.01 0.3 A 2.8 103 1 Avenue & NBston Stroet Unsignalized Stop Control - NB Approach Interaction 0.01<					Right		5	0.09	11.8	В	2.3
1 Avenue & 28 Street / English Bay Road Unsignalized spo Cortot - BAYB Approaches WB Through LTR 21 0.13 10.6 B 3.7 101 1 Avenue & 25 Street NB Laft 5 0.03 0.01 A 0.01 102 1 Avenue & 25 Street Unsignalized Unsignalized Stop Control - NB NB Laft 6 0.00 0.01 A 0.01 102 1 Avenue & 25 Street Unsignalized Unsignalized Stop Control - NB NB Through TR 81 0.06 A 0.06 102 1 Avenue & 25 Street Unsignalized Stop Control - NB NB Through TR 81 0.06 0.0 A 0.00 103 1 Avenue & 25 Street Unsignalized Stop Control - NB NB Through TR 81 0.05 3.6 A 1.3 103 1 Avenue & 25 Street Unsignalized Stop Control - NB NB Through TR 81 0.05 3.6 A 2.8 103 1 Avenue & Netson Stroet					Left		11	0.13	10.5	В	3.7
101 English Bay Road Slop Control - EAVIS Approaches Rapt Approaches 55 0.13 0.05 B 3.7 101 English Bay Road Slop Cantrol - Right Rapt 0.00 0.01 A 0.01 102 I Avenue & 25 Street Keight Rapt 10 11 10 0.00 0.04 A 0.05 102 I Avenue & 25 Street Keight Size Control - NB Approach Intersection 0.03 0.31 A 0.08 102 I Avenue & 25 Street Keight Size Control - NB Approach Intersection 0.01 A 0.00 A 0.00 103 I Avenue & 25 Street Unsignalized Size Control - NB Approach WB Intersection 0.01 A 0.02 103 I Avenue & 8 Nelson Street Unsignalized Approach WB Intersection 0.11 0.3 A 2.8 103 I Avenue & 16 Street Unsignalized Step Control - NB Approach WB Intersection 0.11 0.3 A 2.8 104 I Avenue		1 Avenue & 28 Street /	Unsignalized	WB	Through	LTR	21	0.13	10.5	В	3.7
Lagen Boy Links Approaches Left 6 0.00 0.0 A 0.1 102 1.4 enue & 25 Street NB Image in LR 78 0.00 0.4 A 0.1 102 1.4 venue & 25 Street Linsignalized Stop Control - NB Approach Image in LR 78 0.003 0.1 A 0.05 102 1.4 venue & 25 Street Linsignalized Stop Control - NB Approach Image in LR 1 0.06 0.00 A 0.00 103 1.4 venue & 25 Street Unsignalized Stop Control - NB Approach Image in LR Ima	101	English Bay Road	Stop Control - EB/WB		Right		55	0.13	10.5	В	3.7
102 1 Avenue & 16 Street Unsignalized Street Unsignalized Approach Unsignalized Stop Control - NB Approach Unsignalized Right			Approaches		Left		6	0.00	0.0	A	0.1
102 1 Avenue & 25 Street Unsignalized bio Control - NB Aproach Interface (Hermough) LTR 42 (Hermough) 0.03 (Hermough) 0.1 (Hermough) A (Hermough) A (Hermough) 0.03 (Hermough) 0.03 (Hermough) 0.03 (Hermough) 0.03 (Hermough) 0.03 (Hermough) 0.03 (Hermough) 0.03 (Hermough) 0.01 (Hermough) 0.01 (Herm				NB	Through	LTR	79	0.00	0.4	A	0.1
102 1 Avenue & 16 Street Unsignalized Unsignalized Stop Control - NB Approach SB (10) LTR (11) 422 (2) 0.03 (3) 0.3 (4) A (4) 0.8 (3) 102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Image (11) 0.10 4.11 A (4) 0.05 0.00 A (4) 0.00 103 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Image (11) 0.00 0.0 A (10) 0.05 0.4 A (10) 0.00 A (10) A (10) <td< td=""><td></td><td></td><td></td><td></td><td>Right</td><td></td><td>30</td><td>0.00</td><td>0.4</td><td>A</td><td>0.1</td></td<>					Right		30	0.00	0.4	A	0.1
102 1 Avenue & 16 Street 0.03 Right 1 Right Right 1 Right 1 Right Right 1 Right				CD	Left	1 70	42	0.03	0.3	A	0.8
102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach 0 				30	Through	LIK	62	0.03	3.1	A	0.8
102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Left NB 1 0.06 0.06 A 0.01 102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach WB Through NB 11 0.06 0.05 0.0 A 0.01 103 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach WB Through Through LR 0.05 3.6 A 1.3 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Approach Left 1 0.01 9.3 A 2.8 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Approach Left 1 0.01 9.3 A 2.8 104 1 Avenue & Nelson Street Unsignalized Stop Control - NB Approach Left 1 0.01 0.6 A 0.02 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Left 20 0.05 1.03 B 1.4 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Right <td></td> <td></td> <td></td> <td></td> <td>Right</td> <td>raaction</td> <td>5</td> <td>0.03</td> <td>3.1</td> <td>A</td> <td>0.8</td>					Right	raaction	5	0.03	3.1	A	0.8
102 1 Avenue & 25 Street Unsignalized Stop Control + NB Approach EB Image Trough (1) 11 0.06 0.00 A 0.00 102 1 Avenue & 25 Street Stop Control + NB Approach NB Image Trough LT 81 0.05 0.4 A 1.3 103 1 Avenue & 25 Street Stop Control + NB Approach NB Image Trough LT 81 0.05 0.4 A 1.3 103 1 Avenue & Nelson Street Unsignalized Stop Control + NB Approach Left 83 0.10 9.3 A 2.8 103 1 Avenue & Nelson Street Unsignalized Stop Control + NB Approach Right 48 0.11 0.0 A 0.02 104 1 Avenue & Nelson Street Unsignalized Stop Control + NB Approach NB Left 11 0.01 0.0 A 0.02 104 1 Avenue & 16 Street Unsignalized Stop Control + NB Approach NB Left 20 0.05 10.3 B 1.4 104 1 Avenue & 16 Street Unsignalized Stop					Uverali Inte	SECIION		0.10	4.1	A	
102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach 003 				FR	Through	TD	01	0.06	0.0	۸	0.0
102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach Unsignalized NB WB Imough Through LR 1 0.05 0.26 0.4 A 1.3 102 1 Avenue & 25 Street Stop Control - NB Approach NB Right 0.05 3.6 A 2.8 NB Through LR - - - - - NB Unsignalized Stop Control - NB Left 1 0.10 9.3 A 2.8 103 1 Avenue & Netion Street Unsignalized Stop Control - NB Left -				LD	Right	IN	11	0.00	0.0	Δ	0.0
102 1 Avenue & 25 Street Unsignalized Stop Control - NB Approach WB Through Right 1 0.06 3.6 A 1.3 103 1 Avenue & 25 Street Stop Control - NB Approach Left 1 0.10 9.3 A 2.8 103 1 Avenue & Nelson Street Versignalized Stop Control - NB Approach Versignalized Stop Control - NB Ap					Left		66	0.00	0.0	A .	1.3
102 1 Avenue & 25 Street Stop Control - NB Approach NB NB Column - 10 0.00 1.00 9.3 A 2.8 103 1 Avenue & 25 Street Stop Control - NB Approach NB Impough IR 0.10 9.3 A 2.8 103 1 Avenue & Netson Street Imaginalized Stop Control - NB Approach Imaginalized Stop Control - NB Approach Imaginalized Right 0.11 0.3 A 0.0 103 1 Avenue & Netson Street Imaginalized Stop Control - NB Approach Imaginalized Stop Control - NB Approach Imaginalized Right			Unsignalized	WB	Through	ΙT	81	0.05	3.6	A .	1.3
Image: Approach Left 1 0.10 9.3 A 2.8 NB Through B Through B	102	1 Avenue & 25 Street	Stop Control - NB		Right			0.00	0.0		
103 1 Avenue & Nelson Street Unsignalized Visignalized 104 Unsignalized 1 Avenue & 16 Street Unsignalized Visignalized Stop Control - NB Approach NB Trough Through Right NB Trough Right NB NB NB 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Approach Unsignalized Stop Control - NB Unsignalized Stop Control - NB Left 9 0.01 0.1 A 0.02 104 1 Avenue & Nelson Street Unsignalized Stop Control - NB Unsignalized Stop Control - NB Unsignalized Right Unsignalized Through NB 1 0.05 10.3 B 1.4 104 1 Avenue & 16 Street Unsignalized NB Unsignalized Stop Control - NB EB Infrough -			Approach		Left		1	0.10	9.3	Α	2.8
Image: street Unsignalized Street Right (1) 83 0.10 9.3 A 2.8 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Aproach Image: street 0.11 1.3 A 0.00 A 0.00 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Aproach Image: street 0.11 0.0 A 0.0 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Aproach Image: street Image: street 0.01 0.0 A 0.0 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Aproach Image: street Image: street Image: street Image: street Image: street 0.05 10.3 B 1.4 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Aproach Image: street Image: street Image: street Image: street 0.09 0.0 A 0.0 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Aproach Image: street Image: street Image: street 0.07 10.0 A				NB	Through	LR					
Image: heat of the section Left Image: heat of the section Image: heat of the se					Right		83	0.10	9.3	Α	2.8
103 1 Avenue & Nelson Street Unsignalized Sup Control - NB Approach SB Unsignalized Sup Control - NB Approach Image and Sup Control - Sup Control - NB Approach Image and Sup Control - Sup A Control - Sup Approach Image and Su					Left						
Image: heat of the section Image: heat of the section <th< td=""><td></td><td></td><td></td><td>SB</td><td>Through</td><td></td><td></td><td></td><td></td><td></td><td></td></th<>				SB	Through						
103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Approach Overall Intersection Right 0.11 1.3 A 103 1 Avenue & Nelson Street Unsignalized Stop Control - NB Approach Umsignalized NB Umsignal					Right						
103 1 Avenue & Nelson Street Unsignalized bio Control - NB Approach Left MB unsignalized Through Approach Left MB unsignalized Through Approach Left MB unsignalized Through Approach Unsignalized MB 104 1 Avenue & 16 Street Unsignalized MB Unsignalized MB Unsignalized Through					Overall Inte	rsection		0.11	1.3	A	
103 1 Avenue & Nelson Street Unsignalized top Control - NB Approach EB Through Right TH 116 0.11 0.0 A 0.0 103 1 Avenue & Nelson Street Unsignalized top Control - NB Approach Right 127 0.01 0.1 A 0.2 104 1 Avenue & 16 Street Street Street NB 1.4 0 0.5 10.3 B 1.4 104 1 Avenue & 16 Street Stop Control - NB Approach Right 13 0.05 10.3 B 1.4 104 1 Avenue & 16 Street Stop Control - NB Approach Left - <td></td> <td></td> <td></td> <td></td> <td>Left</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					Left						
103 1 Avenue & Nelson Street Unsignalized biop Control - NB Approach - </td <td></td> <td></td> <td></td> <td>EB</td> <td>Through</td> <td>TR</td> <td>116</td> <td>0.11</td> <td>0.0</td> <td>A</td> <td>0.0</td>				EB	Through	TR	116	0.11	0.0	A	0.0
103 1 Avenue & Nelson Street Unsignalized top Control - NB Approach WB Left 9 0.01 0.1 A 0.2 103 Street Mapproach WB Through LT 127 0.01 0.6 A 0.2 104 Approach MB Left 20 0.05 10.3 B 1.4 104 1 Avenue & 16 Street Street NB Left 10 10.3 B 1.4 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Verall Intersection 0.09 1.9 A 10					Right		48	0.11	0.0	A	0.0
1 Avenue & Nelson Street Unsignalized Stop Control - NB Approach WB Through Right L 127 0.01 0.6 A 0.2 103 Street Stop Control - NB Approach MB Through Right -					Left		9	0.01	0.1	A	0.2
103 Number of the street Stop Control - NB Approach Right Approach Left 20 0.05 10.3 B 1.4 104 1 Avenue & 16 Street NB Image of the street Image o	103	1 Avenue & Nelson	Unsignalized	WB	Through	LT	127	0.01	0.6	A	0.2
Left 20 0.05 10.3 B 1.4 NB Through LR		Street	Stop Control - NB Approach		Right						
104 1 Avenue & 16 Street Unsignalized Yield Control - NB 105 Unsignalized 104 Unsignalized 1 Avenue /2 Avenue & 105 Unsignalized 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach NB Through Left 12 0.05 2.1 A 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Unsignalized Stop Control - NB Verall Intersection 0.09 0.0 A 0.0 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Verall Intersection 0.05 2.1 A 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Verall Intersection 0.05 2.1 A 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 1 Avenue /2 Avenue & 10 Street Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 10 Street Yield Control - SB Approach Left 12 0.01 0.0 A 0.0 10<					Left		20	0.05	10.3	В	1.4
Image: Instance of the second secon				NB	Through	LR				-	
Image: Second state of the second state of				CD	Right		13	0.05	10.3	В	1.4
104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Unsignalized Stop Control - NB Approach Overall Intersection 0.09 1.9 A 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Unsignalized MB Inrough Through Through Approach TR 91 0.09 0.0 A 0.0 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach WB Through Through Approach T 0.01 0.0 A 0.0 105 1 Avenue /2 Avenue & 105 Through 10 Street Unsignalized Vield Control - SB Approach Unsignalized WB Unsignalized Through Coveral Intersection 0.05 2.1 A 105 1 Avenue /2 Avenue & 10 Street Unsignalized Vield Control - SB Approach Unsignalized VB Unsignalized Through Coveral Intersection 0.05 2.1 A 105 1 Avenue /2 Avenue & 10 Street Unsignalized Vield Control - SB Approach WB Through Through Coveral Intersection 0.05 2.1 A 105 1 Avenue /2 Avenue & 10 Street Unsignalized Vield Control - SB Approach WB Through Through Coveral Intersection					Left						
104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Unsignalized Stop Control - NB Approach Unsignalized Stop Control - NB Approach Unsignalized EB Unsignalized Through Left 0.09 1.9 A 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Unsignalized MB Unsignalized Through Left Unsignalized Through Left Unsignalized MB Unsignalized Through Left Unsignalized Through Left <td></td> <td></td> <td></td> <td>58</td> <td>Inrougn</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				58	Inrougn						
104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Left 0.09 1.9 A 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Unsignalized WB Left 7 0.01 0.0 A 0.0 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Vield Control - SB Approach WB Left 36 0.07 10.2 B 1.9 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach					Right			0.00	1.0	۸	
$104 \ 1 \ \text{Avenue \& 16 Street} \ 1 \ \text{Approach} \ 1 \ \text{Avenue \& 16 Street} \ 1 \ \text{Avenue \& 16 Street} \ 1 \ \text{Approach} \ 1 \ \text{Avenue \& 16 Street} \ 1 \ \text{Approach} \ 1 \ \text{Approach} \ 1 \ \text{Approach} \ 1 \ \text{Approach} \ 1 \ \text{Avenue \& 16 Street} \ 1 \ \text{Avenue \& 16 Street} \ 1 \ \text{Avenue \& 16 Street} \ 1 \ \text{Approach} \ 1 \ \text{Avenue \& 16 Street} \ 1 \ 1 \ \text{Avenue \& 16 Street} \ 1 \ 1 \ \text{Avenue \& 16 Street} \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ $					Overall Inte	section		0.09	1.9	A	
104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach NB Right Imough Left 7 7 0.01 0.01 0.0 0.0 A 0.0 0.0 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach WB Through Imough NB LT 100 0.01 0.0 A 0.1 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach VB Left 36 0.07 10.2 B 1.9 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach NB Left 10 - - - 105 1 Avenue /2 Avenue & 10 Street NB EB Left - - - NB Through				FR	Through	TP	01	0.00	0.0	۸	0.0
104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach Usignalized WB WB Left 7 0.01 0.0 A 0.1 104 1 Avenue & 16 Street Unsignalized Stop Control - NB Approach WB Left 7 0.01 0.0 A 0.1 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach WB Left 36 0.07 10.2 B 1.9 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Unsignalized Yield Control - SB Approach Unsignalized Yield Control - SB Approach WB Unsignalized Through 12 0.01 0.1 A 0.2 NB Unsignalized Yield Control - SB Approach WB Unsignalized Through Left 12 0.01 0.1 A 0.2 NB Through Left 12 0.01 0.9 A 0.2 Right Left 12 0.01 0.9 A 0.2 Right Left 10 10				LD	Right		31	0.09	0.0	Δ	0.0
Unsignalized Stop Control - NB Approach WB Image Through LT 100 0.01 0.03 A 0.1 104 1 Avenue & 16 Street Stop Control - NB Approach WB Image Through LEft 36 0.07 10.2 B 1.9 105 1 Avenue & 16 Street NB Left 36 0.07 10.2 B 1.9 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach MB Left 12 0.07 10.2 B 1.9 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach MB Left 12 0.01 0.1 A 0.2 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 1 Avenue /2 Avenue & 10 Street Unsignalized Yield Control - SB Approach NB Left 12 0.01 0.1 A 0.2 105 10 Street Yield Control - SB Approach NB					Left		7	0.05	0.0	Δ	0.0
104 1 Avenue & 16 Street Stop Control - NB Approach Right 100 000 110 110 000 110 000 110 000 110 000 110 000 110 000 110 000 110 000 <td></td> <td></td> <td>Unsignalized</td> <td>WB</td> <td>Through</td> <td>IT</td> <td>100</td> <td>0.01</td> <td>0.5</td> <td>A</td> <td>0.1</td>			Unsignalized	WB	Through	IT	100	0.01	0.5	A	0.1
1 Approach Left 36 0.07 10.2 B 1.9 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach MB Left 12 0.07 10.2 B 1.9 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 12 0.01 0.9 A 0.2 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 1	104	1 Avenue & 16 Street	Stop Control - NB		Right						
NB Through LR NO NO Right 12 0.07 10.2 B 1.9 NB Right 12 0.07 10.2 B 1.9 SB Through Image: SB Through Image: SB <			Approach		Left		36	0.07	10.2	В	1.9
Instruction Unsignalized Yield Control - SB Approach Unsignalized WB WB Instruction Intersection Intersection Intersection <th< td=""><td></td><td></td><td></td><td>NB</td><td>Through</td><td>LR</td><td></td><td></td><td></td><td></td><td></td></th<>				NB	Through	LR					
105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Unsignalized Yield Control - SB Approach Left Left 12 0.01 0.1 A 0.2 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach WB Left 12 0.01 0.1 A 0.2 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach WB Left 1 1 0.01 0.9 A 0.2 Right Left 1					Right		12	0.07	10.2	В	1.9
105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Unsignalized WB Through Left 12 0.01 0.1 A 0.2 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach WB Left 12 0.01 0.9 A 0.2 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach WB Left					Left						
Image: Note of the section Right Image: Note of the section				SB	Through						
105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Overall Intersection 0.05 2.1 A 105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 10 Street Unsignalized Yield Control - SB Approach Left 10					Right						
105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach Left 12 0.01 0.1 A 0.2 105 10 Street Unsignalized Yield Control - SB Approach WB EB Left 0 0 0.9 A 0.2 105 10 Street Yield Control - SB Approach WB Through 0 <					Overall Inte	rsection		0.05	2.1	A	
Instantian Instantized Network Instantized Street Instantized Network Instantite Network Instantite Network <thi< td=""><td></td><td></td><td></td><td></td><td>Left</td><td></td><td>12</td><td>0.01</td><td>0.1</td><td>A</td><td>0.2</td></thi<>					Left		12	0.01	0.1	A	0.2
Instruction Instruction Instruction Right Instruction Instruction <th< td=""><td></td><td></td><td></td><td>EB</td><td>Through</td><td>LT</td><td>95</td><td>0.01</td><td>0.9</td><td>A</td><td>0.2</td></th<>				EB	Through	LT	95	0.01	0.9	A	0.2
105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach WB Left Image: Control - SB Right Me Image: Control - SB Right Image: Control - SB Riter -					Right						
105 1 Avenue / 2 Avenue & 10 Street Unsignalized Yield Control - SB Approach WB Inrough			Linear Provid	14/5	Left						
10 Street 10 Street ried control - SB Approach Right Left Image: Control - SB Right Control - SB	105	1 Avenue / 2 Avenue &	Unsignalized	VV B	Through			-			
Approach Left Constraint	105	10 Street	Yield Control - SB	-	Right						
Incougn IK 75 0.05 0.0 A 0.0 Right 4 0.05 0.0 A 0.0 Left 0 - - - - SB Through LR - - - Right 41 0.05 9.2 A 1.3			Approach	ND	Lett	T0	75	0.05	0.0	^	0.0
Ngin 4 0.05 0.0 A 0.0 Left 0 - - - - - SB Through LR - - - - - Right 41 0.05 9.2 A 13 - -				NB	Pight	IK	/5	0.05	0.0	A	0.0
SB Through LR Image: Constraint of the second s				F			4	0.05	0.0	A _	0.0
				SB	Through	I R	U U	-	-	-	-
					Right		41	0.05	92	Α	13

Synchro Results - 2010 Horizon with Highway 28 Upgrades PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.07	4.3	A	
				Left		14	0.07	9.1	A	1.7
			EB	Through	LR					
				Right		40	0.07	9.1	A	1.7
				Left						
	8 Avenue & Lakeshore	Unsignalized	WB	Through						
106	Drive	Stop Control - EB		Right						÷
		Approach	ND	Left		27	0.02	0.2	A	0.5
			NB	Through	LI	39	0.02	3.1	A	0.5
				Right						
			SB	Through	TD	25	0.02	0.0	^	0.0
			0D	Pight		17	0.03	0.0	A	0.0
				Overall Inte	rsection	17	0.03	6.5	Δ	0.0
				Left	00000011	7	0.20	0.0	A	0.1
			EB	Through	LT	61	0.01	0.8	A	0.1
				Right	R	29	0.02	0.0	A	0.0
				Left		37	0.03	0.2	A	0.7
		Unsignalized	WB	Through	LTR	55	0.03	2.7	A	0.7
107	8 Avenue & 10 Street	Stop Control - NB/SB Approaches		Right		17	0.03	2.7	Α	0.7
				Left		17	0.20	11.2	В	6.1
			NB	Through	LTR	52	0.20	11.2	В	6.1
				Right		60	0.20	11.2	В	6.1
				Left		15	0.14	12.2	В	3.9
			SB	Through	LTR	51	0.14	12.2	В	3.9
				Right		5	0.14	12.2	В	3.9
				Overall Inte	rsection		0.79	14.9	B	
			50	Left	L	319	0.79	27.5	C	#73.5
			EB	Ihrough	IIR	247	0.25	8.5	A	18.1
108				Right		53	-	-	-	-
			W/B	Through	L	4	0.01	9.2	A	0.1
	8 Avenue & 16 Street	Signalized ¹	WB	Pight	TIK	28	0.12	7.0	A	9.1
100		Orginalized		Left		32	-	-	-	-
			NB	Through	LTR	18	0.12	12.0	В	10.0
				Right		4	-	-	-	-
			SB	Left		27	-	-	-	-
				Through	LTR	8	0.22	6.6	A	10.7
				Right		74	-	-	-	-
				Overall Inte	rsection		0.25	2.9	A	
				Left	L	119	0.12	8.5	A	3.2
			EB	Through	2T	422	0.14	0.0	A	0.0
				Right						
				Left						
400	1151 00 0 05 Oto 1	Unsignalized	WB	Through	21	273	0.09	0.0	A	0.0
109	Highway 28 & 25 Street	Stop Control - SB		Right	ĸ	30	0.02	0.0	A	0.0
		Approach	NB	Left						
			IND	Picht						
						10	0.25	11.5	P	80
			SB	Through	I R	10	0.20	11.3		0.0
			55	Right		151	0.25	11.5	R	8.0
				Overall Inte	rsection	101	0.12	1.8	A	0.0
				Left		43	0.04	0.4	A	0.9
			EB	Through	LT	293	0.04	1.3	A	0.9
				Right						
				Left						
	Highway 55 & 28 Stract/	Unsignalized	WB	Through	TR	150	0.12	0.0	A	0.0
110	English Ray Road	Stop Control - SB		Right		23	0.12	0.0	A	0.0
	English bay rodu	Approach		Left						
			NB	Through						
				Right		<u></u>	.	15 -	-	
			SB	Left		32	0.10	13.6	В	2.6
				Through	LR	_	<u></u>	46.5		
				Right		1	0.10	13.6	В	2.6
Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
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				Overall Inte	rsection		0.42	18.1	В	-
				Left	L	145	0.32	15.6	В	28.3
			EB	Through	Т	31	0.10	25.5	С	11.6
				Right	R	149	0.40	8.2	A	14.1
				Left	L	133	0.31	17.5	В	26.3
	Highway 28 & Highway		WB	Through	Т	10	0.03	24.8	С	5.7
111		Signalized ²		Right	R	51	0.15	9.1	A	8.7
	337 10 Avenue			Left	2L	88	0.27	29.7	С	13.1
			NB	Through	2T	345	0.42	21.9	С	36.0
				Right	R	118	0.27	6.0	A	11.0
				Left	L	45	0.27	31.8	С	15.8
			SB	Through	2T	304	0.41	22.9	С	31.4
				Right	R	75	0.20	6.7	A	9.0
				Overall Inte	rsection		0.04	2.0	A	
				Left	. ===	17	0.01	0.1	A	0.3
			EB	Through	LTR	137	0.01	0.8	A	0.3
				Right		15	0.01	0.8	A	0.3
		Lineinnelined		Left	1.70	0	-	-	-	-
440	AC Average 8 AC Chroat	Unsignalized	VV B	Inrougn	LIK	63	0.00	0.0	A	0.0
112	To Avenue & To Street	Stop Control - NB/SB		Right		/	0.00	0.0	A	0.0
		Approacties	NB	Through	I TD	9	0.03	11.1	D D	0.7
			IND	Bight	LIK	5	0.03	11.1	D	0.7
						12	-	- 10.1	- P	1.0
			SB	Through	I TR	2	0.04	10.1	B	1.0
			02	Pight	LIIX	11	0.04	10.1	B	1.0
				Overall Inte	rsection	11	0.04	3.7	Δ	1.0
				L eft	00001011	8	0.11	0.1	A	0.2
			FB	Through	I TR	86	0.01	0.6	A	0.2
			20	Right	LIII	10	0.01	0.6	A	0.2
				Left		13	0.01	0.1	A	0.2
		Unsignalized	WB	Through	LTR	64	0.01	0.9	A	0.2
113	16 Avenue & 10 Street	Stop Control - NB/SB		Right		34	0.01	0.9	A	0.2
		Approaches		Left		6	0.04	10.3	В	0.9
			NB	Through	LTR	9	0.04	10.3	В	0.9
				Right		8	0.04	10.3	В	0.9
				Left		38	0.11	10.8	В	2.9
			SB	Through	LTR	11	0.11	10.8	В	2.9
				Right		16	0.11	10.8	В	2.9
				Overall Inte	rsection		0.59	14.2	В	-
				Left		10	-	-	-	-
			EB	Through	LTR	10	0.09	14.0	В	7.7
				Right		10	-	-	-	-
				Left	LT	131	0.49	24.1	C	30.7
004	Highway 28 / 55 &	01	VVB	Through	ĸ	10	0.26	5.7	A	9.6
201	Energy Centre Access	Signalized		Right		111	-	-	-	-
			NP	Lett	 2T	10	0.03	17.8	A	2.5
			ND	Picht	∠ I P	72	0.39	5.4	D ^	76
				Left		61	0.14	72	A .	1.0
			SB	Through	2T	526	0.17	11.6	R	43.7
			00	Right	R	10	0.00	6.9	A	29
				Overall Inte	rsection	10	1.00	10.2	B	
				Left		0	-	-	-	-
			EB	Through	LTR	10	0.20	20.4	С	5.8
				Riaht		40	0.20	20.4	Č	5.8
				Left		71	1.00	161.2	F	50.2
	Highwoy 20 / FE 9 75	Unsignalized	WB	Through	LTR	10	1.00	161.2	F	50.2
202	⊓ignway 28 / 55 & 75	Stop Control - EB/WB		Right		10	1.00	161.2	F	50.2
	Avenue	Approaches		Left	L	10	0.01	9.5	А	0.3
			NB	Through	2T	717	0.25	0.0	А	0.0
				Right	R	20	0.01	0.0	A	0.0
				Left	L	0	-	-	-	-
			SB	Through	2T	657	0.22	0.0	A	0.0
1		1		Right	R	10	0.01	0.0	Α	0.0

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.47	10.1	В	-
				Left						
			EB	Through						
				Right		_			_	
			14/5	Left	L	7	0.02	18.6	В	3.6
202	Highway 28 / 55 & 69	Signalized ²	VV B	I hrough Diabt	D	104	0.20	6.9	Δ	10.1
203	Avenue	-		Right	ĸ	104	0.30	0.8	A	10.1
			NB	Through	2Т	644	0.47	15.3	R	10.1
			ND	Right	R	26	0.47	5.9	A	43.4
				Left	L	118	0.28	6.0	A	10.4
			SB	Through	2T	650	0.34	6.4	A	28.1
				Right				-		
				Overall Inte	rsection		0.29	8.3	A	
				Left						
			EB	Through						
				Right						
				Left	L	83	0.28	19.8	В	20.5
	Highway 28 / 55 & Tri-	Signalized ²	WB	Through						
204	City Mall Access	eignalizea		Right	R	10	0.04	11.2	В	3.5
				Left						
			NB	Through	THR	659	0.29	9.9	A	32.6
				Right		/2	-	-	-	-
			CD	Left		55	0.13	4.9	A	5.6
			36	Diabt	21	002	0.20	5.0	A	20.4
					rsection		0.27	1.0	Δ	
					136011011		0.27	1.0	A	
			FB	Through						
			20	Right						
				Left	L	37	0.27	36.2	E	8.4
		Unsignalized	WB	Through					_	
205	Highway 28 / 55 & 62	Stop Control - WB		Right	R	8	0.02	11.4	В	0.4
	Avenue / 61 Avenue	Approach		Left						
			NB	Through	2T	723	0.25	0.0	A	0.0
				Right	R	70	0.05	0.0	A	0.0
				Left	L	9	0.01	10.1	В	0.4
			SB	Through	2T	676	0.23	0.0	A	0.0
				Right						
				Overall Inte	rsection		0.67	20.6	С	
				Left	L	51	0.14	15.9	В	12.7
			EB	Through	1	51	0.15	25.3	C	16.8
				Right	R	31	0.10	9.4	A	6.5
			\//P	Lett		71	0.18	15.7	В	16.5
201	Highway 28 / 55 & 54	Signalized ²	VVD	Through Diabt	I D	152	0.15	23.7		19.0
301	Avenue				71	100	0.34	0.∠ 21.2	A C	12.7
			NB	Through	2T	602	0.15	26.1	C C	80.0
				Right	R	61	0.14	68	A	91
				Left	.`. L	163	0.46	25.1	c	44.7
			SB	Through	2T	581	0.53	19.8	B	84.1
				Right	R	61	-	-	-	-
				Overall Inte	rsection	-	3.35	849.3	F	
				Left		30	2.25	812.5	F	72.3
			EB	Through	LTR	30	2.25	812.5	F	72.3
				Right		10	2.25	812.5	F	72.3
				Left		50	3.35	Error	F	Error
	Highway 28 / 55 & 52	Unsignalized	WB	Through	LTR	30	3.35	Error	F	Error
302	Avenue	Stop Control - EB/WB		Right		55	3.35	Error	F	Error
	Avonuo	Approaches		Left		70	0.09	1.1	A	2.3
			NB	Through	LTTR	615	0.27	1.3	A	2.3
				Right		80	0.27	0.0	A	0.0
			00	Left	1770	140	0.21	2.7	A	6.2
			28	I nrougn Diabt	LIIK	510	0.21	2.8	A	6.2
1	1	1	1	r.igni		40	0.20	0.0	A	0.0

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection	•	0.76	14.3	В	
				Left	L	375	0.76	22.5	С	76.5
			EB	Through	Т	329	0.42	11.4	В	48.0
				Right	R [C]	135	0.19	2.3	A	7.1
				Left		9	-	-	-	-
	Highwoy 28 / 55 8 50		WB	Through	LT	161	0.22	9.3	A	24.4
303		Signalized ³		Right	R [C]	155	0.21	2.2	A	7.5
	Avenue			Left	L	133	0.40	22.9	С	29.3
			NB	Through	2T	275	0.23	17.3	В	22.8
				Right	R [C]	162	0.01	10.8	В	2.3
				Left	L	116	0.44	23.5	С	33.1
			SB	Through	2T	232	0.28	17.6	В	26.7
				Right	R [C]	5	0.30	4.7	A	11.4
				Overall Inte	rsection		0.47	5.1	A	
				Left		16	0.02	0.2	A	0.5
			EB	Through	LTTR	486	0.20	0.4	A	0.5
				Right		50	0.20	0.0	A	0.0
				Left		98	0.12	1.4	A	3.2
	Highway 28 / 55 & 52	Unsignalized	WB	Through	LTTR	523	0.21	1.8	A	3.2
304	Street	Stop Control - NB/SB		Right		42	0.21	0.0	A	0.0
		Approaches		Left		23	0.47	32.2	D	18.7
			NB	Through	LTR	10	0.47	32.2	D	18.7
				Right		66	0.47	32.2	D	18.7
			0.5	Left	1.75	21	0.41	42.6	E	14.5
			5B	Through	LIR	8	0.41	42.6	E	14.5
				Right		27	0.41	42.6	E	14.5
				Overall Inte	rsection		0.22	0.2	A	
			55	Left	-					
			EB	Through	21	634	0.22	0.0	A	0.0
				Right						
		Lister Bard	14/15	Left	٥Ŧ	= 0 1				
0.05	Highway 28 / 55 & 51	Unsignalized	WB	Through	21	504	0.17	0.0	A	0.0
305	Street	Stop Control - SB		Right	R [C]	23	0.02	0.0	A	0.0
		Approach	ND	Lett						
			IND	Through Diabh						
				Right						
			C D	Leit						
			30	Diaht		10	0.02	10.2	Р	0.0
				Overall Inte	reaction	19	0.03	10.3	D	0.0
					Section		0.70	12.3	D	
			FR	Through						
			LD	Pight						
				Left	-	230	0.43	16.3	R	44.6
			WB	Through	<u> </u>	233	0.45	10.5		0
306	Highway 28 / 55 & 50	Signalized ³	110	Right	R	144	0.25	4.0	Δ	9.9
	Street	Gignalized		Left	n n		0.20			
			NB	Through	2T	383	0.29	10.4	В	23.3
				Right	R	188	0.28	2.6	A	8.2
				Left		215	-	-	-	-
			SB	Through	LTT	419	0.70	16.7	В	47.5
			_	Right						
				Overall Inte	rsection		0.22	1.0	Α	
				Left	L	11	0.09	33.2	D	2.4
			EB	Through						
				Right	R	34	0.07	11.4	В	1.7
				Left						
	Highwoy 20 / 55 9 40	Unsignalized	WB	Through						
307		Stop Control - EB/WB		Right	R [C]	10	0.02	10.7	В	0.4
	Avenue	Approaches		Left		33	0.05	0.6	А	1.2
			NB	Through	LTTR [C]	550	0.21	0.8	А	1.2
				Right		32	0.21	0.0	A	0.0
				Left						
			SB	Through	2T	649	0.22	0.0	A	0.0
I	1			Right	R	10	0.01	0.0	A	0.0

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.38	9.9	А	
				Left	L	78	0.19	13.1	В	15.8
			EB	Through	TR	29	0.12	7.5	A	9.5
				Right		35	-	-	-	-
				Left	L	114	0.28	14.0	В	2.2
	Highway 28 / 55 & 43		WB	Through	Т	49	0.08	11.9	В	10.6
308	Avenue	Signalized ³		Right	R	73	0.14	4.4	A	7.1
	, tronuo			Left	L	19	0.05	8.9	A	4.2
			NB	Through	TTR	464	0.33	9.6	A	28.4
				Right		67	-	-	-	-
			0.0	Left	L	137	0.38	14.2	В	23.0
			28	Inrougn	21	474	0.29	9.7	A	26.0
				Right	K	12	0.10	2.8	A	5.0
				Overall Inte	section		0.13	4.2	A	
			ED	Through						
			ED	Pight						
				Left		82	0.13	9.8	Δ	35
		Unsignalized	WB	Through	IR	02	0.15	5.0		0.0
309	52 Avenue & 57 Street	Stop Control - WB		Right	LIX	13	0 13	9.8	Α	3.5
	(North)	Approach		Left		10	0.10	0.0		0.0
		11	NB	Through	TR	31	0.08	0.0	Α	0.0
				Right		82	0.08	0.0	Α	0.0
				Left		9	0.01	0.1	Α	0.2
			SB	Through	LT	20	0.01	2.4	A	0.2
				Right						
				Overall Inte	rsection		0.07	2.5	Α	
				Left		46	0.07	10.0	Α	1.8
			EB	Through	LR					
				Right		1	0.07	10.0	A	1.8
				Left						
	52 Avenue & 57 Street	Unsignalized	WB	Through						
310	(South)	Stop Control - EB		Right						
	(ooun)	Approach		Left		11	0.01	0.1	A	0.2
			NB	Through	LT	66	0.01	1.1	A	0.2
				Right						
			0.0	Lett	тр	40	0.07	0.0	^	0.0
			30	Diabt	IK	40	0.07	0.0	A	0.0
				Overall Inte	reaction	55	0.07	0.0	A	0.0
					36011011	2	0.08	0.0	A	0.0
			FB	Through	ITP	10	0.00	0.0	A	0.0
			LD	Right	LIN	10	0.00	0.7	A	0.0
				Left		12	0.00	0.1	A	0.0
		Unsignalized	WB	Through	I TR	14	0.01	22	A	0.2
311	50 Avenue & 59 Street	Stop Control - NB/SB		Right		14	0.01	2.2	A	0.2
		Approaches		Left		22	0.08	9.5	A	2.2
			NB	Through	LTR	22	0.08	9.5	A	2.2
				Right		19	0.08	9.5	A	2.2
				Left		6	0.02	9.6	A	0.5
			SB	Through	LTR	6	0.02	9.6	A	0.5
	<u> </u>	<u> </u>		Right		1	0.02	9.6	A	0.5
				Overall Inte	rsection		0.12	7.2	A	
			_	Left		22	0.02	0.1	A	0.4
			EB	Through	LTR	5	0.02	3.4	A	0.4
				Right		22	0.02	3.4	A	0.4
		Lineine - Point		Left	1.70	8	0.01	0.0	A	0.1
240		Unsignalized	WB	Ihrough	LIR	8	0.01	1.8	A	0.1
312	50 Avenue & 57 Street	Stop Control - NB/SB		Right		18	0.01	1.8	A	0.1
		Approaches		Lett		31	0.12	10.4	B	3.4
			IND	Right	LIK	3/ 8	0.12	10.4	B	3.4 3.4
						5	0.12	9.5	Δ	17
			SB	Through	I TR	21	0.06	9.5	A	17
				Right		21	0.06	9.5	A	1.7

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.26	2.3	A	
				Left		45	0.05	0.9	A	1.2
			EB	Through	LTR	775	0.05	1.3	A	1.2
				Right		17	0.05	1.3	A	1.2
				Left		1	0.00	0.0	A	0.0
	Centre Avenue & 59	Unsignalized	WB	Through	LTR	353	0.00	0.0	A	0.0
313	Street	Stop Control - NB/SB		Right		13	0.00	0.0	A	0.0
	Olicci	Approaches		Left		5	0.13	32.7	D	3.6
			NB	Through	LTR	5	0.13	32.7	D	3.6
				Right		7	0.13	32.7	D	3.6
				Left		17	0.26	44.5	E	7.9
			SB	Through	LTR	5	0.26	44.5	E	7.9
				Right		6	0.26	44.5	E	7.9
				Overall Inte	rsection		0.59	5.3	A	
				Left		44	0.05	0.9	A	1.2
			EB	Through	LTR	808	0.05	1.3	A	1.2
				Right		17	0.05	1.3	A	1.2
				Left		37	0.06	0.8	A	1.6
	Centre Avenue & 57	Unsignalized	WB	Through	LT	351	0.06	1.8	A	1.6
314	Street	Stop Control - NB/SB		Right	R	32	0.02	0.0	A	0.0
		Approaches		Left		5	0.26	33.0	D	7.8
			NB	Through	LTR	6	0.26	33.0	D	7.8
				Right		27	0.26	33.0	D	7.8
				Left		26	0.59	81.7	F	22.5
			SB	Through	LTR	9	0.59	81.7	F	22.5
				Right		17	0.59	81.7	F	22.5
				Overall Inte	rsection		0.13	1.8	A	
				Left						
			EB	Through	TR	143	0.13	0.0	A	0.0
				Right		46	0.13	0.0	A	0.0
			14/5	Left		3	0.00	0.0	A	0.1
a. 1 =		Unsignalized	WB	Through	LT	114	0.00	0.2	A	0.1
315	54 Avenue & 51 Street	Stop Control - NB		Right		= 0				<u>.</u>
		Approach	ND	Left	1.5	56	0.10	11.1	В	2.7
			INB	Inrougn	LR		0.40			07
				Right		1	0.10	11.1	В	2.7
			C D	Leit						
			30	Diaht		-				
					reaction		0.16	2.1	۸	
				Overall little	Section	71	0.16	3.1	A	1.0
			EB	Through	I TD	270	0.07	0.7	A	1.0
			LD	Pight	LIN	15	0.07	2.2	A	1.0
				Loft		10	0.07	2.2	A	1.0
		Unsignalized	WB	Through	ITR	231	0.00	0.0	Δ	0.0
316	50 Avenue & 53 Street	Stop Control - NR/SR		Right	LIN	10	0.00	0.1	Δ	0.0
010		Approach				14	0.00	18.2	ĉ	23
		, , , , , , , , , , , , , , , , , , , ,	NB	Through	I TR	3	0.09	18.2	<u>с</u>	2.3
				Right		6	0.09	18.2	c C	2.3
				Left	-	21	0.16	15.9		4 7
			SB	Through	LTR	3	0.16	15.9		47
				Right	_//\	32	0.16	15.9	C	47
	1	1	Ì	Overall Inte	rsection	- JL	0.45	11.1	B	
				Left		48	0.45	12.0	B	-
			EB	Through	LTR	208	0.45	12.0	B	-
				Right		18	0.45	12.0	B	-
				Left		20	0.38	11.1	B	-
		Unsignalized	WB	Through	LTR	178	0.38	11.1	В	-
317	50 Avenue & 52 Street	Stop Control - All		Right		39	0.38	11.1	B	-
		Approaches		Left		26	0.15	9.6	Ā	-
			NB	Through	LTR	31	0.15	9.6	A	-
				Right		24	0.15	9.6	A	-
				Left		47	0.23	10.1	В	-
			SB	Through	LTR	35	0.23	10.1	В	-
				Right		48	0.23	10.1	В	-

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.47	11.2	В	
				Left		62	0.47	12.5	В	-
			EB	Through	LTR	211	0.47	12.5	В	-
				Right		19	0.47	12.5	В	-
				Left		8	0.33	10.6	В	-
		Unsignalized	WB	Through	LTR	164	0.33	10.6	В	-
318	50 Avenue & 51 Street	Stop Control - All		Right		26	0.33	10.6	В	-
		Approaches		Left		28	0.14	9.5	A	-
			NB	Through	LTR	28	0.14	9.5	A	-
				Right		23	0.14	9.5	Α	-
				Left		74	0.23	10.3	В	-
			SB	Through	LTR	32	0.23	10.3	В	-
				Right		24	0.23	10.3	В	-
				Overall Inte	rsection		0.46	10.9	В	
				Left		0	-	-	-	-
			EB	Through	LTR	193	0.46	11.4	В	-
				Right		114	0.46	11.4	В	-
		Unsignalized		Left		83	0.32	10.4	В	-
		Stop Control -	WB	Through	LTR	112	0.32	10.4	В	-
319	50 Avenue & 50 Street	EB/WB/NB Approaches		Right		0	-	-	-	-
		Assumed Yield Control -		Left		83	0.31	10.4	В	-
		SB Approach	NB	Through	LTR	0	-	-	-	-
				Right		109	0.31	10.4	В	-
				Left		0	-	-	-	-
			SB	Through	LTR	0	-	-	-	-
				Right		0	-	-	-	-
				Overall Inte	rsection		0.32	5.5	А	
				Left		50	0.04	0.4	A	11
			FB	Through	I TR	253	0.04	15	A	11
			20	Right	LIIX	25	0.04	1.5	A	11
				Left		23	0.02	0.2	A	0.5
		Unsignalized	WB	Through	I TR	135	0.02	1.2	A	0.5
320	50 Avenue & 49 Street	Stop Control - NB/SB		Right	L 110	29	0.02	1.2	Δ	0.5
020		Approaches		Left		10	0.02	15.5	C C	5.5
		, approaction	NB	Through	I TR	28	0.10	15.5	C.	5.5
				Right		31	0.19	15.5	C.	5.5
				Left		40	0.32	17.6	C.	10.9
			SB	Through	I TR	23	0.32	17.6	C C	10.9
			02	Right		53	0.32	17.6	C.	10.9
				Overall Inte	rsection	00	0.02	21	A	10.0
				Left		34	0.03	0.3	A	0.7
			FB	Through	I TR	261	0.03	1.0	Δ	0.7
			LD	Right	LIIX	35	0.03	1.0	Δ	0.7
				Left		7	0.03	0.1	Δ	0.7
		Unsignalized	WR	Through	ITR	146	0.01	0.1	Δ	0.2
321	50 Avenue & 45 Street	Stop Control - NR/SR		Right	LIIN	4	0.01	0.4	Â	0.2
521		Annroaches		Left		1/	0.01	13.6	R	2.1
		Approactics	NR	Through	LTR	3	0.00	13.6	R	2.1
				Right		1/	0.00	13.6	B	2.1
				Left		0	0.00	12.0	B	1.0
			SB	Through	I TP	Э Л	0.00	12.0	P	1.0
			50	Picht	LIK	4	0.00	12.3	P	1.0
					reaction	10	0.00	12.3		1.0
					Section	70	0.08	2.9	A	4 5
			ED	Leit	1.7	12	0.06	0.5	A	1.5
			ED	Direkt	LI	801	0.06	2.1	A	1.5
				Right						
		Unoignational		Lett	T D	400	0.00	0.0		
200	50 Avenue 9 44 Otas	Unsignalized	WB	Inrough	IR	106	0.08	0.0	A	0.0
322	50 Avenue & 41 Street	Stop Control - SB		Right		8	0.08	0.0	A	U.U
		Approaches	ND	Left			-			
			NB	Ihrough			-			
				Right			0.00	46.1		
			05	Left		14	0.08	10.4	В	2.2
			SB	Through	LR	-	_		-	_
	1	1		Right		38	0.08	10.4	В	2.2

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.11	5.3	A	
				Left		82	0.06	0.5	A	1.5
			EB	Through	LT	69	0.06	4.3	A	1.5
				Right						
				Left						
	50 Avenue / Twp Rd 630	Unsignalized	WB	Through	TR	26	0.03	0.0	A	0.0
323	& "Baywood Road" / RR	Stop Control - SB		Right		11	0.03	0.0	A	0.0
	20	Approaches		Left						
			NB	Through						
				Right						
				Left		18	0.11	94	Α	3.0
			SB	Through	I R		01	0		0.0
				Right		70	0.11	94	Δ	3.0
					rsection	10	0.11	8.4	Δ	0.0
							0.34	0.4	^	
			ED	Through	TD	657	0.54	0.4	۸	102.0
			ED	Diaht	IN	037	0.54	9.4	A	102.9
						0 F	-	-	-	- 17
			MD	Leit	L -	5	0.01	6.4	A	1.7
101	Kingsway & Medley		VVD	Through		208	0.22	5.8	A	31.5
401	Road	Signalized		Right		40	0.44	40.0	P	0.0
			ND	Leit	10	10	0.11	10.9	В	8.0
			NB	Through	LR					
				Right		20	-	-	-	-
				Left					-	
			SB	Through						
				Right						
				Overall Inte	rsection		0.74	13.6	В	
				Left	L	153	0.33	10.5	В	21.7
			EB	Through	Т	608	0.74	17.1	В	92.6
				Right						
				Left						
	Kingsway & Glenwood		WB	Through	Т	261	0.32	9.4	A	30.9
402	Drive (East)	Signalized ³		Right	R [C]	107	0.15	2.0	A	5.4
	Dive (Last)			Left						
			NB	Through						
				Right						
				Left		131	0.29	18.9	В	29.5
			SB	Through	LR					
				Right		1	-	-	-	-
				Overall Inte	rsection		0.51	0.4	A	
				Left						
			EB	Through	TR	749	0.51	0.0	A	0.0
				Right		1	0.51	0.0	A	0.0
				Left	L	5	0.01	9.8	A	0.2
1		Unsignalized	WB	Through	Т	257	0.18	0.0	A	0.0
403	Kingsway & Glenwood	Stop Control - NB/SB		Right		-	-			-
	Drive (West)	Approaches		Left	L	6	0.04	20.6	С	1.1
1			NB	Through		-			-	
1				Right	R	11	0.04	20.6	С	1.1
1				Left		-			-	
1			SB	Through						
1				Right	R	n	-	-	-	-
—				Overall Inte	rsection		0.45	10.2	В	
1				L eft	1	20	0.05	97	A	44
1			EB	Through	- TR	277	0.45	13.4	B	37.6
			20	Right		10	-	-		-
1					1	201	0.21	11 7	- P	11.2
1			W/R	Through	TP	161	0.21	11.7	R	25.7
404	Kingsway & Timberline	Signalized 3	44 D	Diaht	IN	101	0.34	11.1		23.1
404	Drive	Signalized		rtight		49		-		-
1			ND	Lett	1.7	6	-	-	-	-
1			NB	Inrough		5	0.02	9.3	A	3.0
				Right	к	161	0.27	3.1	A	8.1
1			0.5	Lett	1.70	51	-	-	-	-
1			SB	Ihrough	LIR	4	0.12	9.6	A	9.3
1	1	1	1	Right		5	-	-	-	-

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.26	8.7	A	
				Left		3	0.08	8.6	A	-
			EB	Through	LTR	45	0.08	8.6	A	-
				Right		0	-	-	-	-
				Left		24	0.23	8.8	A	-
		Unsignalized	WB	Through	LTR	61	0.23	8.8	A	-
405	Kingsway & Queensway	Stop Control - All		Right		70	0.23	8.8	A	-
		Approaches		Left		3	0.26	8.7	A	-
			NB	Through	LTR	57	0.26	8.7	A	-
				Right		127	0.26	8.7	A	-
				Left		89	0.16	8.8	A	-
			SB	Through	LTR	9	0.16	8.8	A	-
				Right		2	0.16	8.8	A	-
				Overall Inte	rsection		0.10	8.3	A	
				Left		14	0.10	9.9	A	2.8
			EB	Through	LTR	46	0.10	9.9	A	2.8
				Right		14	0.10	9.9	A	2.8
				Left		9	0.09	10.0	В	2.3
	Kingsway & Tennis Court	Unsignalized	WB	Through	LTR	49	0.09	10.0	В	2.3
406	Ringsway & Termis Court Road	Stop Control - EB/WB		Right		1	0.09	10.0	В	2.3
	Road	Approaches		Left		24	0.02	0.1	A	0.4
			NB	Through	LTR	7	0.02	4.0	A	0.4
				Right		13	0.02	4.0	A	0.4
				Left		0	-	-	-	-
			SB	Through	LTR	0	-	-	-	-
				Right		5	0.00	0.0	A	0.0
				Overall Inte	rsection		0.02	1.4	A	
				Left		1	0.00	0.0	A	0.0
			EB	Through	LTR	46	0.00	0.2	A	0.0
				Right		1	0.00	0.2	A	0.0
				Left		1	0.00	0.0	A	0.0
	Queensway & Tennis	Unsignalized	WB	Through	LTR	68	0.00	0.1	A	0.0
407	Court Road	Stop Control - EB/WB		Right		5	0.00	0.1	A	0.0
	Court Road	Approaches		Left		7	0.02	9.4	A	0.5
			NB	Through	LTR	3	0.02	9.4	A	0.5
				Right		5	0.02	9.4	A	0.5
				Left		2	0.01	9.1	A	0.2
			SB	Through	LTR	0	-	-	-	-
				Right		3	0.01	9.1	А	0.2

 1. Assumed same timing plan as Highway 28 & 54 Avenue Timing Plan sent from City - May 13, 2010
 3. 0.01
 9.1

 2. Assume timing plan as per Timing Plan sent from City - May 13, 2010
 3. Assumed timing plan from existing 2010 horizon - same timing plan as Highway 28 & 50 Avenue Timing Plan sent from City - August 31, 2010

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inter	rsection		0.13	5.1	A	
				Left		11	0.09	11.8	В	2.3
			EB	Through	LTR	27	0.09	11.8	В	2.3
				Right		5	0.09	11.8	В	2.3
		l la siene slime d	WD	Left	1.70	11	0.13	10.5	В	3.7
101	1 Avenue & 28 Street /	Unsignalized	WB	Inrough	LIK	21	0.13	10.5	В	3.7
101	English Bay Road			Right		55	0.13	10.5	В	3.7
		Approaches	NB	Through	I TR	79	0.00	0.0	A	0.1
			ne -	Right	LIIX	30	0.00	0.4	A	0.1
				Left		42	0.03	0.3	A	0.8
			SB	Through	LTR	62	0.03	3.1	A	0.8
				Right		5	0.03	3.1	A	0.8
				Overall Inter	rsection		0.10	4.1	A	
				Left						
			EB	Through	TR	81	0.06	0.0	A	0.0
				Right		11	0.06	0.0	A	0.0
				Left		66	0.05	0.4	A	1.3
400	4.4. 0.05.00	Unsignalized	WB	Through	LT	81	0.05	3.6	A	1.3
102	1 Avenue & 25 Street	Stop Control - NB		Right		4	0.40			
		Approach	ND	Left		1	0.10	9.3	A	2.8
			IND	I nrougn Bight	LR	02	0.10	0.2	۸	2.0
				Right		83	0.10	9.3	A	2.8
			SB	Through						
			00	Right						
				Overall Inte	rsection		0 11	13	Α	
				Left						
			EB	Through	TR	116	0.11	0.0	А	0.0
				Right		48	0.11	0.0	A	0.0
				Left		9	0.01	0.1	А	0.2
	1 Avenue & Nelson	Unsignalized	WB	Through	LT	127	0.01	0.6	A	0.2
103	Street	Stop Control - NB		Right						
	Officer	Approach		Left		20	0.05	10.3	В	1.4
			NB	Through	LR				_	
				Right		13	0.05	10.3	В	1.4
			CD.	Left						
			30	Bight						
					reaction		0.00	1.0	Δ	
				Left	36011011		0.09	1.3	~	
			FB	Through	TR	91	0.09	0.0	Δ	0.0
				Right		38	0.09	0.0	A	0.0
				Left		7	0.01	0.0	A	0.1
		Unsignalized	WB	Through	LT	100	0.01	0.5	A	0.1
104	1 Avenue & 16 Street	Stop Control - NB		Right						
		Approach		Left		36	0.07	10.2	В	1.9
			NB	Through	LR					
				Right		12	0.07	10.2	В	1.9
			05	Left						
			SB	Through						
				Right						
				Overall Intel	Section	10	0.05	2.1	A	0.0
			ED	Left	1 T	12	0.01	0.1	A	0.2
			EB	Piakt	LI	32	0.01	0.9	A	0.2
		Unsignalized	WB	Through						
105	1 Avenue / 2 Avenue &	Yield Control - SB		Right						
	10 Street	Approach	-	Left						
			NB	Through	TR	75	0.05	0.0	Α	0.0
				Right		4	0.05	0.0	A	0.0
				Left		0	-	-	-	-
			SB	Through	LR					
				Right		41	0.05	9.2	A	1.3

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inter	rsection		0.07	4.3	A	
				Left		14	0.07	9.1	A	1.7
			EB	Through	LR					
				Right		40	0.07	9.1	A	1.7
				Left						
	8 Avenue & Lakeshore	Unsignalized	WB	Through						
106	Drive	Stop Control - EB		Right						
	Dive	Approach		Left		27	0.02	0.2	A	0.5
			NB	Through	LT	39	0.02	3.1	A	0.5
				Right						
				Left						
			SB	Through	TR	25	0.03	0.0	A	0.0
				Right		17	0.03	0.0	A	0.0
				Overall Inter	rsection		0.20	6.5	A	
				Left		7	0.01	0.0	A	0.1
			EB	Through	LT	61	0.01	0.8	A	0.1
				Right	R	29	0.02	0.0	A	0.0
				Left		37	0.03	0.2	A	0.7
		Unsignalized	WB	Through	LTR	55	0.03	2.7	A	0.7
107	8 Avenue & 10 Street	Stop Control - NB/SB		Right		17	0.03	2.7	A	0.7
		Approaches		Left		17	0.20	11.2	В	6.1
			NB	Through	LTR	52	0.20	11.2	В	6.1
				Right		60	0.20	11.2	В	6.1
				Left		15	0.14	12.2	В	3.9
			SB	Through	LTR	51	0.14	12.2	В	3.9
				Right		5	0.14	12.2	В	3.9
				Overall Inte	rsection		0.79	14.9	В	
				Left	L	319	0.79	27.5	С	#73.5
			EB	Through	TTR	247	0.25	8.5	A	18.1
				Right		53	-	-	-	-
				Left	L	4	0.01	9.2	A	1.9
			WB	Through	TTR	110	0.12	7.6	A	9.1
108	8 Avenue & 16 Street	Signalized ¹		Right		28	-	-	-	-
				Left		32	-	-	-	-
			NB	Through	LTR	18	0.12	12.0	В	10.0
				Right		4	-	-	-	-
				Left		27	-	-	-	-
			SB	Through	LTR	8	0.22	6.6	A	10.7
				Right		74	-	-	-	-
				Overall Inter	rsection		0.25	2.9	A	
				Left	L	119	0.12	8.5	A	3.2
			EB	Through	2T	422	0.14	0.0	A	0.0
				Right						
				Left						
		Unsignalized	WB	Through	2T	273	0.09	0.0	A	0.0
109	Highway 28 & 25 Street	Stop Control - SB		Right	R	30	0.02	0.0	A	0.0
		Approach		Left						
			NB	Through						
				Right						
				Left		10	0.25	11.5	В	8.0
			SB	Through	LR					
				Right		151	0.25	11.5	В	8.0
				Overall Inte	rsection		0.12	1.8	A	
				Left		43	0.04	0.4	A	0.9
			EB	Through	LT	293	0.04	1.3	A	0.9
				Right						
				Left						
	Highway 55 & 28 Street/	Unsignalized	WB	Through	TR	150	0.12	0.0	A	0.0
110	English Ray Road	Stop Control - SB		Right		23	0.12	0.0	A	0.0
	English Bay Road	Approach		Left						
			NB	Through						
				Right						
				Left		32	0.10	13.6	В	2.6
			SB	Through	LR					
				Right		7	0.10	13.6	В	2.6

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inter	rsection		0.42	18.1	В	-
				Left	L	145	0.32	15.6	В	28.3
			EB	Through	Т	31	0.10	25.5	С	11.6
				Right	R	149	0.40	8.2	A	14.1
				Left	L 	133	0.31	17.5	В	26.3
111	Highway 28 & Highway	Oinn alling d ²	WB	Inrough		10	0.03	24.8	C	5.7
	55 / 16 Avenue	Signalized		Right	<u>к</u>	00	0.15	9.1	A	8.7 12.1
			NB	Through	2L 2T	345	0.27	29.7	C	36.0
			ND	Right	R	118	0.42	6.0	A	11.0
				Left	L	45	0.27	31.8	C	15.8
			SB	Through	2T	304	0.41	22.9	C	31.4
				Right	R	75	0.20	6.7	Α	9.0
				Overall Inter	rsection		0.04	2.0	A	
				Left		17	0.01	0.1	A	0.3
			EB	Through	LTR	137	0.01	0.8	A	0.3
				Right		15	0.01	0.8	A	0.3
				Left		0	-	-	-	-
		Unsignalized	WB	Through	LTR	63	0.00	0.0	A	0.0
112	16 Avenue & 16 Street	Stop Control - NB/SB		Right		7	0.00	0.0	A	0.0
		Approaches	ND	Left		9	0.03	11.1	В	0.7
			IND	I nrougn Bight	LIK	5	0.03	11.1	В	0.7
				Loft		12	-	10.1	- B	-
			SB	Through	I TR	2	0.04	10.1	B	1.0
			0D	Right	LIIX	11	0.04	10.1	B	1.0
				Overall Inter	rsection		0.11	3.7	A	1.0
				Left		8	0.01	0.1	A	0.2
			EB	Through	LTR	86	0.01	0.6	A	0.2
				Right		10	0.01	0.6	Α	0.2
				Left		13	0.01	0.1	A	0.2
		Unsignalized	WB	Through	LTR	64	0.01	0.9	A	0.2
113	16 Avenue & 10 Street	Stop Control - NB/SB		Right		34	0.01	0.9	A	0.2
		Approaches		Left		6	0.04	10.3	В	0.9
			NB	Through	LTR	9	0.04	10.3	В	0.9
				Right		8	0.04	10.3	В	0.9
			CD.	Leit		38	0.11	10.8	B	2.9
			50	Right	LIN	16	0.11	10.8	B	2.9
				Overall Inter	rsection	10	0.59	14.2	B	-
				Left		10	-	-	-	-
			EB	Through	LTR	10	0.09	14.0	В	7.7
				Right		10	-	-	-	-
				Left	LT	131	0.49	24.1	С	30.7
	Highway 28 / 55 8		WB	Through	R	10	0.26	5.7	A	9.6
201	Energy Centre Access	Signalized ²		Right		111	-	-	-	-
	Linergy Contre Access			Left	L	10	0.03	7.8	A	2.5
			NB	Through	2T	645	0.59	17.4	В	57.1
				Right	R	72	0.14	5.1	A	7.6
			00	Left	L	61	0.17	/.3	A	8.3
			28	I nrough	21 P	526	0.39	11.6	B A	43./
					T.	10	0.02	0.9	A	2.9
					3601011	0	0.37	7.0	A .	_
			EB	Through	I TR	10	0.15	72	A	69
				Right	Ent	40	-	-	-	-
				Left		71	-	-	-	-
		Only Ontions Officers	WB	Through	LTR	10	0.35	15.4	В	16.3
202	nignway 28 / 55 & 75	Intersection		Right		10	-	-	-	-
	Avenue	Intersection		Left	L	10	0.03	7.4	A	2.4
			NB	Through	2T	717	0.37	7.3	A	35.3
				Right	R	20	0.02	3.6	A	2.5
			0-	Left	L	0	-	-	-	-
			SB	Through	2T	657	0.34	7.0	A	31.8
				Right	R	10	0.01	4.1	A	1.8

4000 4010 401 60 400 <th>Node #</th> <th>Intersection</th> <th>Traffic Control</th> <th>Approach</th> <th>Movement</th> <th>Laning</th> <th>Volume</th> <th>V/C Ratio</th> <th>Delay (s)</th> <th>LOS</th> <th>95th Queue (m)</th>	Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
903 Highway 28 / 56 & 50 × 50 × 50 × 50 × 50 × 50 × 50 × 50					Overall Inter	rsection		0.47	10.1	В	-
Pain Pain Pain Pain Pain Pain Pain Pain					Left						
9203 Highway 26 /5 5. 6 /g Signalized P Right Reset P 7 0.02 16.6 0.8 0.0 9204 Highway 26 /5 5. 6 /g Signalized P Right Reset P 0.02 16.6 A 0.01 9204 Highway 28 /5 5. 6 /g Signalized P Right Reset P 0.02 16.6 A 40.1 9204 Left Net P 1 0.04 0.53 A 4.64 1 Left Net P 1 0.05 6.6 A 0.01 1 Left Net P 1 0.05 6.6 A 0.01 1 Left Net P 0.05 6.6 A 0.01 0.00 1.00				EB	Through						
101 AvenueSignalized 2Ng Ng Ng Ng Ng Ng 					Right		-	0.00	40.0	(
1001001001000.000.000.000.000.000.000.00AvenueNemeNeme100100100100100100100NemeNemeNeme100100100100100100100100NemeNemeNeme1001001000.000.000.000.000.00100NemeNeme1001001000.000.000.000.000.00100NemeNeme1001001000.000.000.000.000.000.00NemeNeme1001001000.001000.00<					Left	L	/	0.02	18.6	В	3.6
Avenue Avenue<	202	Highway 28 / 55 & 69	Signalized ²	WB	Inrough	D	104	0.20	6.9	Δ	10.1
NB Transh 27 644 0.04 15.3 B 49.4 1 Right 27 650 0.04 6.3 A 10.4 3 B Through 27 650 0.04 6.3 A 10.4 3 Fridue Left L 118 0.34 6.3 A 10.4 1 Through 27 650 0.34 6.3 A 10.4 1 Through Through 1 0.34 6.3 A 10.4 1 Through Through Through 1 0.28 19.8 A 20.5 1 Left L 83 0.20 19.8 3.5 1.5 5 5 5 1.5 5	203	Avenue			Right	ĸ	104	0.30	0.8	A	10.1
100 100 100 100 100 100 100 100 100 100 21 650 0.34 6.4 A 23.1 100 100 21 650 0.34 6.4 A 23.1 100				NB	Through	2T	644	0.47	15.3	B	10 1
Big Left L 118 0.28 6.0 A 10.1 204 Highway 28 / 55 & Tri- City Mail Access Signalized ¹ Triough Interval Interval <td></td> <td></td> <td></td> <td>NB</td> <td>Right</td> <td>R</td> <td>26</td> <td>0.47</td> <td>59</td> <td>A</td> <td>4.2</td>				NB	Right	R	26	0.47	59	A	4.2
301 Image 301 Through 2T 669 0.34 6.4 A A 301 Right Image					Left	L	118	0.28	6.0	A	10.4
Image: constraint of the section of the sec				SB	Through	2T	650	0.34	6.4	A	28.1
An A second s					Right						
41111000 <th< td=""><td></td><td></td><td></td><td></td><td>Overall Inte</td><td>rsection</td><td></td><td>0.29</td><td>8.3</td><td>А</td><td></td></th<>					Overall Inte	rsection		0.29	8.3	А	
204Highway 28 / 55 & Tri- City Mal AccessSignalized PEB A (City Mal Access)EB 					Left						
204Highway 28 / 55 & 7.17, City Mail AccessSignalized?Right H Intersection Latt0000011000000000001100				EB	Through						
Aug Highway 28 / 55 & 7.7. City Mail Access Signalized 2 We must be in the second					Right						
Highway 28 / 58 & Th; City Mail Access Signalized ² With Integration (Construction) Integration (Construction) Integration (Construction)					Left	L	83	0.28	19.8	B	20.5
204 City Mall Access -	00.4	Highway 28 / 55 & Tri-	Signalized ²	WB	Through	_				1	
301 Highway 28 / 55 & 54 August Augu	204	City Mall Access			Right	K	10	0.04	11.2	В	3.5
301 Highway 28 / 55 & 62 Avenue / 61 Avenue Only Option: Signalize Intersection Channelize NB R Intersection (Channelize NB R) Intersection (Channelize NB R) Intersection (Channelize NB R) Only Option: Signalize (Intersection Channelize NB R) Intersection (Channelize NB R) <thintersection (Channelize NB R)</thintersection 				ND	Left	TTTD	050	0.00	0.0	Δ.	22.0
1000 10000 10000 <				IND	I nrougn Bight	IIIR	659	0.29	9.9	A	32.6
301 Highway 28 / 55 & 62 Avenue Only Option: Signalized Signalized Left Right Left Left Left C Signalized A 20- 20- 20- 20- 20- 20- 20- 20- 20- 20-					Right		7Z 55	- 0.12	-	-	-
$301 \\ Highway 28 / 55 & 56 \\ Avenue / 61 Avenue A / 61 / 8 / 9 / 9 / 9 / 9 / 9 / 9 / 9 / 9 / 9$				SB	Through	2T	602	0.13	4.9	Δ	25.4
301 Highway 28 / 55 & 54 Avenue / 61 Avenue Only Option: Signalize Intersection. Channelize NB R WB Left Left L 37 0.15 13.7 B 8.4 301 Highway 28 / 55 & 54 Avenue 01/ Option: Signalize Intersection. Channelize NB R WB Intrough				0D	Right	21	002	0.20	5.0		23.4
205 Highway 28 / 55 & 62 Avenue / 61 Avenue Only Option: Signalize Intersection. Channelize NB R I = fit (Heff)					Overall Inte	rsection		0.31	4.6	Α	
Bighway 28 / 55 & 62 Avenue / 61 Avenue Only Option: Signalize Intersection. Channelize NB R EB Through (Left Image: Constraint of the section of the secti					Left			0.01			
205 Highway 28 / 55 & 62 Avenue / 61 Avenue Only Option: Signalize Intersection. Channelize NB R WB Right Intersection Right Right NB 37 0.15 13.7 B 8.4 301 Highway 28 / 55 & 62 Avenue / 61 Avenue MB Intersection. Channelize NB R NB Intersection. Right NB Right Right Right NB Right Right Right NB Right Ri Right Ri Ri Ri Right Right Ri Ri Ri Right Right Right Ri Right Ri				EB	Through						
301 Highway 28 / 55 & 5.6 (2) Nenue / 61 Avenue Only Option: Signalize / 100 (100 (100 (100 (100 (100 (100 (10					Right						
205 Highway 28 / 55 & 62 Avenue / 61 Avenue Only Option: Signalize NB R WB Through Left R 8 0.03 8.5 A 2.5 301 Highway 28 / 55 & 52 Avenue N N N Right R 8 0.03 8.5 A 2.5 301 Highway 28 / 55 & 52 Avenue Signalized ² N N Right R 9 0.02 5.6 A 4.3 301 Highway 28 / 55 & 5.4 A N<					Left	L	37	0.15	13.7	В	8.4
100 May 20 / 30 GL Avenue / 61 Avenue Intersection. Channelize NB R Right NB R 8 0.03 8.5 A 2.5 NB NB NB Right Right R (2) 723 0.31 4.5 A 33.3 NB Right Right R (2) 70 0.07 2.0 A 4.3 NB Right NB Right R (2) 70 0.07 2.0 A 4.3 NB NB Right R 9 0.02 5.6 A 2.0 SB Through 1 676 0.29 4.4 A 30.7 Right R 31 0.15 25.3 C 16.8 Right R 31 0.16 15.7 B 16.5 Through T 61 0.15 23.7 C 19.0 Avenue Signalized ² MB Iter<		Highway 28 / 55 8 62	Only Option: Signalize	WB	Through						
Arbitro / 0 / Netholds Channelize NB R Left Image: NB (C) Left Image: NB (C) NB Trough 2T 723 0.31 4.5 A 33.3 Right R (C) 70 0.07 2.0 A 4.3 Highway 28 / 55 & 5 / Avenue NB Left L 9 0.02 5.6 A 2.0 Market Avenue NB Left L 9 0.02 5.6 A 2.0 Market Avenue NB Left L 9 0.02 5.6 A 2.0 Market Avenue NB Through T 676 0.29 4.4 A 6.5 Market Avenue NB Through T 511 0.14 15.9 B 12.7 Market Avenue Signalized ² Left L 71 0.18 15.7 B 16.5 Market Avenue Signalized ² Left L 11 0.15 21.3 C<	205		Intersection.		Right	R	8	0.03	8.5	A	2.5
301 Highway 28 / 55 & 54 Avenue Signalized ² NB Through (Eff) 2T 723 0.31 4.5 A 33.3 302 Highway 28 / 55 & 54 Avenue NB NB Through (Right H) 2T 723 0.31 4.5 A 33.3 301 Highway 28 / 55 & 54 Avenue A A 30 20 5.6 A 2.0 302 Highway 28 / 55 & 54 Avenue Signalized ² Image: Comparison of the section of the secti		Avenue / 01 Avenue	Channelize NB R		Left						
$301 \\ 101 \\ 102 \\ 302 $				NB	Through	2T	723	0.31	4.5	A	33.3
301 Highway 28 / 55 & 54 / Avenue Only Option: Signalized 2 SB Left L 51 9 0.02 5.6 A 2.0 301 Highway 28 / 55 & 54 / Avenue Image: Avenue Signalized 2 Image: Avenue Image: Avenue <td< td=""><td></td><td></td><td></td><td></td><td>Right</td><td>R [C]</td><td>70</td><td>0.07</td><td>2.0</td><td>A</td><td>4.3</td></td<>					Right	R [C]	70	0.07	2.0	A	4.3
301 Highway 28 / 55 & 54 / Avenue Signalized ² Signalized ² Signalized ² Signalized ² Signalized ² Image of the section of t				05	Left	L	9	0.02	5.6	A	2.0
301 Highway 28 / 55 & 54 / Avenue Signalized ² Signalized ² Left L 51 0.14 15.9 B 12.7 301 Highway 28 / 55 & 54 / Avenue Signalized ² EB Left L 51 0.14 15.9 B 12.7 301 Highway 28 / 55 & 54 / Avenue Signalized ² WB EB Left L 71 0.18 15.7 B 16.8 Muse Filter L T 61 0.15 23.7 C 19.0 MB Through T 61 0.15 21.3 C 11.7 NB Through ZT 602 0.67 26.1 C 44.7 NB Through ZT 620 0.67 26.1 C 44.7 NB Through ZT 631 0.16 25.1 C 44.7 Through ZT 581 0.53 19.8 B 84.1 Right <t< td=""><td></td><td></td><td></td><td>5B</td><td>Inrough</td><td>21</td><td>6/6</td><td>0.29</td><td>4.4</td><td>A</td><td>30.7</td></t<>				5B	Inrough	21	6/6	0.29	4.4	A	30.7
301 Highway 28 / 55 & 54 Avenue Signalized ² Left L 51 0.14 15.9 B 12.7 301 Highway 28 / 55 & 54 Avenue Signalized ² Left L 51 0.14 15.9 B 12.7 301 Highway 28 / 55 & 54 Avenue Signalized ² Left L 71 0.16 25.3 C 10.8 302 Highway 28 / 55 & 52 Avenue Signalized ² Left L 71 0.18 15.7 B 16.5 MB Intrough T 61 0.15 23.7 C 19.0 MB Intrough T 61 0.15 21.3 C 11.7 NB Intrough ZT 602 0.67 26.1 C 80.0 Through ZT 602 0.67 26.1 C 80.0 11.0 16 21.3 16 16 11.0 11.0 16 21.4 16 10 10 11.0<						reaction		0.67	20.6	<u> </u>	
$301 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$						section	51	0.67	20.6	B	10.7
301 Highway 28 / 55 & 54 Avenue Signalized ² Image: Constraint of the second seco				FB	Through	Т	51	0.14	25.3	C C	12.7
$301 Highway 28 / 55 & 52 \\ Avenue \\ 301 Highway 28 / 55 & 52 \\ Avenue \\ 302 Highway 28 / 55 & 52 \\ A$				LD	Right	R	31	0.13	9.4	A	6.5
301 Highway 28 / 55 & 54 Avenue Signalized ² WB Through Right T 61 0.15 23.7 C 19.0 301 Avenue Avenue NB Right R 153 0.34 6.2 A 12.7 Avenue NB Right R 153 0.34 6.2 A 12.7 NB NB Left L 31 0.15 21.3 C 11.7 NB Through 2T 602 0.67 26.1 C 80.0 Right R 61 0.14 6.8 A 9.1 Avenue NB Through 2T 581 0.53 19.8 B 84.1 Right R 61 -					Left		71	0.18	15.7	B	16.5
301 Highway 28 / 55 & 54 Avenue Signalized Right R 153 0.34 6.2. A 102 301 Avenue Avenue Right R 153 0.34 6.2. A 102 4 Avenue Right R 153 0.34 6.2. A 11.7 1 NB Through 2T 602 0.67 26.1 C 80.0 1 Right R 61 0.14 68 A 9.1 1 Left L 163 0.46 25.1 C 44.7 1 Right R 61 - - - - 1 Right R 61 - - - - 1 Right R 61 - - - - 1 Left 30 - - - - - 1 Highway 28 / 55 & 52			0	WB	Through	_ T	61	0.15	23.7	C	19.0
Avenue Left L 31 0.15 21.3 C 11.7 NB Through 2T 602 0.67 26.1 C 80.0 Right R 61 0.14 6.8 A 9.1 B Through 2T 581 0.67 26.1 C 80.0 B Through 2T 602 0.67 26.1 C 80.0 B Through 2T 581 0.46 25.1 C 44.7 B Through 2T 581 0.53 19.8 B 84.1 Right R 61 - - - - B Through LTR 30 - - - - Mightway 28 / 55 & 52 Marce EB Left 30 0.22 15.0 B 13.4 Highway 28 / 55 & 52 Avenue NB Right 10 - -	301	Highway 28 / 55 & 54	Signalized *		Right	R	153	0.34	6.2	A	12.7
MB Through 2T 602 0.67 26.1 C 88.0 Right R 61 0.14 6.8 A 9.1 B Left L 163 0.46 25.1 C 44.7 SB Through 2T 581 0.53 19.8 B 84.1 Right R 61 - - - - - Right R 61 - - - - - Versitive Right R 61 - - - - Mighty R 61 - - - - - Mighty Right R 61 - - - - Mighty Right 100 - - - - - Avenue Intersection Highty 100 - - - - - NB <td></td> <td>Avenue</td> <td></td> <td></td> <td>Left</td> <td>L</td> <td>31</td> <td>0.15</td> <td>21.3</td> <td>С</td> <td>11.7</td>		Avenue			Left	L	31	0.15	21.3	С	11.7
302 Highway 28 / 55 & 52 Avenue Only Option: Signalize Intersection Channelize NB R Only Option: Signalize Intersection Channelize NB R User NB Left L 163 0.46 25.1 C 44.7 MB 2T 581 0.53 19.8 B 84.1 Right R 61 - - - - MB Left 30 - - - - Mighway 28 / 55 & 52 Avenue MIY Option: Signalize Intersection Channelize NB R User Left 30 - - - - MB Left 55 - - - - - MB Intersection Channelize NB R Left 70 - - - NB Left 70 - - - - - SB MB LTTR [C] 615 0.59 11.4 B 60.7 Right 80 - - - - - -				NB	Through	2T	602	0.67	26.1	С	80.0
$302 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$					Right	R	61	0.14	6.8	A	9.1
$ \begin{array}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline SB & Through & 2T & 581 & 0.53 & 19.8 & B & 84.1 \\ \hline Right & R & 61 & - & & & & & & & & & & & & & & & & & $					Left	L	163	0.46	25.1	С	44.7
Normal State Image: State<				SB	Through	2T	581	0.53	19.8	В	84.1
302 Highway 28 / 55 & 52 Avenue Only Option: Signalize Intersection Channelize NB R Image: Construction of the c					Right	R	61	-	-	-	-
302 Highway 28 / 55 & 52 Avenue Only Option: Signalize Intersection Channelize NB R EB Left 30 -<					Overall Inter	rsection		0.70	13.3	В	
302 Highway 28 / 55 & 52 Avenue Only Option: Signalize Intersection Channelize NB R LB Inrough Right LTR 30 0.22 15.0 B 13.4 B Right 10 - - - - - Multiply Second - - - - - - Multiply NB Intersection Channelize NB R MB Left 55 - - - NB Through LTR 30 0.39 13.1 B 18.7 Right 55 - - - - - - NB Through LTR [C] 615 0.59 11.4 B 60.7 Right 80 - - - - - - SB Through LTTR [C] 615 0.59 11.4 B 60.7 Right 80 - - - - - - <td></td> <td></td> <td></td> <td>55</td> <td>Left</td> <td>1.75</td> <td>30</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>				55	Left	1.75	30	-	-	-	-
302 Highway 28 / 55 & 52 Avenue Only Option: Signalize Intersection Channelize NB R Kignt 10 -<				EB	Ihrough	LſR	30	0.22	15.0	В	13.4
$302 \begin{array}{c ccccccccccccccccccccccccccccccccccc$					Right		10	-	-	-	-
302 Highway 28 / 55 & 52 Avenue Only option: organize Intersection Channelize NB R WB Hindugit Right LTR 50 0.59 13.1 B 18.7 302 Avenue Intersection Channelize NB R Right 55 - - - - 1 Left 70 - - - - - 1 Right 80 - - - - - 1 Right 80 - - - - - 1 SB Through LTTR [C] 615 0.59 11.4 B 60.7 1 Right 80 - - - - - 1 SB Through LTTR 510 0.70 15.3 B #73.7 Right 40 - - - - - -			Only Ontion: Signaliza	WB	Through	I TP	30	- 0.20	- 12.1	- P	- 19.7
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	302	Highway 28 / 55 & 52	Intersection	VVD	Right	LIK	55	0.39	13.1	В	10.7
NB Through LTTR [C] 615 0.59 11.4 B 60.7 Right 80 - <t< td=""><td>302</td><td>Avenue</td><td>Channelize NB R</td><td></td><td></td><td></td><td>70</td><td>-</td><td>_</td><td>-</td><td>-</td></t<>	302	Avenue	Channelize NB R				70	-	_	-	-
Right 80 - <td></td> <td></td> <td></td> <td>NB</td> <td>Through</td> <td>LTTR ICI</td> <td>615</td> <td>0.59</td> <td>11.4</td> <td>B</td> <td>60.7</td>				NB	Through	LTTR ICI	615	0.59	11.4	B	60.7
Left 140 - <td></td> <td></td> <td></td> <td></td> <td>Right</td> <td>[0]</td> <td>80</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td>					Right	[0]	80	-	-	-	-
SB Through LTTR 510 0.70 15.3 B #73.7 Right 40 - <					Left		140	-	-	-	-
Right 40				SB	Through	LTTR	510	0.70	15.3	В	#73.7
					Right		40	-	-	-	-

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.76	14.3	В	
				Left	L	375	0.76	22.5	С	76.5
			EB	Through	Т	329	0.42	11.4	В	48.0
				Right	R [C]	135	0.19	2.3	A	7.1
				Left		9	-	-	-	-
	Highway 28 / 55 & 50		WB	Through	LT	161	0.22	9.3	A	24.4
303	Avenue	Signalized ³		Right	R [C]	155	0.21	2.2	A	7.5
	Avenue			Left	L	133	0.40	22.9	С	29.3
			NB	Through	2T	275	0.23	17.3	В	22.8
				Right	R [C]	162	0.01	10.8	В	2.3
				Left	L	116	0.44	23.5	С	33.1
			SB	Through	2T	232	0.28	17.6	В	26.7
				Right	R [C]	5	0.30	4.7	A	11.4
				Overall Inter	rsection		0.71	16.5	С	
				Left		16	0.52	14.5	В	-
			EB	Through	LTTR	486	0.57	15.1	С	-
				Right		50	0.57	15.7	С	-
				Left		98	0.71	21.8	С	-
	Highway 28 / 55 & 52	Option 1: Convert to 4-	WB	Through	LTTR	523	0.71	18.7	С	-
304	Street	way stop.		Right		42	0.58	15.5	С	-
	0001	Channelize NB R		Left		23	0.21	11.1	В	-
			NB	Through	LTR [C]	10	0.21	11.1	В	-
				Right		66	0.21	11.1	В	-
				Left		21	0.12	10.7	В	-
			SB	Through	LTR	8	0.12	10.7	В	-
				Right		27	0.12	10.7	В	-
				Overall Inter	rsection		0.66	11.8	В	
				Left		16	-	-	-	-
			EB	Through	LTTR	486	0.46	10.5	В	37.6
				Right		50	-	-	-	-
				Left		98	-	-	-	-
	Highway 28 / 55 & 52	Option 2: Signalize	WB	Through	LTTR	523	0.66	14.0	В	51.8
304	Street	intersection. Channelize NB R		Right		42	-	-	-	-
				Left		23	-	-	-	-
			NB	Through	LTR [C]	10	0.22	7.0	A	10.3
				Right		66	-	-	-	-
				Left		21	-	-	-	-
			SB	Through	LTR	8	0.13	8.5	A	8.1
				Right		27	-	-	-	-
				Overall Inter	rsection		0.22	0.2	A	
				Left						
			EB	Through	2T	634	0.22	0.0	A	0.0
				Right						
			14/5	Left						
005	Highway 28 / 55 & 51	Unsignalized	WB	Through	21	504	0.17	0.0	A	0.0
305	Street	Stop Control - SB		Right	к [C]	23	0.02	0.0	A	0.0
		Approach	ND	Left						
			NB	Inrough						
				Right						
			00	Lett						
			ЗB	Diabt		10	0.02	10.2	P	0.0
			l		K [U]	19	0.03	10.3	B	υ.Ծ
					ระบบบท		0.70	12.3	L D	
			EP	Leit						
			LD	Diabt						
				right		220	0.42	16.2	P	14 6
306			\\/P	Through	L	239	0.43	10.3	P	44.0
	Highway 28 / 55 & 50	Signalized 3	VVD	Dicht	P	144	0.25	4.0	Δ	0.0
300	Street	Signalized			71	144	0.20	4.0	A	ອ.ອ
			NR	Through	2Т	383	0.20	10.4	P	22.2
				Piaht	21 P	189	0.29	26		20.0 2.0
			F	Left	IX.	215	0.20	2.0	<u>_</u>	
			SB	Through	1 TT	<u>210</u> <u>410</u>	0.70	16.7	B	47.5
			55	Piaht		טוד	0.70	10.7		
L	1	1		Night						

307 Highway 28 /5 8 4 3 Usignalized bio-Scatter Usignalized Highway 28 /5 8 4 3 Usignalized H	Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
307 Highney 28 / 55 & 43 Avenue Left Sup Control - E8WB Approaches Left Floragin (Mini- Approaches) Left Right Ri					Overall Inter	rsection		0.22	1.0	A	
307 Highway 26 / 55 & 4 Avenue & 57 Street (south) Lunspnaized Highway 28 / 55 & 4 Avenue & 57 Street (south) Lunspnaized Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 4 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW Highway 28 / 55 & 5 Avenue & 57 Street Sup Cornet-LEW High					Left	L	11	0.09	33.2	D	2.4
307 Highway 28 / 55 & 4 Avenue Lucisponder Leng Outpoint Right Reg Outpoint Right Reg Outpoint Right Reg Outpoint Right Reg Outpoint No How Highway 28 / 55 & 4 Approaches No Auth Reg Outpoint Right Reg Outpoint OUTP Approaches No Auth Reg Outpoint				EB	Through						
307 Highway 28 / 55 & 44 Avenue Unsignalized Stop Corris - Leave Approaches WB Approaches Image Ref (R) (R) (R) (R) (R) (R) (R) (R) (R) (R)			Unsignalized Stop Control - EB/WB		Right	R	34	0.07	11.4	В	1.7
307 Highway 28 / 56 & 40 Avenue Subscription Leads bio Control - EBM Avenue Mile Approaches Through Highway 28 / 56 & 43 Avenue Mile Avenue Mile Avenue<					Left						
307 Avenue Selp Control - Early Approaches Right R[C] 10 0.02 0.07 6 0.04 400 Approaches Approaches Integration of the second of the s	007	Highway 28 / 55 & 46		WB	Through	5 101				1	
308 Fight Name NB ITR (0 50 0.05 0.05 A 12 308 Highway 28 / 55 & 43 NB NB ITR (0 50 0.21 0.02 A 0.00 308 Highway 28 / 55 & 43 Signalized * Itrough TR 48 10 0.01 A 0.00 308 Highway 28 / 55 & 43 Signalized * Itrough TR 28 0.12 7.5 A 0.9 308 Highway 28 / 55 & 43 Signalized * Itrough TR 28 0.12 7.5 A 0.9 400 NB Itrough TR 40 0.08 10.9 B 0.06 NB	307	Avenue			Right	R [C]	10	0.02	10.7	В	0.4
308 Highway 28 / 55 & 43 Avenue Signalized 1 (North) Northigh and the section (North) Northe section (North) Northigh and the section (Nor			Approacnes	ND	Left		33	0.05	0.6	A	1.2
308 Highway 28 / 56 & 43 Avenue Signalized 1 Signalized 1 Image is a set of the				IND	Inrougn	LIIR[C]	550	0.21	0.8	A	1.2
308 Image 21 Bight 649 0.22 0.0 A 0.0 Bight R 100 0.011 0.0 A 0.0 Bight R 10 0.011 0.0 A 0.0 Bight R 10 0.011 0.0 A 0.0 Bight R 10 0.011 0.00 A 0.0 Bight R 10 0.012 7.5 A 0.5 Right R 73 0.14 4.4 A 7.1 Hight R 73 0.14 4.4 A 7.1 Right R 73 0.14 4.4 A 7.1 Right R 72 0.00 8.8 A 4.2 9.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0					Right		32	0.21	0.0	A	0.0
308 Highway 28 / 55 & 4.3 Avenue Signalized 1 Constraint of the second second second seco				SB	Through	эт	640	0.22	0.0	۸	0.0
308 Highway 28 / 55 & 43 Avenue Signalized ³ Image: constraint intersection in the section in th				55	Pight	21 D	10	0.22	0.0	A	0.0
308 Highway 28 / 55 & 43 A 15.8 High is a signalized is signalized						rsection	10	0.01	0.0	Δ	0.0
308 Highway 28 / 55 & 43 Avenue Signalized 3 EB Through Right 17 29 0.12 7.6 A 0.6 308 Highway 28 / 55 & 43 Avenue Signalized 3 Image: 100 mm of the second						1	78	0.30	13.1	B	15.8
308 Highway 28 / 55 & 4.3 Avenue Signalized ³ Image: constraint of the second of				FB	Through		29	0.13	7.5	A	9.5
308 Highway 28 / 55 & 43 Avenue Signalized ³ ieff Right R					Right	110	35	-	-	-	-
308 Highway 28 / 55 & 4.3 Avenue Signalized 3 WB Through Right R 7.3 0.14 4.4 A A 7.1 309 Avenue Left L 19 0.06 8.9 A 4.2 Right 67 - - - - - - Right 67 -					Left	L	114	0.28	14.0	В	2.2
308 Highway 8/ 10 56 4.3 Avenue Signalized 3 Avenue Signalized 3 Avenue Signalized 3 High 1 R 73 0.14 4.4 A 7.1 Avenue Avenue Fight 1 R 73 0.14 4.4 A 7.1 Avenue Fight 1 R 73 0.014 4.4 A 7.1 Marcine Fight 1 R 67 -				WB	Through	T	49	0.08	11.9	В	10.6
Avenue Avenue<	308	Highway 28 / 55 & 43	Signalized ³		Right	R	73	0.14	4.4	A	7.1
309 52 Avenue & 57 Street (North) Unsignalized Size Control - VBA Approach NB Through (North) TR (H 440 0.33 9.6 A 22.4 309 52 Avenue & 57 Street (North) Indignalized Stop Control - VBA Approach Left L 137 0.38 9.6 A 22.0 311 52 Avenue & 57 Street (South) Unsignalized Stop Control - VBA Approach Left R 72 0.10 2.8 A 52.0 311 52 Avenue & 57 Street (South) Unsignalized Stop Control - VBA Approach Left R 0.13 9.8 A 3.5 311 52 Avenue & 57 Street (South) Unsignalized Stop Control - VBA Approach Left 13 0.13 9.8 A 3.5 311 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Left 13 0.03 A 0.00 4 Left 9 0.01 0.1 A 0.22 52 Avenue & 57 Street (South) Unsignalized Approach Left 1 0.07 1.0		Avenue			Left	L	19	0.05	8.9	Α	4.2
309 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Aproach Unsignalized Stop Control - WB Aproach NB Rept Through 27 474 0.28 A 52.0 310 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Aproach Unsignalized Stop Control - WB Aproach Unsignalized Stop Control - WB Aproach Unsignalized Stop Control - WB Aproach Left 82 0.13 9.8 A 3.5 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - WB Aproach Left 82 0.13 9.8 A 3.5 311 52 Avenue & 57 Street (South) Unsignalized Stop Control - WB Aproach Left 9 0.01 0.1 A 0.0 310 52 Avenue & 67 Street (South) Unsignalized Stop Control - EB Aproach Left 9 0.01 0.1 A 0.2 311 50 Avenue & 57 Street (South) Unsignalized Stop Control - EB Aproach Fight 1 0.07 2.5 A 311 50 Avenue & 57 Street (South) MB Through LT 66 0.01 1.1 A				NB	Through	TTR	464	0.33	9.6	Α	28.4
309 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Approach Left NB Left Nough R 72 0.10 2.8 A 55.0 311 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Approach Left Image and the section 0.13 4.2 A					Right		67	-	-	-	-
309 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Aproach Unsignalized Stop Control - WB Aproach Through Part I (North) I I I I I I I I I I I I I I I I I I I					Left	L	137	0.38	14.2	В	23.0
309 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Approach Unsignalized Fight R Output (North) 72 (North) 0.13 (North) 4.2 (North) A (North) 52 Avenue & 57 Street (North) 310 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Approach Left 0				SB	Through	2T	474	0.29	9.7	A	26.0
309 52 Avenue & 57 Stret (North) Unsignalized Stop Control - WB Approach Left He Left Bight Left Bight Bight Bight					Right	R	72	0.10	2.8	A	5.0
309 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Aproach Left Hight Image Hight Left Hight Image Hight					Overall Inter	rsection	-	0.13	4.2	A	
309 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Approach EB Through Through Left 13 0.13 9.8 A 3.5 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - WB Approach Left 13 0.13 9.8 A 3.5 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Left 9 0.01 0.0 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach VB Left 9 0.01 0.0 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach Left 1 0.07 10.0 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach Left 1 0.07 0.0 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches Left 1 0.00 0.7 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Aprioaches </td <td></td> <td></td> <td></td> <td></td> <td>Left</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					Left						
309 52 Avenue 8.57 Street (North) 52 Avenue 8.57 Street (South) 53 Avenue 8.57 Street (South) 54 Avenue 8.57 Street (South) 55 Avenue 8.57 Street (South)				EB	Through						
309 52 Avenue & 57 Street (North) Unsignalized Stop Control - WB Approach WB Left Through LR 0.13 9.8 A 3.5 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - WB Approach NB 11 31 0.013 9.8 A 3.5 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach NB 11 31 0.08 0.00 A 0.00 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Unsignalized WB 11 0.07 10.0 A 1.8 311 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach WB 11 0.07 10.0 A 1.8 4 1 0.07 10.0 A 1.8 1 1.8 1.8 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach WB 1 1.001 A 0.2 1 1 0.07 0.0 A 0.0 1 1 0.07					Right						
309 52 Avenue & 57 Street (North) Unsignalized spo Control - WB Approach WB Through Right LR Left Le		52 Avenue & 57 Street (North)			Left		82	0.13	9.8	A	3.5
309 (North) Stop Control - WB Approach			Unsignalized	WB	Through	LR					
310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Unsignalized NB NB Left Through Right 1 0.08 0.00 A 0.00 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Verall Intersection 0.07 10.0 A 1.8 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Verall Intersection 0.07 10.0 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach NB Left 46 0.07 10.0 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach NB Through Through Through Coverall Intersection 0.08 6.0 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches NB Left Through Thr	309		Stop Control - WB		Right		13	0.13	9.8	A	3.5
310 52 Avenue & 57 Street (South) Unsignalized Approach Unsignalized Bapproach Unsignalized Approach Unsignalized Approach Unsignalized Approach Unsignalized Bapproach Unsignalized Bapproach <th< td=""><td></td><td>Approach</td><td>ND</td><td>Left</td><td>то</td><td>24</td><td>0.00</td><td>0.0</td><td>^</td><td>0.0</td></th<>			Approach	ND	Left	то	24	0.00	0.0	^	0.0
310 52 Avenue & 57 Street (South) Unsignalized Suppoach Unsignalized Stop Control - EB Approach Unsignalized Might Unsignalized Left Unsignalized (South) Unsignalized Might WB Through Left LT 20 0.01 A 0.02 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach Unsignalized Might Unsignalized Left 46 0.07 2.5 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach SB Through Through Left 1 0.07 2.5 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach EB Through Through Left 1 0.07 10.0 A 0.2 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approach MB Through Through LTR 14 0.01 2.2 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches Right Through SB LTR 14 0.01 2.2 A 0.2 NB Through Thro				IND	Bight	IR	31	0.08	0.0	A	0.0
310 52 Avenue & 57 Street (South) Unsignalized Sup Control - EB Approach Unsignalized Stop Control - EB Approach WB Intersection (South) 100 A 1.8 311 50 Avenue & 59 Street Unsignalized (South) Unsignalized Approach WB Intersection 0.07 2.5 A Intersection 0.07 2.5 A 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Intersection 46 0.07 10.0 A 1.8 MB Left 1 0.07 10.0 A 1.8 MB Left 11 0.01 0.1 A 0.2 MB Left 11 0.01 0.1 A 0.0 MB Left 11 0.00 <t< td=""><td></td><td></td><td></td><td>Loft</td><td></td><td>02</td><td>0.08</td><td>0.0</td><td>A</td><td>0.0</td></t<>					Loft		02	0.08	0.0	A	0.0
310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Unsignalized Stop Control - EB Approach Unsignalized Through (South) Unsignalized (South) Unsignalized (South) Unsignalized (South) WB Through (Lf) LR A 0.07 2.5 A 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Unsignalized Stop Control - EB Approach WB Through Through (Lf) 1 0.07 10.0 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches VB Through Through (Lf) TR 46 0.07 0.0 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches Unsignalized Stop Control - NB/SB Approaches WB Through Through (Lf) Lf 10 0.00 0.7 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches MB Left 12 0.01 0.1 A 0.2 311 50 Avenue & 59 Street Stop Control - NB/SB Approaches Kight 11R 10 </td <td></td> <td></td> <td></td> <td>SB</td> <td>Through</td> <td>IТ</td> <td>20</td> <td>0.01</td> <td>2.4</td> <td>A A</td> <td>0.2</td>				SB	Through	IТ	20	0.01	2.4	A A	0.2
310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Unsignalized Stop Control - Right Left Inrough Inrough LT 46 0.07 2.5 A 311 50 Avenue & 59 Street (South) Unsignalized Stop Control - NB/SB Approach Unsignalized Stop Control - NB/SB Approach Left Inrough 1 0.07 10.0 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches WB Inrough Inrough IT 66 0.01 1.1 A 0.2 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches Unsignalized Stop Control - NB/SB Left 2 0.00 0.0 A 0.0 311 50 Avenue & 59 Street Stop Control - NB/SB Approaches Left 2 0.00 0.0 A 0.0 311 50 Avenue & 59 Street Stop Control - NB/SB Approaches Left 22 0.08 9.5 A 2.2 NB Through LTR 10 0.01 A 0.2 2 A 0.2 S				0D	Right	<u> </u>	20	0.01	2.4	^	0.2
310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Left 46 0.07 10.0 A 1.8 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach WB Left 1 0.07 10.0 A 1.8 310 50 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach WB Image: Control - EB Right NB					Overall Inte	section		0.07	2.5	Α	
310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach EB Through Right LR 0.00 An 1.8 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach WB Through Left 1 0.07 10.0 A 1.8 310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach WB Through Through B 1 0.07 10.0 A 1.8 MB Through Through B Left 11 0.01 0.1 A 0.2 NB Through Through B Left 11 0.01 1.1 A 0.2 NB Through Through B LFt 1 0.01 1.1 A 0.2 NB Through Through B LFt 1 0.00 A 0.0 Stop Control - NB/SB Approaches MB Through Through B LTR 10 0.00 0.7 A 0.2 NB Through Through Through D LTR 14 0.01 2.					Left	0000.011	46	0.07	10.0	A	1.8
310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach Right How Sup Control - EB Approach Right How NB 1 0.07 10.0 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches WB Right How NB 1 0.07 10.0 A 1.8 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches Left How How How How How How How How How How				EB	Through	LR		0.01			
310 52 Avenue & 57 Street (South) Unsignalized Stop Control - EB Approach WB Left Image: Control - EB Right Right Image: Control - EB Right Right Image: Control - EB Right Right Image: Control - EB Right Image: Control - EB Righ					Right		1	0.07	10.0	Α	1.8
$310 \begin{array}{ c c c c c c c c c c c c c c c c c c c$					Left						
310 52 Avenue & 57 Street (South) Stop Control - EB Approach Right Image: Control - EB Approach Right Image: Control - EB Approach 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches Image: Control - NB/SB Approach Right Image: Control - NB/SB Approach		ED Avenue 8 EZ Otreet	Unsignalized	WB	Through						
Approach Left 11 0.01 0.1 A 0.2 NB Through LT 66 0.01 1.1 A 0.2 Right Left 10 0.1 A 0.2 Right Left 0 0 A 0.2 B Through TR 66 0.01 1.1 A 0.2 SB Through TR 46 0.07 0.0 A 0.0 Right 55 0.07 0.0 A 0.0 Right 55 0.07 0.0 A 0.0 B Through Lft 2 0.00 0.0 A 0.0 B Through Lft 10 0.00 0.7 A 0.0 B Right 100 0.00 0.7 A 0.0 B Through LTR 14 0.01 2.2 A 0.2	310	52 Avenue & 57 Street	Stop Control - EB		Right						
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		(Sourr)	Approach		Left		11	0.01	0.1	A	0.2
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				NB	Through	LT	66	0.01	1.1	A	0.2
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$					Right						
SB Through TR 46 0.07 0.0 A 0.0 Right 55 0.07 0.0 A 0.0 Right 55 0.07 0.0 A 0.0 Number of the section 0.08 6.0 A 0.0 S11 50 Avenue & 59 Street Unsignalized Feb Left 2 0.00 0.0 A 0.0 S11 50 Avenue & 59 Street Unsignalized Key Left 110 0.00 0.7 A 0.0 MB Left 12 0.01 0.1 A 0.2 MB MB Left 12 0.01 0.1 A 0.2 NB MB Left 14 0.01 2.2 A 0.2 NB MB Left 22 0.08 9.5 A 2.2 NB MB Left 22 0.08 9.5 A 2.2					Left					-	
311 50 Avenue & 59 Street Unsignalized Approaches WB Right 55 0.07 0.0 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches MB Left 2 0.00 0.0 A 0.0 11 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches WB Left 12 0.01 0.1 A 0.2 11 50 Avenue & 59 Street Stop Control - NB/SB Approaches Left 12 0.01 0.1 A 0.2 11 50 Avenue & 59 Street Stop Control - NB/SB Approaches Left 14 0.01 2.2 A 0.2 11 0.08 9.5 A 2.2 0.08 9.5 A 2.2 11 0.02 9.6 A 0.5 0.5 11 0.02 9.6 A 0.5				SB	Through	TR	46	0.07	0.0	A	0.0
311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches Unsignalized WB Left 2 0.08 6.0 A M 311 50 Avenue & 59 Street Unsignalized EB Left 2 0.00 0.0 A 0.0 311 50 Avenue & 59 Street WB Left 12 0.01 0.1 A 0.2 MB Left 12 0.01 0.1 A 0.2 Right 14 0.01 2.2 A 0.2 Right 19 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 2.2 Right 19 0.02 9.6 A 0.5 Right 1 0.02					Right		55	0.07	0.0	A	0.0
311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches EB Left 2 0.00 0.0 A 0.0 311 50 Avenue & 59 Street Unsignalized Fight 10 0.00 0.7 A 0.0 NB Eff 12 0.01 0.1 A 0.2 Right 14 0.01 2.2 A 0.2 Right 19 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 2.2 BB Through LTR 6 0.02 9.6 A 0.5 Right 1 0.02 9.6 A 0.5 0.5					Overall Inte	section	6	0.08	6.0	A	0.0
311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches LB Inrough Right L1R 10 0.00 0.7 A 0.0 311 50 Avenue & 59 Street Unsignalized Stop Control - NB/SB Approaches WB LEft 12 0.01 0.1 A 0.2 B MB LEft 14 0.01 2.2 A 0.2 Right 19 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 0.5 SB Through LTR 6 0.02 9.6 A 0.5 Right 1 0.02 9.6 A 0.5				F 2	Left	1.70	2	82 0.13 9.8 A 3.5 13 0.13 9.8 A 3.5 31 0.08 0.0 A 0.0 82 0.08 0.0 A 0.0 9 0.01 0.1 A 0.2 20 0.01 2.4 A 0.2 0.07 2.5 A $$			
311 50 Avenue & 59 Street Variable here = 0.5 Avenue & 59 Street Variable = 0.5 Avenue & 50 Street Variable = 0.5 Avenue & 50 Str	311			EB	I nrough	LIK	10	0.00	0.7	A	0.0
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$					Right		10	0.00	0.7	A	0.0
311 50 Avenue & 59 Street Stop Control - NB/SB Approaches WD Hindugin Right LTR 14 0.01 2.2 A 0.2 MB Right 14 0.01 2.2 A 0.2 MB Left 22 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 2.2 Right Left 6 0.02 9.6 A 0.5 Right 1 0.02 9.6 A 0.5			Insignalized	W/R	Through		14	0.01	0.1	A 	0.2
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		50 Avenue & 50 Streat	Ston Control - NR/SP	VVD	Pight	LIK	14	0.01	2.2	A 	0.2
NB Lot 22 0.00 5.5 A 2.2 Right LTR 22 0.08 9.5 A 2.2 Right 19 0.08 9.5 A 2.2 Right 1 0.02 9.6 A 0.5	011		Approaches		l eft		22	0.01	9.5	Δ	2.2
Image: Line Line <thline< th=""> Line Line</thline<>			nppi vaulies	NB	Through	I TR	22	0.08	9.5	A	2.2
Left 6 0.02 9.6 A 0.5 SB Through LTR 6 0.02 9.6 A 0.5 Right 1 0.02 9.6 A 0.5					Right		19	0.08	9.5	A	2.2
SB Through LTR 6 0.02 9.6 A 0.5 Right 1 0.02 9.6 A 0.5					Left		6	0.02	9.6	A	0.5
Right 1 0.02 9.6 A 0.5				SB	Through	LTR	6	0.02	9.6	A	0.5
					Right		1	0.02	9.6	A	0.5

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inter	rsection		0.12	7.2	A	
				Left		22	0.02	0.1	A	0.4
			EB	Through	LTR	5	0.02	3.4	A	0.4
				Right		22	0.02	3.4	A	0.4
		Lingingalized		Lett		8	0.01	0.0	A	0.1
212	EQ Avenue & EZ Street	Unsignalized	WB	Inrough	LIR	8	0.01	1.8	A	0.1
312	50 Avenue & 57 Street	Approaches		Right		18	0.01	1.8	A R	0.1
		Approacties	NB	Through	ITR	37	0.12	10.4	B	3.4
			i i b	Right	LIIX	8	0.12	10.4	B	3.4
				Left		5	0.06	9.5	A	1.7
			SB	Through	LTR	21	0.06	9.5	A	1.7
				Right		21	0.06	9.5	Α	1.7
				Overall Inter	rsection		0.73	16.0	С	
				Left		45	0.73	20.2	С	-
			EB	Through	LTTR	775	0.73	18.6	С	-
				Right		17	0.68	17.1	С	-
		Option 1: Convert to 4-		Left		1	0.33	10.5	В	-
040	Centre Avenue & 59	way stop. Provide	WB	Through	LTTR	353	0.35	10.6	В	-
313	Street	additional lane on		Right		13	0.35	10.7	В	-
		EB/WB approaches.	NB	Through	ITD	5	0.03	9.5	A	-
			IND	Right	LIK	7	0.03	9.5	A	-
				Left		17	0.05	9.8	A	-
			SB	Through	I TR	5	0.00	9.8	A	-
				Right		6	0.06	9.8	A	-
				Overall Inter	rsection		0.87	17.6	В	
				Left		45	-	-	-	-
			EB	Through	LTR	775	0.87	21.9	С	#229.6
				Right		17	-	-	-	-
				Left		1	-	-	-	-
	Centre Avenue & 59 Street	Option 2: Signalize	WB	Through	LTR	353	0.37	7.3	A	52.0
313		intersection		Right		13	-	-	-	-
				Left		5	-	-	-	-
			NB	Inrough	LIK	5	0.06	20.5	C	6.8
				Right		17	-	-	-	-
			SB	Through	I TR	5	0 11	23.4	- C	- 10.2
			00	Right	LIIX	6	-	-	-	-
				Overall Inter	rsection	Ŭ	0.81	19.8	С	
				Left		44	0.81	26.8	D	-
			EB	Through	LTTR	808	0.81	24.4	С	-
				Right		17	0.75	22.0	С	-
		Option 1: Convert to 4-		Left		37	0.43	12.7	В	-
	Centre Avenue & 57	way stop Provide	WB	Through	LTTR	351	0.43	12.3	В	-
314	Street	additional lane on		Right		32	0.41	11.9	В	-
	2	EB/WB approaches.		Left		5	0.08	9.9	A	-
			NB	Through	LTR	6	0.08	9.9	A	-
				Right		27	0.08	9.9	A	-
			SP	Lett	I TD	26	0.11	10.4	B	-
			30	Right	LIK	9	0.11	10.4	B	-
					rsection	17	0.11	17.9	B	-
				Left	000001	44	0.00	-	-	-
			EB	Through	LTR	808	0,88	22.6	С	#244 7
				Right	_//\	17	-	-	-	-
				Left		37	-	-	-	-
	Contro Avenue 9 57	Option 2: Circoling	WB	Through	LT	351	0.44	8.3	A	61.2
314	Centre Avenue & 57	intersection		Right	R	32	0.04	2.3	А	3.3
	Sireet	Intersection		Left		5	-	-	-	-
			NB	Through	LTR	6	0.14	14.4	В	9.1
				Right		27	-	-	-	-
			L	Left		26	-	-	-	-
			SB	Through	LTR	9	0.22	21.9	С	14.4
				Right		17	-	-	-	-

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inter	rsection		0.13	1.8	A	
				Left						
			EB	Through	TR	143	0.13	0.0	A	0.0
				Right		46	0.13	0.0	A	0.0
		Lingingalized		Left	1.7	3	0.00	0.0	A	0.1
315	54 Avenue & 51 Street	Stop Control - NB	VVD	Right	LI	114	0.00	0.2	A	0.1
515	34 Avenue & 31 Street	Approach		Left		56	0.10	11 1	B	27
		, approach	NB	Through	LR		0.10		1	£.1
				Right		1	0.10	11.1	В	2.7
				Left						
			SB	Through						
				Right						
				Overall Inter	rsection		0.16	3.1	A	
			50	Left	1.75	71	0.07	0.7	A	1.8
			EB	Through	LIR	270	0.07	2.2	A	1.8
				Right		15	0.07	2.2	A	1.8
		Unsignalized	WB	Through	I TR	2 231	0.00	0.0	A	0.0
316	50 Avenue & 53 Street	Stop Control - NB/SB	WB	Right	LIIX	19	0.00	0.1	A	0.0
		Approach		Left		14	0.09	18.2	C	2.3
			NB	Through	LTR	3	0.09	18.2	C	2.3
				Right		6	0.09	18.2	С	2.3
				Left		21	0.16	15.9	С	4.7
			SB	Through	LTR	3	0.16	15.9	С	4.7
				Right		32	0.16	15.9	С	4.7
				Overall Inter	rsection		0.45	11.1	В	
				Left	1.75	48	0.45	12.0	В	-
			EB	Inrough	LIK	208	0.45	12.0	В	-
				Right		18	0.45	12.0	В	-
		Unsignalized	W/B	Leit	I TD	20	0.38	11.1	B	-
317	50 Avenue & 52 Street	Stop Control - All	WB	Right	LIIX	39	0.38	11.1	B	-
0.1.		Approaches		Left		26	0.15	9.6	A	-
			NB	Through	LTR	31	0.15	9.6	A	-
				Right		24	0.15	9.6	A	-
				Left		47	0.23	10.1	В	-
			SB	Through	LTR	35	0.23	10.1	В	-
				Right		48	0.23	10.1	В	-
				Overall Inter	rsection		0.47	11.2	В	
				Left		62	0.47	12.5	В	-
			ED	I nrougn Bight	LIK	211	0.47	12.5	B	-
						19	0.47	12.5	B	-
		Unsignalized	WB	Through	I TR	164	0.33	10.0	B	-
318	50 Avenue & 51 Street	Stop Control - All		Right		26	0.33	10.6	В	- 1
-		Approaches		Left		28	0.14	9.5	Ā	-
			NB	Through	LTR	28	0.14	9.5	A	-
				Right		23	0.14	9.5	А	-
				Left		74	0.23	10.3	В	-
			SB	Through	LTR	32	0.23	10.3	В	-
L				Right		24	0.23	10.3	B	-
				Overall Inter	section	0	0.46	10.9	В	
			ED	Lett		U 102	-	-	- D	-
			LD	Right	LIK	193	0.40	11.4	D R	-
		Unsignalized		Left		83	0.40	10.4	B	-
		Stop Control -	WB	Through	LTR	112	0.32	10.4	В	-
319	50 Avenue & 50 Street	EB/WB/NB Approaches		Right		0	-	-	-	-
		Assumed Yield Control -		Left		83	0.31	10.4	В	-
		SB Approach	NB	Through	LTR	0	-	-	-	-
				Right		109	0.31	10.4	В	-
				Left		0	-	-	-	-
			SB	Through	LTR	0	-	-	-	-
				Right		0	-	-	-	-

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inter	rsection		0.32	5.5	A	
				Left		50	0.04	0.4	A	1.1
			EB	Through	LTR	253	0.04	1.5	A	1.1
				Right		25	0.04	1.5	A	1.1
				Left		23	0.02	0.2	A	0.5
		Unsignalized	WB	Through	LTR	135	0.02	1.2	A	0.5
320	50 Avenue & 49 Street	Stop Control - NB/SB		Right		29	0.02	1.2	A	0.5
		Approaches		Left		10	0.19	15.5	C	5.5
			NB	Through	LIR	28	0.19	15.5	C	5.5
				Right		31	0.19	15.5	C Q	5.5
			00	Left	1 7 0	40	0.32	17.6	C Q	10.9
			56	Inrougn	LIR	23	0.32	17.6	ι C	10.9
						53	0.32	17.6		10.9
				Overall Inter	section	24	0.08	2.1	A	0.7
			EB	Leit	ITD	34	0.03	0.3	A	0.7
			ED	Bight	LIK	201	0.03	1.0	A	0.7
				Loft		30	0.03	0.1	A	0.7
		Insignalized	WB	Through	I TR	146	0.01	0.1	A .	0.2
321	50 Avenue & 45 Street	Stop Control - NB/SB	WB	Right	LIN	140	0.01	0.4	Δ	0.2
021		Approaches		Left		14	0.01	13.6	B	2.1
		, pp. edenee	NB	Through	I TR	3	0.08	13.6	B	2.1
				Right	Ent	14	0.08	13.6	B	21
				Left		9	0.06	12.3	B	1.6
			SB	Through	LTR	4	0.06	12.3	B	1.6
			_	Right		15	0.06	12.3	B	1.6
				Overall Inte	rsection		0.08	2.9	A	
				Left		72	0.06	0.5	A	1.5
			EB	Through	LT	168	0.06	2.7	A	1.5
				Right						
				Left						
		Unsignalized	WB	Through	TR	106	0.08	0.0	А	0.0
322	50 Avenue & 41 Street	Stop Control - SB		Right		8	0.08	0.0	A	0.0
		Approaches		Left						
			NB	Through						
				Right						
				Left		14	0.08	10.4	В	2.2
			SB	Through	LR					
				Right		38	0.08	10.4	В	2.2
				Overall Inte	rsection		0.11	5.3	A	
				Left		82	0.06	0.5	A	1.5
			EB	Through	LT	69	0.06	4.3	A	1.5
				Right						
				Left						
	50 Avenue / Twp Rd 630	Unsignalized	WB	Through	TR	26	0.03	0.0	A	0.0
323	& "Baywood Road" / RR	Stop Control - SB		Right		11	0.03	0.0	A	0.0
	20	Approaches		Left						
			NB	Through						
				Right		40	0.44	0.4	•	
			CD.	Lett	10	18	0.11	9.4	A	3.0
			56	Inrougn	LR	70	0.11	0.4	^	2.0
				Right Overall Inte	racetion	70	0.11	9.4	A	3.0
					5801011		0.54	ō.4	A	
			FR	Through	TD	657	0.54	0.4	۸	102.0
				Right	л	6	0.04	3.4	A	102.9
					1	5	- 0.01	64	-	- 17
			WR	Through	Т	268	0.01	5.4	Δ	31.5
401	Kingsway & Medley	Signalized ³	,,,,,	Right	1	200	0.22	0.0	A	J1.J
101	Road	Signalized		Left		16	0 11	10.9	R	80
			NB	Through	I R			10.0		0.0
1				Right		20	-	-	-	-
			├ ───┼	Left		-~				
			SB	Through						
				Right						
P										

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inte	rsection		0.74	13.6	В	
				Left	L	153	0.33	10.5	В	21.7
			EB	Through	Т	608	0.74	17.1	В	92.6
				Right						
		Signalized ³		Left						
	Kingowov & Clonwood		WB	Through	Т	261	0.32	9.4	A	30.9
402	Ningsway & Gieriwood			Right	R [C]	107	0.15	2.0	A	5.4
	Drive (East)			Left						
			NB	Through						
				Right						
				Left		131	0.29	18.9	В	29.5
			SB	Through	LR					
				Right		1	-	-	-	-
				Overall Inter	rsection		0.51	0.4	А	
				Left						
			EB	Through	TR	749	0.51	0.0	Α	0.0
				Right		1	0.51	0.0	Α	0.0
				Left	L	5	0.01	9.8	А	0.2
	Kingewey & Clenwood	Unsignalized	WB	Through	Т	257	0.18	0.0	A	0.0
403	Ningsway & Gieriwood	Stop Control - NB/SB		Right						
	Drive (west)	Approaches		Left	L	6	0.04	20.6	С	1.1
			NB	Through						
				Right	R	11	0.04	20.6	С	1.1
				Left						
			SB	Through						
				Right	R	0	-	-	-	-
			Overall Inter	rsection		0.45	10.2	В		
				Left	L	20	0.05	9.7	Α	4.4
			EB	Through	TR	277	0.45	13.4	В	37.6
				Right		10	-	-	-	-
				Left	1	66	0.21	11 7	В	11.2
			WB	Through	TR	161	0.34	11.1	В	25.7
404	Kingsway & Limberline Drive	Signalized ³		Right		49	-	-	-	-
-		-		Left		6	-	-	-	-
			NB	Through	LT	5	0.02	9.3	А	3.0
				Right	R	161	0.27	3.1	Α	8.1
				Left		51	-	-	-	-
			SB	Through	LTR	4	0.12	9.6	А	9.3
				Right		5	-	-	-	-
				Overall Inter	rsection		0.26	8.7	А	
				Left		3	0.08	8.6	A	-
			EB	Through	LTR	45	0.08	8.6	A	-
				Right		0	-	-	-	-
				Left		24	0.23	8.8	А	-
		Unsignalized	WB	Through	LTR	61	0.23	8,8	A	-
405	Kingsway & Queenswav	Stop Control - All		Riaht		70	0.23	8.8	A	-
	U U U U U U U U U U	Approaches		Left		3	0.26	8.7	A	-
			NB	Through	LTR	57	0.26	8.7	А	-
				Right		127	0.26	8,7	A	-
				Left		89	0.16	8.8	A	-
			SB	Through	LTR	9	0.16	8.8	A	-
				Right		2	0.16	8.8	A	-
				Overall Inte	rsection	•	0.10	8,3	Α	
				Left		14	0.10	9,9	A	2.8
			EB	Through	LTR	46	0.10	9,9	9 B 29.5 - - - A 0.0 6 C 1.1 6 C 1.1 6 C 1.1 6 C 1.1 7 A 4.4 4 B 37.6 - - - 7 B 11.2 1 B 25.7 - - - 3 A 3.0 1 A 8.1 - - - - - - 3 A - 3 A - 3 A - 3 A<	
				Right		14	0.10	9,9	A	2.8
				Left		9	0.09	10.0	В	2.3
		Unsignalized	WB	Through	LTR	49	0.09	10.0	B	2.3
406	Kingsway & Tennis Court	Stop Control - EB/WB		Right	2.11	1	0.09	10.0	B	2.3
	Road	Approaches		Left		24	0.02	0.1	A	0.4
			NB	Through	LTR	7	0.02	4.0	A	0.4
				Right		13	0.02	4.0	A	0.4
				Left		0	-	-	-	-
			SB	Through	I TR	0	-	-	-	_
				Right	2.11	5	0.00	0.0	Α	0.0
L				rugin		5	0.00	0.0	~	0.0

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
				Overall Inter	rsection		0.02	1.4	A	
				Left		1	0.00	0.0	A	0.0
			EB	Through	LTR	46	0.00	0.2	A	0.0
				Right		1	0.00	0.2	2 A	0.0
		Unsignalized Stop Control - EB/WB Approaches		Left		1	0.00	0.0	A	0.0
	Queensway & Tennis		WB	Through	LTR	68	0.00	0.1	A	0.0
407				Right		5	0.00	0.1	A	0.0
	Court Road			Left		7	0.02	9.4	A	0.5
			NB	Through	LTR	3	0.02	9.4	A	0.5
				Right		5	0.02	9.4	A	0.5
				Left		2	0.01	9.1	A	0.2
			SB	Through	LTR	0	-	-	-	-
				Right		3	0.01	9.1	А	0.2

1. Assumed same timing plan as Highway 28 & 54 Avenue Timing Plan sent from City - May 13, 2010 2. Assume timing plan as per Timing Plan sent from City - May 13, 2010

3. Assumed timing plan from existing 2010 horizon - same timing plan as Highway 28 & 50 Avenue Timing Plan sent from City - August 31, 2010

B Appendix B - Transportation Study Collision History Review and Analysis

Technical Memorandum

City of Cold Lake

Transportation Study Collision History Review and Analysis

April 2011



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Introduction

The City of Cold Lake (City) is located 287 km northeast of the City of Edmonton in Alberta and was formed in 1996 by merging three municipalities, namely Grand Centre, Medley (Canadian Forces Base W4) and Cold Lake. Grand Centre was subsequently renamed Cold Lake South (CLS) and the original Cold Lake is now known as Cold Lake North (CLN).

The City has experienced noticeable growth in recent years. According to municipal census the City had a population of 11,991 in 2006 and 13,924 in 2009. This corresponds to a 5.4% linear growth annually. Current transportation improvements within the City have been based on the previous transportation study completed in 2000 and is no longer considered representative of the actual transportation network required to address current and future transportation needs.

In light of the continuing accelerated pace of development in the region and the need to rationalize and identify the transportation network requirements for the City, including surrounding rural municipalities and counties, the existing transportation plan requires a comprehensive update.

1.1 STUDY BACKGROUND

Associated Engineering (AE) was retained by the City to update the existing transportation study. The purpose of the transportation study is to provide a comprehensive long-range plan that integrates the transportation infrastructure with requirements of the existing and future land uses. The transportation study will provide the City with a blueprint on which to plan and implement specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15-year, and 20-year planning horizons.

One component of the transportation study was to review the City's collision history and identify high collision locations. The collision data was also analyzed at the high collision locations to determine potential safety concerns. This technical memorandum documents the review of the collision history and the collision analysis completed for the locations with high collision rates.

1.2 STUDY METHODOLOGY

The following tasks were completed for the collision history review and analysis:

- Collect and review collision data
- Identify high collision locations
- Determine collision distribution patterns at high collision locations
- Determine potential safety concerns at high collision locations
- Recommend improvement options at the Chrysler intersection
- Produce draft and final report.



2 Collision Data

Collision data was obtained from Alberta Transportation (AT) for collisions which occurred in the City between 2005 and 2009. A total of 2,079 collisions were identified within the 5-year timeframe.

The collision data was analyzed to determine the number of collisions which occurred at each intersection within the City limits, over the 5-year timeframe. Following this exercise, it was discovered that eight (8) of the 2,079 collisions occurred outside the City limits; therefore, a total of 2,071 collisions occurred in Cold Lake between 2005 and 2009. Table 2.1 presents a breakdown of the collisions by year, over the 5-year timeframe.

VEAD	NUMBER OF	NUMBER OF COLLISIONS				
TEAN	COLLISIONS	WITHIN CITY	OUTSIDE CITY			
2005	326	326	0			
2006	368	363	5			
2007	436	434	2			
2008	515	514	1			
2009	434	434	0			
TOTAL	2,079	2,071	8			

Table 2.1Breakdown of Collisions by Year (2005 – 2009)

Intersections with five or more collisions within the 5-year timeframe have been summarized in Table 2.2. The intersections listed in the table have been organized in descending order to present intersections with higher collision frequency first.



RANK	INTERSECTION	5 YEAR TOTAL	2005	2006	2007	2008	2009
1	HWY 28 & 54 AVENUE	42	10	11	9	11	1
-	HWY 28 & UNKNOWN	38	5	11	5	12	5
2	HWY 28 & TRI CITY MALL INTERSECTION	29	6	6	7	9	1
3	HWY 28 & 50 AVENUE	25	14	3	4	4	0
	55 STREET & 54 AVENUE		0	5	5	4	7
4	55A STREET & 54 AVENUE	2	0	0	0	1	1
	COMBINED 55/55A STREET & 54 AVENUE	23	0	5	5	5	8
5	50 STREET & 50 AVENUE	13	2	1	5	3	2
6	50 STREET & 46 AVENUE	13	4	3	2	3	1
7	50 STREET & HWY 28	13	5	2	2	4	0
8	51 STREET & 50 AVENUE	13	1	4	2	5	1
9	50 STREET & 43 AVENUE	11	3	2	2	3	1
10	52 STREET & 50 AVENUE	11	4	2	2	1	2
11	49 STREET & 51 AVENUE	10	2	1	2	0	5
12	HWY 28 & 43 AVENUE	10	1	5	0	3	1
13	HWY 28 & 55 AVENUE	10	1	2	3	3	1
14	HWY 28 & 52 AVENUE		1	2	2	4	0
15	HWY 28 & 40 AVENUE	9	0	3	2	2	2
16	16 STREET & 8 AVENUE	8	0	2	1	2	3
17	HWY 28 & 16 AVENUE	8	0	3	3	1	1
18	55 STREET & 50 AVENUE	7	1	0	3	2	1
19	HWY 28 & 61 AVENUE	7	1	3	1	1	1
20	HWY 28 & 75 AVENUE (IMPERIAL PARK ROAD)	7	1	1	5	0	0
21	50 STREET & WAL-MART ENTRANCE	7	0	3	1	3	0
22	50 STREET & 48 AVENUE	7	0	0	3	2	2
23	10 STREET & 8 AVENUE	6	2	0	3	1	0
24	16 STREET & 5 AVENUE	6	2	0	0	2	2
25	HWY 28 & 47 AVENUE	6	1	2	0	3	0
26	HWY 28 & 57 AVENUE	6	2	0	1	3	0
27	12 STREET & 8 AVENUE	5	1	1	1	1	1
28	25 STREET & HWY 28	5	1	0	1	1	2
29	45 STREET & 50 AVENUE		1	0	1	1	2

Table 2.2Intersections with Five or More Collision (2005 - 2009)



RANK	INTERSECTION	5 YEAR TOTAL	2005	2006	2007	2008	2009
30	52 STREET & HWY 28	5	1	2	2	0	0
31	HWY 28 & 46 AVENUE	5	1	0	2	1	1
32	16 STREET & 16 AVENUE	5	0	2	2	1	0
33	49 STREET & 50 AVENUE	5	0	1	0	2	2
34	53 STREET & 50 AVENUE	5	0	2	0	1	2
35	HWY 28 & ENERGY CENTRE ROAD (78 AVENUE)	5	0	0	1	0	4

The 'Highway 28 & Unknown' intersection represents collisions which were known to have occurred at an intersection along Highway 28 but where the cross street was unknown. After sorting the data it is unclear if the 38 collisions occurred at one or more intersections. For this reason, the Highway 28 & unknown intersection was excluded from the list of high collision locations.

The intersections of 55 Street/54 Avenue and 55A Street/54 Avenue were considered to be one intersection. Both 55 Street and 55A Street were used interchangeably to identify the service roads located on either side of Highway 28, between 57 Avenue and 50 Avenue. It was unclear whether the intersection of 55 Street/54 Avenue applied to the intersection west of Highway 28, and 55A Street/54 Avenue applied to the intersection west of Highway 28, and 55A Street/54 Avenue applied to the intersection east of Highway 28, or vice versa.

49 Street and 51 Avenue is an offset intersection; the westbound approach is located approximately 80 m north of the eastbound approach. The collision data did not differentiate between collisions which occurred on 49 Street and the westbound approach of 51 Avenue and 49 Street and the eastbound approach of 51 Avenue. For this reason, the intersections were treated as one.

Intersections with 10 or more collisions within the 5-year timeframe were identified as high collision locations within the City and selected for further collision analysis. Thirteen intersections met the criteria and have been highlighted in Table 2.2 above and presented in Figure 2.1.





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DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	

3

Collision Analysis

The collision data for each high collision location was extracted and provided in Appendix A. The data was further analyzed to determine collision distribution patterns in accordance with the Transportation Association of Canada's The Canadian Guide to In-Service Road Safety Reviews (TAC Guide). The collision distribution patterns analyzed include:

- Temporal collision distributions By year, by month, by day, and by hour
- Type and cause distributions By type, by cause, and by severity
- Environmental distributions By weather conditions, by road surface condition, and by light condition.

The detailed collision analysis completed for each location has been included in Appendix B and summarized in the following sections. The 5-year collision data was analyzed collectively for each location, aside from the collision distribution pattern by year.

3.1 HIGHWAY 28 AND 54 AVENUE

Highway 28 and 54 Avenue had a total of 42 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: Between 2005 and 2008, the number of collisions remained relatively constant with an average of 10 collisions each year. In 2009, there was one collision.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 45% in winter versus 33% in summer.
- By Day: The majority of collisions (86%) occurred during the weekday. The highest collision frequency occurred on Friday (21%).
- By Hour: The highest number of collisions occurred between 5:00 p.m. and 6:00 p.m. (17%). The majority of collisions (64%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision types were 'Left Turn Across Path' (33%) and 'Rear End' (33%).
- By Cause: The predominant collision cause was 'Left Turn Across Path' (21%).
- By Severity: The majority of collisions (79%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (71%) occurred when the weather was clear.



- By Road Surface Condition: Most collisions (45%) occurred when the road surface was dry.
- By Light Condition: The majority of collisions (81%) occurred during daylight.

3.2 HIGHWAY 28 AND TRI CITY MALL

Highway 28 and Tri City Mall had a total of 29 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: Between 2005 and 2008, the number of collisions remained relatively constant with an average of 7 collisions each year. In 2009, there was only one collision.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 59% in winter versus 21% in summer.
- By Day: The majority of collisions (83%) occurred during the weekday. The highest collision frequency occurred on Friday (31%).
- By Hour: The highest number of collisions occurred between 12:00 p.m. and 1:00 p.m. (21%). The majority of collisions (59%) occurred during the afternoon period (between 1:00 p.m. and before 7:00 p.m.).
- By Type: The predominant collision type was 'Rear-End' (69%).
- By Cause: The predominant collision cause was 'Followed Too Closely' (34%).
- By Severity: The majority of collisions (90%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (76%) occurred when the weather was clear.
- By Road Surface Condition: Most collisions (45%) occurred when there was slush/snow/ice on the road surface.
- By Light Condition: The majority of collisions (83%) occurred during daylight.

3.3 HIGHWAY 28 AND 50 AVENUE

Highway 28 and 50 Avenue had a total of 25 collisions between 2005 and 2009. The key findings from the collision analysis were:

• By Year: Between 2006 and 2008, the number of collisions remained relatively constant with an average of 4 collisions each year. In 2005, there were 14 collisions and in 2009, there were no collisions.



- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 40% in winter versus 28% in summer.
- By Day: The majority of collisions (92%) occurred during the weekday. The highest collision frequency occurred on Thursday (32%).
- By Hour: The highest number of collisions occurred between 7:00 a.m. and 8:00 a.m., between 12:00 p.m. and 1:00 p.m., and between 2:00 p.m. and 3:00 p.m. (12% each). The morning period (between 6:00 a.m. and 12:00 p.m.) and the afternoon period (between 1:00 p.m. and 7:00 p.m.) experienced the same number of collisions (36%).
- By Type: The predominant collision type was 'Rear End' (36%).
- By Cause: The predominant collision cause was 'Left Turn Across Path' (16%).
- By Severity: The majority of collisions (80%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (68%) occurred when the weather was clear.
- By Road Surface Condition: Most collisions (44%) occurred when the road surface was dry.
- By Light Condition: The majority of collisions (80%) occurred during daylight.

3.4 55/55A STREET AND 54 AVENUE

55/55A Street and 54 Avenue had a total of 23 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: Between 2006 and 2008, the number of collisions remained constant at 5 collisions each year. In 2005, there were zero collisions and in 2009, there were 8 collisions.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 52% in winter versus 26% in summer.
- By Day: The majority of collisions (91%) occurred during the weekday. The highest collision frequency occurred on Monday (26%).
- By Hour: The highest number of collisions occurred between 5:00 p.m. and 6:00 p.m. (17%). The majority of collisions (57%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Rear End' (26%).

- By Cause: The predominant collision cause was 'Improper Turn' (13%).
- By Severity: The majority of collisions (83%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (57%) occurred when the weather was clear.
- By Road Surface Condition: The majority of collisions (52%) occurred when there was slush/snow/ice on the road surface.
- By Light Condition: The majority of collisions (65%) occurred during daylight.

3.5 50 STREET AND 50 AVENUE

50 Street and 50 Avenue had a total of 13 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There were 2 collisions in 2005, 1 collision in 2006, 5 collisions in 2007, 3 collisions in 2008, and 2 collisions in 2009.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 46% in winter versus 31% in summer.
- By Day: The majority of collisions (77%) occurred during the weekday. The highest collision frequency occurred on Friday (46%).
- By Hour: The highest number of collisions occurred between 6:00 p.m. and 7:00 p.m. (23%). The majority of collisions (62%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Rear End' (38%).
- By Cause: The predominant collision cause was 'Backed Unsafely' (31%).
- By Severity: The majority of collisions (85%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (85%) occurred when the weather was clear.
- By Road Surface Condition: The majority of collisions (62%) occurred when the road surface was dry.
- By Light Condition: The majority of collisions (77%) occurred during daylight.


3.6 50 STREET AND 46 AVENUE

50 Street and 46 Avenue had a total of 13 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There were 4 collisions in 2005, 3 collisions in 2006, 2 collisions in 2007, 3 collisions in 2008, and 1 collision in 2009.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 38% in winter versus 15% in summer.
- By Day: The majority of collisions (69%) occurred during the weekday; however, the highest collision frequency occurred on Saturday (23%).
- By Hour: The highest number of collisions occurred between 5:00 p.m. and 6:00 p.m. (23%). The majority of collisions (69%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Rear End' (38%).
- By Cause: The predominant collision cause was 'Followed Too Closely' (15%).
- By Severity: All the collisions were property damage only.
- By Weather: The majority of collisions (62%) occurred when the weather was clear.
- By Road Surface Condition: Most of the collisions (46%) occurred when the road surface was dry.
- By Light Condition: The majority of collisions (62%) occurred during daylight.

3.7 HIGHWAY 28 AND 50 STREET

Highway 28 and 50 Street had a total of 13 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There were 5 collisions in 2005, 2 collisions in 2006, 2 collisions in 2007, 4 collisions in 2008, and no collisions in 2009.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 54% in winter versus 8% in summer.
- By Day: The majority of collisions (85%) occurred during the weekday.

- By Hour: The highest number of collisions occurred between 8:00 a.m. and 9:00 a.m., and between 11:00 a.m. and 12:00 p.m. (15% each). The majority of collisions (54%) occurred during the morning period (between 6:00 a.m. and 12:00 p.m.).
- By Type: The predominant collision type was 'Rear End' (46%).
- By Cause: The predominant collision causes were 'Stop Sign Violation', 'Followed Too Closely' and "Improper Lane Change' (8% each).
- By Severity: The majority of collisions (85%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (62%) occurred when the weather was clear.
- By Road Surface Condition: Most of the collisions (46%) occurred when there was slush/snow/ice on the road surface.
- By Light Condition: The majority of collisions (69%) occurred during daylight.

3.8 51 STREET AND 50 AVENUE

51 Street and 50 Avenue had a total of 13 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There was 1 collision in 2005, 4 collisions in 2006, 2 collisions in 2007, 5 collisions in 2008, and 1 collision in 2009.
- By Month: More collisions occurred during the summer months (May to August) than the winter months (November to February); 38% in summer versus 15% in winter.
- By Day: The majority of collisions (85%) occurred during the weekday. The highest collision frequency occurred on Friday (23%).
- By Hour: The highest number of collisions occurred between 4:00 p.m. and 5:00 p.m. (31%). The majority of collisions (77%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Backing' (62%).
- By Cause: The predominant collision cause was 'Backed Unsafely' (54%).
- By Severity: All the collisions were property damage only.
- By Weather: All the collisions occurred when the weather was clear.



- By Road Surface Condition: The majority of collisions (85%) occurred when the road surface was dry.
- By Light Condition: The majority of collisions (77%) occurred during daylight.

3.9 50 STREET AND 43 AVENUE

50 Street and 43 Avenue had a total of 11 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There were 3 collisions in 2005, 2 collisions in 2006, 2 collisions in 2007, 3 collisions in 2008, and 1 collision in 2009.
- By Month: More collisions occurred during the summer months (May to August) than the winter months (November to February); 36% in summer versus 27% in winter.
- By Day: The majority of collisions (55%) occurred during the weekday; however, the highest collision frequency occurred on Sunday (27%).
- By Hour: The highest number of collisions occurred between 3:00 p.m. and 4:00 p.m. (27%). The majority of collisions (64%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Right Angle' (36%).
- By Cause: The predominant collision cause was 'Stop Sign Violation' (18%).
- By Severity: The majority of collisions (82%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (55%) occurred when the weather was clear.
- By Road Surface Condition: Most of the collisions (45%) occurred when the road surface was dry.
- By Light Condition: The majority of collisions (82%) occurred during daylight.

3.10 52 STREET AND 50 AVENUE

52 Street and 50 Avenue had a total of 11 collisions between 2005 and 2009. The key findings from the collision analysis were:

• By Year: There were 4 collisions in 2005, 2 collisions in 2006, 2 collisions in 2007, 1 collision 2008, and 2 collisions in 2009.

- By Month: More collisions occurred during the summer months (May to August) than the winter months (November to February); 55% in summer versus 28% in winter.
- By Day: All the collisions occurred during the weekday. The highest collision frequency occurred on Monday (36%).
- By Hour: The highest number of collisions occurred between 12:00 p.m. and, 1:00 p.m. and between 1:00 p.m. and 2:00 p.m. (18% each). Most collisions (36%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Backing' (55%).
- By Cause: The predominant collision cause was 'Backed Unsafely' (45%).
- By Severity: The majority of collisions (82%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (82%) occurred when the weather was clear.
- By Road Surface Condition: The majority of collisions (64%) occurred when the road surface was dry.
- By Light Condition: The majority of collisions (82%) occurred during daylight.

3.11 49 STREET AND 51 AVENUE

49 Street and 51 Avenue had a total of 10 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There were 2 collisions in 2005, 1 collision in 2006, 2 collisions in 2007, no collisions in 2008, and 5 collisions in 2009.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 70% in winter versus 10% in summer.
- By Day: The majority of collisions (60%) occurred during the weekday.
- By Hour: The highest number of collisions occurred between 5:00 p.m. and 6:00 p.m. (30%). Most collisions (50%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision types were 'Struck Object' (33%) and 'Right Angle' (33%).
- By Cause: The predominant collision cause was 'Followed Too Closely' (20%).



- By Severity: The majority of collisions (80%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (70%) occurred when the weather was clear.
- By Road Surface Condition: The majority of collisions (80%) occurred when there was slush/snow/ice on the road surface.
- By Light Condition: The majority of collisions (70%) occurred during daylight.

3.12 HIGHWAY 28 AND 43 AVENUE

Highway 28 and 43 Avenue had a total of 10 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There was 1 collision in 2005, 5 collisions in 2006, no collisions in 2007, 3 collisions in 2008, and 1 collision in 2009.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 70% in winter versus 10% in summer.
- By Day: The majority of collisions (80%) occurred during the weekday. The highest collisions frequency occurred on Thursday (30%).
- By Hour: The highest number of collisions occurred between 1:00 p.m. and 2:00 p.m., and between 6:00 p.m. and 7:00 p.m. (20% each). The majority of collisions (70%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Rear End' (60%).
- By Cause: The predominant collision cause was 'Followed Too Closely' (30%).
- By Severity: The majority of collisions (80%) were property damage only. There were no fatalities.
- By Weather: The majority of collisions (60%) occurred when the weather was clear.
- By Road Surface Condition: Half the collisions occurred when there was slush/snow/ice on the road surface.
- By Light Condition: The majority of collisions (60%) occurred during daylight.

3.13 HIGHWAY 28 AND 55 AVENUE

Highway 28 and 55 Avenue had a total of 10 collisions between 2005 and 2009. The key findings from the collision analysis were:

- By Year: There was 1 collision in 2005, 2 collisions in 2006, 3 collisions in 2007, 3 collisions in 2008, and 1 collision in 2009.
- By Month: More collisions occurred during the winter months (November to February) than the summer months (May to August); 70% in winter versus 10% in summer.
- By Day: The majority of collisions (90%) occurred during the weekday.
- By Hour: The highest number of collisions occurred between 3:00 p.m. and 4:00 p.m., between 4:00 p.m. and 5:00 p.m., and 6:00 p.m. and 7:00 p.m. (20% each). The majority of collisions (80%) occurred during the afternoon period (between 1:00 p.m. and 7:00 p.m.).
- By Type: The predominant collision type was 'Rear End' (40%).
- By Cause: The predominant collision causes were 'Followed Too Closely' (30%) and 'Left Turn Across Path' (30%).
- By Severity: The majority of collisions (70%) were property damage only. There were no fatalities.
- By Weather: Half the collisions occurred when the weather was clear.
- By Road Surface Condition: Half the collisions occurred when there was slush/snow/ice on the road surface.
- By Light Condition: The majority of collisions (80%) occurred during daylight



4

Potential Safety Concerns

Potential safety concerns at each high collision location were identified, where possible, from the patterns identified from the collision analysis. In general, the potential safety issues identified in this section are non-conclusive since the collision data did not provide enough detail, with regards to travel direction and other factors, to identify the collision causes and the probable solutions. The high collision locations identified in this memorandum need further detailed analysis to identify the exact cause of the collisions and develop probable engineering solutions. The information presented in this section is intended to highlight potential concerns that should be considered and analyzed in further detail.

4.1 HIGHWAY 28 AND 54 AVENUE

Highway 28 and 54 Avenue is currently a signalized intersection. The collision history revealed that while 42 collisions occurred in the 5-year timeframe, only one collision occurred during 2009. The collisions that occurred before 2009 were primarily 'Left Turn – Across Path' and 'Rear End' collisions. These collision types are typical at intersections where the minor road (i.e., 54 Avenue) is stop-controlled and must rely on gaps on the major road (i.e., Highway 28).

Highway 28 and 54 Avenue will be improved as part of the Highway 28 Twinning project that is currently underway. The improvements will include an additional through lane in both directions on Highway 28 and a dedicated right turn lane on the northbound approach. The intersection should be monitored after the highway twinning project to determine if the improvements will impact the collision frequency.

4.2 HIGHWAY 28 AND TRI CITY MALL

Highway 28 and Tri City Mall is currently a signalized intersection. The collision history revealed that while 29 collisions occurred in the 5-year timeframe, only one collision occurred during 2009. The collisions that occurred before 2009 were primarily 'Rear End' and 'Right Angle' collisions. These collision types are typical at intersections where the minor road (i.e., Tri City Mall) is stop-controlled and must rely on gaps on the major road (i.e., Highway 28)

Highway 28 and Tri-City Mall will be improved as part of the Highway 28 Twinning project that is currently underway. The improvements will include dedicated turn lanes and an additional through lane in both directions on Highway 28. The intersection should be monitored after the highway twinning project to determine if the improvements will impact the collision frequency.

4.3 HIGHWAY 28 AND 50 AVENUE

Highway 28 and 50 Avenue is currently a signalized intersection. The collision history revealed a significant drop in collisions after 2005. There were 14 collisions in 2005, approximately 4 collisions each year between 2006 and 2008, and no collisions in 2009.



The collisions that occurred between 2006 and 2009 where primarily 'Left Turn – Across Path', 'Rear End' and 'Sideswipe – Same Direction'. The 'Left Turn – Across Path' and 'Rear End' collisions could be indicative of possible sight problems associated with the geometry of the intersection and its location on horizontal curves. On the other hand, the 'Left Turn – Across Path' and 'Sideswipe – Same Direction' collisions could be indicative of problems with the intersection signal timing and driver frustration that resulted from the poor signal timing.

The Cold Lake South Arena that was previously located in the southwest corner of Highway 28 and 50 Avenue has moved. In light of the developmental changes adjacent to the study intersection, the City indicated an opportunity to review the intersection for improvements to geometry and lane configuration. The In-Service Safety Review recommended that a detailed intersection analysis be completed for Highway 28 and 50 Avenue to address the safety concerns at the study intersection. Improvements to the intersection geometry and lane configuration should reduce the collision frequency at this intersection.

4.4 55/55A STREET AND 54 AVENUE

55/55A Street and 54 Avenue is currently an un-signalized intersection with stop signs provided for the northbound and southbound approaches on 55/55A Street. Both intersections east and west of Highway 28 have the same traffic control and similar intersection configurations. The collision history revealed a general increase in collisions; there was no collision in 2005, 5 collisions each year between 2006 and 2008, and 8 collisions in 2009. The collisions that occurred were primarily 'Rear End' and 'Right Angle' collisions. These collision types are typical of intersections where the minor road (i.e., 55/55A Street) is stop-controlled and must rely on gaps on the major road (i.e., 54 Avenue).

The intersection of 55/55A Street and 54 Avenue is located close to the intersection of Highway 28 and 54 Avenue. With three intersections located within 65 m, multiple conflict points are generated, turning movements become more complex, and driver workload is significantly increased. These factors could be responsible for the collisions that have occurred at this intersection.

4.5 50 STREET AND 50 AVENUE

50 Street and 50 Avenue is currently an un-signalized intersection with a stop sign provided for the northbound approach on 50 Street. The southbound approach is part of a private parking lot and assumed to be yield control; traffic from driveways are expected to yield to traffic on the roadway. The 13 collisions that occurred were primarily 'Rear End' collisions. 'Rear End' collisions are typical of intersections where the minor road (i.e., 50 Street) is stop-controlled and must rely on gaps on the major road (i.e., 50 Avenue). Angle parking is provided along the south side of 50 Avenue, east and west of 50 Street. The angle parking may lead to rear end collisions with vehicles backing out from the stalls.

4.6 50 STREET AND 46 AVENUE

50 Street and 46 Avenue is currently an un-signalized intersection with stop signs provided for the northbound and southbound approaches on 50 Street. The eastbound approach at 46 Avenue is a right-in-



right-out to Highway 28 and right-of-way at the intersection is provided for traffic entering from and exiting to Highway 28. The westbound approach is an entrance to the Dairy Queen and multiple driveways are located on the east side of 50 street. The 13 collisions that occurred were primarily 'Rear End' collisions. The multiple driveways near the intersection create more conflict points and thus increase driver workload; these factors could be responsible for the collisions the rear end collisions.

4.7 HIGHWAY 28 AND 50 STREET

Highway 28 and 50 Street is currently a signalized intersection. Immediately east of the intersection, 50 Street diverges; one leg continues north to intersect with 50 Avenue and one leg continues south as the service road parallel to Highway 28. A stop sign is provided at the point of divergence, for northbound traffic from the service road. The 13 collisions that occurred were primarily 'Rear End' collisions. Highway 28 and 50 Street is located at the end of a horizontal curve and visibility of the intersection is poor from 50 Street. The 'Rear End' collisions are indicative of possible sight problems associated with the geometry of the intersection.

4.8 51 STREET AND 50 AVENUE

51 Street and 50 Avenue is currently an un-signalized intersection with stop signs provided for all approaches. The 13 collisions that occurred were primarily 'Backing' collisions. Angle parking is provided along the south side of 50 Avenue, east and west of 51 Street, and along the east side of 51 Street, south of 50 Avenue. The 'Backing' collisions are indicative of potential problems with the angle parking provided on these roadways.

4.9 50 STREET AND 43 AVENUE

50 Street and 43 Avenue is currently an un-signalized intersection with stop signs provided for the northbound and southbound approaches on 50 Street. The 11 collisions that occurred were primarily 'Right Angle' collisions. 'Right Angle' collisions are typical at intersections where the minor road (i.e., 50 Street) is stop-controlled and must rely on gaps on the major road (i.e., 43 Avenue). The 50 Street/43 Avenue intersection is located within 50 m of the Highway 28/43 Avenue intersection. The short separation distance does not provide much time for drivers stopped at 50 Street to process and respond to vehicles that have just turned off Highway 28 onto 54 Avenue. This could be a potential cause for the collisions at this intersection.

4.10 52 STREET AND 50 AVENUE

52 Street and 50 Avenue is currently an un-signalized intersection with stop signs provided for all approaches. The 11 collisions that occurred were primarily 'Backing' collisions. Angle parking is provided along the north side of 50 Avenue, west of 52 Street, and along the south side of 50 Avenue, east of 52 Street. Angle parking is also provided along the east side of 52 Street, south of 50 Avenue. The 'Backing' collisions are indicative of potential problems with drivers backing out of the angle parking provided on these roadways.

4.11 49 STREET AND 51 AVENUE

49 Street and 51 Avenue is an offset intersection; the westbound approach is located approximately north of the eastbound approach. The intersection is un-signalized with a yield sign provided for the westbound approach and a stop sign provided for the eastbound approach. The 10 collisions that occurred were primarily 'Struck Object' and 'Right Angle' collisions. 'Right Angle' collisions are typical at intersections where the minor road (i.e., 51 Avenue) is stop/yield-controlled and must rely on gaps on the major road (i.e., 49 Street).

4.12 HIGHWAY 28 AND 43 AVENUE

Highway 28 and 43 Avenue is currently a signalized intersection. The 10 collisions that occurred were primarily 'Rear End' collisions. The 'Rear End' collisions are indicative of potential problems with the signal timing. Insufficient green time could result in driver frustration and motivate drivers to follow too closely behind the leading vehicle. Highway 28/43 Avenue is located within 50m of the 50 Street/43 Avenue intersection. The short separation distance could also be responsible for collisions. Vehicles turning off 50 Street onto westbound 54 Avenue may not have enough time to anticipate and react to traffic on 54 Avenue that have stopped for a red light at Highway 28.

4.13 HIGHWAY 28 AND 55 AVENUE

Highway 28 and 55 Avenue is currently an un-signalized intersection. The 10 collisions that occurred were primarily 'Rear End' collisions. 'Rear End' collisions are typical of intersections where the minor road (i.e., 55 Avenue) is stop-controlled and must rely on gaps on the major road (i.e., Highway 28).

Similar to the intersection of Highway 28/54 Avenue, Highway 28/55 Avenue has service roads (55/55A Street) which run parallel to Highway 28 on both sides of the highway. With three intersections provided within, multiple conflict points are generated, turning movements become more complex, and driver workload is significantly increased. These factors could have led to the rear end collisions.

Highway 28 and 55 Avenue will be improved as part of the Highway 28 Twinning project that is currently underway. The improvements will include dedicated turn lanes in both directions on Highway 28. The intersection should be monitored after the highway twinning project to determine if the improvements will impact the collision frequency.





Chrysler Intersection

The Cold Lake Chrysler car dealership is located in the northeast corner of Highway 28 and 50 Street. This intersection, shown in Figure 5.1, has been identified by the City and by the collision analysis as a high collision location.

As indicated previously, Highway 28 and 50 Street is currently a signalized intersection. Immediately 30m east of the intersection, 50 Street diverges; one leg continues north to intersect with 50 Avenue and one leg continues south as the service road parallel to Highway 28. A stop sign is provided at the point of divergence, for northbound traffic from the service road. Due to the close proximity of Highway 28 with the service road, there are multiple conflict points within the area and the turning movements between the intersections result in driver confusion.

Through discussions with the City, three options were considered to improve the operation of the Chrysler intersection: provide a roundabout at the service road intersection, provide a right-in-right-out (RIRO) at the service road intersection, or provide a cul-de-sac at the service road intersection. A roundabout at the service road intersection is not feasible due to the close proximity to Highway 28 and the limited right-of-way at the intersection. Therefore, the roundabout option was eliminated.

The City should consider providing a RIRO or cul-de-sac at the service road intersection to improve safety. The RIRO would eliminate some turning movements to and from the service road, while the cul-de-sac would eliminate all turning movements to and from the service road. Both options would reduce the number of conflict points and driver confusion. After implementing the RIRO or cul-de-sac, existing traffic on 50 Street would transfer to Highway 28 or 49 Street via 47 Avenue. A detailed traffic analysis should be completed at the study intersection, and the adjacent intersections, to determine the traffic impact of the RIRO or cul-de-sac. The traffic analysis will determine if any improvements would be required on the adjacent intersections to accommodate the additional traffic volumes from 50 Street. RIRO versus cul-de-sacs



50 Street	Vice Road 47Avenue	CITY OF COLD LAKE TRANSPORTATION STUDY FIGURE 5.1 CHRYSLER INTERSECTION
Junio	-	50 011
Highman 28		PROJECT NO: 2010-30 DATE: APRIL APPROVED: SCALE: NTS DWG NO:
	AF .	Associated Engineering

6

Conclusion

Associated Engineering was retained by the City of Cold Lake to undertake a review of the collision history within the City and identify high collision locations. AE also analyzed the collision data at the high collision locations to determine collision distribution patterns and provide the City with potential safety concerns at each location.

Between 2005 and 2009, a total of 2,071 collisions occurred within the City of Cold Lake.

Intersections with 10 collisions or more within the 5-year timeframe were identified as high collision locations. The following intersections were identified as high collision locations:

- 1. Highway 28 and 54 Avenue
- 2. Highway 28 and Tri City Mall
- 3. Highway 28 and 50 Avenue
- 4. 55/55A Street and 54 Avenue
- 5. 50 Street & 50 Avenue
- 6. 50 Street and 46 Avenue
- 7. Highway 28 and 50 Street
- 8. 51 Street and 50 Avenue
- 9. 50 Street and 43 Avenue
- 10. 52 Street and 50 Avenue
- 11. 49 Street and 51 Avenue
- 12. Highway 28 and 43 Avenue
- 13. Highway 28 and 55 Avenue

At the intersections listed above, the following collision distribution patterns were analyzed:

- Temporal Collision Distributions By year, by month, by day, and by hour
- Type and Cause Distributions By type, by cause, and by severity
- Environmental Distributions By weather conditions, by road surface condition, and by light condition.

Detailed collision analysis at each location have been included in Appendix B and summarized in Section 3.

Potential safety concerns at each high collision location were identified, where possible, from the patterns identified from the collision analysis. In general, the potential safety issues identified in this section are non-conclusive since the collision data did not provide enough detail, with regards to travel direction and other factors, to identify the collision causes and the probable solutions.



The high collision locations identified in this memorandum need further detailed analysis to identify the exact cause of the collisions and develop probable engineering solutions. AE recommends that the City conduct in-service safety assessments at each of the high collision locations to understand the underlying causes for the collisions. As part of the in-service safety assessments, the City should obtain the full collision reports from AT to obtain a better understanding of the collision events and to facilitate the identification of the safety issues.

The Chrysler intersection, located at Highway 28 and 50 Street, was identified by the City and by the collision analysis as a high collision location. Through discussions with the City, three options were considered to improve the operation of the Chrysler intersection: provide a roundabout at the service road intersection, provide a right-in-right-out at the service road intersection, or provide a cul-de-sac at the service road intersection. The roundabout option is not feasible due to the close proximity to Highway 28 and the limited right-of-way at the intersection. AE recommends that the City consider providing a right-in-right-out or a cul-de-sac at the service road intersection. Both the right-in-right-out and cul-de-sac would eliminate some, if not all, turning movements to and from the service road, thereby removing some conflict points and reducing driver confusion. A detailed traffic analysis should be completed at the study intersection, and the adjacent intersections, to determine the traffic impact of the right-in-right-out or cul-de-sac.

Seven of the thirteen high collision locations occurred at intersections with Highway 28 or the service roads (55/55A Street or 50 Street) that run parallel to the highway. The separation distance that are provided between Highway 28 and the service roads are typically within 30m to 65m. Multiple intersections located within a short distance generate more conflict points and significantly increases the driver workload; thus, resulting in a higher frequency of collisions. Similar to the Chrysler intersection, the City should consider closing or providing right-in-right-out, or cul-de-sacs, at the service road and complete a traffic analysis to determine which service road intersections to close and the impact of the road closure on the surrounding road network. Intersection closures typically shift traffic to the adjacent intersections. Traffic analysis is required to determine if any improvements would be required on the adjacent intersections to accommodate the additional traffic volumes.

Appendix A - Alberta Transportation Data



									ON					OCCURRENCE							
COLLISION CASE	CASE	OBJECT	POLICE			NORTH/SOUTH	EAST/WEST	on	AT INTERSECTION WITH STREE	AVE AT INTERSECTION WITH	IF NOT AT INTERSECTION	IF NOT AT INTERSECTION -		DATE	OCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER		PRIMARY
NUMBER	YEAR	NUMBER	SERVICE	IN/ NEAR		ROAD NAME	ROAD NAME	ON HWY #	HWY# NU	E STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES		EVENI
1315/53	2005	1	1137	1	COLD LAK	HVV Y 28	54 AVENUE	28	1	54 AVE				6/2/2005	11	2	2	1	0	2	8
1315/53	2005	2	1137	1	COLD LAK	HVV Y 28	54 AVENUE	28	1	54 AVE				6/2/2005	11	2	2	1	0	2	8
163/6//	2005	2	1137	1	COLD LAK		54 AVENUE	28	1	54 AVE				1/3/2005	13	2	4	3	0	2	0
1637677	2005	2	1137	1	COLD LAK	HWV 20	54 AVENUE	20	1	54 AVE				1/3/2005	13	2	4	3	0	2	
163/6//	2005	3	1137	1	COLD LAK		54 AVENUE	28	1	54 AVE				1/3/2005	13	2	4	3	0	2	
1637706	2005	4	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			INTERSECTION BY LAKELAND INN & EXTRA FOODS	1/11/2005	15	2	4	0	0	2	5
1637706	2003	2	1137	1	COLDLAK	HWV 20		20	1	54 AVE			INTERSECTION BY LAKELAND INN & EXTRA FOODS	1/11/2005	10	3	2	0	0	2	5
1637700	2005	2	11.37	1	COLDLAK	HWY 20		20	1	54 AVE			INTERSECTION BT LAREDAND INN & EXTRA FOODS	7/21/2005	10	3	2	1	0	2	5
1637722	2005	2	11.37	1	COLDLAK	LIMY 20		20	1	54 AVE				7/21/2005	10	2	2	1	0	2	5
1037722	2005	2	4407	1	COLDLAK	111/1 20	54 AVENUE	20	1	54 AVE				1/21/2005	10	2	2		0	2	5
1637738	2005	1	1137	1	COLD LAK	HVVY 28	54 AVENUE	28	1	54 AVE				1/22/2005	15	3	2	0	0	2	8
103//36	2005	2	1137		COLD LAK	HVV T 26	54 AVENUE	28		54 AVE				1/22/2005	15	3	2	0	0	2	0
1720811	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				8/30/2005	13	3	3	0	0	2	8
1720811	2005	2	1137	1	COLD LAK	HVV Y 28	54 AVENUE	28	1	54 AVENUE				8/30/2005	13	3	3	0	0	2	8
1720811	2005	3	1137	1	COLD LAK	HVV Y 28	54 AVENUE	28	1	54 AVENUE				8/30/2005	13	3	3	0	0	2	8
1720963	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				10/12/2005	16	3	2	0	0	2	8
1720963	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				10/12/2005	16	3	2	0	0	2	8
1720982	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				9/12/2005	12	3	2	0	0	2	11
1720982	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				9/12/2005	12	3	2	0	0	2	11
1721219	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				12/20/2005	15	3	3	0	0	2	5
1721219	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				12/20/2005	15	3	3	0	0	2	5
1721219	2005	3	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				12/20/2005	15	3	3	0	0	2	5
1721287	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				11/26/2005	17	3	2	0	0	2	5
1721287	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				11/26/2005	17	3	2	0	0	2	5
1721236	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				1/12/2006	10	2	2	2	0	2	3
1721236	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				1/12/2006	10	2	2	2	0	2	3
1721296	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			AT INTERSECTION	6/3/2006	10	2	2	1	0	2	3
1721296	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			AT INTERSECTION	6/3/2006	10	2	2	1	0	2	3
1778739	2006	1	1137	1	COLD LAK	HW Y 28	54 AVENUE	28	1	54 AVE				3/10/2006	9	3	2	0	0	2	5
1778739	2006	2	1137	1	COLD LAK	HW Y 28	54 AVENUE	28	1	54 AVE				3/10/2006	9	3	2	0	0	2	5
1778740	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				2/24/2006	18	3	2	0	0	2	12
1778740	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				2/24/2006	18	3	2	0	0	2	12
1778778	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			NORTH	7/10/2006	15	3	2	0	0	2	5
1778778	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			NORTH	7/10/2006	15	3	2	0	0	2	5
1778861	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				5/16/2006	18	3	2	0	0	2	8
1778861	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				5/16/2006	18	3	2	0	0	2	8
1778913	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			55 ST	6/16/2006	14	3	2	0	0	2	5
1778913	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			55 ST	6/16/2006	14	3	2	0	0	2	5
1873175	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1				N/B IN FRONT OF ESSO-5426-55 ST	8/25/2006	16	2	2	1	0	2	1
1873175	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1				N/B IN FRONT OF ESSO-5426-55 ST	8/25/2006	16	2	2	1	0	2	1
Z524695	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				3/15/2006	14	3	2	0	0		8
Z524695	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				3/15/2006	14	3	2	0	0		8
Z563444	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				8/8/2006	19	3	2	0	0		12
Z563444	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				8/8/2006	19	3	2	0	0		12
Z586822	2006	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				11/9/2006	18	3	2	0	0		5
Z586822	2006	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				11/9/2006	18	3	2	0	0		5
1721140	2007	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				2/7/2007	14	3	2	0	0	2	5
1721140	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				2/7/2007	14	3	2	0	0	2	5
1721160	2007	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				2/17/2007	17	3	2	0	0	2	5
1721160	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				2/17/2007	17	3	2	0	0	2	5
1873118	2007	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				8/7/2007	10	3	2	0	0	2	5
1873118	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				8/7/2007	10	3	2	0	0	2	5
1873122	2007	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				8/10/2007	16	3	3	0	0	2	97
1873122	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				8/10/2007	16	3	3	0	0	2	97
1873122	2007	3	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				8/10/2007	16	3	3	0	0	2	97
1873126	2007	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				8/24/2007	17	2	2	2	0	2	5
1873126	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVENUE				8/24/2007	17	2	2	2	0	2	5
2040867	2007	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				9/19/2007	17	3	2	0	0	2	12
2040867	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				9/19/2007	17	3	2	0	0	2	12
2041156	2007	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1				54 AVENUE LIGHTS AT EXTRA FOODS	11/23/2007	18	3	2	0	0	2	8
2041156	2007	2	1137	1	COLDIAK	HWY 28	54 AVENUE	28	1				54 AVENUE LIGHTS AT EXTRA FOODS	11/23/2007	18	3	2	0	0	2	8
2041861	2007	1	1137	1	COLDIAK	HW Y 28	54 AVENUE	28	1	54 AVE				9/17/2007	12	3	2	0	0	2	5
2041861	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				9/17/2007	12	3	2	Ó	0	2	5
Z541958	2007	1	1137	1	COLD LAK	HW Y 28	54 AVENUE	28	1	54 TH			LIGHTS @ ESTRA FOODS	11/21/2007	12	3	2	0	0		8
Z541958	2007	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 TH			LIGHTS @ ESTRA FOODS	11/21/2007	12	3	2	0	0		8
2041003	2008	1	1137	1	COLD LAK	HW Y 28	54 AVENUE	28	1				BTW LAKELAND INN EXTRA FOODS	2/7/2008	17	3	2	0	0	2	7
2041003	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1				BTW LAKELAND INN EXTRA FOODS	2/7/2008	17	3	2	0	0	2	7
2041040	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			(IN CITY)	4/14/2008	14	3	3	0	0	2	8
2041040	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			(IN CITY)	4/14/2008	14	3	3	0	0	2	8
2041040	2008	3	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			(IN CITY)	4/14/2008	14	3	3	0	0	2	8
2041049	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			IN CITY - DO NOT PLOT	4/18/2008	17	2	3	1	0	2	8
2041049	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			IN CITY - DO NOT PLOT	4/18/2008	17	2	3	1	0	2	8
2041049	2008	3	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			IN CITY - DO NOT PLOT	4/18/2008	17	2	3	1	ō	2	8
2041252	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54AVE			LIGHTS IN FRONT OF LAKE LAND INN	7/16/2008	15	3	2	Ó	ō	2	12
2041252	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54AVE			LIGHTS IN FRONT OF LAKE LAND INN	7/16/2008	15	3	2	0	0	2	12
2041539	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				6/10/2008	16	3	3	0	0	2	5
2041539	2008	2	1137	1	COLDIAK	HW Y 28	54 AVENUE	28	1	54 AVF				6/10/2008	16	3	3	ő	ő	2	5
2041539	2008	3	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE				6/10/2008	16	3	3	0	0	2	5
2041736	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1	54 AVE			IN CITY - DO NOT PLOT	1/29/2008	9	3	3	õ	ő	2	8
2041736	2008	2	1137	1	COLDIAK	HWY 28	54 AVENUE	28	1	54 AVF			IN CITY - DO NOT PLOT	1/29/2008	9	3	3	ŏ	õ	2	8
2041736	2008	3	1137	1	COLDIAK	HWY 28	54 AVENUE	28	1	54 AVE			IN CITY - DO NOT PLOT	1/29/2008	9	3	3	0	ő	2	Ř
2041750	2000	1	1137	1	COLDIAK	HWY 28	54 AVENUE	28	1	54AVE			IN CITY - DO NOT PLOT	1/30/2008	14	3	2	0	0	2	13
2041750	2000	2	1137	1	COLDIAK	HWV 28	54 AVENUE	20	1	5/4/E			IN CITY - DO NOT PLOT	1/30/2008	14	3	2	0	0	2	13
2041785	2008	4	1137	1	COLD LAK	HWV 28	54 AVENUE	20	1	54 AVE			IN ON 1 - DO NOT FLOT	2/29/2008	1 1 1	3	4 1	1	0	2	13
2041785	2008	2	1137	1	COLDIAK	HWY 28	54 AVENUE	20	1	54 AVE				2/29/2008	1	2	1	1	0	2	1
22041700	2000	4	1107	1	COLDUAK	HWV 20		20	1	54 AVE				11/23/2000	14	2			0	2	0
2209004	2000	1 0	1137	1	COLD LAK	HWV 20		20	1	04 AVE				11/23/2008	11	3	2	0	0	2	0
2209034	2008	2 1	1137	1	COLD LAK	HWY 28	54 AVENUE	20	1	54 AVE			(IN CITY)	10/2/2008	17	3	2	0	0	2	0 07
2203000	2008	1	1137	1	COLD LAK	HW/Y 20		20	1	04 AVE				10/2/2008	17	3	2	0	0	2	3/
2209000	2008	4	1137	1	COLD LAK	HWV 20	54 AVENUE	20	1	54 AVE	4 5	54 AV/E	(IN CILT)	11/3/2000	10	3	2	0	0	2	3/
2200750	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	20	1		1.0	54 AVE		11/3/2008	10	3	2	0	0	2	07
22007/60	2000	4	1107	1	COLD LAK	HWV 20	54 AVENUE	20	1	E4 AV/E	1.0	54 AVE		2/22/2000	10	3	2	0	0	-	0
2301433	2009		1137	1	COLD LAK	FIVE 1 20		20	1	04 AVE				2/22/2009	12	3	2	0	0	2	0
2301403	2009	2	1137		JULD LAK	rivv f 20	34 AVENUE	20	1	34 AVE				212212009	12	3	2	U	U	2	0

													LIGHT												
COLLISION CASE	SPECIAL	ROAD ALIO	GNMENT ROAD A			COLLISION		DI	RIVER/PED DI	RIVER/PED P	DINT OF DR	IVER LIGHT	CONDITIO	N TRAFFIC CONTROL	TRAFFIC CONDITION	PEDESTRIAN DRIVER/PED	CONTRIBUTING ROAD	D ENVIRONMENTAL	SURFACE					VEHICLE CONDITION/	UNSAFE
1315753	FACILITY 1	A 1		в I 1	2	LOCATION OB	JECT TYPE OF	JECT ID	24	F SEX I	MPACT AC	10 CONDITIC	DNA B 97	2 DEVICE PRESENT	DEVICE CONDITION	ACTION CONDITION		CONDITION		LOAD DETAILS A	LOAD DETAILS B	ATTACHMENTS	TRAILER TYPE	CONTRIBUTING FACTORS	SPEEDS
1315753	1	1		1	2	2	3	6	23	M	1	97 1	97	2	1	1	1	1	1						
1637677	1	1		1	2	2	1	3	57	F	4	1 1	97	2	1	1	4	1	3						
1637677	1	1		1	2	2	1	1	36	F	8	1 1	97	2	1	1	1	1	3						
1637677	1	1		1	2	2	1	2	72	М	8	6 1	97	2	1	1	1	1	3						
1637706	1	1		1	2	2	1	1	44 30	M	8	1 3 9 3	97 97	2	1	97 97	1	1	3						
1637722	1	1		1	2	2	1	1	45	M	1	9 1	97	2	1	1	1	1	1						
1637722	1	1		1	2	2	1	1	28	F	8	1 97	97	97	97	1	97	1	1						
1637738	1	1		1	2	2	1	1	72	M	4	1 1	97	2	1	1	1	1	3						
1720811	1	1		1	2	2	1	3	17	M	8	97 97	97	97	97	97	97	97	97						
1720811	1	1		1	2	2	1	1	22	M	4	97 97 97 97	97	97	97	97	97	97 97	97						
1720963	1	1		1	2	2	1	1	31	F	8	6 1	97	2	97	1	1	1	1						
1720963 1720982	1	1		1	2	2	1	2	41 36	F	4	1 1 10 1	97 1	2	97 97	1	1	1	1	1	1	1	1	1	2
1720982	1	1		1	2	2	1	1	29	M	6	1 1	1	2	97	1	4	2	2	-					-
1721219	1	1		1	2	2	1	3	45	M	8	97 97 07 07	97	97	97	97	97	97	97						
1721219	1	1		1	2	2	1	3	34	F	7	1 1	97	2	1	97	1	97	97						
1721287	97	7		1	2	2	1	1	30	м	8	97 3	97	2	1	1	1	1	1						
1721287 1721236	97 1	7		1	2	2	1	2	43 52	M	3	97 3 1 1	97 97	2	1	1	1	1	1						
1721236	1	1		1	2	2	1	3	31	F	8	13 1	97	3	97	1	1	1	2						
1721296	1	1		1	2	2	1	1	39 16	F	8	1 1	97	2	1	1	1	1	2						
1778739	1	1		1	2	2	1	1	26	F	8	1 1	1	2	1	1	1	4	3						
1778739	1	1		1	2	2	1	1	41	F	1	9 1	1	2	1	1	1	4	3						
1778740	97 97	7		1	2	2	1	2	20 16	F	о 1	, 1 10 1	97 97	2	1	97 97	1	1 1	99 99						
1778778	1	1		1	2	2	1	2	41	F	8	1 1	97	2	1	1	1	1	1						
1778778	1	1		1	2	2	1	1	46 61	F	3	9 1 1 1	97 97	2	1	1	1	1	1						
1778861	1	1		1	2	2	1	3	48	М		97 1	97	2	1	97	1	1	1						
1778913	1	1		1	2	2	1	1	17 18	F	7	1 1 9 1	1	2	1	1	1	1	1						
1873175	1	1		1	2	1	1	2	47	F	7	1 1	97	1		1	1	1	1						
1873175	1	1		1	2	1	1	3	40	F		97 1	97	1		97	1	1	1						
Z524695	1	1		1	2	2	1	2	27	F	4	1	1	2			1	1	1						
Z563444	1	1		1	2	2	1	3	17	F	1	1	1	2			1	1	1						
Z586822	1	1		1	2	2	1	1	24 46	F	8	1	1 97	2			1	1	1						
Z586822	1	1		1	2	2	1	1	53	F	2	3	97	2			1	1	3						
1721140 1721140	97 97	1		1	2	2	1	1	54 42	F	97 6	1 1 4 1	97 97	3	97 97	1	1	1	3						
1721160	1	1		1	2	2	1	1	20	M	1	13 1	97	2	1	1	1	4	3						
1721160	1	1		1	2	2	1	2	26	M	8	1 1	97	2	1	97	1	4	3						
1873118	97	1		1	4	2	1	1	51	M	1	1 1	1	2	1	1	1	1	1						
1873122	97	1		1	4	2	1	1	20	M	8	97 97	97	97	97	97	97	97	97						
1873122	97	1		1	4	2	1	2	30 49	M	97	97 97 97 97	97	97	97	97	97	97	97						
1873126	97	1		1	2	2	1	2	46	м	8	1 1	97	2	1	1	1	1	1						
2040867	97	1		1	2	2	1	1	26 64	F	2	9 1 1 1	97	2	1	1	1	1	1						
2040867	1	1		1	2	2	1	2	29	м	1	10 1	1	2	1	1	1	1	1						
2041156	97 97	7		7	97 97	97 97	1	3	48 16	F	4	1 3 6 3	97	2	1	1	4	4	3						
2041861	1	1		1	2	2	1	3	16	М	8	9 1	1	2	1	1	1	1	2						
2041861 Z541958	1	1		1	2	2	1	1	51 43	M	4	ז 1 1	1	2	1	1	1	1	2						
Z541958	1	1		1	2	2	1	2	18	м		1	1	2			1	4	3						
2041003 2041003	97 97	1		1	2	1	1	2	43 24	M	2	1 3 1 3	97 97	3	97	1	4	4	3						
2041040	1	1		1	2	2	1	1	20	м	8	97 1	1	2	1	1	1	1	1						
2041040 2041040	1	1		1	2	2	1 1	1 3	41 36	F	4 4	1 1 1 1	1	2	1	1	1	1	1						
2041049	97	1		1	2	2	1	1	44	F	4	1 1	97	2	1	97	1	1	1						
2041049 2041049	97 97	1		1	2	2	1	1	32 23	F	4	1 1 97 97	97 97	2	1 97	97 97	1 97	1	1						
2041252	1	1		1	2	1	1	1	23	F	7	1 1	1	1		1	1	1	1						
2041252	1	1		1	2	1	1	2	45 23	M	2	10 1	1	1	4	1	1	1	1						
2041539	97	1		1	2	2	1	3	40	M	6	97 1	97	2	1	97	97	1	1						
2041539	97	1		1	2	2	1	1	48	F	8	1 1	97	2	1	97	1	1	1						
2041736 2041736	97 97	7		7	97 97	97 97	1 1	2	37 68	⊢ M	4 8	1 1 1 1	2	2	1	1 1	1	5	3						
2041736	97	7		7	97	97	1	2	36	м	5	1 1	97	2	1	1	1	5	3						
2041750	97 97	1		1	4	2	1	2	25 37	M	4	8 1 1 1	1	2	97 97	1	1	1	3						
2041785	97	1		1	2	2	1	2	51	M	1 1		97	2	1	2	1	1	1						
2041785	97	1		1	2	2	2	7	18	F	4	3	97	2	1	2 97	1	1	1						
2209654	1	1		1	2	2	1	1	82	M	÷ ;	97 97	99	2 97	97	97	97	97 97	3						
2209688	1	1		1	2	1	1	1	31	F	97	97 1	99	2	1	1	1	1	1						
2209050	97	1		1	2	2	1	1	16	М	97	10 1	99	2 1	I	99 1	1	2	2						
2209750	97	1		1	2	2	1	2	49	M	1	1 1	99	1	1	1	1	2	2						
2307453	1	1		1	2	2	1	з 1	42 18	F	4 8	, 1 6 1	99	2	1	1	1	1	2						

	CASE		POLICE	IN/ NEAR		NORTH/SOUTH	FAST/WEST POAD NAME	ON HWY #	AT INTERSECTION WITH	ON STREET/AVENUE	AT INTERSECTION WITH	IF NOT AT INTERSECTION	IF NOT AT INTERSECTION -		OCCURRENCE DATE			NUMBER OF		NUMBER		PRIMARY
1627702	2005	INDIVIDEN	1127					20	1	ON STREET/AVENDE	STREET/AVENUE	DISTANCE	DESCRIPTION	TDI CITY MALL	1/12/2005	12	2	venices	NJOKED			0
1637703	2005	2	1137	1	COLDIAK	HWY 28	TRI CITY MALL INTERSECTION	20	1					TRI CITY MALL	1/13/2005	13	3	2	0	0	2	8
1637726	2005	1	1137	1	COLDIAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					INTERSECTION WITH TRI CITY MALL	2/11/2005	14	3	2	0	0	2	3
1637726	2005	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					INTERSECTION WITH TRI CITY MALL	2/11/2005	14	3	2	ő	0	2	3
1721007	2005	1	1137	1	COLDIAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL				11/2/2005	17	3	3	0	0	2	8
1721007	2005	2	1127	1	COLDLAK	LIWY 20	TRI CITY MALL INTERSECTION	20	1		TRI CITY MALL				11/2/2005	17	3	3	0	0	2	0
1721007	2005	2	1137	1	COLDLAK	11001 20	TRI CITY MALL INTERSECTION	20	1		TRI CITY MALL				11/2/2005	17	3	3	0	0	2	0
1721007	2005	3	1137	1	COLD LAK		TRI CITY MALL INTERSECTION	20	1		IRI CITT MALL			AT TRICITY MALL INTERSECTION NORTHROUND	12/2005	10	3	3	1	0	2	0
1721193	2005	1	1137		COLD LAK	HWY 20	TRI CIT F MALL INTERSECTION	20			66 AVE				12/4/2005	10	2	2		0	2	0
1721193	2005	2	1137	1	COLD LAK	HVVY 28	TRICITY MALL INTERSECTION	28	1		66 AVE			AT TRICITY MALL INTERSECTION NORTHBOUND	12/4/2005	10	2	2	1	0	2	8
1721234	2005	1	1137	1	COLD LAK	HWY 28	TRICITY MALL INTERSECTION	28	1					TRI CITY MALL INTERSECTION	1/12/2005	12	3	2	0	0	2	8
1721234	2005	2	1137	1	COLD LAK	HWY 28	TRECITY MALL INTERSECTION	28	1					TRI CITY MALL INTERSECTION	1/12/2005	12	3	2	0	0	2	8
Z524820	2005	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					BY IGA(SOBEYS)	5/14/2005	16	3	1	0	0		1
Z524820	2005	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					BY IGA(SOBEYS)	5/14/2005	16	3	1	0	0		1
1778727	2006	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL				3/3/2006	15	3	2	0	0	2	3
1778727	2006	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL				3/3/2006	15	3	2	0	0	2	3
1778742	2006	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			TRAFFIC LIGHTS @ TRI CITY MALL	3/3/2006	10	3	2	0	0	2	8
1778742	2006	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			TRAFFIC LIGHTS @ TRI CITY MALL	3/3/2006	10	3	2	0	0	2	8
1778780	2006	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		65 AVE				7/10/2006	17	3	3	0	0	2	8
1778780	2006	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		65 AVE				7/10/2006	17	3	3	0	0	2	8
1778780	2006	3	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		65 AVE				7/10/2006	17	3	3	0	0	2	8
1778817	2006	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					AT TRI CITY MALL LIGHTS	8/10/2006	13	3	2	0	0	2	8
1778817	2006	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					AT TRI CITY MALL LIGHTS	8/10/2006	13	3	2	0	0	2	8
1873196	2006	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE				9/15/2006	21	3	2	0	0	2	8
1873196	2006	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE				9/15/2006	21	3	2	0	0	2	8
1873/21	2006	1	1137	1	COLDIAK	HW/Y 28	TRUCITY MALL INTERSECTION	28	1					TRUCITY MALL EXIT/ENTRANCE	12/15/2006	18	3	2	0	0	2	8
1873/21	2000	2	1137	1	COLD LAK	HW/Y 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL EXIT/ENTRANCE	12/15/2006	18	3	2	0	0	2	8
20 40969	2000	2	1137	1	COLD LAK	11001 20	TRICITY MALL INTERSECTION	20	1					@ TDL CITY MALL	12/13/2000	15	3	2	0	0	2	10
2040868	2007	1	1137	1	COLD LAK	HWYY 28	TRICITY MALL INTERSECTION	28	1					@ TRI CITY MALL	12/14/2007	15	3	2	0	0	2	12
2040868	2007	2	1137	1	COLD LAK	HVVY 28	TRI CITY MALL INTERSECTION	28	1					@ TRI CITY MALL	12/14/2007	15	3	2	0	0	2	12
2041106	2007	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					@ TRICITY MALL INTERSECTION	12/10/2007	/	3	2	0	0	2	8
2041106	2007	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					@ TRI CITY MALL INTERSECTION	12/10/2007	7	3	2	0	0	2	8
2041219	2007	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL @ INTERSECTION	11/8/2007	6	3	2	0	0	2	8
2041219	2007	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL @ INTERSECTION	11/8/2007	6	3	2	0	0	2	8
2041778	2007	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL INTERSECTION	10/1/2007	14	3	2	0	0	2	10
2041778	2007	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL INTERSECTION	10/1/2007	14	3	2	0	0	2	10
2041864	2007	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					LIGHTS IN FRONT OF MALL	9/17/2007	15	3	3	0	0	2	8
2041864	2007	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					LIGHTS IN FRONT OF MALL	9/17/2007	15	3	3	0	0	2	8
2041864	2007	3	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					LIGHTS IN FRONT OF MALL	9/17/2007	15	3	3	0	0	2	8
2041888	2007	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION							LIGHTS AT ZELLERS	11/25/2007	12	3	2	0	0	2	8
2041888	2007	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION							LIGHTS AT ZELLERS	11/25/2007	12	3	2	0	0	2	8
7449583	2007	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					AT TRI-CITY MALL	12/14/2007	13	3	2	0	0		8
7//0583	2007	2	1137	1	COLDIAK	HW/Y 28	TRI CITY MALL INTERSECTION	28	1					AT TRI-CITY MALL	12/14/2007	13	3	2	0	ő		8
2040059	2007	1	1127	1	COLDLAK	LIM/V 20	TRI CITY MALL INTERSECTION	20	1		65 AV/E			TPLCITY MALL LIGHTS	1/0/2009	19	2	2	0	0	1	0
2040550	2008	2	1137	1	COLD LAK	110/1 20	TRI CITY MALL INTERSECTION	20	1		65AVE			TRI CITY MALL LICHTS	1/9/2008	10	3	2	0	0	1	0
2040956	2008	2	1137		COLD LAK	HW1 20	TRI CITY MALL INTERSECTION	20	1		BSAVE			TRI CITT MALL LIGHTS	1/9/2008	10	3	2	0	0	1	0
2041056	2008	1	1137	1	COLD LAK	HVVY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL INTERSECTION	5/16/2008	15	3	2	0	0	2	8
2041056	2008	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRECITY MALL INTERSECTION	5/16/2008	15	3	2	0	0	2	8
2041061	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					THE CITY MALL INTERSECTION (IN CITY)	5/22/2008	12	3	3	0	0	2	8
2041061	2008	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					THE CITY MALL INTERSECTION (IN CITY)	5/22/2008	12	3	3	0	0	2	8
2041061	2008	3	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					THE CITY MALL INTERSECTION (IN CITY)	5/22/2008	12	3	3	0	0	2	8
2041562	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			TRI-CITY MALL INTERSECTION IN CITY - DO NOT PLOT	6/25/2008	12	3	2	0	0	2	8
2041562	2008	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			TRI-CITY MALL INTERSECTION IN CITY - DO NOT PLOT	6/25/2008	12	3	2	0	0	2	8
2041654	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			IN CITY - DO NOT PLOT	2/4/2008	13	3	1	0	0	2	9
2041757	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL TURNOFF			IN CITY - DO NOT PLOT	2/1/2008	12	3	2	0	0	2	1
2041757	2008	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL TURNOFF			IN CITY - DO NOT PLOT	2/1/2008	12	3	2	0	0	2	1
2041760	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					ENTRANCE TO TRI CITY MALL - IN CITY DO NOT PLOT	2/2/2008	97	3	2	0	0	2	97
2041760	2008	2	1137	1	COLDIAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					ENTRANCE TO TRI CITY MALL - IN CITY DO NOT PLOT	2/2/2008	97	3	2	0	0	2	97
2041800	2008	- 1	1137	1	COLDIAK	HW/Y 28	TRI CITY MALL INTERSECTION	20	1					TRI-CITY MALL INTERSECTION - IN CITY DO NOT PLOT	3/4/2008	16	2	2	1	0	2	8
2041000	2000	2	1137	1	COLD LAK	LIWV 20	THE CITY MALL INTERSECTION	20	1						2/4/2000	16	2	2	1	0	2	0
2041000	2000	2	1137	1	COLD LAK		TREAT WALL INTERSECTION	20	1		CC AVE			TREGIT I WALL INTERSECTION - IN CITEDUNUT PLUT	3/4/2000	10	2	2		0	2	0
2083165	2008	1	1137	1	COLD LAK	HWY 28	TRECTLY MALL INTERSECTION	28	1		66 AVE			TRI CITY MALL	2/2/2008	12	3	2	U	U	2	3
2083165	2008	2	1137	1	COLD LAK	HWY 28	TREGITY MALL INTERSECTION	28	1		66 AVE			TRI CITY MALL	2/2/2008	12	3	2	0	0	2	3
2041403	2009	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE				1/21/2009	19	2	3	4	0	2	8
2041403	2009	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE				1/21/2009	19	2	3	4	0	2	8
2041403	2009	3	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE				1/21/2009	19	2	3	4	0	2	8

														TRAFFIC			CONTRIBUTING						
COLLISION CASE	SPECIAL	ROAD	ROAD	ROAD	COLLISION	OB.IECT		DRIVER/PED	DRIVER/PED			LIGHT	LIGHT	CONTROL DEVIC		DRIVER/PED	ROAD	ENVIRONMENTAL	SURFACE				
NUMBER	FACILITY	ALIGNMENT A	ALIGNMENT B	CLASS	LOCATION	TYPE	OBJECT ID	AGE	SEX	IMPACT	ACTION	CONDITION A	CONDITION B	PRESENT	DEVICE CONDITION PEDESTRIAN ACTION	CONDITION	CONDITION	CONDITION	CONDITION	LOAD DETAILS A	LOAD DETAILS B	ATTACHMENTS	TR
1637703	1	1	1	2	2	1	3	73	M	4	1	1	97	2	1	1	1	1	3	EGNE DE MEC M	20/10 021/120 0		
1637703	1	1	1	2	2	1	2	28	M	-	1	1	97	2	1	1	1	1	3				
1637726	1	1	1	2	2	1	1	63	F	5	10	1	97	2	1	1	1	1	1				
1637726	1	1	1	2	2	1	1	23	M	0	1	1	97	2	1	1	1	1	1				
1721007	1	1	1	2	2	1	2	22	M	4	1	1	97	2	1	1	1	1	1				
1721007	1	1	1	2	2	1	2	18	M	8	1	1	97	2	1	1	1	1	1				
1721007	1	1	1	2	2	1	2	10	M	8	97	1	97	2	1	1	1	1	1				
1721103	1	1	1	2	2	1	1	50	F	4	00	99	99	2	1	99	97	1	3				
1721103	1	1	1	2	2	1	4	18	M	8	00	99	99	2	1	99	97	1	3				
1721133	1	1	1	2	2	1	-	21	M	0	6	1	1	2	1	1	1	1	2				
1721234	1	1	1	2	2	1	2	27	M	4	1	1	1	2	1	1	1	1	2				
7524920	07	7	1	2	2	1	1	27	E	-		1	07	2	I	'	1	1	2				
7524020	97	7	1	2	1	0	12	15	r.	5			57				07						
1779707	1	1	1	2	2	1	2	24	м	7	07	1	07	2	1	1	57	1	07				
1770727	1	1		2	2	1	2	40	NA NA	4	57		57	2	1	1	1	1	97				
1770727	1	7	1	2	2	1	2	49	IVI	4	9/	1	97	2	07	1	08	1	97				
1770742	1	7	1	2	2	1	3	34	г Г	0	1	07	97	2	97	1	90	1	3				
1770742	1	1	1	2	2	4	3	31	F M	4	00	97	97	2	97	1	90	1	3				
1770700	1	1	1	2	2	1	1	5/		0	99	1	97	2	1	1	1	2	2				
1770700	1	4	4	2	2	1	4	45	г Е	3	4	4	97	2	1	1	4	2	2				
1770700	1	1	1	2	2	4	2	40	-	4		1	57	2	1	1	1	2	2				
1770017	1	1	1	2	1	4	3	23		4	1	1	97	2	1	1	1	1	1				
1770017		1	1	2	1	1	1	10	F	•	0	1	97	0				1	1				
18/3196	1	1	1	2	2	1	2	37	M	4	1	3	2	2	1	1	1	2	2	1	1		
10/3190	1			2	2		2	17	IVI	0	96	97	97	2	1	1		2	2	2			
1873421	1	1	1	3	2	1	1	32	F	8	99	1	2	2	97	1	1	4	3				
1873421	1	1	1	3	2	1	2	17	M	4	1	1	2	2	97	1	1	4	3				
2040868	97	1	1	4	2	1	1	30	M	1	1	1	1	2	1	1	1	1	3				
2040868	97	1	1	4	2	1	1	45	F		97	1	1	2	1	1	1	1	3				
2041106	97	7	7	97	97	1	1	26	M	4	1	1	97	2	1	1	1	1	3				
2041106	97		(97	97	1	2	24	M	8	6	1	97	2	1	1	1	1	3				
2041219	97	1	1	2	2	1	3	20	F	8	6	3	97	2	1	1	4	4	3	2			
2041219	97	1	1	2	2	1	2	38	M	4	1	3	97	2	1	1	4	4	3	2			
2041778	1	1	1	2	2	1	2	27	M	8	97	1	1	2	1	1	1	1	1				
2041778	1	1	1	2	2	1	2	52	M	8	97	1	1	2	1	1	1	1	1				
2041864	97	1	1	2	2	1	3	19	-	4	1	1	97	2	1	1	1	1	1				
2041864	97	1	1	2	2	1	3	38	F		97	97	97	97	97	97	97	1	1				
2041864	97	1	1	2	2	1	3	16	M	8	97	97	97	97	97	97	97	1	1				
2041888	y					1	1	41	F	4	1	1	97	2	1	97	98	1	3				
2041888	y or	_	-			1	3	48	F		6	1	97	2	1	97	98	1	3				
Z449583	97	<u>′</u>	/	97	97	1	3	56	M	8		1	97	1			97	4	3				
Z449583	97			97	97	1	2	29	M			1	97	1			97	4	3				
2040958	97	1	1	2	2	1	2	68	м	4	1	3	2	2	1	1	1	1	1				
2040958	97	1	1	2	2	1	2	10		8	6	3	2	2	1	99	1	1	1				
2041056	1	1	1	2	2	1	2	48	M	4	1	1	97	2	1	99	1	1	1				
2041056	1	1	1	2	2	1	2	26	M	8	6	1	97	1		99	1	1	1				
2041061	97	1	1	4	2	1	3	42		4	1	1	1	1		1	1	1	1				
2041061	97	1	1	4	2	1	3	32	F	8	1	1	1	1		1	1	1	1				
2041061	9/	1	1	4	2	1	2	19		8	0	1	97	1		1	1	1	1				
2041562	1	1	1	3	2	1	1	21	-	8	1	1	97	2	1	1	1	1	1				
2041562	1	1	1	3	2	1	3	40	F	4	97	1	97	2	1	1	1	1	1				
2041654	1	1	1	2	2	1	1	81	M	8	1	1	97	2	1	1	1	1	3				
2041/5/	1	1	1	2	2	1	2	46	M	8	1	1	1	2	1	1	1	4	3				
2041757	1	1	1	2	2	1	1	60	M	/	1	1	1	2	1	1	1	4	3				
2041760	97	<u>'</u>	1	97	97	1	2	28	M	6	1	1	97	2	1	97	4	97	97				
2041760	97	7	7	97	97	1	2	50	M	6	1	1	97	2	1	97	4	97	97				
2041800	97	7	7	97	97	1	3	49	M	97	1	1	97	2	1	1	1	1	1				
2041800	97	7	7	97	97	1	2	53	M		6	1	97	2	1	97	1	1	1				
2083165	1	1	1	2	2	1	2	41	M	6	1	1	1	2	1	1	1	1	3				
2083165	1	1	1	2	2	1	3	28	F	7	97	1	1	2	1	1	1	1	3				
2041403	1	1	1	2	2	1	2	17	M	4	1	3	2	1		1	1	1	3				
2041403	1	1	1	2	2	1	1	42	F	7	1	3	2	1		1	1	1	3				
2041403	1	1	1	2	2	1	3	27	M	8	6	3	2	1		3	1	1	3				

VEHICLE CONDITION/ CONTRIBUTING UNSAFE AD DETAILS B ATTACHMENTS TRAILER TYPE FACTORS SPEEDS

COLLISION CASE	CASE YEAR	OBJECT NUMBER	POLICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTER SECTION WITH HWY #	ON STREET/AVENUE	AT INTERSECTION WITH STREET/AVENUE	IF NOT AT INTERSECTION DISTANCE	IF NOT AT INTERSECTION - DESCRIPTION	SPECIAL REFERENCE	OCCURRENCE DATE ((CCYY/MM/DD)	OCCURRENC HOUR	E COLLISION SEVERITY	NUMBER OF	NUMBER	NUMBER FATALITIES	HIT AND RUN	PRIMARY V EVENT
1552836	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				9/10/2005	20	2	2	2	0	2	8
1552836	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				9/10/2005	20	2	2	2	0	2	8
1637704	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVEEET				1/13/2005	12	3	2	0	0	2	8
1637704	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVEEET				1/13/2005	12	3	2	0	0	2	8
1637727	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				2/4/2005	7	3	2	0	0	2	5
1637727	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				2/4/2005	7	3	2	0	0	2	5
1637728	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				2/4/2005	7	3	2	0	0	2	5
1637728	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				2/4/2005	7	3	2	0	0	2	5
1637769	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE	5	HWY 28 & 50TH AVENUE		3/7/2005	14	3	2	0	0	2	5
1637769	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE	5	HWY 28 & 50TH AVENUE		3/7/2005	14	3	2	0	0	2	5
1637777	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			IN FRONT OF A & W 5002 55ST	3/17/2005	16	3	2	ō	ō	2	8
1637777	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			IN FRONT OF A & W 5002 55ST	3/17/2005	16	3	2	0	0	2	8
1637779	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/18/2005	8	3	2	0	0	2	8
1637779	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/18/2005	8	3	2	0	0	2	8
1637781	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/17/2005	97	2	2	1	0	2	8
1637781	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/17/2005	97	2	2	1	0	2	8
1637841	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				5/26/2005	6	3	3	0	0	2	5
1637841	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				5/26/2005	6	3	3	0	0	2	5
1637841	2005	3	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				5/26/2005	6	3	3	0	0	2	5
1720871	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			TURNING LEFT AT INTERSECTION	6/8/2005	15	3	2	0	0	2	13
1720871	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			TURNING LEFT AT INTERSECTION	6/8/2005	15	3	2	0	0	2	13
1720914	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVENUE				7/27/2005	19	3	2	0	0	2	5
1720914	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVENUE				7/27/2005	19	3	2	0	0	2	5
1721176	2005	1	1137	1	COLDIAK	HW/Y 28	50 AVENUE	28	1		50TH AVENUE			CENTRE	11/29/2005	12	3	2	0	0	2	8
1721176	2005	2	1137	1	COLDIAK	HWY 28	50 AVENUE	28	1		50TH AVENUE			CENTRE	11/29/2005	12	3	2	0	0	2	8
1721178	2005	1	1137	1	COLDIAK	HWY 28	50 AVENUE	20	1		50 AVENUE			GENINE	11/29/2005	14	2	3	2	0	2	8
1721178	2005	2	1137	1	COLDIAK	HWY 28	50 AVENUE	20	1		50 AVENUE				11/29/2005	14	2	3	2	0	2	8
1721179	2005	2	1137	1	COLDLAK	HW/Y 29	50 AVENUE	20	1		50 AVENUE				11/20/2005	14	2	3	2	0	2	
7542325	2005	1	1137	1	COLDLAK	LIWY 28	50 AVENUE	20	1		50 AVENUE				11/29/2005	14	2	1	2	0	2	0
7542325	2005	2	1137	1	COLDLAK	LIWY 28	50 AVENUE	20	1		50TH AVE			@ INTERSECTION NW SIDE HIT L POLE WEST OF HWY 28	11/29/2005	11	3	1	0	0		9
1779756	2005	- 1	1137	1	COLDLAK	LIWY 28	50 AVENUE	20	1		50 AVE			WINTERGECTION NW SIDE THT EFOLE WEST OF THMT 20	5/1/2006	0	3	2	0	0	2	9
1770756	2000	2	1137	1	COLDLAK	LIW/V 20		20	1		50 AVE				5/1/2000	9	3	2	0	0	2	0
1770700	2006	2	1137	1	COLDLAK		50 AVENUE	20	1		50 AVE				3/1/2006	9	3	2	1	0	2	0
1770702	2006	1	1137	1	COLD LAK		50 AVENUE	20	1		50 AVE				7/21/2006	15	2	2	1	0	2	0
1070193	2006	2	1137	1	COLD LAK		50 AVENUE	20	1		SU AVE				8/20/2006	13	2	2	1	0	2	2
1073172	2000	1	1137	1	COLDLAK	HW1 20	50 AVENUE	20	1		SOTHAVE			MIDDLE OF INTERSECTION	0/29/2000	17	2	2	1	0	1	3
18/31/2	2006	2	1137	1	COLD LAK		50 AVENUE	28	1		SUTHAVE			MIDDLE OF INTERSECTION	8/29/2006	17	2	2	1	0	1	3
1528/41	2007	1	1137	1	COLD LAK	HWY Y 28	50 AVENUE	28	1		50 AVE			CENTRE AVE	10/15/2007	11	3	2	0	0	2	12
1528/41	2007	2	1137	1			50 AVENUE	28	1					CENTRE AVE	10/15/2007	11	3	2	0	0	2	12
1721047	2007	1	1137	1	COLD LAK	HWY Y 28	50 AVENUE	28	1		50 AVE NB				2/23/2007	13	3	2	0	0	2	5
1721047	2007	2	1137	1	COLD LAK	HWY Y 28	50 AVENUE	28	1		50 AVE NB				2/23/2007	13	3	2	0	0	2	5
18/31/0	2007	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/12/2007	7	3	2	0	0	2	5
18/31/0	2007	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/12/2007	/	3	2	0	0	2	5
2040921	2007	1	1137	1	COLD LAK	HW 1 28	50 AVENUE	28	1		50 AVE				12/16/2007	97	3	2	0	0	2	12
2040921	2007	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			NOT CONCEPTOR	12/16/2007	97	3	2	0	0	2	12
2040982	2008	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVENUE			IN CITY - DO NOT PLOT	2/14/2008	18	3	2	0	0	2	13
2040982	2008	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVENUE			IN CITY - DO NOT PLOT	2/14/2008	18	3	2	U	U	2	13
2041275	2008	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				7/31/2008	9	3	2	0	U	2	97
2041275	2008	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				7/31/2008	9	3	2	0	0	2	97
2209626	2008	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			(IN CITY)	10/30/2008	14	3	2	0	U	2	97
2209626	2008	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			(IN CITY)	10/30/2008	14	3	2	0	0	2	97
Z586385	2008	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			IN CITY - DO NOT PLOT	12/4/2008	12	3	1	0	0		7
Z586385	2008	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			IN CITY - DO NOT PLOT	12/4/2008	12	3	1	0	0		7

														TRAFFIC							
COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYP	E OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF	DRIVER ACTION	LIGHT CONDITION A	LIGHT CONDITION B	CONTROL DEVICI PRESENT	E TRAFFIC CONDITION DEVICE CONDITION	PEDESTRIAN ACTION	DRIVER/PED CONDITION	CONTRIBUTING ROAD CONDITION	ENVIRONMENTAL CONDITION	SURFACE CONDITION	LOAD DETAILS A
1552836	1	7	2	3	2	1	3	34	F	4	1	3	97	2	1		1	1	1	2	2
1552836	1	7	2	3	2	1	3	41	F	8	6	3	97	2	1		3	1	1	2	
1637704	1	1	2	3	2	1	1	41	F	4	1	1	97	2	1		1	1	1	3	
1637704	1	1	2	3	2	1	1	37	М	8	1	1	97	2	1		1	1	1	3	
1637727	1	0	2	3	2	1	1	59	М	2	9	3	2	2	1		1	1	1	1	
1637727	1	0	2	3	2	1	2	55	M	8	1	97	97	2	1		1	1	1	1	
1637728	1	1	2	3	2	1	1	42	M	8	1	3	2	2	1		1	1	1	1	
1637728	1	1	2	3	2	1	2	29	М	8	14	97	97	2	1		1	1	1	1	
1637769	1	1	2	3	2	1	1	75	M		13	1	1	1			1	1	1	2	
1637769	1	1	2	3	2	1	1	24	F		1	1	1	1			1	1	1	2	
1637777	1	1	2	3	2	1	1	38	F	9	1	1	1	4	97		1	4	4	3	
1637777	1	1	2	3	2	1	1	28	F		97	97	97	97	97		97	97	4	3	
1637779	97	1	2	3	2	1	3	38	F	8	99	1	97	2	1		1	1	4	3	
1637779	97	1	2	3	2	1	2	39	M	4	1	1	97	2	1		1	1	4	3	
1637781	1	1	2	3	2	1	3	64	M	4	1	1	97	2	1		1	1	1	3	
1637781	1	1	2	3	2	1	1	24	M	8	1	1	97	2	1		1	1	1	3	
1637841	1	1	2	3	2	1	2	39	M	7	1	1	97	2	1		1	1	1	1	
1637841	1	1	2	3	2	1	3	40	F	7	9	1	97	2	1		1	1	1	1	
1637841	1	1	2	3	2	1	1	25	F	2	1	1	97	2	1		1	1	1	1	
1720871	1	1	2	3	2	1	1	69	M	8	99	1	1	2	1		1	1	1	1	
1720871	1	1	2	3	2	1	3	35	M	4	99	1	1	2	1		1	1	1	1	
1720914	1	1	2	3	2	1	1	16	F	7	1	1	1	2	1		97	1	1	1	
1720914	1	1	2	3	2	1	1	21	М		9	1	1	2	1		97	1	1	1	
1721176	1	1	2	3	2	1	3	49	F	4	1	1	97	2	1		1	4	4	3	
1721176	1	1	2	3	2	1	3	17	М	8	1	1	97	2	1		1	4	4	3	
1721178	1	1	2	2	2	1	1	45	F	4	1	1	97	2	1		1	1	4	3	
1721178	1	1	2	2	2	1	1	18	F	8	1	1	97	2	1		1	1	4	3	
1721178	1	1	2	2	2	1	1	19	м	4	1	1	97	2	1		1	1	4	3	
Z542325	1	1	1	3	2	1	1	33	F	8		1	97	2				4	4	3	
Z542325	1	1	1	3	2	9	13											97			
1778756	1	1	2	3	2	1	1	48	м	4	1	1	97	4	97		1	1	2	2	
1778756	1	1	2	3	2	1	2	48	м	8	6	1	97	4	97		1	1	2	2	
1778793	1	1	1	3	2	1	1	47	F	4	97	1	97	2	1		97	1	1	1	
1778793	1	1	1	3	2	1	1	19	M	8	97	1	97	2	1		97	1	1	1	
1873172	1	1	1	3	2	1	1	39	F	7	1	1	1	2	1		1	1	1	1	
1873172	1	1	1	3	2	1	2			1	11	1	1	2	1		99	1	1	1	
1528741	97	1	1	2	1	1	2	48	м	7	1	1	97	1			1	1	1	1	
1528741	97	1	1	2	1	1	4	33	M	2	10	1	97	1			1	1	1	1	
1721047	1	1	1	3	2	1	2	71	M	8	97	1	1	2	1		1	4	4	3	
1721047	1	1	1	3	2	1	2	47	M	8	97	1	1	2	1		1	4	4	3	
1873170	97	1	1	2	2	1	1	36	F	2	9	1	97	2	1		1	1	1	3	
1873170	97	1	1	2	2	1	1	39	M	8	1	1	97	2	1		1	1	1	3	
2040921	1	1	1	2	2	1	1	48	M	97	97		97	97	97		97	97	07	97	
2040021	1	1	1	2	2	1	2	32	M	57	07	97	97	07	07		97	97	97	07	
2040921	1	1	1	2	2	1	1	33	M	8	1	3	97	2	1		1	57	37	3	
2040302	1	1	1	2	2	1	2	34	M	0	8	3	97	2	1		1	1	1	3	
2040302	97	1	1	2	2	1	∠ 1	53	F	8	97	1	97	2	1		1	1	1	1	
2041275	37	1	1	3	2	1	1	00	г М	0	97	1	97	2	1		1	1	1	1	
2041275	97	1	1	3	2	1	2	87 57	IVI NA	2	97	1	97	2	1		1	1	1	1	
2209020	1	1	1	0	2	1	3	30		5 7	11	1	33	2	1		1	1	1	1	
2209020	1	1	1	ö	2	1	3	30	F	6	11	1	39	2	1		1	1	1	1	
2000300	1	1	1	ö	2	1	5	30	IVI	ø		1	1	2				1	1	1	
Z586385	1	1	1	8	2	Э	13											97			

VEHICLE CONDITION/ CONTRIBUTING LOAD DETAILS B ATTACHMENTS TRAILER TYPE FACTORS UNSAFE SPEEDS

	CASE	OBJECT	POLICE			NORTH/SOUTH	EAST/WEST		AT INTERSECTION WITH		AT INTERSECTION WITH	IF NOT AT INTERSECTION			OCCURRENCE DATE	OCCURRENCE	E COLLISION	NUMBER OF NUMBER	R NUMBER	1	PRIMARY
COLLISION CASE NUMBER	YEAR	NUMBER	SERVICE	IN/ NEAR	CITY NAME	ROAD NAME	ROAD NAME	ON HWY #	HWY #	ON STREET/AVENUE	STREET/AVENUE	DISTANCE	IF NOT AT INTERSECTION - DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES INJUR	D FATALITIE	S HIT AND RUN	EVENT
1720945	2006	1	1137	1	COLD LAK	55 STREET	54 AVENUE	28	1		54 AVE			55 ST	6/26/2006	13	2	2 1	0	2	1
1720945	2006	2	1137	1	COLD LAK	55 STREET	54 AVENUE	28	1		54 AVE			55 ST	6/26/2006	13	2	2 1	0	2	1
1873358	2006	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE			NEAR OF 5343-55 ST	11/28/2006	19	3	2 0	0	2	97
1873358	2006	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE			NEAR OF 5343-55 ST	11/28/2006	19	3	2 0	0	2	97
1873360	2006	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				11/29/2006	8	3	2 0	0	2	1
1873360	2006	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				11/29/2006	8	3	2 0	0	2	1
1873371	2006	1	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST			5402 55 ST E	11/30/2006	17	3	2 0	0	2	8
1873371	2006	2	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST			5402 55 ST E	11/30/2006	17	3	2 0	0	2	8
1972422	2000	4	1107	4	COLD LAK	EE OTREET				54 AVE	55 61	F	EE OT	SERVICE ROAD INTERSECTION	12/15/2000	19	3	2 0	0	2	07
1073422	2000	2	1137	1	COLD LAK	EE OTDEET	54 AVENUE			54 AVE		5	55 51	SERVICE ROAD INTERSECTION	12/15/2000	10	3	2 0	0	2	97
1701120	2000	2	1137	1	COLD LAK	55 STREET	54 AVENUE			34 AVE		5	55 51		2/9/2007	7	3	2 0	0	2	3/
1721138	2007	1	1137		COLD LAK	55 STREET	54 AVENUE							INTERGECTION@MACH 5451 55 31	2/8/2007	-	3	2 0	0	2	3
1721138	2007	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55.07	5 4 A 1 (5			INTERSECTION@MACH 5451 55 ST	2/8/2007	1	3	2 0	0	2	3
1721145	2007	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 51	54 AVE				2/2/2007	18	3	2 0	0	2	5
1721145	2007	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 S I	54 AVE				2/2/2007	18	3	2 0	0	2	5
1873011	2007	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				5/18/2007	11	3	2 0	0	2	3
1873011	2007	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				5/18/2007	11	3	2 0	0	2	3
1873037	2007	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 STREET	54 AVENUE				7/26/2007	97	3	2 0	0	2	3
1873037	2007	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 STREET	54 AVENUE				7/26/2007	97	3	2 0	0	2	3
2040903	2007	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVENUE				12/31/2007	97	3	2 0	0	2	5
2040903	2007	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVENUE				12/31/2007	97	3	2 0	0	2	5
2041289	2008	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				8/9/2008	17	3	2 0	0	2	5
2041289	2008	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				8/9/2008	17	3	2 0	0	2	5
2041359	2008	1	1137	1	COLD LAK	55A STREET	54 AVENUE			54 AVE	55A ST				12/8/2008	17	2	2 1	0	2	6
2041359	2008	2	1137	1	COLD LAK	55A STREET	54 AVENUE			54 AVE	55A ST				12/8/2008	17	2	2 1	0	2	6
2041398	2008	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 SE	54 AVE				12/31/2008	15	3	2 0	0	1	8
20/1398	2008	2	1137	4	COLDLAK	55 STREET	54 AVENUE			55 SE	54 AV/E				12/31/2008	15	3	2 0	0	1	8
2209660	2000	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				11/25/2008	14	3	2 0	0	2	12
2203000	2000		1107	4	COLD LAK	EE CTREET				55 GT	54 AVE				11/25/2000	14	3	2 0	0	2	12
2209000	2000	2	4407		COLD LAK	55 STREET				55 51	54 AVE				0/0/2008	14	3	2 0	0	2	12
2209759	2006	1	1137		COLD LAK	55 STREET	54 AVENUE			55 51	54 AVE				9/8/2008	0	2	2 3	0	2	0
2209759	2008	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 81	54 AVE				9/8/2008	8	2	2 3	0	2	8
2041420	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 51	54 AVE				1/27/2009	15	2	3 3	0	2	8
2041420	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				1/27/2009	15	2	3 3	0	2	8
2041420	2009	3	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				1/27/2009	15	2	3 3	0	2	8
2041650	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				5/20/2009	8	3	2 0	0	2	6
2041650	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				5/20/2009	8	3	2 0	0	2	6
2307010	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			ACCESS ROAD	54 AVE			JCT OF HWY 28 AND ACCESS RD AT NO FRILLS	10/13/2009	19	3	2 0	0	2	3
2307010	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			ACCESS ROAD	54 AVE			JCT OF HWY 28 AND ACCESS RD AT NO FRILLS	10/13/2009	19	3	2 0	0	2	3
2307067	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				9/14/2009	16	3	2 0	0	2	8
2307067	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				9/14/2009	16	3	2 0	0	2	8
2307142	2009	1	1137	1	COLD LAK	55A STREET	54 AVENUE			54 AVE	55 A ST				12/7/2009	15	3	2 0	0	2	3
2307142	2009	2	1137	1	COLD LAK	55A STREET	54 AVENUE			54 AVE	55 A ST				12/7/2009	15	3	2 0	ō	2	3
2307225	2009	-	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST				4/18/2009	14	3	2 0	0	2	7
2307225	2000		1137		COLDIAK	55 STREET	54 AV/ENUE			54 AVE	55 ST				4/18/2009	14	3	2 0	0	2	7
2307240	2003	1	1137	1	COLD LAK	55 STREET				55 ST	54 AVE				7/3/2009	12	3	2 0	0	2	
2307240	2009	2	1137	1	COLD LAK	EE OTDEET				55 51 EE OT	54 AVE				7/3/2009	12	3	2 0	0	2	0
2307240	2009	2	1137		COLD LAK	55 SIREE!	54 AVENUE			50 51	54 AVE				7/3/2009	12	3	2 0	U	2	0
2307411	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 81				9/2/2009	17	3	3 0	0	2	5
2307411	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 S I				9/2/2009	17	3	3 0	0	2	5
2307411	2009	3	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST				9/2/2009	17	3	3 0	0	2	5

CURRENCE DATE (CCYY/MM/DD)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY EVENT
6/26/2006	13	2	2	1	0	2	1
6/26/2006	13	2	2	1	0	2	1
11/28/2006	19	3	2	0	0	2	97
11/28/2006	19	3	2	0	0	2	97
11/29/2006	8	3	2	0	0	2	1
11/29/2006	8	3	2	0	0	2	1
11/30/2006	17	3	2	0	0	2	8
11/30/2006	17	3	2	0	0	2	8
12/15/2006	18	3	2	0	0	2	97
12/15/2006	18	3	2	0	0	2	97
2/8/2007	7	3	2	0	0	2	3
2/8/2007	7	3	2	0	0	2	3
2/2/2007	18	3	2	0	0	2	5
2/2/2007	18	3	2	0	0	2	5
5/18/2007	11	3	2	0	0	2	3
5/18/2007	11	3	2	0	õ	2	3
7/26/2007	97	3	2	0	0	2	3
7/26/2007	97	3	2	0	0	2	3
12/31/2007	97	3	2	0	0	2	5
12/31/2007	97	3	2	0	0	2	5
8/9/2008	17	3	2	0	0	2	5
8/9/2008	17	3	2	ő	ő	2	5
12/8/2008	17	2	2	1	0	2	6
12/8/2008	17	2	2	1	0	2	6
12/31/2008	15	3	2	0	ő	1	8
12/31/2008	15	3	2	0	0	1	8
11/25/2008	14	3	2	ő	ő	2	12
11/25/2008	14	3	2	ő	ő	2	12
9/8/2008	8	2	2	3	ő	2	8
9/8/2008	8	2	2	3	ő	2	8
1/27/2009	15	2	3	3	ő	2	8
1/27/2009	15	2	3	3	ő	2	8
1/27/2009	15	2	3	3	ő	2	8
5/20/2009	8	3	2	ő	ő	2	6
5/20/2009	8	3	2	0	ő	2	6
10/13/2009	19	3	2	ő	ő	2	3
10/13/2009	19	3	2	0	ő	2	3
9/14/2000	16	3	2	0	0	2	8
9/14/2009	16	3	2	0	0	2	8
12/7/2000	16	2	2	0	0	2	2
12/7/2009	15	3	2	0	0	2	2
4/19/2009	14	3	2	0	0	2	7
4/19/2009	14	2	2	0	0	2	7
++ 10/2009 7/2/2000	14	3	2	0	0	2	,
7/2/2009	12	3	2	0	0	2	0
0/2/2009	12	3	2	0	0	2	0
3/2/2009	17	3	3	0	0	2	5
01212003	17				11		

	SPECIAL	ROAD	ROAD		COLLISION			DRIVER/PED	DRIVER/PED	POINT OF	DRIVER	LIGHT	LIGHT	TRAFFIC CONTROL	TRAFFIC CONDITION	PEDESTRIAN	DRIVER/PED	CONTRIBUTING ROAD	ENVIRONMENTAL	SURFACE		
COLLISION CASE NUMBER	FACILITY	ALIGNMENT A	ALIGNMENT B	ROAD CLASS	LOCATION	OBJECT TYPE	OBJECT ID	AGE	SEX	IMPACT	ACTION	CONDITION A	CONDITION B	DEVICE PRESENT	DEVICE CONDITION	ACTION	CONDITION	CONDITION	CONDITION	CONDITION	LOAD DETAILS A	LOAD DETAILS B
1720945	1	1	1	2	2	1	1	19	F	1	1	1	97	2	1		1	1	1	1		
1720945	1	1	1	2	2	4	8	14	F		97	97	97	97	97		97	97	1	1		
1873358	1	1	1	4	2	1	1	29	F	3	13	3	2	2	1		1	1	4	3	2	
1873358	1	1	1	4	2	1	2	31	M	8	1	3	2	2	1		1	1	4	3	2	
1873360	1	1	1	2	2	1	1	28	M	8	99	1	97	2	1		1	1	1	3		
1873360	1	1	1	2	2	1	3	32	M	4	99	1	97	2	1		1	1	1	3		
1873371	1	1	1	2	2	1	1	50	F	4	1	3	97	2	1		1	1	4	3		
1873371	1	1	1	2	2	1	3	52	F		1	3	97	2	1		1	1	4	3		
1873422	1	1	1	2	2	1	2	55	M	2	97	3	97	1			97	1	4	3		
1873422	1	1	1	2	2	1	2	37	M	8	98	3	97	1			97	1	4	3		
1721138	97	1	1	2	1	1	1	54	M	8	13	1	97	1			1	1	1	3		
1721138	97	1	1	2	1	1	1	49	M	8	1	1	97	3	1		1	1	1	3		
1721145	97	1	1	4	2	1	1	52	M	7	1	1	97	2	1		1	98	1	3		
1721145	97	1	1	4	2	1	2	39	F	7	9	1	97	2	1		1	98	1	3		
1873011	97	1	1	2	2	1	3	46	м	8	97	97	97	97	97		97	97	97	97		
1873011	97	1	1	2	2	1	1	70	F	6	97	97	97	97	97		97	97	97	97		
1873037	97	1	1	2	1	1	2	20	м	3	9	1	1	2	1		1	1	1	1	2	
1873037	97	1	1	2	1	1	1	17	м	8	3	1	1	2	1		1	1	1	1		
2040903	97	1	1	2	2	1	1	17	М	1	1	1	97	2	1		1	1	1	3		
2040903	97	1	1	2	2	1	2	17	F	2	13	1	97	2	1		1	1	1	3		
2041289	97	7	7	97	97	1	2	17	м	8	99	97	97	97	97		97	97	97	97		
2041289	97	7	7	97	97	1	2	24	м		99	97	97	97	97		97	97	97	97		
2041359	97	1	1	2	1	1	1	50	м	7	99	3	2	1			97	1	4	3		
2041359	97	1	1	2	1	1	1	47	F	7	99	3	2	1			97	1	4	3		
2041398	97	1	1	2	2	1	3	49	F	4	97	3	1	97	97		97	1	4	3		
2041398	97	1	1	2	2	1	99				97	97	97	97	97		97	97	4	3		
2209660	97	1	1	2	1	1	9	53	F	1	1	1	97	1			1	1	1	3		
2209660	97	1	1	2	1	1	3	61	м	7	10	1	97	1			1	1	1	3		
2209759	97	1	1	2	2	1	1	19	F	8	99	1	97	97	97		97	1	1	1		
2209759	97	1	1	2	2	1	3	35	F	4	99	1	97	97	97		97	1	1	1		
2041420	97	1	1	2	2	1	2	26	м	4	1	1	1	1			1	1	1	3		
2041420	97	1	1	2	2	1	3	30	F	3	6	1	1	1			1	1	1	3		
2041420	97	1	1	2	2	1	1	27	M	8	1	1	1	1			97	1	1	3		
2041650	1	1	1	2	2	1	3	17	м	6	99	1	1	97	97		99	97	97	97		
2041650	1	1	1	2	2	1	3	28	м	1	99	1	1	97	97		99	97	97	97		
2307010	97	0	1	2	2	1	1	21	F	8	1	3	2	2	1		1	1	1	1		
2307010	97	0	1	2	2	1	2	51	M	1	2	3	2	3	1		1	1	1	1		
2307067	97	1	1	2	2	1	2	45	M	4	1	1	1	2	1		1	1	1	1		
2307067	97	1	1	2	2	1	3	28	F	8	6	1	1	2	1		99	1	1	1		
2307142	97	. 1	. 1	2	2	. 1	3	54	F	7	99	. 1	. 1	2	1		1	1	1	3		
2307142	97	1	1	2	2	1	2	31	M	8	00	1	1	2	1		1	1	1	3		
2307225	97	1	1	2	2	1	2	18	M	5	1	1	1	2	1		1	3	2	2		
2307225	97	1	1	2	2	1	5	32	M	0	. 14		1	2				3	2	2	1	1
2307223	97	1	1	2	2	1	5	45	M	8	99	1	1	2	1		1	1	2	2	1	1
2307240	97	1	1	2	2	1	2	52	M	4	1	1	1	2	1		1	1	2	2		
2307210	1	1	1	2	2	1	2	75	M	8	۰ ۵	1	1	2	1		1	1	-	1		
2307411	1	1	1	2	2	1	2	18	M	11	9 11	1	1	2	1		1	1	1	1		
2307411	1	1	1	2	2	1	3	21	F	7	1	1	1	2	1		1	1	1	1		
2001411				2	2		5	21		'				2								

VEHICLE CONDITION/ UNSAFE ATTACHMENTS TRAILER TYPE CONTRIBUTING FACTORS SPEEDS

1 2 1 2 1 5 1 97

								AT			IF NOT AT										
COLLISION CASE	CASE	OBJECT	POLICE			NORTH/SOUTH	EAST/WEST	INTERSECTION		AT INTERSECTION WITH	INTERSECTION	IF NOT AT INTERSECTION -		OCCURRENCE DATE	OCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER		PRIMARY
NUMBER	YEAR	NUMBER	SERVICE I	N/ NEAR	CITY NAME	ROAD NAME	ROAD NAME ON HWY #	WITH HWY #	ON STREET/AVENUE	STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES I	IIT AND RUN	EVENT
1315702	2005	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				12/2/2005	17	3	2	0	0	2	3
1315702	2005	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				12/2/2005	17	3	2	0	0	2	3
1637719	2005	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				12/24/2005	1	3	2	0	0	2	8
1637719	2005	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				12/24/2005	1	3	2	0	0	2	8
1721245	2006	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE	50 ST			IN FRONT OF SCOTIA BANK	5/10/2006	18	3	2	0	0	2	13
1721245	2006	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE	50 ST			IN FRONT OF SCOTIA BANK	5/10/2006	18	3	2	0	0	2	13
1720941	2007	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				6/15/2007	18	3	2	0	0	2	12
1720941	2007	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				6/15/2007	18	3	2	0	0	2	12
1721084	2007	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE			SIDE OF TD BANK	4/11/2007	17	3	2	0	0	1	7
1721084	2007	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE			SIDE OF TD BANK	4/11/2007	17	3	2	0	0	1	7
1721161	2007	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE WB	50 ST				2/23/2007	11	3	2	0	0	2	8
1721161	2007	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE WB	50 ST				2/23/2007	11	3	2	0	0	2	8
1873142	2007	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				8/17/2007	18	3	2	0	0	2	12
1873142	2007	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				8/17/2007	18	3	2	0	0	2	12
1873463	2007	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 STREET	50 AVE				1/12/2007	16	2	2	1	0	2	8
1873463	2007	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 STREET	50 AVE				1/12/2007	16	2	2	1	0	2	8
2041546	2008	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				6/14/2008	16	3	2	0	0	2	8
2041546	2008	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				6/14/2008	16	3	2	0	0	2	8
2209766	2008	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE	50 ST				9/19/2008	12	3	2	0	0	2	13
2209766	2008	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE	50 ST				9/19/2008	12	3	2	0	0	2	13
Z586393	2008	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				11/10/2008	24	3	1	0	0		1
Z586393	2008	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				11/10/2008	24	3	1	0	0		1
2041434	2009	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				2/7/2009	10	2	2	1	0	2	8
2041434	2009	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 ST	50 AVE				2/7/2009	10	2	2	1	0	2	8
2307447	2009	1	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE		10	50 ST		3/12/2009	14	3	2	0	0	2	13
2307447	2009	2	1137	1	COLD LAK	50 STREET	50 AVENUE		50 AVE		10	50 ST		3/12/2009	14	3	2	0	0	2	13

	SPECIAL A	ROAD ALIGNMENT	ROAD ALIGNMENT B			OBJECT	OBJECT	DRIVER/PED DF	RIVER/PED	POINT OF IMPACT				TRAFFIC CONTROL	TRAFFIC CONDITION PE	EDESTRIAN D		CONTRIBUTING ROAD CONDITION				ATTACHMENTS TR		VEHICLE CONDITION/ CONTRIBUTING FACTORS	
1315702	1	1	1	2	2	1	1	25	F	8	11	3	97	2	1	Action 6	1	1	98	3		ATTACIMENTO		TACIONO	OI LEDO
1315702	1	1	1	2	2	1	2	25	M	7	1	3	97	2	1		1	1	98	3					
1637719	97	7	7	97	97	1	2	30	M	8	6	1	97	4	1		1	1	1	1					
1637719	97	7	7	97	97	1	1	44	F	4	1	97	97	97	97		1	97	1	1					
1721245	97	7	7	97	97	1	1	47	М	5	8	1	97	1			1	1	1	1					
1721245	97	7	7	97	97	1	3	43	М	4	1	1	97	1			1	1	1	1					
1720941	97	1	1	2	2	1	5	35	F	3	13	1	1	3	1		1	1	1	1	2	1	4	1	2
1720941	97	1	1	2	2	1	1	51	М	6	1	1	1	3	1		1	1	1	1					
1721084	97	1	1	2	1	5	1			8	7							97	1	1					
1721084	97	1	1	2	1	1	99				99	97	97	97	97		99	97	1	1					
1721161	97	7	7	97	97	1	1	39	F	4	97	1	97	97	1		1	4	4	3					
1721161	97	7	7	97	97	1	1	42	М	8	97	1	97	97	97		1	4	4	3					
1873142	97	1	1	2	1	1	1	48	F	97	8	1	97	1			1	1	1	1					
1873142	97	1	1	2	1	1	3	24	M		1	1	97	1			1	1	1	1					
1873463	97	0	1	2	2	1	2	25	М	4	1	1	97	3	97		1	1	1	3					
1873463	97	0	1	2	2	8	17	21	М	8	1	1	97	3	97		1	1	1	3					
2041546	97	1	1	2	1	1	3	48	М	4	3	1	97	3	1		97	1	1	1					
2041546	97	1	1	2	1	1	3	27	М	8	1	1	97	3	1		97	1	1	1					
2209766	97	1	1	2	2	1	1	30	M	6	97	1	97	3	1		97	1	1	1					
2209766	97	1	1	2	2	1	2	38	М	5	8	1	97	97	97		97	1	1	1					
Z586393	97	7	7	97	97	1	1	21	М	1		3	2	3				4	1	3					
Z586393	97	7	7	97	97	9	13											97							
2041434	97	1	1	3	2	1	1	52	F	4	1	1	1	2	1		97	1	1	3					
2041434	97	1	1	3	2	1	1	26	М	8	6	1	1	97	97		97	1	1	3					
2307447	97	1	1	2	1	1	1	18	М	3	1	1	1	6	1		1	1	1	1					
2307447	97	1	1	2	1	1	2	25	М	4	8	1	1	97	97		97	1	1	1					

												IF NOT AT	IF NOT AT									
COLLISION CASE	CASE	OBJECT	POLICE			NORTH/SOUTH ROAD	D EAST/WEST ROAD		AT INTERSECTION		AT INTERSECTION WITH	INTERSECTION	INTERSECTION -		OCCURRENCE DATE	DCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER		
NUMBER	YEAR	NUMBER	SERVICE	IN/ NEAF	R CITY NAME	NAME	NAME	ON HWY #	WITH HWY #	ON STREET/AVENUE	STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES	HIT AND RUN	PRIMARYEVENT
1315589	2005	1	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	50 STREET				10/19/2005	12	3	2	0	0	2	1
1315589	2005	2	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	50 STREET				10/19/2005	12	3	2	0	0	2	1
1720806	2005	1	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	EAST SERVICE RD.			SERVICE ROAD IN FRONT OF DAIRY QUEEN	9/1/2005	21	3	2	0	0	1	6
1720806	2005	2	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	EAST SERVICE RD.			SERVICE ROAD IN FRONT OF DAIRY QUEEN	9/1/2005	21	3	2	0	0	1	6
1721290	2005	1	1137	1	COLD LAK	50 STREET	46 AVENUE			50 STREET	46 AVENUE				12/21/2005	17	3	2	0	0	2	8
1721290	2005	2	1137	1	COLD LAK	50 STREET	46 AVENUE			50 STREET	46 AVENUE				12/21/2005	17	3	2	0	0	2	8
Z524717	2005	1	1137	1	COLD LAK	50 STREET	46 AVENUE			50 STREET	46 AVENUE				9/1/2005	13	3	2	0	0		12
Z524717	2005	2	1137	1	COLD LAK	50 STREET	46 AVENUE			50 STREET	46 AVENUE				9/1/2005	13	3	2	0	0		12
1873226	2006	1	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE			STOP SIGN BY WALMART	11/4/2006	16	3	2	0	0	2	3
1873226	2006	2	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE			STOP SIGN BY WALMART	11/4/2006	16	3	2	0	0	2	3
1873228	2006	1	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	50 ST			STOP SIGN @ WALMART INTERSECTION	11/4/2006	15	3	2	0	0	2	8
1873228	2006	2	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	50 ST			STOP SIGN @ WALMART INTERSECTION	11/4/2006	15	3	2	0	0	2	8
1873440	2006	1	1137	1	COLD LAK	50 STREET	46 AVENUE							SERVICE ROAD IN FRONT OF DAIRY QUEEN 4605-50 ST	12/19/2006	9	3	2	0	0	2	8
1873440	2006	2	1137	1	COLD LAK	50 STREET	46 AVENUE							SERVICE ROAD IN FRONT OF DAIRY QUEEN 4605-50 ST	12/19/2006	9	3	2	0	0	2	8
1721077	2007	1	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE				4/13/2007	15	3	3	0	0	2	5
1721077	2007	2	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE				4/13/2007	15	3	3	0	0	2	5
1721077	2007	3	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE				4/13/2007	15	3	3	0	0	2	5
2041222	2007	1	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST		2	46 AVE		11/20/2007	17	3	2	0	0	2	8
2041222	2007	2	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST		2	46 AVE		11/20/2007	17	3	2	0	0	2	8
2041050	2008	1	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE			PORK CHOP ON SERVICE ROAD IN FRONT OF DAIRY QUEEN	4/18/2008	18	3	2	0	0	2	8
2041050	2008	2	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE			PORK CHOP ON SERVICE ROAD IN FRONT OF DAIRY QUEEN	4/18/2008	18	3	2	0	0	2	8
2041557	2008	1	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	50 ST			STOP SIGN IN FRONT OF DAIRY QUEEN	5/18/2008	17	3	2	0	0	2	7
2041557	2008	2	1137	1	COLD LAK	50 STREET	46 AVENUE			46 AVE	50 ST			STOP SIGN IN FRONT OF DAIRY QUEEN	5/18/2008	17	3	2	0	0	2	7
2041791	2008	1	1137	1	COLD LAK	50 STREET	46 AVENUE			46 TH AVENUE	50TH STREET				3/3/2008	18	3	2	0	0	2	97
2041791	2008	2	1137	1	COLD LAK	50 STREET	46 AVENUE			46 TH AVENUE	50TH STREET				3/3/2008	18	3	2	0	0	2	97
2307279	2009	1	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE				7/25/2009	20	3	2	0	0	2	12
2307279	2009	2	1137	1	COLD LAK	50 STREET	46 AVENUE			50 ST	46 AVE				7/25/2009	20	3	2	0	0	2	12

COLLISION CASE	SPECIAL	ROAD	ROAD		COLLISION			DRIVER/PED	DRIVER/PED	POINT OF	DRIVER	LIGHT	LIGHT CONDITION	TRAFFIC CONTROL	TRAFFIC CONDITION	PEDESTRIAN	DRIVER/PED	CONTRIBUTING	ENVIRONMENTAL	SURFACE	LOAD DETA
NUMBER	FACILITY	ALIGNMENT A	ALIGNMENT B	ROAD CLASS	LOCATION	OBJECT TYPE	OBJECT ID	AGE	SEX	IMPACT	ACTION	CONDITION A	А В	DEVICE PRESENT	DEVICE CONDITION	ACTION	CONDITION	ROAD CONDITION	CONDITION	CONDITION	Α
1315589	1	1	1	3	2	1	1	52	M	8	9	1	97	1			1	1	97	1	
1315589	1	1	1	3	2	1	1	30	F	7	1	1	97	1			1	1	97	1	
1720806	1	1	1	2	2	1	1	20	м	7	1	3	1	3	97		1	1	1	1	
1720806	1	1	1	2	2	1	2			7	13	3	1	1			99	97	1	1	
1721290	1	1	1	3	2	1	1	19	M	8	6	3	2	1			1	1	1	2	
1721290	1	1	1	3	2	1	2	44	М	4	1	3	2	1			1	1	1	2	
Z524717	1	1	1	2	2	1	2	75	F	7		1	1	2				1	1	1	
Z524717	1	1	1	2	2	1	1	21	М	3		1	1	1				1	1	1	
1873226	9					1	3	24	F	6	1	3	97	1			1	3	4	3	
1873226	9					1	1	68	F	8	97	3	97	3	1		1	3	4	3	
1873228	9					1	1	47	F	4	1	1	97	3	1		97	98	4	3	
1873228	9					1	2	20	М	8	6	1	97	1			97	98	4	3	
1873440	1	1	1	4	2	1	3	56	F	4	1	1	1	3	1		1	1	1	3	
1873440	1	1	1	4	2	1	3	40	F	8	1	1	1	3	1		1	1	1	3	
1721077	97	1	1	2	1	1	1	20	м	6	1	1	1	3	1		1	1	1	1	
1721077	97	1	1	2	1	1	1	17	М	1	99	1	1	97	97		97	1	1	1	
1721077	97	1	1	2	1	1	1	34	F	5	1	1	97	1			1	1	1	1	
2041222	97	1	1	2	1	1	3	31	F	4	97	3	97	1			97	1	1	3	
2041222	97	1	1	2	1	1	1	34	M	8	97	3	97	1			97	1	1	3	
2041050	8	1	1	2	2	1	2	36	F	8	1	97	97	97	97		97	97	97	97	
2041050	8	1	1	2	2	1	1	51	F	4	99	97	97	97	97		97	97	97	97	
2041557	97	1	1	2	2	1	3	34	M	1	1	1	97	3	1		1	1	1	1	
2041557	97	1	1	2	2	1	3	70	F	8	2	1	97	3	1		99	1	1	1	
2041791	97	1	1	2	2	1	3	27	F	8	98	1	1	3	97		1	98	4	3	
2041791	97	1	1	2	2	1	2	55	м	3	1	1	1	97	97		99	98	4	3	
2307279	1	1	1	2	2	1	2	50	F	3	10	1	1	1			1	1	1	1	
2307279	1	1	1	2	2	1	2	25	M		1	1	1	3	1		1	1	1	1	

TAILS LOAD DETAILS B ATTACHMENTS TRAILER TYPE

VEHICLE CONDITION/ CONTRIBUTING FACTORS UNSAFE SPEEDS

												IF NOT AT	IF NOT AT									
COLLISION CASE	CASE	OBJECT	POLICE			NORTH/SOUTH ROAD	EAST/WEST ROAD		AT INTERSECTION		AT INTERSECTION WITH	INTERSECTION	INTERSECTION -		OCCURRENCE DATE	OCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER		PRIMARY
NUMBER	YEAR	NUMBER	SERVICE	IN/ NEAR	CITY NAME	NAME	NAME	ON HWY #	WITH HWY #	ON STREET/AVENUE	STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES	HIT AND RUN	EVENT
1637758	2005	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				3/9/2005	12	2	2	1	0	2	8
1637758	2005	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				3/9/2005	12	2	2	1	0	2	8
1720829	2005	1	1137	1	COLD LAK	50 STREET	HWY28	28	1		50 ST				8/9/2005	7	3	2	0	0	2	8
1720829	2005	2	1137	1	COLD LAK	50 STREET	HWY28	28	1		50 ST				8/9/2005	7	3	2	0	0	2	8
1720926	2005	1	1137	1	COLD LAK	50 STREET	HWY28	28	1		50 ST				11/8/2005	13	2	2	1	0	2	3
1720926	2005	2	1137	1	COLD LAK	50 STREET	HWY28	28	1		50 ST				11/8/2005	13	2	2	1	0	2	3
1721003	2005	1	1137	1	COLD LAK	50 STREET	HWY28	28	1		50 ST				11/4/2005	17	3	2	0	0	2	8
1721003	2005	2	1137	1	COLD LAK	50 STREET	HWY28	28	1		50 ST				11/4/2005	17	3	2	0	0	2	8
Z524810	2005	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 STREET				4/29/2005	6	3	2	0	0		8
Z524810	2005	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 STREET				4/29/2005	6	3	2	0	0		8
1721271	2006	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				2/8/2006	16	3	2	0	0	2	3
1721271	2006	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				2/8/2006	16	3	2	0	0	2	3
1778730	2006	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 STREET				3/4/2006	8	3	2	0	0	2	2
1778730	2006	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 STREET				3/4/2006	8	3	2	0	0	2	2
1721045	2007	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1					JUST WEST OF 50 ST	2/23/2007	15	3	2	0	0	2	12
1721045	2007	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1					JUST WEST OF 50 ST	2/23/2007	15	3	2	0	0	2	12
1721079	2007	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 STREET			IN FRONT OF RAILBIRDS	4/15/2007	22	3	1	0	0	2	1
1721079	2007	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 STREET			IN FRONT OF RAILBIRDS	4/15/2007	22	3	1	0	0	2	1
2040963	2008	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST			IN CITY - DO NOT PLOT	1/14/2008	8	3	2	0	0	2	8
2040963	2008	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST			IN CITY - DO NOT PLOT	1/14/2008	8	3	2	0	0	2	8
2040966	2008	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50ST			IN CITY - DO NOT PLOT	1/14/2008	11	3	2	0	0	2	8
2040966	2008	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50ST			IN CITY - DO NOT PLOT	1/14/2008	11	3	2	0	0	2	8
Z586694	2008	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST			(IN CITY)	3/20/2008	11	3	1	0	0		1
Z586694	2008	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST			(IN CITY)	3/20/2008	11	3	1	0	0		1
Z680603	2008	1	1137	1	COLD LAK	50 STREET	HW Y 28	28	1		50ST			IN CITY	12/9/2008	10	3	1	0	0		1
Z680603	2008	2	1137	1	COLD LAK	50 STREET	HW Y 28	28	1		50ST			IN CITY	12/9/2008	10	3	1	0	0		1

COLLISION CASE	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION	OBJECT TYP	E OBJECT ID	DRIVER/PED	DRIVER/PED SEX	POINT OF	DRIVER	LIGHT CONDITION A	LIGHT CONDITION B	TRAFFIC CONTROL DEVICE PRESENT	TRAFFIC CONDITION DEVICE CONDITION	PEDESTRIAN ACTION	DRIVER/PED CONDITION	CONTRIBUTING ROAD CONDITION	ENVIRONMENTAL CONDITION		LOAD DETAILS A	LOAD
1637758	1	1	2	2	2	1	1	56	F		6	1	97	1			1	1	1	1		
1637758	1	1	2	2	2	1	1	35	F		1	97	97	97	97		1	97	1	1		
1720829	1	1	2	2	2	1	1	30	M	3	1	1	1	1			1	1	1	1	2	
1720829	1	1	2	2	2	1	3	43	F	7	97	1	1	1			1	1	1	1	2	
1720926	1	1	2	2	2	1	3	45	F	8	1	1	1	1			1	1	1	1		
1720926	1	1	2	2	2	1	1	74	F	6	2	1	1	3	97		1	1	1	1		
1721003	97	7	2	2	2	1	2	16	M	8	97	97	97	97	97		97	97	97	97		
1721003	97	7	2	2	2	1	2	45	M	4	97	97	97	97	97		97	97	97	97		
Z524810	1	1	2	3	2	1	2	62	M	3		1	1	1				1	4	3		
Z524810	1	1	2	3	2	1	2	43	M	7		1	1	1				1	4	3		
1721271	1	1	2	2	2	1	1	52	F	8	97	1	97	3	97		97	1	1	3		
1721271	1	1	2	2	2	1	1	41	M	5	97	1	97	1			97	1	1	3		
1778730	1	1	1	3	2	1	1	18	M	8	97	97	97	97	97		97	97	97	97		
1778730	1	1	1	3	2	1	3	62	м	7	97	97	97	97	97		97	97	97	97		
1721045	1	1	1	1	1	1	3	34	м	97	1	1	1	1			1	4	4	3		
1721045	1	1	1	1	1	1	2	61	M		10	1	1	1			1	4	4	3		
1721079	97	1	2	2	1	1	2	20	м	1	1	3	97	1			97	1	1	1		
1721079	97	1	2	2	1	9	13											97	1	1		
2040963	97	1	1	4	2	1	2	61	F	8	1	1	1	97	97		1	1	1	3		
2040963	97	1	1	4	2	1	2	50	м	4	1	1	1	97	97		1	1	1	3		
2040966	1	1	1	2	2	1	1	62	F	8	97	97	97	97	97		97	4	1	3		
2040966	1	1	1	2	2	1	2	54	F		97	97	97	97	97		97	97	1	3		
Z586694	97	1	1	2	2	1	5	30	M	12		1	1	2				1	1	1		
Z586694	97	1	1	2	2	9	13											97				
Z680603	97	1	1	2	2	1	1	31	F	10		1	1	97				1	4	3		
Z680603	97	1	1	2	2	9	13											97				

VEHICLE CONDITION/ D DETAILS CONTRIBUTING B ATTACHMENTS TRAILER TYPE FACTORS UNSAFE SPEEDS

											IF NOT AT										
COLLISION CASE		OBJECT	POLICE			NORTH/SOUTH	EAST/WEST	AT INTERSECTIO	N WITH	AT INTERSECTION WITH	INTERSECTION	IF NOT AT INTERSECTION -		OCCURRENCE DATE	OCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER		PRIMARY
NUMBER	CASE YEAR	NUMBER	SERVICE	IN/ NEAF	CITY NAME	ROAD NAME	ROAD NAME	ON HWY # HWY #	ON STREET/AVENUE	STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES	HIT AND RUN	EVENT
1720951	2005	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST			AT CIBC	9/9/2005	16	3	2	0	0	2	13
1720951	2005	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST			AT CIBC	9/9/2005	16	3	2	0	0	2	13
1720972	2006	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVENUE	51 STREET				2/15/2006	15	3	2	0	0	2	1
1720972	2006	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVENUE	51 STREET				2/15/2006	15	3	2	0	0	2	1
1778753	2006	1	1137	1	COLD LAK	51 STREET	50 AVENUE		51 ST	50 AVE				5/4/2006	11	3	1	0	0	1	7
1778753	2006	2	1137	1	COLD LAK	51 STREET	50 AVENUE		51 ST	50 AVE				5/4/2006	11	3	1	0	0	1	7
1778753	2006	3	1137	1	COLD LAK	51 STREET	50 AVENUE		51 ST	50 AVE				5/4/2006	11	3	1	0	0	1	7
1778872	2006	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE		3	51 ST		5/27/2006	14	3	2	0	0	2	13
1778872	2006	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE		3	51 ST		5/27/2006	14	3	2	0	0	2	13
1873209	2006	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				10/23/2006	19	3	2	0	0	2	5
1873209	2006	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				10/23/2006	19	3	2	0	0	2	5
1721052	2007	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST			ON 50 AVE IN FRONT OF MOVIE GALLERY	3/13/2007	18	3	2	0	0	1	97
1721052	2007	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST			ON 50 AVE IN FRONT OF MOVIE GALLERY	3/13/2007	18	3	2	0	0	1	97
1721096	2007	1	1137	1	COLD LAK	51 STREET	50 AVENUE		51 ST	50 AVE				3/26/2007	14	3	2	0	0	1	12
1721096	2007	2	1137	1	COLD LAK	51 STREET	50 AVENUE		51 ST	50 AVE				3/26/2007	14	3	2	0	0	1	12
2041278	2008	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST			IN FRONT OF IDA PHARMACY (NORLITE) 5016 50 AVE	8/3/2008	12	3	2	0	0	2	13
2041278	2008	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST			IN FRONT OF IDA PHARMACY (NORLITE) 5016 50 AVE	8/3/2008	12	3	2	0	0	2	13
2041593	2008	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				8/14/2008	14	3	2	0	0	1	13
2041593	2008	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				8/14/2008	14	3	2	0	0	1	13
2209586	2008	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				12/16/2008	17	3	2	0	0	2	13
2209586	2008	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				12/16/2008	17	3	2	0	0	2	13
2209698	2008	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				10/3/2008	16	3	2	0	0	2	13
2209698	2008	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				10/3/2008	16	3	2	0	0	2	13
2209729	2008	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				10/24/2008	16	3	2	0	0	2	13
2209729	2008	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				10/24/2008	16	3	2	0	0	2	13
2307117	2009	1	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				7/8/2009	16	3	2	0	0	1	13
2307117	2009	2	1137	1	COLD LAK	51 STREET	50 AVENUE		50 AVE	51 ST				7/8/2009	16	3	2	0	0	1	13

	PRIMARY
HIT AND RUN	EVENT
2	13
2	13
2	1
2	1
1	7
1	7
1	7
2	13
2	13
2	5
2	5
1	97
1	97
1	12
1	12
2	13
2	13
1	13
1	13
2	13
2	13
2	13
2	13
2	13
2	13
1	13

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	E OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER	LIGHT CONDITION A	LIGHT CONDITION B	TRAFFIC CONTROL DEVICE PRESENT	TRAFFIC CONDITION DEVICE CONDITION	PEDESTRIAN ACTION	DRIVER/PED CONDITION	CONTRIBUTING ROAD CONDITION	ENVIRONMENTAL CONDITION	SURFACE CONDITION	LOAD DETAILS A	LOAD DETAILS B ATTACHMENTS
1720951	97	7	7	97	97	1	2	43	F	3	1	1	97	1			1	1	1	1		
1720951	97	7	7	97	97	1	2	62	F	5	8	1	97	1			1	1	1	1		
1720972	1	1	1	2	1	1	2	40	F	4	1	1	97	1			1	1	1	1		
1720972	1	1	1	2	1	1	2	58	M	8	6	1	97	1			1	1	1	1		
1778753	1	1	1	2	2	1	2	46	F	8	5	1	97	3	97		1	1	1	1		
1778753	1	1	1	2	2	2	7	43	F			1	97	97	97	1	97		1	1		
1778753	1	1	1	2	2	2	7	20	F		97	97	97	97	97		97	97	1	1		
1778872	1	1	1	2	1	1	1	48	F	6	1	1	97	1			1	1	1	1		
1778872	1	1	1	2	1	1	2	40	м	4	8	1	97	1			97	97	1	1		
1873209	1	1	1	2	2	1	2	24	F	3	99	3	2	3	1		1	1	1	1		
1873209	1	1	1	2	2	1	1	20	M	8	99	3	2	3	1		1	1	1	1		
1721052	97	1	1	4	1	5	1			8	7							97	1	3		
1721052	97	1	1	4	1	1	99				99	97	97	97	97		97	97	1	3		
1721096	1	1	1	2	1	5	1			97	7							97	1	1		
1721096	1	1	1	2	1	1	2				13	1	1	97	97		97	1	1	1		
2041278	97	1	1	2	1	1	2	60	M	4	8	1	97	1			97	1	1	1		
2041278	97	1	1	2	1	5	1			8	7							97	1	1		
2041593	97	1	1	2	97	1	2	63	M	97	8	1	1	1			97	1	1	1		
2041593	97	1	1	2	97	5	1			8	7							97	1	1		
2209586	97	1	1	2	2	1	2	18	F	8	1	3	2	3	1		99	1	1	3		
2209586	97	1	1	2	2	1	3	38	F		8	3	2	1			99	1	1	3		
2209698	97	1	1	2	2	1	3	19	F	5	8	1	1	97	97		97	1	1	1		
2209698	97	1	1	2	2	1	3	52	M	3	1	1	1	3	1		97	1	1	1		
2209729	97	1	1	2	2	1	1	27	F	2	1	1	1	1			97	1	1	1		
2209729	97	1	1	2	2	1	2	28	M		8	1	1	1			97	1	1	1		
2307117	97	1	1	2	1	1	1	23	M	4	1	1	1	3	1		1	1	1	1		
2307117	97	1	1	2	1	1	99				99	1	1	97	97		99	1	1	1		

VEHICLE CONDITION CONTRIBUTI NG UNSAFE TRAILER TYPE FACTORS SPEEDS

												IF NOT AT	IF NOT AT									
COLLISION CASE	04.05 VE 45	OBJECT	POLICE			NORTH/SOUTH	EAST/WEST	on	AT INTERSECTION		AT INTERSECTION WITH	INTERSECTION	INTERSECTION -		OCCURRENCE DATE	OCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER		PRIMARY
NUMBER	CASE YEAR	NUMBER	SERVICE	IN/ NEAR		ROAD NAME	ROAD NAME	ON HWY #	WITH HWY#	ON STREET/AVENUE	STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCTT/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES	HII AND RUN	EVENI
1552910	2005	1	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 81			SERVICE RD IN FRONT OF TIM HORTONS	8/26/2005	16	2	2	1	0	2	3
1552910	2005	2	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 81			SERVICE RD IN FRONT OF TIM HORTONS	8/26/2005	16	2	2	1	0	2	3
1637776	2005	1	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 81			SERVICE RD	3/17/2005	15	3	2	0	0	2	1
1637776	2005	2	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 81			SERVICE RD	3/17/2005	15	3	2	0	0	2	1
1720920	2005	1	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE				7/31/2005	15	3	2	0	0	2	12
1720920	2005	2	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE				7/31/2005	15	3	2	0	0	2	12
1552869	2006	1	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE				3/10/2006	17	3	2	0	0	2	3
1552869	2006	2	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE				3/10/2006	17	3	2	0	0	2	3
Z563442	2006	1	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE			ON EAST SIDE OF INTERSECTION IN NB LANI	E 7/30/2006	22	3	2	0	0		5
Z563442	2006	2	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE			ON EAST SIDE OF INTERSECTION IN NB LANI	E 7/30/2006	22	3	2	0	0		5
1873314	2007	1	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 ST				4/21/2007	15	3	2	0	0	2	1
1873314	2007	2	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 ST				4/21/2007	15	3	2	0	0	2	1
1873380	2007	1	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE				NEXT TO TIM HORTONS 50 ST	3/28/2007	97	3	2	0	0	2	13
1873380	2007	2	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE				NEXT TO TIM HORTONS 50 ST	3/28/2007	97	3	2	0	0	2	13
2040983	2008	1	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 ST			EAST ACCESS RD	2/12/2008	6	3	2	0	0	1	3
2040983	2008	2	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 ST			EAST ACCESS RD	2/12/2008	6	3	2	0	0	1	3
2138378	2008	1	1137	1	COLD LAK	50 STREET	43 AVENUE			50TH ST				LIGHTS BY WALMART 4301 50 ST	5/31/2008	16	3	2	0	0	2	6
2138378	2008	2	1137	1	COLD LAK	50 STREET	43 AVENUE			50TH ST				LIGHTS BY WALMART 4301 50 ST	5/31/2008	16	3	2	0	0	2	6
2209610	2008	1	1137	1	COLD LAK	50 STREET	43 AVENUE			50 STREET	43 AVENUE				11/9/2008	9	3	2	0	0	2	3
2209610	2008	2	1137	1	COLD LAK	50 STREET	43 AVENUE			50 STREET	43 AVENUE				11/9/2008	9	3	2	0	0	2	3
2041431	2009	1	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE				2/5/2009	13	2	2	1	0	2	5
2041431	2009	2	1137	1	COLD LAK	50 STREET	43 AVENUE			50 ST	43 AVE				2/5/2009	13	2	2	1	0	2	5

	PRIMARY
HIT AND RUN	EVENT
2	3
2	3
2	1
2	1
2	12
2	12
2	3
2	3
	5
	5
2	1
2	1
2	13
2	13
1	3
1	3
2	6
2	6
2	3
2	3
2	5

COLLISION CASE	SPECIAL	ROAD	ROAD	ROAD	COLLISION			DRIVER/PED	DRIVER/PED	POINT OF	DRIVER	LIGHT	LIGHT CONDITION	TRAFFIC CONTROL	TRAFFIC CONDITION	PEDESTRIAN	DRIVER/PED	CONTRIBUTING ROAD	ENVIRONMENTAL	SURFACE		
NUMBER	FACILITY	ALIGNMENT A	ALIGNMENT B	CLASS	LOCATION	OBJECT TYP	E OBJECT ID	AGE	SEX	IMPACT	ACTION	CONDITION A	в	DEVICE PRESENT	DEVICE CONDITION	ACTION	CONDITION	CONDITION	CONDITION	CONDITION	LOAD DETAILS A	LOAD
1552910	1	1	1	2	2	1	1	69	F	6	2	1	1	3	97		1	1	1	1		
1552910	1	1	1	2	2	1	3	32	F	8	1	1	1	1			1	1	1	1		
1637776	1	1	1	2	2	1	2	52	M	8	97	1	97	3	1		1	1	4	3		
1637776	1	1	1	2	2	1	3	35	F	3	97	1	97	3	1		1	1	4	3		
1720920	1	1	1	4	1	1	2	23	M	2	99	1	1	99	97		99	99	99	99		
1720920	1	1	1	4	1	1	1	42	F	6	99	1	1	99	97		99	99	99	99		
1552869	1	1	1	4	2	1	1	57	M	6	1	1	1	2	1		1	98	4	3		
1552869	1	1	1	4	2	1	1	39	F	8	1	97	97	2	1		1	98	4	3		
Z563442	1	1	1	2	2	1	1	69	F	8		3	2	2				1	2	2		
Z563442	1	1	1	2	2	1	3	27	M	3		3	2	2				1	2	2		
1873314	97	1	1	4	2	1	3	48	M	1	1	1	97	1			1	1	1	1		
1873314	97	1	1	4	2	8	20	29	M		4	1	97	1			1	1	1	1		
1873380	1	1	1	2	1	8	17	44	M	2	8	1	97	1			1	2	1	1	2	
1873380	1	1	1	2	1	1	2	69	M	2	1	1	97	1			1	2	1	1		
2040983	97	1	1	2	2	1	2	42	M	2	1	3	97	1			1	1	1	3		
2040983	97	1	1	2	2	1	2	19	M	8	2	3	97	3	1		1	1	1	3		
2138378	9					1	1	34	F	7	1	1	1	1			97	1	1	1		
2138378	9					1	1	19	F	8	97	1	1	1			97	1	1	1		
2209610	1	1	1	2	2	1	3	41	M	3	1	1	1	2	1		1	98	2	2		
2209610	1	1	1	2	2	1	2	32	M	1	98	1	1	2	1		1	98	2	2		
2041431	1	1	1	2	2	1	1	35	F	8	97	1	99	2	1		1	1	1	1		
2041431	1	1	1	2	2	1	1	52	M	1	9	1	99	2	1		1	1	1	1		

DAD DETAILS B ATTACHMENTS TRAILER TYPE

VEHICLE CONDITION/ CONTRIBUTING FACTORS UNSAFE SPEEDS

												IF NOT AT										
COLLISION CASE	CASE	OBJECT	POLICE			NORTH/SOUTH	EAST/WEST		AT INTERSECTION		AT INTERSECTION WITH	INTERSECTION	IF NOT AT INTERSECTION -		OCCURRENCE DATE	OCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER		PRIMARY
NUMBER	YEAR	NUMBER	SERVICE	IN/ NEAR	CITY NAME	ROAD NAME	ROAD NAME	ON HWY #	WITH HWY #	ON STREET/AVENUE	STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES	HIT AND RUN	EVENT
1637844	2005	1	1137	1	COLD LAK	52 STREET	50 AVENUE			52 ST	50 AVENUE				5/27/2005	24	3	2	0	0	2	6
1637844	2005	2	1137	1	COLD LAK	52 STREET	50 AVENUE			52 ST	50 AVENUE				5/27/2005	24	3	2	0	0	2	6
1637846	2005	1	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST			IN FRONT OF T D BANK	5/31/2005	11	3	2	0	0	2	13
1637846	2005	2	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST			IN FRONT OF T D BANK	5/31/2005	11	3	2	0	0	2	13
1720868	2005	1	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST				6/10/2005	20	2	2	1	0	2	8
1720868	2005	2	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST				6/10/2005	20	2	2	1	0	2	8
1720896	2005	1	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST			ACROSS FROM CREDIT UNION	7/11/2005	13	3	2	0	0	2	13
1720896	2005	2	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST			ACROSS FROM CREDIT UNION	7/11/2005	13	3	2	0	0	2	13
1778777	2006	1	1137	1	COLD LAK	52 STREET	50 AVENUE			52 ST		10	50 AVE		7/10/2006	14	3	2	0	0	2	13
1778777	2006	2	1137	1	COLD LAK	52 STREET	50 AVENUE			52 ST		10	50 AVE		7/10/2006	14	3	2	0	0	2	13
1873362	2006	1	1137	1	COLD LAK	52 STREET	50 AVENUE			52 ST		2	50 AVE	IN FRONT OF SMOKE DAMAGE	11/29/2006	15	3	2	0	0	2	13
1873362	2006	2	1137	1	COLD LAK	52 STREET	50 AVENUE			52 ST		2	50 AVE	IN FRONT OF SMOKE DAMAGE	11/29/2006	15	3	2	0	0	2	13
1721055	2007	1	1137	1	COLD LAK	52 STREET	50 AVENUE			52 STREET	50 AVE			SIDE STREET OF 5202 50 AVE TD BANK	3/19/2007	12	3	2	0	0	1	13
1721055	2007	2	1137	1	COLD LAK	52 STREET	50 AVENUE			52 STREET	50 AVE			SIDE STREET OF 5202 50 AVE TD BANK	3/19/2007	12	3	2	0	0	1	13
1721088	2007	1	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52ST			IN FRONT OF ROYAL LEPAGE W/B	4/10/2007	10	3	2	0	0	2	8
1721088	2007	2	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52ST			IN FRONT OF ROYAL LEPAGE W/B	4/10/2007	10	3	2	0	0	2	8
2041508	2008	1	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE		10	52 ST	IN FRONT OF ORBITING TRENDS	5/9/2008	13	3	2	0	0	2	13
2041508	2008	2	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE		10	52 ST	IN FRONT OF ORBITING TRENDS	5/9/2008	13	3	2	0	0	2	13
2041413	2009	1	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST				1/26/2009	9	3	2	0	0	2	3
2041413	2009	2	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST				1/26/2009	9	3	2	0	0	2	3
2307460	2009	1	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST				2/24/2009	12	2	2	6	0	2	8
2307460	2009	2	1137	1	COLD LAK	52 STREET	50 AVENUE			50 AVE	52 ST				2/24/2009	12	2	2	6	0	2	8

IMBER ALITIES	HIT AND RUN	PRIMARY EVENT
0	2	6
0	2	6
0	2	13
0	2	13
0	2	8
0	2	8
0	2	13
0	2	13
0	2	13
0	2	13
0	2	13
0	2	13
0	1	13
0	1	13
0	2	8
0	2	8
0	2	13
0	2	13
0	2	3
0	2	3
0	2	8
0	2	8

COLLISION CASE	SPECIAL	ROAD	ROAD		COLLISION	OBJECT			DRIVER/PED	POINT OF	DRIVER	LIGHT	LIGHT	TRAFFIC CONTROL	TRAFFIC CONDITION	PEDESTRIAN	DRIVER/PED	CONTRIBUTING	ENVIRONMENTAL	SURFACE	
NUMBER	FACILITY	ALIGNMENT A	ALIGNMENT B	ROAD CLASS	LOCATION	TYPE	OBJECT ID	DRIVER/PED AGE	SEX	IMPACT	ACTION	CONDITION A	CONDITION B	DEVICE PRESENT	DEVICE CONDITION	ACTION	CONDITION	ROAD CONDITION	CONDITION	CONDITION	LOAD DETAILS A
1637844	1	1	1	2	2	1	1	18	F	7	97	3	2	3	1		1	1	1	1	
1637844	1	1	1	2	2	1	2	21	м	7	97	3	2	3	1		1	1	1	1	
1637846	1	1	1	4	1	1	2	69	м	4	8	1	1	1			1	1	1	1	
1637846	1	1	1	4	1	1	-	25	F	3	1	1	1	1			1	4	1	1	
1720868	1	1	1	2	2	1	1	10	M	8	6	1	1	3	1		1	1	1	1	
1720000	1	1	1	2	2	1		20	M	4	1	1	1	3	1		1	1		1	
1720808				2	2		2	20	IVI	4				3				1			
1720896	1	1	1	4	1	1	3	44	F	8	1	1	97	1			1	1	1	1	
1720896	1	1	1	4	1	1	1	68	F	4	8	1	97	1			1	1	1	1	
1778777	97	7	7	97	97	1	1	23	F	2	97	97	97	97	97		97	97	97	97	
1778777	97	7	7	97	97	1	1	17	F	4	97	97	97	97	97		97	97	97	97	
1873362	1	1	1	1	1	1	1	20	м	6	1	1	1	1			1	1	1	3	
4070002	1	1	1	1	1	1		27	F	4		1	1				4	1		2	
18/ 3302			-		-		2	51		-	0									5	
1721055	97	7	7	97	97	5	1			8	7							97	1	3	
1721055	97	7	7	97	97	1	2	24	F	4	8	1	97	1			1	1	1	3	
1721088	1	1	1	2	2	1	1	63	F	4	1	1	97	3	1		97	1	1	1	
1721088	1	1	1	2	2	1	3	47	F	8	99	1	97	97	97		97	1	1	1	
2041508	97	7	7	97	97	1	1	57	м	2	1	1	97	1			1	1	1	1	
2041509	07	7	7	07	07	1	2	79	-	-		1	07	4			4	1	4	4	
2041508	97			9/	91	1	4	78		4	0		91	1					-		
2041413	97	1	1	2	2	1	1	31	M	8	99	1	1	3	1		1	1	1	1	
2041413	97	1	1	2	2	1	2	76	M	2	99	1	1	3	1		1	1	1	1	
2307460	97	1	1	2	2	1	3	17	F	8	6	1	1	3	1		1	1	4	3	
2307460	97	1	1	2	2	1	1	17	М	4	1	1	1	3	1		1	1	4	3	

VEHICLE CONDITION UNSAFE LOAD DETAILS B ATTACHMENTS TRAILER TYPE CONTRIBUTING FACTORS SPEEDS

			POLICE	IN/ NEAR		NORTH/SOUTH	EAST/WEST	ON HWY #	ON AT INTERSECTION STREET/AV WITH HWY # ENUE	AT INTERSECTION WITH	IF NOT AT INTERSECTION	IF NOT AT INTERSECTION -					NUMBER OF		NUMBER		PRIMARY	
1637732	2005	1	1137	1	COLD LAK	49 STREET	51 AVENUE	0111111#	49 STREET	51 AVENUE	DIGITANGE	DECONTINUN	OF EGIAE REFERENCE	1/22/2005	17	3	2	0	0	2	1	1
1637732	2005	2	1137	1	COLD LAK	49 STREET	51 AVENUE		49 STREET	51 AVENUE				1/22/2005	17	3	2	0	0	2	1	1
1720872	2005	1	1137	1	COLD LAK	49 STREET	51 AVENUE		49 STREET	51 AVE				6/8/2005	12	2	1	1	0	2	11	97
1720872	2005	2	1137	1	COLD LAK	49 STREET	51 AVENUE		49 STREET	51 AVE				6/8/2005	12	2	1	1	0	2	11	97
1873345	2006	1	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 STREET				11/24/2006	12	3	2	0	0	2	3	1
1873345	2006	2	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 STREET				11/24/2006	12	3	2	0	0	2	3	1
2040922	2007	1	1137	1	COLD LAK	49 STREET	51 AVENUE		49 ST	51 AVE				12/16/2007	17	3	2	0	0	2	3	97
2040922	2007	2	1137	1	COLD LAK	49 STREET	51 AVENUE		49 ST	51 AVE				12/16/2007	17	3	2	0	0	2	3	97
2041824	2007	1	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST				12/14/2007	10	2	2	1	0	2	3	97
2041824	2007	2	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST				12/14/2007	10	2	2	1	0	2	3	97
2306970	2009	1	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST			4818 51 AVE	2/14/2009	2	3	1	0	0	1	1	97
2306970	2009	2	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST			4818 51 AVE	2/14/2009	2	3	1	0	0	1	1	97
2307004	2009	1	1137	1	COLD LAK	49 STREET	51 AVENUE		49 ST	51 AVE				10/8/2009	9	3	2	0	0	2	1	97
2307004	2009	2	1137	1	COLD LAK	49 STREET	51 AVENUE		49 ST	51 AVE				10/8/2009	9	3	2	0	0	2	1	97
2307161	2009	1	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST				12/14/2009	16	3	2	0	0	2	13	97
2307161	2009	2	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST				12/14/2009	16	3	2	0	0	2	13	97
2307195	2009	1	1137	1	COLD LAK	49 STREET	51 AVENUE		49 ST	51 AVE				12/27/2009	14	3	2	0	0	2	8	97
2307195	2009	2	1137	1	COLD LAK	49 STREET	51 AVENUE		49 ST	51 AVE				12/27/2009	14	3	2	0	0	2	8	97
2307448	2009	1	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST				3/9/2009	17	3	2	0	0	2	8	97
2307448	2009	2	1137	1	COLD LAK	49 STREET	51 AVENUE		51 AVE	49 ST				3/9/2009	17	3	2	0	0	2	8	97

	PRIMARY	SPECIAL																			
IIT AND RUN	EVENT	FACILITY																			
2	1	1																			
2	1	1																			
2	11	97																			
2	11	97																			
2	3	1																			
2	3	1																			
2	3	97																			
2	3	97																			
2	3	97																			
2	3	97																			
1	1	97																			
1	1	97																			
2	1	97																			
2	1	97																			
2	13	97																			
2	13	97																			
2	8	97																			
2	8	97																			
2	8	97																			
COLLISION CASE	ROAD	ROAD	ROAD	COLLISION	OBJECT		DRIVER/PED	DRIVER/PED	POINT OF	DRIVER	LIGHT	LIGHT	TRAFFIC CONTROL	TRAFFIC CONDITION	PEDESTRIAN	DRIVER/PED	CONTRIBUTING	ENVIRONMENTAL	SURFACE		LOAD DET
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NUMBER	ALIGNMENT A	ALIGNMENT B	CLASS	LOCATION	TYPE	OBJECT ID	AGE	SEX	IMPACT	ACTION	CONDITION A	CONDITION B	DEVICE PRESENT	DEVICE CONDITION	ACTION	CONDITION	ROAD CONDITION	CONDITION	CONDITION	LOAD DETAILS A	в
1637732	1	1	2	2	5	2			6	7							97	1	3		
1637732	1	1	2	2	1	2	21	M	8	98	1	97	3	99		1	1	1	3		
1720872	7	7	97	97	2	7	14	F			1	97	3	97	98	1		1	1		
1720872	7	7	97	97	1	3	60	F	8	1	1	97	3	97		1	1	1	1		
1873345	1	1	2	2	1	3	44	М	8	1	1	97	1			1	1	4	3		
1873345	1	1	2	2	1	1	19	F	1	1	1	97	1			1	1	4	3		
2040922	1	1	2	1	1	1	48	M	8	97	97	97	97	97		97	97	97	97		
2040922	1	1	2	1	1	1	19	F	6	97	97	97	97	97		97	97	97	97		
2041824	1	1	2	2	1	3	29	F	8	1	1	97	1			1	1	1	3		
2041824	1	1	2	2	1	3	60	M	1	3	1	97	4	1		1	1	1	3		
2306970	1	1	2	1	1	2	19	м	8	12	3	2	1			3	1	1	3		
2306970	1	1	2	1	9	13												1	3		
2307004	1	1	2	2	1	1	22	F	1	99	1	1	4	1		1	4	4	3		
2307004	1	1	2	2	1	2	42	м		1	1	1	4	1		1	4	4	3		
2307161	1	1	2	2	1	1	52	M	8	1	1	1	4	1		97	1	1	3		
2307161	1	1	2	2	1	2	83	м	4	8	1	1	97	97		97	97	1	3		
2307195	1	1	2	2	1	3	69	M	6	1	1	1	3	97		1	3	1	3		
2307195	1	1	2	2	1	3	26	F	2	6	1	1	3	97		1	3	1	3		
2307448	1	1	2	2	1	3	48	м	4	6	3	2	4	1		1	1	1	3		
2307448	1	1	2	2	1	2	45	M	8	1	3	2	4	1		1	1	1	3		

VEHICLE CONDITION/ ETAILS CONTRIBUTING UNSAFE ATTACHMENTS TRAILER TYPE FACTORS SPEEDS

	CASE	OBJECT	POLICE			NORTH/SOUTH	EAST/WEST	ON HIMN #			AT INTERSECTION WITH	IF NOT AT INTERSECTION	IF NOT AT INTERSECTION -			OCCURRENCE					HIT AND P	RIMARY	SPECIAL
1721201	2005	NUMBER	1127	IN/ NEAR				29		UN STREET/AVENUE		DISTANCE	DESCRIPTION		(CCTT/WW/DD) 12/10/2005	12	2	VEHICLES	INJURED	FATALITIES	2		PACILITY
1721201	2005	2	1127	1	COLD LAK	LIMY 20	43 AVENUE	20	1						12/10/2005	12	2	2	2	0	2	3	1
1721201	2003	2	1107	1	COLD LAK	110/1 20	43 AVENUE	20	1		43 AVENUE			WACDONALD/ HWI HORTON INTERSECTION	2/8/2006	0	2	2	2	0	2	3	1
1770737	2006	1	1137		COLD LAK	HW1 20	43 AVENUE	20			43 AVE				3/8/2006	0	3	2	0	0	2	0	1
1778737	2006	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				3/8/2006	8	3	2	0	0	2	8	1
1778908	2006	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				6/9/2006	9	2	3	5	0	2	8	1
1778908	2006	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				6/9/2006	9	2	3	5	0	2	8	1
1778908	2006	3	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				6/9/2006	9	2	3	5	0	2	8	1
1873368	2006	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				11/30/2006	15	3	2	0	0	2	8	1
1873368	2006	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				11/30/2006	15	3	2	0	0	2	8	1
1873390	2006	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		50 ST			INTERSECTION @ TIM HORTON'S 43 AVE	11/30/2006	18	3	2	0	0	2	1	1
1873390	2006	2	1137	1	COLDLAK	HWY 28	43 AVENUE	28	1		50 ST			INTERSECTION @ TIM HORTON'S 43 AVE	11/30/2006	18	3	2	0	0	2	1	1
1873425	2006	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				11/27/2006	14	3	2	0	0	2	8	1
1873425	2006	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				11/27/2006	14	3	2	0	0	2	8	1
2040989	2008	1	1137	1	COLDIAK	HW/Y 28		28	1		434VE			AT INTERSECTION OF HW/Y28& 4341/F	2/17/2008	13	3	2	0	0	2	8	97
2040090	2000		1127	1	COLDLAK	LIM/V 29		20	1		4241/E			AT INTERSECTION OF HW/V208 42AVE	2/17/2000	12	2	2	0	0	2	0	07
2040909	2008	4	1107	1	COLD LAK	11001 20	43 AVENUE	20	1		43AVE			AT INTERSECTION OF TWITZOR 43AVE	2/17/2008	13	2	2	0	0	2	0	37
2209616	2008	1	1137		COLD LAK	HW1 20	43 AVENUE	20	1		43 AVE				11/12/2008	13	3	2	0	0	2	0	
2209616	2008	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				11/12/2008	13	3	2	0	0	2	8	1
2209686	2008	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				10/2/2008	18	3	2	0	0	2	5	1
2209686	2008	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				10/2/2008	18	3	2	0	0	2	5	1
2307091	2009	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1					TIM HORTONS	11/6/2009	17	3	1	0	0	2	1	97
2307091	2009	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1					TIM HORTONS	11/6/2009	17	3	1	0	0	2	1	97

COLLISION CASE	ROAD	ROAD		COLLISION	OBJECT	OBJECT	DRIVER/PED	DRIVER/PED	POINT OF	DRIVER	LIGHT CONDITION	LIGHT	TRAFFIC CONTROL	TRAFFIC CONDITION	PEDESTRIAN	DRIVER/PED	CONTRIBUTING ROAD	ENVIRONMENTAL	SURFACE
NUMBER	ALIGNMENT A	ALIGNMENT B	ROAD CLASS	LOCATION	TYPE	ID	AGE	SEX	IMPACT	ACTION	Α	CONDITION B	DEVICE PRESENT	DEVICE CONDITION	ACTION	CONDITION	CONDITION	CONDITION	CONDITION
1721201	1	1	3	2	1	1	26	M	7	1	1	97	2	1		1	1	1	1
1721201	1	1	3	2	1	2	77	F	1	11	1	97	2	1		1	1	1	1
1778737	1	1	2	2	1	1	66	M	8	97	97	97	97	97		97	97	97	97
1778737	1	1	2	2	1	10	58	M	4	97	97	97	97	97		97	97	97	97
1778908	1	1	2	2	1	1	61	F	4	1	1	1	2	1		1	1	2	2
1778908	1	1	2	2	1	3	69	M	4	1	1	1	2	1		1	1	2	2
1778908	1	1	2	2	1	1	45	F	8	98	1	1	2	1		1	1	2	2
1873368	1	1	4	2	1	1	21	M	8	99	1	1	2	1		1	1	4	3
1873368	1	1	4	2	1	1	71	M	4	1	1	1	2	1		1	1	4	3
1873390	1	1	2	1	1	2	36	M	4	1	3	97	2	1		1	4	1	3
1873390	1	1	2	1	1	1	21	M		97	3	97	2	1		1	4	1	3
1873425	1	1	3	2	1	3	31	M	8	6	1	1	1			1	1	1	3
1873425	1	1	3	2	1	2	20	M	4	1	1	1	1			1	1	1	3
2040989	1	1	2	2	1	1	39	M	4	1	1	97	2	1		1	1	1	3
2040989	1	1	2	2	1	2	42	M	8	6	1	97	2	1		99	1	1	3
2209616	1	1	2	2	1	1	46	F	4	1	1	97	2	1		1	1	4	3
2209616	1	1	2	2	1	1	17	M	8	6	1	97	2	1		1	1	4	3
2209686	1	1	2	2	1	2	44	М	5	1	1	1	1			1	1	1	1
2209686	1	1	2	2	1	3	56	М	8	9	2	1	1			1	1	1	1
2307091	7	7	97	97	1	1	38	M	8	1	3	99	1			1	1	1	1
2307091	7	7	97	97	7	15												1	1

				VEHICLE	
				CONDITION/	
				CONTRIBUTING	UNSAFE
LOAD DETAILS A	LOAD DETAILS B	ATTACHMENTS	TRAILER TYPE	FACTORS	SPEEDS

COLLISION CASE	CASE	OBJECT	POLICE			NORTH/SOUTH	EAST/WEST ROAD		AT INTERSECTION	ON STREET/AV	AT INTERSECTION WITH	IF NOT AT INTERSECTION	IF NOT AT INTERSECTION -		OCCURRENCE DATE	OCCURRENCE	COLLISION	NUMBER OF	NUMBER	NUMBER	HIT AND	PRIMARY
NUMBER	YEAR	NUMBER	SERVICE	IN/NEAR	CITY NAME	ROAD NAME	NAME	ON HWY #	WITH HWY #	ENUE	STREET/AVENUE	DISTANCE	DESCRIPTION	SPECIAL REFERENCE	(CCYY/MM/DD)	HOUR	SEVERITY	VEHICLES	INJURED	FATALITIES	RUN	EVENT
1721004	2005	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVENUE				11/7/2005	14	3	2	0	0	2	8
1721004	2005	2	1137	1	COLD LAK	HWY28	55 AVENUE	28	1		55 AVENUE				11/7/2005	14	3	2	0	0	2	8
1720965	2006	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				11/7/2006	15	3	1	0	0	2	1
1720965	2006	2	1137	1	COLD LAK	HWY28	55 AVENUE	28	1		55 AVE				11/7/2006	15	3	1	0	0	2	1
1721231	2006	1	1137	1	COLD LAK	HWY28	55 AVENUE	28	1		55 AVENUE				1/13/2006	15	3	2	0	0	2	8
1721231	2006	2	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVENUE				1/13/2006	15	3	2	0	0	2	8
1873321	2007	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE			BY HUSKY SERVICE STATION	4/18/2007	16	2	3	1	0	2	12
1873321	2007	2	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE			BY HUSKY SERVICE STATION	4/18/2007	16	2	3	1	0	2	12
1873321	2007	3	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE			BY HUSKY SERVICE STATION	4/18/2007	16	2	3	1	0	2	12
1954761	2007	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				9/6/2007	16	3	2	0	0	2	8
1954761	2007	2	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				9/6/2007	16	3	2	0	0	2	8
Z541953	2007	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				11/23/2007	18	3	2	0	0		1
Z541953	2007	2	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				11/23/2007	18	3	2	0	0		1
2041570	2008	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE			IN CITY - DO NOT PLOT	6/26/2008	18	3	2	0	0	2	5
2041570	2008	2	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE			IN CITY - DO NOT PLOT	6/26/2008	18	3	2	0	0	2	5
2041772	2008	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				2/6/2008	8	2	2	1	0	2	5
2041772	2008	2	1137	1	COLD LAK	HW Y 28	55 AVENUE	28	1		55 AVE				2/6/2008	8	2	2	1	0	2	5
2209659	2008	1	1137	1	COLD LAK	HW Y 28	55 AVENUE	28	1		55 AVE				11/25/2008	12	2	2	2	0	2	3
2209659	2008	2	1137	1	COLD LAK	HW Y 28	55 AVENUE	28	1		55 AVE				11/25/2008	12	2	2	2	0	2	3
2307093	2009	1	1137	1	COLD LAK	HW Y 28	55 AVENUE	28	1					SB NEAR HUSKY SS	11/7/2009	17	3	2	0	0	2	8
2307093	2009	2	1137	1	COLD LAK	HW Y 28	55 AVENUE	28	1					SB NEAR HUSKY SS	11/7/2009	17	3	2	0	0	2	8

COLLISION CASE	SPECIAL	ROAD ALIGNMENT ROAI	D ALIGNMENT		COLLISION	OBJECT		DRIVER/PED		POINT OF	DRIVER	LIGHT	LIGHT CONDITION	TRAFFIC CONTROL DEVICE	TRAFFIC CONDITION DEVICE	PEDESTRIAN	DRIVER/PED	CONTRIBUTING ROAD	ENVIRONMENTAL	SURFACE					VEHICLE CONDITION/ CONTRIBUTING	UNSAFE
NUMBER	FACILITY	Α	в	ROAD CLASS	LOCATION	TYPE	OBJECT ID	AGE	DRIVER/PED SEX	IMPACT	ACTION	CONDITION A	В	PRESENT	CONDITION	ACTION	CONDITION	CONDITION	CONDITION	CONDITION	LOAD DETAILS A	LOAD DETAILS B	ATTACHMENTS	TRAILER TYPE	FACTORS	SPEEDS
1721004	1	1	1	2	2	1	3	18	M	8	6	1	97	1			1	1	1	2						
1721004	1	1	1	2	2	1	1	25	M	4	1	1	97	1			1	1	1	2						
1720965	1	1	1	2	1	1	1	27	M	8	98	1	97	1			1	1	1	3						
1720965	1	1	1	2	1	9	13												1	3						
1721231	1	1	1	2	2	1	2	17	M	8	97	1	97	1			1	1	97	3						
1721231	1	1	1	2	2	1	3	32	F	4	1	1	97	1			1	1	97	3						
1873321	97	1	1	2	2	1	1	41	M	1	99	1	97	97	97		1	1	2	2						
1873321	97	1	1	2	2	1	3	31	F	5	1	1	97	97	97		1	1	2	2						
1873321	97	1	1	2	2	1	3	47	F	2	1	1	97	1			1	1	2	2						
1954761	1	1	1	2	2	1	1	17	F	8	6	1	97	1			1	4	2	2						
1954761	1	1	1	2	2	1	2	28	M		1	1	97	1			1	4	2	2						
Z541953	97	7	7	97	97	1	1	45	M	4		3	2	1				1	99	3						
Z541953	97	7	7	97	97	1	2	22	M	8		3	2	1				1	99	3						
2041570	97	1	1	2	2	1	2	47	M	8	1	1	1	1			1	4	2	2						
2041570	97	1	1	2	2	1	2	29	M	7	9	1	1	3	1		1	4	2	2						
2041772	97	1	1	4	2	1	9	72	M	8	99	1	1	2	97		1	1	1	3						
2041772	97	1	1	4	2	1	1	42	F	1	9	1	1	2	97		1	1	1	3						
2209659	1	1	1	2	2	1	1	21	F	6	9	1	99	3	99		1	1	1	3						
2209659	1	1	1	2	2	1	3	27	F		1	1	99	1			1	1	1	3						
2307093	1	1	1	2	1	1	4	16	M	4	1	3	2	1			1	1	1	1						
2307093	1	1	1	2	1	1	4	16	M	8	6	3	2	1			1	1	1	1						

Appendix B - Collision Analysis Summaries



HWY 28 & 54 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	10	24%
2006	11	26%
2007	9	21%
2008	11	26%
2009	1	2%
Total	42	100%

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	6	14%
2	February	6	14%
3	March	2	5%
4	April	2	5%
5	May	1	2%
6	June	4	10%
7	July	3	7%
8	August	6	14%
9	September	3	7%
10	October	2	5%
11	November	6	14%
12	December	1	2%
	Total	42	100%

Collision by Day

	DAY	NO. OF COLLISIONS	% OF TOTAL
1	Sunday	2	5%
2	Monday	6	14%
3	Tuesday	8	19%
4	Wednesday	7	17%
5	Thursday	6	14%
6	Friday	9	21%
7	Saturday	4	10%
	Total	42	100%

Collision by Hour

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	1	2%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	0	0%
8	8:00 AM	0	0%
9	9:00 AM	2	5%
10	10:00 AM	5	12%
11	11:00 AM	2	5%
12	12:00 PM	4	10%
13	1:00 PM	2	5%
14	2:00 PM	5	12%
15	3:00 PM	4	10%
16	4:00 PM	5	12%
17	5:00 PM	7	17%
18	6:00 PM	4	10%
19	7:00 PM	1	2%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
	Total	42	100%

Collision by Type

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	2	5%
2	Off Road Left	0	0%
3	Right Angle	2	5%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	14	33%
6	Sideswipe	0	0%
7	Other	1	2%
8	Rear End	14	33%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	1	2%
12	Sideswipe - Same Direction	4	10%
13	Backing	1	2%
97	Unknown	3	7%
	Total	42	100%

HWY 28 & 54 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	2	5%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	1	2%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	5	12%
7	Parked Vehicle	0	0%
8	Backed Unsafely	1	2%
9	Left Turn Across Path	9	21%
10	Improper Lane Change	6	14%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	2	5%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	15	36%
98	Other	0	0%
99	Unknown	1	2%
	Total	42	100%

Collision by Severity

COLLISION SEVERITY		NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	9	21%
3	Property Damage	33	79%
97	Unknown	0	0%
Total		42	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	30	71%
2	Raining	2	5%
3	Hail/Sleet	0	0%
4	Snow	5	12%
5	Fog/Smog/Smoke/Dust	1	2%
6	High Wind	0	0%
97	Unknown	4	10%
98	Other	0	0%
99	Unknown	0	0%
	Total	42	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	19	45%
2	Wet	6	14%
3	Slush/Snow/Ice	13	31%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	3	7%
98	Other	0	0%
99	Unknown	1	2%
	Total	42	100%

LIGHT CONDITION		NO. OF COLLISIONS	% OF TOTAL
1	Daylight	34	81%
2	Sunglare	0	0%
3	Darkness	6	14%
97	Unknown	2	5%
99	Unknown	0	0%
	Total	42	100%

HWY 28 & TRI CITY MALL COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	6	21%
2006	6	21%
2007	7	24%
2008	9	31%
2009	1	3%
Total	29	100%

Collision by Month MONTH % OF TOTAL 14% 17% NO. OF COLLISIONS January February March 5 2 10% 0% 3 3 April May June 0 4 10% 3% 3 5 6 1 3% 3% 3% 7% 3% July 1 August September October 8 9 2 1 10 November December 11 12 3 5 10% 17% Total 29 100%

Collision by Day	y .		
	DAY	NO. OF COLLISIONS	% OF TOTAL
1	Sunday	2	7%
2	Monday	5	17%
3	Tuesday	1	3%
4	Wednesday	5	17%
5	Thursday	4	14%
6	Friday	9	31%
7	Saturday	3	10%
	Total	20	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	1	3%
7	7:00 AM	1	3%
8	8:00 AM	0	0%
9	9:00 AM	0	0%
10	10:00 AM	1	3%
11	11:00 AM	0	0%
12	12:00 PM	6	21%
13	1:00 PM	4	14%
14	2:00 PM	2	7%
15	3:00 PM	4	14%
16	4:00 PM	3	10%
17	5:00 PM	2	7%
18	6:00 PM	2	7%
19	7:00 PM	1	3%
20	8:00 PM	0	0%
21	9:00 PM	1	3%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	1	3%
	Total	29	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	2	7%
2	Off Road Left	0	0%
3	Right Angle	3	10%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	0	0%
6	Sideswipe	0	0%
7	Other	0	0%
8	Rear End	20	69%
9	Off Road Right	1	3%
10	Head On	1	3%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	1	3%
13	Backing	0	0%
97	Unknown	1	3%
	Total	29	100%

HWY 28 & TRI CITY MALL COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	5	17%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	10	34%
7	Parked Vehicle	0	0%
8	Backed Unsafely	0	0%
9	Left Turn Across Path	0	0%
10	Improper Lane Change	1	3%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	0	0%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	9	31%
98	Other	1	3%
99	Unknown	3	10%
	Total	29	100%

Collision by Severity

	COLLISION SEVERITY	NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	3	10%
3	Property Damage	26	90%
97	Unknown	0	0%
Total		29	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	22	76%
2	Raining	2	7%
3	Hail/Sleet	0	0%
4	Snow	4	14%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	1	3%
98	Other	0	0%
99	Unknown	0	0%
	Total	29	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	11	38%
2	Wet	3	10%
3	Slush/Snow/Ice	13	45%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	2	7%
98	Other	0	0%
99	Unknown	0	0%
	Total	29	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	24	83%
2	Sunglare	0	0%
3	Darkness	4	14%
97	Unknown	0	0%
99	Unknown	1	3%
	Total	29	100%

HWY 28 & 50 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	14	56%
2006	3	12%
2007	4	16%
2008	4	16%
2009	0	0%
Total	25	100%

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	1	4%
2	February	4	16%
3	March	5	20%
4	April	0	0%
5	May	2	8%
6	June	1	4%
7	July	3	12%
8	August	1	4%
9	September	1	4%
10	October	2	8%
11	November	3	12%
12	December	2	8%
	Total	25	100%

Collision by Day

	DAY	NO. OF COLLISIONS	% OF TOTAL
1	Sunday	1	4%
2	Monday	4	16%
3	Tuesday	4	16%
4	Wednesday	2	8%
5	Thursday	8	32%
6	Friday	5	20%
7	Saturday	1	4%
	Total	25	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	1	4%
7	7:00 AM	3	12%
8	8:00 AM	1	4%
9	9:00 AM	2	8%
10	10:00 AM	0	0%
11	11:00 AM	2	8%
12	12:00 PM	3	12%
13	1:00 PM	1	4%
14	2:00 PM	3	12%
15	3:00 PM	2	8%
16	4:00 PM	1	4%
17	5:00 PM	1	4%
18	6:00 PM	1	4%
19	7:00 PM	1	4%
20	8:00 PM	1	4%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	2	8%
	Total	25	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	0	0%
2	Off Road Left	0	0%
3	Right Angle	1	4%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	7	28%
6	Sideswipe	0	0%
7	Other	1	4%
8	Rear End	9	36%
9	Off Road Right	1	4%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	2	8%
13	Backing	2	8%
97	Unknown	2	8%
	Total	25	100%

HWY 28 & 50 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	4	16%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	2	8%
7	Parked Vehicle	0	0%
8	Backed Unsafely	1	4%
9	Left Turn Across Path	4	16%
10	Improper Lane Change	1	4%
11	Disobey Traffic Signal	2	8%
12	Ran off Road	0	0%
13	Improper Turn	1	4%
14	Left of Centre	1	4%
15	Improper Passing	0	0%
97	Blank	7	28%
98	Other	0	0%
99	Unknown	2	8%
	Total	25	100%

Collision by Severity

	COLLISION SEVERITY	NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	5	20%
3	Property Damage	20	80%
97	Unknown	0	0%
	Total	25	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	17	68%
2	Raining	1	4%
3	Hail/Sleet	0	0%
4	Snow	6	24%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	1	4%
98	Other	0	0%
99	Unknown	0	0%
	Total	25	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	11	44%
2	Wet	3	12%
3	Slush/Snow/Ice	10	40%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	1	4%
98	Other	0	0%
99	Unknown	0	0%
	Total	25	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	20	80%
2	Sunglare	0	0%
3	Darkness	4	16%
97	Unknown	1	4%
99	Unknown	0	0%
	Total	25	100%

55/55A STREET & 54 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	0	0%
2006	5	22%
2007	5	22%
2008	5	22%
2009	8	35%
Total	23	100%

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	1	4%
2	February	2	9%
3	March	0	0%
4	April	1	4%
5	May	2	9%
6	June	1	4%
7	July	2	9%
8	August	1	4%
9	September	3	13%
10	October	1	4%
11	November	4	17%
12	December	5	22%
	Total	23	100%

Collision by Day

DAY		NO. OF COLLISIONS	% OF TOTAL
1	Sunday	0	0%
2	Monday	6	26%
3	Tuesday	4	17%
4	Wednesday	4	17%
5	Thursday	3	13%
6	Friday	4	17%
7	Saturday	2	9%
Total		23	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	1	4%
8	8:00 AM	3	13%
9	9:00 AM	0	0%
10	10:00 AM	0	0%
11	11:00 AM	1	4%
12	12:00 PM	1	4%
13	1:00 PM	1	4%
14	2:00 PM	2	9%
15	3:00 PM	3	13%
16	4:00 PM	1	4%
17	5:00 PM	4	17%
18	6:00 PM	2	9%
19	7:00 PM	2	9%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	2	9%
	Total	23	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	2	9%
2	Off Road Left	0	0%
3	Right Angle	5	22%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	4	17%
6	Sideswipe	2	9%
7	Other	1	4%
8	Rear End	6	26%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	1	4%
13	Backing	0	0%
97	Unknown	2	9%
Total		23	100%

55/55A STREET & 54 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	1	4%
2	Stop Sign Violation	1	4%
3	Yield Sign Violation	1	4%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	2	9%
7	Parked Vehicle	0	0%
8	Backed Unsafely	0	0%
9	Left Turn Across Path	1	4%
10	Improper Lane Change	1	4%
11	Disobey Traffic Signal	1	4%
12	Ran off Road	0	0%
13	Improper Turn	3	13%
14	Left of Centre	1	4%
15	Improper Passing	0	0%
97	Blank	3	13%
98	Other	1	4%
99	Unknown	7	30%
	Total	23	100%

Collision by Severity

COLLISION SEVERITY		NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	4	17%
3	Property Damage	19	83%
97	Unknown	0	0%
Total		23	100%

Collision by Weather Condition

ENVIRONMENTAL CONDITION		NO. OF COLLISIONS	% OF TOTAL
1	Clear	13	57%
2	Raining	2	9%
3	Hail/Sleet	0	0%
4	Snow	5	22%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	3	13%
98	Other	0	0%
99	Unknown	0	0%
	Total	23	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	6	26%
2	Wet	2	9%
3	Slush/Snow/Ice	12	52%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	3	13%
98	Other	0	0%
99	Unknown	0	0%
	Total	23	100%

LIGHT CONDITION		NO. OF COLLISIONS	% OF TOTAL
1	Daylight	15	65%
2	Sunglare	0	0%
3	Darkness	6	26%
97	Unknown	2	9%
99	Unknown	0	0%
Total		23	100%

50 STREET & 50 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	2	15%
2006	1	8%
2007	5	38%
2008	3	23%
2009	2	15%
Total	13	100%

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	1	8%
2	February	2	15%
3	March	1	8%
4	April	1	8%
5	May	1	8%
6	June	2	15%
7	July	0	0%
8	August	1	8%
9	September	1	8%
10	October	0	0%
11	November	1	8%
12	December	2	15%
Total		13	100%

Collision by Day					
	DAY	NO. OF COLLISIONS	% OF TOTAL		
1	Sunday	0	0%		
2	Monday	1	8%		
3	Tuesday	0	0%		
4	Wednesday	2	15%		
5	Thursday	1	8%		
6	Friday	6	46%		
7	Saturday	3	23%		
	Total	13	100%		

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	1	8%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	0	0%
8	8:00 AM	0	0%
9	9:00 AM	0	0%
10	10:00 AM	1	8%
11	11:00 AM	1	8%
12	12:00 PM	1	8%
13	1:00 PM	0	0%
14	2:00 PM	1	8%
15	3:00 PM	0	0%
16	4:00 PM	2	15%
17	5:00 PM	2	15%
18	6:00 PM	3	23%
19	7:00 PM	0	0%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	1	8%
97	Unknown	0	0%
	Total	13	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	1	8%
2	Off Road Left	0	0%
3	Right Angle	1	8%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	0	0%
6	Sideswipe	0	0%
7	Other	1	8%
8	Rear End	5	38%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	2	15%
13	Backing	3	23%
97	Unknown	0	0%
	Total	13	100%

50 STREET & 50 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	1	8%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	1	8%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	2	15%
7	Parked Vehicle	1	8%
8	Backed Unsafely	4	31%
9	Left Turn Across Path	0	0%
10	Improper Lane Change	0	0%
11	Disobey Traffic Signal	1	8%
12	Ran off Road	0	0%
13	Improper Turn	1	8%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	2	15%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

Collision by Severity

	COLLISION SEVERITY	NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	2	15%
3	Property Damage	11	85%
97	Unknown	0	0%
	Total	13	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	11	85%
2	Raining	0	0%
3	Hail/Sleet	0	0%
4	Snow	1	8%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	0	0%
98	Other	1	8%
99	Unknown	0	0%
	Total	13	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	8	62%
2	Wet	0	0%
3	Slush/Snow/Ice	5	38%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	0	0%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	10	77%
2	Sunglare	0	0%
3	Darkness	2	15%
97	Unknown	1	8%
99	Unknown	0	0%
	Total	13	100%

50 STREET & 46 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	4	31%
2006	3	23%
2007	2	15%
2008	3	23%
2009	1	8%
Total	13	100%

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	0	0%
2	February	0	0%
3	March	1	8%
4	April	2	15%
5	May	1	8%
6	June	0	0%
7	July	1	8%
8	August	0	0%
9	September	2	15%
10	October	1	8%
11	November	3	23%
12	December	2	15%
	Total	42	100%

Collision by Day

	DAY		% OF TOTAL
1	Sunday	1	8%
2	Monday	1	8%
3	Tuesday	2	15%
4	Wednesday	2	15%
5	Thursday	2	15%
6	Friday	2	15%
7	Saturday	3	23%
	Total	13	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	0	0%
8	8:00 AM	0	0%
9	9:00 AM	1	8%
10	10:00 AM	0	0%
11	11:00 AM	0	0%
12	12:00 PM	1	8%
13	1:00 PM	1	8%
14	2:00 PM	0	0%
15	3:00 PM	2	15%
16	4:00 PM	1	8%
17	5:00 PM	3	23%
18	6:00 PM	2	15%
19	7:00 PM	0	0%
20	8:00 PM	1	8%
21	9:00 PM	1	8%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	0	0%
	Total	13	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	1	8%
2	Off Road Left	0	0%
3	Right Angle	1	8%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	1	8%
6	Sideswipe	1	8%
7	Other	1	8%
8	Rear End	5	38%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	2	15%
13	Backing	0	0%
97	Unknown	1	8%
	Total	13	100%

50 STREET & 46 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	1	8%
2	Stop Sign Violation	1	8%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	2	15%
7	Parked Vehicle	0	0%
8	Backed Unsafely	0	0%
9	Left Turn Across Path	1	8%
10	Improper Lane Change	1	8%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	1	8%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	3	23%
98	Other	1	8%
99	Unknown	2	15%
	Total	13	100%

Collision by Severity

	COLLISION SEVERITY	NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	0	0%
3	Property Damage	13	100%
97	Unknown	0	0%
Total		13	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	8	62%
2	Raining	0	0%
3	Hail/Sleet	0	0%
4	Snow	3	23%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	2	15%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	6	46%
2	Wet	1	8%
3	Slush/Snow/Ice	5	38%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	1	8%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	8	62%
2	Sunglare	0	0%
3	Darkness	4	31%
97	Unknown	1	8%
99	Unknown	0	0%
	Total	13	100%

HWY 28 & 50 STREET COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL		
2005	5	38%		
2006	2	15%		
2007	2	15%		
2008	4	31%		
2009	0	0%		
Total	13	100%		
Collision by Month				

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	2	15%
2	February	2	15%
3	March	3	23%
4	April	2	15%
5	May	0	0%
6	June	0	0%
7	July	0	0%
8	August	1	8%
9	September	0	0%
10	October	0	0%
11	November	2	15%
12	December	1	8%
	Total	13	100%

Collision by Day				
	DAY	NO. OF COLLISIONS	% OF TOTAL	
1	Sunday	1	8%	
2	Monday	2	15%	
3	Tuesday	3	23%	
4	Wednesday	2	15%	
5	Thursday	1	8%	
6	Friday	3	23%	
7	Saturday	1	8%	
	Total	13	100%	

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	1	8%
7	7:00 AM	1	8%
8	8:00 AM	2	15%
9	9:00 AM	0	0%
10	10:00 AM	1	8%
11	11:00 AM	2	15%
12	12:00 PM	1	8%
13	1:00 PM	1	8%
14	2:00 PM	0	0%
15	3:00 PM	1	8%
16	4:00 PM	1	8%
17	5:00 PM	1	8%
18	6:00 PM	0	0%
19	7:00 PM	0	0%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	1	8%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	0	0%
	Total	13	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	3	23%
2	Off Road Left	1	8%
3	Right Angle	2	15%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	0	0%
6	Sideswipe	0	0%
7	Other	0	0%
8	Rear End	6	46%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	1	8%
13	Backing	0	0%
97	Unknown	0	0%
	Total	13	100%

HWY 28 & 50 STREET COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	2	15%
2	Stop Sign Violation	1	8%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	1	8%
7	Parked Vehicle	0	0%
8	Backed Unsafely	0	0%
9	Left Turn Across Path	0	0%
10	Improper Lane Change	1	8%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	0	0%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	8	62%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

Collision by Severity

	COLLISION SEVERITY	NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	2	15%
3	Property Damage	11	85%
97	Unknown	0	0%
	Total	13	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	8	62%
2	Raining	0	0%
3	Hail/Sleet	0	0%
4	Snow	3	23%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	2	15%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	5	38%
2	Wet	0	0%
3	Slush/Snow/Ice	6	46%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	2	15%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	9	69%
2	Sunglare	0	0%
3	Darkness	1	8%
97	Unknown	3	23%
99	Unknown	0	0%
	Total	13	100%

51 STREET & 50 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	1	8%
2006	4	31%
2007	2	15%
2008	5	38%
2009	1	8%
Total	13	100%

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	0	0%
2	February	1	8%
3	March	2	15%
4	April	0	0%
5	May	2	15%
6	June	0	0%
7	July	1	8%
8	August	2	15%
9	September	1	8%
10	October	3	23%
11	November	0	0%
12	December	1	8%
	Total	13	100%

Collision by Day				
	DAY	NO. OF COLLISIONS	% OF TOTAL	
1	Sunday	1	8%	
2	Monday	2	15%	
3	Tuesday	2	15%	
4	Wednesday	2	15%	
5	Thursday	2	15%	
6	Friday	3	23%	
7	Saturday	1	8%	
	Total	12	100%	

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	0	0%
8	8:00 AM	0	0%
9	9:00 AM	0	0%
10	10:00 AM	0	0%
11	11:00 AM	1	8%
12	12:00 PM	1	8%
13	1:00 PM	0	0%
14	2:00 PM	3	23%
15	3:00 PM	1	8%
16	4:00 PM	4	31%
17	5:00 PM	1	8%
18	6:00 PM	1	8%
19	7:00 PM	1	8%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	0	0%
	Total	13	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	1	8%
2	Off Road Left	0	0%
3	Right Angle	0	0%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	1	8%
6	Sideswipe	0	0%
7	Other	1	8%
8	Rear End	0	0%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	1	8%
13	Backing	8	62%
97	Unknown	1	8%
	Total	13	100%

51 STREET & 50 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE		% OF TOTAL
1	Driving Properly	0	0%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	1	8%
6	Followed Too Closely	1	8%
7	Parked Vehicle	0	0%
8	Backed Unsafely	7	54%
9	Left Turn Across Path	0	0%
10	Improper Lane Change	0	0%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	1	8%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	0	0%
98	Other	0	0%
99	Unknown	3	23%
	Total	13	100%

Collision by Severity

COLLISION SEVERITY		NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	0	0%
3	Property Damage	13	100%
97	Unknown	0	0%
Total		13	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	13	100%
2	Raining	0	0%
3	Hail/Sleet	0	0%
4	Snow	0	0%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	0	0%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	11	85%
2	Wet	0	0%
3	Slush/Snow/Ice	2	15%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	0	0%
98	Other	0	0%
99	Unknown	0	0%
	Total	13	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	10	77%
2	Sunglare	0	0%
3	Darkness	2	15%
97	Unknown	1	8%
99	Unknown	0	0%
	Total	13	100%

50 STREET & 43 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	3	27%
2006	2	18%
2007	2	18%
2008	3	27%
2009	1	9%
Total	11	100%

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	0	0%
2	February	2	18%
3	March	3	27%
4	April	1	9%
5	May	1	9%
6	June	0	0%
7	July	2	18%
8	August	1	9%
9	September	0	0%
10	October	0	0%
11	November	1	9%
12	December	0	0%
	Total	11	100%

Collision by Day

	DAY	NO. OF COLLISIONS	% OF TOTAL
1	Sunday	3	27%
2	Monday	0	0%
3	Tuesday	1	9%
4	Wednesday	1	9%
5	Thursday	2	18%
6	Friday	2	18%
7	Saturday	2	18%
	Total	11	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	1	9%
7	7:00 AM	0	0%
8	8:00 AM	0	0%
9	9:00 AM	1	9%
10	10:00 AM	0	0%
11	11:00 AM	0	0%
12	12:00 PM	0	0%
13	1:00 PM	1	9%
14	2:00 PM	0	0%
15	3:00 PM	3	27%
16	4:00 PM	2	18%
17	5:00 PM	1	9%
18	6:00 PM	0	0%
19	7:00 PM	0	0%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	1	9%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	1	9%
	Total	11	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	2	18%
2	Off Road Left	0	0%
3	Right Angle	4	36%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	2	18%
6	Sideswipe	1	9%
7	Other	0	0%
8	Rear End	0	0%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	1	9%
13	Backing	1	9%
97	Unknown	0	0%
	Total	11	100%

50 STREET & 43 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	1	9%
2	Stop Sign Violation	2	18%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	1	9%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	0	0%
7	Parked Vehicle	0	0%
8	Backed Unsafely	1	9%
9	Left Turn Across Path	1	9%
10	Improper Lane Change	0	0%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	0	0%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	3	27%
98	Other	1	9%
99	Unknown	1	9%
	Total	11	100%

Collision by Severity

	COLLISION SEVERITY	NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	2	18%
3	Property Damage	9	82%
97	Unknown	0	0%
	Total	11	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	6	55%
2	Raining	2	18%
3	Hail/Sleet	0	0%
4	Snow	2	18%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	0	0%
98	Other	0	0%
99	Unknown	1	9%
	Total	11	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	5	45%
2	Wet	2	18%
3	Slush/Snow/Ice	3	27%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	0	0%
98	Other	0	0%
99	Unknown	1	9%
	Total	11	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	9	82%
2	Sunglare	0	0%
3	Darkness	2	18%
97	Unknown	0	0%
99	Unknown	0	0%
	Total	11	100%

52 STREET & 50 AVENUE COLLISION ANALYSIS

Collision by Year

NO. OF COLLISIONS	% OF TOTAL
4	36%
2	18%
2	18%
1	9%
2	18%
11	100%
	NO. OF COLLISIONS 4 2 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	1	9%
2	February	1	9%
3	March	1	9%
4	April	1	9%
5	May	3	27%
6	June	1	9%
7	July	2	18%
8	August	0	0%
9	September	0	0%
10	October	0	0%
11	November	1	9%
12	December	0	0%
	Total	11	100%

Collision by Day

	DAY	NO. OF COLLISIONS	% OF TOTAL
1	Sunday	0	0%
2	Monday	4	36%
3	Tuesday	3	27%
4	Wednesday	1	9%
5	Thursday	0	0%
6	Friday	3	27%
7	Saturday	0	0%
	Total	11	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	0	0%
8	8:00 AM	0	0%
9	9:00 AM	1	9%
10	10:00 AM	1	9%
11	11:00 AM	1	9%
12	12:00 PM	2	18%
13	1:00 PM	2	18%
14	2:00 PM	1	9%
15	3:00 PM	1	9%
16	4:00 PM	0	0%
17	5:00 PM	0	0%
18	6:00 PM	0	0%
19	7:00 PM	0	0%
20	8:00 PM	1	9%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	1	9%
97	Unknown	0	0%
	Total	11	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	0	0%
2	Off Road Left	0	0%
3	Right Angle	1	9%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	0	0%
6	Sideswipe	1	9%
7	Other	0	0%
8	Rear End	3	27%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	0	0%
13	Backing	6	55%
97	Unknown	0	0%
	Total	11	100%

52 STREET & 50 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	0	0%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	2	18%
7	Parked Vehicle	0	0%
8	Backed Unsafely	5	45%
9	Left Turn Across Path	0	0%
10	Improper Lane Change	0	0%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	0	0%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	2	18%
98	Other	0	0%
99	Unknown	2	18%
	Total	11	100%

Collision by Severity

COLLISION SEVERITY		NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	2	18%
3	Property Damage	9	82%
97	Unknown	0	0%
	Total	11	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	9	82%
2	Raining	0	0%
3	Hail/Sleet	0	0%
4	Snow	1	9%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	1	9%
98	Other	0	0%
99	Unknown	0	0%
	Total	11	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	7	64%
2	Wet	0	0%
3	Slush/Snow/Ice	3	27%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	1	9%
98	Other	0	0%
99	Unknown	0	0%
	Total	11	100%

	LIGHT CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Daylight	9	82%
2	Sunglare	0	0%
3	Darkness	1	9%
97	Unknown	1	9%
99	Unknown	0	0%
	Total	11	100%

49 STREET & 51 AVENUE COLLISION ANALYSIS

Collision by Year

NO. OF COLLISIONS	% OF TOTAL		
2	20%		
1	10%		
2	20%		
0	0%		
5	50%		
10	100%		
	NO. OF COLLISIONS 2 1 2 2 0 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	1	10%
2	February	1	10%
3	March	1	10%
4	April	0	0%
5	May	0	0%
6	June	1	10%
7	July	0	0%
8	August	0	0%
9	September	0	0%
10	October	1	10%
11	November	1	10%
12	December	4	40%
	Total	10	100%

Collision by Day

	DAY	NO. OF COLLISIONS	% OF TOTAL
1	Sunday	2	20%
2	Monday	2	20%
3	Tuesday	0	0%
4	Wednesday	1	10%
5	Thursday	1	10%
6	Friday	2	20%
7	Saturday	2	20%
	Total	10	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	1	10%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	0	0%
8	8:00 AM	0	0%
9	9:00 AM	1	10%
10	10:00 AM	1	10%
11	11:00 AM	0	0%
12	12:00 PM	2	20%
13	1:00 PM	0	0%
14	2:00 PM	1	10%
15	3:00 PM	0	0%
16	4:00 PM	1	10%
17	5:00 PM	3	30%
18	6:00 PM	0	0%
19	7:00 PM	0	0%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	0	0%
	Total	10	100%

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	3	30%
2	Off Road Left	0	0%
3	Right Angle	3	30%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	0	0%
6	Sideswipe	0	0%
7	Other	0	0%
8	Rear End	2	20%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	1	10%
12	Sideswipe - Same Direction	0	0%
13	Backing	1	10%
97	Unknown	0	0%
	Total	10	100%

49 STREET & 51 AVENUE COLLISION ANALYSIS

Collision by Cause

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	2	20%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	1	10%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	2	20%
7	Parked Vehicle	1	10%
8	Backed Unsafely	1	10%
9	Left Turn Across Path	0	0%
10	Improper Lane Change	0	0%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	1	10%
13	Improper Turn	0	0%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	1	10%
98	Other	0	0%
99	Unknown	1	10%
	Total	10	100%

Collision by Severity

	COLLISION SEVERITY	NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	2	20%
3	Property Damage	8	80%
97	Unknown	0	0%
	Total	10	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	7	70%
2	Raining	0	0%
3	Hail/Sleet	0	0%
4	Snow	2	20%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	1	10%
98	Other	0	0%
99	Unknown	0	0%
	Total	10	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	1	10%
2	Wet	0	0%
3	Slush/Snow/Ice	8	80%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	1	10%
98	Other	0	0%
99	Unknown	0	0%
	Total	10	100%

	LIGHT CONDITION	NO. OF COLLISIONS	
1	Daylight	7	70%
2	Sunglare	0	0%
3	Darkness	2	20%
97	Unknown	1	10%
99	Unknown	0	0%
	Total	10	100%

HWY 28 & 43 AVENUE COLLISION ANALYSIS

Collision	by	Year
A		

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	1	10%
2006	5	50%
2007	0	0%
2008	3	30%
2009	1	10%
Total	10	100%

Collision by Month

	MONTH	NO. OF COLLISIONS	% OF TOTAL
1	January	0	0%
2	February	1	10%
3	March	1	10%
4	April	0	0%
5	May	0	0%
6	June	1	10%
7	July	0	0%
8	August	0	0%
9	September	0	0%
10	October	1	10%
11	November	5	50%
12	December	1	10%
	Total	10	100%

Collision by Day

	DAY	NO. OF COLLISIONS	% OF TOTAL
1	Sunday	1	10%
2	Monday	1	10%
3	Tuesday	0	0%
4	Wednesday	2	20%
5	Thursday	3	30%
6	Friday	2	20%
7	Saturday	1	10%
	Total	10	100%

	HOUR	NO. OF COLLISIONS	% OF TOTAL	
1	1:00 AM	0	0%	
2	2:00 AM	0	0%	
3	3:00 AM	0	0%	
4	4:00 AM	0	0%	
5	5:00 AM	0	0%	
6	6:00 AM	0	0%	
7	7:00 AM	0	0%	
8	8:00 AM	1	10%	
9	9:00 AM	1	10%	
10	10:00 AM	0	0%	
11	11:00 AM	0	0%	
12	12:00 PM	1	10%	
13	1:00 PM	2	20%	
14	2:00 PM	1	10%	
15	3:00 PM	1	10%	
16	4:00 PM	0	0%	
17	5:00 PM	1	10%	
18	6:00 PM	2	20%	
19	7:00 PM	0	0%	
20	8:00 PM	0	0%	
21	9:00 PM	0	0%	
22	10:00 PM	0	0%	
23	11:00 PM	0	0%	
24	12:00 AM	0	0%	
97	Unknown	0	0%	
	Total	10	100%	

	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL
1	Struck Object	2	20%
2	Off Road Left	0	0%
3	Right Angle	1	10%
4	Passing - Left Turn	0	0%
5	Left Turn - Across Path	1	10%
6	Sideswipe	0	0%
7	Other	0	0%
8	Rear End	6	60%
9	Off Road Right	0	0%
10	Head On	0	0%
11	Passing Right Turn	0	0%
12	Sideswipe - Same Direction	0	0%
13	Backing	0	0%
97	Unknown	0	0%
	Total	10	100%

HWY 28 & 43 AVENUE COLLISION ANALYSIS

Collision by Cause

COLLISION CAUSE		NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	1	10%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	3	30%
7	Parked Vehicle	0	0%
8	Backed Unsafely	0	0%
9	Left Turn Across Path	1	10%
10	Improper Lane Change	0	0%
11	Disobey Traffic Signal	1	10%
12	Ran off Road	0	0%
13	Improper Turn	0	0%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	2	20%
98	Other	1	10%
99	Unknown	1	10%
	Total	10	100%

Collision by Severity

COLLISION SEVERITY		NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	2	20%
3	Property Damage	8	80%
97	Unknown	0	0%
	Total	10	100%

Collision by Weather Condition

ENVIRONMENTAL CONDITION		NO. OF COLLISIONS	% OF TOTAL
1	Clear	6	60%
2	Raining	1	10%
3	Hail/Sleet	0	0%
4	Snow	2	20%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	1	10%
98	Other	0	0%
99	Unknown	0	0%
	Total	10	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	3	30%
2	Wet	1	10%
3	Slush/Snow/Ice	5	50%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	1	10%
98	Other	0	0%
99	Unknown	0	0%
	Total	10	100%

LIGHT CONDITION		NO. OF COLLISIONS	% OF TOTAL
1	Daylight	6	60%
2	Sunglare	1	10%
3	Darkness	2	20%
97	Unknown	1	10%
99	Unknown	0	0%
	Total	10	100%

HWY 28 & 55 AVENUE COLLISION ANALYSIS

Collision by Year		
YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	1	10%
2006	2	20%
2007	3	30%
2008	3	30%
2009	1	10%
Total	10	100%

Collision by Month MONTH NO. OF COLLISIONS % OF TOTAL 10% 10% 0% January 1 1 February March 2 1 3 0 April May 10% 0% 4 1 5 0 6 7 June 1 10% 0% July 0 8 August 0 0% 10% 0% 9 September 1 10 October 0 November December 50% 0% 11 5 12 0 Total 10 100%

Collision by Day				
	DAY	NO. OF COLLISIONS	% OF TOTAL	
1	Sunday	0	0%	
2	Monday	1	10%	
3	Tuesday	2	20%	
4	Wednesday	2	20%	
5	Thursday	2	20%	
6	Friday	2	20%	
7	Saturday	1	10%	
	Total	10	100%	

	HOUR	NO. OF COLLISIONS	% OF TOTAL
1	1:00 AM	0	0%
2	2:00 AM	0	0%
3	3:00 AM	0	0%
4	4:00 AM	0	0%
5	5:00 AM	0	0%
6	6:00 AM	0	0%
7	7:00 AM	0	0%
8	8:00 AM	1	10%
9	9:00 AM	0	0%
10	10:00 AM	0	0%
11	11:00 AM	0	0%
12	12:00 PM	1	10%
13	1:00 PM	0	0%
14	2:00 PM	1	10%
15	3:00 PM	2	20%
16	4:00 PM	2	20%
17	5:00 PM	1	10%
18	6:00 PM	2	20%
19	7:00 PM	0	0%
20	8:00 PM	0	0%
21	9:00 PM	0	0%
22	10:00 PM	0	0%
23	11:00 PM	0	0%
24	12:00 AM	0	0%
97	Unknown	0	0%
	Total	10	100%

ollision by Type				
	COLLISION TYPE	NO. OF COLLISIONS	% OF TOTAL	
1	Struck Object	2	20%	
2	Off Road Left	0	0%	
3	Right Angle	1	10%	
4	Passing - Left Turn	0	0%	
5	Left Turn - Across Path	2	20%	
6	Sideswipe	0	0%	
7	Other	0	0%	
8	Rear End	4	40%	
9	Off Road Right	0	0%	
10	Head On	0	0%	
11	Passing Right Turn	0	0%	
12	Sideswipe - Same Direction	1	10%	
13	Backing	0	0%	
97	Unknown	0	0%	
	Total	10	100%	

Collision by Cause

HWY 28 & 55 AVENUE COLLISION ANALYSIS

	COLLISION CAUSE	NO. OF COLLISIONS	% OF TOTAL
1	Driving Properly	0	0%
2	Stop Sign Violation	0	0%
3	Yield Sign Violation	0	0%
4	Fail to Yield Right-of-Way, Uncontrolled Intersection	0	0%
5	Fail to Yield Right-of-Way, Pedestrian	0	0%
6	Followed Too Closely	3	30%
7	Parked Vehicle	0	0%
8	Backed Unsafely	0	0%
9	Left Turn Across Path	3	30%
10	Improper Lane Change	0	0%
11	Disobey Traffic Signal	0	0%
12	Ran off Road	0	0%
13	Improper Turn	0	0%
14	Left of Centre	0	0%
15	Improper Passing	0	0%
97	Blank	2	20%
98	Other	1	10%
99	Unknown	1	10%
	Total	10	100%

Collision by Severity

COLLISION SEVERITY		NO. OF COLLISIONS	% OF TOTAL
1	Fatal	0	0%
2	Injury	3	30%
3	Property Damage	7	70%
97	Unknown	0	0%
	Total	10	100%

Collision by Weather Condition

	ENVIRONMENTAL CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Clear	5	50%
2	Raining	3	30%
3	Hail/Sleet	0	0%
4	Snow	0	0%
5	Fog/Smog/Smoke/Dust	0	0%
6	High Wind	0	0%
97	Unknown	1	10%
98	Other	0	0%
99	Unknown	1	10%
Total		10	100%
Total		10	100%

Collision by Surface Condition

	SURFACE CONDITION	NO. OF COLLISIONS	% OF TOTAL
1	Dry	1	10%
2	Wet	4	40%
3	Slush/Snow/Ice	5	50%
4	Loose Surface Material	0	0%
5	Muddy	0	0%
97	Unknown	0	0%
98	Other	0	0%
99	Unknown	0	0%
Total		10	100%

LIGHT CONDITION		NO. OF COLLISIONS	% OF TOTAL
1	Daylight	8	80%
2	Sunglare	0	0%
3	Darkness	2	20%
97	Unknown	0	0%
99	Unknown	0	0%

C Appendix C - Cold Lake Transportation Study Traffic Volume Forecast and Analysis

Technical Memorandum

City of Cold Lake

Cold Lake Transportation Study Traffic Volume Forecast and Analysis

April 2011



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Introduction

The City of Cold Lake (City) is located 287 km northeast of the City of Edmonton and was formed in 1996 by merging three municipalities, namely Grand Centre, Medley (Canadian Forces Base W4) and Cold Lake. Grand Centre was subsequently renamed Cold Lake South (CLS) and the original Cold Lake is now known as Cold Lake North (CLN).

The City has experienced noticeable growth in recent years. According to municipal census the City had a population of 11,991 in 2006 and 13,924 in 2009. This corresponds to a 5.4% linear growth annually. Current transportation improvements within the City have been based on the previous transportation study completed in 2000 (2000 Transportation Study) and is no longer considered representative of the actual transportation network required to address current and future transportation needs.

In light of the continuing accelerated pace of development in the region and the need to rationalize and identify the transportation network requirements for the City, including surrounding rural municipalities and counties, the existing transportation plan requires a comprehensive update.

1.1 STUDY BACKGROUND

Associated Engineering (AE) was retained by the City to update the existing transportation study. The purpose of the transportation study is to provide a comprehensive long-range plan that integrates the transportation infrastructure with requirements of the existing and future land uses. The transportation study will provide the City with a blueprint on which to plan and implement specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15-year, and 20-year planning horizons.

One component of the transportation study was to forecast the future traffic volumes for the next 20 years. Traffic volumes were forecasted for the 5-year, 10-year, 15-year, and 20-year planning horizons, and analyzed to determine the future road classification and the number of lanes required to accommodate the future traffic volumes. This technical memorandum presents the methodology used and the results from the traffic volume forecast and analysis.

1.2 STUDY AREA

The traffic volume forecast will encompass the area bounded by the current city limits. Figure 1.1 presents the study area.



1.3 STUDY OBJECTIVE

The objectives for the traffic volume forecast and analysis were:

- Forecast the future traffic volumes over the next 20 years, in 5-year planning horizons
- Establish the required road classification for the City's major road network over the next 20 years
- Determine the number of lanes required for the City's major road network over the next 20 years.

For the purpose of the study, the afternoon (p.m.) peak hour traffic volume forecast was considered to be the most critical and was selected for the analysis. The following planning horizons were analyzed:

- 5-year (2015) horizon
- 10-year (2020) horizon
- 15-year (2025) horizon
- 20-year (2030) horizon.

1-2

The road classification and number of lanes required to accommodate traffic under the 20-year (2030) horizon will be used by the City to preserve the right-of-way required to accommodate future roadway expansion.





PROJECT NO:	2010-3050
DATE:	FEBRUARY 2011
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FIGURE 1.1 TRAFFIC FORECAST STUDY AREA 2

Traffic Forecast: Methodology

A spreadsheet model, following the four-step planning process, was used to forecast the future traffic volumes. To complete the spreadsheet model, a skeletal road network was developed for each planning horizon to represent the anticipated road network. The major road network (collectors and arterials) identified for each planning horizon in the 2000 Transportation Study were used to represent the skeletal road network for the respective planning horizon. Aside from alignment changes to English Bay Road/ 28 Street/25 Street in the northwest quadrant and the classification of Centre Avenue, between 57 Street and Highway 28, as a four-lane arterial, the major road networks presented in the 2000 Transportation Study were considered to be valid. Changes were made to the 5-year and 10-year road networks to reflect the current alignment of English Bay Road/28 Street/25 Street.

Future traffic within the City will be comprised of background traffic and development traffic. Background traffic represents the growth in existing traffic reflecting the additional trips generated in the surrounding areas and in the City's existing subdivisions. Future background traffic volumes for each planning horizon were estimated by applying an annual growth rate of 2% to the existing (2010) traffic volumes, over a 5-year, 10-year, 15-year, and 20-year period.

Development traffic represents traffic generated by new subdivisions or area redevelopment. The information about future development or redevelopment within the City was obtained from the City's Area Structure Plans (ASP), Area Redevelopment Plans (ARP) and Outline Pans, and from the Municipal District (MD) of Bonnyville's Intermunicipal Development Plan (IDP). Future development traffic volumes for each planning horizon were estimated using a four-step process, which involved:

- **Trip Generation:** Estimate the number of trips generated from and attracted to each development/redevelopment
- **Trip Distribution**: Estimate the origin and destination of trips to and from each development/redevelopment
- Modal Split: Not within the scope of the study
- **Trip Assignment**: Select the routes to and from the developments/redevelopments and assign the development traffic volumes to the City's road network.



3

Traffic Forecast: Background Traffic Volumes

Growth rate calculations were completed as part of the existing condition analysis for the transportation study update and an annual, non-compounding, growth rate of 2.0% was established. The growth rate was selected after discussions with the City. The detailed growth rate calculations can be referenced in the technical memorandum titled Existing (2010) Traffic Operational Analysis.

3.1 FORECASTED BACKGROUND TRAFFIC VOLUMES

Background traffic volumes for the planning horizons were estimated by applying the 2.0% annual growth rate to the existing (2010) traffic volumes, over a 5-year, 10-year, 15-year and 20-year period. The existing (2010) daily traffic volumes were obtained from the Existing (2010) Traffic Operational Analysis technical memorandum and presented in Figure 3.1.

Figure 3.2 through Figure 3.5 present the forecasted daily background traffic volumes for the 5-year, 10-year, 15-year and 20-year horizons.







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FIGURE 3.1 EXISTING (2010) DAILY TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
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FIGURE 3.2 5 YEAR (2015) DAILY BACKGROUND TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 3.3 10 YEAR (2020) DAILY BACKGROUND TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 3.4 15 YEAR (2025) DAILY BACKGROUND TRAFFIC VOLUMES





PROJECT NO:	2010-3050 APRIL 2011
APPROVED: SCALE: DWG NO:	NTS

FIGURE 3.5 20 YEAR (2030) DAILY BACKGROUND TRAFFIC VOLUMES

4 Traffic Forecast: Future Development Traffic Volumes

4.1 FUTURE DEVELOPMENTS

There are 20 development/redevelopment projects identified for the City and surrounding area in the next 20 years; 13 are located within the City and seven are located outside the City, in the MD of Bonnyville. The development/redevelopment projects are shown in Figure 4.1 and are discussed in the following sections.

AE contacted the Department of Defence in Medley to obtain information about future land use growth or change within the base, and was informed that there would be no expected changes or growth within the 20-year planning horizon of the transportation study.

4.1.1 City of Cold Lake

The 13 development/redevelopment projects expected within the City are:

- Fischer Estates: 63.5 hectares located in Cold Lake South (SE ¼ 34-62-2-4)
- Iron Horse: 30.77 hectares located in Cold Lake South (N ½ f 34-62-2-4)
- Cold Lake Central: 248.0 hectares located between Cold Lake North and Cold Lake South (W ½ 11-63-2-4, W ¼ 2-63-2-4, and S ½ 2-63-11-4)
- Grand Centre SE: 105.0 hectares located in Cold Lake South (W ½ 35-62-2-4)
- Forest Heights: 64.0 hectares located in Cold Lake North (NW ¼ o13-63-2-4)
- Northshore: 244.0 hectares located in Cold Lake North (NE ¼ 22-63-2-4, SE ¼ 22-63-2-4, SW ¼ 23-63-2-4, and NW ¼ 23-63-2-4)
- Lot 2, Plan 982 1024: 1.81 hectares located in Cold Lake North (SE ¼ 23-63-2-4)
- Horseshoe Bay: 77.7 hectares located in Cold Lake North (NW ¼ 26-63-2-4, SW ¼ 35-63-2-4, and NW ¼ 35-63-2-4)
- Uplands: 101.9 hectares located in Cold Lake north (NE 13-63-2-4 and SE 13-63-2-4)
- Lakeshore Redevelopment: 66.0 hectares located in Cold Lake North.
- Lakewood Estates: 21.3 hectares located in Cold Lake North (SW ¼ 26-63-2-4)
- **Creekside Estates**: 60.5 hectares located in Cold Lake North (SE ½ 22-63-2-4)
- Parkview Estates: 36.8 hectares located in Cold Lake North (NW 23-63-2-4).





PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	FEBRUARY 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.1 FUTURE DEVELOPMENT/REDEVELOPMENT PROJECTS CITY OF COLD LAKE AND SURROUNDING AREA

4.1.2 MD of Bonnyville

The seven development projects expected outside the City, in the MD of Bonnyville are:

- Hills of Cold Lake: 119.3 hectares located northwest of Cold Lake North (SE, NE ¼ 34-63-2-4)
- Fawn Ridge Estates: 34.9 hectares located south of Cold Lake South (NW ¼ 23-62-2-4)
- **IDP Residential Development 1:** 63 hectares located along the north side of Highway 55, west of the City
- **IDP Residential Development 2:** 84 hectares located west of the IDP Commercial Development, from 75 Avenue and south of 61/62 Avenue
- **IDP Residential Development 3:** 418 hectares located east of Cold Lake Central, from Energy Centre and 55 Avenue
- **IDP Industrial Development:** 392 hectares located along both sides of Highway 55, west of the City
- **IDP Commercial Development:** 157 hectares located along the west side of Highway 28, from Energy Centre to 55 Avenue.

4.1.3 Development Phasing

The ASP, ARP and Outline Plans for the development/redevelopment projects provided by the City and the IDP did not discuss the expected timing or staging for the projects. Most of the documents stated that the timing would be dictated by market conditions and the availability of municipal servicing capacity.

To forecast the future development traffic volumes for each planning horizon, the following assumptions were made:

- Each development/redevelopment plan will experience 25% growth in each planning horizon with full build-out by 2030 except for Fischer Estates, Iron Horse, Forest Heights and the IDP developments
- Development of Fischer Estates, Iron Horse and Forest Heights will be delayed until 2020. By 2030, these three developments will be 50% developed
- Development of the residential land from the IDP will be delayed until 2015. By 2030, the three residential developments will be 30% developed
- Development of the industrial land from the IDP will be delayed until 2015. By 2030, the industrial development will be 20% developed
- Development of the commercial land from the IDP will be delayed until 2015. By 2030, the commercial development will be 30% developed.

The development phasing assumptions were established through discussions with the City's Planning Department. Table 4.1 summarizes the development phasing assumed for each planning horizon.



Development / Redevelopment	Land Use	5-year (2015) Horizon	10-year (2020) Horizon	15-year (2025) Horizon	20-year (2030) Horizon
Fischer Fototoo	Residential	0%	0%	25%	50%
FISCHER ESTATES	Commercial	0%	0%	25%	50%
Iron Horse	Residential	0%	0%	25%	50%
	Residential	25%	50%	75%	100%
Cold Lake Central	Commercial	50%	100%	100%	100%
Grand Centre	Residential	25%	50%	75%	100%
Southeast	Industrial	25%	50%	75%	100%
Forest Heights	Residential	0%	0%	25%	50%
	Residential	25%	50%	75%	100%
Newteshews	Commercial	25%	50%	75%	100%
NorthShore	Institutional	25%	50%	75%	100%
	School	0%	0%	100%	100%
Lot 2, Plan 982 1024	Commercial	100%	100%	100%	100%
Horseshoe Bay	Residential	50%	100%	100%	100%
	Residential	25%	50%	75%	100%
Uplands	Health Services & Mixed Use	25%	50%	75%	100%
Lakeshore Area Redevelopment	All	25%	50%	75%	100%

Table 4-1Development Phasing Assumption

Development / Redevelopment	Land Use	5-year (2015) Horizon	10-year (2020) Horizon	15-year (2025) Horizon	20-year (2030) Horizon
Lakewood Estates	Residential	25%	50%	75%	100%
Creekside Estates	Residential	25%	50%	75%	100%
Dorla iour Estatos	Residential	25%	50%	75%	100%
Parkview Estates	Commercial	25%	50%	75%	100%
Hills of Cold Lake	Residential	25%	50%	75%	100%
Fawn Ridge Estates Development	Residential	25%	50%	75%	100%
IDP Residential Development 1	Residential	0%	10%	20%	30%
IDP Residential Development 2	Residential	0%	10%	20%	30%
IDP Residential Development 3	Residential	0%	10%	20%	30%
IDP Industrial Development	Industrial	0%	5%	10%	20%
IDP Commercial Development	Commercial	0%	10%	20%	30%

4.2 TRIP GENERATION

The ASP, ARP and Outline Plans for the development/redevelopment projects were reviewed to obtain information regarding the future land uses and the associated developable area. Of particular relevance was the residential, commercial, industrial and institutional land uses.

Portions of the above mentioned subdivisions are currently developed. Traffic volumes from the developed portions are captured by existing (2010) traffic volumes; therefore, these areas were not included in the forecast for the future development traffic volumes. The breakdown of the future land uses and areas for each development/redevelopment project are presented in Appendix A.

Table 4.2 summarizes the trip generation calculations for each development/redevelopment project. The Institute of Transportation Engineer (ITE) Trip Generation Handbook (7th Edition) was referenced to obtain trip rates for each land use. The maximum site coverage assumptions listed in Table 4.2 reflect those stated in the Traffic Demand Forecast Work Plan established at project initiation and attached in Appendix B. Some site coverage assumptions were revised using engineering judgement to reflect more practical trip estimates.



4-8

Figure 4.2 through Figure 4.5 present the expected p.m. peak hour trips generated by each development/redevelopment project, for the 5-year, 10-year, 15-year and 20-year horizon, respectively.

In order to establish the trip distribution within the City, the study area was broken into nine traffic analysis zones (TAZ), and is illustrated in Figure 4.6. Zone boundaries were selected to encompass areas with relatively homogenous land use types (e.g., business zones and residential zones).

City of Cold Lake Transportation Study	1 hectare =	107,639.1	sq.ft.
Project No: 2010-3050	1 hectare =	2.4711	acre
Date: April 9, 2011			

Table 4.2 Future Developments Trip Generation Trip Generation - ITE Trip Generation Handbook

						Indonondont	Variable			ITE	Data					Trip	s (T)		
Dovelopment	Description	# of	Unit	Land Lico Description	Maximum Lot	independent	valiable	AM P	Peak		PM P	eak			AM Peak			PM Peak	
Development	Description	# 01	Onit		Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	449	du	210: Single Family Residential	-	Dwelling Units	449	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	324	81	243	414	261	153
Fischer	Multi Family Residential	295	du	230: Residential Condo/Townhouse	-	Dwelling Units	295	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	123	21	102	146	98	48
Fischer	Commercial - Arterial	0.0	ha	770: Business Park	80%	1000 sq.ft	0.0	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	-	-	-	-	-	-
	Commercial - Neighbourhood	5.8	ha	770: Business Park	50%	1000 sq.ft	313.3	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	438	368	70	431	99	332
					Tota	I Dwelling Units	744						Total Trips:	884	470	415	992	458	534

Total Commercial/Industrial (1000 sq.ft) 313

						Indonondont	ariable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	allable	AM P	eak		PM P	eak			AM Peak			PM Peak	
Deteleption			•		Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	323	du	210: Single Family Residential	-	Dwelling Units	323	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	236	59	177	308	194	114
Iron Horse	Medium Density Residential	18	du	230: Residential Condo/Townhouse	-	Dwelling Units	18	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	13	2	11	15	10	5
	High Density Residential	45	du	223: Mid-Rise Apartment	-	Dwelling Units	45	T = 0.41(X) - 13.06	31%	69%	T = 0.48(X) - 11.07	58%	42%	5	2	4	11	6	4
					Total	Dwelling Units	386						Total Trips:	254	63	191	333	210	123

						Indonandant	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	Valiable	AM P	eak		PM P	eak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	1,354	du	210: Single Family Residential	-	Dwelling Units	1,354	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	957	239	718	1,118	705	414
Cold Lake Control Area	Medium Density Residential	578	du	230: Residential Condo/Townhouse	-	Dwelling Units	578	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	210	36	174	253	170	84
Cold Lake Certifal Area	High Density Residential	602	du	223: Mid-Rise Apartment	-	Dwelling Units	602	T = 0.41(X) - 13.06	31%	69%	T = 0.48(X) - 11.07	58%	42%	234	72	161	278	161	117
	Commercial - Arterial	18.7	ha	770: Business Park	80%	1000 sq.ft	1,612.7	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	2,182	1,833	349	1,949	448	1,500
					Tota	I Dwelling Units	2,534						Total Trips:	3,583	2,180	1,403	3,598	1,484	2,114

Total Commercial/Industrial (1000 sq.ft) 1,612.7

						Independent	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	variable	AM P	eak		PM P	eak			AM Peak	i.		PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound %	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	281	du	210: Single Family Residential	-	Dwelling Units	281	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	206	52	155	272	171	101
Grand Centre SE	Mobile home	150	du	240: Mobile Home Park	-	Dwelling Units	150	Ln(T) = 0.64Ln(X) + 0.96	20%	80%	T = 0.57(X) + 2.06	62%	38%	65	13	52	88	54	33
	Industrial - Light Industrial	5.9	ha	130: Industrial Park	60%	1000 sq.ft	380.1	Ln(T) = 0.77Ln(X) + 1.09	82%	18%	T = 0.77(X) + 42.11	21%	79%	288	236	52	335	70	265
					Tota	I Dwelling Units	431						Total Trips:	559	301	258	694	296	398

Total Commercial/Industrial (1000 sq.ft) 380.1

						Indonondont	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	variable	AM P	eak		PM P	eak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Foroat Heighte	Single Family Residential	345	du	210: Single Family Residential	-	Dwelling Units	345	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	251	63	188	327	206	121
Folest Heights	Multi Family Residential	248	du	230: Residential Condo/Townhouse	-	Dwelling Units	248	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	107	18	89	127	85	42
					Tota	I Dwelling Units	593						Total Trips:	358	81	277	453	291	163

						Indonondont	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	variable	AM F	eak		PM P	eak			AM Peak			PM Peak	ί.
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	537	du	210: Single Family Residential	-	Dwelling Units	537	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	385	96	289	487	307	180
	Medium Density Residential	475	du	230: Residential Condo/Townhouse	-	Dwelling Units	475	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	180	31	149	216	145	71
	Mixed Lice Commercial 1	547	du	223: Mid-Rise Apartment	-	Dwelling Units	547	T = 0.41(X) - 13.06	31%	69%	T = 0.48(X) - 11.07	58%	42%	211	65	146	251	146	106
	Mixed Use commercial	6.5	ha	770: Business Park	25%	1000 sq.ft	174.9	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	247	208	40	252	58	194
Northshore	Mixed Use Institutional ²	157	du	223: Mid-Rise Apartment	-	Dwelling Units	157	T = 0.41(X) - 13.06	31%	69%	T = 0.48(X) - 11.07	58%	42%	51	16	35	64	37	27
	Wixed Use Institutional	2.6	ha	720: Medical-Dental Office Building	15%	1000 sq.ft	42.0	2.48	79%	21%	3.72	27%	73%	104	82	22	156	42	114
	School Site	1,958	students	520: Elementary School	-	Students	1,958	Ln(T) = 1.11Ln(X) - 1.73	55%	45%	Ln(T) = 1.08Ln(X) - 1.90	45%	55%	799	439	360	537	242	295
	Commercial - Neighbourhood	1.8	ha	770: Business Park	50%	1000 sq.ft	96.9	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	139	116	22	147	34	113
	Commercial - Arterial	11.9	ha	770: Business Park	80%	1000 sq.ft	1,024.7	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	1,399	1,175	224	1,284	295	989
1. Maximum lot coverage for comm	nercial portion of mix use commercial assumed to be	25%			Tota	I Dwelling Units	1,716						Total Trips:	3,516	2,229	1,286	3,394	1,305	2,089

Maximum lot coverage for institutional portion of mix use insitutuional assumed to be 15%



Animate Base bia Animate																		
NameN						Maximum Lot	Independen	t Variable	AM D	oak	ITE	Data PM Book		AM Book	Trip	5 (T)	PM Book	
10 <th>Development</th> <th>Description</th> <th># of</th> <th>Unit</th> <th>Land Use Description</th> <th>Coverage</th> <th>Description</th> <th>Units (X)</th> <th>Equation or Average Rate</th> <th>% Inbound</th> <th>% Outbound</th> <th>Equation or Average Rate % Inbound % Outbound</th> <th>I Total</th> <th>In</th> <th>Out</th> <th>Total</th> <th>In</th> <th>Out</th>	Development	Description	# of	Unit	Land Use Description	Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbound % Outbound	I Total	In	Out	Total	In	Out
And the constrained of the constrai	Lot 2	Commercial - Arterial	15,365	sq.ft	770: Business Park	· ·	1000 sq.ft	15.4	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 23% 77%	23	19	4	27	6	21
Description Per Link to base base base Per Per Per Per P					Tota	al Commercial/Indus	strial (1000 sq.ft)	15.4				Total Trips	: 23	19	4	27	6	21
Name Nomina No No <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td>ITE</td> <td>Data</td> <td></td> <td></td> <td>Trips</td> <td>(T)</td> <td></td> <td></td>				1			1				ITE	Data			Trips	(T)		
Image image image image 	Development	Description	# of	Unit	Land Use Description	Maximum Lot	Independen	t Variable	AM P	eak		PM Peak		AM Peak			PM Peak	
Name day Normality Norma						Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbound % Outbound	l Total	In	Out	Total	In	Out
Amountability Amountability<	Horseshoe Bay	Low Density Residential	42	du	210: Single Family Residential	-	Dwelling Units	42	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53 63% 37%	39	10	29	49	31	18
Description Description Unit bit bit description Descripti						Tota	I Dwelling Units	42	l			Total Trips	: 39	10	29	49	31	18
DescriptionDescripti											ITE	Data			Trips	; (T)		
Image of a bin of a bi	Development	Description	# of	Unit	Land Use Description	Maximum Lot	Independen	t Variable	AM P	eak		PM Peak		AM Peak			PM Peak	
the building						Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbound % Outbound	Total	In	Out	Total	In	Out
Main production (Main Control (Main Cont		Single Family Residential	904	du	210: Single Family Residential	· ·	Dwelling Units	904	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53 63% 37%	642	161	482	778	490	288
Image Notion Sol Sol Sol Sol Sol	Uplands	Multi Family Residential	480	du	230: Residential Condo/Townhouse	-	Dwelling Units	480	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32 67% 33%	181	31	150	218	146	72
	Maximum site coverage for H	Health Services and Mixed Use 3.4	5.0	ha	620: Nursing Home	50%	1000 sq.ft	269.1	0.38	53%	47%	0.42 47% 53%	102	54	48	113	53	60
	AM directional split for Nursing	g Home, by 1000 sq. ft., not available. Assume reve	rse of PM direc	tional split	Total H	lealth Care & Mixed	Use (1000 sq.ft)	269.1				Total mps	. 320	240	000	1,100	009	415
Description of discription of discription of discription Description Description Description Description Description Description Description Discription Discription <thdiscription< t<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thdiscription<>																		
Description Ard Unit Lund ubs begregation Notice Laboration Matrixe Laboration Matri	SUBTRACT										ITE	Data			Trine	: (T)		_
Name Description No Description Space of a space in	Development	Description	# of	Unit	Land Use Description	Maximum Lot	Independen	t Variable	AM P	eak		PM Peak		AM Peak		. (.)	PM Peak	
Base of the series Bits B	Development	Description	# 01		Land Use Description	Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbound % Outbound	Total	In	Out	Total	In	Out
basebore APA Opinion No Opinion Opinion No Opinion Opinion <		902 10 Street	0.11	hec	770: Business Park	50%	1000 sa.ft	5.9	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 23% 77%	9	8	1	11	3	9
Listen or APPOr A source Finite Accordance by Listen or App Accordance by Listen or		904 10 Street	0.07	hec	770: Business Park	50%	1000 sq.ft	3.7	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 23% 77%	6	5	1	7	2	6
bit	Lakeshore ARP	901 9 Avenue	0.11	hec	770: Business Park	50%	1000 sq.ft	6.0	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 23% 77%	9	8	1	11	3	9
Image: part of the UL contrustry left in the UL contrustry left i		803 10 Avenue	0.22	hec	770: Business Park	50%	1000 sq.ft	12.1	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 23% 77%	18	15	3	22	5	17
	E - E - H-II	Fire Hall / Community Hall	0.34	hec	495: Recreational Community Center ⁵	50%	1000 sq.ft	18.4	22.88	50%	50%	10 % of All Day	422	211	211	42	21	21
OPEN dependent of Auseing part of 12 pendent of 12 pende	For Fire Hall, assumed same	trip rate as luture community centre. Trips will rema	in the same ess	entially.	Total Fi	I otal Comme re Hall / Community	rcial (1000 sq.ft) Hall (1000 sq.ft)	18.4				Total Trips	464	246	218	94	33	61
<table-container> Description Preside Presid Preside Preside</table-container>	ADD							10.1	L									
Development off <						Movimum Lot	Independen	t Variable			ITE	Data			Trips	5 (T)		
Name	Development	Description	# of	Unit	Land Use Description	Coverage				eak				AM Peak			-wi Peak	
Vacant part of not 2012 stret and 8 wrunz 38 0.0 201 (n/1)-0.001/0,0 / 30 6/5 375 2.4 4 20 27 18 1 Vacant part of not 2015 met 0.0 2235 MetReade Agamment ¹ - Dwelling Unit 15 0.0 2235 MetReade Agamment ¹ - Dwelling Unit 16 0.0 0.03 316 60% 0.03 358 40% 3 1 2 4 2 4 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 3 1 2 4 2 4 2 4 2 2 4 2 2 4 2 2 4 2 3 1 2 4 2 4 2 2 3 3 6 6 3 3 6 6 3 3 6 6 3 3 6 6 3 3 6 6 10 10 10 10 10 10							Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbound % Outbound	Total	In	Out	Total	In	Out
bit 10 slopi 10 0.0 223: 00-0000000000000000000000000000000000		Vacant parcel on 12 Street and 8 Avenue	38	du	230: Residential Condo/Townhouse	-	Dwelling Units	38	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(1) = 0.82Ln(X) + 0.32 67% 33%	24	4	20	27	18	9
901 9 Avenue 15 0.0 221 MeHsRes Apsentie - Description 16 0.3 31% 67% 0.39 59% 42% 5 1 3 6 3 Lakeshore AP 001 0 Avenue 3 0.0 223 MeHsRes Apsential 0 0.0 0.0 0.0 0<		902 10 Street	9	du	223: Mid-Rise Apartment	-	Dwelling Units	9	0.3	31%	69%	0.39 58% 42%	4		2	4	2	2
Lakeshore APP 03 0.0 200 Single Family Residential - Description 3 TO OX + 043 2.9% 7.5% In(1) - 0.90.01, 0.5.3 6.3% 7.7% 7.1% 3.0 9.0 5.0 3.0 <td></td> <td>901 9 Avenue</td> <td>15</td> <td>du</td> <td>223: Mid-Rise Apartment</td> <td>-</td> <td>Dwelling Units</td> <td>15</td> <td>0.3</td> <td>31%</td> <td>69%</td> <td>0.39 58% 42%</td> <td>5</td> <td>1</td> <td>3</td> <td>6</td> <td>3</td> <td>2</td>		901 9 Avenue	15	du	223: Mid-Rise Apartment	-	Dwelling Units	15	0.3	31%	69%	0.39 58% 42%	5	1	3	6	3	2
Image Park 0.11 0.00 411: Chy Park 100% Arres 0.3 1.59 50% 10% c/ All Dep 0<	Lakeshore ARP	803 10 Avenue	3	du	210: Single Family Residential	-	Dwelling Units	3	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53 63% 37%	12	3	9	5	3	2
Bible bars 1.16 Inc. 411: Cly Park 100% Acres 2.9 1.59 50% 50% 10% of All Day 5 2.0 0.0 <td></td> <td>Triangle Park</td> <td>0.11</td> <td>hec</td> <td>411: City Park⁷</td> <td>100%</td> <td>Acres</td> <td>0.3</td> <td>1.59</td> <td>50%</td> <td>50%</td> <td>10 % of All Day</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>		Triangle Park	0.11	hec	411: City Park ⁷	100%	Acres	0.3	1.59	50%	50%	10 % of All Day	0	0	0	0	0	0
Centosph park 0.26 hec 411 (1) park (2) park 100% Arres 0.6 1.59 50% 50% 10% of All Day 1 1 1 0 0.0 0.0 0.0 0.0 1.59 50% 50% 50% 10% of All Day 1 1 1 1 1 0 0.		Bibeau Park	1.16	hec	411: City Park	100%	Acres	2.9	1.59	50%	50%	10 % of All Day	5	2	2	0	0	0
Inc large 10 community large 0.0 mode with 10 mode with 10 mode with 10 mode mediation results in negative tirp values. 0.00 mode mediation since equation since equatina		Centoaph Park	0.26	hec	411: City Park	100%	Acres	0.6	1.59	50%	50%	10 % of All Day	1	1	1	0	0	0
Average rate used in stead of equation resce equation resce equation rescerible in right values. Initial break rescente and break rescente and rescente an		Fire Hall / Community Hall	0.34	hec	495: Recreational Community Center °	50%	1000 sq.ft	18.4	22.88	50%	50%	10 % of All Day	422	211	211	42	21	21
Inclusion of all-day, weekday. HM trips assumed to be 10% of all-day trips (presented under AM Trips). To be used for special events only. Total Fire Hall / Community entry for all-day. Weekday. HM trips assumed to be 10% of all-day trips (presented under AM Trips). To be used for special events only. Total Fire Hall / Community entry for all-day. Weekday. HM trips assumed to be 10% of all-day trips (presented under AM Trips). To be used for special events only. Total Fire Hall / Community entry for all-day. Weekday. HM trips assumed to be 10% of all-day trips (presented under AM Trips). To be used for special events only. Total Fire Hall / Community entry for all (100 erent). State Fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community entry for all (100 erent). The fire Hall / Community en		equation since equation results in negative trip valu	les.			Tota	I Dwelling Units	80				Total Trips	: 475	225	251	90	51	38
best bit in the second relation of the second relation relatio	Average rate used instead of		An a dama a state d		IDS)		Itv Park (Acres)	3.8										
<table-container> beside propertion Mage Marry Mar</table-container>	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre	r, weekday. PM trips assumed to be 10% of all-day t	rips (presented % of all-dav trip	under AM Tr s (presented	under AM Trips). To be used for special events only.	re Hall / Community	Hall (1000 sq.ft)	18.4										
Development # of # of Unit Land Use Description Maximula Coverage is Reading and rescription Maximula Coverage Maximula Coverage </td <td>Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre</td> <td>, weekday. PM trips assumed to be 10% of all-day t e is for all-day, weekday. PM trips assumed to be 10</td> <td>rips (presented % of all-day trip</td> <td>under AM Tr s (presented</td> <td>under AM Trips). To be used for special events only. Total Fi</td> <td>re Hall / Community</td> <td>Hall (1000 sq.ft)</td> <td>18.4</td> <td>l</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>; (T)</td> <td></td> <td></td>	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre	, weekday. PM trips assumed to be 10% of all-day t e is for all-day, weekday. PM trips assumed to be 10	rips (presented % of all-day trip	under AM Tr s (presented	under AM Trips). To be used for special events only. Total Fi	re Hall / Community	Hall (1000 sq.ft)	18.4	l							; (T)		
Image: section in the section in th	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre	, weekday. PM trips assumed to be 10% of all-day t e is for all-day, weekday. PM trips assumed to be 10	rips (presented % of all-day trip	under AM Tr s (presented	under AM Trips). To be used for special events only. Total Fi	re Hall / Community	Hall (1000 sq.ft)	18.4			ITE	Data			Trip		PM Peak	
Lakewood Low Density Residential 153 du 210: Single Family Residential Condo/Townhouse	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development	, weekday. PM trips assumed to be 10% of all-day t e is for all-day, weekday. PM trips assumed to be 10 Description	rips (presented % of all-day trip # of	under AM Tr s (presented Unit	Under AM Trips). To be used for special events only. Total Fi	Maximum Lot	Hall (1000 sq.ft)	18.4	AM P	eak	ITE	Data PM Peak		AM Peak	Trips			
Total Dwelling Units 153 Total Trips: 117 29 87 157 99 54 Development If the pendential If the pendential <th< td=""><td>Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development</td><td>, weekday. PM trips assumed to be 10% of all-day t e is for all-day, weekday. PM trips assumed to be 10 Description</td><td>rips (presented % of all-day trip # of</td><td>under AM Tr s (presented Unit</td><td>Under AM Trips). To be used for special events only. Total Fi</td><td>Maximum Lot Coverage</td><td>Hall (1000 sq.ft)</td><td>18.4 t Variable Units (X)</td><td>AM P Equation or Average Rate</td><td>eak % Inbound</td><td>ITE I % Outbound</td><td>Data PM Peak Equation or Average Rate % Inbound % Outbound</td><td>l Total</td><td>AM Peak In</td><td>Trip: Out</td><td>Total</td><td>In</td><td>Out</td></th<>	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development	, weekday. PM trips assumed to be 10% of all-day t e is for all-day, weekday. PM trips assumed to be 10 Description	rips (presented % of all-day trip # of	under AM Tr s (presented Unit	Under AM Trips). To be used for special events only. Total Fi	Maximum Lot Coverage	Hall (1000 sq.ft)	18.4 t Variable Units (X)	AM P Equation or Average Rate	eak % Inbound	ITE I % Outbound	Data PM Peak Equation or Average Rate % Inbound % Outbound	l Total	AM Peak In	Trip: Out	Total	In	Out
$ h_{0} = h_{$	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development Lakewood	weekday. PM trips assumed to be 10% of all-day t a is for all-day, weekday. PM trips assumed to be 10 Description	rips (presented % of all-day trip # of 153	under AM Tr s (presented Unit du	Under AM Trips). To be used for special events only. Total Fit Land Use Description 210: Single Family Residential	Maximum Lot Coverage	Hall (1000 sq.ft) Independen Description Dwelling Units	18.4 t Variable Units (X) 153	AM P Equation or Average Rate T = 0.70X + 9.43	eak % Inbound 25%	ITE 1 % Outbound 75%	Equation or Average Rate % Inbound % Outbound Ln(T) = 0.90Ln(X) + 0.53 63% 37%	Total	AM Peak In 29	Out 87	Total	In 99	Out 58
Description # of # of Unit Land Use Description Maximum Low Coverage At the Coverag	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development Lakewood	weekday. PM trips assumed to be 10% of all-day t a is for all-day, weekday. PM trips assumed to be 10 Description	rips (presented % of all-day trip # of 153	under AM Tr s (presented Unit du	Under AM Trips). To be used for special events only. Total Fit Land Use Description 210: Single Family Residential	Maximum Lot Coverage	Hall (1000 sq.ft) Independen Description Dwelling Units I Dwelling Units	18.4 t Variable Units (X) 153	AM P Equation or Average Rate T = 0.70X + 9.43	eak % Inbound 25%	ITE I % Outbound 75%	Equation or Average Rate % Inbound % Outbound Ln(T) = 0.90Ln(X) + 0.53 63% 37% Total Trips	Total 117 117	AM Peak In 29 29	Out 87 87	Total 157 157	In 99 99	Out 58 58
$\frac{1}{1000} = \frac{1}{1000} = 1$	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development Lakewood	weekday. PM trips assumed to be 10% of all-day t a is for all-day, weekday. PM trips assumed to be 10 Description	rips (presented % of all-day trip # of 153	under AM Tr s (presented Unit du	Under AM Trips). To be used for special events only.	Maximum Lot Coverage	Hall (1000 sq.ft) Independen Description Dwelling Units	Units (X) 153	AM P Equation or Average Rate T = 0.70X + 9.43	eak % Inbound 25%	ITE I % Outbound 75%	Equation or Average Rate % Inbound % Outbound Ln(T) = 0.90Ln(X) + 0.53 63% 37% Total Trips	Total 117 : 117	AM Peak In 29 29	Trip: Out 87 87 Trip:	Total 157 157	In 99 99	Out 58 58
Low Density Residential 594 du 210: Single Family Residential - Dwelling Units 594 T = 0.700 + 9.43 25% 75% Ln(T) = 0.90Ln(X) + 0.53 63% 37% 425 153 43 40 70 33% 88 15 73 104 70 33% 88 15 73 104 70 33%	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development Lakewood	weekday. PM trips assumed to be 10% of all-day to be 10% of all-day. PM trips assumed to be 10% of all-day to be 1	<pre>ips (presented % of all-day trip # of 153</pre>	Under AM Tr s (presented Unit du	Under AM Trips). To be used for special events only. Total Fit Land Use Description 210: Single Family Residential	Maximum Lot Coverage - Tota Maximum Lot	Hall (1000 sq.ft) Independen Description Dwelling Units I Dwelling Units Independen	18.4 t Variable Units (X) 153 153 t Variable	AM P Equation or Average Rate T = 0.70X + 9.43 AM P	eak % Inbound 25% eak	ITE I % Outbound 75% ITE I	Data Equation or Average Rate % Inbound % Outbound Ln(T) = 0.90Ln(X) + 0.53 63% 37% Total Trips Data PM Peak	Total 117 : 117	AM Peak	Out 87 87 Trip:	Total 157 157 : (T)	In 99 99 99 7M Peak	Out 58 58
Creekside Unit Designation of the second sec	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development Lakewood Development	weekday. PM trips assumed to be 10% of all-day to be 10% of all-day, weekday. PM trips assumed to be 10% of all-day to be 10% of all-da	<pre>ips (presented % of all-day trip # of 153</pre>	Unit	Under AM Trips). To be used for special events only. Total Fit Land Use Description 210: Single Family Residential Land Use Description	Maximum Lot Coverage	Hall (1000 sq.ft) Independen Description Dwelling Units Independen Description	18.4 t Variable Units (X) 153 153 t Variable Units (X)	AM P Equation or Average Rate T = 0.70X + 9.43 AM P Equation or Average Rate	eak % Inbound 25% eak % Inbound	ITE % Outbound 75% ITE % Outbound	Data PM Peak Equation or Average Rate % Inbound % Outbound Ln(T) = 0.90Ln(X) + 0.53 63% 37% Total Trips Data PM Peak Equation or Average Rate % Inbound % Outbound	Total	AM Peak In 29 29 AM Peak In	Trip: Out 87 87 Trip: Out	Total 157 157 5 (T) Total	In 99 99 99 2M Peak	Out 58 58 00000000000000000000000000000000
	Average rate used instead of Trip rate for park is for all-day, Trip rate for community centre Development Lakewood Development	, weekday. PM trips assumed to be 10% of all-day t a is for all-day, weekday. PM trips assumed to be 10 Description Low Density Residential	<pre>ips (presented % of all-day trip # of 153</pre>	Unit	Under AM Trips). To be used for special events only. Total Fit Land Use Description 210: Single Family Residential Land Use Description	Maximum Lot Coverage	Hall (1000 sq.ft) Independen Description Dwelling Units I Dwelling Units Independen Description	18.4 18.4 t Variable Units (X) 153 153 t Variable Units (X) 59.4	AM P Equation or Average Rate T = 0.70X + 9.43 AM P Equation or Average Rate T = 0.70X + 0.42	eak % Inbound 25% eak % Inbound	ITE % Outbound 75% ITE % Outbound 75%	Data PM Peak Equation or Average Rate % Inbound % Outbound Ln(T) = 0.90Ln(X) + 0.53 63% 37% Total Trips Data Equation or Average Rate % Inbound % Outbound ln(T) = 0.90Ln(X) + 0.52 63% 37%	Total 117 117 117 117 117 117 117 117 117 117 117 117 117	AM Peak In 29 29 AM Peak In	Trips Out 87 87 Trips Out 310	Total 157 157 (T) Total	In 99 99 PM Peak In 324	Out 58 58 Out

107,639.1 2.4711

1 hectare =

1 hectare =

sq.ft.

acre

City of Cold Lake Transportation Study

Project No: 2010-3050 Date: April 9, 2011

City of Cold Lake Transportation Study Project No: 2010-3050 Date: April 9, 2011	1 hectare = 1 hectare =	107,639.1 2.4711	sq.ft. acre
Table 4.2 Future Developments Trip Generation Trip Generation - ITE Trip Generation Handbook			

						Indopondop	+ Variablo			ITE	Data					Trips	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independen	variable	AM P	Peak		PM F	Peak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound %	outbound	Total	In	Out	Total	In	Out
Parkview	Low Density Residential	367	du	210: Single Family Residential	-	Dwelling Units	367	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	266	67	200	345	218	128
Faikview	Commercial	2.6	ha	770: Business Park	50%	1000 sq.ft	141.7	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	201	169	32	208	48	160
					Tota	I Dwelling Units	367					1	Total Trips:	467	236	232	553	265	288
				Total C	ommercial/Indus	trial (1000 sq.ft)	141.7						_						
						Independent	t Variable			ITE	Data					Trip	5 (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	macpenaen	, vanabie	AM P	Peak		PM F	Peak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound %	6 Outbound	Total	In	Out	Total	In	Out
MD - Hills of Cold Lake	Option 2 - 300 1/2 Acre Lot Subdivision	300	du	210: Single Family Residential	-	Dwelling Units	300	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	219	55	165	288	182	107
	-				Tota	Dwelling Units	300					٦	Total Trips:	219	55	165	288	182	107
						Independent	t Variable			ITE	Data					Trips	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	P		AM P	Peak		PM P	Peak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound %	6 Outbound	Total	In	Out	Total	In	Out
MD - Fawn Ridge Estates9	Country Residential Lots	0	du	210: Single Family Residential	-	Dwelling Units	54	0.77	26%	74%	1.02	64%	36%	42	11	31	55	35	20
9. Information, including dwelling un	nits, trip generation rates and percentage splits, as p	er 2010 TIA			Tota	I Dwelling Units	54					٦	Total Trips:	42	11	31	55	35	20
						-													
						Independent	t Variable		<u>.</u>	ITE	Data					Trips	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	· ·		AMP	Peak		PMF	'eak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound %	6 Outbound	Total	In	Out	Total	In	Out
IDP - Residential Development 1	Low Density Residential	283	du	210: Single Family Residential	-	Dwelling Units	283	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	208	52	156	273	172	101
	Multi Family Residential	236	du	230: Residential Condo/Townhouse	-	Dwelling Units	236	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	103	17	85	122	81	40
					Tota	I Dwelling Units	519					T	Total Trips:	310	69	241	395	254	141
			-								_								
						Independent	t Variable			ITE	Data	-				Trips	5 (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	· ·	1	AM F	Peak		PM F	Peak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound %	Outbound	Total	In	Out	Total	In	Out
IDP - Residential Development 2	Low Density Residential	379	du	210: Single Family Residential	-	Dwelling Units	379	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	275	69	206	356	224	132
	Multi Family Residential	316	du	230: Residential Condo/Townhouse	-	Dwelling Units	316	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	130	22	108	154	104	51
					Tota	I Dwelling Units	696						Total Trips:	405	91	314	510	328	183
													-				-		-

	33%	130	22	108	15	54	104	51
Total Dwelling Units 696 To	otal Trips:	405	91	314	51	10	328	183
Independent Veriable ITE Data				Tr	ips (T)			
Development Description # of Unit Land Use Description Maximum Lot Maximum Lot			AM Peal	(P	PM Peal	(
Coverage Description Units (X) Equation or Average Rate % Inbound % Outbound Equation or Average Rate % Inbound % Inboun	Outbound	Total	In	Out	Tot	tal	In	Out
IDP Peridential Development 3 Low Density Residential 1,880 du 210: Single Family Residential - Dwelling Units 1,880 T = 0.70X + 9.43 25% 75% Ln(T) = 0.90Ln(X) + 0.53 63%	37%	1326	331	994	150	03	947	556
Multi Family Residential 1,567 du 230: Residential Condo/Townhouse - Dwelling Units 1,567 Ln(T) = 0.80Ln(X) + 0.26 17% 83% Ln(T) = 0.82Ln(X) + 0.32 67%	33%	467	79	387	57	74	385	189
Total Dwelling Units 3,447 To	otal Trips:	1,792	411	1,381	2,0)77	1,331	746
	_							
Independent Veriable ITE Data				Tr	ips (T)			
Development Description # of Unit Land Use Description Maximum Lot Maximum Lot AM Peak PM Peak			AM Peal	(P	PM Peak	(
Coverage Description Units (X) Equation or Average Rate % Inbound % Outbound %	Outbound	Total	In	Out	Tot	tal	In	Out
DP - Industrial Developments = 10 Industrial - Light & Heavy Industrial -	79%	1,079	885	194	1,6	666	350	1,316
). Maximum site coverage for IDP - Industial Developments assumed to be 25% Total Commercial/Industrial (1000 sq.ft) 2,109	otal Trips:	1,079	885	194	1,6	666	350	1,316
					-			
ITE Data				Tr	ips (T)			
Development Description # of Unit Land Use Description Maximum Lot AM Peak PM Peak			AM Peal	(Р	PM Peak	(
Description Units (X) Equation or Average Rate % Inbound % Outbound % Outbou	Outbound	Total	In	Out	Tot	tal	In	Out
IDP - Commercial ¹¹ Commercial - Arterial 47.2 ha 770: Business Park 25% 1000 sq.ft 1,270.8 Ln(T) = 0.98Ln(X) + 0.45 84% 16% Ln(T) = 0.92Ln(X) + 0.78 23%	77%	1,727	1,451	276	1,5	565	360	1,205
1. Maximum site coverage for IDP - Industial Developments assumed to be 25% Total Commercial/Industrial (1000 sg.ft) 1,271	otal Trips:	1,727	1,451	276	1,5	565	360	1,205
	· •							

						Indonondon	t Variabla			ITE	Data					Trips	5 (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independen		AM P	eak		PM P	eak			AM Peak			PM Peak	ĸ
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
IDP - Industrial Developments 10	Industrial - Light & Heavy Industrial	78	ha	130: Industrial Park	25%	1000 sq.ft	2,109.4	Ln(T) = 0.77Ln(X) + 1.09	82%	18%	T = 0.77(X) + 42.11	21%	79%	1,079	885	194	1,666	350	1,316
10. Maximum site coverage for IDP	P - Industial Developments assumed to be 25%			Total Co	ommercial/Indu	strial (1000 sq.ft)	2,109						Total Trips:	1,079	885	194	1,666	350	1,316

						Iaximum Lot		ITE Data				Trips			s (T)				
Development	Description	# of	Unit	Land Use Description	Maximum Lot			AM Peak		PM Peak		AM Peak		PM Peak		Į.			
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
IDP - Commercial 11	Commercial - Arterial	47.2	ha	770: Business Park	25%	1000 sq.ft	1,270.8	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	1,727	1,451	276	1,565	360	1,205
11. Maximum site coverage for IDP - Industial Developments assumed to be 25% Total C		ommercial/Indus	strial (1000 sq.ft)	1,271						Total Trips:	1,727	1,451	276	1,565	360	1,205			



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.2 5 YEAR (2015) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.3 10 YEAR (2020) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK

PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.4 15 YEAR (2025) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.5 20 YEAR (2030) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK



Associated Engineering

PROJECT NO:	2010-3050
DATE:	FEBRUARY 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.6 TRAFFIC ANALYSIS ZONES WITHIN CITY OF COLD LAKE The development trips presented above in Figure 4.2 through Figure 4.5 were broken down by location and the corresponding TAZ. Table 4.3 through Table 4.6 summarizes the p.m. peak hour trips generated by each zone, for the 5-year, 10-year, 15-year, and 20-year planning horizons respectively.

Zone	Total Trips	Inbound Trips	Outbound Trips
1	347	85	262
2	755	400	355
3	277	172	105
4	974	224	750
5	412	259	154
6	84	18	66
7	0	0	0
8	90	56	33
9	0	0	0
External Zones	86	54	32
Total	3,025	1,268	1,757

Table 4.3
5-year (2015) - Trip Generation from Planned Developments by Zone

Table 4.4
10-year (2020) - Trip Generation from Planned Developments by Zone

Zone	Total Trips	Inbound Trips	Outbound Trips
1	667	163	504
2	1,510	800	710
3	554	344	210
4	1,949	448	1,500
5	825	518	307
6	167	35	132
7	0	0	0
8	180	113	67
9	0	0	0
External Zones	710	353	356
Total	6,023	2,530	3,493



Zone	Total Trips	Inbound Trips	Outbound Trips
1	987	241	745
2	2,777	1,426	1,351
3	944	589	355
4	1,949	448	1,500
5	1,237	777	461
6	359	78	281
7	223	142	81
8	270	169	100
9	0	0	0
External Zones	1,334	652	681
Total	9,003	4,033	4,970

Table 4.515-year (2025) - Trip Generation from Planned Developments by Zone

Table 4.620-year (2030) - Trip Generation from Planned Developments by Zone

Zone	Total Trips	Inbound Trips	Outbound Trips
1	1,307	320	987
2	3,507	1,811	1,696
3	1,335	834	501
4	1,949	448	1,500
5	1,650	1,036	614
6	551	120	431
7	447	284	162
8	360	226	134
9	0	0	0
External Zones	2,041	969	1,072
Total	11,447	5,295	6,152

4.3 TRIP DISTRIBUTION

A simplified gravity model was originally selected to determine the distribution of trips within the City generated by the proposed development/redevelopment. The gravity model assumes that the number of trips between two zones is directly proportional to the trips produced and attracted by both zones and inversely proportional to the square of travel time between the two zones. The procedure for the simplified gravity model was illustrated in detail in the Traffic Demand Forecast Work Plan (included in Appendix B) and the trip distribution calculations for the 5-year planning horizon are presented in Appendix C.

A trip distribution table was established for the 5-year planning horizon using the simplified gravity model. The trip distribution established for each TAZ was not reflective of the local travel patterns within the City; therefore, the trip distribution was revised after discussions with the City to reflect the local characteristic of the City. Table 4.7 presents the trip distribution used for the traffic volume forecast. The same trip distribution was used for each planning horizon (5-year, 10-year, 15-year, and 20-year).

From	То				SUM					
From	1	2	3	4	5	6	7	8	9	30 IVI
1	5%	23%	23%	5%	8%	5%	10%	8%	13%	100%
2	20%	15%	10%	15%	10%	8%	7%	5%	10%	100%
3	20%	10%	15%	15%	10%	8%	7%	5%	10%	100%
4	6%	15%	15%	5%	15%	8%	12%	12%	12%	100%
5	16%	12%	12%	15%	15%	8%	7%	5%	10%	100%
6	5%	5%	5%	5%	15%	5%	25%	25%	10%	100%
7	10%	5%	5%	15%	10%	18%	12%	15%	10%	100%
8	10%	5%	5%	15%	10%	20%	10%	15%	10%	100%
9	8%	10%	10%	10%	7%	20%	10%	10%	15%	100%
SUM	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

Table 4.7Trip Distribution Table (Within City Limits)

The trip distribution presented above is only applicable to development trips within the City. The developments located outside the City, within the MD of Bonnyville, were distributed using the trip distribution presented in Table 4.8.



Table 4.8 Trip Distribution Table (Outside City Limits)

Development	Inbound Trips	Outbound Trips
Hills of Cold	20% from Cold Lake North business area	5% to Cold Lake North business area
Lake	20% from Tri-City Mall area	25% to Tri-City Mall area
	20% from Cold Lake South business area	25% to Cold Lake South business area
	20% from the commercial area in the south	40% to the commercial area in the south
	(near 43 Avenue)	(near 43 Avenue)
	20% from Medley	5% to Medley
Fawn Ridge	20% from Cold Lake North business area	5% to Cold Lake North business area
Estates	20% from Tri-City Mall area	25% to Tri-City Mall area
	20% from Cold Lake South business area	25% to Cold Lake South business area
	20% from the commercial area in the south	40% to the commercial area in the south
	(near 43 Avenue)	(near 43 Avenue)
	20% from Medley	5% to Medley
IDP	25% Internal	30% Internal
Residential 1	15% from Cold Lake North business area	5% to Cold Lake North business area
IDP	15% from Tri-City Mall area	20% to Tri-City Mall area
Residential 2	15% from Cold Lake South business area	20% to Cold Lake South business area
IDP	15% from the commercial area in the south	20% to the commercial area in the south
Residential 3	(near 43 Avenue)	(near 43 Avenue)
	15% from Medley	5% to Medley
IDP Industrial	25% Internal	25% Internal
	25% Cold Lake North residential	25% Cold Lake North residential
	10% Residential behind Tri-City Mall	10% Residential behind Tri-City Mall
	35% Cold Lake South residential	35% Cold Lake South residential
	5% Medley	5% Medley
IDP	25% Internal	25% Internal
Commercial	25% Cold Lake North residential	25% Cold Lake North residential
	10% Residential behind Tri-City Mall	10% Residential behind Tri-City Mall
	35% Cold Lake South residential	35% Cold Lake South residential
	5% Medley	5% Medley

4.4 TRIP ASSIGNMENT

The development trips were assigned onto the future road network by considering the logical routes that would be taken by the commuters between the origin and destinations, on the basis of impedance and travel time. To capture worst-case traffic scenarios, the development trips were primarily assigned to the skeletal road network established for the planning horizon.

To simplify the trip assignment process, selected intersections were used to represent each study zone and development trips were assumed to enter/exit the zone from those intersections. As a result, some roadways within the skeletal road network do not appear to have background or development traffic assigned to it. The traffic volumes on these roadways were forecasted using growth patterns established from the other roadways.

4.5 FORECASTED DEVELOPMENT TRAFFIC VOLUMES

Figure 4.7 presents the forecasted daily development traffic volumes for the 5-year (2015) Horizon. Figure 4.8 presents the forecasted daily development traffic volumes for the 10-year (2020) Horizon. Figure 4.9 presents the forecasted daily development traffic volumes for the 15-year (2025) Horizon. Figure 4.10 presents the forecasted daily development traffic volumes for the 20-year (2030) Horizon.







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APPROVED:	
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DWG NO:	

FIGURE 4.7 5 YEAR (2015) DAILY DEVELOPMENT TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.8 10 YEAR (2020) DAILY DEVELOPMENT TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.9 15 YEAR (2025) DAILY DEVELOPMENT TRAFFIC VOLUMES




PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.10 20 YEAR (2030) DAILY DEVELOPMENT TRAFFIC VOLUMES 5

Traffic Forecast: Total Traffic Volumes

Total traffic volumes were calculated by combining the background traffic volumes with the development traffic volumes for common planning horizons. The average traffic growth for each road classification established in the 2000 Transportation Study (collectors, two-lane arterials, and four-lane arterials) was used to forecast future traffic volumes on the roadways which were not included in the trip assignment. The total traffic volumes for each planning horizon are presented in the following section.

5.1 FORECASTED TOTAL TRAFFIC VOLUMES

Figure 5.1 presents the forecasted daily total traffic volumes for the 5-year (2015) Horizon. Figure 5.2 presents the forecasted daily total traffic volumes for the 10-year (2020) Horizon. Figure 5.3 presents the forecasted daily total traffic volumes for the 15-year (2025) Horizon. Figure 5.4 presents the forecasted daily total traffic volumes for the 20-year (2030) Horizon







PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.1 5 YEAR (2015) DAILY TOTAL TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.2 10 YEAR (2020) DAILY TOTAL TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.3 15 YEAR (2025) DAILY TOTAL TRAFFIC VOLUMES



F	Associated Engineering

PROJECT NO:	2012-3703
DATE:	FEB 2013
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.4 (REVISED) 20 YEAR (2030) DAILY TOTAL TRAFFIC VOLUMES 6

Roadway Requirements

6.1 METHODOLOGY

Table 6.1 presents the City's roadway design standards obtained from the Municipal Engineering Servicing Standards And Standard Construction Specifications (2008). The table presents the City's roadway designation/classification and the daily service volumes for each roadway classification.

Roadway Designation	Daily Service Volume (vpd)	Daily Service Volume Range (vpd)		
Urban Expressway	>30,000	>30,000		
Divided Arterial	>20,000	20,000 - 30,000		
Undivided Arterial	<20,000	10,000 - 20,000		
Divided Residential Collector	<10,000	3,000 - 10,000		
Undivided Residential Collector	<10,000	3,000 - 10,000		
Divided Residential Local	<3,000	500 - 3,000		
11m Undivided Residential Local	<3,000	500 - 3,000		
10m Undivided Residential Local	<3,000	500 - 3,000		
Rural Industrial Collector	<10,000	3,000 - 10,000		
Urban Industrial Collector	<10,000	3,000 - 10,000		
Rural Industrial Local	<3,000	500 - 3,000		
Urban Industrial Local	<3,000	500 - 3,000		
Frontage (Service) Road	<3,000	500 - 3,000		
Lanes	<500	<500		

Table 6-1 City of Cold Lake – Roadway Classification and Daily Service Volumes

Table 6.2 presents typical lane capacities, in vehicles per hour, for various road classifications.



Road Classification	City of Cold Lake Road Classification	Capacity (vehicles per hour, per lane)	Capacity (vehicles per day, per lane)	
Provincial Controlled Access Highway	Expressway	1,800	18,000	
County Arterial Road	Divided Arterial	1,000	10,000	
Local Major and Minor Arterial Roads	Undivided Arterial	800	8,000	
Local Collector Road	Local Collector Road Collector (Residential or Industrial)		4,000	
Local Road (Other)	Local (Residential or Industrial)	100	1,000	

Table 6-2Lane Capacity by Road Classification

NOTE: Capacities are generalized based on typical engineering design standards.

Lane capacity per day based on assumption that peak hour traffic volumes are 10% of daily traffic volumes.

The forecasted total traffic volumes for each planning horizon were compared with the daily service volumes provided in Table 6.1 to determine the required roadway classification, as per the City's standards. The lane volumes were also compared with the lane capacity for the given road classification provided in Table 6.2, to determine the number of lanes required along each roadway.

6.2 RESULTS

The required road classification and number of lanes for the future road network are summarized and provided in Appendix D for each planning horizon. The results presented in the appendix were determined from the forecasted traffic volumes and does not account for continuous roadway functionality and lane balancing along a single corridor.

As mentioned, the road classification and number of lanes required to accommodate traffic under the 20year (2030) horizon will be used by the City to retain the right-of-way required to accommodate future roadway expansion. All the major corridors under the 20-year (2030) horizon were reviewed independently to establish continuous roadway function and lane balance along the corridor, where possible.

Figure 6.1 presents the recommended road classification and number of lanes, for the 20-year (2030) horizon.

According to the preliminary analysis completed for the 20-year planning horizon, 1 Avenue (25 Street to 16 Street) should be classified as a two-lane undivided arterial roadway. However, in order to maintain continuous roadway functionality, AE recommends that the road segment be classified as a collector roadway. This portion of 1 Avenue is adjacent to Kinosoo Beach, a major tourist attraction in Cold Lake North, and has been identified in the In-Service Road Safety Review technical memorandum, as an ideal location to implement traffic calming and beautification measures. A collector road classification would better suit the functionality of the area. Table 6.3 summarizes the road corridors in the 20-year planning horizon, along with the recommended road classification, number of lanes, and expected capacities. Table 6.4 summarizes the major road network in the 20-year planning horizon, along with a comparison of the existing and future road classification and number of lanes. The table also summarizes the improvements required to upgrade the corridors from the existing horizon to the 20-year planning horizon.





PROJECT NO:	2012-3703	CITY OF COLD LAKE		
DATE:	FEB 2013	TRANSPORTATION STUDY		
SCALE: DWG NO:	NTS	FIGURE 6.1 (REVISED) ROADWAY CLASSIFICATION 20 YEAR (2030) HORIZON		

City of Cold Lake - Transportation Study Project No: 2012-3703 Date: Janaury 22, 2013

TABLE 6.3: CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON - ROAD CLASSIFICATION, NUMBER OF LANES AND CAPACITIES

	Intersec	ction		Forecasted Volumes		Forecasted Volumes		Post Classification Post Classification		Road Classification Lane Capacity		
Corridor	From	Te	Direction	Daily Traffic -	Daily Traffic -	2000 TPS ¹	City of Cold Lake ²	for Road Classification	for Road Classification	Required (One		
	11011	10	Eastbound	Directional 3,360	Two Way			(ven/nou/nane)	(ven/day/lane)	1		
1 Avenue	28 Street	25 Street	Westbound	2,210	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1		
1 Avenue	25 Street	Nelson Street	Westbound	5,560	12,210	Collector	Undivided Arterial	800	8,000	1		
1 Avenue	Nelson Street	16 Street	Eastbound Westbound	6,240 6,580	12,820	Collector	Undivided Arterial	800	8,000	1		
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	21,470	42,370	4-Lane Arterial	Expressway	1,800	18,000	2		
8 Avenue	25 Street	16 Street	Eastbound	11,990	20.050	4-I ane Arterial	Divided Arterial	1.000	10.000	2		
			Westbound Eastbound	8,060 4,630				.,		1 2		
8 Avenue	16 Street	10 Street	Westbound	3,910	8,540	4-Lane Artenal	Collector (Residential or Industrial)	400	4,000	1		
8 Avenue	10 Street	Lakeshore Drive	Westbound	3,210	5,930	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
Hwy 55	West City Limit	25 Street	Eastbound Westbound	7,370	10,690	2-Lane Arterial	Undivided Arterial	800	8,000	1		
Hwy 55	25 Street	Hwy 28	Eastbound	14,440	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2		
16 Avenue	Hwy 28	16 Street	Eastbound	8,250	14.370	2-I ane Arterial	Undivided Arterial	800	8.000	2		
			Westbound Eastbound	6,120 4.880						1		
16 Avenue ^o	16 Street	10 Street	Westbound	3,820	8,700	2-Lane Artenal	Collector (Residential or Industrial)	400	4,000	1		
16 Avenue	10 Street	8 Street	Westbound	3,520	7,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
16 Avenue	8 Street	East City Limit	Eastbound Westbound	1,530	3,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
English Bay Road 6	North City Limit	Lake Avenue	Northbound	6,430	12,350	Collector	Undivided Arterial	800	8,000	1		
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24 700	Collector	Divided Arterial	1.000	10.000	2		
English Buy Road	Latoritoria		Southbound Northbound	11,840 14,740	24,700	0.1		1,000	10,000	2		
English Bay Road	1 Avenue	25 Street	Southbound	12,380	27,120	Collector	Divided Arterial	1,000	10,000	2		
English Bay Road	25 Street	Hwy 28	Southbound	12,300	25,810	Collector	Divided Arterial	1,000	10,000	2		
25 Street	English Bay Road	Hwy 55	Northbound Southbound	6,690 5,370	12,060	Collector	Undivided Arterial	800	8,000	1		
25 Street ⁷	1 Avenue	English Bay Road	Northbound	4,450	8,410	Collector	Collector (Residential or Industrial)	400	4,000	1		
English Bay Road/25	English Bay Road	25 Street	Eastbound	2,500	4.580		Collector (Residential or Industrial)	400	4.000	1		
Street Connector	Ligion Bay Road	20 0000	Westbound Eastbound	2,080	1,000			400	4,000	1		
Nelson Street	1 Avenue	16 Street	Westbound	1,600	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1		
16 Street ⁸	1 Avenue	8 Avenue	Southbound	3,570	8,680	Collector	Collector (Residential or Industrial)	400	4,000	1		
16 Street	8 Avenue	16 Avenue	Northbound Southbound	3,240 3.580	6,820	Collector	Collector (Residential or Industrial)	400	4,000	1		
16 Street	16 Avenue	75 Avenue	Northbound	3,810	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1		
16 Avenue/16 Street	8 Avenue	16 Avenue	Northbound	1,270	2 760		Local (Residential or Industrial)	150	1 500	1		
Connector 16 Avenue/16 Street	40 August	40.0000	Southbound Eastbound	1,490 1,550	2,700		Level (Residential or Indebute)	150	1,000	1		
Connector	16 Avenue	16 Street	Westbound	840	2,390		Local (Residential or Industrial)	150	1,500	1		
10 Street	1 Avenue	8 Avenue	Southbound	3,320	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1		
10 Street ⁹	8 Avenue	16 Avenue	Northbound Southbound	3,560 4,250	7,810	Collector	Collector (Residential or Industrial)	400	4,000	1		
10 Street	16 Avenue	16 Street	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1		
8 Street	16 Avenue	75 Avenue	Northbound	2,550	4,780	Collector	Collector (Residential or Industrial)	400	4.000	1		
10	40.4	04.4	Southbound Northbound	2,230 2,380	4,000	0-11		100	1,000	1		
6 Street	16 Avenue	21 Avenue	Southbound	2,300	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1		
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Southbound	31,810	62,490	4-Lane Arterial	Expressway	1,800	18,000	2		
Hwy 28/55	75 Avenue	69 Avenue	Northbound Southbound	31,690 33,860	65,550	4-Lane Arterial	Expressway	1,800	18,000	2		
Hwy 28/55	69 Avenue	54 Avenue	Northbound	22,820	50,210	4-Lane Arterial	Expressway	1,800	18,000	2		
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,390	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2		
60 Auropuio	Clanwood	Hun: 29/55	Eastbound	4,730 5,590	10.070	2 Long Artorial	Lindbided Attoriel	800	8.000	2 1		
69 Avenue	Gieriwood	Hwy 28/35	Westbound	4,480	10,070	2-Larie Arterial	Undivided Artena	800	8,000	1		
69 Avenue	Hwy 28/55	Future Arterial	Westbound	7,440	15,790	Collector	Undivided Arterial	800	8,000	1		
49 Street	75 Avenue	69 Avenue	Southbound	680	1,800	Collector	Local (Residential or Industrial)	150	1,500	1		
47 Street	75 Avenue	69 Avenue	Northbound	960 600	1,560	Collector	Local (Residential or Industrial)	150	1,500	1		
47 Street/49 Street	47 Street	49 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1		
47 Street	69 Augoug	61 Avenue/62	Northbound	1,520	3 270	Collector	Collector (Residential or Industrial)	400	4.000	1		
47 Gudet		Avenue	Southbound Northbound	1,750 1,030	3,210	001001001		400	4,000	1		
47 Street**	ol Avenue/62 Avenue	54 Avenue	Southbound	1,590	2,620	Collector	Local (Residential or Industrial)	150	1,500	1		
61 Avenue/62 Avenue ¹²	Hwy 28/55	47 Street	Westbound	3,880	8,000	Collector	Collector (Residential or Industrial)	400	4,000	1		
61 Avenue/62 Avenue	47 Street	45 Street	Eastbound Westbound	3,990 1,810	5,800	Collector	Collector (Residential or Industrial)	400	4,000	1		
61 Avenue/62 Avenue	45 Street	Future Arterial	Eastbound	1,440	2,350	Collector	Collector (Residential or Industrial)	400	4,000	1		
47 Street/45 Street	47 Street	45 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1		
Connector 45 Street	61 Avenue #2 Aven	54 Augouro	vv estbound Northbound	720 1,280	2,000		Local (Residential or Industrial)	150	1 500	1		
45 511661	61 Avenue/62 Avenue	54 Avenue	Southbound	800	2,000	-	Local (Residential of Industrial)	150	1,500	1		
54 Avenue ¹³	56 Street	Hwy 28/55	Westbound	5,190	8,570	Collector	Collector (Residential or Industrial)	400	4,000	1		
54 Avenue ¹⁴	Hwy 28/55	51 Street	Eastbound Westbound	4,160 3,680	7,840	Collector	Collector (Residential or Industrial)	400	4,000	1		
54 Avenue	51 Street	45 Street	Eastbound	3,950	6,800	Collector	Collector (Residential or Industrial)	400	4,000	1		
54 Avenue ¹⁵	45 Street	41 Street	Eastbound	3,095	5,515	Collector	Collector (Residential or Industrial)	400	4,000	1		
54 Avecus	d1 Strant	Future Arterial	Westbound Eastbound	2,420	4 220	Collector	Collector (Pasidantial or Industrial)	400	4.000	1		
J4 AVENUE	+1 OUUU	i atare Artenal	Westbound	1,990	4,230	COllector	Conscion (residential of Industrial)	400	4,000	1		
52 Avenue	59 Street	57 Street	Westbound	3,190	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1		
52 Avenue	57 Street	Hwy 28/55	Eastbound Westbound	3,920 3,850	7,770	Collector	Collector (Residential or Industrial)	400	4,000	1		
Centre Avenue	59 Street	57 Street	Eastbound	17,310	24,740	2-Lane Arterial	Divided Arterial	1,000	10,000	2		
Centre Avenue	57 Street	Hwy 28/55	Eastbound	14,500	25,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2		
50 Aurorus ¹⁶	Hwy 29/55	51 Street	Eastbound	11,410 6,355	10 830	2-Lane Arterial	Collector (Residential or Industrial)	400	4 000	2		
SU AVENUE	11wy 20/00	51 Stielet	Westbound	4,475	10,030	2-Land Alterial			4,000	1		
50 Avenue ¹⁷	51 Street	50 Street	Westbound	3,300	8,740	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
50 Avenue ¹⁸	50 Street	45 Street	Westbound	5,290 2,180	7,470	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
50 Avenue ¹⁹	45 Street	41 Street	Eastbound Westbound	4,940 2,440	7,380	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
50 Avenue	41 Street	Future Arterial	Eastbound	3,900	6,650	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
	1	1	vvestoound	2,700	1	1		1	1	1		

City of Cold Lake - Transportation Study Project No: 2012-3703 Date: Janaury 22, 2013

TABLE 6.3: CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON - ROAD CLASSIFICATION, NUMBER OF LANES AND CAPACITIES

Nume Pair Annue Nume Pair Annue Pair Annue Nume Pair Annue Nume Num<	Corridor	Intersection			Forecasted Volumes		Forecasted Volu	Volumes	Road Classification Road Classification		Lane Capacity	Lane Capacity	Number of Lanes
PortP	Corridor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Direction)		
Image Image <th< td=""><td>50 Avenue</td><td>Future Arterial</td><td>Baywood Road</td><td>Eastbound Westbound</td><td>2,070 1,560</td><td>3,630</td><td>2-Lane Arterial</td><td>Collector (Residential or Industrial)</td><td>400</td><td>4,000</td><td>1</td></th<>	50 Avenue	Future Arterial	Baywood Road	Eastbound Westbound	2,070 1,560	3,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1		
Point Oxada and bases	43 Avenue ²⁰	Hwy 28/55	45 Street	Eastbound Westbound	4,830 3,530	8,360	Collector	Collector (Residential or Industrial)	400	4,000	1		
19 9 Advance 0 0 4400 4400 4400 17 Tesse 30 Anver 0 4400 4400 19 Tesse 30 Anver 0 4400 4400 4400 4400 19 50 Anver 0 3000 4400 Eperation 1000 4400 19 50 Anver 50 Anver<	59 Street	52 Avenue	Centre Avenue	Northbound Southbound	3,050 1,350	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1		
1 1 0	57 Street	54 Avenue	52 Avenue	Northbound Southbound	2,130 1,400	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1		
Import Markan Sharan Status Status<	57 Street	52 Avenue	Centre Avenue	Northbound Southbound	3,960 2,510	6,470	Collector	Collector (Residential or Industrial)	400	4,000	1		
Imposition Contraction Participant	Hwy 28/55	54 Avenue	52 Avenue	Northbound Southbound	20,930 22,150	43,080	4-Lane Arterial	Expressway	1,800	18,000	2		
Imp Op Op Monta Description Description <thdescription< th=""> Description <</thdescription<>	Hwy 28/55	52 Avenue	50 Avenue	Northbound Southbound	18,500 21,950	40,450	4-Lane Arterial	Expressway	1,800	18,000	2		
Inv. 2020 0.9 Some 0.4 Annu Vectors of 1.100 1.100 1.000 2 Hug 2050 0.3 Annu 9.4 Annu 9.4 Annu 9.4 Annu 9.000 2 Hug 2050 0.3 Annu 0.4 Annu 10.00 10.000 2 Hug 2050 0.3 Annu 0.4 Annu Hug 2050 11.000 4.000 1 Annu Hug 2050 0.4 Annu Hug 2050 10.000 1 1 A Annu Hug 2050 10.000 1.000 1.000 1 1 A Annu Hug 2050 10.000 1.000 1.000 1 1 A Annu Shannu 19.000 1.000 1.000 1.000 1 A Shannu Shannu 19.0000 1.000	Hwy 28/55	50 Avenue	50 Street	Northbound Southbound	10,700 13,030	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2		
Image G Aname Subsect 1.000 1.000 1.000 1.000 Type 205 3 Aname Subsect 1.000 4.200 Animal Deckad Animal 0.000 -2 Aname Hay 205 47 Bent Subsect 2.000 4.200 Animal 0.000 -2 Aname Hay 205 47 Bent Subsect 2.000 4.000 -1 47 Bent 43 Aname Hay 205 47 Bent Subsect 2.000 4.000 -1 51 Bent 64 Anama Shame Subsect 2.200 4.400 -0 Codectry finisteniar or hava10 4.000 -1 51 Stem 69 Anama Shame Subsect 2.200 4.400 Codectry Undeckor finisteniar or hava10 4.000 -1 51 Stem 69 Anama Shame Subsect 2.200 Codectry Load Reademinar or hava10 4.000 -1 41 Stame Shame Shame Stame Stame Stame 5.0000 -1 <td< td=""><td>Hwy 28/55</td><td>50 Street</td><td>43 Avenue</td><td>Northbound Southbound</td><td>13,120 16,420</td><td>29,540</td><td>4-Lane Arterial</td><td>Divided Arterial</td><td>1,000</td><td>10,000</td><td>2</td></td<>	Hwy 28/55	50 Street	43 Avenue	Northbound Southbound	13,120 16,420	29,540	4-Lane Arterial	Divided Arterial	1,000	10,000	2		
Image: biology 34 Annual Section 4220 10.07 4-Line Annual Underland Annual 800 8.000 2 40 Annual May 2005 Vietabooli 2.000 1.000 - Colector Residentia or Industrial 400 4.000 - 41 Annual May 2005 4.98004 2.000 4.000 - Colector Residentia or Industrial 400 4.000 - 47 Street 4.98004 2.000 4.000 - Colector Residentia or Industrial 400 4.000 - 51 Street 64 Annual 54 Annual Street Cole Colector Residentia or Industrial 400 4.000 - 45 Street 50 Annual <	Hwy 28/55	43 Avenue	34 Avenue	Northbound Southbound	9,960 11,690	21,650	4-Lane Arterial	Divided Arterial	1,000	10,000	1 2		
International matrix	Hwy 28/55	34 Avenue	South City Limit	Northbound Southbound	9,220 10,450	19,670	4-Lane Arterial	Undivided Arterial	800	8,000	2		
JA. Arous My 2050 47 Street Existence 2400 4.300 - Catesor Residence instanting 440 4.000 - 47 Street 54 Arous 54 Arous 54 Arous 50 Arous 500000 - Catesor Residence instanting 440 4.000 - 51 Street 54 Arous 50 Arous Netributed 2.000 4.000 - Catesor Residence instanting 4400 4.000 - 50 Street 54 Arous 50 Arous Netributed 7.100 1.300 Catesor Local (Residencia or Instanting 440 8.000 - 45 Street 50 Arous 50 Arous 50 Arous 50.0000 4.000 -	40 Avenue	43 Avenue	Hwy 28/55	Eastbound Westbound	2,260 2,790	5,050	-	Collector (Residential or Industrial)	400	4,000	1		
47 Ditest 43 Anora Methodical 2200 4.400 · Collector Oelector Oelec	34 Avenue	Hwy 28/55	47 Street	Eastbound Westbound	2,400 1,990	4,390	-	Collector (Residential or Industrial)	400	4,000	1		
91 Smet 94 Annue 50 Annue Annue Statistication 4.20 Caleboard Calebo	47 Street	43 Avenue	34 Avenue	Northbound Southbound	2,280 2,210	4,490	-	Collector (Residential or Industrial)	400	4,000	1		
50 Street 50 Street 50 Annual Herr 2000 1.380 Calector Unside Anteal 800 8.000 1 46 Street 64 Annual 60 Annual Statistication 460 1.100 1.000 <td>51 Street</td> <td>54 Avenue</td> <td>50 Avenue</td> <td>Northbound Southbound</td> <td>1,980</td> <td>4,210</td> <td>Collector</td> <td>Collector (Residential or Industrial)</td> <td>400</td> <td>4,000</td> <td>1</td>	51 Street	54 Avenue	50 Avenue	Northbound Southbound	1,980	4,210	Collector	Collector (Residential or Industrial)	400	4,000	1		
46 Street 54 Annua 50 Annua Nethboard 700 Street 1.150 Calescer Local (Readenial or Industria) 1150 1.500 1 45 Street 50 Annua 40 Annua Street 50 Annua 150 1.500 1 44 Street 51 Annua 50 Annua Street 30 Annua Netthours 2.510 0.300 Calescer	50 Street	50 Avenue	Hwy 28/55	Northbound Southbound	7,170	13,980	Collector	Undivided Arterial	800	8,000	1		
d6 Streat 60 Annua 41 Annua Nethboard 990 Southboard 2.420 Collector Local (Residential or Industrial) 150 1,500 1 41 Street 54 Annua 60 Annua Mathcard 3.870 6.380 Collector Collector (Residential or Industrial) 400 4.000 1 Future Antralal 00 Annua Boarthouard 5.770 12,260 2-Lane Antralal Undvided Antraial 800 8.000 1 Future Antrala 01 Annua Boarthouard 6.870 12,260 2-Lane Antralal Undvided Antraial 800 8.000 1 Future Antralal 61 Annua Boarthouard 6.870 12,260 2-Lane Antralal Undvided Antraial 800 8.000 1 Future Antralal 64 Annua 60 Annua Southboard 6.720 11,350 2-Lane Antralal Undvided Antraial 800 8.000 1 Krigmany Tentific and Gueenway Timboard 6.720 20,860 2-Lane Antralal Undvided Antraial 800	45 Street	54 Avenue	50 Avenue	Northbound Southbound	700 450	1,150	Collector	Local (Residential or Industrial)	150	1,500	1		
41 Stret 54 Annu 50 Annu Suffixion 3.00 6.380 Collector (Residential or Industrial) 400 4.000 1 Future Antrait 09 Annua 01 Annual 50 Annual 5000 12.070 2-Lane Antrait 000 8.000 1 Future Antrait 09 Annua 01 Annual 570 12.000 2-Lane Antrait Undvided Annual 800 8.000 1 Future Antrait 61 Annual Stance 570 12.000 2-Lane Antrait Undvided Annual 800 8.000 1 Future Antrait 64 Annual 50 Annua 570 12.200 2-Lane Antrait Undvided Annual 800 8.000 1 Kingsewy 99 Streat Glimecod Eatiboard 12.200 2-Lane Antrait Undvided Antrait 10.000 2 2 Kingsewy Destroard Glimecod Eatiboard 12.210 Collector Undvided Antrait 10.000 1 1 1 1 1 1 1 1 1	45 Street	50 Avenue	43 Avenue	Northbound	960 1.460	2,420	Collector	Local (Residential or Industrial)	150	1,500	1		
Future Antenial 75 Avenue 60 Avenue 60 Avenue 61 Avenue® 6000 1.2070 2-Lune Antenial Undivided Antenial 8000 8.000 1. Future Antenial 61 Avenue® 61 Avenue® 61 Avenue® 6100 1.2600 2-Lune Antenial Undivided Antenial 800 8.000 1 Future Antenial 61 Avenue® 64 Avenue 6500 1.2000 2-Lune Antenial Undivided Antenial 800 8.000 1 Future Antenial 61 Avenue® 54 Avenue 5200 2-Lune Antenial Undivided Antenial 800 8.000 1 Future Antenial 54 Avenue 59 Strete Generood 4.000 2.200 2.4me Antenial 1.000 10.000 1 Kingsway 9 Strete Generood 8.800 4.000 1 1.200 2.4me Antenial 1.000 10.000 1 Kingsway Theretine Generood 8.800 6.700 1.210 Celector Undivided Antenial 8.000 4.000 1	41 Street	54 Avenue	50 Avenue	Northbound	3,870	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1		
Future Arterial 69 Avenue 61 Avenue® 64 Avenue® 64 Bit bood 550 12,650 2-Lare Arterial Undvided Arterial 800 8,000 1 Future Arterial 61 Avenue® 54 Avenue 54 Avenue 56 Avenue 56,000 12,800 2-Lare Arterial Undvided Arterial 800 8,000 1 Future Arterial 54 Avenue 54 Avenue 54 Avenue 56,000 1 50,000 1 Kingsway 59 Street Glanwood 42,000 2-Lare Arterial Undvided Arterial 800 8,000 1 Kingsway 59 Street Glanwood Eastboard 12,200 2-Lare Arterial Undvided Arterial 800 8,000 1 Kingsway Timebrine Glanwood Eastboard 12,210 Collector Undvided Arterial 800 8,000 1 Kingsway Termisfica Collector Undvided Arterial 800 4,000 1 1 Kingsway Termisfica Street 5,750 <td< td=""><td>Future Arterial</td><td>75 Avenue</td><td>69 Avenue</td><td>Northbound</td><td>6,900 5,170</td><td>12,070</td><td>2-Lane Arterial</td><td>Undivided Arterial</td><td>800</td><td>8,000</td><td>1</td></td<>	Future Arterial	75 Avenue	69 Avenue	Northbound	6,900 5,170	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	1		
Future Artenial Ef Avenuebe Avenue Solutioscuri 6.8/00 12.800 2.Lane Artenial Undwided Artenial B00 8.000 1 Future Artenial 61 Avenuebe Xavenue Solutioscuri 5.590 10.300 2.Lane Artenial Undwided Artenial 800 8.000 1 Kingsway 59 Street Gienecord 4.520 2.2ue Artenial Undwided Artenial 10.000 10.000 2 Kingsway Timberline Gienecord 4.520 2.2ue Artenial Duided Artenial 10.000 10.000 1 Kingsway Timberline Gienecord 4.540 2.21780 Collector Duided Artenial 800 8.000 1 Kingsway Queersway Timberline Statutorial 14.200 2.120 Collector Undwided Artenial 800 8.000 1 Kingsway Tennis Court Road Tennis Court Road Eastbarned 1.440 3.400 Collector Lone N/A N/A N/A Oueersway Kingsway	Future Arterial	69 Avenue	61 Avenue/62	Northbound	6,760	12,660	2-Lane Arterial	Undivided Arterial	800	8,000	1		
Future Arterial 64 Avenue 60 Avenue Northboard 4730 10.350 2 Lane Arterial Undwided Arterial 800 8.000 1 Kingsway 59 Streat Glemocod Eastboard 8.200 20.820 24.ane Arterial Divided Arterial 1,000 10.000 2 Kingsway Timberline Glemocod Eastboard 6.710 22.750 Collector Divided Arterial 10.000 10.000 1 Kingsway Tennis Court Road Queensway Timberline Weetboard 2.200 3.000 Collector Undwided Arterial 800 8.000 1 Kingsway Tennis Court Road Queensway Weetboard 2.200 3.000 Collector Collector (Residential or Industrial) 400 4.000 1 Tennis Court Road Gueensway Kingsway Soutboard 3.130 Collector Collector (Residential or Industrial) 400 4.000 1 Oweensway Kingsway Hangsway Hangsway Soutboard 5.770	Future Arterial	61 Avenue/62 Avenue	54 Avenue	Northbound	6,810	12,800	2-Lane Arterial	Undivided Arterial	800	8,000	1		
Kingsway 99 Street Glerwood Wetbourd 12.400 20.620 2.Lane Arterial Divided Arterial 1.000 10.000 2 Kingsway Timberline Glerwood Wetbourd 8.710 22.750 Collector Divided Arterial 1.000 10.000 1 Kingsway Timberline Glerwood 8.710 22.750 Collector Undvided Arterial 800 8.000 1 Kingsway Tennis Court Road Queensway Timberline 12.210 Collector Collector Collector Collector A.000 1 </td <td>Future Arterial</td> <td>54 Avenue</td> <td>50 Avenue</td> <td>Northbound</td> <td>5,730</td> <td>10,350</td> <td>2-Lane Arterial</td> <td>Undivided Arterial</td> <td>800</td> <td>8,000</td> <td>1</td>	Future Arterial	54 Avenue	50 Avenue	Northbound	5,730	10,350	2-Lane Arterial	Undivided Arterial	800	8,000	1		
Kingsway Timberline Glerwood Fissibility 1/10 22,750 Collector Divided Anterial 1,000 10,000 2 Kingsway Queensway Timberline Eastboard 7,020 Collector Undivided Anterial 800 8,000 1 Kingsway Ternis Court Road Queensway Weitboard 5,190 12,210 Collector Collector (Residential or Industrial) 400 4,000 1 Kingsway Ternis Court Road Ternis Court Road Ternis Court Road Ternis Court Road 4,000 4,000 1 Ternis Court Road Ternis Court Road Kingsway Southboard 3,100 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Ternis Court Road Kingsway Southboard 2,440 5,570 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Hanger Ln Nothboard 3,20 Collector Collector (Residential or Industrial)	Kingsway	59 Street	Glenwood	Eastbound	12,400	20,620	2-Lane Arterial	Divided Arterial	1,000	10,000	2		
Kingsway Queensway Timberine Westbound 5/30 12.210 Collector Undvided Attarial 800 8.000 1 Kingsway Ternis Court Road Queensway Westbourd 5/30 12.280 3.300 Collector Collector Collector Restbourd 4/00 4/000 1 Kingsway End Road Ternis Court Road Queensway Kingsway Northbourd 3.300 Collector Collector Collector Restbourd 4/00 4/000 1 Ternis Court Road Queensway Kingsway Northbourd 3.310 5.770 Collector Collector Collector Restbourd 4/00 4/000 1 Queensway Kingsway Northbourd 4/10 5.010 Collector Coll	Kingsway	Timberline	Glenwood	Eastbound	8,220 14,040	22,750	Collector	Divided Arterial	1,000	10,000	2		
Kingsway Tennis Court Road Queensway Kestbourd 2.200 3.300 Collector Collector Collector Residual 4.000 1 Kingsway End d Road Tennis Court Road Kestbourd 1.440 3.480 Collector Collector Collector Collector Residual 4.000 1 Tennis Court Road Queensway Kingsway Southbourd 330 400 Collector Lane N/A N/A N/A Queensway Tennis Court Road Kingsway Southbourd 3.130 5.570 Collector Collector Collector Residential or Industrial) 400 4.000 1 Queensway Kingsway Hangt Ln Southbourd 3.130 5.570 Collector Collector (Residential or Industrial) 400 4.000 1 Timberline Juniper Avenue Kingsway Nothbourd 1.400 5.210 Collector Collector (Residential or Industrial) 400 4.000 1 Timberline Kingsway <td>Kingsway</td> <td>Queensway</td> <td>Timberline</td> <td>Eastbound</td> <td>7,020</td> <td>12,210</td> <td>Collector</td> <td>Undivided Arterial</td> <td>800</td> <td>8,000</td> <td>1</td>	Kingsway	Queensway	Timberline	Eastbound	7,020	12,210	Collector	Undivided Arterial	800	8,000	1		
Kingsway End of Road Tennis Court Road Westbound 2.040 3.480 Collector Collector (Residential or Industrial) 400 4.000 1 Tennis Court Road Queensway Kingsway	Kingsway	Tennis Court Road	Queensway	Eastbound	1,280	3,300	Collector	Collector (Residential or Industrial)	400	4,000	1		
Tennis Court Road Queensway Kingsway Nothbound 320 400 Collector Lane NA NA NA Queensway Tennis Court Road Kingsway Southbound 3130 5.570 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Hanger Ln Nothbound 4100 5.010 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Hanger Ln Southbound 4100 5.010 Collector Collector (Residential or Industrial) 400 4,000 1 Timberline Juniper Avenue Kingsway Athabasa Rod Northbound 4170 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Timberline Kingsway Athabasa Rod Northbound 5270 13,730 2-Lane Anterial Undwided Arterial 800 8,000 2 1 1. Road classification based on Daly Servide Volanue Stipal and In (Sunicola Edginenering Servicing	Kingsway	End of Road	Tennis Court Road	Eastbound	1,440	3,480	Collector	Collector (Residential or Industrial)	400	4,000	1		
Cueensway Tennis Court Road Kingsway Northbound 3.130 5.570 Collector Collector (Residential or Industrial) 400 4.000 11 Queensway Kingsway Hanger Ln Southbound 2.440 5.010 Collector (Residential or Industrial) 400 4.000 1 Queensway Kingsway Hanger Ln Northbound 1.00 5.010 Collector (Residential or Industrial) 400 4.000 1 Timberline Juniper Avenue Kingsway Antabasca Row Southbound 1.400 5.010 Collector (Residential or Industrial) 400 4.000 1 Timberline Kingsway Antabasca Row Southbound 4.100 6.480 Collector Collector (Residential or Industrial) 400 4.000 1 2	Tennis Court Road	Queensway	Kingsway	Northbound	330	400	Collector	Lane	N/A	N/A	N/A		
L L Southbound 2,440 1 Queensway Kingsway Hanger Ln Northbound 4,100 5,010 Collector Collector (Residential or Industrial) 400 4,000 1 Timbetine Juniper Avenue Kingsway Antabasca Rad 910 3,220 Collector Collector (Residential or Industrial) 400 4,000 1 Timbetine Kingsway Antabasca Rad Northbound 4,400 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Interview Kingsway Antabasca Rad Northbound 6,480 Collector Collector Residential or Industrial) 400 4,000 1 Int Root disselfication based on Datify Sender Volume situatiation Industrial Northbound 6,480 Collector Collector Residential or Industrial 800 8,000 1 Int Root disselfication based on Datify Sender Volume situatiation Industrial Northbound 6,480 1,730 2-Lane Anterial Undvided Anterial 800 8,000 1 Int Roo	Queensway	Tennis Court Road	Kingsway	Northbound	3,130	5,570	Collector	Collector (Residential or Industrial)	400	4,000	N/A 1		
Image: Note: Control of the second	Queensway	Kingsway	Hanger Ln	Northbound	2,440 4,100	5.010	Collector	Collector (Residential or Industrial)	400	4.000	2		
Image Southbound 1,400 1 Timberline Kingsway Athabase Road 1,400 1 Southbound 4,100 4,170 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Southbound 2,310 5,000 2,310 5,000 1 1 1 Read classification based on 2000 Transportation Study 8,000 2,270 1,3730 2-Lane Anterial Undivided Anterial 800 8,000 1 2 Road classification based on 2000 Transportation Study 5,070 5,070 1,3730 2-Lane Anterial Undivided Anterial 800 8,000 1 2 Road classification based on 2000 Transportation Study 5,070 1,3730 2-Lane Anterial Undivided Anterial 8000 8,000 1 3 Based on Lace Quacity Table (transportation Study 5,070 Standard Classification based on 200 5 5 5 5 5 5 5 5 5 5 5 5 5 5 </td <td>Timberline</td> <td>Juniper Avenue</td> <td>Kingsway</td> <td>Northbound</td> <td>910 1,920</td> <td>3.320</td> <td>Collector</td> <td>Collector (Residential or Industrial)</td> <td>400</td> <td>4.000</td> <td>1</td>	Timberline	Juniper Avenue	Kingsway	Northbound	910 1,920	3.320	Collector	Collector (Residential or Industrial)	400	4.000	1		
Source Source Source Control C	Timberline	Kingsway	Athabasca Road	Southbound Northbound	1,400 4,170	6.480	Collector	Collector (Residential or Industrial)	400	4.000	1 2		
Instruction Southbound 5,270 Instruction Construction Construction <thconstruction< th=""> <thconstruction< th=""></thconstruction<></thconstruction<>	Glenwood Drive	Glenwood	Kingsway	Southbound Northbound	2,310 8,460	13,730	2-I ane Arterial	Undivided Arterial	800	8,000	1 2		
19. A 2-lane collector cross section is appropriate for 50 Avenue between 45 Street and 41 Street as the AADT is less than 9000 20. A 2-lane collector cross section is appropriate for 34 Avenue hetween Hwy 28 and 45 Street as the AADT is less than 9000													

City of Cold Lake - Transportation Study Project No: 2010-3050 Date: April 11, 2011

TABLE 6.4: COMPARISON OF EXISTING AND 20-YEAR ROAD NETWORK

Operations	Intersection		Existing (2010) Road	Existing (2010) Number of Recommended 20-Year (2030) Road		Existing (2010) Road Existing (2010) Number of Recommended 20-Year (2030) Road Recommended		Recommended 20-Year	Income and Described
Corridor	From	То	Classification ¹	Lanes (One	Direction)	Classification	(2030) Number of Lanes (One Direction)	Improvements Required	
8 Avenue	10 Street	Lakeshore Drive	Undivided Arterial	-	1	Divided Arterial	2	Widen to provide centre median and 2 travel lanes in each direction	
8 Avenue	25 Street	10 Street	Divided Arterial		2	Divided Arterial	2	-	
Hug/ 28/55	Huay 55/16 Avenue	52 Δυρομο	Divided Arterial		2	Evoropeway	2		
1 wy 20/55	They so to Avenue	50 Avenue	Undivided Arterial		2	Expressivay	2	-	
Hwy 28/55	53 Avenue	52 Avenue	Undivided Artenai		2	Expressway	2	widen to provide centre median	
Hwy 28/55	52 Avenue	50 Avenue	Divided Arterial		2	Expressway	2	•	
Hwy 28/55	50 Avenue	52 Street	Divided Arterial		2	Divided Arterial	2	-	
Hwy 28/55	52 Street	47 Avenue	Undivided Arterial		2	Divided Arterial	2	Widen to provide centre median	
Hwy 28/55	47 Avenue	40 Avenue	Divided Arterial		2	Divided Arterial	2	-	
Hwy 28/55	40 Avenue	South City Limit	Undivided Arterial		1	Undivided Arterial	1	-	
1 Avenue	28 Street	1 Avenue	Collector (Residential or Industrial)	-	1	Collector (Residential or Industrial)	1	-	
Hwy 55 ²	West City Limit	28 Street	Collector (Residential or Industrial)		1	Undivided Arterial	1	-	
Hwy 55	28 Street	Hwy 28	Collector (Residential or Industrial)		1	Divided Arterial	2	Build pavement structure to Arterial standard (centre median and 2 trave	
16 Avenue	Hwy 28	16 Street	Collector (Residential or Industrial)		1	Undivided Arterial	2	Build pavement structure to Arterial standard (2 travel lanes in each	
16 Avenue	16 Street	8 Street	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	2	urection) Widen to provide 2 travel lanes in each direction	
16 Δυσρικο	8 Street	East City Limit	Collector (Residential or Industrial)		1 1	Collector (Residential or Industrial)	2		
	o onear				1		1	-	
English Bay Road	North City Limit	Lake Avenue	Collector (Residential of Industrial)		1	Undivided Artenai	1	- Build pavement structure to Arterial standard (centre median and 2 trave	
English Bay Road	Lake Avenue	Hwy 28	Collector (Residential or Industrial)		1	Divided Arterial	2	lanes in each direction)	
28 Street	English Bay Road	Hwy 55	Collector (Residential or Industrial)		1	Undivided Arterial	1	Realign 28 Street and build pavement structure to Arterial standard	
25 Street	1 Avenue	English Bay Road	Collector (Residential or Industrial)		1	Undivided Arterial	1	÷	
Nelson Street	1 Avenue	16 Street	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
16 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)		1	Undivided Arterial	1	-	
16 Street	16 Avenue	75 Avenue	Local		1	Undivided Arterial	1	Build pavement structure to Arterial standard	
Future Arterial	75 Avenue	50 Avenue	Non-existant			Undivided Arterial	1	Build out as per 20-year horizon	
10 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
10 Street	16 Avenue	16 Street	Local		1	Collector (Residential or Industrial)	1		
8 Street	16 Америе	75 Анерие	Local		1 1	Collector (Residential or Industrial)	1	Ruild payament structure to Collector standard	
6 Otreet	10 Avenue	04 Avenue	Local		1	Collector (Residential or Industrial)	1	Build pavement structure to Collector standard	
6 Street	16 Avenue	21 Avenue	Local		1	Collector (Residential or Industrial)	1		
20 Avenue	12 Street	8 Street	Non-existant			Collector (Residential or Industrial)	1	Build out as per 20-year horizon Build novement structure to Collector standard (2 travel lanes in each	
75 Avenue	Hwy 28/55	Future Arterial	Local		1	Collector (Residential or Industrial)	2	direction)	
69 Avenue	Glenwood	Hwy 28/55	Non-existant		-	Undivided Arterial	1	Build out as per 20-year horizon	
69 Avenue	Hwy 28/55	Future Arterial	Local		1	Undivided Arterial	1	-	
47 Street	69 Avenue	61/62 Avenue	Local		1 1	Collector (Residential or Industrial)	1	-	
54 Avenue	56 Street	49 Street	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	2	Widen to provide 2 travel lanes in each direction	
54 Avenue	49 Street	Future Arterial	Non-existant			Collector (Residential or Industrial)	2	Build out as per 20-year horizon	
52 Avenue	59 Street	57 Street	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
52 Avenue	57 Street	Hwy 28/55	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	2	Widen to provide 2 travel lanes in each direction	
Centre Avenue	59 Street	57 Street	Undivided Arterial		1	Divided Arterial	2	Widen to provide centre median and 2 travel lanes in each direction	
Centre Avenue	57 Street	Hun/ 28/55	Lindivided Arterial		2	Divided Arterial	2 2	Widen to provide centre median	
Cante Avande	57 50660	11wy 20/35			2	Divided Artenia	2	widen to provide centre median	
50 Avenue	Hwy 28/55	Future Arterial	Undivided Arterial		1	Undivided Arterial	1	-	
50 Avenue	Future Arterial	Baywood Road	Undivided Arterial		1	Collector (Residential or Industrial)	1	- Duild an unrest structure to Calleston standard (O torong langes in such	
43 Avenue	Hwy 28/55	45 Street	Local		1	Collector (Residential or Industrial)	2	direction)	
59 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	÷	
57 Street	54 Avenue	52 Avenue	Local		1 1	Collector (Residential or Industrial)	1	-	
57 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
51 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
50 Street	50 Avenue	Hwy 28/55	Collector (Residential or Industrial)	-	1	Undivided Arterial	1	-	
45 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
45 Street	50 Avenue	43 Avenue	Local	-	1	Collector (Residential or Industrial)	1	-	
41 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1		
Kingour	50 Per	Glonur - d	Linduidad Ar	L	1	Divided Antor -1	1 2	Widen to provide centre motion and 0 travel travel to and at a st	
ningsway	J9 Street	Gienwood	Undivided Arterial		1	Divided Arterial	2	Build pavement structure to Arterial standard (centre median and 2 travel	
Kingsway	Timberline	Glenwood	Collector (Residential or Industrial)		1	Divided Arterial	2	lanes in each direction)	
Kingsway	Queensway	Timberline	Collector (Residential or Industrial)		1	Undivided Arterial	1	-	
Kingsway	Queensway	End of Road	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
Queensway	Tennis Court Road	Hanger Ln	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1 1	-	
Timberline	Juniper Avenue	Athabasca Road	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-	
Glenwood Drive	Glenwood	Kingsway	Collector (Residential or Industrial)		1	Undivided Arterial	2	Build pavement structure to Arterial standard (2 travel lanes in each	
1 Based on 2000 Trans	nortation Study Bood	Clossifications with	ensideration for Highway 29 Turinging	(10 Street and F	(4 (1) (2)				

Based on 2000 Transportation Study Road Classifications with consideration for Highway 28 Twinning (10 Street and 54 Avenue)
 Following the reclassification of a roadway, no improvements are required to upgrade the pavement structure unless widening is also required.



Summary of Findings

AE was retained by the City to forecast the future traffic volumes for the next 20 years. Traffic volumes were forecasted for the 5-year, 10-year, 15-year, and 20-year planning horizons and analyzed to determine roadway classification and number of lanes required to accommodate the future traffic volumes.

Figure 5.1 through Figure 5.4 present the forecasted daily traffic volumes for the 5-year, 10-year, 15-year, and 20-year planning horizons respectively.

The forecasted total traffic volumes for each planning horizon were compared with the City's daily service volumes to determine the required roadway classification. The lane volumes were also compared with the lane capacity for the given road classification, to determine the required number of lanes required along each roadway. The results of the analysis are summarized in Appendix D for each planning horizon.

The 20-year (2030) road classification and number of lanes will be used by the City to determine the rightof-way that should be retained to accommodate future expansion of the road network. The major corridors in the 20-year road network were reviewed independently to establish consistent road classification and numbers of lanes along the corridor, where possible. The recommended road classification and number of lanes is presented in Figure 6.1.

Table 6.4 summarizes the major road network in the 20-year planning horizon, along with a comparison of the existing and future road classification and number of lanes. The table also summarizes the improvements required to upgrade the corridors from the existing horizon to the 20-year planning horizon.



Appendix A - ASP, ARP and Outline Plan Information



FISCHER ESTATES - LAND USE INFORMATION

	Total Dev	/elopable	Develope	ed in 2010	Undeveloped in 2010	
Land Ose Type	Area (ha.)	Dwelling Units	Areas (ha)	Dwelling Units	Area (ha)	Dwelling Units
Low-Density Residential	25.0	449	-	0	-	449
Multi-Family Residential	5.9	295	-	0	-	295
Commercial - Arterial	3.6	-	3.6	-	0.0	-
Commercial - Neighbourhood	6.7	-	0.9	-	5.8	-
Municipal Reserve	5.0	-	0.0	-	5.0	-
Stormwater	4.7	-	0.0	-	4.7	-
Other (Roadway/Pathway)	12.6	-	0.0	-	12.6	-
Total	63.5	744	4.5	0	28.1	744

IRON HORSE - LAND USE INFORMATION

	Total Developable		Develope	ed in 2010	Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Low-Density Residential	19.7	323	-	0	-	323
Medium-Density Residential	0.6	18	-	0	-	18
High-Density Residential	0.9	45	-	0	-	45
Municipal Reserve	2.24	-	0.0	-	0.0	-
Other (Roadways)	7.36	-	0.0	-	0.0	-
Total	30.8	386	0.0	0	0.0	386

COLD LAKE CENTRAL - LAND USE INFORMATION

	Total Developable		Developed in 2010		Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Low-Density Residential	90.1	1,559	-	205	-	1,354
Medium-Density Residential	20.7	622	-	44	-	578
High-Density Residential	10.5	1,046	-	444	-	602
Manufactured Housing	12.3	243	-	243	-	0
Commercial - Arterial	37.7	-	18.9	-	18.7	-
Institutional	2.6	-	2.6	-	0.0	-
Parks/Municipal Reserve	25.8	-	0.0	-	0.0	-
Stormwater Facility/PUL (Sanitary Forcemain)	13.9	-	0.0	-	0.0	-
Circulation	36.9	-	0.0	-	0.0	-
Total	250.6	3,470	21.6	936	18.7	2,534

GRAND CENTRE SE - LAND USE INFORMATION

	Total Dev	elopable	Developed in 2010		Undevelop	oed in 2010
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Low-Density Residential	21.6	370	-	89	-	281
Mobile Home	8.4	240	-	90	-	150
Commercial - Arterial	10.1	-	10.1	-	0.0	-
Industrial	15.8	-	9.9	-	5.9	-
Utility	6.4	-	0.0	-	6.4	-
Open Space	1.8	-	0.0	-	1.8	-
Fairgrounds	40.1	-	0.0	-	40.1	-
Cementary	0.8	-	0.8	-	0.0	-
Total	105.0	610	20.8	179	54.3	431

FOREST HEIGHTS - LAND USE INFORMATION

	Total Developable		Developed in 2010		Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Developed in 2007 (120 Residential Lots & School Site)	19.6	120	19.6	120	0.0	0
Single-Family Residential	20.6	345	0.0	0	20.6	345
Multi-Family Residential	8.3	248	0.0	0	8.3	248
Municipal Reserve	4.4	-	0.0	-	4.4	-
Storm Water Management	1.7	-	0.0	-	1.7	-
Roadways	9.4	-	0.0	-	9.4	-
Total Residential	64.0	713	19.6	120	44.4	593

NORTHSHORE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

TOTAL AREA

	Total Area ¹	Creekside ASP ²	Parkview ASP ³	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	244.1	60.5	36.8	146.8
Non-Residential Subtotal	125.6	17.8	13.2	94.6
Linear Parks (Parkways/Trails)	4.9	0.0	0.0	4.9
Local Parks	10.4	1.3	5.7	3.5
Special Study Area	20.8	9.8	0.0	11.0
Stormwater Management Facilities	10.1	3.6	0.0	6.5
Public Utility Lots	1.6	0.0	0.0	1.6
Roads	53.6	2.8	7.5	43.3
School Site	4.6	0.0	0.0	4.6
Institutional	5.6	0.0	0.0	5.6
Religious Assembly	0.3	0.3	0.0	0.0
Neighbourhood Commercial	1.8	0.0	0.0	1.8
Highway Commercial	11.9	0.0	0.0	11.9
Residential	118.5	42.7	23.6	52.2
Low Density Residential	91.9	38.4	21.0	32.6
Medium Density Residential	14.9	4.4	0.0	10.6
Mixed Use Commercial	9.1	0.0	2.6	6.5
Mixed Use Institutional	2.6	0.0	0.0	2.6

1. From Northshore ASP

2. From Creekside ASP

3. From Parkview ASP

2007 HORIZON - DEVELOPED

	Total Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	244.1	60.5	36.8	146.8
Non-Residential Subtotal	5.9	0.3	0.0	5.6
Linear Parks (Parkways/Trails)	0.0	0.0	0.0	0.0
Local Parks	0.0	0.0	0.0	0.0
Special Study Area	0.0	0.0	0.0	0.0
Stormwater Management Facilities	0.0	0.0	0.0	0.0
Public Utility Lots	0.0	0.0	0.0	0.0
Roads	0.0	0.0	0.0	0.0
School Site	0.0	0.0	0.0	0.0
Institutional	5.6	0.0	0.0	5.6
Religious Assembly	0.3	0.3	0.0	0.0
Neighbourhood Commercial	0.0	0.0	0.0	0.0
Highway Commercial	0.0	0.0	0.0	0.0
Residential	5.1	0.0	0.0	5.1
Low Density Residential	5.1	0.0	0.0	5.1
Medium Density Residential	0.0	0.0	0.0	0.0
Mixed Use Commercial	0.0	0.0	0.0	0.0
Mixed Use Institutional	0.0	0.0	0.0	0.0
Developable Area	233.1	60.2	36.8	136.1

NORTHSHORE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

2010 HORIZON - DEVELOPED

	Total Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	233.1	60.2	36.8	136.1
Non-Residential Subtotal	0.9	0.9	0.0	0.0
Linear Parks (Parkways/Trails)	0.0	0.0	0.0	0.0
Local Parks	0.0	0.0	0.0	0.0
Special Study Area	0.0	0.0	0.0	0.0
Stormwater Management Facilities	0.9	0.9	0.0	0.0
Public Utility Lots	0.0	0.0	0.0	0.0
Roads	0.0	0.0	0.0	0.0
School Site	0.0	0.0	0.0	0.0
Institutional	0.0	0.0	0.0	0.0
Religious Assembly	0.0	0.0	0.0	0.0
Neighbourhood Commercial	0.0	0.0	0.0	0.0
Highway Commercial	0.0	0.0	0.0	0.0
Residential	7.4	5.7	1.7	0.0
Low Density Residential	7.4	5.7	1.7	0.0
Medium Density Residential	0.0	0.0	0.0	0.0
Mixed Use Commercial ¹	0.0	0.0	0.0	0.0
Mixed Use Institutional	0.0	0.0	0.0	0.0
Developable Area	224.8	53.7	35.1	136.1

2010 - DEVELOPABLE

	Total Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	224.8	53.7	35.1	136.1
Non-Residential Subtotal	118.8	16.6	13.2	89.0
Linear Parks (Parkways/Trails)	4.9	0.0	0.0	4.9
Local Parks	10.4	1.3	5.7	3.5
Special Study Area	20.8	9.8	0.0	11.0
Stormwater Management Facilities	9.2	2.8	0.0	6.5
Public Utility Lots	1.6	0.0	0.0	1.6
Roads	53.6	2.8	7.5	43.3
School Site	4.6	0.0	0.0	4.6
Institutional	0.0	0.0	0.0	0.0
Religious Assembly	0.0	0.0	0.0	0.0
Neighbourhood Commercial	1.8	0.0	0.0	1.8
Commercial - Arterial	11.9	0.0	0.0	11.9
Residential	106.0	37.1	21.9	47.1
Low Density Residential	79.4	32.7	19.2	27.5
Medium Density Residential	14.9	4.4	0.0	10.6
Mixed-Use Commercial ⁴	9.1	0.0	2.6	6.5
Mixed-Use Institutional	2.6	0.0	0.0	2.6

4. To maintain consistency with Northshore ASP, Parkview's Commercial as been considered as Mixed Use Commercial - To account for total land area

NORTHSHORE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

TOTAL DEVELOPABLE - SCHOOL/RESIDENTIAL

	Total Area		Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	1,958	0	0	1,958
Low-Density Residential	Dwelling Units	1,654	659	401	594
Medium-Density Residential	Dwelling Units	671	196	0	475
Mixed-Use Commercial	Dwelling Units	547	0	0	547
Mixed-Use Institutional	Dwelling Units	157	0	0	157

2007 DEVELOPED - SCHOOL/RESIDENTIAL

	Total Area		Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	0	0	0	0
Low-Density Residential	Dwelling Units	57	0	0	57
Medium-Density Residential	Dwelling Units	0	0	0	0
Mixed-Use Commercial	Dwelling Units	0	0	0	0
Mixed-Use Institutional	Dwelling Units	0	0	0	0

2010 DEVELOPED - SCHOOL/RESIDENTIAL

	Total Area		Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	0	0	0	0
Low-Density Residential	Dwelling Units	99	65	34	0
Medium-Density Residential	Dwelling Units	0	0	0	0
Mixed-Use Commercial	Dwelling Units	0	0	0	0
Mixed-Use Institutional	Dwelling Units	0	0	0	0

2010 DEVELOPABLE - SCHOOL/RESIDENTIAL

	Total	Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	1,958	0	0	1,958
Low-Density Residential	Dwelling Units	1,498	594	367	537
Medium-Density Residential	Dwelling Units	671	196	0	475
Mixed-Use Commercial	Dwelling Units	547	0	0	547
Mixed-Use Institutional	Dwelling Units	157	0	0	157

LOT 2, PLAN 982 1024 - LAND USE INFORMATION

	Total Dev	/elopable	Developed in 2010		Undevelop	oed in 2010
Land Use	Area (s.ft.)	Dwelling Units	Area (s.ft.)	Dwelling Units	Area (s.ft.)	Dwelling Units
Residential						
Building 1	5,506.0	12	5,506.0	12	0.0	0
Building 2	5,506.0	12	5,506.0	12	0.0	0
Building 3	19,394.0	54	19,394.0	54	0.0	0
Building 6 - Will not be built	0.0	0	0.0	0	0.0	0
Total Residential	30,406.0	78	30,406.0	78	0.0	0
Commercial						
Building 4	11,295.9	0	0.0	0	11,295.9	0
Building 5	4,068.6	0	0.0	0	4,068.6	0
Total Commercial	15,364.5	0	0.0	0	15,364.5	0

HORSESHOE BAY - LAND USE INFORMATION

Land Use	Area (acres)	Area (ha)	% of Planned Area	Lots	Population Estimate
Existing 50 ft width lot (Beach Avenue)	4.0	1.6	2.0%	21	65
Existing 0.5 acre lots	3.7	1.5	2.0%	7	22
Existing 1.0 acre lots	14.0	5.7	7.4%	11	34
Potential Serviced Residential Estates	105.0	42.5	55.3%	182	564
Natural Area Park	5.0	2.0	2.6%		
Lakeshore Trail System	5.0	2.0	2.6%		
Environmental Reserve	26.0	10.5	13.7%		
English Bay Road	7.0	2.8	3.7%		
Local Roads (by dedication)	20.0	8.0	10.5%		
Total	190.0	77.0	100.0%	219	651

	Total Developable	Developed in 2010	Undeveloped in 2010
Land Use	(Dwelling Unit)	(Dwelling Unit)	(Dwelling Unit)
Low Density Residential	219	177	42

UPLANDS - LAND USE INFORMATION

	Total Developable		Develope	ed in 2010	Undeveloped in 2010		
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	
Single-Family Residential	45.2	904	0.0	0	45.2	904	
Multi-Family Residential	9.6	480	0.0	0	9.6	480	
Health Services and Mixed Use	5.0	-	0.0	-	5.0	-	
Municipal Reserve	12.7	-	0.0	-	12.7	-	
SWMF and Existing Wetlands	7.9	-	0.0	-	7.9	-	
Roads and Lanes	21.5	-	0.0	-	21.5	-	
Total	101.9	1,384	0.0	0	101.9	1,384	

LAKESHORE REDEVELOPMENT - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

	Description	Existing Land Use	Area (s.m.)	Area (hec)	Max. Site Coverage	Developable Area (hec)	Area (sq.ft)
1	Vacant parcel on 12 Street and 8 Avenue	Vacant	16,938.6	1.7	0%	0.0	0.0
2	902 10 Street ¹	Commercial	1,097.2	0.1	50%	0.1	5,905.0
3	904 10 Street	Commercial	690.4	0.1	50%	0.0	3,715.9
4	901 9 Avenue	Commercial	1,118.8	0.1	50%	0.1	6,021.3
5	803 10 Avenue	Commercial	2,248.6	0.2	50%	0.1	12,102.1
6	Triangle Park ²	Park / Open Space	1,135.7	0.1	100%	0.1	12,224.7
7	Bibeau Park	Park / Open Space	11,648.9	1.2	100%	1.2	125,387.8
8	Centoaph Park	Park / Open Space	2,605.4	0.3	100%	0.3	28,044.2
9	Fire Hall ³	Fire Hall	3,427.9	0.3	50%	0.2	18,449.1

1. Assume maximum site coverage for HDR is the same for MDR (50%)

2. Will not include in existing trip generation since not currently used. Following redevelopment, parks will be used and generate traffic.

3. From address map, fire hall building is approximately 50% of site.

	Description	Future Land Use	Area (s.m.)	Area (hec)	Max. Site Coverage	Developable Area (hec)	Area (sq.ft)	Dwelling Units
1	Vacant parcel on 12 Street and 8 Avenue ⁴	Medium Density Residential	16,938.6	1.7	50%	0.8	91,162.6	38
2	902 10 Street ⁵	High Density Residential	1,097.2	0.1	50%	0.1	5,905.0	15
3	904 10 Street ⁵	High Density Residential	690.4	0.1	50%	0.0	3,715.9	9
4	901 9 Avenue ⁵	High Density Residential	1,118.8	0.1	50%	0.1	6,021.3	15
5	803 10 Avenue ⁶	Low Density Residential	2,248.6	0.2	45%	0.1	10,891.9	3
6	Triangle Park	Park / Open Space	1,135.7	0.1	100%	0.1	12,224.7	-
7	Bibeau Park	Park / Open Space	11,648.9	1.2	100%	1.2	125,387.8	-
8	Centoaph Park	Park / Open Space	2,605.4	0.3	100%	0.3	28,044.2	-
9	Fire Hall	Community Hall	3,427.9	0.3	50%	0.2	18,449.1	-

4. Maximum Density of 45 units/ha

5. HDR assumed to have 1 dwelling unit per 400 sq.ft of building footprint. Derived using ratio from Lot 2 buildings.

6. 803 10 Avenue can be subdivided into three single family lots

LAKEWOOD ESTATES - LAND USE INFORMATION

		Total Developable		Developed in 2010		Undevelop	oed in 2010
Land Use	Area (s.m.)	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Total ASP Area	213,281.7	21.3	198				
Low-Density Residential	103,315.2	10.3					
Phase I		-	45	-	45	-	0
Phase II		-	32	-	0	-	32
Phase III		-	21	-	0	-	21
Phase IV		-	31	-	0	-	31
Phase V		-	21	-	0	-	21
Phase VI		-	28	-	0	-	28
Phase VII		-	20	-	0	-	20
Municipal Reserve	25,619.5	2.6	-	0.0	-	2.6	-
Others (Roadway/Pathways)	84,347.0	8.4	-	0.0	-	8.4	-
Total	213,281.7	21.3	198	0.0	45	11.0	153

CREEKSIDE ESTATES - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

		Total Developable			Develope	d in 2010	Undeveloped in 2010	
Land Use	Area (s.m.)	Area (ha)	Density (Units/ha) ¹	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Total ASP Area	605,034.5	60.5						
Developed - In 2010								
Low-Density Residential	56,734.3	5.7	-	65	-	65	-	0
SWMF	-	0.9	-	-	0.9	-		
Undeveloped - In 2010								
Low-Density Residential	330,059.3	33.0	18.0	594	-	0	-	594
Medium-Density Residential	-	4.4	45.0	196	-	0	-	196
Park	-	1.3	-	-	0.0	-	1.3	-
SWMF	-	2.8	-		0.0	-	2.8	-
Special Study Area	-	9.8	-	-	0.0	-	9.8	-
Other (Roadways / Pathways)	-	2.8					2.8	
Total		60.5		855	0.9	65	16.6	790

1. From Northshore ASP

PARKVIEW ESTATES - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

		Total Developable			2010 Developed		2010 Undeveloped	
Land Use	Area (s.m.)	Area (ha)	Density (Units/ha) ¹	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Total ASP Area	367,975.6	36.8	-	-				
Developed - In 2010								
Low-Density Residential (R1B)	17,287.5	1.7	-	34	-	34	-	0
Undeveloped - In 2010								
Low-Density Residential - Divided Lots	51,906.5	5.2	-	114	-	0		114
Low-Density Residential - Undivided Lots	140,448.2	14.0	18.0	253	-	0		253
Neighbourhood Commercial ²	26,325.8	2.6	-	-	0.0	-	2.6	
Open Space	56,814.5	5.7	-	-	0.0	-	5.7	
Other (Roadways / Pathways)	75,193.1	7.5	-	-	0.0	-	7.5	
Total	292,782.5	29.3		401	0.0	34	15.8	367

1. From Northshore ASP

2. Outline Plan shows this area as C3 - Neighbourhood Commercial but Northshore ASP shows as Mixed Use Commercial

HILLS OF COLD LAKE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

Description of Land Use	Unserviced Lots (Acres)	Serviced Lots (Acres)
Total area available for development	294.9	294.9
Land to be allocated to the MD. Land marked as MR reserve.	45.7	64.5
Area of road reserve and public utility lanes	46.3	59.5
Area planned for establishment of building lots	202.9	170.9

Phasing

Phase	Unserviced Lot Subdivision	Serviced Lot Subdivision
Phase A - Year 1	40	40
Phase B - Year 2-3	40	40
Phase C - Year 4-5	40	40
Phase D - Year 6-8	60	60
Phase E - Year 9	20	20
Phase F - Year 10-11	-	40
Phase G - Year 12-13	-	40
Phase H - Year 14	-	20
Total	200	300

FAWN RIDGE ESTATES - LAND USE INFORMATION

	Developable Area		
Subdivisions and Legal Description	Land Use	(Acres)	Dwelling Units
NW 23-62-3-4 (Fawn Ridge Estates Subdivision)	Country Residential (CR)	86.3	54

			Direction Distribution (%)		Direction Distribution (%)	
	Trip Generation Rate (Trips per Dwelling					
Time Period	Units)	Generated Trips	Inbound	Outbound	Inbound	Outbound
NW 23-62-3-4 (Fawn Ridge Estates Subdivision)						
Country Residential (Fawn Ridge Estates Subdivision) Code 210						
Weekday (AADT)	9.57	517	50%	50%	258	258
AM Peak Hour	0.77	42	26%	74%	11	31
PM Peak Hour	1.02	55	64%	36%	35	20

City of Cold Lake Transportation Study Project No: 2010-3050 Date: April 9, 2011

MD BONNYVILLE - RESIDENTIAL

Source: Intermunicipal Development Plan (Feb 2009)

Future Land Uses:

- Residential developments

Land Use	Location	Developable Area (m ²)	Developable Area (Hec)	Developed Area by 2030 (Hec)
Residential Development 1 - 30% Developed by 2030	Along north side of Highway 55, west of Cold Lake	629,116.85	63	19
Residential Development 2 - 30% Developed by 2030	West of IDP Commercial Development, between 75 Avenue and south of 61/62 Avenue	843,132.02	84	25
Residential Development 3 - 30% Developed by 2030	East of Cold Lake Central, between Energy Centre to 55 Avenue	4,178,346.10	418	125

Assumed:

- Single family: 20 dwelling units/ha

- Multi family: 50 dwelling units/ha

- 75/25 split between single family and multi family residential developments

Land Use	Building Type	Developable Area (Hec)	Dwelling Units
	75% - Single Family Residential	14	283
Residential Development 1	25% - Multi Family Residential	5	236
	Total	19	519
	75% - Single Family Residential	19	379
Residential Development 2	25% - Multi Family Residential	6	316
	Total	25	696
	75% - Single Family Residential	94	1,880
Residential Development 3	25% - Multi Family Residential	31	1,567
	Total	125	3,447

City of Cold Lake Transportation Study Project No: 2010-3050 Date: April 9, 2011

MD BONNYVILLE - IDP INDUSTRIAL

Source: Intermunicipal Development Plan (Feb 2009)

Location:

- Either side of Highway 55, west of Cold Lake

Future Land Uses:

- Industrial

				Developed Area
	Land Use	Developable Area (m ²)	Developable Area (Hec)	by 2030 (Hec)
	Industrial Development - 20% Developed by 2030	3,919,353.21	392	78

Assumed:

- 60% max site coverage (as per City of Cold Lake Bylaw)

City of Cold Lake Transportation Study Project No: 2010-3050 Date: April 9, 2011

MD BONNYVILLE - IDP COMMERCIAL

Source: Intermunicipal Development Plan (Feb 2009)

Location:

- Along west side of Highway 28, from Energy Centre to 55 Avenue

Future Land Uses:

- Commercial

Land Use	Developable Area (m²)	Developable Area (Hec)	Developed Area by 2030 (Hec)
Commercial Development - 30% developed by 2030	1,574,100.10	157	47

Assumed:

- Arterial Commercial: 80% site coverage (as per City of Cold Lake Bylaw)

B Appendix B - Traffic Demand Forecast Work Plan


MEMO		Subject:	Traffic Demand Fored	cast Worl	< Plan
		Project:	City of Cold Lake Tra	nsportati	on Study
		From:	Rohit Vij		
		To:	Bob Kitchen		
Associated	GLOBAL PERSPECTIVE.	Date:	February 25, 2011	File:	20103050.00.01.10

1 OBJECTIVE

The objective of this work plan is to develop a methodology by which to forecast future traffic demand within Cold Lake, using the ASP, ARP and Outline Plans. **Highlighted text illustrates our assumptions for Cold Lake Transportation Study.** Please review the assumptions and provide your consensus.

2 BACKGROUND INFORMATION

Associated Engineering (AE) has obtained the following information from the City of Cold Lake.

2.1 AREA STRUCTURE PLANS (ASP)

- Fischer Estates
- Horseshoe Bay
- Iron Horse
- Cold Lake Central
- Southeast
- Forest Heights
- North Shore
- Lot 2, Plan 982 1024
- Uplands

2.2 AREA REDEVELOPMENT PLAN (ARP)

Cold Lake Downtown (Cold Lake North)

2.3 OUTLINE PLANS

- Lakewood Estates
- Creekside Estates
- Parkview Estates

Figure 1 presents the Outline Plan for Lakewood Estates. The Outline Plan presents the breakdown of the subdivision to parcels and indicates the phasing anticipated; however, the land use is not indicated. Based on the layout, it will be assumed that subdivision will be solely low-density residential.





Figure 1

OVERALL DEVELOPMENT CONCEPT



CREEKSIDE

OVERALL DESIGN CONCEPT



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Figure 2





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Figure 2 presents the Outline Plan for Creekside Estates. The Outline Plan presents the breakdown of the subdivision into parcels and indicates the land use. For parcels where the land use is not indicated, low-density residential will be assumed.

The available ASP, ARP and Outline Plans are shown in Figure 3.

2.4 CITY OF COLD LAKE LAND USE BY-LAW

The different land use districts within the City of Cold Lake was presented and described in the Land Use By-law. The following table summarizes the information of interest for the purpose of the Traffic Demand Forecast.

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density
RE – Residential Estates District	35%	108.0	-	1 unit/lot
R1A – Residential District (Single Detached)	45%	84.0	-	1 unit/lot
R1B – Residential District (Single Detached – Small Lots)	45%	72.0	-	1 unit/lot
R1B-1 – Residential District (Single Detached – Small Lots)	45%	72.0	-	1 unit/lot
R2 – Residential District (Semi- Detached/Duplex)	45%	72.0	-	2 units/lot
R3 – Medium Density Residential (Row Housing)	50%	63.0	-	42 units/ha
R4 – High Density Residential	-	-	1.3	95 units/ha
RMX – Residential Mixed Use	-	At discretion of Development Authority	-	-

Table 2.1 – Information from City of Cold Lake Land Use Bylaw





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Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density
RMHC – Residential Manufactured Home Community District	40%	a) single wide – 65.0 b) double wide – 85.0	-	16 units/ha
RMHS – Residential Manufactured Home Subdivision	40%	49.5	-	-
C1 – Downtown Commercial (Central Business District)	80%	At discretion of Development Authority	-	-
C2 – Arterial Commercial (Along Major Arterial Roads, Highway 28)	80%	At discretion of Development Authority	-	-
C3 – Neighbourhood Commercial	50%	Permitted Use – 250.0 Discretionary Use – 1000.0	-	-
LC – Lakeshore Commercial	80%	Commercial – Min. 30% of all floors, 50% of ground floor Residential – Max. 70% of all, 50% of ground floor	-	-
BD – Beach District		At discretion of	f Development Authority	
LI – Light Industrial	60%	-	-	-
HI – Heavy Industrial	60%	-	-	-





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Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density			
PS – Public Service (Educational, government, health care and recreational services)	At discretion of Development Authority						
IP – Imperial Park District		At discretion c	of Development Authority				
UR – Urban Reserve		At discretion of Development Authority					
CON - Conservation	At discretion of Development Authority						
DC – Direct Control District	-	-	-	-			
DC-SR – Spinnaker Ridge Direct Control District	-	-	-	45 units/ha 8 units/row house			
DC-TCE – Tri City Estates Direct Control District	40%	63.0	-	40 units/ha			
DC-RMHC – Residential Manufactured Home Community Direct Control District	45%	49.5	-	25.2 units/ha or 19.76 per gross ha.			
FW – National Defense		At discretion of De	partment of National Defe	nse			

2.5 MD OF BONNYVILLE NO. 87 LAND USE BYLAW

The different land use districts within the MD of Bonnyville was presented and described in the Land Use Bylaw. The following table summarizes the information of interest for the purpose of the Traffic Demand Forecast.

Table 2.2 – Information	from N	ID of	Bonnyville	Land Use	e Bylaw

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m ²)	Maximum Floor Area Ratio	Maximum Density
A – Agricultural	-	-	-	1 unit/lot
CR – Country Residential (Resort)	-	-	-	1 unit/lot





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Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density
CR1 – Country Residential	-	-	-	1 unit/lot
CR2 – Country Residential (Large Lot)	-	-	-	1 unit/lot
CUD – Controlled Urban Development	-	-	-	-
DC – Direct Control	-	-	-	-
HG – Hamlet General	-	Unserviced – 1860.0 Serviced – 420.0 Sewer only – 930.0 Water only – 1400.0	-	1 unit/lot
HR1 – Hamlet Single Family Residential	-	Unserviced – 1860.0 Serviced – 560.0 Sewer only – 930.0 Water only – 1400.0	-	1 unit/lot
HR2 – Hamlet Multi Family Residential (Duplex)	35%	Interior Site – 697.0 Corner Site – 744.0	-	2 units/lot
HR2 – Hamlet Multi Family Residential (Triplex/Fourplex)	-	297.0 / unit	At discretion of Development Authority	At discretion of Development Authority
HR2 – Hamlet Multi Family Residential (Townhouse)	At discretion of Development Authority	Interior Lot – 185.5 Corner Lot – 297.0	At discretion of Development Authority	30 units/ha
HR2 – Hamlet Multi Family Residential (Apartment)	30%	800.0	0.60	At discretion of Development Authority
HUR – Hamlet Urban Reserve District	-	-	-	-
IR – Intensive Recreation		At discretion of Deve	elopment Authority	





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Land Use District	Maximum Lot Coverage	Minimum Floor Are (m²)	Minimum Floor Area Ma (m²)		Maximum Density
MHC – Manufactured Home Community	-	a) single wide – 465.0 b) double wide – 510.0		-	20 units/ha
RC – Rural Commercial		At discretion of	Deve	elopment Authority	
RI – Rural Industrial		At discretion of	Deve	lopment Authority	

3 WORKPLAN

A spreadsheet model will be utilized to forecast the future traffic demand of Cold Lake in the 5-year, 10-year, 15-year, and 20-year horizons. The spreadsheet model will comprise of 9 steps, which are explained in detail below.

3.1 STEP 1: DEVELOP NETWORK

- Draw road network. The road network for the City of Cold Lake will consist of collector and arterial roads within the existing City limits.
- Divide study areas into traffic analysis zones (TAZ). The City will be divided into different TAZs that are homogenous in terms of land use. AE anticipates that nine TAZs will be established for Cold Lake to represent the following:
 - TAZ 1: Cold Lake North Commercial
 - TAZ 2: Cold Lake North Residential North/West
 - TAZ 3: Cold Lake North Residential South/East
 - TAZ 4: Central Corridor Commercial (between Cold Lake North and Cold Lake South, including 75 Avenue and 61/62 Avenue)
 - TAZ 5: Central Corridor Residential (between Cold Lake North and Cold Lake South, including Energy Centre Access and 61/62 Avenue)
 - TAZ 6: Cold Lake South Commercial
 - TAZ 7: Cold Lake South Residential West
 - TAZ 8: Cold Lake South Residential East
 - TAZ 9: Medley
- Identify intersections with counts within each zone.
- Determine the centroid for each zone. The centroid may be chosen to be the geographic center or the "center" of the road network.





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- Calculate the area of each zone (A₁, A₂, etc.)
- Calculate the distance between the centroid of each zone and the furthest point of the zone (d_{ii}) and calculate the distance between each centroid (d_{ij}). Where i denotes the study zone and j denotes the destination zone.

3.2 STEP 2 – EXISTING VOLUME

• Build a spreadsheet in Excel to summarize the existing traffic volumes. The table would be similar to the following table.

later and an			Zone 1		Zone 2		Zone		ne 9
Intersec	tion	I _{1,1}	I _{1,2}	I _{1,x}	I _{2,1}	I _{2,2}	l _{i,x}	I _{9,1}	I _{9,x}
	Left	5	9	15					
NB	Through	85	211	150					
	Right	3	15	7					
	Left								
SB	Through								
	Right								
	Left								
EB	Through								
	Right								
	Left								
WB	Through								
	Right								

Existing Traffic Volumes (2010 Horizon)

Where $I_{i,x}$ denotes intersection number x in Zone i.





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3.3 STEP 3 – FUTURE BACKGROUND VOLUMES

- Grow the existing traffic volumes using an annual growth factor to the 5-year, 10-year, 15-year, and 20-year horizons.
- An annual growth rate of 2.0% has been chosen to since it was used in the Municipal Development Plan and represents the median between the moderate (1.5%) and high (2.5%) projection growth in the Inter-municipal Development Plan.
- Future traffic volume n years = Existing traffic volumes + (Existing traffic volume x n x growth %). Therefore for n = 5 years, Future traffic volume = Existing traffic volume + (Existing traffic volume x 5 x 0.02).
- Build spreadsheets similar to Step 2 to summarize the Future Background Traffic.
- Four future background traffic volume spreadsheets will be developed for Cold Lake to represent the future background traffic volumes in the 5-year, 10-year, 15-year, and 20-year horizons.

5-year Background Traffic Volumes (2015)





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		Zone 1		Zone 2			Zone 9		
Intersec	tion	I _{1,1}	I _{1,2}	I _{1,x}	I _{2,1}	I _{2,2}	l _{i,x}	I _{9,1}	I _{9,x}
ND	Left	6 = 5+(5x5x 0.02)	10 = 9+(9x5x 0.02)	17 =15+(15 x5x0.02)					
NB	Through	94	232	165					
	Right	3	17	8					
	Left								
SB	Through								
	Right								
	Left								
EB	Through								
	Right								
	Left								
WB	Through								
	Right								

3.4 STEP 4 – FUTURE PRODUCTION

- Calculate the trip production for each horizon using the information provided by the City in the ASPs, ARPs and Outline Plans.
- The City does not have projected growth information available for the four horizons. The City of Cold Lake is subject to boom/bust cycles of population growth or contraction tied to the resource section. This makes growth forecasting difficult.
- For the transportation study, growth assumptions are necessary. Associated Engineering assumed that the following development staging would be implemented for each study horizon:





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Development / Redevelopment	Land Use	5-Year (2015) Horizon	10-Year (2020) Horizon	15-Year (2025) Horizon	20-Year (2030) Horizon	Total % Developed
Fischer Estates	Residential	0%	0%	25%	25%	50%
	Commercial	0%	0%	25%	25%	50%
Iron Horse	Residential	0%	0%	25%	25%	50%
	Residential	25%	25%	25%	25%	100%
	Commercial	50%	50%	0%	0%	100%
Grand Centre	Residential	25%	25%	25%	25%	100%
Southeast	Industrial	25%	25%	25%	25%	100%
Forest Heights	Residential	0%	0%	25%	25%	50%
	Residential	25%	25%	25%	25%	100%
Northshoro	Commercial	25%	25%	25%	25%	100%
Nottinshore	Institutional	25%	25%	25%	25%	100%
	School	0%	0%	100%	0%	100%
Lot 2, Plan 982 1024	Commercial	100%	0%	0%	0%	100%
Horseshoe Bay	Residential	50%	50%	0%	0%	100%
Liplands	Residential	25%	25%	25%	25%	100%
opianus	Health Services & Mixed Use	25%	25%	25%	25%	100%

Assumed Development Staging by Study Horizon





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Development / Redevelopment	Land Use	5-Year (2015) Horizon	10-Year (2020) Horizon	15-Year (2025) Horizon	20-Year (2030) Horizon	Total % Developed
Lakeshore Area Redevelopment	All	25%	25%	25%	25%	100%
Lakewood Estates	Residential	25%	25%	25%	25%	100%
Creekside Estates	Residential	25%	25%	25%	25%	100%
Dorkview Estatos	Residential	25%	25%	25%	25%	100%
	Commercial	25%	25%	25%	25%	100%
Hills of Cold Lake	Residential	25%	25%	25%	25%	100%
Fawn Ridge Estates Development	Residential	25%	25%	25%	25%	100%

- The trips produced by the new developments for each future horizon will be generated using the Institute of Transportation Engineers (ITE) Trip Generation Handbook, 7th Edition and summarized in a spreadsheet similar to the one below.
- Four trip production spreadsheets will be produced to represent the trip production in the 5-year, 10-year, 15-year, and 20-year horizons.

Zone (i)	Trip Produced
1	
2	
3	
4	
5	
6	

Trip Production (Pi) - Horizon





GLOBAL PERSPECTIVE. LOCAL FOCUS.

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 Total (ΣPi)

3.5 STEP 5 – FUTURE ATTRACTION

- Calculate attraction from land use and origin-destination (OD) surveys.
- For the spreadsheet model this is normally not available and this step is bypassed.
- This is the case for the Cold Lake project.

3.6 STEP 6 – TRIP TABLE

- Calculate the trips T_{ij} between origin zone i and destination zone j, using the gravity model illustrated in the following table.
- The gravity model states that the interaction (trips) between two zones declines with increasing distance between them.

From/To Zone	Weight	%	Final Trip
Zone 1 to Zone 1	$A_1/(d_{11})^2$	$[A_1/(d_{11})^2] / \sum_1$	$P_1 \ge [A_1/(d_{11})^2] / \sum_1$
Zone 1 to Zone 2	$A_1/(d_{12})^2$	$[A_1/(d_{12})^2] / \sum_1$	$P_1 x [A_1/(d_{12})^2] / \sum_1$
Zone 1 to Zone 3	A ₁ /(d ₁₃) ²	$[A_1/(d_{13})^2] / \sum_1$	P₁ x [A₁/(d₁₃)²] / ∑₁
Zone 1 to Zone 4	$A_1/(d_{14})^2$	$[A_1/(d_{14})^2] / \sum_1$	$P_1 x [A_1/(d_{14})^2] / \sum_1$
Zone 1 to Zone 5	A ₁ /(d ₁₅) ²	$[A_1/(d_{15})^2] / \sum_1$	P₁ x [A₁/(d₁₅)²] / ∑₁
Zone 1 to Zone 6	$A_{1}/(d_{16})^{2}$	$[A_1/(d_{16})^2] / \sum_1$	$P_1 x [A_1/(d_{16})^2] / \sum_1$
Zone 1 to Zone 7	$A_1/(d_{17})^2$	$[A_1/(d_{17})^2] / \sum_1$	$P_1 \ge [A_1/(d_{17})^2] / \sum_1$
Zone 1 to Zone 8	A ₁ /(d ₁₈) ²	$[A_1/(d_{18})^2] / \sum_1$	$P_1 x [A_1/(d_{18})^2] / \sum_1$
Zone 1 to Zone 9	A ₁ /(d ₁₉) ²	$[A_1/(d_{19})^2] / \sum_1$	$P_1 x [A_1/(d_{19})^2] / \sum_1$





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- Repeat above table for all zones (Zone 1 through Zone 9).
- Compile the final trip table, similar to the one shown below, for each time horizon.
- Four trip tables will be produced to represent the trip distribution in the 5-year, 10-year, 15-year and 20-year horizons.

O D	1	2	3	4	5	6	7	8	9	Total
1	$P_1 x$ $[A_1/(d_{11})^2] / \sum_1$	P ₁ x [A ₁ /(d ₁₂) ²] / Σ ₁	P ₁ x [A ₁ /(d ₁₃) ²] / Σ ₁	$P_1 x$ [A ₁ /(d ₁₄) ²] / Σ_1	P ₁ x [A ₁ /(d ₁₅) ²] / Σ ₁	P ₁ x [A ₁ /(d ₁₆) ²] / Σ ₁	$P_1 x$ [A ₁ /(d ₁₇) ²] / Σ_1	P ₁ x [A ₁ /(d ₁₈) ²] / Σ ₁	$P_1 x$ [A ₁ /(d ₁₉) ²] / Σ_1	$\Sigma = P_1$
2										$\sum = P_2$
3										$\Sigma = P_3$
4										$\sum = P_4$
5										$\Sigma = P_5$
6										$\sum = P_6$
7										$\sum = P_7$
8										$\Sigma = P_8$
9										$\sum = P_9$
Total	$\sum = A_1$	$\sum = A_2$	$\sum = A_3$	$\sum = A_4$	$\sum = A_5$	$\sum = A_6$	$\sum = A_7$	$\sum = A_8$	$\Sigma = A_9$	

• If Step 5 had been completed, the sum of the attraction for each zone should equal the sum of production for the same zone.

3.7 STEP 7 – ASSIGNMENT

- Assign the trips to intersections using the minimum path algorithm for each zone, for each study horizon.
- 3.8 STEP 8 EXTERNAL TRIP (IF AVAILABLE)
- Collect external trips from Cordon points





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- Distribute external-external trips to intersections.
- This step will be bypassed for Cold Lake as there is no information available for external trips

3.9 STEP 9 – ADD DEVELOPMENT TRIPS TO BACKGROUND TRIPS

- Add the trip distribution from Step 7 to the future background traffic volumes established in Step 3.
- The volumes provided at each intersection are the total traffic volume anticipated for each of the study horizons and can be used to analysis the future intersection capacity.



C Appendix C - Gravity Model (Trip Distribution) Calculations



Traffic Demand Model: Zones & Intersections

Zana	Description	Intersection with Counts
Zone	Description	Node # Intersection
		104 1 Avenue & 16 Street
		105 1 Avenue / 2 Avenue & 10 Street
		106 8 Avenue & Lakeshore Drive
1	Cold Lake North - Commercial/Recreational	107 8 Avenue & 10 Street
		108 8 Avenue & 16 Street
		109 Highway 28 & 25 Street
		111 Highway 55/ 16 Avenue & Highway 28
		101 1 Avenue & 28 Street / English Bay Road
2	Cold Lake North Desidential (North of Liver 20)	102 1 Avenue & 25 Street
2	Cold Lake North - Residential (North of Hwy 28)	103 1 Avenue & Nelson Street
		110 Highway 55 & 28 Street / English Bay Road
0	Cold Lake North Desidential (Couth of Liver 20)	112 16 Avenue & 16 Street
3	Cold Lake North - Residential (South of Hwy 28)	113 16 Avenue & 10 Street
		202 Highway 28 / 55 & 75 Avenue
	Ostat Lates Ostatest - Ostatestatist	203 Highway 28 / 55 & 69 Avenue / Museum Road
4	Cold Lake Central - Commercial	204 Highway 28 / 55 & Tri-City Mall Access
		205 Highway 28 / 55 & 62 Avenue / 61 Avenue
5	Cold Lake Central - Residential	201 Highway 28 / 55 & Energy Centre Access
		301 Highway 28 / 55 & 54 Avenue
		302 Highway 28 / 55 & 52 Avenue
		303 Highway 28 / 55 & 50 Avenue
		304 Highway 28 / 55 & 52 Street
		305 Highway 28 / 55 & 51 Street
		306 Highway 28 / 55 & 50 Street
6	Cold Lake South - CBD/Commercial	307 Highway 28 / 55 & 46 Avenue
		308 Highway 28 / 55 & 43 Avenue
		316 50 Avenue & 53 Street
		317 50 Avenue & 52 Street
		318 50 Avenue & 51 Street
		319 50 Avenue & 50 Street
		320 50 Avenue & 49 Street
		309 57 Street & 52 Avenue (North)
		310 57 Street & 52 Avenue (South)
-	Ordel Lake Orach Desidential (Mast of Liver 00)	311 50 Avenue & 59 Street
1	Cold Lake South - Residential (West of Hwy 28)	312 50 Avenue & 57 Street
		313 Centre Avenue & 59 Street
		314 Centre Avenue & 57 Street
		315 54 Avenue & 51 Street
0	Ostal Later Ostatic Desidential (East of them 00)	321 50 Avenue & 45 Street
8	Cold Lake South - Residential (East of Hwy 28)	322 50 Avenue & 41 Street
		323 50 Avenue / Twp Rd 630 & Baywood Road / RR 20
		401 Kingsway & Medley Road
		402 Kingsway & Glenwood Drive (West)
		403 Kingsway & Glenwood Drive (East)
9	Medley	404 Kingsway & Timberline Drive
		405 Kingsway & Queensway
		406 Kingsway & Tennis Court Road
		407 Queensway & Tennis Court Road

Zone	Description	Area (m ²)	Area (hec)
1	Cold Lake North - Commercial/Recreational	818,544	81.9
2	Cold Lake North - Residential (North of Hwy 28)	5,302,120	530.2
3	Cold Lake North - Residential (South of Hwy 28)	4,499,137	449.9
4	Cold Lake Central - Commercial	622,964	62.3
5	Cold Lake Central - Residential	2,710,956	271.1
6	Cold Lake South - CBD/Commercial	1,171,259	117.1
7	Cold Lake South - Residential (West of Hwy 28)	4,519,673	452.0
8	Cold Lake South - Residential (East of Hwy 28)	5,295,608	529.6
9	Medley	34,603,627	3,460.4
	Total	59,543,887	5,954.4

Traffic Demand Model: Zones & Areas

Traffic Demand Model: Distances

	Distance from Zone X to Zone Y (m)									
	1	2	3	4	5	6	7	8	9	
1	2,190	1,674	1,348	3,747	4,019	6,077	6,321	6,077	7,799	
2	1,674	3,277	2,896	4,055	4,535	6,504	6,521	6,691	7,336	
3	1,348	2,896	2,729	3,251	3,312	5,299	5,706	5,161	7,650	
4	3,747	4,055	3,251	1,144	649	2,450	2,576	2,688	4,476	
5	4,019	4,535	3,312	649	2,191	2,058	2,395	2,155	4,704	
6	6,077	6,504	5,299	2,450	2,058	1,701	888	747	3,890	
7	6,321	6,521	5,706	2,576	2,395	888	2,813	1,630	3,002	
8	6,077	6,691	5,161	2,688	2,155	747	1,630	3,068	4,632	
9	7,799	7,336	7,650	4,476	4,704	3,890	3,002	4,632	5,380	

Distance from Centroid to furthest point in same zone

Traffic Demand Model - Distances²

	Distance from Zone X to Zone Y (m)									
	1	2	3	4	5	6	7	8	9	
1	4,796,930	2,801,310	1,817,598	14,039,176	16,154,592	36,928,963	39,957,131	36,929,607	60,825,891	
2	2,801,310	10,741,309	8,388,242	16,441,732	20,568,375	42,307,265	42,528,271	44,762,992	53,815,958	
3	1,817,598	8,388,242	7,449,558	10,572,188	10,970,754	28,074,900	32,557,480	26,631,180	58,527,941	
4	14,039,176	16,441,732	10,572,188	1,309,087	421,173	6,002,192	6,637,264	7,225,079	20,033,666	
5	16,154,592	20,568,375	10,970,754	421,173	4,801,520	4,235,053	5,734,169	4,645,231	22,125,180	
6	36,928,963	42,307,265	28,074,900	6,002,192	4,235,053	2,893,811	789,007	557,471	15,134,766	
7	39,957,131	42,528,271	32,557,480	6,637,264	5,734,169	789,007	7,911,770	2,658,492	9,014,252	
8	36,929,607	44,762,992	26,631,180	7,225,079	4,645,231	557,471	2,658,492	9,410,559	21,456,287	
9	60,825,891	53,815,958	58,527,941	20,033,666	22,125,180	15,134,766	9,014,252	21,456,287	28,949,736	

Distance from Centroid to furthest point in same zone

Traffic Demand Model: Future Production, 5 Year (2015)

Zone	Total Trips	In Trips	Out Trips
1	347	85	262
2	755	400	355
3	277	172	105
4	974	224	750
5	412	259	154
6	84	18	66
7	0	0	0
8	90	56	33
9	0	0	0
Outside of City	86	54	32
Total	3,025	1,268	1,757

Traffic Demand Model: Future Production, 10 Year (2020)

Zone	Total Trips	In Trips	Out Trips
1	667	163	504
2	1,510	800	710
3	554	344	210
4	1,949	448	1,500
5	825	518	307
6	167	35	132
7	0	0	0
8	180	113	67
9	0	0	0
Outside of City	172	108	63
Total	6,023	2,530	3,493

Traffic Demand Model: Future Production, 15 Year (2025)

Zone	Total Trips	In Trips	Out Trips
1	987	241	745
2	2,777	1,426	1,351
3	944	589	355
4	1,949	448	1,500
5	1,237	777	461
6	359	78	281
7	223	142	81
8	270	169	100
9	0	0	0
Outside of City	257	163	95
Total	9,003	4,033	4,970

Traffic Demand Model: Future Production, 20 Year (2030)

Zone	Total Trips	In Trips	Out Trips
1	1,307	320	987
2	3,507	1,811	1,696
3	1,335	834	501
4	1,949	448	1,500
5	1,650	1,036	614
6	551	120	431
7	447	284	162
8	360	226	134
9	0	0	0
Outside of City	343	217	126
Total	11,447	5,295	6,152

Traffic Demand Model, 5 Year Horizon: Future Production Weight based on Gravity Model. Weight of Zone X to Zone Y = (Area of Zone Y) / (Distance between Zone X & Y ^ 2)

From Zone	To Zone	Weight ¹	%	Final Trip
	1	0.17	3.0%	11
	2	1.89	33.8%	117
	3	2.48	44.1%	153
	4	0.04	0.8%	3
1	5	0.17	3.0%	10
1	6	0.03	0.6%	2
	7	0.11	2.0%	7
	8	0.14	2.6%	9
	9	0.57	10.1%	35
	SUM	5.61	100.0%	347
	1	0.29	12.2%	92
	2	0.49	20.7%	156
	3	0.54	22.5%	170
	4	0.04	1.6%	12
	5	0,13	5.5%	42
2	6	0.03	1.2%	9
	7	0,11	4.5%	34
	8	0,12	5.0%	37
	9	0.64	26.9%	203
	SUM	2.39	100.0%	755
	1	0.45	15.2%	42
	2	0.63	21.3%	59
	3	0.60	20.4%	56
	4	0.06	2.0%	6
	5	0.00	8.3%	23
3	6	0.20	1.4%	<u>25</u> 4
	7	0.04	4.7%	13
	8	0.14	6.7%	10
	9	0.20	20.0%	55
	SUM	2.96	100.0%	277
	1	0.06	0.5%	5
	2	0.00	2.9%	28
	3	0.32	3.8%	38
	<u> </u>	0.43	4.3%	42
	5	6.44	58.2%	567
4	6	0.44	1.8%	17
	7	0.20	6.2%	60
	8	0.00	6.6%	65
	9	1.73	15.6%	152
	SUM	11.06	100.0%	97/
	1	0.05	0.8%	2
	2	0.05	3.0%	16
	2	0.20	6.3%	26
	1	1.48	22.6%	03
	<u>4</u> Б	0.56	22.0% 8.6%	36
5	6	0.00	0.070 1 20/	17
	7	0.20	+.∠% 10.10/	50
	/ 8	0.79	17.1%	72
	0	1.14	22.00/	00
	SUM	6.53	100 0%	<u> </u>
1	000	0.00	100.070	714

Traffic Demand Model, 5 Year Horizon: Future Production Weight based on Gravity Model. Weight of Zone X to Zone Y = (Area of Zone Y) / (Distance between Zone X & Y ^ 2)

From Zone	To Zone	Weight ¹	%	Final Trip	
	1	0.02	0.1%	0	
	2	0.13	0.7%	1	
	3	0.16	0.8%	1	
	4	0.10	0.5%	0	
6	5	0.64	3.4%	3	
0	6	0.40	2.1%	2	
	7	5.73	30.2%	25	
	8	9.50	50.1%	42	
	9	2.29	12.1%	10	
	SUM	18.97	100.0%	84	
	1	0.02	0.2%	0	
	2	0.12	1.4%	0	
	3	0.14	1.6%	0	
	4	0.09	1.1%	0	
7	5	0.47	5.4%	0	
1	6	1.48	17.0%	0	
	7	0.57	6.5%	0	
	8	1.99	22.8%	0	
	9	3.84	43.9%	0	
	SUM	8.74	100.0%	0	
	1	0.02	0.3%	0	
	2	0.12	1.7%	2	
	3	0.17	2.4%	2	
	4	0.09	1.2%	1	
8	5	0.58	8.4%	8	
0	6	2.10	30.2%	27	
	7	1.70	24.4%	22	
	8	0.56	8.1%	7	
	9	1.61	23.2%	21	
	SUM	6.96	100.0%	90	
	1	0.01	0.6%	0	
	2	0.10	4.2%	0	
	3	0.08	3.3%	0	
	4	0.03	1.3%	0	
9	5	0.12	5.2%	0	
J	6	0.08	3.3%	0	
	7	0.50	21.2%	0	
	8	0.25	10.4%	0	
	9	1.20	50.6%	0	
	SUM	2.36	100.0%	0	

					Trips					
From	1	2	3	4	5	6	7	8	9	SUM
1	11	117	153	3	10	2	7	9	35	347
2	92	156	170	12	42	9	34	37	203	755
3	42	59	56	6	23	4	13	19	55	277
4	5	28	38	42	567	17	60	65	152	974
5	3	16	26	93	36	17	50	72	99	412
6	0	1	1	0	3	2	25	42	10	84
7	0	0	0	0	0	0	0	0	0	0
8	0	2	2	1	8	27	22	7	21	90
9	0	0	0	0	0	0	0	0	0	0
SUM	154	379	445	157	688	78	211	251	576	

Traffic Demand Model, 5 Year Horizon: Future Production

Note: Sum of column for Zone 1 must match sum of row for Zone 1 IF both production and attraction information available. No attraction information.

TRIP DISTRIBUTION FROM GRAVITY MODEL

_					Trips					
From	1	2	3	4	5	6	7	8	9	SUM
1	3%	34%	44%	1%	3%	1%	2%	3%	10%	100%
2	12%	21%	22%	2%	6%	1%	4%	5%	27%	100%
3	15%	21%	20%	2%	8%	1%	5%	7%	20%	100%
4	1%	3%	4%	4%	58%	2%	6%	7%	16%	100%
5	1%	4%	6%	23%	9%	4%	12%	17%	24%	100%
6	0%	1%	1%	1%	3%	2%	30%	50%	12%	100%
7	0%	1%	2%	1%	5%	17%	7%	23%	44%	100%
8	0%	2%	2%	1%	8%	30%	24%	8%	23%	100%
9	1%	4%	3%	1%	5%	3%	21%	10%	51%	100%

ADJUSTED TRIP DISTRIBUTION

					Trips					
From	1	2	3	4	5	6	7	8	9	SUM
1	5%	23%	23%	5%	8%	5%	10%	8%	13%	100%
2	20%	15%	10%	15%	10%	8%	7%	5%	10%	100%
3	20%	10%	15%	15%	10%	8%	7%	5%	10%	100%
4	6%	15%	15%	5%	15%	8%	12%	12%	12%	100%
5	16%	12%	12%	15%	15%	8%	7%	5%	10%	100%
6	5%	5%	5%	5%	15%	5%	25%	25%	10%	100%
7	10%	5%	5%	15%	10%	18%	12%	15%	10%	100%
8	10%	5%	5%	15%	10%	20%	10%	15%	10%	100%
9	8%	10%	10%	10%	7%	20%	10%	10%	15%	100%
SUM	100%	100%	100%	100%	100%	100%	100%	100%	100%	

Appendix D - Capacity Analysis



CAPACITY ANALYSIS - EXISTING (2010) HORIZON

	Interse	ection		Forecast	ed Volumes	Read Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lense
Corridor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	for Road Classification (veh/hour/lane) ³	for Road Classification (veh/day/lane) 4	Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound Westbound	960 850	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
1 Avenue	25 Street	Nelson Street	Eastbound	1,640	3,110	Collector	Collector (Residential or Industrial)	400	4,000	1
1 Avenue	Nelson Street	16 Street	Eastbound	1,290	2,650	Collector	Local (Residential or Industrial)	100	1,000	2
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	5,410	9.650	2-I ane Arterial	Collector (Residential or Industrial)	400	4 000	2
11wy 20	11Wy 35/10 Avenue	20 00 00	Southbound Eastbound	4,240 5,260	3,000			400	4,000	2
8 Avenue	25 Street	16 Street	Westbound	2,600	7,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	16 Street	10 Street	Westbound	1,100	2,980	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
8 Avenue	10 Street	Lakeshore Drive	Westbound	950 770	1,720	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	1
Hwy 55	West City Limit	28 Street	Eastbound Westbound	3,360 1,570	4,930	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	28 Street	Hwy 28	Eastbound	3,250	4,980	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	Hwy 28	16 Street	Eastbound	1,820	3,210	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	16 Street	10 Street	Eastbound	1,390	2.050	Collector	Local (Residential or Industrial)	100	1.000	2
16 Ανορμο	10 Street	8 Street	Eastbound	780	2.430	Collector	Local (Residential or Industrial)	100	1.000	2
	TO Subsi	0 011661	Westbound	1,110	2,400	Collector	Local (Residential of fildestial)	100	1,000	2
English Bay Road	North City Limit	1 Avenue	Southbound	1,090	2,540	Collector	Local (Residential or Industrial)	100	1,000	2
English Bay Road	1 Avenue	25 Street	Southbound	780	1,930	Collector	Local (Residential or Industrial)	100	1,000	1
English Bay Road	25 Street	Hwy 28	Southbound	1,490	3,100	Collector	Collector (Residential or Industrial)	400	4,000	1
28 Street	English Bay Road	Hwy 55	Northbound Southbound	660 390	1,050	Collector	Local (Residential or Industrial)	100	1,000	1
25 Street	1 Avenue	English Bay Road	Northbound Southbound	840 770	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
Nelson Street	1 Avenue	16 Street	Eastbound	570	900	Collector	Local (Residential or Industrial)	100	1,000	1
16 Street	1 Avenue	8 Avenue	Northbound	2,070	2.840	Collector	Local (Residential or Industrial)	100	1.000	3
16 Street	8 Америе	16 Avenue	Southbound Northbound	770 420	870	Collector	Local (Residential or Industrial)	100	1,000	1
10 Street	8 Avenue	TO Avenue	Southbound Northbound	450 780	670	Collector	Local (Residential of Industrial)	100	1,000	1
10 Street	1 Avenue	8 Avenue	Southbound	830	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
10 Street	8 Avenue	16 Avenue	Southbound	910	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Southbound	6,170	12,980	2-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	75 Avenue	69 Avenue	Northbound Southbound	7,480 7,680	15,160	2-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	69 Avenue	54 Avenue	Northbound	7,500	14,650	2-Lane Arterial	Undivided Arterial	800	8,000	1
54 Avenue	56 Street	Hwy 28/55	Eastbound	1,330	2,860	Collector	Local (Residential or Industrial)	100	1,000	2
54 Avenue	Hwy 28/55	51 Street	Eastbound	2,320	4,600	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	51 Street	45 Street	Eastbound	2,280	2.610	Collector	Local (Residential or Industrial)	100	1.000	2
50 Average	57 Otreat	10 00000	Westbound Eastbound	1,170 810	2,010	Collector	Level (Residential or Industrial)	100	1,000	2
52 Avenue	57 Street	HWy 26/55	Westbound Eastbound	1,180 220	1,990	Collector	Local (Residential or Industrial)	100	1,000	2
50 Avenue	62 Street	59 Street	Westbound	370	590	Collector	Local (Residential or Industrial)	100	1,000	1
50 Avenue	59 Street	57 Street	Westbound	530	950	Collector	Local (Residential or Industrial)	100	1,000	1
50 Avenue	57 Street	55 Street	Eastbound Westbound	180 340	520	Collector	Local (Residential or Industrial)	100	1,000	1
Centre Avenue	59 Street	57 Street	Eastbound Westbound	8,340 3,700	12,040	2-Lane Arterial	Undivided Arterial	800	8,000	2
Centre Avenue	57 Street	Hwy 28/55	Eastbound	8,500 4 300	12,800	4-Lane Arterial	Undivided Arterial	800	8,000	2
50 Avenue	Hwy 28/55	51 Street	Eastbound	3,280	5,890	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	51 Street	50 Street	Eastbound	3,080	5.050	2-I ane Arterial	Collector (Residential or Industrial)	400	4.000	1
E0 Avenue	E0 Street	4E Street	Westbound Eastbound	1,970 3,210	5,000 5,100	2 Long Arterial	Collector (Residential or Industrial)	400	4,000	1
S0 Avenue	SU Street	40 011661	Westbound	1,890	5,100	2-Lane Anterial	Collector (Residential of Industrial)	400	4,000	1
50 Avenue	45 Street	41 Street	Westbound	1,510	4,130	2-Lane Arterial	Conector (Residential or Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial	Westbound	1,140	2,960	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
50 Avenue	Future Arterial	Baywood Road	Westbound	960	2,470	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	1
59 Street	50 Avenue	Centre Avenue	Northbound Southbound	630 280	910	Collector	Local (Residential or Industrial)	100	1,000	1
57 Street	52 Avenue	50 Avenue	Northbound Southbound	770 470	1,240	Collector	Local (Residential or Industrial)	100	1,000	1
57 Street	50 Avenue	Centre Avenue	Northbound	820	1,340	Collector	Local (Residential or Industrial)	100	1,000	1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	6,970	13,840	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	52 Avenue	50 Avenue	Northbound	7,640	13,340	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	50 Avenue	50 Street	Southbound Northbound	5,700 5,280	10.730	4-I ane Arterial	Undivided Arterial	800	8,000	1
11wy 20/00	So Avenue	30 011001	Southbound	5,450 5,930	10,730	+ Lano Artenar	Chuivideu Aitendi	0	0,000	1
Hwy 28/55	50 Street	43 Avenue	Southbound	6,670	12,600	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	43 Avenue	South City Limit	Southbound	6,230	11,730	2-Lane Arterial	Undivided Arterial	800	8,000	1
51 Street	54 Avenue	50 Avenue	Southbound	900	1,770	Collector	Local (Residential or Industrial)	100	1,000	1
50 Street	50 Avenue	Hwy 28/55	Northbound Southbound	2,980 2,900	5,880	Collector	Collector (Residential or Industrial)	400	4,000	1
45 Street	54 Avenue	50 Avenue	Northbound Southbound	410 280	690	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street	54 Avenue	50 Avenue	Northbound	800	1,320	Collector	Local (Residential or Industrial)	100	1,000	1
1	1		Journoorld	320	1	1	1	1		· · · · ·

CAPACITY ANALYSIS - EXISTING (2010) HORIZON

Corridor	Inters	ection	Direction	Forecast	Forecasted Volumes		Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Contact	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
Kingeway	50 Street	Glenwood	Eastbound	7,290	10,510	2-Lane Arterial	Lindivided Arterial	800	8.000	1
Ringsway	33 011061	Clerwood	Westbound	3,220	10,510	2-Lane Arteriar		000	8,000	1
Kingeway	Timberline	Glenwood	Eastbound	6,200	8 870	Collector	Collector (Residential or Industrial)	400	4.000	2
Ringsway	Timbernine	Clerwood	Westbound	2,670	0,070	CONSCIO	Collector (Residential of Industrial)	400	4,000	1
Kingsway	Queensway	Timberline	Eastbound	2,840	4 480	Collector	Collector (Residential or Industrial)	400	4.000	1
Ringsway	Quodriaway	Timbernine	Westbound	1,640	4,400	CONSCIO	Collector (Residential of Industrial)	400	4,000	1
Kingeway	Tennis Court Road	Oueensway	Eastbound	540	1 170	Collector	Local (Residential or Industrial)	100	1 000	1
Ringsway	Termis Court Road	Queenaway	Westbound	630	1,170	CONSCION	Eddal (Residential of Industrial)	100	1,000	1
Kingeway	End of Road	Tennis Court Road	Eastbound	740	1 520	Collector	Local (Residential or Industrial)	100	1.000	1
Ringsway	End of Road	Termis Court Road	Westbound	780	1,520	CONSCION	Eddal (Residential of Industrial)	100	1,000	1
Tennis Court Road	Queensway	Kingeway	Northbound	220	270	Collector	Lano	N/A	N/A	N/A
Terrina Court Road	Quoonaway	Ringsway	Southbound	50	210	CONSCION	Laite	1975	INA	N/A
Queensway	Tennis Court Road	Kingsway	Northbound	1,020	1 790	Collector	Local (Residential or Industrial)	100	1 000	2
quoonomay	Torino Court Hoda	rangonay	Southbound	770	1,100	Condition	2000 (Residential of Indestrial)	100	1,000	1
Queensway	Kingsway	Hanger I n	Northbound	1,870	2 200	Collector	Local (Residential or Industrial)	100	1 000	2
quoonomay	rangonay	ridingor En	Southbound	330	2,200	Condition	2000 (Residential of Indestrial)	100	1,000	1
Timberline	Juniner Avenue	Kingsway	Northbound	740	1 340	Collector	Local (Residential or Industrial)	100	1 000	1
TIMborinio	ouniper / wonde	rangonay	Southbound	600	1,010	Condition	2000 (Robiddinia) of Industria)	100	1,000	1
Timberline	Kingeway	Athabasca Road	Northbound	1,720	2 520	Collector	Local (Residential or Industrial)	100	1.000	2
TITIDGTIIIG	Tungaway	Anabasca Road	Southbound	800	2,520	CONSCION	Eddal (Residential of Industrial)	100	1,000	1
Glenwood Drive	Glenwood	Kingeway	Northbound	2,600	3 020	Collector	Collector (Residential or Industrial)	400	4.000	1
Cicriwood Drive	Chertwood	rungsway	Southbound	1,320	5,320	CONDUID	Concetor (residential of Industrial)	400	4,000	1

I. Road classification based on 2000 Transportation Study
 I. Road classification based on 2000 Transportation Study
 I. Road classification based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 S. Based on Lane Capacity Table (latched). Using road classification according to City's standards.
 A Based on assumption that PM peak hour traffic is 10% of the daily traffic

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CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

A	Inters	ection		Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	То	Direction	Daily Traffic -	Daily Traffic -	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	1,600	2,800	Collector	Local (Residential or Industrial)	100	1,000	2
1 Avenue	25 Street	Nelson Street	Eastbound	2,490	4 630	Collector	Collector (Residential or Industrial)	400	4 000	1
4 August	Nelses Street	40 Otreat	Westbound Eastbound	2,140 2,680	5,500	Collector	Collector (Residential or Industrial)	400	4,000	1
1 Avenue	INEISON Street	16 Street	Westbound	2,820	5,500	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	8,240	17,840	4-Lane Arterial	Undivided Arterial	800	8,000	2
8 Avenue	25 Street	16 Street	Westbound	4,020	10,890	4-Lane Arterial	Undivided Arterial	800	8,000	1
8 Avenue	16 Street	10 Street	Eastbound Westbound	2,470 1,740	4,210	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	10 Street	Lakeshore Drive	Eastbound Westbound	1,300 1,310	2,610	4-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
Hwy 55	West City Limit	28 Street	Eastbound Westbound	3,700	5,430	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	28 Street	Hwy 28	Eastbound	5,130	9,040	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
16 Avenue	Hwy 28	16 Street	Eastbound	3,720	6,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	16 Street	10 Street	Eastbound	2,770 2,490	4.010	2-I ane Arterial	Collector (Residential or Industrial)	400	4.000	1
16 Avenue	10 Street	8 Street	Westbound Eastbound	1,520 2,450	4.240	2-Lane Arterial	Collector (Residential or Industrial)	400	4 000	1
Facial Day David	North City Limit	4 Aureur	Westbound Northbound	1,790 4,740	4,240	2-Laite Artenar	Collector (Residential or Industrial)	400	4,000	1 2
English Bay Road	North City Limit	T Avenue	Southbound	3,860	8,600	Collector	Collector (Residential or Industrial)	400	4,000	1
English Bay Road	1 Avenue	25 Street	Southbound	4,130	9,710	Collector	Collector (Residential or Industrial)	400	4,000	2
English Bay Road	25 Street	Hwy 28	Southbound	4,730	8,950	Collector	Collector (Residential or Industrial)	400	4,000	2
28 Street	English Bay Road	Hwy 55	Southbound	2,650	4,460	Collector	Collector (Residential or Industrial)	400	4,000	1
25 Street	1 Avenue	English Bay Road	Northbound Southbound	1,620 1,400	3,020	Collector	Collector (Residential or Industrial)	400	4,000	1
Nelson Street	1 Avenue	16 Street	Eastbound	1,180 680	1,860	Collector	Local (Residential or Industrial)	100	1,000	2
16 Street	1 Avenue	8 Avenue	Northbound	4,840	6,600	Collector	Collector (Residential or Industrial)	400	4,000	2
16 Street	8 Avenue	16 Avenue	Northbound	970	2,060	Collector	Local (Residential or Industrial)	100	1,000	1
16 Street	16 Avenue	10 Street	Northbound	1,090	1.780	Collector	Local (Residential or Industrial)	100	1.000	2
10 Street	1 Америе	8 Америе	Southbound Northbound	750 1,340	2,610	Collector	Local (Residential or Industrial)	100	1,000	1 2
10 011061	Avenue	0 Avenue	Southbound Northbound	1,270	2,010			100	1,000	2
TO Street	8 Avenue	To Avenue	Southbound Northbound	1,710	3,290	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	16 Avenue	16 Street	Southbound	980	2,020	Collector	Local (Residential or Industrial)	100	1,000	1
6 Street ⁵	16 Avenue	21 Avenue	Southbound	980	2,020	Collector	Local (Residential or Industrial)	100	1,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Southbound	12,020	25,070	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	75 Avenue	69 Avenue	Southbound	13,970 13,860	27,830	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	69 Avenue	54 Avenue	Northbound Southbound	13,310 15,550	28,860	4-Lane Arterial	Divided Arterial	1,000	10,000	2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound Westbound	1,750 3.080	4,830	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	56 Street	Hwy 28/55	Eastbound Westbound	1,820	4,110	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	Hwy 28/55	51 Street	Eastbound	3,800	7,350	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	51 Street	45 Street	Eastbound	2,990	5,420	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	59 Street	57 Street	Eastbound	980	2,350	Collector	Local (Residential or Industrial)	100	1,000	1
52 Avenue	57 Street	Hway 28/55	Eastbound	1,370	4 130	Collector	Collector (Residential or Industrial)	400	4 000	2
Centre Avenue	59 Street	57 Street	Westbound Eastbound	2,450 12,290	17 560	2-Lane Arterial	Lindivided Arterial	800	8,000	1 2
Centre Avenue	53 Otreet	5/ 00/65	Westbound Eastbound	5,270 11,020	40,400	2-Lane Arterial	Undivided Arterial	800	8,000	1 2
Centre Avenue	or Sueet	rnwy 20/55	Westbound Eastbound	7,400	10,42U			000	6,000	1
50 Avenue	Hwy 28/55	51 Street	Westbound	3,640	8,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	51 Street	50 Street	Westbound	2,640	6,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	50 Street	45 Street	Westbound	2,320	6,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	45 Street	41 Street	Westbound	2,060	5,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial		2,840	4,620	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	Future Arterial	Baywood Road	Eastbound Westbound	2,360 1,500	3,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
43 Avenue	Hwy 28/55	45 Street	Eastbound Westbound	3,410 3,100	6,510	Collector	Collector (Residential or Industrial)	400	4,000	1
59 Street	52 Avenue	Centre Avenue	Northbound	1,310	1,890	Collector	Local (Residential or Industrial)	100	1,000	2
57 Street	54 Avenue	52 Avenue	Northbound	910	1,510	Collector	Local (Residential or Industrial)	100	1,000	1
57 Street	52 Avenue	Centre Avenue	Northbound	1,700	2,780	Collector	Local (Residential or Industrial)	100	1,000	2
Hwy 28/55	54 Avenue	52 Avenue	Northbound	11,440	24,400	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	52 Avenue	50 Avenue	Southbound Northbound	12,960 11,980	23.440	4-Lane Arterial	Divided Arterial	1.000	10.000	2
Huny 20/55	50 Avenue	50 Street	Southbound Northbound	11,460 5,180	11 660	A-Lane Artorial	Lindivided Artorial	800	8,000	2
U 00/55	EO OLL ·	42 4	Southbound Northbound	6,480 8,070	47.540			000	0,000	1 2
rtwy 28/55	ou Street	43 Avenue	Southbound	9,440	17,510	4-∟ane Arterial	Undivided Arterial	800	8,000	2
Hwy 28/55	43 Avenue	South City Limit	Southbound	7,360	13,880	4-Lane Arterial	Undivided Arterial	800	8,000	1
51 Street	54 Avenue	50 Avenue	Southbound	1,320	2,800	Collector	Local (Residential or Industrial)	100	1,000	2
50 Street	50 Avenue	Hwy 28/55	Southbound	4,770 4,530	9,300	Collector	Collector (Residential or Industrial)	400	4,000	2
45 Street	54 Avenue	50 Avenue	Northbound Southbound	520 340	860	Collector	Local (Residential or Industrial)	100	1,000	1
45 Street	50 Avenue	43 Avenue	Northbound Southbound	370 580	950	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street	54 Avenue	50 Avenue	Northbound Southbound	1,660 1,080	2,740	Collector	Local (Residential or Industrial)	100	1,000	2

CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

Corridor	ection	Direction	Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes	
Contrast	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
Kingsway	50 Street	Glenwood	Eastbound	9,530	15 530	2-Lane Arterial	Individed Arterial	800	8 000	2
rungaway	33 00000	Clerwood	Westbound	6,000	13,330	2-Lano Antonia	Ondivided Artenai	000	0,000	1
Kingsway	Timberline	Glenwood	Eastbound	7,950	12 240	Collector	Individed Arterial	800	8 000	1
Killysway	Timbernine	Gieriwood	Westbound	4,290	12,240	CONECTO	Undivided Arterial	800	8,000	1
Kingeway	Queensway	Timberline	Eastbound	3,770	6 360	Collector	Collector (Residential or Industrial)	400	4 000	1
Ringaway	Queenaway	TITIDETITIE	Westbound	2,590	0,000	Conscion	Collector (Residential or Industrial)	400	4,000	1
Kingeway	Tennis Court Road		Eastbound	770	1 770	Collector	Local (Residential or Industrial)	100	1 000	1
Ringaway	Termis Court Road	Qubbilisway	Westbound	1,000	1,770	Conscion	Eocal (Residential or Industrial)	100	1,000	1
Kingeway	End of Road	Tennie Court Road	Eastbound	900	2 0 2 0	Collector	Local (Residential or Industrial)	100	1 000	1
rungaway	End of Rodu	Termis Court Road	Westbound	1,120	2,020	Conscion	Eddal (Residential or Industrial)	100	1,000	2
Tennis Court Road	Queensway	Kingsway	Northbound	250	310	Collector	Lane	N/A	N/A	N/A
Tonino obartitoda	quoonomay	rangonay	Southbound	60	010	Condeter	Edito			N/A
Queensway	Tennis Court Road	Kingsway	Northbound	1,790	3 1 1 0	Collector	Collector (Residential or Industrial)	400	4 000	1
quoonomay	Torino Oburt Roda	rangonay	Southbound	1,320	0,110	Condector		100	1,000	1
Queensway	Kingsway	Hanger I n	Northbound	2,370	2,860	Collector	Local (Residential or Industrial)	100	1 000	3
Queensway	rangaway	Hanger En	Southbound	490	2,000	Conscion	Eddal (Residential or Industrial)	100	1,000	1
Timberline	luniner Avenue	Kingeway	Northbound	1,050	1.830	Collector	Local (Residential or Industrial)	100	1 000	2
TITIDOTITIO	Sumper Avenue	Ringaway	Southbound	780	1,030	Conscion	Eddal (Residential or Industrial)	100	1,000	1
Timberline	Kingsway	Athabasca Road	Northbound	2,270	3.470	Collector	Collector (Residential or Industrial)	400	4 000	1
TITIDOTITIO	rangaway	Athabasca Road	Southbound	1,200	3,470	Conscion	Collector (Residential or Industrial)	400	4,000	1
Glenwood Drive	Glenwood	Kingeway	Northbound	3,430	5 130	Collector	Collector (Residential or Industrial)	400	4 000	1
Cierrwood Drive	Cicilwood	ThingSway	Southbound	1,700	3,730	CONDUID	Concetor (residential of Industrial)	400	4,000	1

Control of the second reaction based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 Read classification based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 Read classification based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 Read on Lane Capacity Table (attached). Using read classification according to City's standards.
 Read on assumption that PM peak hour traffic is 10% of the daily traffic
 S. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

	Inters	ection		Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two	2000 TPS ¹	City of Cold Lake ²	for Road Classification (veh/hour/lane) ³	for Road Classification (veh/day/lane) 4	Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	2,190	3 690	Collector	Collector (Residential or Industrial)	400	4.000	1
1 Augnug	25 Street	Noloon Street	Westbound Eastbound	1,500 4,250	7,620	Collector	Collector (Residential or Industrial)	400	4,000	1 2
T Avenue	25 Street	INVERSION STREET	Westbound Eastbound	3,380 4,120	7,630	Collector	Collector (Residential of Industrial)	400	4,000	1 2
1 Avenue	Nelson Street	16 Street	Westbound	4,350	8,470	Collector	Collector (Residential or Industrial)	400	4,000	2
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	12,480	26,760	4-Lane Arterial	Divided Arterial	1,000	10,000	2
8 Avenue	25 Street	16 Street	Westbound	5,750	14,780	4-Lane Arterial	Undivided Arterial	800	8,000	1
8 Avenue	16 Street	10 Street	Eastbound Westbound	3,250 2,500	5,750	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	10 Street	Lakeshore Drive	Eastbound Westbound	1,780	3,700	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	West City Limit	28 Street	Eastbound	4,640	6,850	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
Hwy 55	28 Street	Hwy 28	Eastbound	7,690	14.100	2-Lane Arterial	Undivided Arterial	800	8.000	1
16 Αγρομο	Hung 28	16 Street	Westbound Eastbound	6,410 5,720	9.850	2-I ane Arterial	Collector (Recidential or Industrial)	400	4,000	1 2
10 Avenue	11my 20	10 00000	Westbound Eastbound	4,130 3.810	3,030	2-Lane Arterial		400	4,000	2
16 Avenue	16 Street	10 Street	Westbound	2,320	6,130	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	10 Street	8 Street	Westbound	2,470	6,060	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
English Bay Road	North City Limit	1 Avenue	Southbound	6,090	13,480	Collector	Undivided Arterial	800	8,000	1
English Bay Road	1 Avenue	25 Street	Northbound Southbound	9,100 6.800	15,900	Collector	Undivided Arterial	800	8,000	2
English Bay Road	25 Street	Hwy 28	Northbound Southbound	7,980	14,720	Collector	Undivided Arterial	800	8,000	1
28 Street	English Bay Road	Hwy 55	Northbound	4,620	7,920	Collector	Collector (Residential or Industrial)	400	4,000	2
25 Street	1 Avenue	English Bay Road	Northbound	3,310	6.010	Collector	Collector (Residential or Industrial)	400	4.000	1
Noloop Street	1 Αυρουο	16 Street	Eastbound	2,700 1,820	2,970	Collector	Loool (Residential or Industrial)	100	1.000	2
Neison Street	T Avenue	10 Stieet	Westbound	1,050	2,070	Collector	Eucar (Residential or Industrial)	100	1,000	2
16 Street	1 Avenue	8 Avenue	Southbound	2,530	8,760	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	8 Avenue	16 Avenue	Southbound	1,950	3,490	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	16 Avenue	10 Street	Southbound	1,740	3,250	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	1 Avenue	8 Avenue	Northbound Southbound	1,950 1,870	3,820	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	8 Avenue	16 Avenue	Northbound	2,280	4,810	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	16 Avenue	16 Street	Northbound	1,820	3,510	Collector	Collector (Residential or Industrial)	400	4,000	1
6 Street 5	16 Avenue	21 Avenue	Northbound	1,820	3.510	Collector	Collector (Residential or Industrial)	400	4.000	1
Hany 28/55	Hway 55/16 Avenue	75 Ανορμο	Northbound	1,690 20,290	38 580	4-I and Arterial	Exprocession	1 800	18,000	1 2
11wy 20/35	They Sol To Avenue	13 Avenue	Southbound Northbound	18,290 21,650	30,300	4-Laite Arterial	Expressivay	1,000	10,000	2
Hwy 28/55	75 Avenue	69 Avenue	Southbound	21,170	42,820	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	69 Avenue	54 Avenue	Southbound	20,270	37,270	4-Lane Arterial	Expressway	1,800	18,000	2
75 Avenue	Hwy 28/55	Future Arterial	Westbound	5,530	9,240	Collector	Collector (Residential or Industrial)	400	4,000	2
69 Avenue	Glenwood	Hwy 28/55	Eastbound Westbound	3,080 2,450	5,530	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	56 Street	Hwy 28/55	Eastbound Westbound	2,350 3.210	5,560	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,130 4 280	9,410	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	51 Street	45 Street	Eastbound	4,600	8,340	Collector	Collector (Residential or Industrial)	400	4,000	2
52 Avenue	59 Street	57 Street	Eastbound	1,500	3.610	Collector	Collector (Residential or Industrial)	400	4.000	1
52 Δυρομο	57 Street	Huay 28/55	Westbound Eastbound	2,110 2,590	6 360	Collector	Collector (Recidential or Industrial)	400	4,000	1
32 Avenue	57 Street	11wy 20/35	Westbound Eastbound	3,770	0,000	Collector		400	4,000	1 2
Centre Avenue	59 Street	57 Street	Westbound	5,390	17,950	2-Lane Arterial	Undivided Arterial	800	8,000	1
Centre Avenue	57 Street	Hwy 28/55	Westbound	8,210	19,350	4-Lane Arterial	Undivided Arterial	800	8,000	2
50 Avenue	Hwy 28/55	51 Street	Westbound	4,850	11,410	2-Lane Arterial	Undivided Arterial	800	8,000	1
50 Avenue	51 Street	50 Street	Eastbound Westbound	5,190 3,500	8,690	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
50 Avenue	50 Street	45 Street	Eastbound Westbound	5,420 3,090	8,510	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
50 Avenue	45 Street	41 Street	Eastbound	4,560	7,270	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
50 Avenue	41 Street	Future Arterial	Eastbound	3,950	6,420	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,470 3,270	5,350	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
43 Auguro	Huay 20/65	45 Circos	Westbound Eastbound	2,080 4,710	8,540	Collector	Collector (Residential or Industrial)	400	4,000	1 2
45 AVENUE	riwy 28/35	40 STREET	Westbound	3,930 2,010	0,040	Conector	Conector (residential or industrial)	400	4,000	1 3
59 Street	52 Avenue	Centre Avenue	Southbound	980	2,990	Collector	Local (Residential or Industrial)	100	1,000	1
57 Street	54 Avenue	52 Avenue	Southbound	930	2,340	Collector	Local (Residential or Industrial)	100	1,000	1
57 Street	52 Avenue	Centre Avenue	Southbound	2,620	4,280	Collector	Collector (Residential or Industrial)	400	4,000	1 1
Hwy 28/55	54 Avenue	52 Avenue	Northbound Southbound	14,270	32,000	4-Lane Arterial	Expressway	1,800	18,000	1
Hwy 28/55	52 Avenue	50 Avenue	Northbound	14,590 15,870	30,460	4-Lane Arterial	Expressway	1,800	18,000	1
Hwy 28/55	50 Avenue	50 Street	Northbound	7,220	16,490	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	50 Street	43 Avenue	Northbound	10,360	22,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	43 Δυσομο	South City Limit	Southbound Northbound	12,550 7,700	16.210	4. ane Arterial	Undivided Arterial	800	8,000	2
E4 C	54 Aurer	50 A	Southbound Northbound	8,610 1,550	2 040	Collector	Collector / Decidential and the tory	400	4,000	2
51 Street	54 AVENUE	SU AVENUE	Southbound Northbound	1,690 5,520	3,240	Collector	Conector (Residential or Industrial)	400	4,000	1
50 Street	50 Avenue	Hwy 28/55	Southbound	5,240	10,760	Collector	Undivided Arterial	800	8,000	1
45 Street	54 Avenue	50 Avenue	Southbound	420	1,060	Collector	Local (Residential or Industrial)	100	1,000	1
45 Street	50 Avenue	43 Avenue	Northbound Southbound	450 710	1,160	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street	54 Avenue	50 Avenue	Northbound Southbound	2,560 1,660	4,220	Collector	Collector (Residential or Industrial)	400	4,000	1

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

Corridor	Inters	ection	Direction	Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Contaor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
Kingsway	59 Street	Glenwood	Eastbound Westbound	9,220 6,220	15,440	2-Lane Arterial	Undivided Arterial	800	8,000	2
Kingsway	Timberline	Glenwood	Eastbound Westbound	9,960 6.010	15,970	Collector	Undivided Arterial	800	8,000	2
Kingsway	Queensway	Timberline	Eastbound Westbound	4,840	8,440	Collector	Collector (Residential or Industrial)	400	4,000	2
Kingsway	Tennis Court Road	Queensway	Eastbound Westbound	890 1.400	2,290	Collector	Local (Residential or Industrial)	100	1,000	1
Kingsway	End of Road	Tennis Court Road	Eastbound	1,080	2,550	Collector	Local (Residential or Industrial)	100	1,000	2
Tennis Court Road	Queensway	Kingsway	Northbound	270	330	Collector	Lane	N/A	N/A	N/A N/A
Queensway	Tennis Court Road	Kingsway	Northbound	2,300	3,990	Collector	Collector (Residential or Industrial)	400	4,000	1
Queensway	Kingsway	Hanger Ln	Northbound	2,940	3,590	Collector	Collector (Residential or Industrial)	400	4,000	1
Timberline	Juniper Avenue	Kingsway	Northbound	1,390	2,370	Collector	Local (Residential or Industrial)	100	1,000	2
Timberline	Kingsway	Athabasca Road	Northbound Southbound	2,890	4,520	Collector	Collector (Residential or Industrial)	400	4,000	1
Glenwood Drive	Glenwood	Kingsway	Northbound	6,290	9,880	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2

CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

	Inters	ection		Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	То	Direction	Daily Traffic -	Daily Traffic -	2000 TPS ¹	City of Cold Lake ²	for Road Classification (veh/hour/lane) ³	for Road Classification (veh/day/lane) 4	Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	2,870	4.780	Collector	Collector (Residential or Industrial)	400	4.000	1
4.4	05 01-1-1	Nolosa Orean	Westbound Eastbound	1,910 5,660	10.040	0-11		000	0,000	1
1 Avenue	25 Street	Nelson Street	Westbound	4,680	10,340	Collector	Undivided Artenai	800	8,000	1
1 Avenue	Nelson Street	16 Street	Westbound	5,990	11,670	Collector	Undivided Arterial	800	8,000	1
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	17,380	36,170	4-Lane Arterial	Expressway	1,800	18,000	1
8 Avenue	25 Street	16 Street	Eastbound Westbound	11,040 7,320	18,360	4-Lane Arterial	Undivided Arterial	800	8,000	2
8 Avenue	16 Street	10 Street	Eastbound	3,930	7,150	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,250	4,850	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	West City Limit	28 Street	Eastbound	2,600 5,560	8.270	2-Lane Arterial	Collector (Residential or Industrial)	400	4.000	2
Hum EE	29 Street	Line 28	Westbound Eastbound	2,710 11,050	20.440	2 Long Arterial	Divided Arterial	1.000	10.000	1 2
Hwy 55	28 Stieet	Hwy 28	Westbound	9,390 7.360	20,440	2*Lane Arterial	Divided Alterial	1,000	10,000	1
16 Avenue	Hwy 28	16 Street	Westbound	5,550	12,910	2-Lane Arterial	Undivided Arterial	800	8,000	1
16 Avenue	16 Street	10 Street	Westbound	3,110	7,960	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	10 Street	8 Street	Westbound	4,640 3,190	7,830	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
English Bay Road	North City Limit	1 Avenue	Northbound Southbound	10,550 9,540	20,090	Collector	Divided Arterial	1,000	10,000	2
English Bay road	1 Avenue	25 Street	Northbound	13,350	24,350	Collector	Divided Arterial	1,000	10,000	2
English Bay road	25 Street	Hwy 28	Northbound	11,090	21,150	Collector	Divided Arterial	1,000	10,000	2
28 Street	English Bay Road	Hwy 55	Northbound	7,100	12,690	Collector	Undivided Arterial	800	8,000	1
25 Street	1 Avenue	Foolish Bay Road	Northbound	5,590 4,640	8 710	Collector	Collector (Residential or Industrial)	400	4.000	1 2
Lo otroot	1 Avenue	40 One of	Southbound Eastbound	4,070 2,510	0,000	Oollosta	Collector (Residential or Industrial)	400	4,000	2
Nelson Street	1 Avenue	16 Street	Westbound	1,450	3,900	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	1 Avenue	8 Avenue	Southbound	3,660	11,530	Collector	Undivided Arterial	800	8,000	1
16 Street	8 Avenue	16 Avenue	Southbound	2,180 2,910	5,090	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	16 Avenue	10 Street	Northbound Southbound	2,550 2,330	4,880	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	1 Avenue	8 Avenue	Northbound	2,800	5,510	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	8 Avenue	16 Avenue	Northbound	3,020	6,500	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	16 Avenue	16 Street	Northbound	2,440	4,590	Collector	Collector (Residential or Industrial)	400	4,000	1
6 Street 5	16 Avenue	75 Avenue	Northbound	2,150 2,440	4.590	Collector	Collector (Residential or Industrial)	400	4.000	1
Hun: 28/55	Huar EE/16 Auropuo	75 Augoug	Southbound Northbound	2,150 27,060	52,800	4 Long Artorial	Everenceurer	1 900	18.000	2
riwy 26/35	Hwy 55/16 Avenue	75 Avenue	Southbound	25,830 28,420	52,890	4-Lane Arterial	Expressway	1,000	18,000	2
Hwy 28/55	75 Avenue	69 Avenue	Southbound	28,570	56,990	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	69 Avenue	54 Avenue	Southbound	24,930	46,290	4-Lane Arterial	Expressway	1,800	18,000	2
75 Avenue	Hwy 28/55	Future Arterial	Westbound	4,950 6,610	11,560	Collector	Undivided Arterial	800	8,000	1
69 Avenue	Glenwood	Hwy 28/55	Eastbound Westbound	4,320 3,680	8,000	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
69 Avenue	Hwy 28/55	Future Arterial	Eastbound Westbound	8,130 8,840	16,970	Collector	Undivided Arterial	800	8,000	2
47 Street ⁶	69 Avenue	61/62 Avenue	Northbound	4,420	8,485	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	56 Street	Hwy 28/55	Eastbound	3,160	7,520	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,310	9,910	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	51 Street	45 Street	Eastbound	4,600 6,340	11.490	Collector	Individed Arterial	800	8.000	2
54 Aurora 7	45 Street	41 Etreet	Westbound Eastbound	5,150 3,795	7 120	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	45 Stieler	41 311001	Westbound	3,335	7,130	Collector	Collector (Residential or Industrial)	400	4,000	1 2
54 Avenue	41 Street	Future Arterial	Westbound	1,520	2,770	Collector	Local (Residential or Industrial)	100	1,000	2
52 Avenue	59 Street	57 Street	Westbound	2,070	4,980	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	57 Street	Hwy 28/55	Eastbound Westbound	3,570 5,200	8,770	Collector	Collector (Residential or Industrial)	400	4,000	2
Centre Avenue	59 Street	57 Street	Eastbound Westbound	15,000 6,440	21,440	2-Lane Arterial	Divided Arterial	1,000	10,000	2
Centre Avenue	57 Street	Hwy 28/55	Eastbound	13,460	23,590	4-Lane Arterial	Divided Arterial	1,000	10,000	2
50 Avenue	Hwy 28/55	51 Street	Eastbound	7,440	12,700	2-Lane Arterial	Undivided Arterial	800	8,000	1
50 Avenue	51 Street	50 Street	Eastbound	6,140	9.750	2-Lane Arterial	Collector (Residential or Industrial)	400	4.000	2
50 Avenue	50 Street	45 Street	Eastbound	3,610 5,990	8.430	2-Lane Arterial	Collector (Residential or Industrial)	400	4.000	2
30 Avenue	30 Sheet	45 50060	Westbound Eastbound	2,440 5.110	0,430	2-Lane Arterial		400	4,000	1 2
50 Avenue	45 Street	41 Street	Westbound	2,180	7,290	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial	Westbound	1,660	4,640	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	Future Arterial	Baywood Road	Westbound	2,630	4,450	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
43 Avenue	Hwy 28/55	45 Street	Eastbound Westbound	5,430 4,510	9,940	Collector	Collector (Residential or Industrial)	400	4,000	2
59 Street	52 Avenue	Centre Avenue	Northbound	2,780	4,010	Collector	Collector (Residential or Industrial)	400	4,000	1
57 Street	54 Avenue	52 Avenue	Northbound	1,940	3,220	Collector	Collector (Residential or Industrial)	400	4,000	1
57 Street	52 Avenue	Centre Avenue	Northbound	3,610	5,900	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	2,290	39.620	4-Lane Arterial	Expresswav	1,800	18,000	2
Huny 20/55	52 Augorug	50 Auronuo	Southbound Northbound	21,530 18,190	37,600	All and Artorial	Evorecourse	1 800	18,000	2
1 IWy 20/00	JZ AVERIUE	SU AVENUE	Southbound	19,410	37,000		⊂ Apresswdy	1,000	10,000	2
Hwy 28/55	50 Avenue	50 Street	Southbound	11,300	20,390	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	50 Street	43 Avenue	Southbound	15,000	27,470	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	43 Avenue	South City Limit	Southbound	9,020	18,910	4-Lane Arterial	Undivided Arterial	800	8,000	2
51 Street	54 Avenue	50 Avenue	Northbound Southbound	1,760 1,940	3,700	Collector	Collector (Residential or Industrial)	400	4,000	1
50 Street	50 Avenue	Hwy 28/55	Northbound	6,300 5,990	12,290	Collector	Undivided Arterial	800	8,000	1
45 Street	54 Avenue	50 Avenue	Northbound	690 440	1,130	Collector	Local (Residential or Industrial)	100	1,000	1
	1 ·	1	1 Journooulu	-+**0	1	1	1	1	1	

CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
45 Street	50 Avenue	43 Avenue	Northbound Southbound	510 870	1,380	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street	54 Avenue	50 Avenue	Northbound Southbound	3,520 2,290	5,810	Collector	Collector (Residential or Industrial)	400	4,000	1
Future Arterial	69 Avenue	54 Avenue	Northbound Southbound	2,320 2,170	4,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1 1
Future Arterial	54 Avenue	50 Avenue	Northbound Southbound	1,880 1,420	3,300	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1 1
Kingsway	59 Street	Glenwood	Eastbound Westbound	10,870 7,200	18,070	2-Lane Arterial	Undivided Arterial	800	8,000	2
Kingsway	Timberline	Glenwood	Eastbound Westbound	12,120 7,510	19,630	Collector	Undivided Arterial	800	8,000	2
Kingsway	Queensway	Timberline	Eastbound Westbound	5,990 4,480	10,470	Collector	Undivided Arterial	800	8,000	1
Kingsway	Tennis Court Road	Queensway	Eastbound Westbound	1,090 1,750	2,840	Collector	Local (Residential or Industrial)	100	1,000	2 2
Kingsway	End of Road	Tennis Court Road	Eastbound Westbound	1,270 1,780	3,050	Collector	Collector (Residential or Industrial)	400	4,000	1 1
Tennis Court Road	Queensway	Kingsway	Northbound Southbound	300 70	370	Collector	Lane	N/A	N/A	N/A N/A
Queensway	Tennis Court Road	Kingsway	Northbound Southbound	2,760 2,080	4,840	Collector	Collector (Residential or Industrial)	400	4,000	1 1
Queensway	Kingsway	Hanger Ln	Northbound Southbound	3,550 790	4,340	Collector	Collector (Residential or Industrial)	400	4,000	1
Timberline	Juniper Avenue	Kingsway	Northbound Southbound	1,680 1,200	2,880	Collector	Local (Residential or Industrial)	100	1,000	2 2
Timberline	Kingsway	Athabasca Road	Northbound Southbound	3,570 2,010	5,580	Collector	Collector (Residential or Industrial)	400	4,000	1
Glenwood Drive	Glenwood	Kingsway	Northbound Southbound	7,310 4,550	11,860	2-Lane Arterial	Undivided Arterial	800	8,000	1 1
1. Road classification based on 2000 Transportation Study 2. Road classification based on 2019 Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008) 3. Based on Lane Capacity Table (datached). Using road classification according to City's standards. 4. Based on assumption that PM beach hour traffic is 10% of the daily traffic 5. Assumed daily traffic of Street to be similar to 10 Street (16 Avenue and 16 Street) 6. Assumed daily traffic for 5 Street to be half of daily traffic on 54 Avenue, east Of Highway 28/55 7. Assumed daily traffic for 54 Avenue (45 Street to 14 Street) to be average of daily traffic on 54 Avenue (51 Street to 45 Street) and 54 Avenue (41 Street to Future Arterial)										
City of Cold Lake - Transportation Study Project No: 2010-3050 Date: April 11, 2011

CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON

	Inters	ection		Forecasted	I Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	то	Direction	Daily Traffic -	Daily Traffic -	2000 TPS 1	City of Cold Lake ²	for Road Classification	for Road Classification	Required (One Direction)
	11011	10	Eastbound	Directional 3.360	Two Way			(veninournane)	(vervay/rarie)	1
1 Avenue	28 Street	25 Street	Westbound	2,210	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
1 Avenue	25 Street	Nelson Street	Eastbound Westbound	6,650 5,560	12,210	Collector	Undivided Arterial	800	8,000	1
1 Avenue	Nelson Street	16 Street	Eastbound	6,240	12,820	Collector	Undivided Arterial	800	8,000	1
Hway 28	Hwy 55/16 Avenue	25 Street	Northbound	21,470	42 370	4-I ane Arterial	Evoressway	1.800	18.000	2
		20 04004	Southbound Eastbound	20,900	42,010	4 Edito / World	Expressing	1,000	10,000	2
8 Avenue	25 Street	16 Street	Westbound	8,580	20,570	4-Lane Arterial	Divided Arterial	1,000	10,000	1
8 Avenue	16 Street	10 Street	Eastbound Westbound	4,630	8,540	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,720	5,930	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	West City Limit	28 Street	Eastbound	7,370	10.690	2-I ane Arterial	Individed Arterial	800	8.000	1
111,900	Webt Only Emili	20 04004	Westbound Eastbound	3,320	10,000	2 Edito / World			0,000	2
Hwy 55	28 Street	Hwy 28	Westbound	11,280	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2
16 Avenue	Hwy 28	16 Street	Eastbound Westbound	8,660 6,650	15,310	2-Lane Arterial	Undivided Arterial	800	8,000	2
16 Avenue	16 Street	10 Street	Eastbound	5,820	9,640	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
16 Avenue	10 Street	8 Street	Eastbound	4,510	8.030	2-I ane Arterial	Collector (Residential or Industrial)	400	4.000	2
TO AVEILLE	10 Stiebt	0.01.661	Westbound	3,520	0,030	2-Lane Antenia	Collector (residential or modatilal)	400	4,000	1
16 Avenue	8 Street	East City Limit	Westbound	1,660	4,030	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
English Bay Road ⁵	North City Limit	Lake Avenue	Northbound Southbound	6,430 5,920	12,350	Collector	Undivided Arterial	800	8,000	1
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24,700	Collector	Divided Arterial	1,000	10,000	2
English Bay Road	1 Δυρομο	25 Street	Northbound	16,370	30.130	Collector	Evorecewou	1 800	18.000	1
Englian Day Koau	1 Avenue	25 5066	Southbound	13,760	30,130	Condition	LApitoSaway	1,000	10,000	1
English Bay Road	25 Street	Hwy 28	Southbound	12,300	25,810	Collector	Divided Arterial	1,000	10,000	2
28 Street	English Bay Road	Hwy 55	Northbound Southbound	8,640 7,040	15,680	Collector	Undivided Arterial	800	8,000	2
25 Street	1 Avenue	English Bay Road	Northbound	5,560	10,510	Collector	Undivided Arterial	800	8,000	1
Nelson Street	1 Avenue	16 Street	Eastbound	4,950	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1
INDIGUT OLIVEL	- Avenue	TO OLIBER	Westbound	1,600	4,300	Condictor	conocior (recordination moustrial)	400	4,000	1
16 Street	1 Avenue	8 Avenue	Southbound	4,530	13,820	Collector	Undivided Arterial	800	8,000	1
16 Street	8 Avenue	16 Avenue	Northbound Southbound	3,850 4,280	8,130	Collector	Collector (Residential or Industrial)	400	4,000	2
16 Street	16 Avenue	10 Street	Northbound	3,810	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	10 Street	75 Δυσομο	Northbound	5,720	10.320	Collector	Individed Arterial	800	8.000	1
16 Street	TO Street	75 Avenue	Southbound	4,600	10,320	Collector	Undivided Artenar	800	8,000	1
10 Street	1 Avenue	8 Avenue	Southbound	3,320	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	8 Avenue	16 Avenue	Northbound Southbound	3,560 4,250	7,810	Collector	Collector (Residential or Industrial)	400	4,000	2
10 Street	16 Avenue	16 Street	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
8 Street	16 Δυρομο	75 Δυσομο	Northbound	2,840	5 3 20	Collector	Collector (Recidential or Industrial)	400	4.000	1
0 01/661	TO Avenue	75 Avenue	Southbound	2,480	5,520	Condition	Collector (residential or moustrial)	400	4,000	1
6 Street *	16 Avenue	21 Avenue	Southbound	2,300	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound Southbound	30,680 31,810	62,490	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	31,690	65,550	4-Lane Arterial	Expressway	1,800	18,000	2
Huay 28/55	69 Avenue	54 Avenue	Northbound	24,020	52.940	4-Lane Arterial	Evoreceway	1 800	18.000	2
1111 20100	oo manab	ound	Southbound Eastbound	28,920	02,040	4 Edito / World	Expressing	1,000	10,000	2
75 Avenue	Hwy 28/55	Future Arterial	Westbound	4,730	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2
69 Avenue	Glenwood	Hwy 28/55	Westbound	5,590	10,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,350	15,790	Collector	Undivided Arterial	800	8,000	2
47 Street 7	69 Avenue	61/62 Avenue	Northbound	3,720	7 895	Collector	Collector (Residential or Industrial)	400	4.000	1
47 Street		ender Hande	Southbound Eastbound	4,175	1,000	Concorda		-100	4,000	2
54 Avenue	56 Street	Hwy 28/55	Westbound	5,610	9,460	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	Hwy 28/55	51 Street	Eastbound Westbound	5,850 4,710	10,560	Collector	Undivided Arterial	800	8,000	1
54 Avenue	51 Street	45 Street	Eastbound	6,960	12,620	Collector	Undivided Arterial	800	8,000	1
54 Avenue 8	45 Street	41 Street	Eastbound	4,600	8.425	Collector	Collector (Residential or Industrial)	400	4,000	2
24 Avenue			Westbound Eastbound	3,825 2.240	0,420	CONDUCTION IN CONTRACT			-,000	1
54 Avenue	41 Street	Future Arterial	Westbound	1,990	4,230	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	59 Street	57 Street	Eastbound Westbound	2,270	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	57 Street	Hwy 28/55	Eastbound	3,920	9,630	Collector	Collector (Residential or Industrial)	400	4,000	1
Centre Avenue	59 Street	57 Street	Eastbound	17,310	24,740	2-Lane Arterial	Divided Arterial	1,000	10.000	2
Contra Arr	67 Ora-	Lh 00.775	Westbound Eastbound	7,430 15,540	07.400	A 1 mm Art 1 1	Distant America	4 000	40.000	1 2
Centre Avenue	57 Street	rtwy 28/55	Westbound	11,950	27,490	4-∟ane Arterial	Divided Arterial	1,000	10,000	2
50 Avenue	Hwy 28/55	51 Street	Westbound	5,570	13,510	2-Lane Arterial	Undivided Arterial	800	8,000	1
50 Avenue	51 Street	50 Street	Eastbound	6,800 4,120	10,920	2-Lane Arterial	Undivided Arterial	800	8,000	1
50 Avenue	50 Street	45 Street	Eastbound	6,610	9,340	2-I ane Arterial	Collector (Residential or Industrial)	400	4.000	2
			Westbound Eastbound	2,730 6,170	0,010		o i i i i i i i i i i i i i i i i i i i	400	4,000	1 2
50 Avenue	45 Street	41 Street	Westbound	3,050	9,220	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial	Westbound	4,680	8,320	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,070	3,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
43 Avenue	Hwy 28/55	45 Street	Eastbound	6,220	11,240	Collector	Undivided Arterial	800	8,000	1
	, 20,00		Westbound Northbound	5,020		2	0.1		2,500	1
59 Street	52 Avenue	Centre Avenue	Southbound	1,350	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1
57 Street	54 Avenue	52 Avenue	Southbound	2,130	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1
57 Street	52 Avenue	Centre Avenue	Northbound	3,960	6,470	Collector	Collector (Residential or Industrial)	400	4,000	1
Hun 28/66	54 Avenue	52 Avenue	Northbound	2,310	45 540	4-) ane Arterial	Evonosewow	1.800	18.000	2
			Southbound	24,610 20,540	10,010			1,000	10,000	2
Hwy 28/55	52 Avenue	50 Avenue	Southbound	21,950	42,490	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	50 Avenue	50 Street	Northbound Southbound	10,700 13,030	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	50 Street	43 Avenue	Northbound	14,520	32,070	4-Lane Arterial	Expressway	1,800	18,000	1
Hwy 28/55	43 Δυσομο		Northbound	17,550	21 420	4-I ane Arterial	Divided Arterial	1,000	10.000	2
riwy 28/55	43 AVENUE	40 AVENUE	Southbound	11,090	21,420	4*Lane Arterial	Divided Artenal	1,000	10,000	2
Hwy 28/55 ⁹	40 Avenue	South City Limit	Southbound	5,100	10,710	4-Lane Arterial	Undivided Arterial	800	8,000	1

City of Cold Lake - Transportation Study Project No: 2010-3050 Date: April 11, 2011

CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Comdor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Direction)
51 Street	54 Avenue	50 Avenue	Northbound Southbound	1,980 2,230	4,210	Collector	Collector (Residential or Industrial)	400	4,000	1
50 Street	50 Avenue	Hwy 28/55	Northbound Southbound	7,170 6,810	13,980	Collector	Undivided Arterial	800	8,000	1
45 Street	54 Avenue	50 Avenue	Northbound Southbound	700 450	1,150	Collector	Local (Residential or Industrial)	100	1,000	1
45 Street	50 Avenue	43 Avenue	Northbound Southbound	960 1,460	2,420	Collector	Local (Residential or Industrial)	100	1,000	1 2
41 Street	54 Avenue	50 Avenue	Northbound Southbound	3,870 2,510	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1
Future Arterial	75 Avenue	69 Avenue	Northbound Southbound	6,900 5,170	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
Future Arterial	69 Avenue	54 Avenue	Northbound Southbound	6,510 5,570	12,080	2-Lane Arterial	Undivided Arterial	800	8,000	1
Future Arterial	54 Avenue	50 Avenue	Northbound Southbound	4,730 3,840	8,570	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
Kingsway	59 Street	Glenwood	Eastbound Westbound	12,400 8,220	20,620	2-Lane Arterial	Divided Arterial	1,000	10,000	2
Kingsway	Timberline	Glenwood	Eastbound Westbound	14,040 8,710	22,750	Collector	Divided Arterial	1,000	10,000	2
Kingsway	Queensway	Timberline	Eastbound Westbound	7,020 5,190	12,210	Collector	Undivided Arterial	800	8,000	1
Kingsway	Tennis Court Road	Queensway	Eastbound Westbound	1,280 2,020	3,300	Collector	Collector (Residential or Industrial)	400	4,000	1
Kingsway	End of Road	Tennis Court Road	Eastbound Westbound	1,440 2,040	3,480	Collector	Collector (Residential or Industrial)	400	4,000	1
Tennis Court Road	Queensway	Kingsway	Northbound Southbound	330 70	400	Collector	Lane	N/A	N/A	N/A N/A
Queensway	Tennis Court Road	Kingsway	Northbound Southbound	3,130 2,440	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
Queensway	Kingsway	Hanger Ln	Northbound Southbound	4,100 910	5,010	Collector	Collector (Residential or Industrial)	400	4,000	2
Timberline	Juniper Avenue	Kingsway	Northbound Southbound	1,920 1,400	3,320	Collector	Collector (Residential or Industrial)	400	4,000	1
Timberline	Kingsway	Athabasca Road	Northbound Southbound	4,170 2,310	6,480	Collector	Collector (Residential or Industrial)	400	4,000	2
Glenwood Drive	Glenwood	Kingsway	Northbound Southbound	8,460 5,270	13,730	2-Lane Arterial	Undivided Arterial	800	8,000	2
1. Road classification based on 2000 Transportation Study 2. Road classification based on 2005 Service Volumes situlated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008) 3. Based on Lane Capacity Table (datached). Using road classification according to City's standards. 4. Based on assumption that PM peak hour traffic to Tity's Month Part (Fig. 1) 4. Samed daily traffic for Engiteh Bay Road (North City). Live to be half of daily traffic on Engiteh Bay Road (Lake Avenue to 1 Avenue) 4. Assumed daily traffic for F Street to be simalar to 10 Street (16 Avenue and 16 Street) 7. Assumed daily traffic for 47 Street to be aft of daily traffic on 64 Avenue, (61 Street to 45 Street) and 54 Avenue (14 Street to Future Arterial) 9. Assumed daily traffic for f Highway 28 (40 Avenue to South City Limit) to be half of daily traffic on Highway 28 (43 Avenue to 40 Avenue)										

Appendix D - Transportation Study Cold Lake North - Parking Study

Technical Memorandum

City of Cold Lake

Transportation Study Cold Lake North - Parking Study

April 2011



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Introduction

The City of Cold Lake (City) is located 287 km northeast of the City of Edmonton in Alberta and was formed in 1996 by merging three municipalities, namely Grand Centre, Medley (Canadian Forces Base W4) and Cold Lake. Grand Centre was subsequently renamed Cold Lake South (CLS) and the original Cold Lake is now known as Cold Lake North (CLN).

The City has experienced noticeable growth in recent years. According to municipal census the City had a population of 11,991 in 2006 and 13,924 in 2009. This corresponds to a 5.4% linear growth annually. Current transportation improvements within the City have been based on the previous transportation study completed in 2000 and is no longer considered representative of the actual transportation network required to address current and future transportation needs.

In light of the continuing accelerated pace of development in the region and the need to rationalize and identify the transportation network requirements for the City, including surrounding rural municipalities and counties, the existing transportation plan requires a comprehensive update.

1.1 PROJECT BACKGROUND

Associated Engineering (AE) was retained by the City to update the 2000 transportation study. The purpose of the transportation study is to provide a comprehensive long range plan that integrates the transportation infrastructure requirements of the existing and future land uses. The transportation study will provide the City with a blueprint on which to plan and implement specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15-year and 20-year planning horizons. The transportation study will consider municipal roads, traffic calming, parking, traffic safety, traffic signal coordination, school zones, transit, truck routes, traffic management, and transportation system operations.

One component of the transportation study was to complete parking studies for CLN and CLS. The parking studies for the two study areas were completed independently. This technical memorandum documents the result of the parking study completed within CLN for the Canada Day long weekend, which represents the peak parking demand in the area.

1.2 STUDY AREA

The City indicated that CLN experiences parking problems on Canada Day due to festivities along 1 Avenue and at Kinosoo Beach. The existing parking condition along Lakeshore Drive, 1 Avenue, and the adjacent areas, were considered to be of interest.

The study area for the CLN Parking Study is presented in Figure 1.1. The study area is roughly bounded by 23 Street/10 Street to the west, Cold Lake to the north and east, and 8 Avenue/2 Avenue to the south.



1.3 STUDY METHODOLOGY

The following tasks were completed for the CLN Parking Study:

- Project initiation meeting,
- Site reconnaissance,
- Information and data collection,
- Parking survey and analysis,
- Development of parking strategies,
- Review meeting, and
- Draft and final reports.



FIGURE 1.1 STUDY AREA

2 Data Collection

2.1 SITE RECONNAISSANCE

A site reconnaissance was completed on May 5, 2010 to observe existing parking conditions within the CLN study area. The prevailing weather condition was cloudy with light flurries. The following observations were made during the site visit:

- No parking zones indicated by painted yellow curbs are provided around intersection corners, at fire hydrants, at alley ways, and at the locations indicated in Figure 2.1.
- A 2-hour parking zone is provided for approximately 250 m along the west side of 23 Street, between Birch Avenue and 1 Avenue and is illustrated in Figure 2.1.

The number of parking stalls provided in the off-street parking lots located at the marina (marina lot) and along 1 Avenue (1 Avenue Lot) were counted. The marina lot contains 58 regular parking stalls and 5 handicap stalls. The 1 Avenue Lot contains 75 regular parking stalls and 11 long stalls intended for recreational vehicles (RVs) and trailers.

An additional off-street parking lot was observed at Kinosoo Beach, in the northeast corner of Birch Avenue. This parking lot is a gravel lot; therefore, the parking stalls are not marked and could not be counted during the site visit. This lot will be referred to as the gravel lot in this report.

2.2 PARKING INVENTORY

On-street parking stalls in CLN are not marked with paint lines. The existing on-street parking inventory was estimated by AE using curb lengths from the City's base map and the following assumptions:

- No parking around corners and alley ways and at the locations indicated in Figure 2.1.
- No parking in front of residential driveways. Where front driveways were present, a standard driveway width of 6.0 m was subtracted from the curb length.
- A standard parking stall length of 7.0 m.

The on-street parking inventory can vary depending on the space left between two parked vehicles. The estimated parking inventory was adjusted based on the parking survey results and observed parking behaviour characteristics. Figure 2.2 presents the on-street parking inventory for CLN.

The off-street parking inventory for the marina lot and the 1 Avenue Lot is presented in Figure 2.3. The parking inventory for the Gravel lot was obtained from the parking survey and is also presented in Figure 2.3.



2.3 PARKING SURVEY

AE conducted the parking survey over a three day period from July 1 to July 3, 2010 to capture the peak parking condition expected in CLN. The prevailing weather condition was sunny on July 1 and July 2, and cloudy on July 3. The purpose of the parking survey was to complete the following:

- Collect parking utilization, duration and turnover data for all on-street parking.
- Collect parking utilization, duration and turnover data for the three off-street parking lots.
- Conduct parking interviews.

Parking utilization is defined as the number of parked vehicles (per hour) divided by the number of available parking stalls.

Parking duration is defined as the length of time, in hours, that a vehicle is parked in one parking stall.

Parking turnover is defined at the number of different vehicles parked within the study period divided by the number of available parking stalls.

Figure 2.4 presents a photograph of the parallel parking observed along 1 Avenue during the Canada Day festivities.







Figure 2.4 Parallel Parking along 1 Avenue on Canada Day



2.4 PARKING UTILIZATION, DURATION AND TURNOVER

Parking utilization, duration and turnover information was collected through a license plate survey. Surveyors collected the full license plate number of parked vehicles in the study area. Each location was revisited every hour for a six hour study period, from 11:00 a.m. to 4:00 p.m.

The license plate information was processed to obtain the following information and is provided in Appendix A:

- Total number of available parking stalls,
- Total number of parked vehicles per hour,
- Duration of parked vehicles, and
- Turnover rates.



2.5 PARKING INTERVIEWS

During the parking survey, commuters in the study area were approached and asked the following parking related questions:

- 1. Where do you live?
- 2. Where are you coming from (origin)?
- 3. Where are you going (destination)?
- 4. How far from your destination did you park?
- 5. How far are you willing to walk from where you park to your destination?
- 6. How long did you/will you be parked for?
- 7. What was your reason for parking today?

A total of 76 interviews were conducted over the course of the three days. The responses were compiled and provided in Appendix B.

3

Data Synthesis

3.1 ON-STREET PARKING

To analyze the existing on-street parking conditions, the study area was examined as a whole, as different parking zones, and as separate study corridors.

The entire study area was broken into the following five parking zones, presented in Figure 3.1:

- Zone 1 Lakeshore Drive
- Zone 2 Residential area west of Lakeshore Drive
- Zone 3 1 Avenue and Kinosoo Beach
- Zone 4 Residential area west of Kinosoo Beach
- Zone 5 Residential area south of 1 Avenue.

The existing parking condition was analyzed in detail for three study corridors, which include:

- Lakeshore Drive, from 1 Avenue to 7 Street
- 10 Street, from 1 Avenue to 8 Avenue
- 1 Avenue, from 23 Street to 10 Street.

The on-street parking utilization, duration and turnover rates for the study area, study zones and study corridors are presented in Appendix C.

3.2 OFF-STREET PARKING

Off-street parking conditions were analyzed for each of the three off-street parking lots independently. The off-street parking utilization, duration, and turnover rates for each parking lot are presented in Appendix D.

3.3 PARKING INTERVIEWS

The responses from the parking interviews were summarized and included in Appendix E. The following summarizes the major findings from the Canada Day long weekend:

- The majority of commuters lived within the City 45% lived in CLN and 33% lived in CLS
- The majority of commuters started their trip from within the City 36% of the trips originated from CLN and 30% originated from CLS
- Half the commuters (50%) were destined for Kinosoo Beach and 14% were destined for the Waterfront/marina



- The majority of commuters parked within 2 blocks of their destination 45% parked within less than 1 block, 14% parked within 1 block and 20% parked within 2 blocks
- Most commuters (43%) were willing to park further than 2 blocks from their destination
- Most commuters (28%) parked in their parking spot for 2 hours
- The predominant trip purpose for CLN was leisure (43%).



4

On-Street Parking Data Analysis

The existing on-street parking condition was analyzed for the entire study area and for the different parking zones and study corridors identified in previous section. The parking condition on July 1 represented the worst-case scenario and was analyzed separately from the parking condition on July 2 and July 3. The data for July 2 and July 3 were averaged and analyzed together to represent typical summer weekend parking conditions within CLN.

The on-street parking analysis was completed and provided in Appendix F. The following sections discuss the results from the analysis.

4.1 ENTIRE STUDY AREA

4.1.1 Parking Demand/Utilization

The existing on-street parking supply was able to accommodate the overall on-street parking demand in the entire study area. The parking demand on July 1 was higher than the parking demand on July 2 and July 3; the parking demand on July 1 was almost double the parking demand on July 2 and July 3. The highest overall parking demand was observed on July 1 at 1:00 p.m. when the parking utilization was 44%.

4.1.2 Parking Duration

The majority of commuters parked for 2 hours or less. On July 1, 48% of commuters parked for 1 hour and 27% parked for 2 hours. On July 2 and July 3, an average of 45% of commuters parked for 1 hour and an average of 16% parked for 2 hours. It should be noted that the proportion of commuters who parked for 6 hours was significantly larger on July 2 and July 3 (22%) than on July 1 (7%).

4.1.3 Parking Turnover

The turnover rate for the entire study area was 1.09 on July 1, 0.32 on July 2 and 0.41 on July 3. The turnover rate is much higher on July 1 (Canada Day) than on a typical day on the weekend.



4.2 STUDY ZONES

4.2.1 Parking Demand/Utilization

The existing on-street parking supply within each parking zone was able to accommodate the onstreet parking demand for the zone. Generally, the on-street parking demand observed on July 1 was higher than the parking demand observed on July 2 and July 3. The most significant difference in parking demand occurred in Zone 3, where the parking demand on July 1 was more than seven times the demand observed on July 2 and July 3.

4.2.2 Parking Duration

<u>Zone 1</u>

The majority of commuters in Zone 1 parked for 2 hours or less. On July 1, 59% of commuters parked for 1 hour and 15% parked for 2 hours. On July 2 and July 3, an average of 65% of commuters parked for 1 hour and an average of 18% parked for 2 hours.

Zone 2

The majority of commuters in Zone 2 parked for 2 hours or less. On July 1, 50% of commuters parked for 1 hour and 20% parked for 2 hours. On July 2 and July 3, an average of 45% of commuters parked for 1 hour and an average of 16% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 25% of commuters parked for 6 hours.

Zone 3

The majority of commuters in Zone 3 parked for 2 hours or less. On July 1, 53% of commuters parked for 1 hour and 28% parked for 2 hours. On July 2 and July 3, an average of 37% of commuters parked for 1 hour and an average of 18% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 27% of commuters parked for 6 hours.

Zone 4

The majority of commuters in Zone 4 parked for 2 hours or less. On July 1, 40% of commuters parked for 1 hour and 25% parked for 2 hours. On July 2 and July 3, an average of 40% of commuters parked for 1 hour and an average of 16% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 27% of commuters parked for 6 hours.

Zone 5

On July 1, the majority of commuters in Zone 5 parked for 2 hours or less, with 40% of commuters parked for 1 hour and 34% of commuters parked for 2 hours. On July 2 and July 3, most commuters parked for 6 hours (35%) or 1 hour (24%).

4.2.3 Parking Turnover

The turnover rates observed on July 1 are higher than the average turnover rates observed on July 2 and July 3. On July 1, Zone 3 and Zone 5 experienced the highest turnover rates at 1.88 and 1.29 respectively. It should be noted that Zone 3 and Zone 5 have the lowest average turnover rates on July 2 and July 3.

4.3 STUDY CORRIDORS

4.3.1 Parking Demand/Utilization

The existing on-street parking supply within each study corridor was able to accommodate the onstreet parking demand for the corridor. The parking demand along Lakeshore Drive and 10 Street remained relatively consistent over the three day study period. The parking demand on 1 Avenue, however, was significantly higher on July 1 than on July 2 and July 3.

4.3.2 Parking Duration

Lakeshore Drive

The majority of commuters along Lakeshore Drive parked for 2 hours or less. On July 1, 60% of commuters parked for 1 hour and 15% parked for 2 hours. On July 2 and July 3, an average of 66% of commuters parked for 1 hour and an average of 18% parked for 2 hours.

10 Street

On July 1, the majority of commuters along 10 Street parked for 2 hours or less, with 39% of commuters parked for 1 hour and 27% of commuters parked for 2 hours. On July 2 and July 3, most commuters along 10 Street either parked for 6 hours (44%) or 1 hour (24%).

1 Avenue

On July 1, the majority of commuters along 1 Avenue parked for 2 hours or less, with 53% of commuters parked for 1 hour and 28% of commuters parked for 2 hours. On July 2 and July 3, most commuters along 1 Avenue either parked for 1 hour (37%) or 6 hours (27%).

4.3.3 Parking Turnover

The turnover rates observed on July 1 are higher than the average turnover rates observed on July 2 and July 3. On July 1, the 1 Avenue corridor experiences the highest turnover rates at 1.88. It should be noted that the 1 Avenue corridor has the lowest average turnover rates on July 2 and July 3.



4.4 OTHER ON-STREET PARKING ISSUES

4.4.1 Illegal Parking

Parking was observed at the following no parking zones during the three-day study period:

- East side of Lakeshore Drive, from 7 Street to 8 Street July 2 and July 3
- East side of Lakeshore Drive, from 8 Avenue to 8 Street July 1
- East side of Lakeshore Drive, from 6 Avenue to 7 Avenue July 1
- South side of 1 Avenue from 16 Street to 10 Street July 1.

The no parking zones are indicated by yellow paint on the side of the curb. Visitors unfamiliar with the area may not understand that the yellow curb paint indicates no parking zones. During the wintertime the yellow curb paint may also become obscured under the snow. AE recommends that no parking signs be installed at the no parking zones to reinforce the parking restriction. Enforcement of the no parking zones should also be increased to ensure that the parking restrictions are obeyed.

4.4.2 Vehicle Type

The following vehicle types were observed during the parking survey, aside from passenger cars:

- Bicycles
- Motorcycles
- Recreational vehicles
- Trailer/boat trailers
- Farm vehicles
- Other.

Of particular interest was the number of RVs and trailers parked on-street in the study area. These vehicle types are longer and will require more than one on-street parking stall. RVs and trailers accounted for approximately 2% of on-street parked vehicles on July 1, 2010, approximately 6% of on-street parked vehicles on July 2, 2010, and 4% of on-street parked vehicles on July 3, 2010. The percentages quoted above are for the entire study area over the entire study period (11:00 a.m. to 4:00 p.m.) each day. It should be noted that Zone 1 (Lakeshore Drive) contained the highest proportion of RVs and trailers for all three days surveyed.

Off-Street Parking Data Analysis

The existing off-street parking condition was analyzed for each parking lot independently and provided in Appendix G. The following sections discuss the results from the analysis.

5.1 MARINA LOT

5.1.1 Parking Demand/Utilization

The existing parking supply provided in the marina lot was unable to accommodate the parking in several time periods, over the three days observed. The parking demand exceeded the parking supply from 12:00 p.m. to 5:00 p.m. on July 1 and the average parking demand exceeded the parking supply from 1:00 p.m. to 3:00 p.m. on July 2 and July 3.

5.1.2 Parking Duration

The majority of commuters in the marina lot parked for 2 hours or less. On July 1, 59% of commuters parked for 1 hour and 17% of commuters parked for 2 hours. On July 2 and July 3, an average of 62% of commuters parked for 1 hour and an average of 17% of commuters parked for 2 hours.

5.1.3 Parking Turnover

The parking turnover rate for the marina lot was 3.27 on July 1, 2.56 on July 2 and 3.14 on July 3. The turnover rate for the marina lot was relatively consistent over the course of the 3 day study period and was high when compared to the turnover rates for on-street parking and for the other two off-street lots.

5.2 1 AVENUE LOT

5.2.1 Parking Demand/Utilization

The existing parking supply provided in the 1 Avenue Lot was able to accommodate the parking demand, for the entire study period. On July 1, parking in the 1 Avenue Lot was only available to vendors participating in the Canada Day parade. Public parking was not allowed.

5.2.2 Parking Duration

On July 1, most of the commuters in the 1 Avenue Lot parked for 6 hours (36%). On July 2 and July 3, the majority of commuters parked for 2 hours or less, with an average of 63% of commuters parking for 1 hour and an average of 23% of commuters parking for 2 hours.



5.2.3 Parking Turnover

The parking turnover rate for the 1 Avenue Lot was 0.63 on July 1, 0.62 on July 2 and 0.53 on July 3. The turnover rate for the 1 Avenue Lot was relatively consistent over the course of the 3 day study period and was low when compared to the marina lot.

5.3 GRAVEL LOT

5.3.1 Parking Demand/Utilization

The existing parking supply provided in the gravel lot was able to accommodate the parking demand, for the entire study period. It should be noted that the parking demand on July 1 is significantly higher than the average parking demand on July 2 and July 3.

5.3.2 Parking Duration

The majority of commuters in the gravel lot parked for 2 hours or less. On July 1, 38% of commuters parked for 1 hour and 28% of commuters parked for 2 hours. On July 2 and July 3, an average of 50% of commuters parked for 1 hour and an average of 30% of commuters parked for 2 hours.

5.3.3 Parking Turnover

The parking turnover rate for the gravel lot was 2.14 on July 1, 0.19 on July 2 and 0.16 on July 3. The turnover rates indicate that the gravel lot was highly utilized on Canada Day, but was underutilized for the remainder of the study period.

5.4 OTHER OFF-STREET PARKING ISSUES

5.4.1 Illegal Parking

The utilization rate for the marina lot exceeded 100% every day for the three-day study period. This indicates that the number of vehicles parked in the marina lot exceeded the number of parking stalls available and provides evidence that people were making their own parking spots and parking illegally.

5.4.2 Vehicle Type

The number of RVs and trailers parked in the off-street lots are very low during the study period. On July 1, 2010, only one RV was observed in the marina lot and one trailer was observed in the 1 Avenue Lot, over the course of the 6-hour study period. No RVs or trailers were observed in the off-street lots on July 2, 2010 or July 3, 2010. The 1 Avenue Lot currently contains 11 long stalls that are intended for RVs and trailers. The demand for RV and trailer parking can be easily accommodated by these stalls.

6

Lakeshore Redevelopment Plan Considerations

The Lakeshore Redevelopment Plan (LRP) was finalized in March 2010 and provided a strategic direction for the revitalization of the Lakeshore Area to a vibrant "Urban Village" that would attract residents and tourists. The LRP considered various aspects of revitalization including changes to the character of the area, infrastructure upgrades, park and public space upgrades, parking improvements, and pedestrian network upgrades.

Section 3.3.1 of the Lakeshore Redevelopment Plan identified a need to reconstruct a portion of Lakeshore Drive between 7 Avenue and 8 Avenue. Four design options were developed for the reconstruction and are presented below and in Figure 6.1:

Option 1: Reconstruct Lakeshore Drive in its current configuration. The advantage of this option is that it maintains the existing level of on-street parking (28 parallel stalls) and two-way traffic flow, however it does not allow for an expanded pedestrian area. AE estimated 35 parallel stalls available on Lakeshore Drive between 7 Avenue and 8 Avenue.

Option 2: Reconstruct Lakeshore Drive as a one-way southbound. This configuration allows for 31 parking stalls set at a 45-degree angle, and an expansion of the sidewalk area to accommodate increased pedestrian use. Additionally, the one-way configuration may reduce the amount of vehicle traffic thereby increasing pedestrian safety.

Option 3: Reconstruct Lakeshore Drive as a one-way northbound. This option allows for 34 parking stalls set at a 45-degree angle and expanded pedestrian space. By allowing northbound traffic, this configuration allows traffic arriving via 8 Avenue (Highway 28) to disperse more efficiently.

Option 4: (Recommended option) Reconstruct Lakeshore Drive as a one-way northbound with parking on alternate sides of the driving lane. This configuration allows for 35 parking stalls set at a 45-degree angle while still accommodating an expanded pedestrian area. The northbound routing permits efficient vehicle circulation, while alternating parking from one side to the other creates a traffic-calming measure to reduce vehicle speeds.

AE completed a sensitivity analysis to determine the impact on parking as a result of the four design options. Table 6.1 presents the expected parking supply along Lakeshore Drive between 7 Avenue and 8 Avenue for each of the design options, and Table 6.2 summarizes the parking demand observed in the worst-case (Canada Day) and typical summer weekend scenarios.



Design Option	Parking Supply
Option 1	35
Option 2	31
Option 3	34
Option 4	35

Table 6.1Expected Parking Supply for Design Options

Table 6.2Observed Parking Demand

	Parking Demand (Vehicles)			
Time	July 1, 2010 (Worst-case Scenario)	July 2 & 3, 2010 (Typical Summer Weekend Scenario)		
11:00 a.m.	10	14		
12:00 p.m.	11	13		
1:00 p.m.	21	15		
2:00 p.m.	17	14		
3:00 p.m.	14	10		
4:00 p.m.	4	9		

A comparison of the expected parking supply versus the existing parking demand indicates that regardless of the design option implemented, the expected parking supply along Lakeshore Drive (between 7 Avenue and 8 Avenue) will accommodate the demand.



FROM APPENDIX B, CITY OF COLD LAKE,

21 DIALS (45 DIGRD)



OPTION 1

FIGURE 6.1 LAKESHORE REDEVELOPMENT PLAN DESIGN OPTIONS

COLD LAKE NORTH PARKING STUDY

CITY OF COLD LAKE

Associated Engineering

LAKESHORE REDEVELOPMENT PLAN (MARCH 2010)



Summary and Recommendations

7.1 SUMMARY OF ANALYSIS RESULTS

From the existing parking conditions analysis, the following conclusions can be made:

- Overall, the existing on-street parking supply is able to accommodate the on-street parking demand
- The existing off-street parking supply provided in the marina lot is unable to accommodate the offstreet parking demand
- The existing off-street parking supply provided in the 1 Avenue Lot is able to accommodate the offstreet parking demand
- The existing off-street parking supply provided in the gravel lot is able to accommodate the offstreet parking demand but approaches capacity on July 1
- For both on-street and off-street parking, the parking demand observed on July 1 (Canada Day) was higher than the parking demand on July 2 and 3, which represents a typical weekend period
- The difference in parking demand between Canada Day and a typical weekend period was most noticeable in the areas surrounding the 1 Avenue corridor and Kinosoo Beach. Zone 3, Zone 4 and Zone 5 were most affected by the increase in parking demand on Canada Day along with the 1 Avenue corridor and the gravel lot
- Parking in "no parking" zones was observed at various locations along Lakeshore Drive and 1 Avenue
- Illegal parking in the off-street lot was observed in the marina lot.

7.2 PARKING STRATEGIES

The following parking strategies were developed to improve the existing parking condition in CLN:

- Provide summer overflow parking for the marina lot
- Provide marked (painted) on-street parking stalls
- Enforce "no-parking" zones
- Pave and paint stalls in the gravel lot.

7.2.1 Provide Summer Overflow Parking for the marina lot

The capacity of the marina lot was exceeded in both the worst-case (Canada Day) and the typical summer weekend scenarios. The peak parking utilization observed on Canada Day was 124% while the peak parking utilization observed on July 2 and July 3 was 106%.

The marina is open from mid-May to the end of September. The parking utilization rates observed during the parking survey can be assumed for the weekends in the summer months. During the off-season, the parking utilization is expected to be much lower.



The City indicated in the Lakeshore Redevelopment Plan that there are currently four lots being used for overflow parking for the marina. The LRP recommends that the City provide a landscaped parking lot on one of the four lots currently used. The landscaped parking lot would be reserved for the marina from mid-May to the end of September and would be available for the general public for the remainder of the year. The results from the parking study confirm the need for an additional parking lot to accommodate overflow parking from the marina and AE supports the recommendations presented in the LRP.

7.2.2 Provide Marked (Painted) On-Street Parking Stalls

With unmarked on-street parking stalls, the available parking supply is dependent on local parking behaviour and the amount of space left between two parked vehicles. Larger spaces would result in less on-street parking stalls available.

The City should consider marking the pavement to indicate on-street parking stalls along 1 Avenue and Lakeshore Drive. Painted on-street parking should be provided along the 1 Avenue from 25 Street to Lakeshore Drive, and along Lakeshore Drive from 2 Avenue to 7 Street. Painted stalls will help to regulate and maximize parking stalls along these corridors and minimize the gaps left between two parked vehicles.

Additionally, the City could enhance the current parking zones by providing more delineation. Parking zones could be physically delineated with concrete bulbs or pavement markings to mark the start and end of the parking zone. The City should consider the concrete bulbs in conjunction with the traffic calming measures proposed in the In-Service Road Safety Reviews technical memorandum for 1 Avenue and Lakeshore Drive corridors.

7.2.3 Enforce "No-Parking" Zones

Illegal parking was observed at several "no-parking" zones within CLN. "No parking" zones within the City are indicated by painted yellow curbs that might be unfamiliar to some visitors and may become obscured during the winter months. The City should consider the installation of Parking Control (RB-51, RB-52) signs to complement the painted curbs and enhance the parking restriction. Figure 7.1 presents examples of Parking Control (RB-51, RB-52) signs from the Manual of Uniform Traffic Control Devices (MUTCD).

Figure 7.1 Parking Control (RB-51, RB-52) Signs



The City should review the no-parking zones along 1 Avenue and Lakeshore Drive on a typical, non-summer, weekday and weekend and evaluate the extent of the no-parking violations and the impact on traffic flow. If the no-parking violations do not have adverse effects on traffic flow, the City should consider the removal of the no-parking zones. If there are adverse effects, the City should consider stricter enforcement. Consistent enforcement of the no-parking policy will reduce the no-parking violations.

The City indicated that complaints have been received regarding illegal parking at various locations throughout Cold Lake. AE recommends that the City monitor the parking conditions throughout the City and determine the effect on traffic operations. Areas which have been specifically identified to have illegal parking issues include: 16 Street, roadways adjacent to schools and playgrounds, and snow removal routes.

7.2.4 Pave and Paint Stalls in the gravel lot

The City should consider paving the gravel lot and providing pavement markings to indicate the designated stalls, in accordance with the policies outlined in the Lakeshore Redevelopment Plan regarding parking. Painted parking stalls will help to regulate the available parking supply in the gravel lot and maximize the number of available stalls, alleviating parking supply problems during peak periods.

Opportunities exist to integrate streetscaping and landscaping in the gravel lot to coordinate with the beautification efforts for the Lakeshore commercial and beachfront areas. Landscaped islands with shrubs and trees can be provided between and at the end of aisles to improve the aesthetic of the parking lot. Additionally good illumination and a designated pathway between the parking lot and Kinosoo Beach could increase the utilization of the gravel lot.


REPORT

Appendix A - Parking Survey Data



City of Cold Lake Project No: 2010-3050 Date: September 10, 2010



COLD LAKE NORTH - PARKING UTILIZATION - JULY 1, 2010

_	_		_	_		Parking Stalls			PARKED V	EHICLES				P	ARKING UTIL	IZATION (%)					PARKING	DURATION			PARKING	TURNOVER
Zone	Туре	Road	From	То	Side	Available	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	1 Hour	2 Hours	3 Hours	4 Hours	5 Hours	6 Hours	Unique Veh.	Turnover Rate
		Lakeshore Drive	8 Street	7 Street	North	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
		Lakeshore Drive	8 Street	7 Street	South	14	0	1	11	14	14	11	0%	7%	79%	100%	100%	79%	5	1	8	5	0	0	19	1.36
		Lakeshore Drive	8 Avenue	8 Street	North	0	0	0	0	0	1	1	-	-	-	-	-	-	0	1	0	0	0	0	1	-
		Lakeshore Drive	8 Avenue	8 Street	South	/	2	1	6	/	/	1	29%	14%	86%	100%	100%	100%	4	3	2	2	0	1	12	1./1
		Lakeshore Drive	7 Avenue	8 Avenue	West	19	5	4	9	0 9	6	3	20%	21%	56%	42% 56%	42%	19%	20	2	2	0	1	0	25	1.03
		Lakeshore Drive	6 Avenue	7 Avenue	Fast	0	0	1	0	0	0	0	-	-	-	-	-	-	1	0	0	0	0	0	1	-
1	On Street	Lakeshore Drive	6 Avenue	7 Avenue	West	8	0	0	0	0	1	0	0%	0%	0%	0%	13%	0%	1	0	0	0	0	0	1	0.13
		Lakeshore Drive	5 Avenue	6 Avenue	East	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
		Lakeshore Drive	5 Avenue	6 Avenue	West	14	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
		Lakeshore Drive	2 Avenue	5 Avenue	East	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
		Lakeshore Drive	2 Avenue	5 Avenue	West	30	4	3	4	4	2	2	13%	10%	13%	13%	7%	7%	3	2	0	0	0	2	7	0.23
		2 Avenue	Lakeshore Drive	10 Street	North	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
	0	2 Avenue	Lakeshore Drive	10 Street	South	9	3	3	2	1	1	1	33%	33%	22%	11%	11%	11%	0	1	1	0	0	1	3	0.33
	Off Street		Marina Parking Lo	ot		63	50	<u>78</u>	100	13	15	78	79%	124%	121%	116%	119%	124%	130	37	19	15	10	10	206	3.27
		10 Stroot		2 Δυσριμο	Wost	180	09	98	120	110	0	104	67%	28%	49% 67%	49% 67%	48%	38%	189	23	32	23	0	0	306	1.14
		10 Street	1 Avenue	3 Avenue	Fast	9	2	4	3	5	4	3	33%	44%	33%	56%	44%	33%	1	3	1	0	0	2	7	0.78
		10 Street	3 Avenue	5 Avenue	West	19	2	1	1	1	1	1	11%	5%	5%	5%	5%	5%	1	0	0	0	0	1	2	0.11
		10 Street	3 Avenue	5 Avenue	East	16	3	3	2	1	1	1	19%	19%	13%	6%	6%	6%	0	1	1	0	0	1	3	0.19
		10 Street	5 Avenue	6 Avenue	West	15	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
		10 Street	5 Avenue	6 Avenue	East	15	0	0	0	0	0	1	0%	0%	0%	0%	0%	7%	1	0	0	0	0	0	1	0.07
		10 Street	6 Avenue	7 Avenue	West	15	0	5	5	6	7	4	0%	33%	33%	40%	47%	27%	3	3	2	1	2	0	9	0.60
		10 Street	6 Avenue	7 Avenue	East	14	2	2	4	3	4	3	14%	14%	29%	21%	29%	21%	2	0	0	1	0	2	5	0.36
2	On Street	10 Street	7 Avenue	8 Avenue	West	19	4	0	0	0	0	0	21%	0%	0%	0%	0%	0%	4	0	0	0	0	0	4	0.21
_		10 Street	7 Avenue	8 Avenue	East	14	4	0	0	0	0	0	29%	0%	0%	0%	0%	0%	4	0	0	0	0	0	4	0.29
		5 Avenue	Lakeshore Drive	10 Street	North	12	1	1	4	3	1	1	8%	8%	33%	25%	8%	8%	2	1	1	1	0	0	5	0.42
	-	5 Avenue	Lakeshore Drive	10 Street	South	12	4	3	6	4	6	6	33%	25%	50%	33%	50%	50%	2	2	1	2	0	2	9	0.75
		6 Avenue	Lakeshore Drive	10 Street	South	14	5	4	3	8	3	3	40%	30%	21%	73%	27%	27%	0	2	0	2	0	 1	10	0.91
	·	7 Avenue	Lakeshore Drive	10 Street	North	14	2	2	4	3	0	0	14%	14%	29%	21%	0%	0%	11	0	0	0	0	0	11	0.43
		7 Avenue	Lakeshore Drive	10 Street	South	13	3	3	1	3	0	0	23%	23%	8%	23%	0%	0%	4	3	0	0	0	0	7	0.54
		8 Avenue	Lakeshore Drive	10 Street	North	18	7	5	9	9	7	7	39%	28%	50%	50%	39%	39%	10	0	7	2	0	1	19	1.06
		8 Avenue	Lakeshore Drive	10 Street	South	9	2	2	3	6	6	3	22%	22%	33%	67%	67%	33%	8	6	0	1	0	0	14	1.56
			Zone #2 Total			242	48	39	51	57	42	35	23%	20%	24%	28%	19%	15%	62	25	13	11	2	12	120	0.58
		1 Avenue	23 Street	Spruce Street	North	11	1	0	0	1	0	0	9%	0%	0%	9%	0%	0%	2	0	0	0	0	0	2	0.18
		1 Avenue	Spruce Street	Tamarak Street	North	22	11	13	18	13	9	8	50%	59%	82%	59%	41%	36%	21	10	1	2	4	0	38	1.73
		1 Avenue	Tamarak Street	Nelson Street / 18 Street	North	51	47	45	48	47	47	36	92%	88%	94%	92%	92%	71%	87	39	11	5	2	7	149	2.92
		1 Avenue	Nelson Street / 18 Street	16 Street	North	18	11	9	10	9	17	13	61%	50%	56%	50%	94%	72%	13	14	6	3	0	0	34	1.89
	On Street	1 Avenue	16 Street	10 Street	North	8	8	5	5	5	4	3	100%	63%	63%	63%	50%	38%	15	6	1	0	0	0	16	2.00
3			23 Street Nelson Street / 22 Street	10 Street	South	8	6	4	2	37	33	3/	100%	50%	20%	38%	38%	38%	0 //8	20	3	0	1	11	95	1.50
		1 Avenue	19 Street	Nelson Street / 18 Street	South	13	7	9	10	37	7	8	54%	69%	77%	90 % 62%	54%	62%	20	9	2	9	1	0	32	2.32
		1 Avenue	Nelson Street / 18 Street	16 Street	South	9	7	5	5	5	5	5	78%	56%	56%	56%	56%	56%	4	14	0	0	0	0	17	1.89
		1 Avenue	16 Street	10 Street	South	0	0	2	2	2	2	2	-	-	-	-	-	-	0	0	0	0	2	0	2	-
	Off Street		1 Avenue Parking I	ot		86	31	38	39	39	34	34	36%	44%	45%	45%	40%	40%	9	13	2	6	6	20	54	0.63
	On Sheet		Unmarked Parking	Lot		58	32	38	47	58	57	50	55%	66%	81%	100%	98%	86%	50	36	26	10	6	2	124	2.14
			Zone #3 Total			325	202	209	220	227	218	196	65%	59%	60%	60%	58%	53%	275	164	60	35	22	40	575	1.79
		23 Street	Birch Avenue	1 Avenue	West	42	1	3	3	4	2	1	2%	7%	7%	10%	5%	2%	0	1	2	0	0	1	4	0.10
		23 Street	Birch Avenue	Pine Avenue	East	6	4	4	4	4	3	3	67%	67%	67%	67%	50%	50%	0	0	0	1	0	3	4	0.67
		23 Street	Pine Avenue	1 Avenue	East	22	5	5	4	4	4	6	23%	23%	18%	18%	18%	27%	2	1	0	0	0	4	7	0.32
		Birch Avenue	23 Street	Tamarak Street	North	28	6	4	5	11	9	11	21%	14%	18%	39%	32%	39%	14	2	3	2	1	1	20	0.71
		Pine Avenue	23 Street	Tamarak Street	North	29	14	0 11	14	10	14	14	24% 45%	∠0% 35%	40% 45%	39%	40% 39%	40%	0 0	Δ /	1	2	0	8	21	0.72
4	On Street	Pine Avenue	23 Street	Spruce Street	South	12	5	3	4	4	4	4	42%	25%	33%	33%	33%	33%	3	1	1	1	0	2	7	0,58
		Pine Avenue	Spruce Street	Tamarak Street	South	16	7	10	8	8	11	8	44%	63%	50%	50%	69%	50%	7	7	1	1	0	4	19	1.19
		Spruce Street	Pine Avenue	1 Avenue	West	12	2	2	3	1	1	3	17%	17%	25%	8%	8%	25%	3	0	1	0	0	1	4	0.33
	[Spruce Street	Pine Avenue	1 Avenue	East	17	7	5	5	5	6	3	41%	29%	29%	29%	35%	18%	4	1	3	0	2	1	11	0.65
	[Tamarak Street	Birch Avenue	1 Avenue	West	9	2	2	5	5	6	3	22%	22%	56%	56%	67%	33%	8	3	3	0	0	0	14	1.56
		Tamarak Street	Birch Avenue	1 Avenue	East	16	12	14	15	14	11	11	75%	88%	94%	88%	69%	69%	20	19	3	1	0	1	43	2.69
			Zone #4 Total			240	72	71	84	87	83	80	35%	35%	41%	41%	39%	36%	75	46	18	11	4	32	178	0.86
		Nelson Street / 22 Street	1 Avenue	3 Avenue	West	21	6	6	4	4	4	4	29%	29%	19%	19%	19%	19%	1	3	1	0	0	3	8	0.38
		Nelson Street / 22 Street	1 Avenue	3 Avenue	East	15	2	3	3	3	4	4	13%	20%	20%	20%	27%	27%	2	1	1	0	0	2	6	0.40
		19 Street	1 Avenue	2 Avenue	VVest East	11	0 7	10	10	- 11 - E	8	11	55%	91%	91%	100%	/3%	100%	10	10	4	2	0	0	32	2.91
		Nolson Street / 19 Street			East	7	6	3	/ 5	0	9	0	70% 86%	90% 71%	71%	71%	57%	00%	12	2	4	1	0	0	∠⊃ 11	2.0U
		Nelson Street / 18 Street	1 Avenue	2 Avenue	East	8	5	5	6	5	7	6	63%	63%	75%	63%	88%	75%	1	7	1	4	0	0	13	1.63
_		16 Street	1 Avenue	3 Avenue	West	18	8	4	5	4	4	4	44%	22%	28%	22%	22%	22%	4	2	1	3	0	1	10	0,56
5	On Street	16 Street	1 Avenue	3 Avenue	East	13	4	8	12	7	5	5	31%	62%	92%	54%	38%	38%	10	3	1	4	0	1	19	1.46
1		2 Avenue	21 Street	19 Street	North	26	12	7	13	13	14	9	46%	27%	50%	50%	54%	35%	23	12	5	0	0	1	34	1.31
		2 Avenue	21 Street	20A Street	South	6	1	1	2	1	1	1	17%	17%	33%	17%	17%	17%	1	1	0	1	0	0	3	0.50
		2 Avenue	20A Street	20 Street	South	13	5	5	4	4	3	3	38%	38%	31%	31%	23%	23%	0	4	0	1	0	2	7	0.54
	[2 Avenue	20 Street	19 Street	South	7	7	5	5	5	4	3	100%	71%	71%	71%	57%	43%	4	5	1	3	0	0	12	1.71
		2 Avenue	19 Street	Nelson Street / 18 Street	North	12	10	6	7	6	3	3	83%	50%	58%	50%	25%	25%	11	3	6	0	0	0	19	1.58
		2 Avenue	19 Street	Nelson Street / 18 Street	South	13	6	4	6	6	5	4	46%	31%	46%	46%	38%	31%	2	11	1	1	0	0	13	1.00
			Zone #5 Total			180	85	78	89	80	75	68	51%	49%	54%	48%	45%	41%	90	76	27	23	0	10	212	1.29

City of Cold Lake Project No: 2010-3050 Date: September 10, 2010



COLD LAKE NORTH - PARKING UTILIZATION - JULY 2, 2010

		_	_		Parking Stalls			PARKED	VEHICLES				P/	ARKING UTI	LIZATION (%)					PARKING	DURATION			PARKING	G TURNOVER
Zone Type	Road	From	То	Side	Available	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4.00 PM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4.00 PM	1 Hour	2 Hours	3 Hours	4 Hours	5 Hours	6 Hours	Unique Veh.	Turnover Rate
	Lakeshore Drive	8 Street	7 Street	North	0	2	5	5	5	5	5	-		-	-	-	-	1	0	0	0	4	1	6	-
	Lakeshore Drive	8 Street	7 Street	South	14	0	4	6	6	6	7	0%	20%	13%	13%	13%	50%	1	0	0	2	4	0	7	0.50
	Lakoshoro Drivo	8 Avonuo	9 Stroot	North	0	0	4	0	0	0	0	070	2370	4370	4370	4370	3070	0	0	0	2	4	0	0	0.50
	Lakoshoro Drivo		8 Stroot	South	7	0	0	2	1	2	2	0%	0%	20%	1.494	20%	20%	4	0	1	0	0	0	5	0.71
	Lakeshore Drive		8 Avenue	East	19	3	5	9	4	0	4	16%	26%	47%	21%	0%	21%	23	1	0	0	0	0	24	1.26
	Lakeshore Drive			West	15	3	6	5		3		10%	38%	31%	10%	10%	13%	2.J	1	0	0	1	0	1/	0.88
	Lakeshore Drive	7 Avenue		Foot	10	0	0	0	3	3	2	1370	30%	3176	1970	1970	1370	9	4	0	0	0	0	0	0.00
On Street	Lakeshore Drive	6 Avenue	7 Avenue	EdSt	0	0	0	0	0	0	0	4.00/	-	-	750/	-	-	0	0	0	0	0	0	0	4.00
' ⊢	Lakeshore Drive	6 Avenue	7 Avenue	west	8	1	3	4	6	5	4	13%	38%	50%	15%	63%	50%	6	2	1	1	0	1	11	1.38
	Lakeshore Drive	5 Avenue	6 Avenue	East	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
	Lakeshore Drive	5 Avenue	6 Avenue	West	14	0	0	1	0	0	0	0%	0%	7%	0%	0%	0%	1	0	0	0	0	0	1	0.07
	Lakeshore Drive	2 Avenue	5 Avenue	East	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
	Lakeshore Drive	2 Avenue	5 Avenue	West	30	1	1	1	2	2	1	3%	3%	3%	7%	7%	3%	2	0	0	0	0	1	3	0.10
	2 Avenue	Lakeshore Drive	10 Street	North	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
	2 Avenue	Lakeshore Drive	10 Street	South	9	3	1	2	2	2	1	33%	11%	22%	22%	22%	11%	2	0	1	0	0	1	4	0.44
Off Street		Marina Parking Lo	ot		63	38	52	64	63	47	49	60%	83%	102%	100%	75%	78%	110	25	16	11	5	6	161	2.56
		Zone #1 Total			180	51	77	99	92	72	75	16%	25%	37%	33%	28%	28%	159	32	19	14	14	10	236	0.88
	10 Street	1 Avenue	3 Avenue	West	3	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	10 Street	1 Avenue	3 Avenue	East	9	2	2	2	2	2	1	22%	22%	22%	22%	22%	11%	0	0	0	0	1	1	2	0.22
	10 Street	3 Avenue	5 Avenue	West	19	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	10 Street	3 Avenue	5 Avenue	East	16	3	2	3	2	2	2	19%	13%	19%	13%	13%	13%	2	0	0	0	0	2	3	0.19
	10 Street	5 Avenue	6 Avenue	West	15	1	0	0	0	0	0	7%	0%	0%	0%	0%	0%	1	0	0	0	0	0	1	0.07
	10 Street	5 Avenue	6 Avenue	East	15	2	2	2	2	2	2	13%	13%	13%	13%	13%	13%	0	0	0	0	0	2	2	0.13
	10 Street	6 Avenue	7 Avenue	West	15	6	6	6	6	7	6	40%	40%	40%	40%	47%	40%	1	0	0	0	0	6	7	0.47
	10 Street	6 Avenue	7 Avenue	East	14	5	5	5	3	4	5	36%	36%	36%	21%	29%	36%	3	3	2	0	0	2	6	0.43
	10 Street	7 Avenue	8 Avenue	West	19	1	1	0	0	0	0	5%	5%	0%	0%	0%	0%	0	1	0	0	0	0	1	0.05
2 On Street	10 Street			Fact	14	0	1	2	2	2	2	0%	7%	1/%	1/1%	1/1%	1/1%	1	0	0	2	0	0	3	0.00
	5 Δγρομο	Lakesbore Drive	10 Street	North	12	1	1	4	2	2	1	8%	8%	33%	17%	17%	8%	1	0	1	1	0	0	6	0.21
	5 Avenue	Lakeshore Drive	10 Street	South	12	5	7	4	4	4	4	42%	59%	22%	229/	220/	22%	-	1	0	0	0	4	7	0.50
	6 Avenue	Lakeshore Drive	10 Street	North	12	2	2	4	4	4	4	42 /0	100/	100/	100/	100/	100/	2	0	0	0	1	4	2	0.30
	6 Avenue	Lakeshore Drive	10 Street	South	14	2	2		2	2	2	10%	10%	70/	10%	10%	10%	0	1	1	0	1	1	2	0.27
	7 Avenue	Lakeshore Drive	10 Street	North	14	2	2	1	2	2	2	14/0	14/0	70/	14 /0	14/0	70/	2	1	0	0	0	1	2	0.14
	7 Avenue	Lakeshore Drive	10 Street	North	14	2	2	5	2	2	1	14%	14%	1%	14%	14%	1%	2	1	0	0	0		4	0.29
	7 Avenue	Lakeshore Drive	10 Street	South	13	4	3	5	3	2	2	31%	23%	38%	23%	15%	15%	6	2	1	0	0		10	0.77
	8 Avenue	Lakeshore Drive	10 Street	North	18	2	1	2	4	4	4	11%	6%	11%	22%	22%	22%	3	1	2	0	0	1	/	0.39
	8 Avenue	Lakeshore Drive	10 Street	South	9	2	1	3	2	3	3	22%	11%	33%	22%	33%	33%	1	2	1	0	0	0	9	1.00
		Zone #2 Total	1	1	242	40	38	42	38	40	37	17%	16%	18%	16%	17%	16%	33	12	8	3	2	22	73	0.32
	1 Avenue	23 Street	Spruce Street	North	11	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	1 Avenue	Spruce Street	Tamarak Street	North	22	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	1 Avenue	Tamarak Street	Nelson Street / 18 Street	North	51	2	1	1	1	3	3	4%	2%	2%	2%	6%	6%	1	2	0	0	0	1	4	0.08
	1 Avenue	Nelson Street / 18 Street	16 Street	North	18	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
On Street	1 Avenue	16 Street	10 Street	North	8	2	2	2	2	2	4	25%	25%	25%	25%	25%	50%	2	0	0	0	0	2	4	0.50
2	1 Avenue	23 Street	Nelson Street / 22 Street	South	8	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
3	1 Avenue	Nelson Street / 22 Street	19 Street	South	41	5	6	7	4	8	7	12%	15%	17%	10%	20%	17%	6	4	1	2	0	2	14	0.34
	1 Avenue	19 Street	Nelson Street / 18 Street	South	13	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	1 Avenue	Nelson Street / 18 Street	16 Street	South	9	2	2	2	2	2	2	22%	22%	22%	22%	22%	22%	0	0	0	0	0	2	2	0.22
	1 Avenue	16 Street	10 Street	South	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
Off Street		1 Avenue Parking L	Lot		86	5	7	20	30	19	5	6%	8%	23%	35%	22%	6%	29	16	7	1	0	0	53	0.62
On Street		Unmarked Parking I	Lot		58	1	3	4	6	5	3	2%	5%	7%	10%	9%	5%	5	2	3	1	0	0	11	0.19
		Zone #3 Total			325	17	21	36	45	39	24	6%	7%	9%	9%	9%	10%	43	24	11	4	0	7	88	0.18
	23 Street	Birch Avenue	1 Avenue	West	42	2	2	1	2	1	3	5%	5%	2%	5%	2%	7%	5	0	0	0	0	1	5	0.12
	23 Street	Birch Avenue	Pine Avenue	East	6	2	1	2	2	1	1	33%	17%	33%	33%	17%	17%	1	1	0	0	0	1	3	0.50
	23 Street	Pine Avenue	1 Avenue	East	22	7	6	6	6	6	4	32%	27%	27%	27%	27%	18%	1	0	0	0	2	4	7	0.32
	Birch Avenue	23 Street	Tamarak Street	North	28	5	5	7	5	4	2	18%	18%	25%	18%	14%	7%	5	0	1	2	0	2	9	0.32
	Birch Avenue	23 Street	Tamarak Street	South	29	9	9	7	6	4	9	31%	31%	24%	21%	14%	31%	12	5	0	1	ñ	3	18	0.62
	Pine Avenue	23 Street	Tamarak Street	North	31	8	7	8	7	6	7	26%	23%	26%	23%	19%	23%	4	1	ñ	2	1	4	11	0.35
4 On Street	Pine Avenue	23 Street	Spruce Street	South	12	5	5	5	5	4	4	42%	42%	42%	42%	33%	33%	0	0	n	1	0	4	5	0.42
		Spruce Street	Tamarak Street	South	16	3	3	2	2	 2		10%	10%	13%	12%	13%	25%	2	1	0	0	0	2	1	0.72
	Spruce Street			Weet	10	0	0	2	2	2 0	4	0%	0%	0%	0%	0%	00%	-	0	0	0	0	2 0	4	0.20
	Spruce Street	Pine Avenue		Foot	12	0	4	4	0	0	0	0 /0	60/	60/	0.0	0%	0 /0	0	1	0	-	0	0	4	0.00
	Tomorok Street	Pine Avenue		LdSI Woot	0	0	0		0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	Tamarak Street	Birch Avenue	1 Avenue	west	9	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	ramarak Street	Zana #4 Tatal	I Avenue	⊏ast	16	1	2	40	1	1	0	0%	13%	0%	0%	0%	0%	1	0	0	0		0	4	0.13
		Zone #4 Total	0.4	1 142	240	42	41	40	30	29	34	18%	17%	17%	10%	12%	13%	31	9	1	6	4	21	65	0.26
Ne	iveison Street / 22 Street	1 Avenue	3 Avenue	west	21	4	6	4	4	5	4	19%	29%	19%	19%	24%	19%	3	0	0	0	0	4	7	0.33
Ne	iveison Street / 22 Street	1 Avenue	3 Avenue	East	15	3	2	2	2	2	2	20%	13%	13%	13%	13%	13%	1	0	0	0	0	2	3	0.20
	19 Street	1 Avenue	2 Avenue	West	11	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	19 Street	1 Avenue	2 Avenue	East	10	3	2	1	1	1	1	30%	20%	10%	10%	10%	10%	2	1	0	0	1	0	3	0.30
Ne	Nelson Street / 18 Street	1 Avenue	2 Avenue	West	7	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
Ne	Nelson Street / 18 Street	1 Avenue	2 Avenue	East	8	3	2	2	2	2	2	38%	25%	25%	25%	25%	25%	1	0	0	0	0	2	3	0.38
5 On Street	16 Street	1 Avenue	3 Avenue	West	18	3	3	3	0	0	1	17%	17%	17%	0%	0%	6%	1	0	3	0	0	0	3	0.17
5 On Street	16 Street	1 Avenue	3 Avenue	East	13	5	5	4	4	3	3	38%	38%	31%	31%	23%	23%	0	1	0	1	0	3	5	0.38
	2 Avenue	21 Street	19 Street	North	26	5	3	2	5	6	3	19%	12%	8%	19%	23%	12%	3	5	0	0	1	1	9	0.35
	2 Avenue	21 Street	20A Street	South	6	1	2	2	2	2	1	17%	33%	33%	33%	33%	17%	0	0	0	0	2	0	2	0.33
	2 Avenue	20A Street	20 Street	South	13	3	3	3	2	2	2	23%	23%	23%	15%	15%	15%	0	1	1	1	0	1	4	0.31
	2 Avenue	20 Street	19 Street	South	7	1	1	1	1	1	1	14%	14%	14%	14%	14%	14%	0	0	2	0	0	0	2	0.29
	2 Δυσριμο	19 Street	Nelson Street / 18 Street	North	12	1	1	1	0	0	0	8%	8%	8%	0%	0%	0%	0	0	1	0	0	0	1	0.08
	ZAVENUE																			1	T				
F	2 Avenue	19 Street	Nelson Street / 18 Street	South	13	1	1	1	1	1	1	8%	8%	8%	8%	8%	8%	0	0	2	0	0	0	2	0.15

City of Cold Lake Project No: 2010-3050 Date: September 10, 2010



COLD LAKE NORTH - PARKING UTILIZATION - JULY 3, 2010

No No No No No No No No No No No							Barking Stalla								P									DADKING 1	
	Zone	Туре	Road	From	То	Side		11:00 AM	12:00 PM	1.00 PM	2:00 PM	3.00 PM	4:00 PM	11:00 AM	12:00 PM	1.00 PM	2:00 PM	3.00 PM	4:00 PM	11:00 AM 12:00 PM	1.00 PM	2:00 PM 3:00 PM	4.00 PM	Unique Veh	Turnover Rate
			Lakeshore Drive	8 Street	7 Street	North	Available	11.00 AW	12.00 FW	1.00 F M	2.00 F M	3.00 F WI	4.00 F M	11.00 AW	12.00 FIV	1.00 FW	2.00 FIVI	3.00 F M	4.00 F WI	1 1	3	2.00 FWI 3.00 FWI	4.00 F W	7	Turnover Nate
			Lakeshore Drive	8 Street	7 Street	South	14	4	2	2	4	4	4	29%	14%	14%	29%	29%	29%	2 0	2	0 0	2	6	0.43
			Lakeshore Drive	8 Avenue	8 Street	North	0	4	0	0	4	4	4	2370	1470	1470	2370	2370	2370	0 0	0	0 0	0	0	0.45
			Lakeshore Drive	8 Avenue	8 Street	South	7	6	4	3	3	1	1	86%	57%	43%	43%	14%	14%	7 4	1	0 0	0	11	1.57
			Lakeshore Drive	7 Avenue	8 Avenue	Fast	19	19	12	8	11	10	7	100%	63%	42%	58%	53%	37%	33 10	2	2 0	0	46	2 42
			Lakeshore Drive	7 Avenue	8 Avenue	West	16	3	2	7	9	6	4	19%	13%	44%	56%	38%	25%	15 4	1	0 1	0	21	1.31
			Lakeshore Drive	6 Avenue		Fast	0	0	0	0	0	0	0	-	-		-	-	-		0	0 0	0	0	-
	1	On Street	Lakeshore Drive	6 Avenue		West	8	3	4	4	4	4	4	38%	50%	50%	50%	50%	50%	5 4	0	1 0	1	10	1 25
			Lakeshore Drive	5 Avenue	6 Avenue	Fast	0	0	0	0	0	0	0	-	-	-	-	-	-	0 0	0	0 0	0	0	-
			Lakeshore Drive	5 Avenue	6 Avenue	West	14	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
			Lakeshore Drive	2 Avenue	5 Avenue	Fast	0	0 0	0	0	Ő	0	0	-	-	-	-	-	-	0 0	Ő	0 0	0	0	-
Image: Image: Image: Image: </td <td></td> <td></td> <td>Lakeshore Drive</td> <td>2 Avenue</td> <td>5 Avenue</td> <td>West</td> <td>30</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>2</td> <td>2</td> <td>3%</td> <td>3%</td> <td>3%</td> <td>3%</td> <td>7%</td> <td>7%</td> <td>0 1</td> <td>0</td> <td>0 0</td> <td>1</td> <td>2</td> <td>0.07</td>			Lakeshore Drive	2 Avenue	5 Avenue	West	30	1	1	1	1	2	2	3%	3%	3%	3%	7%	7%	0 1	0	0 0	1	2	0.07
Image: Image: Image: Image: Image: Image: <td></td> <td></td> <td></td> <td>Lakesbore Drive</td> <td>10 Street</td> <td>North</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>570</td> <td>570</td> <td>570</td> <td>570</td> <td>1 70</td> <td>1 70</td> <td>0 0</td> <td>0</td> <td>0 0</td> <td>0</td> <td>0</td> <td>0.01</td>				Lakesbore Drive	10 Street	North	0	0	0	0	0	0	0	570	570	570	570	1 70	1 70	0 0	0	0 0	0	0	0.01
				Lakeshore Drive	10 Street	South	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
		Off Stroot	2 Avenue	Marina Parking I	10 Street	South	62	61	64	67	67	64	47	07%	102%	106%	106%	102%	75%	122 28	15	0 11	6	108	3.14
		On Street		Zone #1 Total	01		190	102	04	07	101	04	72	91 /0 /19/	2/10/	249/	200/	220/	26%	122 30	24	12 12	12	301	1 13
		1	10 Street		2 Δυσριμο	Wost	2	0	0	0	0	35	0		0%	0%	0%	0%	2070	103 02	0	0 0	0	0	0.00
			10 Street		3 Avenue	Fact	0	1	1	1	1	1	1	119/	11%	110/	119/	119/	11%	0 0	0	0 0	1	1	0.00
			10 Street		5 Avenue	East	9	0	1	1	1	0	0	09/	09/	09/	00/	00/	00/	0 0	0	0 0	0	0	0.11
			10 Street	3 Avenue	5 Avenue	Foot	19	0	0	0	0	0	0	129/	120/	120/	120/	129/	120/	0 0	0	0 0	0	2	0.00
			10 Street	5 Avenue	6 Avenue	Wort	15	1		<u> </u>	1	1	2	79/	70/	70/	70/	70/	70/	0 0	0	0 0		1	0.13
	1		10 Street	5 Avenue	6 Avenue	Fact	10	2			2	2	4	1 70	200/	200/	170	170	70/	0 1	0	0 1	4	۱ د	0.07
	1		10 Street	5 Avenue		EdSI Woot	15	2	3	3	<u>∠</u>	<u>∠</u>	-	13%	20%	20%	13%	13%	1 %	2 2	0	1 0	2	3	0.20
	1		10 Street	6 Avenue		Fact	10	3	2	4 E	4 E	4	5	20%	910/	2170	2170	2170 100/	J3%	2 4	1	1 0	3	9	0.00
1 1 1 1 1 0	1		10 Street	7 Avenue	2 Avenue	Wast	14	4	3	5	5	0	0	29%	∠1%	30%	30%	43%	43%				3	0	0.07
	2	On Street	10 Street		9 Avenue	Fact	19	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
	1		5 Avenue	/ Avenue	0 Avenue	Lasi	14	0	0	0	U E	0	0	0%	0%	0%	0%	0%	0%	2 0	0	2 0	0	F	0.00
			5 Avenue	Lakeshore Drive	10 Street	North	12	4	3	4	5	3	3	33%	25%	33%	42%	25%	25%	2 0	0	2 0	2	5	0.42
			5 Avenue	Lakeshore Drive	10 Street	South	12	4	4	4	4	2	2	33%	33%	33%	33%	17%	17%	0 0	0	2 0	2	4	0.33
			6 Avenue	Lakeshore Drive	10 Street	North	11	1	2	2	2	2	2	9%	18%	18%	18%	18%	18%	0 0	0	0 1	1	2	0.18
Image: Image: Image: Image: <td></td> <td></td> <td>6 Avenue</td> <td>Lakeshore Drive</td> <td>10 Street</td> <td>South</td> <td>14</td> <td>3</td> <td>2</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>21%</td> <td>14%</td> <td>7%</td> <td>7%</td> <td>1%</td> <td>1%</td> <td>1 1</td> <td>0</td> <td>0 0</td> <td>1</td> <td>3</td> <td>0.21</td>			6 Avenue	Lakeshore Drive	10 Street	South	14	3	2	1	1	1	1	21%	14%	7%	7%	1%	1%	1 1	0	0 0	1	3	0.21
Image: state in the state in thest the state in the state in the state in the state in			7 Avenue	Lakeshore Drive	10 Street	North	14	5	6	3	6	2	2	36%	43%	21%	43%	14%	14%	9 4	0	0 0	1	14	1.00
1 0 mm 1 0 mm 1 mm			7 Avenue	Lakeshore Drive	10 Street	South	13	5	6	5	4	2	3	38%	46%	38%	31%	15%	23%	9 2	2	0 0	1	14	1.08
1 0 0 0 2 0 2 0 1 0 0 1 0			8 Avenue	Lakeshore Drive	10 Street	North	18	5	3	1	2	3	1	28%	17%	6%	11%	17%	6%	7 1	0	0 0	1	8	0.44
1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +			8 Avenue	Lakeshore Drive	10 Street	South	9	1	4	2	2	1	1	78%	44%	22%	22%	11%	11%	11 3	0	0 0	0	14	1.56
		-		Route #2 Total	1 1		242	49	47	38	41	32	31	21%	20%	16%	17%	13%	13%	44 15	3	6 2	20	88	0.38
			1 Avenue	23 Street	Spruce Street	North	11	0	0	0	0	1	0	0%	0%	0%	0%	9%	0%	1 0	0	0 0	0	1	0.09
A Image: im			1 Avenue	Spruce Street	Tamarak Street	North	22	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
1 1 1 1 2 2 2 2 1 2 1			1 Avenue	Tamarak Street	Nelson Street / 18 Street	North	51	9	4	2	2	2	2	18%	8%	4%	4%	4%	4%	7 1	0	0 0	2	10	0.20
Part Andmain Object Object </td <td></td> <td></td> <td>1 Avenue</td> <td>Nelson Street / 18 Street</td> <td>16 Street</td> <td>North</td> <td>18</td> <td>2</td> <td>2</td> <td>3</td> <td>2</td> <td>1</td> <td>2</td> <td>11%</td> <td>11%</td> <td>17%</td> <td>11%</td> <td>6%</td> <td>11%</td> <td>1 2</td> <td>1</td> <td>1 0</td> <td>0</td> <td>5</td> <td>0.28</td>			1 Avenue	Nelson Street / 18 Street	16 Street	North	18	2	2	3	2	1	2	11%	11%	17%	11%	6%	11%	1 2	1	1 0	0	5	0.28
A Image Ima		On Street	1 Avenue	16 Street	10 Street	North	8	4	4	4	4	4	4	50%	50%	50%	50%	50%	50%	0 0	0	0 0	4	4	0.50
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Image: state Image: state<			1 Avenue	Nelson Street / 18 Street	16 Street	South	9	1	1	0	0	0	0	11%	11%	0%	0%	0%	0%	0 1	0	0 0	0	1	0.11
Prime Image: prime 			1 Avenue	16 Street	10 Street	South	0	0	0	0	0	0	0	-	-	-	-	-	-	0 0	0	0 0	0	0	-
1 1 0		Off Street		1 Avenue Parking	Lot		86	0	9	18	14	16	15	0%	10%	21%	16%	19%	17%	34 7	2	2 2	0	46	0.53
Network Network <t< td=""><td></td><td>on oncor</td><td></td><td>Unmarked Parking</td><td>Lot</td><td></td><td>58</td><td>2</td><td>4</td><td>3</td><td>3</td><td>1</td><td>0</td><td>3%</td><td>7%</td><td>5%</td><td>5%</td><td>2%</td><td>0%</td><td>5 4</td><td>0</td><td>0 0</td><td>0</td><td>9</td><td>0.16</td></t<>		on oncor		Unmarked Parking	Lot		58	2	4	3	3	1	0	3%	7%	5%	5%	2%	0%	5 4	0	0 0	0	9	0.16
A Bech Avenue Bech Avenue Av		1		Route #3 Total			325	26	33	40	36	34	32	10%	11%	11%	10%	10%	9%	53 16	4	6 4	10	90	0.20
	1		23 Street	Birch Avenue	1 Avenue	West	42	3	2	1	4	3	1	7%	5%	2%	10%	7%	2%	2 3	0	0 0	1	6	0.14
A A			23 Street	Birch Avenue	Pine Avenue	East	6	1	2	2	1	1	1	17%	33%	33%	17%	17%	17%	0 1	0	0 0	1	2	0.33
4 Image is the Annual is the image is the Annual is the An	1		23 Street	Pine Avenue	1 Avenue	East	22	4	3	3	3	3	3	18%	14%	14%	14%	14%	14%	1 0	0	0 0	3	4	0.18
4 1	1		Birch Avenue	23 Street	Tamarak Street	North	28	5	4	3	1	1	2	18%	14%	11%	4%	4%	7%	5 1	3	0 0	0	7	0.25
A Pine Avenue 2.3 Street Tumaratic Kreet Sprue 1 1 1 0 5 1.5 0.48 Pine Avenue 2.3 Street Sprue Street <	1		Birch Avenue	23 Street	Tamarak Street	South	29	14	11	11	11	11	8	48%	38%	38%	38%	38%	28%	4 0	0	0 4	7	15	0.52
N No Pine Avenue 23 Street Spruce Street	4	On Street	Pine Avenue	23 Street	Tamarak Street	North	31	10	9	10	8	6	8	32%	29%	32%	26%	19%	26%	5 5	1	1 0	5	15	0.48
ket Pine Avenue Spruce Street Street Spruce Street	1	511 011001	Pine Avenue	23 Street	Spruce Street	South	12	3	3	4	4	3	3	25%	25%	33%	33%	25%	25%	0 2	0	4 0	0	6	0.50
Figure Street Pine Avenue 1 Avenue 1 a 1 a 1 a 1 a 1 b </td <td></td> <td></td> <td>Pine Avenue</td> <td>Spruce Street</td> <td>Tamarak Street</td> <td>South</td> <td>16</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>5</td> <td>25%</td> <td>25%</td> <td>25%</td> <td>25%</td> <td>25%</td> <td>31%</td> <td>1 1</td> <td>0</td> <td>1 0</td> <td>3</td> <td>5</td> <td>0.31</td>			Pine Avenue	Spruce Street	Tamarak Street	South	16	4	4	4	4	4	5	25%	25%	25%	25%	25%	31%	1 1	0	1 0	3	5	0.31
Price Sprice Since View Price Avenue 1 Avenue East 1 Avenue East 1 Avenue East 1 Avenue 2 Avenue	1		Spruce Street	Pine Avenue	1 Avenue	West	12	1	1	1	1	2	1	8%	8%	8%	8%	17%	8%	5 1	0	0 0	0	6	0.50
Image: Note: Image: Note:<	1		Spruce Street	Pine Avenue	1 Avenue	East	17	2	3	3	3	0	0	12%	18%	18%	18%	0%	0%	5 1	0	1 0	0	7	0.41
Image of the street o			Tamarak Street	Birch Avenue	1 Avenue	West	9	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
Image: Note of the start of			Tamarak Street	Birch Avenue	1 Avenue	East	16	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
Network Network <t< td=""><td></td><td></td><td></td><td>Route #4 Total</td><td></td><td></td><td>240</td><td>47</td><td>42</td><td>42</td><td>40</td><td>34</td><td>32</td><td>18%</td><td>17%</td><td>18%</td><td>16%</td><td>14%</td><td>13%</td><td>28 15</td><td>4</td><td>7 4</td><td>20</td><td>73</td><td>0.30</td></t<>				Route #4 Total			240	47	42	42	40	34	32	18%	17%	18%	16%	14%	13%	28 15	4	7 4	20	73	0.30
Network Inverse Inverse <t< td=""><td></td><td></td><td>Nelson Street / 22 Street</td><td>1 Avenue</td><td>3 Avenue</td><td>West</td><td>21</td><td>6</td><td>7</td><td>6</td><td>5</td><td>7</td><td>6</td><td>29%</td><td>33%</td><td>29%</td><td>24%</td><td>33%</td><td>29%</td><td>4 0</td><td>1</td><td>0 0</td><td>5</td><td>10</td><td>0.48</td></t<>			Nelson Street / 22 Street	1 Avenue	3 Avenue	West	21	6	7	6	5	7	6	29%	33%	29%	24%	33%	29%	4 0	1	0 0	5	10	0.48
19 Street 1 Avenue 2 Avenue West 11 0 0 2 2 2 0% 0% 18% 18% 18% 0	1		Nelson Street / 22 Street	1 Avenue	3 Avenue	East	15	2	2	2	2	3	3	13%	13%	13%	13%	20%	20%	0 1	0	0 0	2	3	0.20
19 1 Avenue 2 Avenue East 10 1			19 Street	1 Avenue	2 Avenue	West	11	0	0	0	2	2	2	0%	0%	0%	18%	18%	18%	0 0	2	0 0	0	2	0.18
Network Network 1 Avenue Q Avenue West 7 0 0 0 0 0% </td <td>1</td> <td></td> <td>19 Street</td> <td>1 Avenue</td> <td>2 Avenue</td> <td>East</td> <td>10</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>10%</td> <td>10%</td> <td>10%</td> <td>10%</td> <td>10%</td> <td>10%</td> <td>0 0</td> <td>0</td> <td>0 0</td> <td>1</td> <td>1</td> <td>0.10</td>	1		19 Street	1 Avenue	2 Avenue	East	10	1	1	1	1	1	1	10%	10%	10%	10%	10%	10%	0 0	0	0 0	1	1	0.10
Network Network 1 Avenue 2 Avenue East 8 3 3 3 4 38% 38% 38% 50% 1 0 0 0 0 3 4 0.50 16 Street 1 Avenue 3 Avenue West 18 5 5 4 3 3 6 28% 22% 17% 17% 33% 3 2 1 1 0	1		Nelson Street / 18 Street	1 Avenue	2 Avenue	West	7	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
S Prete 16 Street 1 Avenue 3 Avenue West 18 5 5 4 3 3 6 28% 22% 17% 17% 33% 3 2 1 1 0 2 8 0.44 16 Street 1 Avenue 3 Avenue East 13 8 8 8 8 7 7 62% 62% 62% 64% 4 1 0 0 2 5 10 0.77 2 Avenue 21 Street 19 Street North 26 4 3 7 7 6 5 15% 12% 27% 27% 23% 13% 3 2 2 2 3 3 2	1		Nelson Street / 18 Street	1 Avenue	2 Avenue	East	8	3	3	3	3	3	4	38%	38%	38%	38%	38%	50%	1 0	0	0 0	3	4	0.50
A final 1 Avenue 3 Avenue East 13 8 8 8 7 7 62% 62% 62% 54% 54% 4 1 0 0 2 5 10 0.77 2 Avenue 21 Street 19 Street 19 Street North 26 4 3 7 7 66 5 15% 12% 27% 23% 19% 3 2 2 1 1 9 0.35 2 Avenue 21 Street 20A Street South 6 3 2 2 50% 50% 50% 33% 33% 33% 0 1 0 0 2 3 0.50 2 Avenue 20 Street 20 Street South 6 6 5 4 4 3 46% 38% 33% 33% 33% 0 1 0 0 0 0.60 0.60 0.60 0.60 0.60 0.60	F	On Street	16 Street	1 Avenue	3 Avenue	West	18	5	5	4	3	3	6	28%	28%	22%	17%	17%	33%	3 2	1	1 0	2	8	0.44
2 Avenue 21 Street 19 Street North 26 4 3 7 7 6 5 15% 12% 27% 23% 19% 3 2 2 1 1 9 0.35 2 Avenue 21 Street 20A Street South 6 3 3 2 2 2 2% 50% 50% 33% 33% 33% 0 1 0 0 2 3 0.50 2 Avenue 20A Street 20 Street South 13 6 6 5 4 4 3 46% 48% 3% 3% 0 1 0 0 2 3 0.50 2 Avenue 20 Street 19 Street South 7 0 0 0 0% 0% 0% 0% 1 1 0 1 0 0 0 0.0 0 0 0 0 0 0 0 00	5	Un Street	16 Street	1 Avenue	3 Avenue	East	13	8	8	8	8	7	7	62%	62%	62%	62%	54%	54%	4 1	0	0 2	5	10	0.77
2 Avenue 21 Street 20A Street South 6 3 3 2 2 2 2 50% 50% 33% 33% 33% 0 1 0 0 0 2 3 0.50 2 Avenue 20A Street 20 Street South 13 6 6 5 4 4 3 46% 48% 38% 31% 33% 0 1 0 0 0 2 3 0.50 2 Avenue 20 Street 19 Street South 7 0 0 0 0 0 0 0 0.60 0.60 0.60 2 Avenue 19 Street Nelson Street/18 Street North 12 1 1 2 2 2 2 2 3% 0% 0% 0% 0% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1		2 Avenue	21 Street	19 Street	North	26	4	3	7	7	6	5	15%	12%	27%	27%	23%	19%	3 2	2	2 1	1	9	0.35
2 Avenue 20A Street 20 Street South 13 6 6 5 4 4 3 46% 48% 31% 31% 23% 0 1 1 0 1 3 6 0.46 2 Avenue 20 Street 19 Street South 7 0 0 0 0 0% 0% 0% 0% 0% 0 0 0 0 0.00 2 Avenue 19 Street Nelson Street / 18 Street North 12 1 1 2 2 2 2 2 8% 8% 17% 17% 17% 1 0 1 3 6 0.46 2 Avenue 19 Street Nelson Street / 18 Street North 12 1 1 2 2 2 2 2 8% 8% 17% 17% 17% 1 0 0 0 0 1 3 6 0.36 2 Avenue <td>1</td> <td></td> <td>2 Avenue</td> <td>21 Street</td> <td>20A Street</td> <td>South</td> <td>6</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>50%</td> <td>50%</td> <td>33%</td> <td>33%</td> <td>33%</td> <td>33%</td> <td>0 1</td> <td>0</td> <td>0 0</td> <td>2</td> <td>3</td> <td>0.50</td>	1		2 Avenue	21 Street	20A Street	South	6	3	3	2	2	2	2	50%	50%	33%	33%	33%	33%	0 1	0	0 0	2	3	0.50
2 Avenue 20 Street 19 Street South 7 0 0 0 0 0% 0% 0% 0% 0 0 0 0 0.00 2 Avenue 19 Street Nelson Street / 18 Street North 12 1 1 2 2 2 2 8% 8% 17% 17% 17% 1 0 1 3 0.25 2 Avenue 19 Street Nelson Street / 18 Street South 13 4 3 2 2 2 31% 15% 15% 1 1 0 0 2 4 0.31 2 Avenue 19 Street Nelson Street / 18 Street South 13 4 3 2 2 2 31% 23% 15% 15% 1 1 0 0 2 4 0.31 3 4 3 42 41 42 43 24% 23% 23% 25% 23%	1		2 Avenue	20A Street	20 Street	South	13	6	6	5	4	4	3	46%	46%	38%	31%	31%	23%	0 1	1	0 1	3	6	0.46
2 Avenue 19 Street Nelson Street/18 Street North 12 1 1 2 2 2 2 8% 8% 17% 17% 17% 1 0 1 0 1 3 0.25 2 Avenue 19 Street Nelson Street/18 Street South 13 4 3 2 2 2 31% 23% 15% 15% 15% 1 1 0 0 1 3 0.25 Route #5 Total Nelson Street/18 Street South 13 4 3 2 2 2 2 31% 23% 15% 15% 15% 15% 1 1 0 0 0 2 4 0.31 Route #5 Total Name#2 Add Add Add Add Add Network North Add	1		2 Avenue	20 Street	19 Street	South	7	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0 0	0	0 0	0	0	0.00
2 Avenue 19 Street Nelson Street/18 Street South 13 4 3 2 2 2 31% 23% 15% 15% 15% 1 1 0 0 0 2 4 0.31 Route #5 Total 180 43 42 42 43 24% 23% 15% 15% 15 1 1 0 0 2 4 0.31	1		2 Avenue	19 Street	Nelson Street / 18 Street	North	12	1	1	2	2	2	2	8%	8%	17%	17%	17%	17%	1 0	1	0 0	1	3	0.25
Route #5 Total 180 43 42 42 41 42 43 24% 23% 22% 22% 23% 17 9 8 3 4 27 63 0.32	1		2 Avenue	19 Street	Nelson Street / 18 Street	South	13	4	3	2	2	2	2	31%	23%	15%	15%	15%	15%	1 1	0	0 0	2	4	0.31
				Route #5 Total	· · · · · · · · · · · · · · · · · · ·		180	43	42	42	41	42	43	24%	23%	22%	22%	22%	23%	17 9	8	3 4	27	63	0.32

REPORT

R Appendix B - Parking Interview Data



Cold Lake - Transportation Study - Cold Lake North Parking Survey Project No: 2010-3050 Date: January 19, 2011

Parking Survey Questionnaire Responses

0	0	Otras t La satism	Time of Devi	Deixer/Desserver		live2	2) Where are you coming from	2) Where ere year	neing (dectination)2	4) How far from you	Ir destination did you	5) How far are you willing	g to walk from where you	6) How long did you	/ will you be parked	7) What was your	and a norking to day?
Survey	Survey	Street Location	Time of Day	Driver/Passenger	1) Where do you	i live?	(origin)?	3) Where are you	going (destination)?	pa	ark?	park to your	destination?	fo	r? .	What was your r	eason for parking today?
	1	Lakeshore	11:00	Driver	Cold Lake North		Home-Cold Lake	Waterfront/Marina		1 Block		1 Block		2 Hours		Tourism	
	2	10th Street	13:37	Driver	Cold Lake South		Residence	Waterfront/Marina		2 Blocks		2 Blocks		> 4 hours		Business	
	3	10th Street	11:15	Driver	Cold Lake South		Cold Lake South	Other	Home CLS	Other		Other	Close as possible	4 Hours		Business	
	4	10th Street	11:20	Driver	Cold Lake North		Home	Other	Work	Other		> 2 Blocks		4 Hours		Business	
	5	10th Street	11:20	Driver	Out-of-Town (within AB)		Home	Waterfront/Marina		Other		Other	2 miles	2 Hours		Leisure	
	6	Lakeshore	14:00	Passenger	Cold Lake South		Home	Kinosoo Beach		> 2 Blocks		< 1 Block		2 Hours		Leisure	
	7	10th Street	13:20	No Response	Cold Lake North		Home	Waterfront/Marina		Other	Walked from home	No Response		No Response		Leisure	
	8	5th Ave	14:58	Driver	Cold Lake North		Home	Other	Work Site	< 1 Block		< 1 Block		> 4 hours		Business	
	9	19th Street & 2nd Ave	16:10	Passenger	Out-of-Town (Outside AB)		BC	Kinosoo Beach		2 Blocks		> 2 Blocks		4 Hours		Leisure	
	10	19th Street & 2nd Ave	16:00	Driver	Out-of-Town (Outside AB)		BC	Kinosoo Beach		2 Blocks		> 2 Blocks		4 Hours		Leisure	
	11	16th Street & 1st Ave	12:25	Driver	Out-of-Town (within AB)		Edmonton	Kinosoo Beach		1 Block		> 2 Blocks		2 Hours		Leisure	
	12	10th Street & 1st Ave	12:05	Passenger	Cold Lake South		52nd Ave & 51st St	Kinosoo Beach		1 Block		2 Blocks		2 Hours		Leisure	
	13	10st Street & 1st Ave	12:00	Driver	Cold Lake South		52nd Ave & 51st St	Kinosoo Beach		1 Block		> 2 Blocks		1 Hour		Leisure	
	14	16th Street & 3rd Ave	11:45	Driver	Medley		Martineav	Kinosoo Beach		2 Blocks		> 2 Blocks		2 Hours		Leisure	
	15	2nd Ave & 20 A Street	11:35	Driver	Cold Lake North		16th Street & 12th Ave	Kinosoo Beach		> 2 Blocks		> 2 Blocks		3 Hours		Leisure	
	16	1st Ave & 16th Street	11:00	Passenger	Medley		Base	Kinosoo Beach		1 Block		2 BIOCKS		2 Hours		Leisure	
	17	1st Ave & 16th Street	11:00	Driver	Cold Lake South		No Response	Kinosoo Beach		1 Block		> 2 Blocks		1 Hour		Leisure	
	18	16th Street & 1st Ave	12:29	Passenger	Out-of-Town (within AB)		Edmonton	Kinosoo Beach		1 Block		> 2 Blocks		2 Hours		Leisure	
	19	Jot Ave & Nelson Street	15.45	Passenger	Cold Lake South		Main Ave Soun Ave & 45th St	Kinosoo Beach		2 DIOCKS		> 2 Blocks		4 Hours		Leisure	
	20	2nd Ave & Nelson Street	15:20	Driver	Cold Lake North		52nd Ave	Kinosoo Beach		2 Blocks		> 2 Blocks	-	2 Hours		Leisure	
	21	3rd Ave & 16th Street	16:45	Driver	Out-of-Town (within AB)		Bed Deer	Kinosoo Beach		1 Block		> 2 Blocks		1 Hour		Leisure	
	22	No Response	No Response	No Response	Cold Lake South		Cold Lake South	Waterfront/Marina		< 1 Block		2 Blocks		1 Hour		Other	Walk
	23	No Response	No Response	No Response	Cold Lake North		Cold Lake South	Waterfront/Marina		> 2 Blocks		1 Block		3 Hours			Waik
	25	Lakeshore Dr. & 5th Ave	12:00	Driver	Cold Lake North		South	Waterfront/Marina		2 Blocks		1 Block		2 Hours		Tourism	
	26	8th St. & Lakeshore Drive	10:50	No Response	Cold Lake North		Canada Day Parade	Other	Home	2 Blocks		> 2 Blocks		> 4 Hours		Personal	
	27	7 Ave & 5 Ave	11:00	No Response	Cold Lake North		No Response	Other	Parade	2 Blocks		> 2 Blocks		4 Hours		Tourism	Leisure Canada Dav
	28	609 Lakeshore Drive	12:00	No Response	Cold Lake North		Home	Other	No Where	Other	Homeowner	> 2 Blocks		Other		Other	
	29	No Response	No Response	No Response	Cold Lake South		Local	Waterfront/Marina	Kinosoo Beach	> 2 Blocks		> 2 Blocks		2 Hours		Leisure	
	30	No Response	No Response	No Response	Cold Lake North		Comox BC	Waterfront/Marina		> 2 Blocks		1 Block		< 30 Minutes		Tourism	
	31	No Response	No Response	No Response	Cold Lake South		Cold Lake South - Home	Kinosoo Beach		2 Blocks		> 2 Blocks		2 Hours		Business	
1-Jul-10	32	No Response	No Response	No Response	Cold Lake North		Home	Kinosoo Beach		2 Blocks		1 Block		3 Hours		Leisure	
	33	Lakeshore 500 Block	14:30	Driver	Cold Lake North		Beach	Other	Home	> 2 Blocks		> 2 Blocks		Other	Walking	Other	
	34	Pine	11:15	Driver	Cold Lake North		Beach Ave	Kinosoo Beach		< 1 Block		> 2 Blocks		2 Hours		Leisure	
	35	Birch Ave	11:25	Driver	Cold Lake North		Home	Kinosoo Beach		1 Block		2 Blocks		4 Hours		Leisure	
	36	Spruce	11:35	Driver	Out-of-Town (within AB)		Lloydminister	Other	Family Visit	> 2 Blocks		2 Blocks		1 Hour		Tourism	
	37	Birch Ave	12:05	Driver	Cold Lake South		52 Ave	Other	Birch Ave	< 1 Block		1 Block		4 Hours		Business	
	38	Birch	13:03	Driver	Cold Lake North		21 Street	Kinosoo Beach		< 1 Block		< 1 Block		2 Hours		Leisure	
	39	Birch	13:07	Driver	Out-of-Town (within AB)		Red Deer	Other	Visiting friends/family	<pre>/ < 1 Block</pre>		> 2 Blocks		> 4 Hours	3 Days	Personal	
	40	Pine	13:18	Passenger	Cold Lake South		50th Ave	Kinosoo Beach		< 1 Block		2 Blocks		2 Hours		Leisure	
	41	Pine	13:27	Driver	Cold Lake North		13 St	Kinosoo Beach		2 Blocks		> 2 Blocks		3 Hours		Leisure	
	42	Pine	14:12	Driver	Cold Lake South		50 Ave	Other		> 2 Blocks		> 2 Blocks		> 4 hours		Leisure	
	43	Spruce	14:20	Driver	Cold Lake South		54 Ave	Kinosoo Beach		2 Blocks		> 2 Blocks		4 Hours		Leisure	
	44	Pine	15:17	Passenger	Out-of-Town (within AB)		Dewberry 44 Observ	Kinosoo Beach		< 1 Block		2 BIOCKS		< 30 Minutes		Leisure	
	45	Pine	15:21	Driver	Cold Lake North		11 Street	Kinosoo Beach		< 1 Block		2 BIOCKS		2 Hours		Leisure	
	40	Direa Ave	10.00	Dilver	Cold Lake South		Souri Sueet	Kinosoo Beach		< 1 DIUCK		I BIOCK		< 30 Willinutes		Leisure	
	47	Pine	16:20	Passenger	Cold Lake North		Wildwood	Kinosoo Beach		< 1 Block		2 Blocks	-	4 Hours		Leisure	
	40	Fille 1et	No Response	No Response	Cold Lake South		Home	Kinosoo Beach		1 Block		< 1 Block	-	< 30 Minutes		Other	Canada
	43 50	No Response	No Response	No Response	Out-of-Town (within AB)		Edmonton	Kinosoo Beach		< 1 Block		Other	Apytime	2 Houre		Other	Canada Day
	51	No Response	No Response	No Response	Out-of-Town (Outside AB)	Golden BC	Home	Kinosoo Beach		< 1 Block		> 2 Blocks	7 uryume	> 4 hours		Other	Canada Day
	52	No Response	No Response	No Response	Cold Lake South	0010011 20	Beach	Other	Food	1 Block		> 2 Blocks		3 Hours		Other	Canada Day
	53	No Response	No Response	No Response	Cold Lake North		Home	Kinosoo Beach		2 Blocks	1 1	< 1 Block		3 Hours	-	Other	Canada Dav
	54	No Response	No Response	No Response	Out-of-Town (within AB)		Edmonton	Kinosoo Beach		< 1 Block	1	< 1 Block		2 Hours		Other	Canada Day
	55	No Response	No Response	No Response	Cold Lake South		Beach	Other	Home	< 1 Block	1	> 2 Blocks		1 Hour		Other	Canada Day
	56	No Response	No Response	No Response	Cold Lake North		Home	Kinosoo Beach		< 1 Block	1	> 2 Blocks		1 Hour		Other	Canada Day
	57	No Response	No Response	No Response	Cold Lake North		Local Establishment	Kinosoo Beach		> 2 Blocks		< 1 Block		> 4 hours		Tourism	
	58	No Response	No Response	No Response	Cold Lake North		Beach	Other	Home	< 1 Block		1 Block		> 4 hours		Other	Canada Day
	59	No Response	No Response	No Response	Cold Lake North		Home	Kinosoo Beach		< 1 Block		Other	Anything	> 4 hours		Other	Canada Day
	60	No Response	No Response	No Response	Cold Lake North		Beach	Other	Home	< 1 Block		> 2 Blocks		2 Hours		Other	Canada Day
	61	Lakeshore	15:36	No Response	Cold Lake North		Home	Waterfront/Marina	Kinosoo Beach	> 2 Blocks		> 2 Blocks		Other	Walked from home	Tourism	Leisure
	62	Lakeshore	15:00	Passenger	Cold Lake South		Home	Waterfront/Marina	Kinosoo Beach	< 1 Block		2 Blocks		2 Hours		Tourism	Leisure
	63	10 Street	14:20	Driver	Out-of-Town (within AB)		Home	Other	Walk	Other		Other		2 Hours		Business	
1	64	2nd Ave & Nelson Street	14:55	Driver	Cold Lake North		16th Ave & 12th Street	Kinosoo Beach		< 1 Block		2 Blocks		3 Hours		Leisure	Personal
	65	23 Street	11:07	Driver	Cold Lake North		1 Ave	Other	Home	< 1 Block		> 2 Blocks		< 30 Minutes		Personal	
2-Jul-10	66	10 Street	11:10	Driver	Cold Lake South		Residence	Other	vvork	< 1 Block		< 1 Block		> 4 Hours		Business	
	67	10 St & 3rd Ave	11:30	Driver	Cold Lake North		Home	Other	Mail Box	< 1 Block		< 1 Block		< 30 Minutes		Personal	Pickup Mail
1	68	10 Street & 7 Ave	11:45	Passenger	Cold Lake South		Work	Other	Work	< 1 Block		< 1 Block		1 Hour		Business	
L	69	10 Street & Ave	13:15	Driver	Cold Lake North		VV OFK	Other	Cold Lake South	< 1 BIOCK		< 1 BIOCK		3 HOUIS		Personal	
	70	10 Street & / AVe	13:00	Driver	Out of Town (Outside AD)	MD of Bonnadil-	No Posponso	Other	Garage Sela	< 1 BIOCK				I FIOUR		Dusiness	
	70	Spruce Street	II.3U	Driver	Out of Town (Outside AB)	Sockotohowan		Other	Galage Sale					< 30 Minutes		Personal	Vord Solo
3-10-10	72	23 Stroot	11.00	Driver	Cold Lake South	Jashalunewall	53 Ave	MD Comparound	i alu Gale	< 1 Block	 			< 50 minutes		Personal	i aid Jale
3-341-10	74	No Response	No Response	No Response	Cold Lake North		Home	Kinosoo Beach	ł		 	2 Blocks		3 Hours		Other	logging & Swim
	75	No Response	No Response	No Response	Cold Lake North		Cold Lake South	Other	Home	< 1 Block	+ +	1 Block		Other	Home	Other	Home
1	76	10 Street	11:10	Driver	Cold Lake North		Visiting	Other	Visiting	< 1 Block	1	1 Block		Other	Half a day	Personal	

REPORT

C Appendix C - Data Synthesis: On-Street Parking



Appendix C – Data Synthesis: On-Street Parking Summary

C.1 Entire Study Area

Table C.1 through **Table C.3** present the parking utilization, duration, and turnover rates calculated for all the on-street parking in the entire study area. The rates were calculated from the information obtained in the parking survey. It should be noted that the average parking utilization and average turnover rates presented in the following tables were first calculated for each block and then averaged to calculate the parking utilization and turnover rate for the entire study area.

		July 1	, 2010	July 2	, 2010	July 3	, 2010	3-Day	Period
Time Period	Parking Stalls Available	Number of Parked Vehicles	Average Parking Utilization Rate						
11:00 AM		363	39%	137	14%	199	22%	233	25%
12:00 AM		338	36%	141	15%	176	19%	218	23%
1:00 PM	060	400	44%	150	17%	166	18%	239	26%
2:00 PM	960	395	43%	131	15%	173	19%	233	26%
3:00 PM		364	40%	129	15%	152	17%	215	24%
4:00 PM		318	34%	129	15%	145	16%	197	22%

Table C.1 Parking Utilization - Entire Study Area

Table C.2 Parking Duration - Entire Study Area

	July 1	, 2010	July 2	, 2010	July 3	8, 2010	3-Day	Period
Duration	Number of Vehicles	Percentage of Total						
1 Hour	501	48%	132	45%	165	44%	266	47%
2 Hours	277	27%	42	14%	67	18%	129	23%
3 Hours	103	10%	22	8%	23	6%	49	9%
4 Hours	72	7%	16	5%	23	6%	37	6%
5 Hours	15	1%	15	5%	13	3%	14	3%
6 Hours	76	7%	66	23%	81	22%	74	13%

Table C.3Parking Turnover - Entire Study Area

	Parking Turnover R	ate (6-Hour Period)										
July 1, 2010	July 1, 2010 July 2, 2010 July 3, 2010 3-Day Period											
1.09	0.32	0.41	0.61									

C.2 Study Zones

Table C.4 through Table C.6 present the parking utilization, duration, and turnover rates calculated for the on-street parking in each zone. The rates were calculated from the information obtained in the parking survey. It should be noted that the average parking utilization and average turnover rates presented in the following tables were first calculated for each block and then averaged to calculate the parking utilization and turnover rate for each study zone.

			July 1	, 2010	July 2	, 2010	July 3	, 2010	3-Day	Period
Zone	Time Period	Parking Stalls	Number of Parked Vehicles	Average Parking Utilizatio n Rate						
	11:00 AM		19	17%	11	10%	36	34%	22	20%
	12:00 AM		19	16%	20	18%	25	25%	21	20%
Zono 1	1:00 PM	447	44	40%	30	29%	25	25%	33	31%
Zone	2:00 PM	117	43	40%	24	25%	32	30%	33	32%
	3:00 PM		39	39%	20	23%	27	24%	29	28%
	4:00 PM		25	28%	21	22%	22	20%	23	23%
	11:00 AM		48	23%	40	17%	49	21%	46	20%
	12:00 AM		39	20%	38	16%	47	20%	41	19%
7	1:00 PM	040	51	24%	42	18%	38	16%	44	20%
Zone Z	2:00 PM	242	57	28%	38	16%	41	17%	45	21%
	3:00 PM		42	19%	40	17%	32	13%	38	16%
	4:00 PM		35	15%	37	16%	31	13%	34	15%
	11:00 AM		139	69%	11	7%	24	12%	58	29%
	12:00 AM		131	59%	11	7%	20	11%	54	26%
70	1:00 PM	101	132	59%	12	7%	19	11%	54	26%
Zone 3	2:00 PM	181	128	58%	9	7%	19	10%	52	25%
	3:00 PM		125	56%	15	8%	17	10%	52	25%
	4:00 PM		110	50%	16	11%	17	10%	48	24%
	11:00 AM		72	35%	42	18%	47	18%	54	23%
	12:00 AM		71	35%	41	17%	42	17%	51	23%
7	1:00 PM	040	84	41%	40	17%	42	18%	55	25%
∠one 4	2:00 PM	240	87	41%	36	16%	40	16%	54	24%
	3:00 PM		83	39%	29	12%	34	14%	49	22%
	4:00 PM		80	36%	34	13%	32	13%	49	21%

Table C.4 Parking Utilization - By Study Zone

			July 1	, 2010	July 2	2, 2010	July 3	, 2010	3-Day	Period
Zone	Time Period	Parking Stalls	Number of Parked Vehicles	Average Parking Utilizatio n Rate						
	11:00 AM		85	51%	33	18%	43	24%	54	31%
	12:00 AM		78	49%	31	17%	42	23%	50	30%
Zana E	1:00 PM	190	89	54%	26	15%	42	22%	52	30%
Zone 5	2:00 PM	180	80	48%	24	13%	41	22%	48	28%
	3:00 PM		75	45%	25	13%	42	22%	47	27%
	4:00 PM		68	41%	21	12%	43	23%	44	25%

Table C.5Parking Duration - By Study Zone

		July 1	, 2010	July 2	2, 2010	July 3	, 2010	3-Day	Period
Zone	Duration	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentag e of Total	Number of Vehicles	Percentage of Total
	1 Hour	58	59%	48	70%	62	63%	56	63%
	2 Hours	15	15%	7	10%	23	23%	15	17%
7000 1	3 Hours	13	13%	3	4%	6	6%	7	8%
Zone i	4 Hours	8	8%	3	4%	3	3%	5	5%
	5 Hours	1	1%	5	7%	1	1%	2	3%
	6 Hours	4	4%	3	4%	4	4%	4	4%
	1 Hour	62	50%	33	41%	44	49%	46	47%
	2 Hours	25	20%	12	15%	15	17%	17	18%
7000.2	3 Hours	13	10%	8	10%	3	3%	8	8%
Zone z	4 Hours	11	9%	3	4%	6	7%	7	7%
	5 Hours	2	2%	2	3%	2	2%	2	2%
	6 Hours	12	10%	22	28%	20	22%	18	18%
	1 Hour	216	53%	2	11%	14	38%	80	51%
	2 Hours	115	28%	6	33%	5	14%	42	27%
7000.0	3 Hours	32	8%	1	6%	2	5%	12	7%
Zone 3	4 Hours	19	5%	2	11%	4	11%	8	5%
	5 Hours	8	2%	0	0%	2	5%	3	2%
	6 Hours	18	4%	7	39%	10	27%	12	7%

		July 1	, 2010	July	2, 2010	July 3	s, 2010	3-Day	Period
Zone	Duration	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentag e of Total	Number of Vehicles	Percentage of Total
	1 Hour	75	40%	6	13%	28	36%	45	40%
	2 Hours	46	25%	9	19%	15	19%	23	21%
Zono 4	3 Hours	18	10%	1	2%	4	5%	8	7%
Zone 4	4 Hours	11	6%	6	13%	7	9%	8	7%
	5 Hours	4	2%	4	9%	4	5%	4	4%
	6 Hours	32	17%	21	45%	20	26%	24	22%
	1 Hour	90	40%	11	23%	17	25%	39	35%
	2 Hours	76	34%	8	17%	9	13%	31	27%
Zono E	3 Hours	27	12%	9	19%	8	12%	15	13%
Zone 5	4 Hours	23	10%	2	4%	3	4%	9	8%
	5 Hours	0	0%	4	9%	4	6%	3	2%
	6 Hours	10	4%	13	28%	27	40%	17	15%

Table C.6 Parking Turnover - By Study Zone

7		Parking Turnover R	ate (6-Hour Period)	
Zone	July 1, 2010	July 2, 2010	July 3, 2010	3-Day Period
Zone 1	0.87	0.67	0.88	0.81
Zone 2	0.58	0.32	0.38	0.43
Zone 3	1.88	0.13	0.17	0.72
Zone 4	0.86	0.26	0.30	0.47
Zone 5	1.29	0.23	0.32	0.62

C.3 Study Corridors

Table C.7 through **Table C.9** present the parking utilization, duration, and turnover rates calculated for the on-street parking along the Lakeshore Drive, 10 Street, and 1 Avenue corridors. The rates were calculated from the information obtained in the parking survey. It should be noted that the average parking utilization and average turnover rates presented in the following tables were first calculated for each block and then averaged to calculate the parking utilization and turnover rate for each study corridor.

			July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
Corridor	Time Period	Parkin g Stalls	Number of Parked Vehicles	Average Parking Utilization Rate	Number of Parked Vehicles	Average Parking Utilization Rate	Number of Parked Vehicles	Average Parking Utilizatio n Rate	Number of Parked Vehicles	Average Parking Utilization Rate
	11:00 AM		16	14%	8	7%	36	39%	20	20%
	12:00 AM		16	14%	19	19%	25	29%	20	20%
Lakeshore	1:00 PM	100	42	42%	28	30%	25	28%	32	34%
Drive	2:00 PM	108	42	45%	22	26%	32	34%	32	35%
	3:00 PM		38	43%	18	23%	27	27%	28	31%
	4:00 PM		24	30%	20	24%	22	23%	22	26%
	11:00 AM		20	19%	20	14%	15	11%	18	15%
	12:00 AM		17	18%	19	14%	17	12%	18	15%
10 Street	1:00 PM	120	17	18%	20	14%	16	11%	18	15%
10 Street	2:00 PM	139	18	20%	17	12%	15	11%	17	14%
	3:00 PM		17	13%	19	14%	16	11%	17	13%
	4:00 PM		13	10%	18	13%	16	11%	16	11%
	11:00 AM		139	69%	11	7%	24	12%	58	29%
	12:00 AM		131	59%	11	7%	20	11%	54	26%
1 Амариа	1:00 PM	101	132	59%	12	7%	19	11%	55	26%
i Avenue	2:00 PM	101	128	58%	9	7%	19	10%	52	25%
	3:00 PM		125	56%	15	8%	17	10%	52	25%
	4:00 PM		110	50%	16	11%	17	10%	48	24%

 Table C.7

 Parking Utilization - By Study Corridor

		July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
Corridor	Duration	Number of Vehicles	Percentage of Total						
	1 Hour	58	60%	46	71%	62	63%	55	64%
	2 Hours	14	15%	7	11%	23	23%	15	17%
Lakeshore	3 Hours	12	13%	2	3%	6	6%	7	8%
Diive	4 Hours	8	8%	3	5%	3	3%	5	5%
-	5 Hours	1	1%	5	8%	1	1%	2	3%
	6 Hours	3	3%	2	3%	4	4%	3	3%
	1 Hour	16	39%	8	27%	5	21%	10	31%
	2 Hours	11	27%	4	13%	4	17%	6	20%
10 Street	3 Hours	4	10%	2	7%	1	4%	2	7%
10 Sileei	4 Hours	2	5%	2	7%	2	8%	2	6%
	5 Hours	2	5%	1	3%	1	4%	1	4%
	6 Hours	6	15%	13	43%	11	46%	10	32%
	1 Hour	216	53%	9	36%	14	38%	80	51%
	2 Hours	115	28%	6	24%	5	14%	42	27%
1 Avenue	3 Hours	32	8%	1	4%	2	5%	12	7%
T Avenue	4 Hours	19	5%	2	8%	4	11%	8	5%
	5 Hours	8	2%	0	0%	2	5%	3	2%
	6 Hours	18	4%	7	28%	10	27%	12	7%

Table C.8 Parking Duration - By Study Corridor

Table C.9Parking Turnover - By Study Corridor

Corridor	Parking Turnover Rate (6-Hour Period)						
Corridor	July 1, 2010	July 2, 2010	July 3, 2010	3-Day Period			
Lakeshore Drive	0.95	0.70	1.01	0.88			
10 Street	0.39	0.18	0.17	0.25			
1 Avenue	1.88	0.13	0.17	0.72			

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Appendix D - Data Synthesis: Off-Street Parking



Appendix D – Data Synthesis: Off-Street Parking Summary

Table D.1 through **Table D.3** present the parking utilization, duration, and turnover rates calculated for the off-street parking in the Marina Lot, the 1 Avenue Lot and the Gravel Lot.

		July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period		
Parking Lot	Time Period	Parking Stalls	Number of Parked Vehicles	Average Parking Utilization Rate	Number of Parked Vehicles	Average Parking Utilization Rate	Number of Parked Vehicles	Average Parking Utilization Rate	Number of Parked Vehicles	Average Parking Utilization Rate
	11:00 AM		50	79%	38	60%	61	97%	50	79%
	12:00 AM		78	124%	52	83%	64	102%	65	103%
Marina	1:00 PM		76	121%	64	102%	67	106%	69	110%
Lot	2:00 PM	63	73	116%	63	100%	67	106%	67	107%
	3:00 PM		75	119%	47	75%	64	102%	62	98%
	4:00 PM		78	124%	49	78%	47	75%	58	92%
	11:00 AM	86	31	36%	5	6%	0	0%	12	14%
	12:00 AM		38	44%	7	8%	9	10%	18	21%
1 Avenue	1:00 PM		39	45%	20	23%	18	21%	26	30%
Lot	2:00 PM		39	45%	30	35%	14	16%	28	32%
	3:00 PM		34	40%	19	22%	16	19%	23	27%
	4:00 PM		34	40%	5	6%	15	17%	18	21%
	11:00 AM		32	55%	1	2%	2	3%	12	20%
	12:00 AM		38	66%	3	5%	4	7%	15	26%
Gravel	1:00 PM	58	47	81%	4	7%	3	5%	18	31%
Lot	2:00 PM		58	100%	6	10%	3	5%	22	39%
	3:00 PM		57	98%	5	9%	1	2%	21	36%
	4:00 PM		50	86%	3	5%	0	0%	18	30%

Table D.1 Parking Utilization – By Parking Lot

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		July 1	, 2010	July 2, 2010		July 3, 2010		3-Day Period	
Parking Lot	Duration	Number of Vehicles	Percentage of Total						
	1 Hour	130	59%	110	64%	122	61%	121	61%
	2 Hours	37	17%	25	14%	38	19%	33	17%
	3 Hours	19	9%	16	9%	15	7%	17	8%
Marina Lot	4 Hours	15	7%	11	6%	9	4%	12	6%
	5 Hours	10	5%	5	3%	11	5%	9	4%
	6 Hours	10	5%	6	3%	6	3%	7	4%
	1 Hour	9	16%	29	55%	34	72%	24	46%
	2 Hours	13	23%	16	30%	7	15%	12	23%
1 Avenue	3 Hours	2	4%	7	13%	2	4%	4	7%
Lot	4 Hours	6	11%	1	2%	2	4%	3	6%
	5 Hours	6	11%	0	0%	2	4%	3	5%
	6 Hours	20	36%	0	0%	0	0%	7	13%
	1 Hour	50	38%	5	45%	5	56%	20	40%
	2 Hours	36	28%	2	18%	4	44%	14	28%
	3 Hours	26	20%	3	27%	0	0%	10	19%
Gravel Lot	4 Hours	10	8%	1	9%	0	0%	4	7%
	5 Hours	6	5%	0	0%	0	0%	2	4%
	6 Hours	2	2%	0	0%	0	0%	1	1%

Table D.2 Parking Duration – By Parking Lot

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	Parking Turnover Rate (6-Hour Period)						
Parking Lot	July 1, 2010	July 2, 2010	July 3, 2010	3-Day Period			
Marina Lot	3.27	2.56	3.14	2.99			
1 Avenue Lot	0.63	0.62	0.53	0.59			
Gravel Lot	2.14	0.19	0.16	0.83			

Table D.3 Parking Turnover – By Parking Lot

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Appendix E - Data Synthesis: Parking Interviews



Appendix E – Data Synthesis: Parking Interview Summary

Table E.1 through Table E.7 summarizes the responses obtained from the parking interviews.

where do you live?					
	Response	Percentage of Total			
Cold Lake North	34	45%			
Cold Lake South	25	33%			
Medley	2	3%			
Out-of-Town (within AB)	10	13%			
Out-of-Town (Outside AB)	5	7%			
No Response	0	0%			
Total	76	100%			

Table E.1 Where do you live?

The majority of commuters interviewed lived within the City, with 45% living in Cold Lake North and 33% living in Cold Lake South.

Where are you coming from (origin)?					
	Response	Percentage of Total			
Cold Lake North	27	36%			
Cold Lake South	23	30%			
Medley	2	3%			
Out-of-Town (within AB)	11	14%			
Out-of-Town (Outside AB)	5	7%			
Unknown	8	11%			
Total	76	100%			

Table E.2 Where are you coming from (origin)?

The majority of commuters interviewed started their trip from within the City, with 36% originating from Cold Lake North and 30% originating from Cold Lake South.

where are you going (destination)?						
	Response	Percentage of Total				
Waterfront/Marina	11	14%				
Kinosoo Beach	38	50%				
MD Campground	1	1%				
Cold Lake North	8	11%				
Cold Lake South	3	4%				
Unknown	15	20%				
No Response	0	0%				
Total	76	100%				

Table E.3Where are you going (destination)?

Half the commuters (50%) interviewed were destined for Kinosoo Beach and 14% were destined for the Waterfront/Marina.

	Response	Percentage of Total
< 1 Block	34	45%
1 Block	11	14%
2 Blocks	15	20%
> 2 Blocks	10	13%
Other	6	8%
No Response	0	0%
Total	76	100%

Table E.4How far from your destination did you park?

The majority of commuters interviewed parked within 2 blocks of their destination, with 45% parked within less than 1 block, 14% parked within 1 block and 20% parked within 2 blocks.

now fail are you winning to wark norm where you park to your dest							
	Response	Percentage of Total	I				
< 1 Block	13	17%	I				
1 Block	13	17%					
2 Blocks	11	14%					
> 2 Blocks	33	43%					
Other	5	7%					
No Response	1	1%					
Total	76	100%					

 Table E.5

 How far are you willing to walk from where you park to your destination?

Most commuters (43%) interviewed are willing to park further than 2 blocks from their destination.

How long did you / will you be parked for?					
	Response	Percentage of Total			
< 30 Minutes	8	11%			
1 Hour	10	13%			
2 Hours	21	28%			
3 Hours	11	14%			
4 Hours	10	13%			
> 4 hours	10	13%			
Other	5	7%			
No Response	1	1%			
Total	76	100%			

Table E.6 How long did you / will you be parked for?

Most commuters (28%) interviewed will be parked in their parking spot for a duration of 2 hours.

	Response	Percentage of Total
Business	10	13%
Tourism	8	11%
Shopping	0	0%
Leisure	33	43%
Personal	9	12%
Other	16	21%
No Response	0	0%
Total	76	100%

Table E.7What was your reason for parking today?

The predominant trip purpose for most commuters interviewed in Cold Lake North was leisure (43%).



F

Appendix F - On-Street Parking Analysis



Appendix F – On Street Parking Analysis

F.1 Entire Study Area

F.1.1 Parking Demand/Utilization

Figure F.1 presents the overall on-street parking supply and demand plotted for the entire study area.



Figure F.1 On-Street Parking Supply vs. Demand – Entire Study Area

The existing on-street parking supply was able to accommodate the overall on-street parking demand in the entire study area. The parking demand on July 1 was higher than the parking demand on July 2 and July 3; the parking demand on July 1 was almost double the parking demand on July 2 and July 3. The highest overall parking demand was observed on July 1 at 1:00 pm.

F.1.2 Parking Duration

Figure F.2 presents the parking duration observed on July 1 and the average parking duration observed on July 2 and July 3, for the entire study area.



Figure F.2

The majority of commuters parked for a duration of 2 hours or less. On July 1, 48% of commuters parked for 1 hour and 27% parked for 2 hours. On July 2 and July 3, an average of 45% of commuters parked for 1 hour and an average of 16% parked for 2 hours. It should be noted that the proportion of commuters who parked for 6 hours was significantly larger on July 2 and July 3 (22%) than on July 1 (7%).

F.1.3 Parking Turnover

The turnover rate for the entire study area was 1.09 on July 1, 0.32 on July 2 and 0.41 on July 3. The turnover rate is much higher on July 1 (Canada Day) than on a typical day on the weekend.

F.2 Study Zones

F.2.1 Parking Demand/Utilization

Figure F.3 through **Figure F.7** present the on-street parking supply and demand plotted for the different parking zones.



Figure F.3 On-Street Parking Supply vs. Demand – Study Zone 1

Figure F.4 On-Street Parking Supply vs. Demand – Study Zone 2



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Figure F.5 On-Street Parking Supply vs. Demand – Study Zone 3

Figure F.6 On-Street Parking Supply vs. Demand – Study Zone 4



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Figure F.7 On-Street Parking Supply vs. Demand – Study Zone 5

The graphs presented in **Figure F.3** through **Figure F.7** illustrate that the existing on-street parking supply within each parking zone was able to accommodate the on-street parking demand for the zone.

Generally, the on-street parking demand observed on July 1 was higher than the parking demand observed on July 2 and July 3. The most significant difference in parking demand occurred in Zone 3, where the parking demand on July 1 was more than seven times the demand observed on July 2 and July 3.

F.2.2 Parking Duration

Figure F.8 through **Figure F.12** present the parking duration observed on July 1 and the average parking duration observed on July 2 and July 3, for each of the parking zones.



The majority of commuters in Zone 1 parked for a duration of 2 hours or less. On July 1, 59% of commuters parked for 1 hour and 15% parked for 2 hours. On July 2 and July 3, an average of 65% of commuters parked for 1 hour and an average of 18% parked for 2 hours.



The majority of commuters in Zone 2 parked for a duration of 2 hours or less. On July 1, 50% of commuters parked for 1 hour and 20% parked for 2 hours. On July 2 and July 3, an average of 45% of commuters parked for 1 hour and an average of 16% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 25% of commuters parked for 6 hours.





The majority of commuters in Zone 3 parked for a duration of 2 hours or less. On July 1, 53% of commuters parked for 1 hour and 28% parked for 2 hours. On July 2 and July 3, an average of 37% of commuters parked for 1 hour and an average of 18% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 27% of commuters parked for 6 hours.

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The majority of commuters in Zone 4 parked for a duration of 2 hours or less. On July 1, 40% of commuters parked for 1 hour and 25% parked for 2 hours. On July 2 and July 3, an average of 40% of commuters parked for 1 hour and an average of 16% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 27% of commuters parked for 6 hours.



On July 1, the majority of commuters in Zone 5 parked for a duration of 2 hours or less, with 40% of commuters parked for 1 hour and 34% of commuters parked for 2 hours. On July 2 and July 3, most commuters in Zone 5 either parked for 6 hours (35%) or 1 hour (24%).

F.2.3 Parking Turnover

The parking turnover rates presented in **Table C.6** (in **Appendix C**) for each parking zone are resummarized in **Table F.1** to present the turnover rates observed on July 1 and the average turnover rates observed on July 2 and July 3.

i arking runiover – Study Zones						
	Parking Turnover Rate (6-Hour Period)					
Zone	July 1, 2010	July 2 & 3, 2010 Average				
Zone 1	0.87	0.77				
Zone 2	0.58	0.35				
Zone 3	1.88	0.15				
Zone 4	0.86	0.28				
Zone 5	1.29	0.28				

Table F.1
Parking Turnover – Study Zones

The turnover rates observed on July 1 are higher than the average turnover rates observed on July 2 and July 3. On July 1, Zone 3 and Zone 5 experienced the highest turnover rates at 1.88 and 1.29 respectively. It should be noted that Zone 3 and Zone 5 have the lowest average turnover rates on July 2 and July 3.

F.3 Study Corridors

F.3.1 Parking Demand/Utilization

Figure F.13 through **Figure F.15** present the on-street parking supply and demand plotted for the individual study corridors.



Figure F.13 On-Street Parking Supply vs. Demand – Lakeshore Drive

Figure F.14 On-Street Parking Supply vs. Demand – 10 Street



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Table F.15On-Street Parking Supply vs. Demand – 1 Avenue

The graphs presented in **Figure F.13** through **Figure F.15** illustrate that the existing on-street parking supply within each study corridor was able to accommodate the on-street parking demand for the corridor. The parking demand along Lakeshore Drive and 10 Street remained relatively consistent over the three day study period. The parking demand on 1 Avenue, however, was significantly higher on July 1 than on July 2 and July 3.

F.3.2 Parking Duration

Figure F.16 through **Figure F.18** present the parking duration observed on July 1 and the average parking duration observed on July 2 and 3, for each of the study corridors.



Figure F.16 Parking Duration – Lakeshore Drive

The majority of commuters along Lakeshore Drive parked for a duration of 2 hours or less. On July 1, 60% of commuters parked for 1 hour and 15% parked for 2 hours. On July 2 and July 3, an average of 66% of commuters parked for 1 hour and an average of 18% parked for 2 hours.

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On July 1, the majority of commuters along 10 Street parked for a duration of 2 hours or less, with 39% of commuters parked for 1 hour and 27% of commuters parked for 2 hours. On July 2 and July 3, most commuters along 10 Street either parked for 6 hours (44%) or 1 hour (24%).



On July 1, the majority of commuters along 1 Avenue parked for a duration of 2 hours or less, with 53% of commuters parked for 1 hour and 28% of commuters parked for 2 hours. On July 2 and July 3, most commuters along 1 Avenue either parked for 1 hour (37%) or 6 hours (27%).

F.3.3 **Parking Turnover**

The parking turnover rates presented in Table C.9 (in Appendix C) for each study corridor are re-summarized in Table F.2 to present the turnover rates observed on July 1 and the average turnover rates observed on July 2 and July 3.

Parking Turnover – Study Corridors							
	Parking Turnover Rate (6-Hour Period)						
Zone	July 1, 2010	July 2 & 3 2010 - Average					
Lakeshore Drive	0.95	0.85					

Table F.2

	Parking Turnover R	ate (6-Hour Period)
Zone	July 1, 2010	July 2 & 3 2010 - Average
10 Street	0.39	0.17
1 Avenue	1.88	0.15

The turnover rates observed on July 1 are higher than the average turnover rates observed on July 2 and July 3. On July 1, the 1 Avenue corridor experiences the highest turnover rates at 1.88. It should be noted that the 1 Avenue corridor has the lowest average turnover rates on July 2 and July 3.

F.4 Other On-Street Parking Issues

F.4.1 Illegal Parking

No parking zones are provided at the following on-street locations:

- East side of Lakeshore Drive, from 7 Street to 8 Avenue
- East side of Lakeshore Drive, from 2 Avenue to 7 Avenue
- West side of Lakeshore Drive, from 6 Avenue to midblock to 7 Avenue
- North side of 2 Avenue, from 10 Street to Lakeshore Drive
- South side of 1 Avenue, from 16 Street to 10 Street
- North side of 1 Avenue, at the 16 Street intersection

Despite the parking restriction, parking was observed at the following locations during the threeday study period:

- East side of Lakeshore Drive, from 7 Street to 8 Street July 2 and July 3
- East side of Lakeshore Drive, from 8 Avenue to 8 Street July 1
- East side of Lakeshore Drive, from 6 Avenue to 7 Avenue July 1
- South side of 1 Avenue from 16 Street to 10 Street July 1

The no parking zones listed above are indicated by yellow paint on the side of the curb. Visitors unfamiliar with the area may not understand that the yellow curb paint indicate no parking zones. During the wintertime the yellow curb paint may also become obscured under the snow. AE recommends that no parking signs be installed at the no parking zones to reinforce the parking restriction. Enforcement of the no parking zones should also be increased to ensure that the parking restrictions are obeyed.

F.4.2 Vehicle Type

The following vehicle types were observed during the parking survey, aside from passenger cars:

- Bicycles
- Motorcycles
- Recreational vehicles
- Trailer/boat trailers
- Farm vehicles
- Other

Table F.3 through **Table F.5** present the breakdown of the vehicle type for on-street parking observed July 1, July 2, and July 3 respectively.

			Vehicle Type					
Zone	Passenger Car	Bicycle	Motorcycle	Recreational Vehicle	Trailer	Farm Vehicle	Other	
1	82	6	0	0	10	0	0	
2	113	2	0	1	4	0	0	
3	383	0	10	0	0	2	0	
4	169	0	0	2	5	0	2	
5	212	0	0	0	0	0	0	
Entire Study Area	959	8	10	3	19	2	2	

Table F.3On-Street Vehicle Type – July 1, 2010

Table F.4On-Street Vehicle Type – July 2, 2010

		Vehicle Type						
Zone	Passenger Car	Bicycle	Motorcycle	Recreational Vehicle	Trailer	Farm Vehicle	Other	
1	62	1	0	1	5	0	0	
2	69	0	0	0	4	0	0	
3	24	0	0	0	0	0	0	
4	59	0	0	0	4	0	2	
5	43	0	0	1	0	0	0	

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Entire Study Area	257	1	0	2	13	0	2
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	Vehicle Type						
Zone	Passenger Car	Bicycle	Motorcycle	Recreational Vehicle	Trailer	Farm Vehicle	Other
1	87	5	0	0	4	0	0
2	83	0	0	2	3	0	0
3	35	0	0	0	0	0	0
4	66	0	0	0	3	0	4
5	63	0	0	0	0	0	0
Entire Study Area	334	5	0	2	10	0	4

Table F.5 On-Street Vehicle Type – July 3, 2010

Of particular interest was the number of RVs and trailers parked on-street in the study area. These vehicle types are longer and will require more than one on-street parking stall. RVs and trailers accounted for approximately 2% of on-street parked vehicles on July 1, 2010, approximately 6% of on-street parked vehicles on July 2, 2010, and 4% of on-street parked vehicles on July 3, 2010. The percentages quoted above are for the entire study area over the entire study period (11:00 am to 4:00 pm) each day. It should be noted that Zone 1 (Lakeshore Drive) contained the highest proportion of RVs and trailers for all three days surveyed.




Appendix G – Off Street Parking Analysis

G.1 Marina Lot

G.1.1 Parking Demand/Utilization

Figure G.1 presents the off-street parking supply and demand plotted for the Marina Lot.



Figure G.1 On-Street Parking Supply vs. Demand – Marina Lot

The existing parking supply provided in the Marina Lot was unable to accommodate the parking in several time periods, over the three days observed. The parking demand exceeded the parking supply from 12:00 pm to 5:00 pm on July 1 and the average parking demand exceeded the parking supply from 1:00 pm to 3:00 pm on July 2 and July 3.

G.1.2 Parking Duration

Figure G.2 presents the parking duration observed on July 1 and the average parking duration observed on July 2 and July 3, for the Marina Lot.



The majority of commuters in the Marina Lot parked for a duration of 2 hours or less. On July 1, 59% of commuters parked for 1 hour and 17% of commuters parked for 2 hours. On July 2 and July 3, an average of 62% of commuters parked for 1 hour and an average of 17% of commuters parked for 2 hours.

G.1.3 Parking Turnover

The parking turnover rate for the Marina Lot was 3.27 on July 1, 2.56 on July 2 and 3.14 on July 3. The turnover rate for the Marina Lot was relatively consistent over the course of the 3 day study period and was high when compared to the turnover rates for on-street parking and for the other two off-street lots.

G.2 1 Avenue Lot

G.2.1 Parking Demand/Utilization

Figure G.3 presents the off-street parking supply and demand plotted for the 1 Avenue Lot.



Figure G.3 On-Street Parking Supply vs. Demand – 1 Avenue Lot

The existing parking supply provided in the 1 Avenue Lot was able to accommodate the parking demand, for the entire study period. On July 1, parking in the 1 Avenue Lot was only available to vendors participating in the Canada Day parade. Public parking was not allowed.

G.2.2 Parking Duration

Figure G.4 presents the parking duration observed on July 1 and the average parking duration observed on July 2 and July 3, for the 1 Avenue Lot.



On July 1, most of the commuters in the 1 Avenue Lot parked for 6 hours (36%). On July 2 and July 3, the majority of commuters parked for a duration of 2 hours or less, with an average of 63% of commuters parked for 1 hour and an average of 23% of commuters parked for 2 hours.

G.2.3 Parking Turnover

The parking turnover rate for the 1 Avenue Lot was 0.63 on July 1, 0.62 on July 2 and 0.53 on July 3. The turnover rate for the 1 Avenue Lot was relatively consistent over the course of the 3 day study period and was low when compared to the Marina Lot.

G.3 Gravel Lot

G.3.1 Parking Demand/Utilization

Figure G.5 presents the off-street parking supply and demand plotted for the Gravel Lot.



Figure G.5 On-Street Parking Supply vs. Demand – Gravel Lot

The existing parking supply provided in the Gravel Lot was able to accommodate the parking demand, for the entire study period. It should be noted that the parking demand on July 1 is significantly higher than the average parking demand on July 2 and July 3.

G.3.2 Parking Duration

Figure G.6 presents the parking duration observed on July 1 and the average parking duration observed on July 2 and July 3, for the Gravel Lot.



The majority of commuters in the Gravel Lot parked for a duration of 2 hours or less. On July 1, 38% of commuters parked for 1 hour and 28% of commuters parked for 2 hours. On July 2 and July 3, an average of 50% of commuters parked for 1 hour and an average of 30% of commuters parked for 2 hours.

G.3.3 Parking Turnover

The parking turnover rate for the Gravel Lot was 2.14 on July 1, 0.19 on July 2 and 0.16 on July 3. The turnover rates indicate that the Gravel Lot was highly utilized on Canada Day, but was underutilized for the remainder of the study period.

G.4 Other Off-Street Parking Issues

G.4.1 Illegal Parking

The utilization rate for the Marina Lot exceeded 100% every day for the three-day study period. This indicates that the number of vehicles parked in the Marina Lot exceeded the number of parking stalls available and provides evidence that people were making their own parking spots and parking illegally.

G.4.2 Vehicle Type

Table G.1 through **Table G.3** presents the breakdown of the vehicle type for off-street parking on July 1, July 2, and July 3 respectively.

	Vehicle Type								
Zone	Passenger Car	Bicycle	Motorcycle Recreational Vehicle		Trailer	Boat	Farm Vehicle		
Marina Lot	204	1	0	1	0	0	0		
1 Avenue Lot	53	0	0	0	1	0	0		
Gravel Lot	123	1	0	0	0	0	0		

Table G.1 Off-Street Vehicle Type – July 1, 2010

Table G.2Off-Street Vehicle Type – July 2, 2010

	Vehicle Type									
Zone	Passenger Car	Bicycle	Motorcycle	Recreational Vehicle	Trailer	Boat	Farm Vehicle			
Marina Lot	161	0	0	0	0	0	0			
1 Avenue Lot	52	0	1	0	0	0	0			
Gravel Lot	11	0	0	0	0	0	0			

Table G.3Off-Street Vehicle Type – July 3, 2010

	Vehicle Type									
Zone	Passenger Car	Bicycle	Motorcycle	Recreational Vehicle	Trailer	Boat	Farm Vehicle			
Marina Lot	197	1	0	0	0	0	0			
1 Avenue Lot	45	1	0	0	0	0	0			
Gravel Lot	9	0	0	0	0	0	0			

The number of RVs and trailers parked in the off-street lots are very low during the study period. On July 1, 2010, only one RV was observed in the Marina Lot and one trailer was observed in the 1 Avenue Lot, over the course of the 6-hour study period. No RVs or trailers were observed in the off-street lots on July 2, 2010 or July 3, 2010. The 1 Avenue Lot currently contains 11 long stalls that are intended for RVs and trailers. The demand for RV and trailer parking can be easily accommodated by these stalls.

Ε

Appendix E - Transportation Study Cold Lake South - Parking Study

Technical Memorandum



City of Cold Lake

Transportation Study Cold Lake South - Parking Study

April 2011



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Appendix B - Verification Study Data



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Introduction

Associated Engineering (AE) was retained by the City of Cold Lake (City) to update the existing transportation study. The purpose of the transportation study is to provide the City with a master plan on which to plan and implement specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15-year and 20-year planning horizons. The transportation study will consider municipal roads, traffic calming, parking management, traffic safety, traffic signal coordination, school zones, transit, truck routes, traffic management, and transportation system operations.

One component of the transportation study is to complete parking studies for the business zones within Cold Lake North (CLN) and Cold Lake South (CLS). The parking studies for the two study areas were completed independently. This technical memorandum documents the result of the parking study completed for the business zone within CLS.

1.1 STUDY BACKGROUND

A comprehensive parking study (1985 parking study) was completed for the downtown core within CLS (formerly the Town of Grand Centre) in August 1985. The study was completed by the Alberta Municipal Affairs Planning Branch at the request of the Town of Grand Centre and the results were published in the Parking Study, Town of Grand Centre report. The report has been included in Appendix A.

The City advised AE that the parking condition and parking policies within CLS has not significantly changed since the previous parking study. Downtown land uses have remained essentially the same since 1985, with the exception of some businesses that have relocated out of the downtown core. For this reason, the current parking demand in the downtown area is expected to be similar to or less than the parking demands observed in 1985.

1.2 STUDY OBJECTIVE

The objective of the CLS parking study was to verify the City's assumption that the current parking condition within CLS has not significantly changed since the previous parking study (1985 parking study).

1.3 STUDY METHODOLOGY

The CLS parking study was completed using the following methodology:

- Attend project initiation meeting and obtain relevant data
- Review previous parking study report
- Conduct verification study including parking survey and analysis
- Produce technical memorandum.



2 Project Initiation Meeting & Data Gathering

A project initiation meeting was held on May 4, 2010 in the City to complete the following:

- Confirm the scope of the CLS parking study
- Obtain the parking study, Town of Grand Centre report.



3

1985 Parking Study Review

The 1985 parking study was completed in response to a perceived parking shortage within the downtown and involved analysis of both long and short term parking characteristics. The study area encompassed the downtown core which is bounded by 51 Avenue to the north, 49 Street to the east and Highway 28/55 to the south and west. Both on-street and off-street parking was analyzed including laneways, major and minor parking lots, vacant lots and select private lots.

The results and recommendations from the 1985 parking study are presented below:

Results

- The City did not have an overall shortage of parking spaces in the downtown. Only 37% of the City's available parking spaces were occupied at peak demand.
- The perceived parking shortage resulted from heavy demand for parking in a 2-block area of downtown east and west of the 50 Avenue/51 Street intersection and poorly-defined parking spaces.

Recommendations

- Parking spaces should be measured and clearly marked in the downtown block faces
- Handi-bus stops should be moved slightly so that high-demand parking spaces were not lost.





4.1 METHODOLOGY

A verification study was conducted on October 20, 2010 to validate the assumption that current parking demands are similar to the 1985 parking conditions. The verification study was completed using a license plate survey at select on-street locations. Surveyors collected the license plate of parked vehicles over a one hour period between 2:30 pm and 3:30 pm on October 20, 2010.

Figure 4.1 presents the on-street locations surveyed for the verification study.

One block from each of the four on-street parking areas examined previously was selected for the verification study. The information collected in the verification study has been included in Appendix B.







4.2 ANALYSIS AND RESULTS

Table 4.1 presents the parking utilization for the select study locations during the 1985 and existing (2010) horizons. The table compares the parking utilization observed in the same time period of 2:30 pm.

ROAD	SIDE OF	PARKING (2:	UTILIZATION 30 PM)	PARKING UTILIZATION	ANNUAL
	ROAD	ROAD 1985 Parking 2010 Veri		GROWTH	GROWTH
		Study	Study	(1985 - 2010)	
	North	15%	23%	8%	0.3%
51 Avenue (51 Street to 52 Street)	South	27%	0%	-27%	-1.1%
(Both Sides	21%	12%	-9%	-0.4%
	North	50%	62%	12%	0.5%
50 Avenue (51 Street to 52 Street)	South	52%	73%	21%	0.5% 0.8% 0.6%
(Both Sides	51%	67%	16%	0.6%
	East	11%	55%	44%	1.7%
52 Street (51 Avenue to 50 Avenue)	West	22%	54%	32%	1.3%
()	Both Sides	17%	54%	38%	1.5%
	East	89%	80%	-9%	-0.4%
52 Street (50 Avenue to Highway 28/55)	West	63%	40%	-23%	-0.9%
(Both Sides	76%	60%	-16%	-0.6%

 Table 4.1

 Parking Utilization (1985 Parking Study vs 2010 Verification Study)

The results in Table 4.1 indicate that the parking utilization along 51 Avenue and 52 Street (south of 50 Avenue) has decreased since 1985 while the parking utilization along 50 Avenue and 52 Street (north of 50 Avenue) has increased since 1985. The annual growth observed along 50 Avenue and 52 Street (north of 50 Avenue) is less than 2%. Even if the parking demand continues to grow at an annual growth rate of 2%, the current parking supply should be able to accommodate the parking demand for the next 30 years.

5

Conclusion

AE was retained by the City to undertake a parking study for the downtown in CLS. The City advised that the parking condition and parking policies within CLS has not significantly changed since the previous parking study conducted in 1985. For this reason, the current parking demand in the downtown is expected to be similar to or less than the parking demand observed in 1985.

AE reviewed the 1985 parking study and conducted a verification study to determine if current parking utilization rates at select locations are similar to those observed in the 1985 parking study. A parking survey was conducted on October 20, 2010 to obtain current parking utilization rates at select locations.

The verification study indicated that the parking utilization has not significantly changed in the downtown. Parking utilization along 51 Avenue and 52 Street (south of 50 Avenue) has decreased since 1985 while the parking utilization along 50 Avenue and 52 Street (north of 50 Avenue) has increased since 1985. The annual growth observed along 50 Avenue and 52 Street (north of 50 Avenue) is less than 2%. Even if the parking demand continues to grow at an annual growth rate of 2%, the current parking supply should be able to accommodate the parking demand for the next 30 years.

The City has experienced a trend of business relocation from the downtown to the commercial area along Highway 28, south of 43 Avenue, in recent years. The trend is expected to continue as the commercial area develops and continues to draw more businesses. With the relocation of businesses outside downtown, an annual parking growth rate of 2% for the downtown may not be achieved. The actual growth in parking demand will be dependent on the future land use changes within the downtown.

The City should monitor the land uses and parking condition periodically within the downtown and consider a detailed parking study if there is significant land use changes that would attract more trips into downtown CLS.



Appendix A - 1985 Parking Study Grand Centre



PARKING STUDY TOWN OF GRAND CENTRE AUGUST, 1985

> Prepared By: Planning Branch Lakeland Unit Alberta Municipal Affairs K.D. Kelly, W. Steblyk Planning Project Personnel

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EXECUTIVE SUMMARY

In May of 1985 at the request of the town, Alberta Municipal Affairs Planning Branch staff conducted a study of parking characteristics in the Town of Grand Centre. The study was in response to a perceived shortage of prime time parking in the Town's downtown core, and involved analysis of long and short term parking characteristics of residents and visitors. Lane, on-street, and parking lot areas were observed over regular intervals for 3 days so that occupancy rates and length of parking space use could be determined.

The results of the study indicate that the Town does not have an overall shortage of parking spaces in the downtown, but is heavily reliant on on-street parking to supplement a shortage of Bylaw-required off-street parking. A heavy demand for parking in a 2-block area of downtown east and west of the IGA intersection, coupled with poorly-defined parking spaces overall creates the impression of a parking shortage.

The following briefly summarizes many of the major findings of the study:

- 1. 6% of parkers are visitors to the Town.
- 2. Of the visitor parkers: 82% are from Saskatchewan 7% are from B.C. 11% are from the rest of Canada and U.S.A.
- 3. Out-of-province vehicles consisted of: cars 65% trucks - 33% vans - 2%
- 4. Grand Centre's parked vehicles mixture is 28% trucks; 62% cars.
- 5. 41% of all parkers are long-term parkers.
- 6. 61% of long-term parkers park in lanes and off-street lots suitable for the purpose; 18% of long-term parkers park on-street in high-demand areas; while the remaining 21% of long-term parkers park on-street in areas of lesser demand.
- 7. The I.G.A. parking lot; Fields/Macleods block face; and the Value Drug Mart block face have the greatest parking demand and parking space turnover.
- Only 37% of the Town's available parking spaces are occupied at peak demand.
- 9. Theoretical required parking in the study area is 1143 spaces (note- this is to be off-street parking).

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- 10. The effective (actual) supply is 1241 spaces (note: this includes on-street and off-street parking).
- 11. If vacant lots currently used for parking were developed, about 100 spaces would be lost from effective supply.
- 12. 18% of total effective parking is lane parking, and all lanes except the Esso block are heavily used.
- 13. 96% of parkers park for less than 1 hour (most for less than 25 minutes) in the high-demand peak hour locations.
- 14. Peak hour demand locations are the Value Drug Mart; Fields; Select Furniture; I.G.A.; and Bordeleau Building Supply block faces.
- 15. Peak hours are approximately 11:00 AM to 3:00 PM with Thursday marginally generating greatest demand.
- 16. Parking violations are negligible with an occasional infraction noted whereby vehicles park over the 51 Street sidewalk in the I.G.A. lot.
- 17. In a 3 hour observation period, 27% of parked vehicles had CFB Cold Lake passes. Most were parked on-street in high parking demand areas.

Recommendations

- 1. Parking spaces should be measured and clearly marked in the downtown block faces.
- 2. Handi-Bus stops should be moved slightly so that high-demand parking spaces are not lost.

Observations

- 1. Parking meters may not be appropriate for the town.
- 2. Public off-street parking lots could be made more attractive to users with clearly defined access to the core.
- 3. Current parking controls and enforcement are adequate and effective.
- Conversion of further block faces from parallel to angle parking is not advised.

1.0 INTRODUCTION

1.1 Background

In the "Fall" of 1984, the business community and the Town of Grand Centre became involved in a series of discussions which examined the amount, location, use, availability and effectiveness of parking in the downtown core. The discussions appeared to peak during the Christmas season when private lands were made available to citizens for municipal parking purposes.

There was a perception that insufficient parking was available in the Town and that some form of remedial action was required. It was also recognized that in order to understand the problems more clearly, and develop workable solutions, more hard data on actual parking useage in the downtown was needed.

Consequently, in February of 1985 the Planning Branch, Alberta Municipal Affairs was requested by the Town to undertake a detailed parking study of the Town's commercial core. A study outline and work program designed to examine the matter in detail were devised by Branch planning staff. The former was reviewed and accepted by the Municipal Planning Commission of the Town of Grand Centre as the Terms of Reference. Simultaneously the M.P.C. defined a study area (Figure 1) and a time frame of three typical peak demand days in the month of May during which data was subsequently gathered from actual field observations of parked vehicles. The analysis of that data forms the substance of this report.

1.2 Purpose

This study provides specific data on parking in downtown Grand Centre. The data, conclusions and recommendations drawn from it should provide the Town with a clearer understanding of parking characteristics and habits in the Town's core. However, it should be remembered that this study represents a "snapshot in time". It identifies the parking pattern as it occurred during a 3 day period in May. Nevertheless it is considered that given the methodology used, the results obtained provide a useful indication of basic parking habits and characteristics in the Town.

Parking problems are however, as much perceptual as they are factual. This study cannot of itself determine whether the parking situation is satisfactory to the community. That is Council's and ultimately the Community's decision. We hope this study will assist in the decision making process.

2.0 STUDY AREA

After careful consideration by the Town and its Municipal Planning Commission, the boundaries of the Study area were confirmed to be as shown on Figure 1. This was determined to be the extent of the Town's commercial downtown core area, and included the furthest outer limits from which it was expected people would walk to the core. Subsequent data gathering during the course of the study confirmed this to be the case, and further confirmed the appropriateness of the study area and its limits. The survey included all on-street, lane, and private and public parking lots within those limits.

3.0 APPROACH

3.1 Timing

The Town considered May 16, 17, 18, 1985 an appropriate time to collect parking data. This coincided with a usual payroll period, as well as representing a usual mid-to-weekend shopping pattern. Although this also coincided with the first long-weekend of the year, it was felt that residents who might leave town for the weekend would still shop Wednesday or Thursday, and be "replaced" by tourists coming to the town on Saturday.

3.2 Technique

The Grand Centre Study used two techniques to gather data on actual parking habits. The first involved a licence plate survey, the second was an "in-out" study of length of stay in selected locations.

3.2.1 Licence Plate Survey_

In order to determine whether the same vehicle was parked in that space on each hourly round, the licence plate number of the vehicle in the space was recorded. The plate numbers were not used for any other purpose. If the same licence (vehicle) was observed to be in the same space over a series of recorded intervals, this was noted in the record sheet and thus the duration and location of long-term parkers could be determined. In addition, the percentage of vacant spaces, their location, as well as peak demand hours and locations could also be determined.

In addition to the information which could be gleaned from analysis of the usual licence plate survey, it was felt by the Town that other useful data could be recorded simultaneously. Information regarding the numbers and types of out-of-province vehicles as well as types of vehicles occupying spaces (eg. truck, recreational vehicle, or car) was also recorded.





3.2.2 In-Out_Survey

This second survey (conducted Friday 2:00pm - 5:00pm) was designed to identify the frequency of turnover of parking spaces in high-demand areas. This survey involved observing blocks of parking spaces (about 25-30) (Figure 3) over several hours and precisely recording the length of time each parked vehicle occupied that space. An indication of the intensity of use, car volumes, and space availability can be determined. The locations selected for this study were the Fields and Value Drug Mart block faces, and the Robinsons parking lot since data indicated a high parking use in these locations.

3.3 Research Focus

Given the techniques to be applied to the analysis of the Town's parking status, it was considered relevant to gather data which would address the following questions:

- 1. What percent of parkers are visitors?
- 2. What percent of parkers are from Saskatchewan/B.C./Other?
- 3. What percent of visitors drive R.V.'s/Cars/Trucks?
- 4. What percent of all parkers drive trucks/cars?
- 5. What percent of parkers are long term parkers?
- 6. Where do long term parkers park?
- 7. What location has the greatest parking space turnover?
- 8. What is the occupancy rate of each defined area?
- 9. What is the occupancy rate of the town as a whole?
- 10. What is the theoretical required parking?
- 11. What is the actual supply?
- 12. What parking will be required/lost if vacant lots are developed?
- 13. What percent of total parking is lane parking and what lanes are most heavily used?
- 14. What percentage of long term parkers use suitable long-term parking areas?
- 15. What is the occupancy rate of on-street vs off-street parking?
- 16. What are the peak hour demand locations?
- 17. What are the peak hours/days?
- 18. Where are the parking violations?
- 19. What percentage of vehicles observed have CFB Cold Lake Base passes?

3.4 Parking Supply

3.4.1 Actual Supply

An inventory of available parking spaces within the study area was undertaken. Where stall spaces were marked (as in some parking lots), they were counted. Where stalls were not marked (largely curbside and some large lots) the space was paced off allowing approximately 22 feet for a parallel stall and 12 feet for an angle stall. Laneways, access points, and other obstacles were taken into consideration.



Unmarked parking lots, where largely unorganized parking occurred, were counted by designing a parking lot grid on surveyed plans of the land. These spaces were then identified in the field by pacing them off in areas of the lot where vehicles tended to park.

Lane parking was estimated on the basis of observed parking practices with allowances for loading bays, garbage bins and other obstacles.

Using the above techniques therefore, the Town's actual supply is:

50 Ave (on-street)	118
Streets north of 50 Ave (on-street)	74
Streets south of 50 Ave (on-street)	144
51 Ave (on-street)	102
Laneways	225
Major parking lots	208
Minor parking lots	84
Vacant lots (currently used for parking)	210
Remaining streets and avenues	43
Remaining lots	_33

TOTAL

1241 spaces

t

3.4.2 Theoretical Demand

Theoretical parking demand can be calculated by assuming that 80% of any developed lot is leasable retail floor area. Calculations indicate that 80% of current commercially developed land in the study area totals approximately 63,895 square metres. Grand Centre's Land Use Bylaw stipulates a variety of parking requirements, including 1 space for every 65 sq. metres of leasable floor area. Given however that patron-intensive commercial uses such as restaurants and taverns are required to provide more parking based on seating and numbers of employees, then this figure could be adjusted to 55 sq metres in order to calculate theoretical demand. Therefore, given the above parameters, theoretical demand is estimated to be 1143 spaces. Thus there is a current excess of supply over theoretical demand of about 79 spaces. (see 3.4.3 below for an adjustment of this figure)

However, should vacant lots now used for parking be developed, up to 179 spaces would be deleted from current supply (net) resulting in a shortage of approximately 100 spaces.

This figure is described as a "net" amount since each new development would be required to supply parking as per bylaw regulations.

More significantly however is the fact that "theoretical parking demand" relates to required <u>off-street</u> parking. In Grand Centre, 481 spaces or 39% of the Town's actual supply is <u>on-street</u> parking. While this may indicate a possible shortcoming in the Town's Land Use Bylaw parking requirements, it should be noted that Grand Centre's status is similar to other Alberta towns (see 5.1).

3.4.3 Handi-Bus

Since this study was completed and calculations finalized, the Town instituted a Handi-bus system. Five bus stops in the core have eliminated about 15 on-street parking spots.(see Figure 3) Therefore the figures noted in this report regarding parking supply could vary slightly from actual current circumstances as a result.

4.0 Rural Factors

The Town of Grand Centre is a regional agricultural and resource-based centre serving as a watershed for large rural populations who regularly visit for shopping, business, and recreational purposes. This regional demand is superimposed on the internal parking demands. Thus, Grand Centre's parking characteristics are not just a product of resident activity. Furthermore, rural demand tends to be a peak demand in that late night shopping is an attractive time to "go to town". The downtown area is attractive to rural users as it offers them an opportunity to satisfy all their demands in one central area. This may account in part for the large number of light trucks observed in the core.

In order for communities to continue to function as focal points for rural areas, adequate parking must be available. To accommodate local and rural parking, some excess parking capacity will exist during off-peak times of the week. This excess capacity is then attractive to the all-day parker who may monopolize these spots continuously.

5.0 ANALYSIS

5.1 Comparative Characteristics

As noted above, an estimate of requirements for parking based on the current land use bylaw indicates the downtown requires about 1143 spaces. Grand Centre has an actual supply of approximately 1241 spaces or 388 spaces per 1000 population (3195 population 1984). Even when the 1985 population of 3506 persons in Grand Centre is used, the supply is still 327 stalls per 1000 population - significantly greater than other similar towns. The following data identifies the results of a recent study of parking in comparable Alberta towns:

<u>Community</u>	<u>On-street</u> Number (%)		Off-street (Number (%)		<u>Total</u>	Population (1984)	Supply/1000 Population	
Fairview	265	(33)	549	(67)	814	3234	254	
Grand Centre	496	(40)	745	(60)	1241	3195	388	
Grimshaw	389	(64)	215	(36)	604	2488	243	
High Level	279	(40)	386	(60)	665	2806	237	
Pincher Creek	315	(38)	514	(62)	829	3712	224	
Vermilion	376	(61)	232	(39)	608	3769	161	

Existing Parking Supply Characteristics

Source: Modified from Mackenzie Regional Planning Commission - "Municipal Parking Research Project" February 1985 This data suggests that there is a sufficient overall supply of parking in the downtown. However, parking problems usually arise not because of an overall shortage of parking spaces, but because there are not enough spaces in the right place. This is the case in Grand Centre as this study will demonstrate. The focus for parking activity is the Credit Union, Robinsons, Tarawyn Centre, Fields block faces, including 51 street north and south of 50 Avenue. The congestion in this area appears to result from a reluctance to park elsewhere and walk to this district.

Research reveals that distances people are willing to walk after parking their vehicles becomes larger as population increases. In smaller urban communities, patrons have a tendency to reduce their walking lengths by parking as close to an establishment as possible, and then moving their vehicles from store to store as opposed to walking. In most cases, this is due to the general availability of stalls within a given area.

This phenomenon was observed and recorded during the Grand Centre study, particularly where persons shopping with small children were involved.

Moreover, studies have shown that based upon duration, parkers tend to accept greater walking distances as their parking durations increase. On the contrary patrons who are short-time parkers seek out parking facilities within 200-500 feet of their destination. This was confirmed in the Grand Centre study where it was noted the highest parking space turnover rate was in the Fields to Robinsons blocks on both sides of 50 Avenue.

Equally important is the development of convenient and attractive pedestrian access from parking lots to commercial street frontage. This is often difficult to establish since off-street lots are either remote from the demand, or access is blocked due to existing development. Grand Centre experiences this problem most acutely in the high demand areas.

5.2 Parking Demand

Other parking studies have shown that irrespective of the amount of curb parking that is available, curb facilities serve a larger proportion of the total parking demand than they constitute of the total supply. Whereas curb spaces usually constitute about 45% of the total supply (39% in Grand Centre), they serve about 65-75% of the total demand based upon previous studies. Analysis of the data indicates this is the case in Grand Centre.

A review of parking studies in other towns indicated that:

- at peak periods of the day, some key block faces reach capacity, however, parking areas immediately adjacent (on and off-street) were almost totally ignored.
- . large off-street parking lots located in close proximity to the core areas were generally under-utilized.
- currently a general deficiency of off-street spaces with respect to bylaw requirements exists.
- employees of downtown businesses were found to be parked in on-street or parking lot stalls intended for customer useage. (Robinsons and Heritage Mall lots experienced this problem).
- rear lanes were generally unusable and thus failed to attract non-employee parkers.

All of the above were found to also be factors in Grand Centre. Based upon these general observations noted in other parking studies and outlined above, the following is apparent with respect to parking in Grand Centre's Core:

- . the high rate of utilization of on-street parking spaces in a two block area of the core does not reflect a shortage but seems to indicate a reluctance on the part of patrons to park in off-street lots or laneways and walk a short distance to complete their business. On the other hand, a lack of strategically placed and readily accessible off-street lots, as well as good access to lane parking, may exacerbate the situation.
- this high rate of utilization may also be the result of an inappropriate use of on-street parking facilities. In Grand Centre it is commonplace for vehicles, especially light trucks to occupy space where two vehicles could park. When a buffer in front and rear of the vehicle is added (usually 3-4 feet at each end), the limited space devoted to parking is poorly or inefficiently used.
- on-street parking currently compensates for a general deficiency in parking required under bylaw practices.

5.3 Occupancy Rates

The Grand Centre licence plate survey provided data on the overall parking occupancy rates of each block in the downtown. As a general rule, a block that is 90% occupied can be considered effectively full, a block or lot that is between 75 and 90% occupied suggests that the capacity of the block is being reached.

5.3.1 On-Street Parking: 50 Avenue (Table #1)

50 Avenue (Main Street) as the principal business strip of Grand Centre generates the greatest demand for parking. Except for the Heritage mall block face, all other block faces on 50 Avenue approached capacity simultaneously on several occasions. It is noteworthy that this occurred from 4:00pm to 7:30pm on Thursday; lunchtime on Friday; 10:00am to 3:00pm on Saturday. The busiest block faces appeared from the data and observation to be the on-street parking in front of the I.G.A. and Credit Union, and the south side of 50th Avenue between 50 and 55 Street, each being completely full on 4 of the 17 occassions (90-100%). The remaining block faces along 50 Avenue were full or approaching full on a significant number of occasions. These block faces generate the greatest demand and seem to be the focus for downtown parking activity. Even the side streets north and south of these locations to the relevant laneways, are in demand for parking. (Figure 4)

5.3.2 On-Street: 51 Avenue (Table #2)

In contrast with 50 Avenue, 51 Avenue is largely underutilized. Only the block face in front of the Post Office approached capacity twice or was full on one occasion. The remaining block faces along 51 Avenue never reached more than 55% of capacity on any occassion.

5.3.3 On-Street: Streets North of 50 Avenue (Table #3)

Only two of these block faces ever approached capacity; these being both sides of 51 Street, and only on one occassion each. The remaining blocks rarely surpassed 50% occupancy indicating a significant degree of underutilization. According to the data and field observations, utilization of these side streets tended to occur mainly between 50 Avenue and the laneways.

5.3.4 On-Street: Streets South of 50 Avenue (Table #4)

Two block faces were noted as areas of high demand; these being both sides of 52 Street by the Tarawyn Centre and Friday's Restaurant building. The west side of 51 Street adjacent to the Commerce Bank and the Beejay Motel also reached capacity on Saturday. All other block faces on side streets south of 50 Avenue rarely approached capacity, again indicating a high degree of underutilization for sidestreets off 50 Avenue.

5.3.5 Laneways (Table #5)

In Grand Centre 18% of all parking spaces in the downtown study area are lane spaces (225). However only an average of 37% of all lane spaces are used for long-term parking (4 hours or more), while 43% of persons who park in lanes are long-term parkers.

Laneways, unlike streets, are considered well-utilized at 50% capacity since they do not demand a high turnover. They are intended primarily for long term employee parking and some customer use. Grand Centre's laneways are somewhat under-utilized with an average occupancy of 37% noted for the 3 days of the study. Only the I.G.A. block approached capacity in the laneway on one occasion, while all of the other lanes were largely under-utilized in terms of long-term parking and general use. Section 5.5 provides a discussion of long-term parking characteristics in the Town.





5.3.6 <u>Major Parking Lots (Table #6)</u> (Figure 5)

The most intensively used parking lot is that of Robinsons and I.G.A. This lot was full or approaching capacity on all but 3 of the 17 occasions, it was observed. All other major lots (A.L.C.B., BAACO, Tomboy, I.D.A., Heritage Mall) appeared to be well utilized (approaching or reaching capacity on a number of occassions) with the exception of the A.L.C.B. parking lot which never exceeded 36% of capacity on any of the 17 observations.

5.3.7 <u>Minor Parking Lots</u> (Table #7) (Figure 6)

Minor parking lots are those adjacent to banks, insurance agencies and convenience stores. Of the lots observed, the Scotia Bank was the most intensely used. The Toronto Dominion and Commerce Bank lots approached capacity on not more than 2 occassions each, with both being underutilized on all other occasions. The other lots (Red Rooster, Treasury Branch, Century 21, and the Insurance Co. lot east of Scotia Bank) also were under-utilized throughout the study period. The Kentucky Fried Chicken and Dairy King lots were rarely used, with quick pick-up and drive-through service being the most common useage. At the most two or three vehicles were noted at lunch and dinner time in these lots, the rest of the time they were vacant.

5.3.8 <u>Vacant Lots Currently Used for Parking (Table #8)</u> (Figure 7)

Of the lots in this category, only two ever approached a significant degree of use. The busiest was the lot located north of the laneway from the I.D.A. store. Its 12 spaces were full or approaching capacity on 12 of the 17 observations. The second, located behind the Credit Union has 8 spots and approached capacity only once.

The Kowalski lot and the vacant lot across from the Grand Centre Hotel each have the capability of accommodating 65 and 107 vehicles respectively, but are vastly underutilized. The Kowalski lot has topographical constraints, while the vacant lot across from the Grand Centre Hotel lacks identification as a parking area, as well as convenient access to 50 Avenue. It does not have a wet weather surface.

5.3.9 <u>Peripheral Streets and Avenues (Table #9)</u>

Of these 6 locations which are peripheral to the core, only the portion of Highway 28 fronting Parkland Chrysler demonstrated high demand. The demand however appeared to arise from customers and employees of Parkland. The remaining streets were significantly underutilized possibly due to their remoteness from the core.





5.3.10 Selected Private Parking Lots (Table #10)

These include the Esso Station, rear of Northern Cable, rear of Sav-Mor Cleaners and Grand Cleaners. Of these, the busiest was Grand Cleaners on 50 Street and 50 Avenue which was filled or approaching capacity on 4 of 17 occassions. While the Esso lot was well used, the Sav-Mor lot was not.

5.4 General Occupancy Observations

As a whole, the occupancy rate for the town for all three days was 37% of capacity. The breakdown between on-street and off-street parking is as follows:

On-Street	Thursday	398
	Friday	38%
	Saturday	38%
	Average	38%
Off-Street	Thursday	38%
	Friday	37%
	Saturday	<u>328</u>
	Average	35%

These figures support the observation that there is no overall shortage of available parking in the downtown area of Grand Centre. If there is a perceived shortage, it is that a majority of the parkers attempt to concentrate within a small portion of the downtown, on 50 Avenue between 50 and 53 Street and the I.G.A. parking lot. Table 11 indicates that even when the side street parking is considered with 50 Avenue block face parking as a unit, there is still only a 50-60% occupancy rate for this high demand area. Neither is there a significant problem with long-term parking in the core area since fewer than 6% of observed on-street parking was long-term.

The problem apparently lies mainly in the possible unwillingness of patrons to park elsewhere and walk to and through the core. In addition, the lack of <u>clearly defined</u> parking spaces in the high-demand areas (and elsewhere) leads to unintentional abuses whereby parkers use 2 or more spaces. Light trucks (which comprised 28% of all observed vehicles) because of their length and width are the most frequent abusers, although many cars were also observed in this practice. This practice has the effect of reducing the total number of available spaces in high demand areas.

It is felt that should all spaces in the town be clearly measured and marked, the effective supply would likely increase.

5.5 Long Term Parking

Long term parkers are those parkers observed to occupy a space for 4 hours or more. Areas suitable for long-term parking are considered to be laneways, most vacant lots, major off-street controlled parking lots, as well as some peripheral on-street locations. In Grand Centre, 620 stalls, or 50% of the 1241 total are considered suitable for this purpose. (see 3.4.1) The data indicates that approximately 41% of all parkers in the study area are long-term parkers.

The percentage of total long-term parkers (LTP) who parked in long term parking areas (LTA) was calculated as follows:

	Total LTP	LTP in LTA	% of Total
Thursday	247	156	63%
Friday	240	140	58%
Saturday	<u>151</u>	92	<u>61%</u>
Total	638	388	61%

On average, 61% of all long-term parkers parked in areas suitable for that purpose. Although this is a significant majority, 39% are parking in areas not intended for long-term parking. The data indicates that (Tables 12 and 13) only 18% of long-term parkers parked on 50th Avenue in the high demand parking areas. Thus, further analysis indicates 51, 52 and 53 Streets north and south of 50 Avenue, as well as 51 Avenue itself are key locations for the remaining 21% of long-term parkers. It can be concluded therefore that long-term parkers are not entirely responsible for the peak hour congestion in the core focus of the town.

5.6 Turnover

Turnover is the rate at which stalls are filled, vacated, and re-occupied. If the turnover rate is high this means that spaces are quickly vacated and quickly filled. If the turnover rate is low this means that vehicles park for longer periods of time or that stalls are not quickly re-occupied. The turnover rate is measured using the time in/time out method, as described previously. In the case of Grand Centre, this survey was conducted on Friday, May 17/85 between the hours of 1:00 and 3:00pm.

The town perceived a problem with turnover rate. It was believed that vehicles were parking too long along the key block faces of downtown. The time in/time out survey provided an analysis of this situation. Using the license plate survey, the areas indicating the greatest turnover over the balance of the day were determined.

These were the two southern sides of 50 ave between 50 and 52 Street (angle parking), and the I.G.A. parking lot.

During the study period, the southern block face between 50 and 51 Street accommodated 163 vehicles. 96.3% of these parked for less than one hour, 3.1% for between one and two hours, and 0.6% for more than 2 hours. This data can be analyzed in the following manner:

	<u>Minutes</u>	Vehicles	<pre>% of Total Vehicles</pre>
Parking Duration	0-14	107	65.6%
50 Avenue	15-29	36	22,1%
(50-51 Street)	30-44	12	7.48
	45-59	2	1.2%
	60-74	2	1.2%
	75-89	1	0.6%
	90-104	1	0.6%
	105-119	1	0.6%
	120+	1	0.6%
TOTAL		163	100%

For the Southern block face between 51 and 52 Street, a total of 121 vehicle movements were recorded with 90.1% of these parked for less than one hour, 8.3% between one and two hours, and 1.7% for more than two hours.

	Minutes	Vehicles	§ of Total Vehicles
Parking Duration	0-14	56	46.38
50 Avenue	15-29	34	28.1%
(51-52 Streets)	30-44	13	10.7%
	45-59	6	5.0%
	60-74	2	1.7%
	75-89	5	4.18
	90-104	3	2.5%
	105-119	0	0%
	120+	2	1.7%
TOTAL,		121	100%

In the I.G.A. parking lot, a total of 123 vehicle movements were recorded. 94.4% of these parked for less than one hour, 2.4% between one and two hours, and 3.3% for more than two hours.

	Minutes	Vehicles	% of Total Vehicles
Parking Duration	0-14	67	54.5%
50 Avenue	15-29	31	25.2%
(I.G.A. Parking Lot)	30-44	14	11.4%
	45-59	4	3.3%
	60-74	2	1.6%
	75-89	1	0.8%
	90-104	0	0%
	105-119	0	08
	120+	4	3.38
TOTAL		123	100%

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For the southern portion of 50 Avenue between 50 and 51 Street the average number of cars per space was 5.6 every two hours with an average occupancy time of 16.2 minutes for each vehicle. For the portion between 51 and 52 Street, the average number of cars per space was 4.2 every two hours with an average time of 24.6 minutes. For the I.G.A. parking lot the average was 3.8 cars per stall over two hours with an average time of 20.6 minutes.

Since only 7 of 407 vehicles observed parked for more than 2 hours it appears that the turnover rate within the busiest sections of downtown Grand Center is adequate to handle the volume of cars which use the downtown. A reduction in parking duration from the currently permitted 2 hours to 30 minutes may increase parking turnover, but this may not be acceptable or desirable.

5.7 Trucks/Vans/Recreational Vehicles

Trucks, vans and R.V.'s are larger, less maneouverable vehicles which can create particular parking problems, such as occupying 2-3 spaces at one time. It is important when planning parking strategies, to determine the proportion of such vehicles to all parkers, and plan for their needs.

The proportions of trucks, vans and R.V.'s to the total number of vehicles surveyed in Grand Centre were as follows:

Thursday	278
Friday	29%
Saturday	28%

All three days 28% (average)

Researchers noted a consistent pattern of truck parking along the Macleods/Bordeleau Building Supplies/51 Street block face; both sides of 50 Street of 50 Avenue; and along the 50 Avenue Credit Union block face. Light trucks also tended to locate in the Heritage Mall, Baaco Pizza, and I.G.A. parking lots. Elsewhere within the study area, trucks were fairly evenly distributed. These observations may be the result of the Town's policy of banning tall or large vehicles from parking along the Value Drug Mart and Fields block faces. At least one vehicle in violation of this By-law was noted to have been ticketed.

5.8 Out-Of-Province Vehicles

Table 14 lists results of data collected regarding out-of-province parkers. It also identifies the proportion of visitor vehicles according to province of origin (ie Saskatchewan, B.C., other). This information was gathered since it was considered to be of value and/or interest to the business community.

Of the 227 out-of-province vehicle observations, 82% were from Saskatchewan, 7% from B.C., and the remainder from Ontario, Manitoba, Quebec, Nova Scotia, Montana, and California. The Saskatchewan vehicles accounted for 3.9% of all the parked vehicle observations in downtown Grand Centre for the study duration. The most popular day for visitors was Saturday during which 6% of all downtown parkers were out-of-province. Perhaps the long weekend was a factor.

Out-of-province vehicle observations were as follows:

	Cars (%)	Trucks (%)	Vans (%)	R.V.'s (%)	Total
Thursday	67 (65)	35 (34)	1 (1)	0	103
Friday	14 (52)	13 (44)	1 (4)	0	27
Saturday	<u>67 (69)</u>	27 (28)	<u>3 (3)</u>	0	97
TOTAL	148 (65)	74 (33)	5 (2)	0	227

5.9 Base Access Vehicles

During the data collection on Saturday, researchers noted a high proportion of vehicles with armed forces base stickers. In one casual observation, 27 of 33 vehicles along the Tarawyn Centre block face displayed the sticker. It was decided to identify those vehicles on subsequent licence plate number recording rounds for information purposes only.

Of the 1059 vehicle observations recorded during these subsequent rounds 285 or 27% carried base stickers. These vehicles were noted mainly in the high demand areas on 50 Avenue. This may seem to indicate a noticeable influence of the base, and those with access to it, on the parking requirements of the town.

5.10 Handi-Bus Impact

As noted in Section 3.4.3 at least 15 parking spaces have been lost to the Town's new Handi-Bus. Unfortunately these are critical, high-demand spaces in the busiest part of the core (compare Figures 3 and 4). While the bus is intended among other things to reduce the need to travel downtown by car, it is unlikely to achieve a significant impact in this regard. The likely affect is to increase the demand for whatever spaces are left in this area and thereby increase the perceived shortage of core area parking.

5.11 Peak Hours

The peak demand for parking is Thursday between 1:30 and 4:00pm, with Friday from 11:00am to 2:00pm and Saturday from 1:00 to 2:15pm close behind. The busiest days were also in the order noted above.

5.12 General Observations

According to the data there is no shortage of parking spaces in the defined core of the Town. Congestion occurs in a small area along both sides of 50 Avenue between 50 and 52 Street since this location seems to be the focus of business activity. Patrons appear unwilling or unable to park further away and walk to this area even though the data indicates parking is readily available at remote locations (relatively speaking). Consequently "cruising" this area searching for a parking spot in close proximity to a desired business, creates congestion at this focus. This is compounded by the fact that parking stalls at this location experience high turnover with most parkers staying for less than 15 minutes and many for less than 5. congestion is most critical on 51 Street at the entrance to the I.G.A. lot. Since parking spaces are frequently available in this area of the downtown, patrons have come to expect to find one there. This conditioning of expectations is difficult to change and undoubtedly has resulted in certain expressed frustrations when spaces are unavailable at this location, leading to the conclusion that there is a parking "shortage" downtown.

Researchers also noted that almost all parking spaces in the study area are undefined. As a consequence patrons park wherever they find it convenient. All too frequently the location chosen effectively uses two spaces. In addition, at unmarked locations (especially along block faces) patrons tend to leave inordinate amounts of room in front of and to the rear of their vehicles. This compounds the problem and effectively reduces the parking "carrying capacity" of the block face.

Moreover, in studies that it conducted the American Automobile Association found that it takes almost 43% less time to park in marked spaces. Undefined parking is also a problem in many off-street parking lots (eg Kowalski, Bordeleau, Grand Centre Hotel) since patrons park wherever convenient, and frequently maximum use of the lot is precluded.

Long-term parking in short-term parking areas is also not a significant problem overall. However it was noted that at least 5 of 32 spaces in the Robinsons/I.G.A. parking lot appeared to be used for employee parking. This may be undesirable in such a high demand area.

6.0 Recommendations

6.1 Stall Marking

It is evident that parking spaces should be clearly defined in the Town. This may have the desired effect of not only regulating and allocating parking, but also of increasing the actual supply. Painting the stalls may not be sufficient since they are covered by ice and snow for long periods. Allowances will have to be made for longer vehicles such as trucks and vans. Perhaps a designated "Trucks Only" parking area should be created to accommodate their unique needs.

6.2 Handi Bus Stops

Since the designated stops for the Handi Bus are located in locations having peak demand, and this may tend to compound an already critical shortage of parking spaces there, other locations for bus stops could be found. In the case of the 50 and 51 Street Handi-Bus stops, they could be moved 1/2 block south without any detrimental impact so that parking spaces less in demand could be used. Similarly the IGA stop could be shifted west on 50 Street to the front of Gerber Realty. The Post Office stop could relocate west of its current 52 Street location to 51 Street in front of the Bakery.

These alterantive locations would restore 15 spaces of much needed parking in high demand areas, without loss of Handi-bus efficiency or significant inconvenience to bus patrons.

7.0 <u>Summary Observations/Alternatives</u>

7.1 Parking Meters

Parking meters and posts clearly define parking spaces in all weather and regulate length of use, yet they may not be necessary or acceptable to the Town as a whole. The purpose of parking meters generally is to increase the turnover and availability of stalls and eliminate long-term parking. In the United States the effectiveness of meters was evaluated by the U.S. Highway Research Board. Their study found that meters resulted in 35% higher turnover; 45% fewer vehicles parked overtime; and one-third to one-fourth the time formerly needed to patrol areas with sign-dependent parking restrictions.

In Grand Centre however, parking stall turnover is not a problem as the data has demonstrated.

The initial costs of meters is relatively high (about \$500 - \$600 each) although it is generally believed that they pay for themselves over the longer term. In high turnover areas however, this may not be the case, particularly if a "grace period" is built into the meter system. Medicine Hat and Swift Current (Saskatchewan) have experience with meters providing up to 15 minutes free parking before a parking fee is required. These meters apparently do not pay for themselves.

In spite of certain advantages, parking meters rarely generate favourable public response. Individuals feel inconvenienced because they must always fumble for change; or they do not want to put money in the meter if they intend to stop for a brief moment. Merchants feel that charging people to park discourages customers from doing business downtown. Councils must be careful how they approach the idea of parking meters and be quite sure that the benefits outweigh the costs.

7.2 Off-Street Parking Lots

Other alternatives lie in the development of regulated off-street parking lots close to the focus of activity in the core (ie 50 Avenue). Grading, paving (or gravelling) and clearly defining parking stalls, back-up laneways, and points of access/egress are essential for maximum efficiency. The design should accommodate winter snow clearing and other related conditions. In addition pedestrian access to and from the parking lots and core area must be reasonably direct, safe, and attractive. Parker habits must be changed through effective information programs to encourage more use of off-street parking.

7.3 Parking Controls

Parking controls such as the two hour limit presently used in much of the Town's core seem to be effective in encouraging rapid parking space turnover and in discouraging long-term parkers from occupying key parking locations. Illegal parking (other than exceeding the 2 hour limit) is generally not a problem in the Town. It was observed in the I.G.A. parking lot where occasionally vehicles would park next to the phone booth over the 51 Street sidewalk. It was also noted in the laneway east of Grand Cleaners. Elsewhere it was not noted to be a concern.

7.4 Conversion from Parallel to Angle Parking

The purpose of such a conversion is to theoretically double the supply of on-street parking. There are however, a number of drawbacks to this proposal. First, angle parking is generally opposed by engineers and police as it results in substantial conflict with through traffic. In the case of Grand Centre, the street of highest demand already uses angle parking on two of its block faces. Angle parking on the opposite sides will aggravate an already acute problem. Secondly, a previous study conducted in the Town of Wainwright suggests that if the conversion was made, it would likely only serve to draw those vehicles, generally owned by employees and parked for most of the day, from adjacent streets and laneways to the street. Therefore, one would expect to find a high occupancy rate on 50 Avenue but with a lower turnover rate and greater proportion of long term parkers. The objective of increasing street front parking supply for shoppers would not be greatly enhanced by this method.

8.0 <u>Conclusions</u>

This study provides data on the perceived parking habits of Grand Centre patrons at a point in time. Certain generalizations and comparisons (perhaps even with other Communities) can be made but certain discretions should be exercised in doing so.

In order to have a more definitive image of the Town's parking characteristics, several such studies should be conducted at various times of the year and the results generalized and compared. There are of course practical and financial limitations to such a process.

While the current study may lack the broader scope envisaged above, it nevertheless provides some excellent data for discussion and contemplation. It is our hope that it will be entirely useful as a basis for broader debate leading to resolution of the Town's current discussions on the matter.

APPENDICES

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OCCUPANCY RATE OF PARKING STALLS 50 AVENUE ON-STREET (FIGURES SHOW PERCENT OCCUPIED)

LOCATION	North Side 52-53 St.	On Street Robinson Block	North Side IDA to Cleaners	On-Street Heritage Mall	South Side 50-51 St.	South Side 50-51 St.	South Side 52-53 St.
NUMBER OF SPACES	14	12	16	7	29	29	11
THURSDAY							
9:30	29	17	56	14	55	83	64
10:45	50	67	44	14	59	55	64
1:30	43	58	50	29	83	86	64
2:30		50	19	14	62	52	73
4:00	50	100	69	14	69	93	100
5:30	79	92	63	0	45	59	82
6:30	86	76	44	0	66	72	64
7:30	57	67	69	o	52	83	82
FRIDAY							
8:30	14	Ø	ę	29	10	23	45
9:45	36	33	69	29	62	77	64
11:15	57	58	63	29	48	65	100
SATURDAY							
8:45	43	42	56	14	28	41	64
10:00	43	58	63	43	48	06	73
11:15	63	75	75	0	69	100	16
1:00	71	75	75	0	83	100	82
2:15	79	92	63	29	83	83	64
3:15	36	83	69	43	69	76	64

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OCCUPANCY RATE OF PARKING STALLS 51 AVENUE ON-STREET (Figures Show Percent Occupied)

			12 TRAT 21	IIIan tat Morre e	c occupted)		
LOCATION	North Side 50-51 St.	(Baaco) North Side 51-52 St.	(ALCB) North Side 52 St-52 Ave	South Side 52 Ave-53 St	(Post Office South Side 53-52 st.	e) South Side 52-51 St	(Tom Boy) South Side 51-49 St
NUMBER OF SPACES	8	13	20	14	13		23 50
THIPCORV							23
TURNOUT	4		1				
9:30	0	¢	15	43	69	0	0
10:45	0	۵	20	36	38	0	22
1:30	0	31	30	21	38	36	13
2:30	0	15	30	21	62	27	22
4:00	0	23	30	21	92	55	30
5:30	0	ω	10	21	69	18	35
6:30	0	38	0	7	15	0	6
7:30	0	38	5	7	23	0	17
FRIDAY							
8:30	0	15	20	21	38	27	٥
9:45	0	23	30	29	77	27	0
ll:45	0	0	25	21	54	18	0
SATURDAY							
8:45	0	23	30	21	46	თ	0
10:00	0	23	55	21	17	18	6
11:15	¢	23	55	21	69	18	13
1:00	0	23	50	14	69	6	0
2:15	0	38	40	21	46	6	o
3:15	0	15	40	14	23	6	0

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OCCUPANCY RATE OF PARKING STALLS STREETS NORTH OF 50 AVENUE ON-STREET (FIGURES SHOW PERCENT OCCUPIED)

ILCONTTON .	53 St.	3	53 St	ш	52	st.	3	52	st.	ធា	51	ŝt.	3	51	st.	ы	49	st.	3
NUMBER OF SPACES	11		12			6			б						11			11	
THURSDAY																			
9:30	6		33			0			0			6			0			27	
10:45	6		58			22			33			5			57			27	
1:30	0		50			0			33			5		.,	36			27	
2:30	0		25			22			11		-1	8]		.,	36			28	
4:00	ი		80			56			44			S		• •	18			36	
5:30	6		17			33			44			5			0			0	
6:30	18		17			11			-1			õ			27			0	
7:30	თ		Ø			22			44		×	ŝ			51			6	
FRIDAY																			
8:30	٥		50			44			II		1.4	ñ			36			13	
9:45	0		42			67			44		ω	ğ			5			64	
11:45	0		50			56		-	67		Ð	4		(1)	36			64	
SATURDAY																			
8:45	0		33			11			H		4	ŝ			8			0	
10:00	თ		42			33		.,	33		Q	4		CN.	Ľ			0	
11:15	6		50			33		-	67		ഗ	9		3	9			0	
1:00	0		33		-	67		.,	33		~	ღ		ŝ	ğ			0	
2:15	o		17		•	44		.,	33		9	4		[*	ň			0	
3:15	6		0		-	44			33		4	ŝ		4	S			0	

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OCCUPANCY RATE OF PARKING STALLS STREETS SOUTH OF 50 AVENUE ON-STREET (FIGURES SHOW PERCENT OCCUPIED)

LOCATION	53St. E	52 st. W	52 St. E	51 St. W	51 St. E	50 St. W	50 St. E	49 St. W
NUMBER OF SPACES	9	6	27	12	33	19	21	18
THURSDAY								
9:30	0	100	63	33	48	37	48	0
10:45	17	88	63	58	55	47	11	0
1:30	50	75	70	33	48	21	43	0
2:30	67	63	68	42	52	26	52	0
4:00	33	63	81	50	58	26	38	0
5:30	33	. 50	52	25	27	58	33	0
6:30	33	38	37	25	12	37	24	0
7:30	33	63	63	33	Q	11	24	0
FRIDAY								
8:30	17	75	67	42	27	16	48	0
9:45	33	75	81	42	55	37	67	0
11:45	33	75	78	33	36	37	52	0
SATURDAY								
8:45	17	25	4	25	18	21	33	0
10:00	17	38	15	50	30	21	24	0
11:15	33	50	30	25	42	26	43	0
1:00	33	38	41	58	45	42	19	0
2:15	17	38	48	92	70	26	29	0
3:15	0	25	48	67	58	32	29	0

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OCCUPANCY RATE OF LANEWAY PARKING EACH BLOCK IDENTFIED BY A PROMINENT BUILDING (FIGURES SHOW PERCENT OCCUPIED)

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BLOCK	Sears	I.G.A.	Select Burnfture	Taco Villa	Tarawyn Centre	Fields	Grand Hotel
NUMBER OF SPACES	56	15	15	16	54	34	34
THURSDAY							
9:30	25	67	40	63	39	57	47
10:45	39	80	60	69	43	60	38
1:30	55	93	53	56	54	60	29
2:30	50	73	60	69	63	57	32
4:00	55	60	40	63	54	49	44
5:30	27	. 47	27	25	41	34	59
6:30	27	40	13	6	33	20	47
7:30	25	40	13	13	35	23	47
FRIDAY							
8:30	41	33	. 20	50	33	54	29
9:45	46	47	33	44	52	57	32
11:15	48	53	33	56	54	63	38
SATURDAY							
8:45	25	20	20	25	33	29	35
10:00	21	20	33	31	52	34	35
11:15	30	33	33	Q	41	37	32
1:00	20	40	27	19	46	26	41
2:15	18	27	27	19	46	37	32
3:15	14	20	9	38	35	37	41
AVERAGE	33	47	32	38	44	43	39
OCCUPANCY							

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OCCUPANCY RATE OF MAJOR PARKING LOTS (FIGURES SHOW PERCENT OCCUPIED)

					-	
LOCATION	ALCB	BAACO	Tomboy	IGA	IDA	Heritage Mall
NUMBER OF SPACES	39	36	32	32	21	48
THURSDAY						
9:30	18	22	22	78	48	73
10:45	28	22	44	100	52	65
1:30	18	53	28	68	71	85
2:30	8	33	47	81	76	60
4:00	23	50	25	85		67
5:30	38	50	81	89	67	67
6:30	10	86	41	78	29	52
7:30	18	92	50	96	48	67
FRIDAY						
8:30	0	19	Q	25	47	42
9:45	8	17	28	59	79	60
11:15	22	31	31	94	68	60
SATURDAY						
8:45	5	22	Q	44	33	35
10:00	10	39	38	81	43	46
11:15	44	53	56	81	43	69
1:00	36	64	69	57	57	63
2:15	41	64	78	94	67	5 L
3:14	26	39	75	16	57	60

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OCCUPANCY RATE OF MINOR PARKING LOTS (FIGURES SHOW PERCENT OCCUPIED)

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LOCATION	Red Rooster	T.D. Bank	Insurance	Treasury Branch	Scotia Bank	Commerce Bank	Century 21
NUMBER OF SPACES	13	10	15	. 13	10	10	13
THURSDAY							
9:30	23	30	40	69	100	50	3
10:45	38	20	53	62	100	70	23
1:30	23	10	60	62	06	50	31
2:30	46	70	40	69	100	50	31
4:00	15	80	33	38	06	40	31
5:30	23	30	0	8	80	20	31
6:30	23	o	0	0	0	0	15
7:30	31	0	0	0	0	0	o
FRIDAY							
8:30	23	20	47	54	60	40	8
9:45	15	80	60	54	80	06	15
11:15	15	70	53	46	80	60	80
SATURDAY							
8:45	36	0	o	0	0	0	31
10:00	50	0	0	0	0	20	46
11:15	43	0	0	0	0	30	54
1:00	L	10	0	0	0	30	38
2:15	21	30	0	0	0	20	38
3:15	7	40	0	0	0	30	0

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OCCUPANCY RATE OF VACANT LOTS CURRENTLY USED FOR PARKING (FIGURES SHOW PERCENT OCCUPIED)

LOCATION	Next to Bakery (51 A	Kowalski Ve) Lot	Behind I.D.A.	Behind Credit Union	North of Parkland Chrysler
NUMBER OF	18	65	12	œ	107
THURSDAY					
9:30	11	т	75	50	4
10:45	22	φ	75	63	ę
1:30	22	15	83	63	ъ
2:30	28	ę	92	75	ю
4:00	22	18	92	38	ũ
5:30	17	14	30	25	L
6:30	0	6	8	38	7
7:30	0	ę	50	38	7
FRIDAY					
8:30	6	8	75	25	м
9:45	22	14	83	13	т
11:15	22	14	92	13	5
SATURDAY					
8:45	0	n	42	13	D
10:00	6	ĸ	75	13	2
11:15	11	ę	75	13	4
1:00	6	ŝ	100	0	ŝ
2:15	6	14	92	0	ę
3:15	Q	11	67	13	ę

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OCCUPANCY RATE OF PERIPHERAL STREETS AND AVENUES (FIGURES SHOW PERCENT OCCUPIED)

LOCATION	52 Avenue	55 Street	50 Avenue	Highway 28	Highway 28	48 Avenue
NUMBER OF	ave to - is co	ave uc-sc	55-53 St	(Beejay Motel) 51-50 st.	50-49 St
SPACES	5	4	8	10	10	9
THURSDAY	;	:				
9:30	20	50	13	20	40	0
10:45	20	50	25	40	50	0
1:30	0	0	38	60	60	0
2:30	0	0	68	50	80	
4:00	0	0	25	20	40	o
5:30	0	50	13	60	20	0
6:30	0	75	13	60	20	0
7:30	0	0	13	60	10	0
FRIDAY						
8:30	0	0	38	30	60	0
9:45	20	50	25	20	80	0
11:15	0	50	25	30	06	0
SATURDAY						
8:45	0	0	13	40	10	0
10:00	0	•	0	10	0	0
11:15	0	25	0	20	30	0
1:00	0	0	50	40	20	0
2:15	0	0	25	20	10	0
3:15	0	0	38	10	0	0

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LOCATION	Esso Parking Lot	Behind Northern Cable	Behind Sav-Mor	Grand Cleaners
NUMBER OF SPACES	14	m	12	4
THURSDAY			-	
9:30	64	33	58	100
10:45	71	33	58	50
1:30	64	33	67	100
2:30	64	33	17	25
4:00	57	33	17	25
5:30	50	67	17	25
6:30	50	67	17	0
7:30	0	67	17	.25
FRIDAY				
8:30	п	67	50	o
9:45	11	100	42	100
11:15	64	100	50	25
SATURDAY				
8:45	11	33	25	25
10:00	64	67	17	75
11:15	64	67	25	50
1:00	71	0	42	50
2:15	64	0	25	0

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OCCUPANCY RATE OF SELECTED PRIVATE PARKING LOTS (FIGURES SHOW PERCENT OCCUPIED)

TABLE #10

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TABLE 11

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OCCUPANCY RATE OF PARKING STALLS 50 AVENUE ON-STREET

INCLUDING ADJACENT SIDE STREETS (FIGURES SHOW PERCENT OCCUPIED)

LOCATION	China Doll	Robinsons	Select	Fields	Tarawyn	Woodland
	Block	Block	Furniture Block	Block	Center Block	Ford Block
NUMBER OF SPACES	35	32	45	81	68	25
THURSDAY						
9:30	23	6	29	48	66	60
10:45	46	44	31	54	59	60
1:30	34	41	38	54	11	64
2:30	46	28	24	49	65	68
4:00	37	53	40	54 .	82	72
5:30	46	56	22	41	50	60
6:30	43	44	22	37	50.	48
7:30	31	53	33	23	66	64
FRIDAY						
8:30	34	31	36	19	44	48
9:45	46	53	51	53	72	60
11:45	54	63	51	41	65	76
SATURDAY						
8:45	31	34	27	22	24	40
10:00	40	53	36	35	53	48
11:15	63	66	36	48	59	64
1:00	57	63	47	58	69	56
2:15	46	66	44	64	11	44
3:15	26	56	42	56	63	36

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LONG TERM PARKERS AS

PERCENTAGE OF TOTAL OBSERVATIONS (Parked at least 4 hours at one location)	Ave. N 50 Ave N 50 Ave I.G.A. S 50 Ave S 50 Ave S 50 Ave 2 St 52-51 St 51-50 St Lot 50-51 St 51-52 St 52-53 St		52 61 151 129 151 53	2 0 5 1 2 1	k · 4% 0% 3% 0.8% 1.3% 2%		11 21 45 33 45 20	0 0 2 0 1 1	k 0% 0% 4% 0% 2% 5%		46 51 132 96 144 34	1 5 3 0	2 .
PERCENTAGE OF (Parked at least	1 50 Ave N 50 Ave 2-51 st 51-50 st		52 61	2 0	4% 0%		11 21	0	0% 0%		46 51	1	
	N 50 Ave. N 53-52 St 5		57	0	%0		16	0	0%		44	0	
	LOCATION	THURSDAY	TOTAL	LTP	æ	FRIDAY	TOTAL	LTP	0X2	SATURDAY	TOTAL	LTP	

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LONG TERM PARKERS AS PERCENT OF TOTAL SPACES Parked at least 4 hours at one loc

		đ)	arked at leas	t 4 nours at	one location)		
LOCATION	N 50 AVe 53-52 St	N. 50 Ave 52-51 St	N 50 Ave 51-50 St	I.G.A. Lot	S 50 Ave 50-51 St	s. 50 Ave 51-52 st	S 50 Ave 52-53 St
THURSDAY							
SPACES	14	12	16	32	29	29	11
LTP	0	7	0	ហ	I	7	Ţ
ą	80	0 %	0%	3%	8 6	7%	86
FRIDAY							
SPACES	14	12	16	32	29	59	11
LTP	0	0	0	2	0	H	-
عن	% 0	80	0%	6%	0 %	3&	86
SATURDAY							
SPACES	14	12	16	32	29	29	11
LTP	0	Ч	ı	5	m	0	7
ф,	0%	8%	6%	16%	10%	0 %	18%

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PROFILE OF OUT-OF--PROVINCE PARKERS

DAY	TOTAL, # OF PARKERS	SASK	OUT OF PROVIN B.C.	CE OTHER	TOTAL
THURSDAY	2287	88 3.8%	8 0.8%	7 0.3%	103 4.5%
FRIDAY	845	23 2.7%	1 0.1%	3 0.4%	27 3.2%
SATURDAY	1608	75 4.7%	7 0.4%	15 0.9%	97 6.0%
ALL DAYS	4740	186 3.9%	l6 0.3%	25 0.5%	227 4.8%

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Appendix B - Verification Study Data



City of Cold Lake Project No: 2010-3050 Date: January 7, 2011

COLD LAKE SOUTH CONFIRMATION STUDY - PARKING DEMAND

Password:

Locked

ROAD	FROM	то	SIDE OF STREET	PARKING SUPPLY	PARKED	VEHICLES	PAR UTILIZ	KING ATION
					1 st Pass	2 nd Pass	1 st Pass	2 nd Pass
			North	13	3	2	23%	15%
51 Avenue	51 Street	52 Street	South	11	0	1	0%	9%
			Total	24	3	3	12%	12%
			North	13	8	8	62%	62%
50 Avenue	51 Street	52 Street	South	22	16	20	73%	91%
		Total	35	24	28	67%	76%	
			East	11	6	7	55%	64%
52 Street	51 Avenue	50 Avenue	West	13	7	6	54%	46%
			Total	24	13	13	54%	55%
			East	20	16	12	80%	60%
52 Street	50 Avenue	Highway 28/55	West	10	4	3	40%	30%
			Total	30	20	15	60%	45%

City of Cold Lake Project No: 2010-3050 Date: January 7, 2011

COLD LAKE SOUTH CONFIRMATION STUDY - 51 AVENUE PARKING SURVEY DATA SHEET -

DATE:October 20, 2010WEATHER:SunnySURVEYOR:M.R.Password:Locked

ROAD	FROM	то			PARKING	PARKED	/EHICLES	COMMENTS
ROAD	FROM	10	SIDE OF STREET	PARKING SUPPLI	RESTRICTIONS	2:45 PM	3:45 PM	(ie: parking restrictions)
					2 Hour Parking	CWA706	JET679	Parallol Parking
		52 Street	North	13	9:00 AM - 6:00 PM	ZAV885	ZAV885	Lots of ompty spaces
	51 Street				Monday - Saturday	EPL189		Lots of empty spaces
STAvenue					2 Hour Parking		YRP689	Parallol Parking
			South	11	9:00 AM - 6:00 PM			All ompty at 2:45 pm
					Monday - Saturday			All empty at 2.45 pm

City of Cold Lake Project No: 2010-3050 Date: January 7, 2011

COLD LAKE SOUTH CONFIRMATION STUDY - 50 AVENUE PARKING SURVEY DATA SHEET -

DATE:	October 20, 2010
WEATHER:	Sunny
SURVEYOR:	M.R.
Password:	Locked

ROAD	FROM	то	SIDE OF STREET	PARKING SUPPLY	PARKING	PARKED VEHICLES		COMMENTS
					RESTRICTIONS	2:30 PM	3:30 PM	(ie: parking restrictions)
		52 Street	North	13	Handicap			
					Handicap			
						EBY826	MEU927	
						KEF878	KEF878	
						CJE983	CJE983	
						ZVP394		
	51 Street				2 Hour Parking	921HBW	EYZ564	Parallel Parking
					9:00 AM - 6:00 PM Monday - Saturday	WGY000		
						HJE726	HJE726	
							010// 50	
							GXY158	
50 Avenue							GXU047	
						EFW200	ELW//1	
			South	22	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	Z) /D 440		Angle parking
						ZVP413		
						U74602	LI74502	
						DD 17225	DD 17225	
						TLIW/308	DDJ7323	
						EW/1071	EW/1071	
						VKA85	VKA85	
						WZC821	STY352	
						DZU756	EZE583	
						NDH808	YGN384	
						567TZR	ZVP567	
						DUU176	DUU176	
						LEN540	ZLM368	
						EZV334	HFY158	
						RAC959	964HID	
							60356	
							ZZT757	
							YYX194	
						ZVP542	MCU530	
						WYS766	RWU353	
							HUB692	
							303HPG	

COLD LAKE SOUTH CONFIRMATION STUDY - 52 STREET PARKING SURVEY DATA SHEET -

DATE:	October 20, 2010			
WEATHER:	Sunny			
SURVEYOR:	B.T.			
Password:	Locked			

ROAD	EPOM	то			PARKING	PARKED VEHICLES		COMMENTS
ROAD	TROM	10	ODE OF OTREET	TARRING GOLLET	RESTRICTIONS	2:30 PM	3:30 PM	(ie: parking restrictions)
52 Street	51 Avenue	50 Avenue	West	13	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	2:30 PM CAM670 LLY026 LYC661 ZRM327 PXA001 STY555 MUB794	3:30 PM CAM670 LYC661 ZSX680 TBU932 MUB794 ZWZ021	(ie: parking restrictions) Parallel Parking
	50 Avenue	Highway 28/55	West	10	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	ESS675 MAN025 Parked trailer YYB502	ESS675 MAN025 Parked trailor	Parallel Parking
	50 Avenue	Highway 28/55	East	20	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	SYB084 KYU100 SYS324 JET502 ZAS773 FZE582 JET920 ZPX006 ZHS906 VRJ223 BBVX130 FAR203 EHB376 RWV443 LYL962 VNP502	SYB084 KYU100 JET502 KYW917 ZAS773 FZE582 JET920 FUS224 VRJ223 YMU000 RWV443 SYX709	Angle Parking
	51 Avenue	50 Avenue	East	11	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	LEN300 CBY080 FUS373 ZVP530 RAX383 77J787	MCV770 CBY080 ZZT722 FUS373 ZVP530 RAX383 ZSX568	Parallel Parking


Appendix F - Cold Lake Transportation Study In-Service Road Safety Reviews

Technical Memorandum

City of Cold Lake

Cold Lake Transportation Study In-Service Road Safety Reviews

April 2011



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Introduction

Associated Engineering (AE) was retained by the City of Cold Lake (City) to update its existing transportation study. The purpose of the transportation study is to provide a comprehensive long range plan that integrates transportation infrastructure requirements with existing and future land uses. The transportation study will provide the City with a master plan on which to plan and implement specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15-year and 20-year planning horizons. The transportation study will consider municipal roads, traffic calming, parking, traffic safety, traffic signal coordination, school zones, transit, truck routes, traffic management, and transportation system operations.

1.1 STUDY BACKGROUND

One component of the transportation study was to complete in-service road safety reviews at select locations within the City. At project initiation, it was established that the following four study corridors would be reviewed:

- 1 Avenue, from the Municipal District (MD) Campground at 23 Street to 2 Avenue/10 Street
- 10 Street, from 2 Avenue to 8 Avenue
- Lakeshore Drive, from 1 Avenue/10 Street to 8 Avenue
- 50 Avenue, from Highway 28 to 49 Street.

This technical memorandum presents the analyses and results of the in-service road safety reviews completed for the four study corridors identified above. This technical memorandum also covers traffic calming, which was considered for each study corridor as part of the potential improvement options.

1.2 STUDY OBJECTIVE

The purpose of the in-service road safety reviews was to identify potential safety issues along the corridors and propose improvement options that will reduce or eliminate identified issues. The in-service road safety reviews were conducted based on the procedures outlined in the Transportation Association of Canada (TAC) Canadian Guide to In-Service Road Safety Reviews (TAC safety guideline).

1.3 STUDY AREA

Figure 1.1 through Figure 1.4 present the four study corridors being studied for the in-service road safety reviews.



1.4 STUDY METHODOLOGY

The scope of an in-service road safety review can range from a high level review based on site observations to an in-depth review involving collision analysis, geometric analysis, traffic operational analysis, traffic conflict analysis, and human factors analysis. For the Cold Lake in-service road safety reviews, a high level approach was chosen and the following methodology was followed:

- Initiate project meeting
- Conduct site reconnaissance of existing conditions
- Review operational conditions at key intersections
- Identify safety issues
- Present improvement options
- Produce draft and final reports.

Various intersections along the four study corridors were analyzed as part of the existing (2010) traffic operational analysis completed for the transportation study update. The results of the operational analysis were reviewed as part of the in-service road safety reviews to identify any operational issues. Collision data for the four study corridors were unavailable at the time of this report.









2 Project Initiation Meeting

A project initiation meeting was held on May 4, 2010 in Cold Lake to complete the following:

- Confirm the scope of the in-service road safety review for each corridor
- Obtain the City's input regarding potential issues along each corridor.



Site Reconnaissance of Existing Conditions

A daytime site reconnaissance was completed by the project team on May 5, 2010 to collect information about the existing conditions along each corridor and to identify potential safety issues. The prevailing weather condition was cloudy with light flurries.

The following sections describe the existing conditions information collected during the site visit.

3.1 **1 AVENUE CORRIDOR**

Physical Characteristics 3.1.1

1 Avenue is an east-west, two-lane, undivided collector which services several tourist attractions in Cold Lake North, including the MD campground and Kinosoo Beach. The section of interest presently is a 520 m stretch located between 23 Street and 2 Avenue/ 10 Street. The study section is relatively straight with no vertical curves.

There are eight intersections along 1 Avenue within the study limits. All the intersections are stop controlled on the northbound and southbound approaches, except for the intersection at 2 Avenue/10 Street. The southbound approach at 2 Avenue/10 Street is yield controlled. The eight intersecting roadways along 1 Avenue are two-lane undivided roadways and are listed below from west to east:

- 23 Street •
- Nelson Street/22 Street
- Spruce Street
- Tamarak Street
- 19 Street
- Nelson Street/18 Street
- 16 Street
- 2 Avenue/10 Street.

The predominant land uses along 1 Avenue are residential and recreational, and are summarized below:

- Single family residential developments along the south side of 1 Avenue between 23 Street . and 10 Street and along the north side of 1 Avenue between 23 Street and Tamarak Street
- Multi-family residential development in the northwest corner of 1 Avenue and 2 Avenue/10 Street
- City's water treatment facility located immediately west of the multi-family development
- MD campground located along the north side of 1 Avenue west of 23 Street



 Kinosoo Beach located along the north side of 1 Avenue between Tamarak Street and the City's water treatment facility.

The traverse cross-section along 1 Avenue ranges from 13.1 m wide on the west end of the corridor to 10.6 m wide on the east end. Parking lanes and curb and gutter are provided on both sides of the corridor. Sidewalks are only provided on the north side of 1 Avenue, from 23 Street to just west of 10 Street. There are multiple residential driveways along the south side of 1 Avenue and several driveways along the north side for Kinosoo Beach and the water treatment plant.

The posted speed limit along 1 Avenue is 50 km/h, except for the stretch along Kinosoo Beach between Tamarak Street and the water treatment facility. The speed limit along this portion is 30 km/h. All of the cross streets have a posted speed limit of 50 km/h.

The existing pavement condition is poor; 1 Avenue contains many cracks and potholes. A pedestrian activated crosswalk with overhead signage and warning flashers is provided along 1 Avenue, at 19 Street.

3.1.2 Traffic Characteristics

Traffic volume data were provided for various intersections along 1 Avenue to analyze the existing traffic conditions. The traffic data was analyzed to determine the existing (2010) traffic volumes as part of the existing (2010) traffic operational analysis completed for the transportation study update. The existing (2010) p.m. peak hour traffic volumes along 1 Avenue are presented in Figure 3.1.

3.2 10 STREET CORRIDOR

3.2.1 Physical Characteristics

10 Street is a north-south, two-lane, undivided collector which serves as a link between Highway 28 and Kinosoo Beach. The section of interest presently is an 850 m stretch located between1 Avenue and 8 Avenue. The study section is relatively straight with no vertical curves, except at3 Avenue where there is a vertical crest curve.



There are six intersections along 10 Street within the study limits. All the intersections are stop controlled on the eastbound and westbound approaches. The intersecting roadways along 10 Street are two-lane undivided roadways and are listed below from north to south:

- 1 Avenue/2 Avenue
- 3 Avenue
- 5 Avenue
- 6 Avenue
- 7 Avenue
- 8 Avenue.

The predominant land uses along 10 Street are residential and institutional, and are summarized below:

- Single family residential developments along both sides of 10 Street
- Multi-family residential developments in the northwest corner of the 10 Street and 1 Avenue/2 Avenue intersection and the northwest corner of the 10 Street and 8 Avenue intersection
- Commercial and institutional (fire hall) land uses located in the northeast corner of the 10 Street and 8 Avenue intersection
- Cenotaph Park located in the southeast corner of the 10 Street and 7 Avenue intersection
- Institutional land uses (churches) located in the southeast corner of the 10 Street and
 3 Avenue intersection and the southeast corner of the 10 Street and 7 Avenue intersection.

The traverse cross-section along 10 Street ranges from 13.0 m wide on the north end of the corridor to 15.2 m wide on the south end. Parking lanes and curb and gutter are provided on both sides of the corridor. Sidewalks are provided on the east side of 10 Street along the entire corridor. Multiple driveways for the residential, commercial and institutional land uses are located on both sides of 10 Street.

No speed limit signs were posted along 10 Street. For the purpose of this study, it was assumed that the posted speed limit along 10 Street is 50 km/h.

The existing pavement condition is poor with numerous cracks and potholes.

3.2.2 Traffic Characteristics

The existing (2010) p.m. peak hour traffic volumes along 10 Street from the existing (2010) traffic operational analysis are presented in Figure 3.2.



3.3 LAKESHORE DRIVE CORRIDOR

3.3.1 Physical Characteristics

Lakeshore Drive is a north-south, two-lane, undivided local roadway which provides access to the Cold Lake Marina and the tourist district situated south of Cold Lake. The section of interest presently is a 1.0 km stretch located between 1 Avenue and 8 Avenue. On the north end, Lakeshore Drive transitions into 2 Avenue through a horizontal curve and intersects with 1 Avenue/10 Street. Lakeshore Drive follows the alignment of the lake; and contains many horizontal curves and slopes upwards on the north end.

There are five intersections along Lakeshore Drive within the study limits. All the intersections along Lakeshore Drive are stop controlled on the eastbound approaches, except for the intersection at 1 Avenue/10 Street. The southbound approach at 1 Avenue/ 10 Street is yield controlled. The intersecting roadways along Lakeshore Drive are two-lane undivided roadways and are listed below from north to south:

- 1 Avenue/10 Street
- 5 Avenue
- 6 Avenue
- 7 Avenue
- 8 Avenue.

The predominant land uses along Lakeshore Drive are residential and commercial, and are summarized below:

- Recreational land use in the form of Cold Lake and Cold Lake Marina along the east side of Lakeshore Drive;
- Single family residential developments along the west side of Lakeshore Drive, from 2 Avenue to 6 Avenue; and
- Commercial land uses in the form of bed and breakfasts and restaurants along the west side of Lakeshore Drive, from 7 Avenue to 8 Avenue.



The traverse cross-section along Lakeshore Drive ranges from 7.0 m wide on the north end of the corridor to 13.4 m wide on the south end; the road widens at 6 Avenue. A parking lane is provided on the west side of Lakeshore Drive between 7 Avenue and 2 Avenue and along the south side of 2 Avenue between 1 Avenue and Lakeshore Drive. South of 7 Avenue, parking lanes are provided on both sides of Lakeshore Drive along with curb extensions and marked crosswalks at 7 Avenue, 8 Avenue, and midblock between 7 Avenue and 8 Avenue. Curb and gutter is provided along both sides of the roadway for the entire study corridor.

From north to south, sidewalks and crosswalks are provided along the study corridor in the following manner:

- Sidewalk provided on south side of 2 Avenue, from 1 Avenue to Lakeshore Drive
- Marked crosswalk provided at the horizontal curve where 2 Avenue transitions to Lakeshore Drive
- Sidewalk provided on east side of Lakeshore Drive, from 2 Avenue to 6 Avenue
- Sidewalk provided along both sides of Lakeshore Drive, from 6 Avenue to 7 Avenue
- Marked crosswalks provided at 7 Avenue, 8 Avenue, and midblock with curb extensions
- Sidewalk provided along west side of Lakeshore Drive, from 7 Avenue to 8 Avenue.

Multiple driveways for the residential and commercial land uses are located on the west side of Lakeshore Drive.

The posted speed limit along Lakeshore Drive is 30 km/h from 1 Avenue/10 Street to 7 Avenue. South of 7 Avenue, the posted speed limit is 50 km/h. All the cross-streets have a posted speed limit of 50 km/h.

The existing pavement condition is poor and Lakeshore Drive contains many cracks and potholes.

3.3.2 Traffic Characteristics

The existing (2010) p.m. peak hour traffic volumes along Lakeshore Drive from the existing (2010) traffic operational analysis are presented in Figure 3.3.



3.4 50 AVENUE CORRIDOR

3.4.1 Physical Characteristics

50 Avenue is an east-west, two-lane, undivided arterial which services the Central Business District of Cold Lake South (CLS). The section of interest presently is a 650 m stretch located between Highway 28 and 49 Street. The study section of 50 Avenue does not have any horizontal or vertical curves.

There are seven intersections along 50 Avenue within the study limits. The study intersections, from west to east, along with a description of the traffic control and intersection configuration are listed below:

Highway 28

- Four-legged intersection with traffic signals
- Northbound approach: two through lanes with separate left turn and channelized right turn lanes
- Southbound approach: two through lanes with separate left turn and channelized right turn lanes
- Eastbound approach: one through lane with separate left turn and channelized right turn lanes
- Westbound approach: one shared left turn and through lane and channelized right turn lane.

55 Street

- Three-legged intersection with stop control on the southbound approach
- Single shared left turn, through and right turn lane on all approaches.

53 Street

- Four-legged intersection with 2-way stop control on the northbound and southbound approaches
- Single shared left turn, through and right turn lane on all approaches

52 Street

- Four-legged intersection with 4-way stop control
- Single shared left turn, through and right turn lane on all approaches.

51 Street

- Four-legged intersection with 4-way stop control
- Single shared left turn, through and right turn lane on all approaches.



50 Street

- Four-legged intersection with 3-way stop control
- Single shared left turn, through and right turn lane on all approaches
- Southbound approach is the entrance to a private driveway and does not have any traffic control.

49 Street

- Four-legged intersection with 2-way stop control on the northbound and southbound approaches
- Single shared left turn, through and right turn lane on all approaches.

The predominant land use along 50 Avenue is commercial.

The traverse cross-section along 50 Avenue ranges from 17.0 m to 19.0 m. Parking lanes and curb and gutter are provided on both sides of the corridor. Parking along 50 Avenue is restricted to two-hours from Monday to Saturday (between 9:00 a.m. and 6:00 p.m.) and is provided in the following manner from west to east:

- From 55 Street to 53 Street: angle and parallel parking on the north side, parallel parking on the south sides
- From 53 Street to 52 Street: angle parking on the north side, parallel parking on the south side
- From 52 Street to 49 Street: parallel parking on the north side, angle parking on the south side.

Sidewalks are provided along both sides of 50 Avenue and multiple driveways are located along the corridor. Marked crosswalks have been provided at all the intersections except for 55 Street and a midblock crosswalk has been provided between 50 Street and 51 Street. Pedestrian crossing (RA-4) signs have been provided for the midblock crosswalk.

The posted speed limit along 50 Avenue is 30km/h between Highway 28 and 55 Street. East of 55 Street, the posted speed limit is 50 km/h. All the cross-streets have a posted speed limit of 50 km/h except for Highway 28 which has a posted speed limit of 30 km/h at 50 Avenue.

The existing pavement condition is fair. A single yellow centerline is provided along 50 Avenue to indicate the separation between the eastbound and westbound travel lanes. Pavement markings have been provided on 50 Avenue to indicate both the parallel and angle parking stalls. The centerline, painted stall lines, and crosswalk markings are worn and need to be repainted.



3.4.2 Traffic Characteristics

The existing (2010) p.m. peak hour traffic volumes along 50 Avenue from the Existing (2010) Traffic Operational Analysis are presented in Figure 3.4.





Operational Analysis

Operational analyses were completed for the intersections along the study corridors as part of the existing (2010) traffic operational analysis for the transportation study update. The following section provides the overall intersection results from the traffic analysis. Information regarding the methodology and assumptions used for the traffic analysis can be found in the technical memorandum titled Existing (2010) Traffic Operational Analysis and the detailed intersection analyses results have been included Appendix A.

4.1 1 AVENUE CORRIDOR

Only three of the eight intersections along 1 Avenue were analyzed for the existing (2010) horizon analysis. Table 4.1 presents the overall intersection capacity results for the study intersections analyzed along 1 Avenue.

Intersection	Maximum V/C Ratio	Delay (s)	LOS
Nelson Street/22 Street	0.11	1.3	А
16 Street	0.09	1.9	А
2 Avenue/10 Street	0.05	2.1	А

Table 4.1 Overall Intersection Capacity Results - 1 Avenue Corridor

All the study intersections are currently operating well with an overall intersection LOS A and maximum v/c ratio of 0.11 or less. All individual movements are also operating at LOS B or better.

4.2 10 STREET CORRIDOR

Only two of the six intersections along 10 Street were analyzed for the existing (2010) traffic operational analysis. Table 4.2 presents the overall intersection capacity results for the study intersections analyzed along 10 Street.



Table 4.2
Overall Intersection Capacity Results - 10 Street Corridor

Intersection	Maximum V/C Ratio	Delay (sec)	LOS
1 Avenue/2 Avenue	0.05	2.1	A
8 Avenue	0.21	6.6	А

All the study intersections are currently operating well with an overall intersection LOS A and maximum v/c ratio of 0.21 or less. All individual movements are also operating at LOS B or better.

4.3 LAKESHORE DRIVE CORRIDOR

Only two of the five intersections along Lakeshore Drive were analyzed for the existing (2010) traffic operational analysis. Table 4.3 presents the overall intersection capacity results for the study intersections analyzed along Lakeshore Drive.

Table 4.3 Overall Intersection Capacity Results - Lakeshore Drive Corridor

Intersection	Maximum V/C Ratio	Delay (sec)	LOS
1 Avenue/10 Street	0.05	2.1	А
8 Avenue	0.07	4.3	А

All the study intersections are currently operating well with an overall intersection LOS A and maximum v/c ratio of 0.07 or less. All individual movements are also operating at LOS A.

4.4 50 AVENUE CORRIDOR

Only six of the seven intersections along 50 Avenue were analyzed for the existing (2010) traffic operational analysis. Table 4.4 presents the overall intersection capacity results for the study intersections analyzed along 50 Avenue.

Intersection	Maximum V/C Ratio	Delay (sec)	LOS
Highway 28	0.76	14.3	В
53 Street	0.16	3.1	А
52 Street	0.45	11.1	В
51 Street	0.47	11.2	В
50 Street	0.46	10.9	В
49 Street	0.32	5.5	А

 Table 4.4

 Overall Intersection Capacity Results – 50 Avenue Corridor

All the study intersections are currently operating well with an overall intersection LOS B or better and maximum v/c ratio of 0.76 or less. All individual movements are also operating at LOS C or better



5

Safety Issues

Potential safety issues along each study corridor were identified based on observations during site reconnaissance. The results from the operational analysis at the various intersections indicated that no improvements are required from an operational standpoint. The safety issues are discussed in the following section for each study corridor.

5.1 1 AVENUE CORRIDOR

5.1.1 1 Avenue/2 Avenue/10 Street Intersection Configuration

Figure 5.1 and Figure 5.2 present photographs of the intersection configuration at 1 Avenue and 2 Avenue/10 Street.

Figure 5.1 1 Avenue/2 Avenue/10 Street Intersection - Southbound on 2 Avenue





Figure 5.2 1 Avenue/2 Avenue/10 Street Intersection - Northbound on 10 Street



1 Avenue transitions into 10 Street at the intersection and free flow is provided for the eastbound/westbound movements along 1 Avenue and 10 Street. Yield control is provided for the southbound movements along 2 Avenue. Due to the alignment and the geometry of the intersection, the through movements along 1 Avenue and 10 Street have to turn slightly to stay on the travel path while movements between 10 Street and 2 Avenue can travel straight. Typically through movements are provided with straight travel paths through an intersection. The travel paths at 1 Avenue/2 Avenue/10 Street may result in driver confusion, particularly at night and for visitors.

Figure 5.3 presents a photograph of the study intersection from the southbound approach.



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Figure 5.3 1 Avenue/2 Avenue/10 Street Intersection - Southbound Approach



Visibility of the study intersection from 2 Avenue is poor because of the horizontal and vertical curve provided on this approach. The yield sign provided for this approach is also partially obscured by the streetlight. As a result, the need to stop at the intersection immediately after the curve may not be expected by drivers.

5.1.2 Speeding Problem

The City indicated that there is a speeding problem in the summer months along 1 Avenue, near Kinosoo Beach. Two site visits were conducted by AE, one in May 2010 and one in July 2010 on the Canada Day long weekend. Both site visits were not representative of a typical summer weekend; May is not a summer month and driver behaviour on the long weekend were affected by the Canada Day parade. Therefore, representative travel speed along 1 Avenue could not be observed.

A speed study should be conducted along 1 Avenue on a typical summer weekend to confirm the speeding problem.

5.1.3 Poor Pavement Conditions

The existing pavement along 1 Avenue is in poor condition and contains many cracks and potholes. According to the TAC safety guideline, poor pavement surfaces will likely reduce the available friction with vehicle tires; causing longer braking distances and a higher risk of rear-end collisions.

5.1.4 19 Street Pedestrian Crosswalk

The only pedestrian crosswalk along 1 Avenue is provided at 19 Street. Figure 5.4 presents a photograph of the pedestrian crosswalk.



Figure 5.4 Pedestrian Crosswalk at 19 Street

The crosswalk is equipped with overhead warning flashers for both direction of travel along 1 Avenue. No pavement markings are provided to delineate the actual crosswalk and no pedestrian crossing (RA-4) signs are provided along 1 Avenue in advance of the actual crosswalk. Crosswalk lines should be provided to clearly mark the crosswalk location for pedestrians and approaching traffic along 1 Avenue. Pedestrian crosswalk (RA-4) signs should be provided at all crosswalks except for at signalized intersections or stop signs, in accordance with Section A6 of the Manual of Uniform Traffic Control Devices (MUTCD).

5.2 10 STREET CORRIDOR

5.2.1 1 Avenue/2 Avenue/ 10 Street Intersection

This is covered in Section 5.1.1.

5.2.2 Vertical Crest Curve at 3 Avenue

There is a vertical crest curve along 10 Street at 3 Avenue. Figure 5.5 presents a photograph of the vertical crest curve.



Figure 5.5 Vertical Crest Curve along 10 Street - Southbound on 10 Street



The vertical curve limits driver sight distance in both directions along 10 Street. Limited sight distances increase the risk of head-on, off-road, rear-end and hidden-intersection collisions. Visibility of the 3 Avenue intersection is poor from 1 Avenue at the 1 Avenue/2 Avenue/10 Street intersection because of the intersection alignment, the vertical curve, and the trees along the west side.

5.2.3 Poor Pavement Conditions

The existing pavement along 10 Street is in poor condition and contains many cracks. According to the TAC safety guideline, poor pavement surfaces will likely reduce the available friction with vehicle tires; causing longer braking distances and a higher risk of rear-end collisions.

5.3 LAKESHORE DRIVE CORRIDOR

5.3.1 1 Avenue/2 Avenue/10 Street Intersection

This is covered in Section 5.1.1.

5.3.2 5.3.2 Road Width and Alignment

Figure 5.6 presents a photograph of Lakeshore Drive north of 6 Avenue.

Figure 5.6 Lakeshore Drive - Northbound.



The pavement width of Lakeshore Drive is narrow between 2 Avenue and 6 Avenue. Two-way traffic with parking on the west side is provided along this section. During the site visit, AE observed that simultaneous northbound and southbound movement along Lakeshore Drive is difficult with parked vehicles on the west side. Vehicles need to slow down and yield to one another.

The alignment of Lakeshore Drive follows the shoreline of the City. As a result, there are numerous horizontal curves along Lakeshore Drive. The horizontal curves limit the sight distance along the corridor. Limited sight distances increase the risk of head-on, off-road, rear-end and hidden-intersection collisions. The sight distance along Lakeshore Drive is further reduced by the natural vegetation along the east side.

5.3.3 Poor Pavement Conditions

The existing pavement along Lakeshore Drive is worn and contains many cracks, ruts, and potholes. According to the TAC safety guideline, poor pavement surfaces will likely reduce the available friction with vehicle tires; causing longer braking distances and a higher risk of rear-end collisions.


5.3.4 Pedestrian Crosswalks

There are a total of four crosswalks along Lakeshore Drive, at the following locations:

- 8 Avenue
- Midblock between 8 Avenue and 7 Avenue
- 7 Avenue
- At the horizontal curve along Lakeshore Drive where it transitions to 2 Avenue.

Due to the traffic calming measures, curb extensions have been provided at the crosswalks between 8 Avenue and 7 Avenue. Pavement markings have also been provided at these crosswalks, however the existing pavement markings are faded.

Figure 5.7 presents a photograph of a typical crosswalk provided between 8 Avenue and 7 Avenue.



Figure 5.7 Crosswalk at 7 Avenue

The pedestrian crosswalk at 2 Avenue is located on the horizontal curve and has faded pavement markings. No pedestrian crosswalk (RA-4) signs have been provided along Lakeshore Drive or 2 Avenue to warn motorist in advance of the crosswalk. Pedestrian crosswalk signs should be provided, especially at this location, to compensate for the limited sight distances in both directions.

The locations of the sidewalks along Lakeshore Drive vary along the corridor in the following manner:

- South side of 2 Avenue, from 1 Avenue to Lakeshore Drive
- East side of Lakeshore Drive, from 2 Avenue to 6 Avenue
- Both sides of Lakeshore Drive, from 6 Avenue to 7 Avenue
- West side of Lakeshore Drive, from 7 Avenue to 8 Avenue.

At 6 Avenue, the sidewalk switches from one side of Lakeshore Drive to the other side. Pedestrians travelling along Lakeshore Drive would need to cross the road in order to walk safely on the sidewalk. A pedestrian crosswalk should be provided at 6 Avenue to provide a safe crossing location.

5.4 50 AVENUE CORRIDOR

5.4.1 Highway 28 Intersection

Figure 5.8 presents a photograph of the 50 Avenue and Highway 28 intersection.



Figure 5.8 50 Avenue/Highway 28 Intersection - Westbound on 50 Avenue

The intersection is located on horizontal curves along Highway 28 and Centre Avenue/Kingsway. Visibility of the intersection along the northbound, southbound and eastbound approaches is reduced as a result of the horizontal curves; however sufficient stopping sight distance is provided for the posted speed of 30 km/h.



A channelized right turn lane, with a yield control, is currently provided for the southbound to eastbound movement. Due to the geometry of the intersection, the angle between the channelized right-turn lane and 50 Avenue is approximately 20 degrees. This is an extremely acute angle that falls well below the 60 degrees stipulated by Section 2.3.6 of the TAC Geometric Design Guide for Canadian Roads (TAC geometric guidelines). Acute angles are difficult for merging drivers, as they require the driver to look back at very large angles to check for gaps in traffic. Not only is this physically difficult but it also detracts the driver's attention from objects ahead of them for a longer period of time.

As per Section 1.3.4 of the TAC geometric guidelines, a minimum intersection spacing of 200 m is required for an arterial roadway. The intersection spacing between the Highway 28/50 Avenue and 55 Street/50 Avenue intersections is 30 m. There could be potential queue problems that result from eastbound traffic waiting to turn left onto 55 Street that could spillback into the Highway 28/50 Avenue intersection, due to the short separation distance.

The westbound approach has one shared left turn and through lane and a channelized right turn lane. However the westbound approach can accommodate a designated left turn lane, a through lane and a channelized right turn lane. The wide through lane may result in driver confusion regarding the designated lane usage.

5.4.2 Angle Parking

Angle parking along one side with parallel parking on other side is provided along 50 Avenue between 53 Street and 49 Street. Angle parking along 50 Avenue increases the Downtown parking supply and serves as a traffic calming measure as traffic along 50 Avenue is cautious of vehicles backing out of the angle parking stalls and travel at slower speeds.

Despite the above mentioned benefits to angle parking, there are also safety concerns since parked vehicles must back into traffic on 50 Avenue. Driver visibility is significantly reduced when backing out, especially with a large vehicle parked beside it. Also, traffic on 50 Avenue is delayed by vehicles backing out of the angle parking stall. The delay was captured by Figure 5.9.

Figure 5.9 Delay along 50 Avenue due to Angle Parking



5.4.3 Faded Pavement Markings

The pavement markings provided along 50 Avenue including the centerline, stop lines, on-street parking stalls and crosswalks are worn. Worn pavement markings are not visible to drivers, especially at night, and will not effectively convey the message intended.

5.4.4 Multiple Driveway Accesses

Multiple driveway accesses are provided along 50 Avenue for private businesses. AE observed that some driveways were closed off using concrete barriers (as an example, the driveway at Tire Country). The City should determine the land ownership of all the driveways along 50 Avenue and identify whether the driveways are currently being used. Unnecessary driveways should be closed to reduce the traffic conflict points along the corridor. The sight distance onto 50 Avenue from the driveways are reduced by vehicles in the parking lane, particularly the angle parking lane.

5.4.5 Pedestrian Crosswalks

With the exception of the midblock crosswalk between 50 Street and 51 Street, pedestrian crossing (RA-4) signs have not been provided in advance of the crosswalks along the corridor. According to Section A6 in the MUTCD, pedestrian crosswalk (RA-4) signs should be provided at all crosswalks except for at signalized intersections or stop signs.

Pedestrians waiting to cross at crosswalks may not be visible to the approaching motorist due to the vehicles parked on-street, especially in the angle parking stalls. Figure 5.10 presents the midblock crossing provided between 50 Street and 51 Street. Pedestrians waiting to cross 50



Avenue from the south side would not be visible to approaching traffic unless they step off the sidewalk and move beyond the parked vehicle in the angle parking stall.



Figure 5.10 Midblock Crossing between 50 Street and 51 Street

6

Improvement Options

Improvement options have been developed to address each of the potential safety issues along the study corridors. The improvement options are discussed in detail below.

6.1 1 AVENUE CORRIDOR

6.1.1 Improve Intersection Configuration at 1 Avenue/2 Avenue/10 Street Intersection

The geometric layout of the intersection of 1 Avenue and 2 Avenue/10 Street requires improvement to provide clear designated travel path. The option of providing a roundabout at this location was presented by the City at the project initiation meeting. A roundabout with a raised centre island would be beneficial at this intersection for the following two reasons:

- The roundabout would provide clarity regarding the designated travel paths
- The roundabout would act as a traffic calming measure during busy summer months and reduce speeds in the adjacent area.

A preliminary assessment determined that a roundabout with an inscribed circle diameter (ICD) of 30 m can be accommodated with minimal impact to the residential lots adjacent to the intersection. A conceptual design for the roundabout should be developed to determine the ultimate configuration including approach legs, splitter islands and access to the existing cul-de-sac. The land ownership and land acquisition will be required once the roundabout detailed design is finalized.

6.1.2 Conduct Speed Study and Provide Traffic Calming

A speed study should be conducted in front of Kinosoo Beach on a typical summer weekend to confirm the excessive speeding problem. If excessive speeding is observed, traffic calming should be considered as an option to reduce the speeding problem.

Traffic calming should be provided along the beachfront between 16 Street and 25 Street. The following traffic calming measures should be considered along 1 Avenue:

- Narrow traffic lanes by enhancing the parking lane with painted stall lines
- Curb extensions with concrete curbs or concrete planters at intersections
- Speed humps or raised pedestrian crossings at intersections.

To reduce travel speeds along 1 Avenue, the City could also install chicanes along the corridor to create a curvilinear travel path. Chicanes are S-shaped curves in the vehicle driving path that are used to slow cars. Most traffic calming chicanes are created by building curb extensions that alternate from one side of the street to the other. Chicanes can also be created by taking



advantage of on-street parking lanes. On-street parking lanes can be alternated from one side of the street to the other to create a chicane-like effect. The parking lanes can be parallel or angled, and the chicane effect can be created through the use of pavement markings or curb extensions and landscaping to screen and define the parking areas.

Some of the traffic calming measures above will result in higher maintenance costs associated with snow removal and street cleaning. Prior to the implementation of these traffic calming measures, consideration should be given to the impact on the maintenance budget.

6.1.3 Repave Corridor

1 Avenue should be repaved to remove the cracks and potholes and to improve the pavement surface. After the corridor is repaved, pedestrian crosswalks and on-street parking stalls should be delineated.

6.1.4 **Provide Pavement Marking and Signage at 19 Street Crosswalk**

The 19 Street crosswalk should be delineated to clearly identify the crosswalk, in accordance with Section A6.3 of the MUTCD. Additionally pedestrian crossing (RA-4) signs should be provided in both directions along 1 Avenue to provide advance warning to approaching vehicles.

6.2 10 STREET CORRIDOR

6.2.1 Provide Signage

To reduce the safety concerns associated with the limited sight distance due to the vertical crest curve, warning signs should be installed to communicate the hidden intersection. A concealed road (WA-13) sign should be installed in both directions along 1 Avenue to warn the motorists of the upcoming intersection at 3 Avenue. Figure 6.1 presents the concealed road (WA-13) sign.



Figure 6.1

6.2.2 Repave Corridor

10 Street should be repaved to remove the cracks and to improve the pavement surface.

6.3 LAKESHORE DRIVE CORRIDOR

6.3.1 Change Lane Configuration along Corridor

Simultaneous two-way travel along Lakeshore Drive, north of 6 Avenue, is difficult with parking allowed on the west side. The following two options are available to the City:

- Remove the parking lane and provide two-way traffic along Lakeshore Drive
- Maintain the parking lane and provide one-way traffic along Lakeshore Drive.

The parking lane on the west side of Lakeshore Drive, north of 6 Avenue, can be removed since residents have off-street parking in the form of garages, parking pads and driveways on their property. This option would have no impact on the existing traffic pattern since two-way traffic will be maintained on Lakeshore Drive.

Converting Lakeshore Drive to allow for one-way traffic was considered in the Lakeshore Redevelopment Plan (LRP) that was finalized in March 2010. Section 3.3.1 of the LRP identified the need to reconstruct a portion of Lakeshore Drive between 7 Avenue and 8 Avenue. The LRP considered the conversion of this portion to allow for one-way traffic in either the northbound or southbound direction.

The City should consider extending the scope of the reconstruction to the entire length of Lakeshore Drive from the 1 Avenue/10 Street intersection to 8 Avenue. This option would have significant impact on the traffic patterns along Lakeshore Drive and the adjacent roadways (i.e. 10 Street, 5 Avenue, 6 Avenue, 7 Avenue and 8 Avenue). A detailed traffic analysis should be completed to evaluate the impact of converting Lakeshore Drive to one way northbound or one-way southbound. The traffic analysis should include the intersection at 1 Avenue/2 Avenue/10 Street to coordinate with the improvements required at this intersection and the possible implementation of a roundabout.

Figure 6.2 through Figure 6.4 present the traffic flow along Lakeshore Drive and the adjacent roadways under the following scenarios:

- Two-way traffic on Lakeshore Drive
- One-way northbound traffic on Lakeshore Drive
- One-way southbound traffic on Lakeshore Drive.



6.3.2 Repave Corridor

Lakeshore Drive should be repaved to remove the cracks, ruts, and potholes and to improve the pavement surface.

6.3.3 Improve Pedestrian Crosswalks

The following improvements are required along Lakeshore Drive to improve pedestrian safety along the corridor:

- Repaint crosswalk lines to enhance visibility at all locations
- Provide pedestrian crosswalk (RA-4) signs for all crosswalk locations except for at stop signs
- Provide a pedestrian crosswalk at 6 Avenue with curb extensions and the proper pavement markings and signage in accordance with the MUTCD.

6.4 50 AVENUE CORRIDOR

6.4.1 Review Highway 28 and 50 Avenue Intersection

The Cold Lake South Arena that was previously located in the southwest corner of Highway 28 and 50 Avenue has moved. In light of the developmental changes adjacent to the study intersection, the City indicated an opportunity to review the intersection for improvements to geometry and lane configuration. AE recommends that a detailed intersection analysis be completed for Highway 28 and 50 Avenue to address the safety concerns discussed in Section 5.4.1.

6.4.2 Close 55 Street Intersection and Re-configure Westbound Approach

The City should consider closing the intersection of 50 Avenue and 55 Street to remove the short separation distance currently provided between 55 Street and Highway 28. This will reduce the number of conflict points that currently exists on the westbound approach as a result of traffic to and from 55 Street.

6.4.3 Conduct Main Street Analysis

50 Avenue is currently designated as an arterial roadway since it is the only east-west route available through Cold Lake South. However, 50 Avenue runs through the central business district and as such, may require a different designation (i.e. collector roadway) to reduce travel speeds and address access requirements for businesses located along the corridor. The City has identified a need to review the designation of 50 Avenue to address the conflicting service requirements and has committed to undertaking a 'Main Street Analysis' along 50 Avenue. The Main Street Analysis will review the corridor function and the possible conversion from an arterial roadway to an urban boulevard.







6.4.4 Provide Back-in Angle or Parallel Parking Stalls

The City should consider replacing the existing angle parking stalls to "back-in" angle parking stalls. Back-in angle parking stalls require drivers to back into the parking stall and park their vehicles with the rear bumper against the curb. Figure 6.5 presents an example of a back-in angle parking stall.

Figure 6.5 Back-in Angle Parking Stalls



Back-in angle parking stalls provide the following benefits:

- Better visibility of traffic, cyclists and pedestrians when leaving a parking stall.
- Naturally guides pedestrians to the sidewalk. The open doors of a parked vehicle encourage pedestrians to use the sidewalk by blocking access to the travel lane.
- Allow commuters to load their trunks from the curb, rather than in the street with traffic.

To facilitate back-in angle parking, the existing pavement markings would need to be changed and the public would need to be educated on the proper procedure for entering/exiting a back-in angle parking stall.

The City could also replace the existing angle parking along 50 Avenue with parallel parking. The



parking supply within the central business district would decrease with the conversion to parallel parking; however, it should be able to accommodate the parking demand. The CLS parking study verified that parking is underutilized in the central business district, with a peak utilization of approximately 37%. A reduction in the parking supply should not have an adverse effect on the parking condition.

6.4.5 Repaint Pavement Markings

The pavement markings along 50 Avenue should be repainted to improve visibility. The City should delineate the pavement markings including the centerline, stop lines, crosswalk lines and parking stall lines.

6.4.6 Close Unnecessary Driveway Accesses

If 50 Avenue is maintained as an arterial roadway, following the Main Street Analysis, the City should determine the land ownership of all the driveways along 50 Avenue and identify whether the driveways are currently being used. Unnecessary driveways should be closed to reduce the traffic conflict points along the corridor.

6.4.7 Provide Curb Extensions and Signage at Crosswalks

The following improvements are required along 50 Avenue to improve pedestrian safety along the corridor:

- Provide pedestrian crosswalk (RA-4) signs at 49 Street and 53 Street, in accordance with the MUTCD
- Provide curb extensions at all crosswalk locations to improve driver visibility of pedestrians waiting to cross.

Conclusion

AE was retained by the City to undertake in-service road safety reviews along the following four corridors:

- 1 Avenue, from the MD Campground (23 Street) to 2 Avenue/10 Street
- 10 Street, from 2 Avenue to 8 Avenue
- Lakeshore Drive, from 1 Avenue/10 Street to 8 Avenue •
- 50 Avenue, from Highway 28 to 49 Street. •

The purpose of the in-service road safety reviews was to identify potential safety issues along the corridors and propose improvement options that will reduce/eliminate the safety issues. The in-service road safety reviews were conducted based on the procedures outlined in the TAC safety guideline. Potential safety issues were identified based on observations during the site reconnaissance and the results from the operational analysis for the existing (2010) traffic operational analysis.

No operational issues were identified as far as traffic flow and intersection capacity is concerned.

Table 7.1 summarizes the safety issues identified for each corridor and the improvement options developed to address each of the potential safety issues.

Study Corridor	Safety Issues	Improvement Options
	1 Avenue/2 Avenue/10 Street intersection configuration	Improve intersection configuration at 1 Avenue/ 2 Avenue/10 Street intersection. Roundabout option should be considered but requires further conceptual design.
1 Avenue	Speeding problem	Conduct speed study to confirm speeding problem. Provide traffic calming measures.
	Poor pavement conditions	Repave corridor.
	19 Street pedestrian crosswalk	Provide pavement marking and signage at 19 Street crosswalk.
10 Street	Vertical crest curve at 3 Avenue	Provide signage.

Table 7.1 Summary of Safety Issues and Improvement Options



Study Corridor	Safety Issues	Improvement Options
	Poor pavement conditions	Repave corridor.
Lakeshore Drive	Road width and alignment	Change lane configuration along corridor. Detailed traffic analysis is required to determine the impact of lane changes prior to implementation.
	Poor pavement conditions	Repave corridor.
	Pedestrian crosswalks	Improve pedestrian crosswalks.
	Highway 28 intersection	Complete detailed intersection analysis to review intersection geometry and lane configuration. Close 55 Street intersection.
		Conduct Main Street Analysis
50 Avenue	Angle parking	Provide back-in angle or parallel parking stalls.
	Faded pavement markings	Repaint pavement markings.
	Multiple driveway accesses	If 50 Avenue remains an arterial roadway, close unnecessary driveway accesses.
	Pedestrian crosswalks	Provide curb extensions and signage at crosswalks.

Figure 7.1 and Figure 7.2 summarize the recommendations for the study corridors in Cold Lake North and Cold Lake South respectively.

7.1 COORDINATION OF IMPROVEMENTS ALONG 1 AVENUE AND LAKESHORE DRIVE

The Lakeshore Redevelopment Plan (LRP) was finalized in March 2010 and provided a strategic direction for the revitalization of the Lakeshore Commercial District to a vibrant "urban village" that would attract residents and tourists. The LRP identified the need to improve the aesthetics of the Lakeshore Commercial District, given its beautiful setting and prominent location at the end of Highway 28. The opportunity exists to expand the scope of the LRP to include the 1 Avenue/beachfront area, to take advantage of the attractiveness of the area in the summer months.

1 Avenue and Lakeshore Drive were analyzed as part of the Cold Lake North Parking Study. The parking study recommended the following strategies for the area:

- Provide overflow parking for the Marina Lot
- Provide marked (painted) parking stalls for on-street parking along 1 Avenue and Lakeshore Drive
- Enforce "no-parking" zones
- Pave and delineate parking stalls in the gravel lot located in the northeast corner of Birch Avenue

The improvements in Table 7.1 for the 1 Avenue and Lakeshore Drive corridors should be coordinated with the visions presented in the LRP and the improvements recommended from the parking study. Integration of the recommendations from the various studies will provide for cost effectiveness and a unified vision for the revitalization/beautification of the area.





4

CHANGE LANE CONFIGURATION ALONG LAKESHORE DRIVE. DETAILED TRAFFIC ANALYSIS REQUIRED.

REPAVE CORRIDOR

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RIAN CROSSWALKS: VALK LINES

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Appendix A - Operational Analysis Results



Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay (s)	LOS	95th Queue (m)
			Overall Intersection	0.11	1.3	A	
			EB	0.11	0.0	A	0.0
				0.11	0.0	A	0.0
				0.01	0.1	A	0.2
		Unsignalized	WB	0.01	0.6	A	0.2
103	Nelson Street	Stop Control - NB					
	Neison Stieet	Approach		0.05	10.3	В	1.4
			NB				
				0.05	10.3	В	1.4
			SB				
			Overall Intersection	0.09	1.9	A	
		Unsignalized	EB	0.09	0.0	A	0.0
	1 Avenue & 16 Street			0.09	0.0	A	0.0
			WB	0.01	0.0	A	0.1
				0.01	0.5	A	0.1
104		Stop Control - NB					
		Approach	NB	0.07	10.2	В	1.9
				0.07	10.2	В	1.9
			SB				
			Overall Intersection	0.05	2.1	A	
				0.01	0.1	A	0.2
			EB	0.01	0.9	A	0.2
	1 Avenue / 2	Unsignalized	WB				
105	Avenue & 10	Yield Control - SB					
	Street	Approach					
			NB	0.05	0.0	A	0.0
				0.05	0.0	A	0.0
				-	-	-	-
			SB				
				0.05	9.2	A	1.3

Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay (s)	LOS	95th Queue (m)
			Overall Intersection	0.05	2.1	A	
				0.01	0.1	A	0.2
			EB	0.01	0.9	A	0.2
	1 Avenue / 2	Unsignalized	WB				
105	Avenue & 10	Yield Control - SB					
	Street	Approach					
			NB	0.05	0.0	A	0.0
				0.05	0.0	A	0.0
			SB	-	-	-	-
				0.05	9.2	A	1.3
		Overall Intersection	0.21	6.6	A		
		0 Unsignalized		0.01	0.0	A	0.1
			EB	0.01	0.6	A	0.1
				0.01	0.6	A	0.1
			WB	0.03	0.2	A	0.7
	8 Avenue & 10			0.03	2.7	A	0.7
107	Street	Stop Control - NB/SB		0.03	2.7	A	0.7
	01001	Approaches		0.21	11.4	В	6.3
			NB	0.21	11.4	В	6.3
				0.21	11.4	В	6.3
				0.14	12.2	В	4.0
			SB	0.14	12.2	В	4.0
				0.14	12.2	В	4.0

Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay (s)	LOS	95th Queue (m)
			Overall Intersection	0.05	2.1	Α	
				0.01	0.1	A	0.2
			EB	0.01	0.9	A	0.2
	1 Avenue / 2	Unsignalized	WB				
105	Avenue & 10	Yield Control - SB					
	Street	Approach					
			NB	0.05	0.0	A	0.0
				0.05	0.0	A	0.0
			SB	-	-	-	-
				0.05	9.2	A	1.3
		Overall Intersection	0.07	4.3	A		
			EB	0.07	9.1	A	1.7
		Unsignalized		0.07	9.1	A	1.7
	8 Avenue &		WB				
106	Lakeshore Drive	Stop Control - EB					
		Approach	ND	0.02	0.2	A	0.5
			NB	0.02	3.1	A	0.5
				0.00			
			28	0.03	0.0	A	0.0
				0.03	0.0	A	0.0

Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay	LOS	95th Queue
-			Overall Intersection	0.76	14.3	B	(11)
				0.76	22.5	C	76.5
			EB	0.42	11.4	В	48.0
				0.19	2.3	A	7.1
				-	-	-	-
	Highway 28 / 55		WB	0.22	9.3	A	24.4
303	& 50 Avenue	Signalized ²		0.21	2.2	A	7.5
			ND	0.40	22.9	C	29.3
			NB	0.23	17.3	В	22.8
				0.01	10.8	Б	2.3
			SB	0.44	17.6	B	26.7
			05	0.30	4 7	A	11.4
			Overall Intersection	0.16	3.1	A	
				0.07	0.7	A	1.8
			EB	0.07	2.2	А	1.8
				0.07	2.2	А	1.8
				0.00	0.0	A	0.0
	50 Avenue & 53	Unsignalized	WB	0.00	0.1	A	0.0
316	Street	Stop Control - NB/SB		0.00	0.1	A	0.0
		Approach	ND	0.09	18.2	C	2.3
			IND	0.09	18.2		2.3
				0.09	15.0	C	2.3
			SB	0.10	15.9	C C	4.7
			05	0.16	15.9	c	4.7
			Overall Intersection	0.45	11.1	B	
				0.45	12.0	В	-
			EB	0.45	12.0	В	-
				0.45	12.0	В	-
				0.38	11.1	В	-
	50 Avenue & 52	Unsignalized	WB	0.38	11.1	В	-
317	Street	Stop Control - All Approaches		0.38	11.1	B	-
			ND	0.15	9.6	A	-
			IND	0.15	9.6	A	-
				0.15	9.6	R	-
			SB	0.23	10.1	B	-
			05	0.23	10.1	B	-
			Overall Intersection	0.47	11.2	В	
			EB	0.47	12.5	В	-
				0.47	12.5	В	-
				0.47	12.5	В	-
			WB	0.33	10.6	В	-
	50 Avenue & 51	Unsignalized		0.33	10.6	В	-
318	Street	Stop Control - All		0.33	10.6	В	-
		Approaches	NB	0.14	9.5	A	-
			ND	0.14	9.5	Δ	-
				0.14	10.3	B	-
			SB	0.23	10.3	В	-
				0.23	10.3	В	-
			Overall Intersection	0.46	10.9	В	
				-	-	-	-
			EB	0.46	11.4	В	-
		Unsignalized		0.46	11.4	B	-
		Stop Control -	WD	0.32	10.4	В	-
210	50 Avenue & 50	EB/WB/NB	VVB	0.32	10.4	В	-
319	Street	Approaches		- 0.31	- 10.4	-	-
		Assumed Yield Control	NB	-	-	-	-
		- SB Approach		0.31	10.4	В	-
				-	-	-	-
			SB	-	-	-	-
				-	-	-	-
			Overall Intersection	0.32	5.5	A	
				0.04	0.4	A	1.1
			EB	0.04	1.5	A	1.1
				0.04	1.5	A	1.1
		Lineier - I'	WD	0.02	0.2	A	0.5
320	50 Avenue & 49	Stop Control - NR/SP	VVD	0.02	1.2	A	0.5
320	Street	Annroaches		0.02	1.2	A C	0.0
		Approactios	NB	0.19	15.5	C C	5.5
				0,19	15.5	č	5.5
				0.32	17.6	č	10.9
			SB	0.32	17.6	С	10.9
			f	0.32	17.6	С	10.9

G Appendix G - Cold Lake Transportation Study Highway 28 Functional Review

Technical Memorandum

City of Cold Lake

Cold Lake Transportation Study Highway 28 Functional Review

April 2011



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Introduction

1.1 STUDY BACKGROUND

Associated Engineering (AE) was retained by the City of Cold Lake (City) to update the existing transportation study. The purpose of the transportation study is to provide a comprehensive long-range plan that integrates the transportation infrastructure with requirements of the existing and future land uses. The transportation study will provide the City with a blueprint for planning and implementing specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15-year and 20-year planning horizons.

One component of the transportation study was to undertake a review of the Highway 28 Functional Plan, from 52 Avenue to the south city limits. The purpose for the review was to provide the City with recommendations on intersection requirements and improvements along the Highway 28 corridor. After an in-depth discussion with the City, the scope of the Highway 28 Functional Review was revised to include the following:

- Capacity analysis of links along the Highway 28 corridor
- Conduct a capacity analysis of one intersection along the study corridor under 20-year horizon
- Develop a template for an intersection that the City could use in the future to determine right-of-way requirements.

The capacity analysis of the links along the Highway 28 corridor was completed as part of the Traffic Volume Forecast and Analysis component of the transportation study update. Overall, the existing four-lane arterial provided along Highway 28 (between 52 Avenue to the south City limit) is sufficient to accommodate both the existing (2010) traffic volumes and the future (2030) forecasted traffic volumes. However, in the 20-year planning horizon, portions of Highway 28 will need to be reclassified as an Expressway classification and portions of the highway will need to be widen to provide a centre median. The traffic volume forecast and analysis technical memorandum should be referenced for further information and details.

1.2 STUDY OBJECTIVE

The objectives of the Highway 28 Functional Review were:

- Select and analyze the traffic operations at a representative intersection under the 20-year planning horizon to determine the required traffic control and intersection configuration
- Develop an intersection configuration template with designated turn lanes, storage lengths, and channelization, if required.

The intersection at Highway 28 and 43 Avenue was selected as the representative intersection as it currently experiences high traffic volumes and is expected to experience higher traffic volumes in the 20-year planning horizon. The afternoon (p.m.) traffic volumes were analyzed to determine the required intersection configuration.

1.3 STUDY AREA

Figure 1.1 shows the location of the Highway 28 and 43 Avenue intersection within the City.





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FIGURE 1.1 HIGHWAY 28 / 43 AVENUE INTERSECTION

2 Existing Condition

2.1 INTERSECTION CONFIGURATION

Highway 28 and 43 Avenue is currently a signalized intersection. The existing lane configuration is presented in Figure 2.1.

2.2 TRAFFIC VOLUME

Figure 2.2 presents the existing (2010) traffic volumes at the study intersection, in the p.m. peak hour.



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TRANSPORTATION STUDY FIGURE 2.1 - HIGHWAY 28 / 43 AVENUE

EXISTING (2010) INTERSECTION CONFIGURATION


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FIGURE 2.2 - HIGHWAY 28 / 43 AVENUE EXISTING (2010) PM PEAK HOUR TRAFFIC VOLUMES 3

Future Condition

3.1 INTERSECTION CONFIGURATION

For the transportation study update, the intersection of Highway 28 and 43 Avenue was analyzed as part of the Existing (2010) Traffic Operational Analysis technical memorandum. The analysis indicated that the intersection is currently operating well, at an overall intersection LOS A and delays of 9.9 seconds. All the intersection movements are operating at LOS B or better, and the maximum v/c ratio observed was 0.38. For further details, please refer to the Existing (2010) Traffic Operational Analysis technical memorandum.

No intersection improvements will be required to accommodate the existing (2010) traffic volumes; therefore, the current intersection configuration was used to conduct the capacity analysis in the 20-year planning horizon.

3.2 20-YEAR (2030) TRAFFIC VOLUME

20-year traffic volumes were forecasted as part of the future traffic volume forecasts for the transportation study update. A spreadsheet model was used to forecast the future traffic volumes within the City. To complete the spreadsheet model, a skeletal road network was established to represent the anticipated road network and future traffic volumes were assigned onto the skeletal road network with consideration given to the logical routes (based on impedance and travel time). The trip assignment process was simplified by using select intersections to represent the different traffic zones within the City and future traffic volumes were assumed to enter/exit the zones from those intersections. For more details about the methodology and assumptions used to generate the future traffic volume forecasts, the Traffic Volume Forecast and Analysis technical memorandum should be referenced.

Developments are anticipated on both sides of Highway 28, near 43 Avenue in the future horizons. On the west side of Highway 28, two residential developments (Iron Horse and Fischer Estates) are expected between 46 Avenue and 34 Avenue. On the east side of Highway 28, the Grand Centre Southeast development is expected between 46 Avenue/50 Avenue and 34 Avenue. The Grand Centre Southeast development will contain commercial, industrial, and residential land uses, and part of the proposed commercial and industrial land uses have already been developed.

For the future traffic volume forecasted, the Highway 28 and 43 Avenue intersections served as a major access point for two traffic zones. As a result, this intersection is expected to experience a significant increase in traffic volumes, especially the movements into and out of 43 Avenue to the north. Figure 3.1 presents the traffic volumes forecasted for the Highway 28 and 43 Avenue intersection, in the 20-year planning horizon.



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CITY OF COLD LAKE TRANSPORTATION STUDY

FIGURE 3.1 - HIGHWAY 28 / 43 AVENUE 20-YEAR (2030) PM PEAK HOUR TRAFFIC VOLUME FORECASTS 4

Intersection Capacity Analysis

4.1 METHODOLOGY

The Synchro 7.0 traffic analysis software based on the Highway Capacity Manual (HCM) was used to complete the capacity analysis of the study intersection. Synchro 7.0 applies the methodology established by the HCM to output a level of service (LOS) for study intersections, given the lane configuration, vehicular volumes, heavy vehicle percentages and signal timing.

A design criteria was developed by AE at project initiation to set various parameters for the capacity analysis and is included in Appendix A. Changes to the design criteria were made as the study progressed and additional information was provided. The Peak Hour Factor (PHF) was revised to 0.86 from a default value of 1.00; a PHF of 0.86 reflects the average calculated PHF from the traffic counts conducted by the City in June 2010. Additionally, default signal timing parameters such as minimum green time and pedestrian walk/clearance time were revised to reflect those proposed as part of the Highway 28 twinning project.

The operational capability of the study intersections were assessed using capacity, which is a measure of the sustainable flow rate at which vehicles can be expected to transverse a point. The critical measures used in the assessment were:

Volume to capacity (v/c) ratio provides the amount of congestion for each turning movement and for each lane group for signalized intersections. A v/c value over 1.00 indicates that the movement or lane group is at capacity.

Control delay is the amount of delay a vehicle experiences in seconds.

LOS is a qualitative measure describing operational conditions within a traffic stream and is based on service measures such as delay and congestion.

For an intersection to be considered operating at the acceptable level, LOS C or above is required for the overall intersection as well as for the individual intersection approaches. The LOS definitions for unsignalized and signalized intersections are included in the design criteria in Appendix A. In the 20-year horizon, traffic volumes are expected to increase such that LOS C may not be achievable at the study intersection; therefore, LOS D was targeted for both the overall intersection as well as the individual approach movements in the 20-year planning horizon.

4.2 RESULTS

Table 4.1 presents the intersection capacity analysis results based on the existing lane configuration and traffic control. Existing signal timing for Highway 28 and 43 Avenue were not available; therefore, Highway 28 and 50 Avenue signal timing plans were used to analyze the traffic operations. Table 4.1 presents the capacity result after the signal timing was optimized to improve the traffic operations.

Intersection	Traffic Control	Approach	Movement	Laning	Volume (veh)	V/C Ratio	Delay (s)	LOS	95th Queue (m)
			Overall Inte		1.10	50.1	D	-	
			Left	L	334	1.05	98.4	F	#109.5
		EB	Through	тр	64	0.43	39.2	D	41.6
			Right		54	-	-	-	-
		zed NB	Left	L	171	0.56	38.8	D	56.4
			Through	Т	106	0.39	48.9	D	44.7
Highway 28 / 43 Avenue	Signalized		Right	R	225	0.55	10.1	В	19.7
			Left	L	33	0.22	34.0	С	16.0
			Through	TTD	893	1.02	73.0	Е	#188.5
			Right	IIK	107	-	-	-	
		SB	Left	L	452	1.10	106.2	F	#186.7
			Through	2T	884	0.49	14.6	В	82.4
				Right	R	419	0.44	2.2	А

 Table 4.1

 Capacity Analysis Results - 20 Year (2030) Forecasted p.m. Traffic Volumes

Note: The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. If the reported v/c < 1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue.

The existing intersection configuration cannot accommodate the traffic volumes anticipated at the study intersection in the 20-year planning horizon. With the existing lane configuration, the intersection is expected to operate at an overall intersection LOS D with delays of 50.1 seconds. Three intersection movements are expected to operate at LOS E or worst. These movements include the eastbound and southbound left turns, and the northbound through lane. These movements are expected to operate above capacity with v/c ratios of 1.05, 1.10 and 1.02.

In order for the intersection to operate above capacity (LOS D), geometric improvements such as left/right turn lanes and channelization were introduced. The required intersection configuration is presented in Figure 4.1.

Table 4.2 presents the intersection capacity results based on the improved intersection configuration.

Table 4.2
Capacity Analysis Results - 20 Year (2030) Forecasted p.m. Traffic Volumes - Required
Intersection Configuration

Intersection	Traffic Control	Approach	Movement	Laning	Volume (veh)	V/C Ratio	Delay (s)	LOS	95th Queue (m)	
			Overall Inte		0.91	29.7	С	-		
			Left	L	334	0.89	48.6	D	#87.7	
		EB	Through	-	64	0.42	25.4	С	28.6	
			Right	IR	54	-	-	-	-	
		WB	Left	L	`	0.48	24.0	С	38.4	
	Signalized		Through	Т	106	0.45	37.6	D	33.3	
Highway 28 / 43 Avenue			Right	R [C]	225	0.58	9.9	А	16.8	
		NB	Left	L	33	0.19	37.4	D	15.2	
			Through	2T	893	0.91	40.5	D	#131.4	
			Right	R [C]	107	0.21	6.9	А	12.9	
		SB	Left	2L	452	0.85	48.4	D	#73.0	
			Through	2T	884	0.65	22.4	С	107.3	
				Right	R [C]	419	0.51	4.4	А	18.1

Note: The # footnote indicates that the volume for the 95th percentile cycle exceeds capacity. If the reported v/c < 1 for this movement, the methods used represent a valid method for estimating the 95th percentile queue.

[C] - Channelization



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CITY OF COLD LAKE TRANSPORTATION STUDY

FIGURE 4.1 - HIGHWAY 28 / 43 AVENUE 20-YEAR (2030) REQUIRED INTERSECTION CONFIGUATION



Intersection Template

The City requested that a standard intersection template be developed with designated turn lanes and channelization. The template will be used by the City to determine and reserve the necessary right-of-way to accommodate future intersection improvements along Highway 28.

As per the City's requirements, a future standard intersection template was developed based on the capacity analysis results for Highway 28 and 43 Avenue. The City's design standards as outlined in the Municipal Engineering Servicing Standards and Standard Construction Specifications (2008) and the Transportation Association of Canada's Geometric Design Guide for Canadian Roads were referenced in the development of the template presented in Figure 5.1.

The intersection template presented in Figure 5.1 was designed to accommodate the traffic volumes assumed for Highway 28 and 43 Avenue. While additional through lanes were not required on the eastbound and westbound approaches from the capacity analysis, two through lanes were provided to reflect the four-lane collector road classification anticipated for 43 Avenue in the 20-year planning horizon.

For application at other intersection locations along Highway 28, between 50 Avenue and 43 Avenue, the City should complete an intersection capacity analysis to determine the designated turn lanes and storage lengths required, as well as geometric design to determine the actual land requirements. The template should be modified to reflect the requirements of the specific intersection.



TECHNICAL MEMORANDUM

6

Conclusion

The scope of the Highway 28 Functional Review was revised to:

- Select and analyze the traffic operations at a representative intersection under the 20-year planning horizon to determine the required traffic control and intersection configuration
- Develop a standard intersection template with designated turn lanes, storage lengths, and channelization, if required.

The intersection of Highway 28 and 43 Avenue currently experiences high traffic volumes and is expected to experience higher traffic volumes in the 20-year planning horizon; therefore, it was selected as the representative intersection. The afternoon (p.m.) traffic volumes, from the 20-year planning horizon, were analyzed to determine the required traffic control and intersection configuration. Figure 4.1 presents the intersection configuration required to accommodate the future traffic volumes anticipated at Highway 28 and 43 Avenue.

As per the City's requirements, a future standard intersection template was developed based on the capacity analysis results for Highway 28 and 43 Avenue. The City's design standards as outlined in the Municipal Engineering Servicing Standards and Standard Construction Specifications (2008) and the Transportation Association of Canada's Geometric Design Guide for Canadian Roads were referenced in the development of the template presented in Figure 5.1.

The intersection template presented in Figure 5.1 was designed to accommodate the traffic volumes assumed for Highway 28 and 43 Avenue. For application at other intersection locations, the City should complete an intersection operational analysis to determine the designated turn lanes and storage lengths required, as well as geometric design to determine the actual land requirements. The template should be modified to reflect the requirements of the specific intersection.

Figure 6.1 summarizes the results from the Highway 28 Functional Review. The figure presents the 20-year road network classification along Highway 28 (between 50 Avenue and 34 Avenue), potential intersections where the intersection template developed could be applied, and the intersection configuration required at various intersections in the existing (2010) conditions.



Appendix A - Design Criteria

City of Cold Lake Transportation Study Project No: 2010-3050 Date: July 5, 2010

TRAFFIC ANALYSIS CRITERIA

A micro model using Synchro/SimTraffic 7.0 will be developed to identify and review intersection capacity needs. Level of service will be used as the common reference in terms of average delay times categorized into six general grades. Table 1.1 defines the LOS criteria for signalized intersections and unsignalized intersections.

Level of Service (LOS)	Overall Average Delay at Unsignalized Intersection	Overall Average Delay at Signalized Intersection
A	≤ 10 seconds	≤ 10 seconds
В	> 10 and ≤ 15 seconds	> 10 and \leq 20 seconds
С	> 15 and ≤ 25 seconds	> 20 and ≤ 35 seconds
D	> 25 and ≤ 35 seconds	> 35 and ≤ 55 seconds
E	> 35 and ≤ 50 seconds	> 55 and ≤ 80 seconds
F	> 50 seconds	> 80 seconds

Table 1.1 Level of Service Definitions

The minimum LOS criteria recommended by Associated Engineering (AE) is LOS C for the overall intersection. Additionally, each specific movement is targeted to achieve a LOS C or better in all cases. To achieve improved levels of service, the following criteria are proposed where applicable in the traffic network model:

- Right turn channelization (yield condition) provided when turning movements exceed 60 vehicles per hour.
- Right turn bays provided to satisfy LOS E or queuing issues in right or through movements.
- Left and right turn bay lengths provided based on 95th queue lengths from Synchro with a minimum storage length of 60 meters.
- Double left turn lanes provided when turning volumes significantly exceed 300 vehicles per hour and LOS or v/c ratios are above the stated minimums.

Table 2.2 presents the recommended traffic analysis assumptions that will be used in the Synchro model. The table also presents assumptions used by four different municipalities within Alberta including the Regional Municipality of Wood Buffalo (RMWB), the City of Calgary, the City of Lethbridge and the City of Medicine Hat. The assumptions used by the RMWB were developed by AE for a specific project.

Traffic Analysis Parameters							
Parameter	RMWB*	City of Calgary	City of Lethbridge	City of Medicine Hat	Recommended		
Link Speed	Existing posted speed limits						
Lane Widths		3.7	7m		3.7m		
Storage Length		Minimu	ım 60m		Minimum 60m		
Adjacent Parking Lanes		Apply data wi	here available		Apply data where available		
Lane Window							
Ideal Saturation Flow (vphpl)	1900	1850	1750	1850 (through) 1650 (turning)	1850		
Lost Time	-	Default	Default	Default	Default		
Leading Detector	2m (turning) 10m (through)	8m (left turn) 4m (through)	Default	-	Default		
Trailing Detector	0	2m	Default	-	Default		
Turning Speed	-	Default	Default	Default	Default		
Lane Utilization	-	Default	Default	Default	Default		
Right Turn Factor	-	Default	Default	Default	Default		
Left Turn Factor (protected)	-	Default	Default	Default	Default		
Saturated Flow Rate (protected)	-	Default	Default	Default	Default		

Table 2.2 Traffic Analysis Assumptions for Synchro

Left Turn Factor (permitted)	-	Default	Default	Default	Default		
Saturated Flow Rate (permitted)	-	Default	Default	Default	Default		
Saturated Flow Rate (RTOR)	-	Default	Default	Default	Default		
Headway Factor	-	Default	Default	Default	Default		
Volume Window							
Conflicting Pedestrian #	-	Apply data where available	Apply data where available	Apply data where available. Minimum = 5.	Apply data where available. Minimum = 5.		
Conflicting Bikes #	-	Apply data where available	Apply data where available	Apply data where available. Minimum = 5.	Apply data where available. Minimum = 5.		
Peak Hour Factor	1.00	1.00	0.88 1.00 (15 min data used)	0.95 – Congested Urban Conditions 0.92 – Current / Base Case Urban Conditions 0.88 – Current / Base Case Undeveloped areas 0.85 – Forecast Case, Local and Collector Roads 0.93 – Forecast Case, Congested Collectors and Minor Arterial Roads 0.95 – Forecast Case, Principal Arterials	0.86		
Growth Factor	1.0	1.0	1.0	1.0	1.0		

Heavy Vehicle (%)	5	Apply data where available. Default 5% (main street), 2% (side street) and 7.5% or greater in industrial areas.	Apply data where available. Default 5% (main street), 2% (side street) and 10% in industrial areas.	Apply data where available. Default 7.5% or greater in industrial areas.	Apply data where available. Default 5% (main street), 2% (side street) and 7.5% or greater in industrial areas.
Bus Blockage (#/hour)	0	Apply data where available	Apply data where available	Apply data where available	Apply data where available
Traffic from Mid- Block (%)	None	Apply data where available	Apply data where available	Apply data where available	Apply data where available
Link OD Volumes	-	Alterations must be documented in detail	Alterations must be documented in detail	Alterations must be documented in detail	Default
Lane Group Flow	-	Default	Default	Default	Default
Vehicle Clearance / Existing Timings	-	Contact City of Calgary - Traffic Signals	Contact City of Lethbridge – Traffic Operations	Minimum Green = 7 seconds on left turns, 10 seconds for through Maximum Time = 20 – 30 seconds on main road	Use existing signal timing where available
		Timing	Window		
Main Street Minimum Initial	-	20 seconds or pedestrian time, whichever is greater	20 seconds or pedestrian interval, whichever is greater	10 seconds or pedestrian time, whichever is greater	15 seconds or pedestrian interval, whichever is greater
Side Street Minimum Initial	-	10 seconds	10 seconds or minimum pedestrian interval, whichever is greater	10 seconds	12 seconds
Minimum Initial Arrows	-	5 seconds	5 seconds	7 seconds	7 seconds
Minimum Initial Split	-	Default	-	Default	Default

Recali	-	Main Street – Ped. / min. unless on fixed (pretimed) mode. Fixed mode generally used in Downtown / Beltline areas. Minor Street or Turns – No recall.	Main Street – Ped. / min. unless on fixed (pretimed) mode. Minor Street or Turns – No recall.	Main Street – Ped. / min. unless on fixed (pretimed) mode. Fixed mode generally used in Downtown area. Minor Street or Turns – No recall.	Main Street – Ped. / min. unless on fixed (pretimed) mode. Minor Street or Turns – No recall.
		Phasing	Window		
Pedestrian Walk Time	8 seconds	Minimum 8 seconds	Minimum 6 seconds	20 seconds	7 seconds
Pedestrian Clearance Time (Don't Walk)	11 seconds	Contact City of Calgary – Traffic Signals	Minimum value derived from actual crossing distance (m) divided by walking speed of 1.2 m/s. In areas with high senior citizens, walking speed of 1.0 m/s should be used.	Pedestrian walk time plus 7 seconds (27 seconds)	17 seconds
Pedestrian Calls (#/hr)	5	Apply data where available	Apply data where available	Apply data where available. Minimum = 5.	Apply data where available. Minimum = 5.
Minimum Splits for Arrows	-	10 seconds plus clearance. In extreme cases 8 seconds plus clearance for prot / perm arrows, 9 seconds plus clearance for prot only arrows.	10 seconds plus clearance. In extreme cases 8 seconds plus clearance for prot / perm arrows, 9 seconds plus clearance for prot only arrows.	10 seconds plus vehicle clearance	10 seconds plus vehicle clearance
Dual Entry	Yes	Yes	Yes	Yes	Yes

Inhibit Max	Yes	Contact City of Calgary – Traffic Signals	Default	No. Contact City of Medicine Hat – Municipal Engineering.	Yes
-------------	-----	---	---------	--	-----

*Project specific to the West Loop Road Project

All other factors will be set at the default or calculated values.

General comments:

- If an arrow (protected) phase is found to be needed in one peak period, it will be included in the signal phasing in the analysis of all peak hours.
- Summary sheets will include v/c ratios, level of service values and 95th queue lengths.

FINAL REPORT

Appendix H - School Zone Safety Analysis

Technical Memorandum

City of Cold Lake

School Zone Safety Analysis

April 2011



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Introduction

The City of Cold Lake (City) is located 287 km northeast of the City of Edmonton in Alberta and was formed in 1996 by merging three municipalities, namely Grand Centre, Medley (Canadian Forces Base W4) and Cold Lake. Grand Centre was renamed Cold Lake South (CLS) and the original Cold Lake is known as Cold Lake North (CLN).

The City has experienced noticeable growth in recent years. According to municipal census, the City had a population of 11,991 in 2006 and 13,924 in 2009. This corresponds to a 5.4% linear growth annually. Current transportation improvements within the City have been based on the previous transportation study completed in 2000 and is no longer considered representative of the actual transportation network required to address the current and future transportation needs.

In light of the continuing accelerated pace of development in the region and the need to rationalize and identify the transportation network requirements for the City, including surrounding rural municipalities and counties, the existing transportation plan requires a comprehensive update.

1.1 PROJECT BACKGROUND

Associated Engineering (AE) was retained by the City to update the existing transportation study. The purpose of the transportation study is to provide a comprehensive long range plan that integrates the transportation infrastructure requirements of the existing and future land uses. The transportation study will provide the City with a master plan on which to plan and implement specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15 year and 20-year planning horizons. The transportation study will consider municipal roads, traffic calming, parking, traffic safety, traffic signal coordination, school zones, transit, truck routes, traffic management, and transportation system operations.

This technical memorandum documents the results of the school zone safety analysis completed for the schools with the City of Cold Lake.

1.2 STUDY OBJECTIVE

The objective of the school zone safety analysis was to evaluate the safety at school sites, with respect to the following:

- Traffic operation during the morning drop-off and afternoon pick-up period (one site only)
- Proper school area/zone designation for roadways abutting the school sites
- Proper playground area/zone designation for roadways abutting the playground sites.



1.3 STUDY AREA

The City provided AE with a comprehensive list of the existing schools within the City. The following schools were studied as part of the school zone safety analysis:

Cold Lake North

- Nelson Heights Middle School
- St. Dominic Elementary School
- Lakesland Christian Academy
- Cold Lake Elementary School.

Cold Lake South

- Ecole Voyageur
- Trinity Christian School
- Grand Centre Middle School
- Grand Centre Elementary School
- Assumption School
- Holy Cross Elementary School.

Medley

- MacKenzie School
- RA Reynolds School
- Ecole Voyager.

2

Study Methodology

The Transportation Association of Canada (TAC) published the School and Playground Areas and Zones: Guidelines for Application and Implementation (TAC guideline) in October 2006. The TAC guideline was developed to "provide a set of uniform guidelines towards the establishment and the signing and marking of school and playground areas and zones in both rural and urban environments", and was developed after a review of the Manual of Uniform Traffic Control Devices (MUTCD) and public consultation with road authorities and stakeholders across Canada. The TAC guideline provides worksheets that can be used to systematically establish school and playground areas and zones, and signing and marking plans that can be implemented at the school and playground areas and zones.

Alberta Transportation (AT) also released a new version of their Guidelines for School and Playground Zones and Areas (AT guideline) in December 2007. The material covered in the AT guideline is similar to the TAC guideline and the school zone and playground zone worksheets are identical. There are some minor variation in the signing and marking plans between the two guidelines. The City currently uses the AT guideline for the establishment of their school and playground areas and zones.

Some municipalities use only school/playground zones and do not differentiate between a school area or school zone, and a playground area or playground zone. It is the City's discretion whether or not to implement a similar standard.

For the purpose of this school zone safety analysis, the school zone and playground zone worksheets from the TAC guideline were used. The following methodology was used to complete the school zone safety analysis:

- Initiate project meeting
- Conduct site reconnaissance and assemble data
- Observe morning and afternoon operation at a representative school site for safety
- Complete school/playground area and zone worksheet analysis
- Provide guidance on signage and pavement markings
- Provide advice on school zones along Highway 28 and Centre Avenue/Kingsway
- Produce draft and final reports.



2 Study Process and Analysis

3.1 PROJECT INITIATION MEETING

A project initiation meeting was held on May 4, 2010 in Cold Lake to complete the following:

- Confirm the scope of the school zone safety analysis
- Obtain the complete list of schools within the City
- Determine the representative school site to observe the morning drop-off and afternoon pick-up operations.

3.2 DATA COLLECTION, SITE RECONNAISSANCE AND OBSERVATIONS

3.2.1 Data Collection

Site visits were conducted at each school site to collect photographs and relevant information required for input into the analysis worksheets discussed in a later section. The site visits were completed over a 2-day period on May 5 and May 6, 2010.

3.2.2 Site Reconnaissance and Observations

As mentioned, a representative school site was selected to observe during the drop-off and pick-up operations from a safety standpoint. Grand Centre Middle School was selected as the representative site because of the following reasons:

- Location: Grand Centre Middle School is centrally located between two major roadways, Highway 28 to the east and Centre Avenue/Kingsway to the south. School zones have been provided on both these roadways.
- Playground: Grand Centre Middle School shares a common field with Grand Centre Elementary. This means that the roadway adjacent to the schools would be more congested during the morning and afternoon periods as a result of drop-off and pick-up at both schools.
- Pedestrian Crosswalk: A pedestrian activated crosswalk signal is also provided across Highway 28 at 51/52 Avenue for safe crossing of students who attend Grand Centre Middle School and Grand Centre Elementary School.

The site reconnaissance was completed on May 5, 2010 from 3:30 p.m. to 4:30 p.m. to observe the afternoon peak hour pick-up operations, and on May 6, 2010 from 7:30 a.m. to 8:30 a.m. to observe the morning peak hour drop-off operations. A one-hour time period was originally chosen for the afternoon observations; however, the time period was shortened since all of the students were discharged and picked up by 4:00 p.m.



The existing site conditions are presented in Figure 3.1 and the observations from the site reconnaissance are summarized below:

- The school bus dropped off and picked up students at the school entrance, in front of the main doors.
- Five crosswalks are currently provided in the vicinity of the school at the following locations: across 52 Avenue at 56 Street, across 56 Street at 52 Avenue, across 56 Street immediately before the horizontal curve which transitions 56 Street to 51 Avenue, across 51 Avenue at the service road, and across the service road at 51 Avenue.
- No crossing guards were present at any of the marked crosswalks.
- The marked crosswalk provided across 56 Street immediately before the horizontal curve was not used by students. Students who were dropped off by parents on the non-school side were typically dropped off at the main door and crossed 56 Street at that point.
- The placement of the pedestrian activated crosswalk across Highway 28 directed students to the school main entrance at 51 Avenue and reduced pedestrian-vehicle conflicts.

No issues were observed during the morning drop-off and afternoon pick-up periods as far as school zone safety was concerned. The AE project team did not observe anything that was considered unsafe.

In the 2010/2011 school year, Grand Centre Middle School was relocated south of Centre Avenue, to the building previously occupied by Grand Centre High School. The high school, in turn, was relocated north of Cold Lake South to the Energy Centre. The old location for Grand Centre Middle School, on 56 Street, currently is vacant and there are no immediate plans for redevelopment of the building. With the relocation of Grand Centre Middle School, student traffic across Highway 28 will shift from the pedestrian activated crosswalk at 51 Avenue to the intersection of Highway 28 and 50 Avenue. The pedestrian crosswalks at this intersection should be maintained to ensure maximum visibility.

Grand Centre Elementary School is still located on the previously shared lot with Grand Centre Middle School. To improve safety for the elementary school, the crosswalk located on the horizontal curve along 56 Street/51 Avenue should be realigned to provide a north-south crosswalk across 51 Avenue. This would provide a safe crosswalk location for students walking along the east side of 56 Street. If the crosswalk is relocated, the City should install a warning sign along the west side of 56 Street to warn southbound motorists of the crosswalk ahead. When the crosswalk is moved across 51 Avenue, visibility of the crosswalk will be partially obscured by the horizontal curve. A warning sign would help to promote driver awareness and improve crosswalk safety.

Figure 3.1 Existing Site Conditions



3.3 SCHOOL/PLAYGROUND AREA AND ZONE WORKSHEET ANALYSIS

3.3.1 School Area and School Zone

According to the TAC guideline, school areas and school zones differ in the following manner:

• School areas are a section of roadway adjacent to a school that is denoted by school area signing only while school zones are a section of roadway adjacent to a school that is denoted by school area signing and reduced speed limit signs.



The worksheet provided in the TAC guideline determines whether a given roadway should be established as a school area or a school zone using a point-based system based on the following criteria:

- School type
- Road classification
- Fencing
- Property line separation
- School entrance
- Sidewalks.

Detailed information about each criterion is provided in Section 2.3 of the TAC guideline. A sample of the TAC school zone input worksheet has been provided in Appendix A along with the TAC school zone results matrix used to assign the required designation.

School zone input worksheets were completed, in accordance with the TAC guideline, for each school site and the results are summarized in Table 3.1. The detailed worksheets are included in Appendix A.

School Site	Adjacent Road	Warranted Designation
Nelson Heights Middle School	5 Avenue	School Area
	Lakeshore Drive	School Area or School Zone
St. Dominic Elementary School	7 Street	School Zone
	10 Street	School Area or School Zone
Lakesland Christian Academy	14 Avenue	School Zone
	16 Avenue	School Area
Cold Lake Elementary	8 Street	School Area or School Zone
Ecole Voyageur	49 Street	School Zone
	51 Avenue	School Area or School Zone
i rinity Christian School	61 Street	School Area or School Zone

Table 3.1TAC School Zone Worksheet Results

School Site	Adjacent Road	Warranted Designation
	57 Street	Nothing
Grand Centre Middle School	52 Avenue	Nothing
	56 Street	School Area
	57 Street	School Area
Grand Centre Elementary School	50 Avenue	School Area
	51 Avenue	School Zone
	48 Avenue	School Area
Grand Centre High School	57 Street	School Area
	47 Avenue	School Area
	48 Avenue	School Area or School Zone
Assumption School	47 Avenue	School Area or School Zone
Holy Cross Elementary	49 Street	School Zone
MacKenzie School	Hickory Street	School Zone
	Queensway	School Area or School Zone
RA Reynolds School	Spruce Crescent	School Area or School Zone
Ecole Voyager	Birch Avenue	School Zone

3.3.2 Playground Area and Playground Zone

Playground areas and playground zones differ in the same manner as school areas and school zones:

• Playground areas are a section of roadway adjacent to a playground that is denoted by playground area signing only while playground zones are a section of roadway adjacent to a playground that is denoted by playground area signing and reduced speed limit signs.

For the playground zone analysis, only the playgrounds adjacent to existing school sites were analyzed. Stand-alone playground areas within the City were not analyzed. Additionally, playgrounds completely fenced within a school site were not analyzed.



The worksheet provided in the TAC guideline determines whether a given roadway should be established as a playground area or playground zone using a point-based system based on the following criteria:

- Playground type
- Road classification
- Fencing
- Property line separation
- Playground entrance
- Sidewalks.

Detailed information about each criterion is provided in Section 2.5 of the TAC guideline. A sample of the TAC playground zone input worksheet has been provided in Appendix B along with the TAC playground zone results matrix used to assign the required designation.

Playground zone input worksheets were completed, in accordance with the TAC guideline, for the selected playground sites and the results are summarized in Table 3.2. The detailed worksheets are included in Appendix B.

Playground Site	Adjacent Road	Warranted Designation
St. Dominic Elementary School	7 Street	Playground Area
Grand Centre Elementary	57 Street	Playground Area
School	50 Avenue	Nothing
MacKenzie School	Oak Drive	Playground Area
	Queensway	Playground Area
RA Reynolds School	Spruce Crescent	Playground Area

Table 3.2TAC Playground Zone Worksheet Results

3.4 SIGNAGE AND PAVEMENT MARKINGS

The signing and marking plans recommended by both TAC and AT for school and playground areas and zones are provided in Appendix C. The existing signage and pavement markings at the school sites should be reviewed against these plans to ensure compliance with the standards. The results presented in Table 3.1 and Table 3.2 indicates that some school and playground sites need to be converted from an

existing school/playground area to a school/playground zone. At these locations, care should be made to comply with the signage and marking plans for the areas/zones.

3.5 SCHOOL ZONES ALONG HIGHWAY 28 AND CENTRE AVENUE/KINGSWAY

Additional school zones currently exist along the following roadways even though there are no school sites located immediately adjacent to them:

- Highway 28, from 52 Avenue to 46 Avenue
- Service road parallel and west of Highway 28, from 52 Avenue to 50 Avenue
- Centre Avenue, from 57A Street to service road west of Highway 28.

The combination of the above school zones have resulted in a large school zone area centred around the intersection of Highway 28 and Centre Avenue/50 Street. The City has expressed concerns over the presence of the long school zone and potential driver frustration resulting from the prolonged 30 km/h speed zone.

While AE is unfamiliar with the history behind the establishment of the above school zones, it is inferred that the school zones were established in an attempt to improve pedestrian safety in crossing these roadways. According to Section 2.0 of the TAC guideline, school and playground areas and zones should be used sparingly and should not be provided in an attempt to increase the safety of crossing the roadway. Other devices should be developed and implemented for these purposes.

AE recommends the removal of these school zones since excessive and prolonged school zones can lead to driver frustration and non-compliance. Before the removal of these school zones, the City should undertake a speed study to determine the current level of compliance within these school zones and review the collision history. If the majority of drivers are currently exceeding the posted 30 km/h limit, the compliance level is already low and the school zone should be removed immediately. If the driver compliance level is high, the City may choose to delay the removal of school zone to such a time when driver compliance is low. On the other hand, if the collision history indicates the presence of pedestrian related collisions on Highway 28 and Centre Avenue/ 50 Street, the City may choose to maintain the 30 km/h zones.

If the removal of the above school zones is not feasible, AE recommends re-designating the school zone to a school area. With a school area, motorists are warned to be cautious of the nearby school and the associated student traffic, but are not required to reduce their travel speeds.



4

Summary and Recommendations

AE was retained by the City to undertake a school zone safety analysis and complete the following tasks:

- Observe existing operations at a representative school site for safety
- Verify the existing school and playground areas and zones
- Determine the need to establish school/playground zone policy and guideline, and recommend the principles and best practices for establishing the guideline for the City.

Roadways adjacent to existing schools within Cold Lake were analyzed to verify the current school/playground areas and zones. Worksheets provided in TAC's School and Playground Areas and Zones: Guidelines for Application and Implementation were used for the verification and the results are summarized in Table 3.1 and Table 3.2. It should be noted that the worksheets from TAC are identical to the worksheets published in AT's guidelines for school and playground zones and areas, which is currently used by the City.

Figure 4.1 presents the results from the TAC school and playground zone worksheets for Cold Lake.

The existing signage and pavement markings at the school sites should be compared against the TAC or AT signage and pavement marking plans provided in Appendix C to ensure compliance with the standards.

Grand Centre Middle School was selected as the representative school site to observe the morning drop-off and afternoon pick-up periods. The school site was observed to identify any safety issues related to traffic operations and pedestrian movement. Overall, the morning and afternoon discharge periods operated well. AE did not observe anything that was considered unsafe.

In the 2010/2011 school year, Grand Centre Middle School was relocated south of Centre Avenue, to the building previously occupied by Grand Centre High School. The old location for Grand Centre Middle School, on 56 Street, currently is vacant and there are no immediate plans for redevelopment of the building. With the relocation of Grand Centre Middle School, student traffic across Highway 28 will shift from the pedestrian activated crosswalk at 51 Avenue to the intersection of Highway 28 and 50 Avenue. The pedestrian crosswalks at this intersection should be maintained to ensure maximum visibility

Grand Centre Elementary School is still located on the previously shared lot with Grand Centre Middle School. To improve safety for the elementary school, AE recommends that the crosswalk currently provided at the horizontal curve transition between 56 Street and 51 Avenue be realigned to provide a north-south crosswalk across 51 Avenue. Signage should be provided on the west side of 51 Avenue to warn southbound drivers of the crosswalk, if it is relocated.




Associated Engineering

PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

CITY OF COLD LAKE TRANSPORTATION STUDY

FIGURE 4.1 - COLD LAKE NORTH TAC SCHOOL/PLAYGROUND ZONE WORKSHEET RESULTS The City should consider the removal of the existing school zones at following locations:

- Highway 28, from 52 Avenue to 46 Avenue
- Service road parallel and west of Highway 28, from 52 Avenue to 50 Avenue
- Centre Avenue, from 57A Street to service road west of Highway 28.

There are no schools located on these roadways and unwarranted school zones can lead to driver frustration and non-compliance. Prior to the removal of these school zones, the City should undertake a speed study to determine the level of driver compliance within these school zones and review the collision history. If current driver compliance level is low, the City should remove the school zones immediately. If current driver compliance level is high, the City can delay the removal of the school zones. On the other hand, if the collision history indicates the presence of pedestrian related collisions on Highway 28 and Centre Avenue/50 Street, the City may choose to maintain the 30 km/h zones. If the removal of the above school zones is not feasible, AE recommends re-designating the school zone to a school area. With a school area, motorists are warned to be cautious of the nearby school and the associated student traffic, but are not required to reduce their travel speeds.

AE recommends that the City continue to follow the policies outlined in the AT guideline. An established guideline would help to promote uniformity in the establishment and signing and marking of schools and playground areas and zones within the City. It should be noted that the methodology established in the AT guideline is similar to the methodology established in the TAC guideline.



Appendix A - School Zone Worksheets



Table A.1 presents the School Zone Input Worksheet from the TAC Guideline

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)	
		Eleme	entary	1.00			
Cohool Turo	40	Middle / Ju	unior High	0.40			
School <u>T</u> ype	40	High S	ichool	0.20		T=	
		Post-Seconda Unive	ary / College / ersity	0.00			
		Urban Land Use	Rural Land Use				
		Local		1.00			
Road <u>C</u> lassification	20	Minor Collector Collector	Local Collector	0.75 0.50		C=	
	Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			
		Fully Tra	versable	1.00			
<u>F</u> encing	Fencing 20		Partially Traversable			F=	
		Non-Traversable		0.10			
		Abuts R	Abuts Roadway				
Property <u>L</u> ine Separation	10	Within 50) metres	0.50		L=	
		Further thar	1 50 metres	0.00			
		Main En Multiple Second	trance / dary Entrances	1.00			
School <u>E</u> ntrance	5	Secondary	Entrance	0.60		E=	
		None		0.00			
Sidowalka	F	None or Non	-School Site	1.00		e	
	Э	Schoo	School Side			3=	

Table A.1TAC School Zone Input Worksheet

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION	WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)
		Both Sides	0.00		
TOTAL SCORE (sum of T,C,F,L,E and S)					

The appropriate school area or school zone designation is determined by comparing the total score from the worksheet against the School Zone Results Matrix, provided below in **Table A.2**.

TOTAL SCORE	AREA OR ZONE					
0 - 40	Nothing					
41 – 64	School Area					
65 – 80	School Area or School Zone*					
81 – 100	School Zone					
* Local conditions must be considered in detail in order to determine the appropriate treatment. Wherever possible, mitigation measures should be explored that would reduce the score so that marginal school zones can be avoided. The reasons for the final decision should always be documented.						

Table A.2 TAC School Zone Results Matrix

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Nelson Heights Middle School - 5 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCC (MPV	DRE * WF)
		Eleme	entary	1.00				
Cabaal Turaa	40	Middle / J	unior High	0.40	0.40			
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / 0	College / University	0.00			T=	16
		Urban Land Use	Rural Land Use					
		Local		1.00				
Road <u>C</u> lassification	20	Minor Collector Collector	Local Collector	0.75 0.50	0.50			
		Major Collector Minor Arterial	Arterial	0.25		_		
		Major Arterial Expressway	Freeway	0.00			C=	10
		Fully Tra	versable	1.00	1.00			
<u>F</u> encing	20	Partially T	raversable	0.50				
		Non-Tra	versable	0.10			F=	20
		Abuts Roadway		1.00				
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50			
		Further that	n 50 metres	0.00			L=	5
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		-		
		None		0.00			E=	5
		None or Non-School Side		1.00				
<u>S</u> idewalks	idewalks 5 School Side		0.60					
		Both	Sides	0.00	0.00		S=	0
	TO.	TAL SCORE (sum of	T,C,F,L,E and S)				5	6
							Schoo	l Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

St. Dominic Elementary School - Lakeshore Drive

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SC (MP)	CORE V * WF)
		Eleme	entary	1.00	1.00	-	
	40	Middle / J	unior High	0.40			
School <u>T</u> ype	40	High S	School	0.20		_	
		Post Secondary / 0	College / University	0.00		T=	40
		Urban Land Use	Rural Land Use				
		Local		1.00	1.00		
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50			
		Major Collector Minor Arterial	Arterial	0.25			
		Major Arterial Expressway	Freeway	0.00		C=	20
		Fully Tra	versable	1.00			
<u>F</u> encing	20	Partially Traversable		0.50			
		Non-Tra	Non-Traversable		0.10	F=	2
		Abuts Roadway		1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50		
		Further that	Further than 50 metres			L=	5
		Main Er Multiple Secon	itrance / dary Entrances	1.00			
School <u>E</u> ntrance	5	Secondary Entrance		0.60	0.60		
		None		0.00		E=	3
		None or Non-School Side		1.00			
<u>S</u> idewalks 5	5	School Side		0.60			
		Both	Sides	0.00	0.00	S=	0
	T	OTAL SCORE (sum	of T,C,F,L,E and S)				70
					Schoo	Area or	

School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

St. Dominic Elementary School - 7 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	(N	SCORE IPV * W	≣ VF)
		Eleme	entary	1.00	1.00	-		
Oshaal T ima	40	Middle / J	unior High	0.40				
School <u>Type</u>	40	High S	School	0.20				
		Post Secondary / 0	College / University	0.00		T=		40
		Urban Land Use	Rural Land Use					
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00		C=		20
		Fully Tra	versable	1.00				
<u>F</u> encing	20	Partially T	raversable	0.50	0.50			
		Non-Tra	versable	0.10		F=		10
		Abuts Roadway		1.00	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50				
		Further that	Further than 50 metres			L=	1	10
		Main Er Multiple Secon	itrance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	y Entrance	0.60				
		None		0.00		E=		5
		None or Non-School Side		1.00				
<u>S</u> idewalks	<s 5="" non-school="" none="" or="" side<="" td=""><td>0.60</td><td></td><td></td><td></td><td></td></s>		0.60					
		Both	Sides	0.00	0.00	S=	1	0
	T	OTAL SCORE (sum	of T,C,F,L,E and S)				85	
						Sc	hool Ze	one

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Lakeland Christian Academy - 10 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	(1	SCO //PV *	RE * WF)
		Eleme	entary	1.00	1.00	-		
	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / 0	College / University	0.00		T:	•	40
		Urban Land Use	Rural Land Use					
		Local		1.00				
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50	0.50			
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00		C	-	10
	Fully Traversable		1.00	1.00				
<u>F</u> encing 20		Partially Traversable		0.50				
		Non-Traversable		0.10		F	•	20
		Abuts Roadway		1.00	1.00			
Property <u>L</u> ine Separation	10	Within 5	0 metres	0.50				
		Further that	n 50 metres	0.00		Ŀ	•	10
		Main Er Multiple Secon	trance / dary Entrances	1.00				
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60				
	None		0.00	0.00	E	=	0	
		None or Non	-School Side	1.00				
<u>S</u> idewalks	5	Schoo	School Side					
		Both	Sides	0.00	0.00	S	•	0
	T	OTAL SCORE (sum	of T,C,F,L,E and S)				80)
						Sc		Area or

School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Lakeland Christian Academy - 14 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	(N	SCORE IPV * WF)		
		Eleme	entary	1.00	1.00	-			
	40	Middle / J	unior High	0.40					
School <u>Type</u>	40	High S	School	0.20					
		Post Secondary / 0	College / University	0.00		T=	40		
		Urban Land Use	Rural Land Use						
		Local		1.00	1.00				
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50					
		Major Collector	Arterial	0.25					
		Major Arterial Expressway	Freeway	0.00		C=	20		
		Fully Traversable		1.00	1.00				
<u>F</u> encing	20 Partially		raversable	0.50					
		Non-Traversable		0.10		F=	20		
		Abuts R	oadway	1.00	1.00				
Property <u>L</u> ine Separation	10	Within 5	0 metres	0.50					
		Further that	n 50 metres	0.00		L=	10		
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00				
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60					
		None		0.00		E=	5		
		None or Non-School Side		1.00					
<u>S</u> idewalks	5	School Side		0.60					
		Both	Sides	0.00	0.00	S=	0		
	T	OTAL SCORE (sum	of T,C,F,L,E and S)				95		
					Sc	hool Zone			

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Cold Lake Elementary - 16 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCO (MPV *	RE WF)	
		Eleme	entary	1.00	1.00	-			
Oshaal T uraa	40	Middle / J	unior High	0.40					
School <u>T</u> ype	40	High S	School	0.20					
		Post Secondary / 0	College / University	0.00		٦	=	40	
		Urban Land Use	Rural Land Use						
		Local		1.00					
Road <u>C</u> lassification	20	Minor Collector Collector	Local Collector	0.75 0.50	0.50				
		Major Collector Minor Arterial	Arterial	0.25					
		Major Arterial Expressway	Freeway	0.00		()=	10	
		Fully Traversable		1.00					
<u>F</u> encing 20		Partially Traversable		0.50					
		Non-Tra	versable	0.10	0.10	F	-	2	
		Abuts Roadway		1.00					
Property <u>L</u> ine Separation	10	Within 5	0 metres	0.50	0.50				
		Further that	n 50 metres	0.00		L	.=	5	
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00				
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60					
		None		0.00		E	=	5	
		None or Non-School Side		1.00					
<u>S</u> idewalks	5	School Side		0.60					
		Both	Sides	0.00	0.00	5	6=	0	
	TOTAL SCORE (sum of T,C,F,L,E and S)						62		
						School	Area		

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Cold Lake Elementary School - 8 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	(SCOI NPV *	RE WF)
		Eleme	entary	1.00	1.00			
Cabaal T uraa	40	Middle / J	unior High	0.40				
School Type	40	High S	School	0.20				
		Post Secondary / C	College / University	0.00		T	-	40
		Urban Land Use	Rural Land Use					
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00		C	=	20
	Fully Traversable		1.00					
<u>F</u> encing 20		Partially Traversable		0.50				
		Non-Traversable		0.10	0.10	F	=	2
		Abuts Roadway		1.00				
Property <u>L</u> ine Separation	10	Within 5	0 metres	0.50	0.50			
		Further that	n 50 metres	0.00		Ŀ	-	5
		Main Er Multiple Secon	itrance / dary Entrances	1.00				
School <u>E</u> ntrance	5	Secondary	y Entrance	0.60	1.00			
		None		0.00		E	-	5
		None or Non-School Side		1.00	1.00			
<u>S</u> idewalks	5	Schoo	ol Side	0.60				
		Both Sides		0.00		S	=	5
		TOTAL SCORE (SI	um of T,C,F,L,E and	S)			77	
							nool A chool	rea or Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

École Voyageur - 49 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	ORE / * WF)
		Eleme	entary	1.00	1.00	_		
	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / C	College / University	0.00			T=	40
		Urban Land Use	Rural Land Use			_		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
			Fully Traversable		1.00	_		
<u>F</u> encing 20	Partially Traversable		0.50					
		Non-Traversable		0.10			F=	20
		Abuts R	Abuts Roadway					
Property <u>L</u> ine Separation	10	Within 5	0 metres	0.50				
		Further than 50 metres		0.00	0.00		L=	0
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		_		
		No	None				E=	5
	None or Non-School Side		1.00					
<u>S</u> idewalks	5	School Side		0.60	0.60			
		Both	Sides	0.00			S=	3
	TO	TAL SCORE (sum of	T,C,F,L,E and S)				88	
						Γ	Scho	ol Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Trinity Christian School - 51 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	:ORE / * WF)
		Eleme	entary	1.00	1.00			
School Type	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20		_		
		Post Secondary / C	College / University	0.00			T=	40
		Urban Land Use	Rural Land Use			-		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
		Fully Tra	versable	1.00				
<u>F</u> encing 20	20	Partially Traversable		0.50		_		
		Non-Traversable		0.10	0.10		F=	2
		Abuts R	Abuts Roadway		1.00			
Property <u>L</u> ine Separation	10	Within 5	0 metres	0.50		_		
		Further than 50 metres		0.00			L=	10
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		_		
		Nc	ne	0.00			E=	5
<u>S</u> idewalks		None or Non	-School Side	1.00				
	5	School Side		0.60	0.60	_		
		Both Sides		0.00			S=	3
	TO	TAL SCORE (sum of	T,C,F,L,E and S)					80
						Schoo	Area or	

School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Trinity Christian School - 61 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCR	IPTION	WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCO (MPV	RE * WF)	
		Eleme	entary	1.00	1.00				
School Type	40	Middle / J	unior High	0.40					
School <u>T</u> ype	40	High School		0.20					
		Post Secondary / C	College / University	0.00			T=	40	
		Urban Land Use	Rural Land Use			-			
		Local		1.00	1.00				
Road <u>C</u> lassification	20	Minor Collector Collector	Local Collector	0.75 0.50					
		Major Collector Minor Arterial	Arterial	0.25					
		Major Arterial Expressway	Major Arterial Expressway Freeway				C=	20	
	20	Fully Traversable		1.00					
<u>F</u> encing		Partially Traversable		0.50					
		Partially Traversable Non-Traversable		0.10	0.10		F=	2	
		Abuts R	loadway	1.00					
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50				
		Further that	n 50 metres	0.00			L=	5	
		Main Er Multiple Secon	trance / dary Entrances	1.00					
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60	0.60	-			
		None		0.00			E=	3	
		None or Non	-School Side	1.00					
<u>S</u> idewalks	5	School Side		0.60	0.60				
		Both	Sides	0.00			S=	3	
	TO	TAL SCORE (sum of	T,C,F,L,E and S)				73		
						S	chool	Area or	

School Area or School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Grand Centre Middle School - 57 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	IT DESCRIPTION Elementary		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SC (MP	CORE V * WF)
		Elementary		1.00			
Oshaal T ura	10	Middle / J	unior High	0.40	0.40		
School <u>T</u> ype	40	High S	School	0.20			
		Post Secondary / C	College / University	0.00		T=	16
		Urban Land Use	Rural Land Use			<u>.</u>	
		Local		1.00			
Road C lassification	20	Minor Collector	Local Collector	0.75	0.50		
		Major Collector Minor Arterial	Arterial	0.25			
		Major Arterial Expressway	Freeway	0.00		C=	10
		Fully Traversable		1.00			
<u>F</u> encing	20	Partially Traversable		0.50			
		Non-Tra	versable	0.10	0.10	F=	2
		Abuts R	loadway	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50			
		Further that	n 50 metres	0.00	0.00	L=	0
		Main Entrance / Multiple Secondary Entrances		1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60	0.60		
		Nc	ne	0.00		E=	3
		None or Non	-School Side	1.00	1.00		
<u>S</u> idewalks	5	Schoo	ol Side	0.60			
		Both	Sides	0.00		S=	5
	TO	TAL SCORE (sum of	T,C,F,L,E and S)			36	
						No	othing

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Grand Centre Middle School - 52 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	T DESCRIPTION Elementary		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SC (MP)	;ORE √ * WF)
		Elementary		1.00			
Oshaal T ura	10	Middle / J	unior High	0.40	0.40		
School <u>T</u> ype	40	High S	School	0.20			
		Post Secondary / C	College / University	0.00		T=	16
		Urban Land Use	Rural Land Use				
		Local		1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75	0.50		
		Major Collector Minor Arterial	Arterial	0.25			
		Major Arterial Expressway	Freeway	0.00		C=	10
		Fully Traversable		1.00			
<u>F</u> encing	20	Partially Traversable		0.50			
		Non-Tra	Non-Traversable		0.10	F=	2
		Abuts R	loadway	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50			
		Further that	n 50 metres	0.00	0.00	L=	0
		Main Entrance / Multiple Secondary Entrances		1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60			
		No	None		0.00	E=	0
		None or Non	-School Side	1.00	1.00		
<u>S</u> idewalks	5	School Side		0.60			
		Both	Sides	0.00		S=	5
	то	TAL SCORE (sum of	T,C,F,L,E and S)			33	
						No	thing

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Grand Centre Middle School - 56 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCC (MPV)RE * WF)
		Eleme	entary	1.00				
O she sh T ime s	10	Middle / J	unior High	0.40	0.40			
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / C	College / University	0.00			T=	16
		Urban Land Use	Rural Land Use					
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
		Fully Traversable		1.00				
<u>F</u> encing	20	Partially Traversable		0.50	0.50			
		Non-Tra	versable	0.10			F=	10
		Abuts R	loadway	1.00	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50				
		Further than 50 metres		0.00			L=	10
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		-		
		None		0.00			E=	5
		None or Non	-School Side	1.00				
<u>S</u> idewalks	5	Schoo	bl Side	0.60				
		Both	Sides	0.00	0.00		S=	0
	TO.	TAL SCORE (sum of	T,C,F,L,E and S)				61	
							Schoo	l Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MPV	ORE ′ * WF)
		Elementary		1.00	1.00			
	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / C	College / University	0.00			T=	40
		Urban Land Use	Rural Land Use					
		Local		1.00				
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50	0.50			
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	10
		Fully Traversable		1.00				
<u>F</u> encing	20	Partially Traversable		0.50				
		Non-Tra	Non-Traversable		0.10		F=	2
		Abuts Roadway		1.00				
Property <u>L</u> ine Separation	10	Within 50 metres		0.50				
		Further than 50 metres		0.00	0.00		L=	0
		Main Entrance / Multiple Secondary Entrances		1.00				
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60	0.60	_		
		Nc	ne	0.00			E=	3
		None or Non	-School Side	1.00	1.00			
<u>S</u> idewalks	5	Schoo	l Side	0.60		_		
		Both	Sides	0.00			S=	5
	TO.	TAL SCORE (sum of	T,C,F,L,E and S)				60	
						Γ	Schoo	ol Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Grand Centre Elementary School - 50 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MPV	ORE / * WF)
		Elementary		1.00	1.00	_		
	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / College / University		0.00			T=	40
		Urban Land Use	Rural Land Use					
		Local		1.00				
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50	0.50			
		Major Collector Minor Arterial	Arterial	0.25		_		
		Major Arterial Expressway	Freeway	0.00			C=	10
		Fully Traversable		1.00				
<u>F</u> encing	20	Partially Traversable		0.50				
		Non-Tra	Non-Traversable		0.10		F=	2
		Abuts Roadway		1.00				
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50	_		
		Further than 50 metres		0.00			L=	5
		Main Entrance / Multiple Secondary Entrances		1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		-		
		Nc	ne	0.00			E=	5
		None or Non	-School Side	1.00				
<u>S</u> idewalks	5	Schoo	ol Side	0.60		_		
		Both	Sides	0.00	0.00		S=	0
	то	TAL SCORE (sum of	T,C,F,L,E and S)				62	
							Schoo	ol Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Grand Centre Elementary School - 51 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MPV	ORE / * WF)
		Elementary		1.00	1.00	_		
	10	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / C	Post Secondary / College / University				T=	40
		Urban Land Use	Rural Land Use			-		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
			Fully Traversable					
<u>F</u> encing 20		Partially Traversable		0.50	0.50			
		Non-Tra	Non-Traversable				F=	10
		Abuts Roadway		1.00	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50		_		
		Further than 50 metres		0.00			L=	10
		Main Er Multiple Secon	itrance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		-		
		No	ne	0.00			E=	5
		None or Non	-School Side	1.00				
<u>S</u> idewalks	5	Schoo	ol Side	0.60		_		
		Both	Sides	0.00	0.00		S=	0
	то	TAL SCORE (sum of	T,C,F,L,E and S)				1	85
							Scho	ol Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Grand Centre High School - 48 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	ORE / * WF)
		Eleme	entary	1.00				
	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20	0.20			
		Post Secondary / C	College / University	0.00			T=	8
		Urban Land Use	Rural Land Use			_		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
			Fully Traversable		1.00			
<u>F</u> encing	20	Partially Traversable		0.50		_		
		Non-Tra	Non-Traversable				F=	20
		Abuts R	oadway	1.00				
Property <u>L</u> ine Separation	10	Within 50 metres		0.50				
		Further than 50 metres		0.00	0.00		L=	0
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60				
		Nc	ne	0.00			E=	5
		None or Non	-School Side	1.00	1.00			
<u>S</u> idewalks	5	Schoo	l Side	0.60				
		Both	Sides	0.00			S=	5
	TO.	TAL SCORE (sum of	T,C,F,L,E and S)					58
							Scho	ol Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Grand Centre High School - 57 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	ORE / * WF)
		Eleme	entary	1.00				
O she sh T ime s	10	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20	0.20			
		Post Secondary / 0	Post Secondary / College / University			Γ	T=	8
		Urban Land Use	Rural Land Use			_		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
		Fully Traversable		1.00	1.00			
<u>F</u> encing	20	Partially T	Partially Traversable Non-Traversable					
		Non-Tra					F=	20
		Abuts R	loadway	1.00				
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50	_		
		Further than 50 metres		0.00			L=	5
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60				
		No	ne	0.00			E=	5
		None or Non	-School Side	1.00	1.00			
<u>S</u> idewalks	5	Schoo	ol Side	0.60				
		Both	Sides	0.00			S=	5
	TO	TAL SCORE (sum of	T,C,F,L,E and S)					63
						Γ	Scho	ol Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Grand Centre High School - 47 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	ORE / * WF)
		Eleme	entary	1.00		_		
	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20	0.20			
		Post Secondary / C	College / University	0.00			T=	8
		Urban Land Use	Rural Land Use			_		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
		Fully Traversable		1.00	1.00	_		
<u>F</u> encing 20		Partially Traversable		0.50				
		Non-Tra	Non-Traversable				F=	20
		Abuts R	oadway	1.00				
Property <u>L</u> ine Separation	10	Within 50 metres		0.50				
		Further than 50 metres		0.00	0.00		L=	0
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		-		
		Nc	ne	0.00			E=	5
		None or Non	-School Side	1.00	1.00			
<u>S</u> idewalks	5	Schoo	l Side	0.60				
		Both	Sides	0.00			S=	5
	TO.	TAL SCORE (sum of	T,C,F,L,E and S)					58
							Scho	ol Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Assumption School - 48 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	: (M	3CORE PV * WF)
		Eleme	entary	1.00			
School Turpo	40	Middle / Jr	unior High	0.40	0.40		
School Type	40	High S	School	0.20			
		Post Secondary / C	Post Secondary / College / University			T=	16
		Urban Land Use	Rural Land Use				
		Local		1.00	1.00		
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50			
		Major Collector Minor Arterial	Arterial	0.25			
		Major Arterial Expressway	Freeway	0.00		C=	20
		Fully Traversable		1.00	1.00		
<u>F</u> encing	20	Partially T	raversable	0.50			
		Non-Tra	versable	0.10		F=	20
		Abuts R	oadway	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50		
		Further than 50 metres		0.00		L=	5
		Main En Multiple Secon	trance / dary Entrances	1.00	1.00		
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		<u> </u>	
		No	ne	0.00		E=	5
		None or Non	-School Side	1.00			
<u>S</u> idewalks	5	Schoo	l Side	0.60			
		Both	Sides	0.00	0.00	S=	0
	TO	TAL SCORE (sum of	T,C,F,L,E and S)				66
						Sch	ool Area or

School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Assumption School - 47 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	S (MF	CORE VV * WF)
		Eleme	entary	1.00			
School Type	40	Middle / Jr	unior High	0.40	0.40		
Зспоог <u>т</u> уре	40	High S	School	0.20			
		Post Secondary / C	College / University	0.00		T=	16
		Urban Land Use	Rural Land Use				
		Local		1.00	1.00		
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50			
		Major Collector Minor Arterial	Arterial	0.25			
		Major Arterial Expressway	Freeway	0.00		C=	20
		Fully Tra	versable	1.00	1.00		
<u>F</u> encing	20	Partially T	raversable	0.50			
		Non-Tra	versable	0.10		F=	20
		Abuts R	loadway	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50			
		Further than	Further than 50 metres		0.00	L=	0
		Main En Multiple Secon	itrance / dary Entrances	1.00	1.00		
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60		_	
		No	ne	0.00		E=	5
		None or Non	-School Side	1.00	1.00		
<u>S</u> idewalks	5	Schoo	ol Side	0.60			
		Both	Sides	0.00		S=	5
	то	TAL SCORE (sum of	T,C,F,L,E and S)				66
						Scho	ol Area or

School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Holy Cross Elementary School - 49 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	ORE / * WF)
		Eleme	entary	1.00	1.00			
Cabaal Turaa	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / 0	College / University	0.00		Γ	T=	40
		Urban Land Use	Rural Land Use			-		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
			Fully Traversable		1.00			
<u>F</u> encing	20	Partially T	raversable	0.50				
		Non-Tra	versable	0.10			F=	20
		Abuts R	loadway	1.00				
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50			
		Further than 50 metres		0.00			L=	5
		Main Er Multiple Secon	itrance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60				
		No	ne	0.00			E=	5
		None or Non	-School Side	1.00				
<u>S</u> idewalks	5	Schoo	bl Side	0.60				
		Both	Sides	0.00	0.00		S=	0
TOTAL SCORE (sum of T,C,F,L,E and S)								90
							Scho	ol Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

MacKenzie School - Hickory Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCO (MPV	ORE * WF)
		Eleme	entary	1.00	1.00			
O she sh T ime s	10	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20				
		Post Secondary / 0	College / University	0.00		Γ	T=	40
		Urban Land Use	Rural Land Use			-		
		Local		1.00	1.00			
Road C lassification	20	Minor Collector	Local Collector	0.75				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
		Fully Traversable Partially Traversable		1.00	1.00			
<u>F</u> encing	20			0.50				
		Non-Tra	versable	0.10			F=	20
		Abuts R	loadway	1.00	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50				
		Further than 50 metres		0.00			L=	10
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60				
		Nc	ne	0.00			E=	5
		None or Non	-School Side	1.00				
<u>S</u> idewalks	5	Schoo	School Side		0.60			
		Both	Sides	0.00			S=	3
TOTAL SCORE (sum of T,C,F,L,E and S)							98	
							Schoo	J Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

RA Reynolds School - Queensway

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	ORE / * WF)
		Eleme	entary	1.00	1.00	-		
Cohool Turno	40	Middle / J	unior High	0.40				
School <u>T</u> ype	40	High S	School	0.20		_		
		Post Secondary / (College / University	0.00			T=	40
		Urban Land Use	Rural Land Use					
		Local		1.00				
Road <u>C</u> lassification	20	Minor Collector Collector	Local Collector	0.75 0.50	0.50			
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	10
		Fully Traversable		1.00				
<u>F</u> encing	20	Partially T	Partially Traversable					
		Non-Tra	Non-Traversable		0.10		F=	2
		Abuts R	oadway	1.00	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50				
		Further than 50 metres		0.00			L=	10
		Main Er Multiple Secon	trance / dary Entrances	1.00	1.00			
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60				
		Nc	ne	0.00			E=	5
		None or Non	-School Side	1.00	1.00			
<u>S</u> idewalks	5	School Side		0.60				
		Both	Both Sides				S=	5
TOTAL SCORE (sum of T,C,F,L,E and S)								72
						S	choo	Area or

School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

RA Reynolds School - Spruce Crescent

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP)	:ORE / * WF)
		Eleme	entary	1.00	1.00	-		
	40	Middle / J	unior High	0.40				
School <u>Type</u>	40	High S	School	0.20				
		Post Secondary / 0	College / University	0.00		Γ	T=	40
		Urban Land Use	Rural Land Use					
		Local		1.00	1.00			
Road C lassification	20	Minor Collector Collector	Local Collector	0.75 0.50				
		Major Collector Minor Arterial	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
	Fully Traversable		versable	1.00				
<u>F</u> encing	20	Partially Traversable		0.50				
		Non-Traversable		0.10	0.10		F=	2
		Abuts R	loadway	1.00	1.00			
Property <u>L</u> ine Separation	10	Within 50 metres		0.50		_		
		Further than 50 metres		0.00			L=	10
		Main Er Multiple Secon	itrance / dary Entrances	1.00				
School <u>E</u> ntrance	5	Secondary	y Entrance	0.60	0.60	_		
		Nc	ne	0.00			E=	3
		None or Non	-School Side	1.00	1.00			
<u>S</u> idewalks	5	Schoo	ol Side	0.60		_		
		Both	Both Sides				S=	5
	TOTAL SCORE (sum of T,C,F,L,E and S)							80
							Schoo	Area or

School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Ecole Voyager - Birch Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP)	ORE / * WF)
		Eleme	entary	1.00	1.00	-		
0.1	40	Middle / J	unior High	0.40				
School <u>Type</u>	40	High S	School	0.20				
		Post Secondary / 0	College / University	0.00		Γ	T=	40
		Urban Land Use	Rural Land Use					
		Local		1.00	1.00			
Road C lassification	20	Minor Collector	Local Collector	0.75 0.50				
		Major Collector	Arterial	0.25				
		Major Arterial Expressway	Freeway	0.00			C=	20
		Fully Traversable Partially Traversable		1.00	1.00	_		
<u>F</u> encing	20			0.50				
		Non-Tra	Non-Traversable				F=	20
		Abuts R	loadway	1.00		_		
Property <u>L</u> ine Separation	10	Within 50 metres		0.50	0.50			
		Further than 50 metres		0.00			L=	5
		Main Er Multiple Secon	itrance / dary Entrances	1.00	1.00	_		
School <u>E</u> ntrance	5	Secondary	/ Entrance	0.60				
		Nc	one	0.00			E=	5
		None or Non	-School Side	1.00	1.00			
<u>S</u> idewalks	5	School Side		0.60		_		
		Both	Sides	0.00			S=	5
	T	OTAL SCORE (sum	of T,C,F,L,E and S)					95
							Scho	ol Zone

Appendix B - Playground Zone Worksheets



Table B.1 presents the Playground Zone Input Worksheet from the TAC Guideline

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)
		Frontage	Playground Capacity (number of children)	n/a		
			16 or more	1.00		
	40		5 to 15	0.75		т_
Playground <u>T</u> ype	40	≥ 50 m	1 to 4	0.40		1=
			No play equipment: sport field or open field only	0.20		
		< 50 m	Any Facilities	0.20		
	20	Urban Land Use	Rural Land Use			
		Local		1.00		
Road		Minor Collector	Local	0.75		6-
<u>C</u> lassification		Collector	Collector	0.50		0-
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		
		Fully Tra	versable	1.00		
<u>F</u> encing	20	Partially Tr	aversable	0.50		F=
		Non-Traversable	e/Indoor Facility	0.10		
		Abuts R	oadway	1.00		
Property <u>L</u> ine Separation	10	Within 50) metres	0.50		L=
		Further thar	1 50 metres	0.00		
Playground <u>E</u> ntrance	5	Main Entrance / M Entra	ultiple Secondary nces	1.00		E=

Table B.1TAC Playground Zone Input Worksheet

P:\20103050\00_\Engineering\03.02_Conceptual_Feasibility_Report\300 - School and Playground Zones\Draft\Appendice\B - Playground Zone Worksheets\1 - Appendix B.doc

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION	WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)	
		Secondary Entrance	0.60			
		None	0.00			
		None (or Non-Playground Side)	1.00			
<u>S</u> idewalks	5	Playground Side	0.40		S=	
		Both Sides	0.00			
TOTAL SCORE (sum of T,C,F,L,E and S)						

The appropriate playground area or playground zone designation is determined by comparing the total score calculated in the above mentioned worksheet against the Playground Zone Results Matrix, provided below in **Table B.2**.

Table B.2TAC Playground Zone Results Matrix

TOTAL SCORE	AREA OR ZONE			
0 – 40	Nothing			
41 – 80	Playground Area			
81 – 100	Playground Zone			

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Table 2.3 Playground Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

St. Dominic Elementary School - 7 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCC (MPV	DRE * WF)
Discussion of Trans	40	Frontage	Playground Capacity (number of children)			•		
		≥ 50 m	16 or more	1.00				
			5 to 15	0.75				
Playground <u>Type</u>	40		1 to 4	0.40				
			No play equipment: sport field or open field only	0.20				
		< 50 m	Any Facilities	0.20	0.20		T=	8
		Urban Land Use	Rural Land Use			-		
	20	Local		1.00	1.00			
Road <u>C</u> lassifcation		Minor Collector	Local	0.75				
		Collector	Collector	0.50				
		Major Collector/ Minor Arterial	Arterial	0.25				
		Major Arterial/ Expressway	Freeway	0.00			C=	20
<u>F</u> encing 20	20	Fully	Traversable	1.00				
		Partially Traversable		0.50		I _		
		Non-Travers	sable/Indoor Facility	0.10	0.10		F=	2
Property <u>L</u> ine 10 Separation		Abuts Roadway		1.00	1.00	-		
	10	With	Within 50 metres					
		Further than 50 metres		0.00			L=	10
Playground <u>E</u> ntrance 5		Main Entrance / Multiple Secondary Entrances		1.00				
	5	5 Seco	dary Entrance	0.60				
		None		0.00	0.00		E=	0
		None (or Non-Playground Side)		1.00	1.00			
<u>S</u> idewalks	5	Playground Side		0.40				
		Both Sides		0.00			S=	5
TOTAL SCORE (sum of T,C,F,L,E and S)					45			

Playground Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.3 Playground Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Grand Centre Elementary School - 57 Street

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCORE (MPV * WF)	
Playground <u>T</u> ype		Frontage	Playground Capacity (number of children)					
		≥ 50 m	16 or more	1.00	1.00			
	10		5 to 15	0.75				
	40		1 to 4	0.40				
			No play equipment: sport field or open field only	0.20		-		
		< 50 m	Any Facilities	0.20			T=	40
		Urban Land Use	Rural Land Use			_		
		Local		1.00				
Road Classifaction	20	Minor Collector	Local	0.75				
Road <u>C</u> lassification	20	Collector	Collector	0.50	0.50			
		Major Collector/ Minor Arterial	Arterial	0.25				
		Major Arterial/ Expressway	Freeway	0.00			C=	10
<u>F</u> encing 20		Fully Traversable		1.00		-		
	20	Partially Traversable		0.50				
		Non-Traversable/Indoor Facility		0.10	0.10		F=	2
Abuts Roadway		1.00		-				
Property <u>L</u> ine 10 Separation	10	Within 50 metres		0.50				
		Further than 50 metres		0.00	0.00		L=	0
Playground <u>E</u> ntrance 5		Main Entrance / Multiple Secondary Entrances		1.00				
	5	Secondary Entrance		0.60				
		None		0.00	0.00		E=	0
None (or Non-Playground Side)		1.00	1.00					
<u>S</u> idewalks	5	Playground Side		0.40				
		Both Sides		0.00			S=	5
TOTAL SCORE (sum of T,C,F,L,E and S)					57			

Playground Area
Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.3 Playground Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Grand Centre Elementary School - 50 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DES	SCRIPTION	WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCO (MPV	ORE * WF)
		Frontage	Playground Capacity (number of children)					
			16 or more	1.00				
	40	> 50 m	5 to 15	0.75				
r layground <u>r</u> ype	-0	2 30 m	1 to 4	0.40				
			No play equipment: sport field or open field only	0.20				
		< 50 m	Any Facilities	0.20	0.20		T=	8
		Urban Land Use	Rural Land Use			_		
		Local		1.00				
Road Classifaction	20	Minor Collector	Local	0.75				
Road <u>C</u> lassification		Collector	Collector	0.50	0.50			
		Major Collector/ Minor Arterial	Arterial	0.25		_	_	
		Major Arterial/ Expressway	Freeway	0.00			C=	10
		Fully	Traversable	1.00		-		
<u>F</u> encing	20	Partially Traversable		0.50		_		
		Non-Traversable/Indoor Facility		0.10	0.10		F=	2
		Abu	ts Roadway	1.00	1.00			
Property <u>L</u> ine Separation	10	Withi	in 50 metres	0.50				
		Further	than 50 metres	0.00			L=	10
		Main Entrance / Mu	Itiple Secondary Entrances	1.00	1.00			
Playground <u>E</u> ntrance	5	Secon	dary Entrance	0.60				
			None	0.00			E=	5
		None (or No	n-Playground Side)	1.00				
<u>S</u> idewalks	5	Play	ground Side	0.40				
		Both Sides		0.00	0.00		S=	0
		TOTAL SCORE (s	um of T,C,F,L,E and S)				3	5

Nothing

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

 Table 2.3 Playground Zone Input Worksheet

 Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

MacKenzie School - Oak Drive

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DES	SCRIPTION	WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCO (MPV	ORE * WF)
		Frontage	Playground Capacity (number of children)			-		
			16 or more	1.00				
Disuground Turns	10	> 50 m	5 to 15	0.75				
Playground <u>T</u> ype	40	2 50 m	1 to 4	0.40				
			No play equipment: sport field or open field only	0.20				
		< 50 m	Any Facilities	0.20	0.20		T=	8
		Urban Land Use	Rural Land Use			-		
		Local		1.00	1.00			
Dood Classifaction	20	Minor Collector	Local	0.75				
Road <u>C</u> lassification	20	Collector	Collector	0.50				
		Major Collector/ Minor Arterial	Arterial	0.25		-		
		Major Arterial/ Expressway	Freeway	0.00			C=	20
		Fully	Traversable	1.00				
<u>F</u> encing	20	Partial	y Traversable	0.50	0.50	_		
		Non-Traversable/Indoor Facility		0.10		ſ	F=	10
		Abut	ts Roadway	1.00	1.00			
Property <u>L</u> ine Separation	10	Withi	n 50 metres	0.50				
		Further	than 50 metres	0.00		ſ	L=	10
		Main Entrance / Mu	Itiple Secondary Entrances	1.00				
Playground <u>E</u> ntrance	5	Secon	dary Entrance	0.60				
			None	0.00	0.00	ſ	E=	0
		None (or No	n-Playground Side)	1.00				
<u>S</u> idewalks	5	Play	ground Side	0.40	0.40			
		В	oth Sides	0.00		ſ	S=	2
		TOTAL SCORE (s	um of T,C,F,L,E and S)				5	0

Playground Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.3 Playground Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

RA Reynolds School - Queensway

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DES	SCRIPTION	WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SCC (MPV	ORE * WF)
		Frontage	Playground Capacity (number of children)			-		
Plavaround T ype			16 or more	1.00	1.00			
	40	> 50 m	5 to 15	0.75				
Playground <u>T</u> ype	40	≥ 50 m	1 to 4	0.40				
			No play equipment: sport field or open field only	0.20				
		< 50 m	Any Facilities	0.20			T=	40
		Urban Land Use	Rural Land Use					
		Local		1.00				
Deed Classification		Minor Collector	Local	0.75				
Road <u>C</u> lassification	20	Collector	Collector	0.50	0.50			
		Major Collector/ Minor Arterial	Arterial	0.25		I _		
		Major Arterial/ Expressway	Freeway	0.00		. [C=	10
		Fully	Traversable	1.00		1		
<u>F</u> encing	20	Partially Traversable		0.50		I _		
		Non-Travers	sable/Indoor Facility	0.10	0.10		F=	2
		Abu	ts Roadway	1.00	1.00	_		
Property <u>L</u> ine Separation	10	Within 50 metres		0.50		1		
		Further than 50 metres		0.00			L=	10
		Main Entrance / Mu	Itiple Secondary Entrances	1.00		_		
Playground <u>E</u> ntrance	5	Secon	dary Entrance	0.60	0.60	I _		
			None	0.00			E=	3
		None (or No	n-Playground Side)	1.00	1.00			
<u>S</u> idewalks	5	Play	ground Side	0.40		I		
		В	oth Sides	0.00		ſ	S=	5
		TOTAL SCORE (s	um of T,C,F,L,E and S)			ſ	7	0

Playground Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.3 Playground Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

RA Reynolds School - Spruce Cres.

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)		SC (MP\	ORE / * WF)
		Frontage	Playground Capacity (number of children)					
			16 or more	1.00				
Disuground Turns	10	> 50 m	5 to 15	0.75				
Playground <u>T</u> ype	40	2 50 m	1 to 4	0.40				
			No play equipment: sport field or open field only	0.20				
		< 50 m	Any Facilities	0.20	0.20		T=	8
		Urban Land Use	Rural Land Use			-		
		Local		1.00	1.00			
Dood Classifaction	20	Minor Collector	Local	0.75				
Road <u>C</u> lassification		Collector	Collector	0.50				
		Major Collector/ Minor Arterial	Arterial	0.25				
		Major Arterial/ Expressway	Freeway	0.00			C=	20
		Fully	Traversable	1.00		-		
<u>F</u> encing	20	Partially Traversable		0.50				
		Non-Travers	able/Indoor Facility	0.10	0.10		F=	2
		Abu	ts Roadway	1.00	1.00			
Property <u>L</u> ine Separation	10	Withi	n 50 metres	0.50				
		Further than 50 metres		0.00			L=	10
		Main Entrance / Mu	Itiple Secondary Entrances	1.00				
Playground <u>E</u> ntrance	5	Secon	dary Entrance	0.60	0.60			
			None	0.00			E=	3
		None (or No	n-Playground Side)	1.00	1.00	•		
<u>S</u> idewalks	5	Playground Side		0.40				
		B	Both Sides				S=	5
		TOTAL SCORE (s	um of T,C,F,L,E and S)					48

Playground Area

C Appendix C - Signage and Pavement Marking Plans













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FINAL REPORT

Appendix I - Unit Rate Development

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

8 Avenue (10 Street to Lakeshore Drive) - Roadway Upgrade

Widen to provide centre median and 2 lanes in each direction. 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts.

				Unit Prices		
Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Remove Existing Curb & Gutter	2.00	lm	\$34.00	Curb & Gutter Removal	\$17.00	lm
Remove Existing Sidewalk - 2m wide along both sides	4.00	m ²	\$80.00	Sidewalk Removal	\$20.00	m ²
Construct 5.0m Centre Median - Pin curb and gutter on existing asphalt	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Construct Additional Pavement Structure						
125mm Asphalt	1.67	m ³	\$804.91	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	13.37	m ²	\$26.74	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	13.37	m ²	\$26.74	Prime Coat	\$2.00	m ²
200mm Granular Base	2.92	m ³	\$198.90	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	4.49	m ³	\$305.75	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	14.95	m ²	\$134.59	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Total Cost for 9 Avenue P	ondway Lingrado, nor motro	of Roadway -	\$2 121 62			

Total Cost for 8 Avenue Roadway Upgrade, per metre of Roadway = \$2,131.63

Various Locations - Install Traffic Signals

Component Traffic Signals

	Quantity	Unit	Cost
	1.00	int	\$350,000.00
Tota	I Cost of Traffic Signals, per	ntersection =	\$350,000.00

Channelize Right Turn Lane (Along Expressway/Arterials) Based on conceptual design for Highway 28 and 43 Avenue right turn channelization. Cost estimate does not include cost to remove existing curb & gutter and sidewalks

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	185.00	lm	\$3,700.00	Sawcutting	\$20.00	lm
Construct Pavement Structure						
125mm Asphalt	72.50	m ³	\$34,872.50	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	580.00	m ²	\$1,160.00	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	580.00	m ²	\$1,160.00	Prime Coat	\$2.00	m ²
200mm Granular Base	238.00	m ³	\$16,219.70	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	357.00	m ³	\$24,329.55	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	1,190.00	m ²	\$10,710.00	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	170.00	lm	\$20,400.00	Curb & Gutter	\$120.00	lm
Concrete Island	35.00	m ²	\$4,015.90	AT X350 - Solid Concrete Islands	\$114.74	m ²
Pavement Marking - Solid Lines	115.00	lm	\$92.06	AT S350 - Roadway Lines - Supplying Paint and Painting (Direction Dividing)	\$800.53	km
Pavement Marking - Dashed Lines	75.00	lm	\$61.07	AT S351 - Roadway Lines - Supplying Paint and Painting (Lane Dividing)	\$814.31	km
Crosswalk Marking	1.00	message	\$239.78	AT S327 - Pavement Messages - Pedestrian Crossing	\$239.78	message

Total Cost to Channelize Right Turn Lane = \$116,960.56

Channelize Right Turn Lane (Along Local) Based on conceptual design for Highway 28 and 43 Avenue right turn channelization. Cost estimate does not include cost to remove existing curb & gutter and sidewalks

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	185.00	lm	\$3,700.00	Sawcutting	\$20.00	lm
Construct Pavement Structure						
90mm Asphalt	52.20	m ³	\$25,108.20	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	580.00	m ²	\$1,160.00	Prime Coat	\$2.00	m ²
250mm Granular Base	297.50	m ³	\$20,274.63	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	1,190.00	m ²	\$10,710.00	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	170.00	lm	\$20,400.00	Curb & Gutter	\$120.00	lm
Concrete Island	35.00	m ²	\$4,015.90	AT X350 - Solid Concrete Islands	\$114.74	m ²
Pavement Marking - Solid Lines	115.00	lm	\$92.06	AT S350 - Roadway Lines - Supplying Paint and Painting (Direction Dividing)	\$800.53	km
Pavement Marking - Dashed Lines	75.00	lm	\$61.07	AT S351 - Roadway Lines - Supplying Paint and Painting (Lane Dividing)	\$814.31	km
Crosswalk Marking	1.00	message	\$239.78	AT S327 - Pavement Messages - Pedestrian Crossing	\$239.78	message

Total Cost to Channelize Right Turn Lane = \$85,761.64

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

Highway 28 (53 Avenue to 52 Avenue, 52 Street to 47 Avenue) - Roadway Upgrade

Widen to provide centre median.

				Unit Prices		
Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Remove Existing Curb & Gutter	2.00	lm	\$34.00	Curb & Gutter Removal	\$17.00	lm
Construct 5.0m Centre Median - Pin curb and gutter on existing asphalt	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Construct Additional Pavement Structure						
125mm Asphalt	0.75	m ³	\$359.79	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	5.97	m ²	\$11.93	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	5.97	m ²	\$11.93	Prime Coat	\$2.00	m ²
200mm Granular Base	1.44	m ³	\$98.00	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	2.27	m ³	\$154.41	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	7.55	m ²	\$67.97	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Total Cost for Highway 28 F	Roadway Upgrade, per met	re of Roadway =	\$1,258.04			

Various Locations - Painted On-Street Parallel Parking Stalls Assumed: 6.0m solid white lines for each parking stall.

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Pavement Markings	6.00	lm	\$4.80	AT S350 - Roadway Lines - Supplying Paint and Painting (Directional Dividing)	\$800.53	km
Total Cost of Pavement Mark	king, per On-Street Parallel P	arking Stall =	\$4.80			

Kinosoo Beach - Pave and Paint Gravel Lot Parking Lot Pavement will be graded for draining; slopes to vary. Assumed same 2.5% slope for roadway.

avenuent will be graded for draining, slopes to vary. Assumed same 2.5% slope for roadw	reay.
Assumed: Same pavement structure as Collector roads. 13.0m solid white lines for each p	arking stall.

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Pave Parking Lot - 2,280m ²						
100mm Asphalt	228.00	m ³	\$109,668.00	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	2,280.00	m ²	\$4,560.00	Prime Coat	\$2.00	m ²
300mm Granular Base	684.00	m ³	\$46,614.60	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	342.00	m ³	\$23,307.30	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	2,280.00	m ²	\$20,520.00	Subgrade Preparation	\$9.00	m ²
Pavement Markings - 58 Stalls	754.00	lm	\$603.60	AT S350 - Roadway Lines - Supplying Paint and Painting (Directional Dividing)	\$800.53	km

Total Cost to Pave and Paint Gravel Lot Parking Lot = \$205,273.50

1 Avenue - Install Parking Control Signs

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Parking Control (RB-51, RB-52) Signs	4.00	signs	\$256.56	AT S288 - Install Sign - Less than 1 m ²	\$64.14	sign
Sign Posts	4.00	posts	\$731.52	AT S772 - Supply and Install Post (100mm x 150mm)	\$182.88	post
Т	otal Cost to Install Parking C	ontrol Signs=	\$988.08			

1 Avenue - Repave Corridor (Residential Collector)

Mill and replace full depth of asphalt layer. Assumed: 13.1m road width along 1 Avenue (from In-Service Road Safety Review).

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Coldmilling	13.10	m ²	\$196.50	Cold Milling Asphalt Pavement	\$15.00	m ²
100mm Asphalt	1.31	m ³	\$630.11	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tatal	Cost of Dependence per motor	r of Doodwood	6006.64			

Total Cost of Repaving, per meter of Roadway = \$826.61

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

19 Street Crosswalk - Provide Pavement Marking and Signage

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Pedestrian Crosswalk - Pavement Markings	1.00	message	\$239.78	AT S327 - Pavement Messages - Pedestrian Crossing	\$239.78	message
Pedestrian Crosswalk (RA-4) Signs	2.00	signs	\$128.28	AT S288 - Install Sign - Less than 1 m ²	\$64.14	sign
Sign Posts	2.00	posts	\$365.76	AT S772 - Supply and Install Post (100mm x 150mm)	\$182.88	post
Total Cost for Pavement Mark	king and Signage at 19 Stree	t Crosswalk =	\$733.82			

Highway 55 (28 Street to Highway 28) - Roadway Upgrade Build pavement structure to Arterial Standard (centre median with 2 lanes in each direction). 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts. Median assumed to have same pavement structure as roadway, in preparation for designated turn lanes. Assumed: Existing pavement width = 13.0m (from MESS).

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove Existing Pavement						
Remove Asphalt	13.00	m ²	\$260.00	Asphalt Removal	\$20.00	m ²
Remove Base Course	3.90	m ³	\$66.30	Excavation to Waste	\$17.00	m ³
Construct 5.0m Centre Median						
125mm Asphalt	0.63	m ³	\$300.67	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	5.00	m ²	\$10.00	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	5.00	m ²	\$10.00	Prime Coat	\$2.00	m ²
200mm Granular Base	1.00	m ³	\$68.17	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	1.50	m ³	\$102.26	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	5.00	m ²	\$45.01	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Construct Pavement Structure						
125mm Asphalt	1.85	m ³	\$889.08	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	14.77	m ²	\$29.54	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	14.77	m ²	\$29.54	Prime Coat	\$2.00	m ²
200mm Granular Base	3.20	m ³	\$217.98	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	4.91	m ³	\$334.38	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	16.36	m ²	\$147.20	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Table of the Ulaboration of D	and search has seen the second second second second	- (D +	60 000 44			

Total Cost for Highway 55 Roadway Upgrade, per metre of Roadway = \$2,990.14

16 Avenue (Highway 28 to 16 Street) - Roadway Upgrade Build pavement structure to Arterial Standard (2 lanes in each direction). 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts. Assumed: Existing pavement width = 13.0m (from MESS).

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove Existing Pavement					-	-
Remove Asphalt	13.00	m ²	\$260.00	Asphalt Removal	\$20.00	m ²
Remove Base Course	3.90	m ³	\$66.30	Excavation to Waste	\$17.00	m ³
Construct Pavement Structure						
125mm Asphalt	1.85	m ³	\$889.08	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	14.77	m ²	\$29.54	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	14.77	m ²	\$29.54	Prime Coat	\$2.00	m ²
200mm Granular Base	3.20	m ³	\$217.98	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	4.91	m ³	\$334.38	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	16.36	m ²	\$147.20	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm

Total Cost for 16 Avenue Roadway Upgrade, per metre of Roadway = \$2,214.01

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

16 Avenue (16 Street to 8 Street) - Roadway Upgrade Widen to provide 2 lanes in each direction.

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Remove Existing Curb & Gutter	2.00	lm	\$34.00	Curb & Gutter Removal	\$17.00	Im
Remove Existing Sidewalk - 2m wide, assumed along both sides	4.00	m ²	\$80.00	Sidewalk Removal	\$20.00	m ²
Construct Pavement Structure						
100mm Asphalt	0.84	m ³	\$403.46	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	8.38	m ²	\$16.75	Prime Coat	\$2.00	m ²
300mm Granular Base	2.87	m ³	\$195.85	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	1.49	m ³	\$101.75	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	9.95	m ²	\$89.58	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm

Total Cost for 16 Avenue Roadway Upgrade, per metre of Roadway = \$1,201.39

English Bay Road (Lake Avenue to Highway 28) - Roadway Upgrade Build pavement structure to Arterial Standard (centre median with 2 lanes in each direction). 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts. Assumed: Existing pavement width = 13.0m (from MESS).

			Unit Prices			
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove Existing Pavement						
Remove Asphalt	13.00	m ²	\$260.00	Asphalt Removal	\$20.00	m ²
Remove Base Course	3.90	m ³	\$66.30	Excavation to Waste	\$17.00	m ³
Remove Existing Curb & Gutter - Along east side, north of 1 Avenue	0.50	lm	\$8.50	Curb & Gutter Removal	\$17.00	lm
Construct 5.0m Centre Median						
125mm Asphalt	0.63	m ³	\$300.67	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	5.00	m ²	\$10.00	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	5.00	m ²	\$10.00	Prime Coat	\$2.00	m ²
200mm Granular Base	1.00	m ³	\$68.17	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	1.50	m ³	\$102.26	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	5.00	m ²	\$45.01	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Construct Pavement Structure						
125mm Asphalt	1.85	m ³	\$889.08	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	14.77	m ²	\$29.54	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	14.77	m ²	\$29.54	Prime Coat	\$2.00	m ²
200mm Granular Base	3.20	m ³	\$217.98	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	4.91	m ³	\$334.38	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	16.36	m ²	\$147.20	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm

Total Cost for English Bay Road Roadway Upgrade, per metre of Roadway = \$2,998.64

28 Street - Remove Existing Roadway Assumed: Existing pavement width = 13.0m (from MESS).

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove Asphalt	13.00	m ²	\$260.00	Asphalt Removal	\$20.00	m ²
Remove Base Course	3.90	m ³	\$66.30	Excavation to Waste	\$17.00	m ³
Top Soil	13.00	m ²	\$51.22	AT G320 - Topsoil (Supply and Place)	\$3.94	m ²
Seeding	13.00	m ²	\$2.00	AT E608 - Broad Cast Seeding	\$1,542.17	ha
Total Cost for Par	vement Removal, per meter	of Roadway =	\$379.52			
Relocate stop signs	2.00	signs	331.88	AT S275 - Removal and Reinstallation or Disposal of Existing Signs	165.94	signs

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

28 Street (English Bay Road to Highway 55) - Build Roadway Realign 28 Street and build pavement structure to Arterial Standard.

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Construct Pavement Structure						
125mm Asphalt	0.92	m ³	\$444.01	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	7.37	m ²	\$14.74	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	7.37	m ²	\$14.74	Prime Coat	\$2.00	m ²
200mm Granular Base	1.72	m ³	\$117.08	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	2.69	m ³	\$183.04	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	8.95	m ²	\$80.58	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Total Cost for 28 Stre	et Construction per met	re of Roadway =	\$1 094 18			

Total Cost for 28 Street Construction, per metre of Roadway = \$1,094.18

16 Street (16 Avenue to 75 Avenue) - Upgrade Roadway Build pavement structure to Arterial standard

Assumed: Existing pavement width = 10.0m (from MESS).

0111111000	
escription Unit Price	Unit
\$20.00	m ²
\$17.00	m ³
e (-40) \$185.00	Tonne
\$2.00	m ²
\$2.00	m ²
\$29.00	Tonne
\$29.00	Tonne
\$9.00	m ²
e	cription Unit Price \$20.00 \$17.00 .(-40) \$185.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.00 \$2.900

Total Cost for 16 Street Roadway Upgrade, per metre of Roadway = \$1,295.08

Future Arterial (75 Avenue to 50 Avenue) - Build Roadway Build out as per 20-year Horizon

	Unit Prices					
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Construct Pavement Structure						
125mm Asphalt	1.01	m ³	\$488.02	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	8.83	m ²	\$17.66	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	8.83	m ²	\$17.66	Prime Coat	\$2.00	m ²
200mm Granular Base	1.99	m ³	\$135.95	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	3.85	m ³	\$262.36	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	14.55	m ²	\$130.92	Subgrade Preparation	\$9.00	m ²

Total Cost for Future Arterial Construction, per metre of Roadway = \$1,052.58

10 Street - Signage for Vertical Curve at 3 Avenue

	Unit Prices					
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Concealed Roadway (WA-13) signs	2.00	signs	\$128.28	AT S288 - Install Sign - Less than 1 m ²	\$64.14	sign
Sign posts	2.00	posts	\$365.76	AT S772 - Supply and Install Post (100mm x 150mm)	\$182.88	post
	Total Cost for Signage a	at 3 Avenue =	\$494.04			

10 Street - Repave (Residential Collector)

Mill and replace full depth of asphalt layer.

Assumed: 15.2m road width along 10 Street (from In-Service Road Safety Review)

				Unit Prices		/	
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit	
Coldmilling	15.20	m ²	\$228.00	Cold Milling Asphalt Pavement	\$15.00	m ²	
100mm Asphalt	1.52	m ³	\$731.12	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne	
Total Cost of Reporting nor mater of Ready y = \$050.12							

Unit Date

Total Cost of Repaving, per meter of Roadway = \$959.12

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

8 Street (16 Avenue to 75 Avenue) - Upgrade Roadway Build pavement structure to Collector standard. Assumed: Existing pavement width = 10.0m (from MESS).

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove Existing Pavement						
Remove Asphalt	10.00	m ²	\$200.00	Asphalt Removal	\$20.00	m ²
Remove Base Course	2.50	m ³	\$42.50	Excavation to Waste	\$17.00	m ³
Construct Pavement Structure						
100mm Asphalt	0.74	m ³	\$355.36	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	7.37	m ²	\$14.75	Prime Coat	\$2.00	m ²
300mm Granular Base	2.57	m ²	\$74.64	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	1.34	m ³	\$91.52	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	8.95	m ³	\$189.35	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	m ²	\$240.00	Curb & Gutter	\$120.00	Im
Total Cost for 8 Street Ro	adway Upgrade, per metre	of Roadway =	\$1,208.12		,	

20 Avenue (12 Street to 8 Street) - Build Roadway Build out as per 20-year Horizon

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Construct Pavement Structure						
100mm Asphalt	0.74	m ³	\$355.36	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	7.37	m ²	\$14.75	Prime Coat	\$2.00	m ²
300mm Granular Base	2.57	m ²	\$74.64	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	1.34	m ³	\$91.52	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	8.95	m ³	\$189.35	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	m ²	\$240.00	Curb & Gutter	\$120.00	lm
Total Cost for 20 Avenue Construction, per metre of Roadway = \$965.						

Lakeshore Drive - Install Parking Control Signs

Lakeshore Drive - Install Parking Control Signs						
				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Parking control (RB-51, RB-52) signs	11.00	signs	\$705.54	AT S288 - Install Sign - Less than 1 m ²	\$64.14	sign
Sign posts	11.00	posts	\$2,011.68	AT S772 - Supply and Install Post (100mm x 150mm)	\$182.88	post
Т	otal Cost to Install Parking C	ontrol Signs=	\$2,717.22			

Lakeshore Drive - Repave Corridor (Residential Local) Mill and replace full depth of asphalt layer. Assumed: 13.4 m road width along Lakeshore Drive (from In-Service Road Safety Review).

Assumed: 13.4 m road width along Lakeshore Drive (from In-Service Road Safety Review).						
				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Coldmilling	13.40	m ²	\$201.00	Cold Milling Asphalt Pavement	\$15.00	m ²
90mm Asphalt	1.21	m ³	\$580.09	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Total	Cost of Repaving, per meter	of roadway =	\$781.09			

Hada Balance

Lakeshore Drive - Improve Pedestrian Crosswalks

			onicines					
Component	Quantity	Unit	Cost	Description	Unit Price	Unit		
Pedestrian Crossing - Pavement marking (8 Ave, midblock 8 Ave & 7 Ave, 7 Ave, 6 Ave, 2 Ave)	5.00	message	\$1,198.90	AT S327 - Pavement Messages - Pedestrian Crossing	\$239.78	message		
Pedestrian Crosswalk (RA-4) signs at crosswalks	10.00	signs	\$641.40	AT S288 - Install Sign - Less than 1 m ²	\$64.14	sign		
Sign posts at crosswalks	10.00	posts	\$1,828.80	AT S772 - Supply and Install Post (100mm x 150mm)	\$182.88	post		
Curb extensions at 6 Avenue Crosswalk								
Curb	30.40	lm	\$3,648.00	Curb & Gutter	\$120.00	lm		
Concrete	18.80	m ²	\$2,157.11	AT X350 - Solid Concrete Islands	\$114.74	m ²		
Fill - Assume 0.305m depth (height of curb)	7.50	m ³	\$511.13	3/4 Granular	\$29.00	Tonne		

Total Cost to Improve Pedestrian Crosswalks along Lakeshore Drive = \$9,985.34

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

75 Avenue (Highway 28 to Future Arterial) - Roadway Upgrade Build pavement structure to Collector standard. Assumed: Existing pavement width = 10.0m (from MESS).

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove Existing Pavement						
Remove Asphalt	10.00	m ²	\$200.00	Asphalt Removal	\$20.00	m ²
Remove Base Course	2.50	m ³	\$42.50	Excavation to Waste	\$17.00	m ³
Construct Pavement Structure						
100mm Asphalt	1.48	m ³	\$711.40	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	14.78	m ²	\$29.55	Prime Coat	\$2.00	m ²
300mm Granular Base	4.79	m ³	\$326.74	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	2.45	m ³	\$167.19	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	16.36	m ²	\$147.20	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Total Cost for 75 Avenue Ro	adway Upgrade, per metre o	of Roadway =	\$1,864.57			

69 Avenue (Glenwood to Highway 28) - Build Roadway Build out as per 20-year Horizon

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Construct Pavement Structure						1
125mm Asphalt	1.01	m ³	\$488.02	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	8.83	m ²	\$17.66	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	8.83	m ²	\$17.66	Prime Coat	\$2.00	m ²
200mm Granular Base	1.99	m ³	\$135.95	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	3.85	m ³	\$262.36	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	14.55	m ²	\$130.92	Subgrade Preparation	\$9.00	m ²
Total Cost for 69 Aven	ue Construction, per metre	of Roadway =	\$1,052.58			

54 Avenue (56 Street to 49 Street) - Roadway Upgrade Widen to provide 2 lanes in each direction.

Component - 1.0m Section of Roadway Quantity Unit Cost Description	Unit Price	Unit
Sawcut Existing Asphalt 2.00 Im \$40.00 Sawcutting	\$20.00	lm
Remove Existing Curb & Gutter 2.00 Im \$34.00 Curb & Gutter Removal	\$17.00	lm
Remove Existing Sidewalk - 2m wide, assumed along both sides 4.00 m ² \$80.00 Sidewalk Removal	\$20.00	m ²
Construct Pavement Structure		
100mm Asphalt 0.84 m ³ \$403.46 Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat 8.38 m ² \$16.75 Prime Coat	\$2.00	m ²
300mm Granular Base 2.87 m ³ \$195.85 3/4 Granular	\$29.00	Tonne
150mm Granular Subbase 1.49 m ³ \$101.75 3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation 9.95 m ² \$89.58 Subgrade Preparation	\$9.00	m ²
Curb & Gutter 2.00 Im \$240.00 Curb & Gutter	\$120.00	lm

Total Cost for 54 Avenue Roadway Upgrade, per metre of Roadway = \$1,201.39

54 Avenue (49 Street to Future Arterial) - Build Roadway Build out as per 20-year Horizon

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Construct Pavement Structure						
100mm Asphalt	1.48	m ³	\$711.40	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	14.78	m ²	\$29.55	Prime Coat	\$2.00	m ²
300mm Granular Base	4.79	m ³	\$326.74	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	2.45	m ³	\$167.19	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	16.36	m ²	\$147.20	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm

Total Cost for 54 Avneue Construction, per metre of Roadway = \$1,622.07
Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

52 Avenue (57 Street to Highway 28) - Roadway Upgrade Widen to provide 2 lanes in each direction.

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Remove Existing Curb & Gutter	2.00	lm	\$34.00	Curb & Gutter Removal	\$17.00	lm
Remove Existing Sidewalk - 2m wide, assumed along one side	2.00	m ²	\$40.00	Sidewalk Removal	\$20.00	m ²
Construct Pavement Structure						
100mm Asphalt	0.84	m ³	\$403.46	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	8.38	m ²	\$16.75	Prime Coat	\$2.00	m ²
300mm Granular Base	2.87	m ³	\$195.85	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	1.49	m ³	\$101.75	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	9.95	m ²	\$89.58	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Total Cost for 52 August D			E4 164 20	· · · · · · · · · · · · · · · · · · ·	•	

Total Cost for 52 Avenue Roadway Upgrade, per metre of Roadway = \$1,161.39

51 Avenue (56 Street to Service Road) - Relocate Crosswalk

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove existing pavement marking	70.00	lm	\$533.40	AT S375 - Removal of Existing Painted Lines	\$7.62	m
Pedestrian Crossing - Pavement marking	1.00	message	\$239.78	AT S327 - Pavement Messages - Pedestrian Crossing	\$239.78	message
	Total Cost for Crosswalk	Relocation =	\$773.18			

Centre Avenue (59 Street to 57 Street) - Roadway Upgrade Widen to provide centre median and 2 lanes in each direction. 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts.

				Onit Prices		
Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Construct 5.0m Centre Median - Pin curb and gutter on existing asphalt	2.00	lm	\$240.00	Curb & Gutter	\$120.00	Im
Construct Additional Pavement Structure						
125mm Asphalt	1.67	m ³	\$804.91	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	13.37	m ²	\$26.74	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	13.37	m ²	\$26.74	Prime Coat	\$2.00	m ²
200mm Granular Base	2.92	m ³	\$198.90	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	4.49	m ³	\$305.75	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	14.95	m ²	\$134.59	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm

Total Cost for Centre Avenue Roadway Upgrade, per metre of Roadway = \$2,017.63

Centre Avenue (57 Avenue to Highway 28) - Roadway Upgrade Widen to provide centre median.

				Unit Prices		
Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Remove Existing Curb & Gutter	2.00	lm	\$34.00	Curb & Gutter Removal	\$17.00	lm
Construct 5.0m Centre Median - Pin curb and gutter on existing asphalt	2.00	lm	\$240.00	Curb & Gutter	\$120.00	Im
Construct Additional Pavement Structure						
125mm Asphalt	0.75	m ³	\$359.79	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	5.97	m ²	\$11.93	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	5.97	m ²	\$11.93	Prime Coat	\$2.00	m ²
200mm Granular Base	1.44	m ³	\$98.00	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	2.27	m ³	\$154.41	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	7.55	m ²	\$67.97	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm

Total Cost for Centre Avenue Roadway Upgrade, per metre of Roadway = \$1,258.04

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

50 Avenue - Provide Back-in Angle Parking Stalls Assumed: City would implement back-in angle parking over parallel parking. 15.0m solid white lines for each parking stall.

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove existing pavement marking	70.00	lm	\$533.40	AT S375 - Removal of Existing Painted Lines	\$7.62	m
Pavement markings	1.00	lm	\$0.80	AT S350 - Roadway Lines - Supplying Paint and Painting (Directional Dividing)	\$800.53	km
Total Cost to Remove Existing and Provide New Pavemer	nt Marking Lines, per Angle P	arking Stall =	\$534.20		• •	

50 Avenue - Repaint Pavement Marking (Highway 28 to 49 Street) Assumed: 6.0m solid white lines for each parallel parking stall

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Repaint centre line	632.00	lm	\$505.93	AT S350 - Roadway Lines - Supplying Paint and Painting (Directional Dividing)	\$800.53	km
Repaint stop bar	20.00	message	\$2,578.60	AT S315 - Pavement Message - Stop Bar	\$128.93	message
Painted on-street parking (parallel stalls) - 53 stalls	318.00	lm	\$254.57	AT S350 - Roadway Lines - Supplying Paint and Painting (Directional Dividing)	\$800.53	km
Pedestrian Crossing - Pavement marking (At 53 St, 52 St, 51 St, midblock 51 St/50 St, 50 St, @ 49 St)	20.00	message	\$4,795.60	AT S327 - Pavement Messages - Pedestrian Crossing	\$239.78	message
Total Cost to Repa	aint Pavement Marking along	50 Avenue =	\$8,134.70			

50 Avenue - Provide Curb Extensions and Signage at Crosswalks

				Unit Prices		
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Curb extensions - 18 (At 53 St, 52 St, 51 St, midblock 51 St/50 St, 50 St and 49 St)						
Curb	273.60	lm	\$32,832.00	Curb & Gutter	\$120.00	lm
Concrete	169.20	m ²	\$19,414.01	AT X350 - Solid Concrete Islands	\$114.74	m ²
Fill - Assume 0.305m depth (height of curb)	67.50	m ³	\$4,600.13	3/4 Granular	\$29.00	Tonne
Pedestrian Crosswalk (RA-4) signs at 49 Street and 53 Street	4.00	signs	\$256.56	AT S288 - Install Sign - Less than 1 m ²	\$64.14	sign
Sign posts at 49 Street and 53 Street	4.00	posts	\$731.52	AT S772 - Supply and Install Post (100mm x 150mm)	\$182.88	post
Total Cost to Brouido Curb	Extensions and Signage at	Crocowolke -	\$E7 924 21			

Total Cost to Provide Curb Extensions and Signage at Crosswalks = \$57,834.21

Highway 28 and 43 Avenue Intersection Improvements

	Alberta Transportation Unit Price (2010)					
Component	Quantity	Unit	Cost	Description	Unit Price	Unit
Pavement						
125mm Asphalt	2,390.00	m ³	\$1,149,590.00	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	19,120.00	m ²	\$38,240.00	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	19,120.00	m ²	\$38,240.00	Prime Coat	\$2.00	m ²
200mm Granular Base	4,656.00	m ³	\$317,306.40	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	6,984.00	m ³	\$475,959.60	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	23,280.00	m ²	\$209,520.00	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	3,150.00	lm	\$378,000.00	Curb & Gutter	\$120.00	lm
Median Fill - Assume 0.305m depth (height of curb)	1,232.20	m ³	\$83,974.43	3/4 Granular	\$29.00	Tonne
Concrete Island	290.00	m ²	\$33,274.60	AT X350 - Solid Concrete Islands	\$114.74	m ²
Concrete Sidewalks	1,190.00	lm	\$142,800.00	Concrete Sidewalk	\$120.00	lm
Pavement Marking - Solid Lines	1,080.00	Im	\$864.57	AT S350 - Roadway Lines - Supplying Paint and Painting (Direction Dividing)	\$800.53	km
Pavement Marking - Dashed Lines	2,415.00	lm	\$1,966.56	AT S351 - Roadway Lines - Supplying Paint and Painting (Lane Dividing)	\$814.31	km
Repaint stop bar	4.00	message	\$515.72	AT S315 - Pavement Message - Stop Bar	\$128.93	message
Crosswalk Marking	7.00	message	\$1,678.46	ATS327 - Pavement Messages - Pedestrian Crossing	\$239.78	message
Total Cost for Hig	hway 28 and 43 Avenue Im	provements =	\$2,871,930.34			

43 Avenue (Highway 28 to 45 Street) - Upgrade Roadway Build pavement structure to Collector standard. Assumed: Existing pavement width = 10.0m (from MESS).

				Unit Prices		
Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Remove Existing Pavement						
Remove Asphalt	10.00	m ²	\$200.00	Asphalt Removal	\$20.00	m ²
Remove Base Course	2.50	m ³	\$42.50	Excavation to Waste	\$17.00	m ³
Remove Existing Curb & Gutter	2.00	lm	\$34.00	Curb & Gutter Removal	\$17.00	lm
Construct Pavement Structure						
100mm Asphalt	1.48	m ³	\$711.40	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Prime Coat	14.78	m ²	\$29.55	Prime Coat	\$2.00	m ²
300mm Granular Base	4.79	m ³	\$326.74	3/4 Granular	\$29.00	Tonne
150mm Granular Subbase	2.45	m ³	\$167.19	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	16.36	m ²	\$147.20	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	Im

Total Cost for 43 Avenue Roadway Upgrade, per meter of Roadway = \$1,898.57

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

Kingsway (Medley Gate to 59 Street) - Roadway Upgrade

Widen to provide centre median and 2 lanes in each direction. 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts.

				Unit Prices		
Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Construct 5.0m Centre Median - Pin curb and gutter on existing asphalt	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Construct Additional Pavement Structure						
125mm Asphalt	1.76	m ³	\$848.87	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	14.83	m ²	\$29.67	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	14.83	m ²	\$29.67	Prime Coat	\$2.00	m ²
200mm Granular Base	3.20	m ³	\$217.77	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	5.65	m ³	\$385.10	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	20.55	m ²	\$184.96	Subgrade Preparation	\$9.00	m ²
Total Cost for Kingaway Boodway Llagrada, par matra of Boodway - \$1,076.04						

Total Cost for Kingsway Roadway Upgrade, per metre of Roadway = \$1,976.04

Kingsway (Glenwood to Medley Gate) - Roadway Upgrade Widen to provide centre median and 2 lanes in each direction. 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts.

				Unit Prices		
Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Description	Unit Price	Unit
Sawcut Existing Asphalt	2.00	lm	\$40.00	Sawcutting	\$20.00	lm
Construct 5.0m Centre Median - Pin curb and gutter on existing asphalt	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Construct Additional Pavement Structure						
125mm Asphalt	1.67	m ³	\$804.91	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne
Tack Coat	13.37	m ²	\$26.74	Tack Coat Between Asphalt Lifts	\$2.00	m ²
Prime Coat	13.37	m ²	\$26.74	Prime Coat	\$2.00	m ²
200mm Granular Base	2.92	m ³	\$198.90	3/4 Granular	\$29.00	Tonne
300mm Granular Subbase	4.49	m ³	\$305.75	3/4 Granular	\$29.00	Tonne
150mm Subgrade Preparation	14.95	m ²	\$134.59	Subgrade Preparation	\$9.00	m ²
Curb & Gutter	2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm
Total Cost for Kingsway Roadway Upgrade, per metre of Roadway = \$2,017.63						

Kingsway (Timberline to Glenwood) - Roadway Upgrade Build pavement structure to Arterial Standard (centre median with 2 lanes in each direction). 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts. Median assumed to have same pavement structure as roadway, in preparation for designated turn lanes.

Assumed: Existing pavement width = 13.0m (from MESS).

					Unit Prices		
Quantity	Unit	Cost	Description	Unit Price	Unit		
13.00	m ²	\$260.00	Asphalt Removal	\$20.00	m ²		
3.90	m ³	\$66.30	Excavation to Waste	\$17.00	m ³		
2.00	lm	\$34.00	Curb & Gutter Removal	\$17.00	lm		
4.00	m ²	\$80.00	Sidewalk Removal	\$20.00	m ²		
0.63	m ³	\$300.67	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne		
5.00	m ²	\$10.00	Tack Coat Between Asphalt Lifts	\$2.00	m ²		
5.00	m ²	\$10.00	Prime Coat	\$2.00	m ²		
1.00	m ³	\$68.17	3/4 Granular	\$29.00	Tonne		
1.50	m ³	\$102.26	3/4 Granular	\$29.00	Tonne		
5.00	m ²	\$45.01	Subgrade Preparation	\$9.00	m ²		
2.00	lm	\$240.00	Curb & Gutter	\$120.00	lm		
1.85	m ³	\$889.08	Asphalt Concrete Pavement - PG Grade (-40)	\$185.00	Tonne		
14.77	m ²	\$29.54	Tack Coat Between Asphalt Lifts	\$2.00	m ²		
14.77	m ²	\$29.54	Prime Coat	\$2.00	m ²		
3.20	m ³	\$217.98	3/4 Granular	\$29.00	Tonne		
4.91	m ³	\$334.38	3/4 Granular	\$29.00	Tonne		
16.36	m ²	\$147.20	Subgrade Preparation	\$9.00	m ²		
2.00	lm	\$240.00	Curb & Gutter	\$120.00	Im		
	Quantity 13.00 3.90 2.00 4.00 0.63 5.00 5.00 1.00 1.50 5.00 1.85 14.77 14.77 14.77 4.91 16.36 2.00	Quantity Unit 13.00 m² 3.90 m³ 2.00 lm 4.00 m² 0.63 m³ 5.00 m² 5.00 m² 1.00 m³ 1.50 m³ 1.60 m³ 1.85 m³ 1.4.77 m² 14.77 m² 3.20 m³ 4.91 m³ 16.36 m² 2.00 lm	Quantity Unit Cost 13.00 m² \$266.00 3.90 m³ \$86.30 2.00 lm \$\$34.00 4.00 m² \$\$80.00 0.63 m³ \$\$00.07 5.00 m² \$10.00 5.00 m² \$10.00 1.00 m³ \$\$88.10 1.00 m³ \$\$88.10 1.50 m³ \$\$10.226 5.00 m² \$\$45.01 2.00 lm \$\$240.00 1.85 m³ \$\$89.08 14.77 m² \$\$29.54 3.20 m³ \$\$334.38 16.36 m² \$\$147.20 2.00 lm \$\$240.00	Quantity Unit Cost Description 13.00 m ² \$260.00 Asphalt Removal 3.90 m ³ \$66.30 Excavation to Waste 2.00 Im \$34.00 Cuth & Guther Removal 4.00 m ² \$80.00 Sidewalk Removal 0.63 m ³ \$10.00 Filme Coat 0.63 m ³ \$10.00 Tack Coat Between Asphalt Lifts 5.00 m ² \$10.00 Tack Coat Between Asphalt Lifts 1.00 m ³ \$68.17 3/4 Granular 1.50 m ³ \$10.02 Filme Coat 1.50 m ³ \$240.00 Cuth & Gutter 1.77 m ² \$29.54 Tack Coat Between Asphalt Lifts 1.77 m ³ \$89.08 Asphalt Concrete Pavement - PG Grade (-40) 1.477 m ³ \$24.00 Cuth & Gutter 1.85 m ³ \$24.54 Tack Coat Between Asphalt Lifts 1.477 m ³ \$29.54 Tack Coat Between Asphalt Lifts 1	Quantity Unit Cost Description Unit Prices 13.00 m ² \$260.00 Asphalt Removal \$20.00 3.80 m ³ \$66.30 Excavation to Waste \$17.00 2.00 Im \$340.00 Curb & Gutter Removal \$17.00 4.00 m ² \$80.00 Sidewalk Removal \$20.00 0.63 m ³ \$10.00 File Removal \$20.00 0.63 m ³ \$10.00 File Removal \$22.00 5.00 m ² \$10.00 File Removal \$22.00 1.50 m ³ \$68.17 3/4 Granular \$22.00 1.50 m ³ \$68.17 3/4 Granular \$29.00 1.50 m ³ \$81.20 \$46.01 \$185.00 1.50 m ³ \$81.21 \$10.00 Prime Coat \$22.00 1.50 m ³ \$81.20 \$10.00 \$18.00 1.50 m ³ \$22.00 \$2.00 \$2.00 1.50 m ³		

Total Cost for Kingsway Roadway Upgrade, per metre of Roadway = \$3,104.14

Cold Lake Transportation Study	Asphalt (m ³ to Tonne) =	2.60	
Project No: 2010-3050	Granular (m ³ to Tonne) =	2.35	
Date: April 14, 2011	1m ² =	0.0001	ha

Glenwood (69 Avenue to Kingsway) - Roadway Upgrade Build pavement structure to Arterial Standard (2 lanes in each direction). 2.5% normal crown, asphalt placed in two lifts, tack coat between lifts.

Assumed: Existing pavement width = 13.0m (from MESS). Unit Prices Component - 1.0m Section of Roadway Remove Existing Pavement Unit Cost Description Unit Price Quantity m² Remove Asphalt 13.00 \$260.00 Asphalt Removal m³ Remove Base Course 3.90 \$66.30 Excavation to Waste Construct Pavement Structure \$889.08 Asphalt Concrete Pavement - PG Grade (-40) 1.85 m³ 125mm Asphalt Tack Coat 14.77 m² \$29.54 Tack Coat Between Asphalt Lifts Prime Coat 14.77 m² \$29.54 Prime Coat 200mm Granular Base 3.20 m³ \$217.98 3/4 Granular 300mm Granular Subbase m³ \$334.38 3/4 Granular 4.91

Unit

m²

m³

Tonne

m²

m²

Tonne

Tonne

m²

lm

\$20.00

\$17.00

\$185.00

\$2.00

\$2.00

\$29.00

\$29.00

\$9.00 \$120.00

150mm Subgrade Preparation Curb & Gutter

 16.36
 m²
 \$147.20
 Subgrade Preparation

 2.00
 im
 \$240.00
 Curb & Gutter

 Total Cost for Glenwood Roadway Upgrade, per metre of Roadway =
 \$\$22,214.01
 \$\$

Technical Memorandum

City of Cold Lake

Cold Lake Transportation Study Traffic Volume Forecast and Analysis

April 2011



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Introduction

The City of Cold Lake (City) is located 287 km northeast of the City of Edmonton and was formed in 1996 by merging three municipalities, namely Grand Centre, Medley (Canadian Forces Base W4) and Cold Lake. Grand Centre was subsequently renamed Cold Lake South (CLS) and the original Cold Lake is now known as Cold Lake North (CLN).

The City has experienced noticeable growth in recent years. According to municipal census the City had a population of 11,991 in 2006 and 13,924 in 2009. This corresponds to a 5.4% linear growth annually. Current transportation improvements within the City have been based on the previous transportation study completed in 2000 (2000 Transportation Study) and is no longer considered representative of the actual transportation network required to address current and future transportation needs.

In light of the continuing accelerated pace of development in the region and the need to rationalize and identify the transportation network requirements for the City, including surrounding rural municipalities and counties, the existing transportation plan requires a comprehensive update.

1.1 STUDY BACKGROUND

Associated Engineering (AE) was retained by the City to update the existing transportation study. The purpose of the transportation study is to provide a comprehensive long-range plan that integrates the transportation infrastructure with requirements of the existing and future land uses. The transportation study will provide the City with a blueprint on which to plan and implement specific transportation network improvement projects over the next 20 years in 5-year, 10-year, 15-year, and 20-year planning horizons.

One component of the transportation study was to forecast the future traffic volumes for the next 20 years. Traffic volumes were forecasted for the 5-year, 10-year, 15-year, and 20-year planning horizons, and analyzed to determine the future road classification and the number of lanes required to accommodate the future traffic volumes. This technical memorandum presents the methodology used and the results from the traffic volume forecast and analysis.

1.2 STUDY AREA

The traffic volume forecast will encompass the area bounded by the current city limits. Figure 1.1 presents the study area.



1.3 STUDY OBJECTIVE

The objectives for the traffic volume forecast and analysis were:

- Forecast the future traffic volumes over the next 20 years, in 5-year planning horizons
- Establish the required road classification for the City's major road network over the next 20 years
- Determine the number of lanes required for the City's major road network over the next 20 years.

For the purpose of the study, the afternoon (p.m.) peak hour traffic volume forecast was considered to be the most critical and was selected for the analysis. The following planning horizons were analyzed:

- 5-year (2015) horizon
- 10-year (2020) horizon
- 15-year (2025) horizon
- 20-year (2030) horizon.

1-2

The road classification and number of lanes required to accommodate traffic under the 20-year (2030) horizon will be used by the City to preserve the right-of-way required to accommodate future roadway expansion.





PROJECT NO:	2010-3050
DATE:	FEBRUARY 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 1.1 TRAFFIC FORECAST STUDY AREA 2

Traffic Forecast: Methodology

A spreadsheet model, following the four-step planning process, was used to forecast the future traffic volumes. To complete the spreadsheet model, a skeletal road network was developed for each planning horizon to represent the anticipated road network. The major road network (collectors and arterials) identified for each planning horizon in the 2000 Transportation Study were used to represent the skeletal road network for the respective planning horizon. Aside from alignment changes to English Bay Road/ 28 Street/25 Street in the northwest quadrant and the classification of Centre Avenue, between 57 Street and Highway 28, as a four-lane arterial, the major road networks presented in the 2000 Transportation Study were considered to be valid. Changes were made to the 5-year and 10-year road networks to reflect the current alignment of English Bay Road/28 Street/25 Street.

Future traffic within the City will be comprised of background traffic and development traffic. Background traffic represents the growth in existing traffic reflecting the additional trips generated in the surrounding areas and in the City's existing subdivisions. Future background traffic volumes for each planning horizon were estimated by applying an annual growth rate of 2% to the existing (2010) traffic volumes, over a 5-year, 10-year, 15-year, and 20-year period.

Development traffic represents traffic generated by new subdivisions or area redevelopment. The information about future development or redevelopment within the City was obtained from the City's Area Structure Plans (ASP), Area Redevelopment Plans (ARP) and Outline Pans, and from the Municipal District (MD) of Bonnyville's Intermunicipal Development Plan (IDP). Future development traffic volumes for each planning horizon were estimated using a four-step process, which involved:

- **Trip Generation:** Estimate the number of trips generated from and attracted to each development/redevelopment
- **Trip Distribution**: Estimate the origin and destination of trips to and from each development/redevelopment
- Modal Split: Not within the scope of the study
- **Trip Assignment**: Select the routes to and from the developments/redevelopments and assign the development traffic volumes to the City's road network.



3

Traffic Forecast: Background Traffic Volumes

Growth rate calculations were completed as part of the existing condition analysis for the transportation study update and an annual, non-compounding, growth rate of 2.0% was established. The growth rate was selected after discussions with the City. The detailed growth rate calculations can be referenced in the technical memorandum titled Existing (2010) Traffic Operational Analysis.

3.1 FORECASTED BACKGROUND TRAFFIC VOLUMES

Background traffic volumes for the planning horizons were estimated by applying the 2.0% annual growth rate to the existing (2010) traffic volumes, over a 5-year, 10-year, 15-year and 20-year period. The existing (2010) daily traffic volumes were obtained from the Existing (2010) Traffic Operational Analysis technical memorandum and presented in Figure 3.1.

Figure 3.2 through Figure 3.5 present the forecasted daily background traffic volumes for the 5-year, 10-year, 15-year and 20-year horizons.







	2010-3050
FRUJEUT NU.	
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 3.1 EXISTING (2010) DAILY TRAFFIC VOLUMES





PROJECT NO: DATE:	2010-3050 APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 3.2 5 YEAR (2015) DAILY BACKGROUND TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 3.3 10 YEAR (2020) DAILY BACKGROUND TRAFFIC VOLUMES





PROJECT NO: DATE:	2010-3050 APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 3.4 15 YEAR (2025) DAILY BACKGROUND TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 3.5 20 YEAR (2030) DAILY BACKGROUND TRAFFIC VOLUMES

4 Traffic Forecast: Future Development Traffic Volumes

4.1 FUTURE DEVELOPMENTS

There are 20 development/redevelopment projects identified for the City and surrounding area in the next 20 years; 13 are located within the City and seven are located outside the City, in the MD of Bonnyville. The development/redevelopment projects are shown in Figure 4.1 and are discussed in the following sections.

AE contacted the Department of Defence in Medley to obtain information about future land use growth or change within the base, and was informed that there would be no expected changes or growth within the 20-year planning horizon of the transportation study.

4.1.1 City of Cold Lake

The 13 development/redevelopment projects expected within the City are:

- Fischer Estates: 63.5 hectares located in Cold Lake South (SE ¼ 34-62-2-4)
- Iron Horse: 30.77 hectares located in Cold Lake South (N ½ f 34-62-2-4)
- Cold Lake Central: 248.0 hectares located between Cold Lake North and Cold Lake South (W ½ 11-63-2-4, W ¼ 2-63-2-4, and S ½ 2-63-11-4)
- Grand Centre SE: 105.0 hectares located in Cold Lake South (W ½ 35-62-2-4)
- Forest Heights: 64.0 hectares located in Cold Lake North (NW ¼ o13-63-2-4)
- Northshore: 244.0 hectares located in Cold Lake North (NE ¼ 22-63-2-4, SE ¼ 22-63-2-4, SW ¼ 23-63-2-4, and NW ¼ 23-63-2-4)
- Lot 2, Plan 982 1024: 1.81 hectares located in Cold Lake North (SE ¼ 23-63-2-4)
- Horseshoe Bay: 77.7 hectares located in Cold Lake North (NW ¼ 26-63-2-4, SW ¼ 35-63-2-4, and NW ¼ 35-63-2-4)
- Uplands: 101.9 hectares located in Cold Lake north (NE 13-63-2-4 and SE 13-63-2-4)
- Lakeshore Redevelopment: 66.0 hectares located in Cold Lake North.
- Lakewood Estates: 21.3 hectares located in Cold Lake North (SW ¼ 26-63-2-4)
- **Creekside Estates**: 60.5 hectares located in Cold Lake North (SE ½ 22-63-2-4)
- Parkview Estates: 36.8 hectares located in Cold Lake North (NW 23-63-2-4).





PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	FEBRUARY 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.1 FUTURE DEVELOPMENT/REDEVELOPMENT PROJECTS CITY OF COLD LAKE AND SURROUNDING AREA

4.1.2 MD of Bonnyville

The seven development projects expected outside the City, in the MD of Bonnyville are:

- Hills of Cold Lake: 119.3 hectares located northwest of Cold Lake North (SE, NE ¼ 34-63-2-4)
- Fawn Ridge Estates: 34.9 hectares located south of Cold Lake South (NW ¼ 23-62-2-4)
- **IDP Residential Development 1:** 63 hectares located along the north side of Highway 55, west of the City
- **IDP Residential Development 2:** 84 hectares located west of the IDP Commercial Development, from 75 Avenue and south of 61/62 Avenue
- **IDP Residential Development 3:** 418 hectares located east of Cold Lake Central, from Energy Centre and 55 Avenue
- **IDP Industrial Development:** 392 hectares located along both sides of Highway 55, west of the City
- **IDP Commercial Development:** 157 hectares located along the west side of Highway 28, from Energy Centre to 55 Avenue.

4.1.3 Development Phasing

The ASP, ARP and Outline Plans for the development/redevelopment projects provided by the City and the IDP did not discuss the expected timing or staging for the projects. Most of the documents stated that the timing would be dictated by market conditions and the availability of municipal servicing capacity.

To forecast the future development traffic volumes for each planning horizon, the following assumptions were made:

- Each development/redevelopment plan will experience 25% growth in each planning horizon with full build-out by 2030 except for Fischer Estates, Iron Horse, Forest Heights and the IDP developments
- Development of Fischer Estates, Iron Horse and Forest Heights will be delayed until 2020. By 2030, these three developments will be 50% developed
- Development of the residential land from the IDP will be delayed until 2015. By 2030, the three residential developments will be 30% developed
- Development of the industrial land from the IDP will be delayed until 2015. By 2030, the industrial development will be 20% developed
- Development of the commercial land from the IDP will be delayed until 2015. By 2030, the commercial development will be 30% developed.

The development phasing assumptions were established through discussions with the City's Planning Department. Table 4.1 summarizes the development phasing assumed for each planning horizon.



Development / Redevelopment	Land Use	5-year (2015) Horizon	10-year (2020) Horizon	15-year (2025) Horizon	20-year (2030) Horizon
Fischer Fototoo	Residential	d Use 5-year (2015) Horizon 10-year (2020) Horizon 1 ((2020) Horizon lential 0% 0% 1 lential 0% 0% 1 lential 0% 0% 1 lential 0% 0% 1 lential 25% 50% 1 lential 25% 50% 1 dential 25% 50% 1 lential 25% 50% 1 utional 25% 50% 1 ol 0% 0% 1 dential 50% 100% 1 dential 25% 50% 1 lential 25% 50% 1 lential 25% 50% 1	25%	50%	
FISCHER ESTATES	Commercial	0%	0%	25%	50%
Iron Horse	Residential	0%	0%	25%	50%
	Residential	25%	50%	75%	100%
Cold Lake Central	Commercial	50%	100%	100%	100%
Grand Centre	Residential	25%	50%	75%	100%
Southeast	Industrial	25%	50%	75%	100%
Forest Heights	Residential	0%	0%	25%	50%
	Residential	25%	50%	75%	100%
Newteshews	Commercial	25%	50%	75%	100%
NorthShore	Institutional	25%	50%	75%	100%
	School	0%	0%	100%	100%
Lot 2, Plan 982 1024	Commercial	100%	100%	100%	100%
Horseshoe Bay	Residential	50%	100%	100%	100%
	Residential	25%	50%	75%	100%
Uplands	Health Services & Mixed Use	25%	50%	75%	100%
Lakeshore Area Redevelopment	All	25%	50%	75%	100%

Table 4-1Development Phasing Assumption

Development / Redevelopment	Land Use	5-year (2015) Horizon	10-year (2020) Horizon	15-year (2025) Horizon	20-year (2030) Horizon
Lakewood Estates	Residential	25%	50%	75%	100%
Creekside Estates	Residential	25%	50%	75%	100%
Dorla iour Estatos	Residential	25%	50%	75%	100%
Parkview Estates	Commercial	25%	50%	75%	100%
Hills of Cold Lake	Residential	25%	50%	75%	100%
Fawn Ridge Estates Development	Residential	25%	50%	75%	100%
IDP Residential Development 1	Residential	0%	10%	20%	30%
IDP Residential Development 2	Residential	0%	10%	20%	30%
IDP Residential Development 3	Residential	0%	10%	20%	30%
IDP Industrial Development	Industrial	0%	5%	10%	20%
IDP Commercial Development	Commercial	0%	10%	20%	30%

4.2 TRIP GENERATION

The ASP, ARP and Outline Plans for the development/redevelopment projects were reviewed to obtain information regarding the future land uses and the associated developable area. Of particular relevance was the residential, commercial, industrial and institutional land uses.

Portions of the above mentioned subdivisions are currently developed. Traffic volumes from the developed portions are captured by existing (2010) traffic volumes; therefore, these areas were not included in the forecast for the future development traffic volumes. The breakdown of the future land uses and areas for each development/redevelopment project are presented in Appendix A.

Table 4.2 summarizes the trip generation calculations for each development/redevelopment project. The Institute of Transportation Engineer (ITE) Trip Generation Handbook (7th Edition) was referenced to obtain trip rates for each land use. The maximum site coverage assumptions listed in Table 4.2 reflect those stated in the Traffic Demand Forecast Work Plan established at project initiation and attached in Appendix B. Some site coverage assumptions were revised using engineering judgement to reflect more practical trip estimates.



4-8

Figure 4.2 through Figure 4.5 present the expected p.m. peak hour trips generated by each development/redevelopment project, for the 5-year, 10-year, 15-year and 20-year horizon, respectively.

In order to establish the trip distribution within the City, the study area was broken into nine traffic analysis zones (TAZ), and is illustrated in Figure 4.6. Zone boundaries were selected to encompass areas with relatively homogenous land use types (e.g., business zones and residential zones).

City of Cold Lake Transportation Study	1 hectare =	107,639.1	sq.ft.
Project No: 2010-3050	1 hectare =	2.4711	acre
Date: April 9, 2011			

Table 4.2 Future Developments Trip Generation

Trip Generation - ITE Trip Generation Handbook

Development Low Fischer						Indonondont	Variable			ITE	Data					Trip	s (T)		
	Description	# of	Unit	Land Lico Description	Maximum Lot	independent	valiable	AM P	Peak		PM P	eak			AM Peak			PM Peak	
Development	Description	# 01	Onit		Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	449	du	210: Single Family Residential	-	Dwelling Units	449	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	324	81	243	414	261	153
Low I Fischer	Multi Family Residential	295	du	230: Residential Condo/Townhouse	-	Dwelling Units	295	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	123	21	102	146	98	48
FISCHEI	Commercial - Arterial	0.0	ha	Land Use Description Maximum Lot Coverage Single Family Residential - Residential Condo/Townhouse - Jusiness Park 80% Jusiness Park 50%	1000 sq.ft	0.0	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	-	-	-	-	-	-	
Comm	Commercial - Neighbourhood	5.8	ha	770: Business Park	50%	1000 sq.ft	313.3	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	438	368	70	431	99	332
					Tota	I Dwelling Units	744						Total Trips:	884	470	415	992	458	534

Total Commercial/Industrial (1000 sq.ft) 313

						Indonondont	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	valiable	AM P	Peak		PM P	eak			AM Peak			PM Peak	1
Low D	p		•		Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	323	du	210: Single Family Residential	-	Dwelling Units	323	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	236	59	177	308	194	114
Iron Horse	Medium Density Residential	18	du	230: Residential Condo/Townhouse	-	Dwelling Units	18	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	13	2	11	15	10	5
	High Density Residential	45	du	223: Mid-Rise Apartment	-	Dwelling Units	45	T = 0.41(X) - 13.06	31%	69%	T = 0.48(X) - 11.07	58%	42%	5	2	4	11	6	4
Total Dwelling					I Dwelling Units	386			-			Total Trips:	254	63	191	333	210	123	

						Indonandant	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	variable	AM P	eak		PM P	Peak			AM Peak			PM Peak	1
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	1,354	du	210: Single Family Residential	-	Dwelling Units	1,354	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	957	239	718	1,118	705	414
Cold Lake Control Area	Medium Density Residential	578	du	230: Residential Condo/Townhouse	- Dwelling Units 1,354 - Dwelling Units 578 Lr	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	210	36	174	253	170	84		
Cold Lake Certifal Area	High Density Residential	an Density Residential 602 du 223: Mid-Rise Apartment - Dwelling Units	602	T = 0.41(X) - 13.06	31%	69%	T = 0.48(X) - 11.07	58%	42%	234	72	161	278	161	117				
Corr	Commercial - Arterial	18.7	ha	770: Business Park	80%	1000 sq.ft	1,612.7	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	2,182	1,833	349	1,949	448	1,500
					Tota	I Dwelling Units	2,534						Total Trips:	3,583	2,180	1,403	3,598	1,484	2,114

Total Commercial/Industrial (1000 sq.ft) 1,612.7

						Indonondont	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	variable	AM P	eak		PM P	eak			AM Peak			PM Peak	[
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
	Low Density Residential	281	du	210: Single Family Residential	-	Dwelling Units	281	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	206	52	155	272	171	101
Grand Centre SE	Mobile home	150	du	240: Mobile Home Park	-	Dwelling Units	150	Ln(T) = 0.64Ln(X) + 0.96	20%	80%	T = 0.57(X) + 2.06	62%	38%	65	13	52	88	54	33
	Industrial - Light Industrial	5.9	ha	130: Industrial Park	60%	1000 sq.ft	380.1	Ln(T) = 0.77Ln(X) + 1.09	82%	18%	T = 0.77(X) + 42.11	21%	79%	288	236	52	335	70	265
					Tota	I Dwelling Units	431						Total Trips:	559	301	258	694	296	398

Total Commercial/Industrial (1000 sq.ft) 380.1

						Indonondoné	Variable			ITE	Data					Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	variable	AM P	eak		PM P	eak			AM Peak			PM Peak	
Sinc					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Foront Heights	Single Family Residential	345	du	210: Single Family Residential	-	Dwelling Units	345	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	251	63	188	327	206	121
Forest Heights	Multi Family Residential	248	du	230: Residential Condo/Townhouse	-	Dwelling Units	248	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	107	18	89	127	85	42
Total Dwelling Units						593						Total Trips:	358	81	277	453	291	163	

ITE Data Independent Variable AM Peak Maximum Lot PM Peak Development Description # of Unit Land Use Description Coverage Equation or Average Rate % In Units (X) Equation or Average Rate % Inbound % Outbound Description 537 du 210: Single Family Residential Dwelling Units 537 T = 0.70X + 9.43 25% 75% Ln(T) = 0.90Ln(X) + 0.53 6 ow Density Residential 475 du 230: Residential Condo/Townhouse Medium Density Residential Dwelling Units 475 Ln(T) = 0.80Ln(X) + 0.26 83% Ln(T) = 0.82Ln(X) + 0.32 6 547 du 223: Mid-Rise Apartment Dwelling Units 547 T = 0.48(X) - 11.07 Mixed Use Commercial ¹ 6.5 ha 770: Business Park 174.9 Ln(T) = 0.98Ln(X) + 0.45 84% 16% Ln(T) = 0.92Ln(X) + 0.7825% 1000 sq.ft Northshore 157 du 223: Mid-Rise Apartment 157 T = 0.41(X) - 13.06 31% 69% T = 0.48(X) - 11.07 Dwelling Units Mixed Use Institutional² 2.6 ha 720: Medical-Dental Office Building 15% 1000 sq.ft 42.0 79% 21% 2.48 3.72
 1,958
 Ln(T) = 1.11Ln(X) - 1.73
 55%
 45%

 96.9
 Ln(T) = 0.98Ln(X) + 0.45
 84%
 16%

 1,958
 students
 520:
 Elementary School

 1.8
 ha
 770:
 Business Park

 11.9
 ha
 770:
 Business Park
 Students Ln(T) = 1.08Ln(X) - 1.90 School Site Commercial - Neighbourhood 50% 1000 sq.ft Ln(T) = 0.92Ln(X) + 0.782 1000 sq.ft 1,024.7 Ln(T) = 0.98Ln(X) + 0.45 84% 16% ommercial - Arterial 80% Ln(T) = 0.92Ln(X) + 0.78

1. Maximum lot coverage for commercial portion of mix use commercial assumed to be 25% 2. Maximum lot coverage for institutional portion of mix use insitutuional assumed to be 15%



				Trip	s (T)		
			AM Peak			PM Peak	
bound	% Outbound	Total	In	Out	Total	In	Out
3%	37%	385	96	289	487	307	180
7%	33%	180	31	149	216	145	71
8%	42%	211	65	146	251	146	106
3%	77%	247	208	40	252	58	194
8%	42%	51	16	35	64	37	27
7%	73%	104	82	22	156	42	114
5%	55%	799	439	360	537	242	295
3%	77%	139	116	22	147	34	113
3%	77%	1,399	1,175	224	1,284	295	989
	Total Trips:	3,516	2,229	1,286	3,394	1,305	2,089

					Maximum Lot	Independen	t Variable)l-	ITE	Data DM Deals		_	AM Deals	Trips	(T) د	DM Deet	
Development	Description	# of	Unit	Land Use Description	Coverage	Description	Units (X)	Equation or Average Rate	^{veaк} % Inbound	% Outbound	Equation or Average Rate % Inbo	ound % Outbound	i Total	In In	Out	Total	In Peak	Out
Lot 2	Commercial - Arterial	15,365	sq.ft	770: Business Park	· ·	1000 sq.ft	15.4	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 239	% 77%	23	19	4	27	6	21
				Tota	al Commercial/Indus	strial (1000 sq.ft)	15.4					Total Trips	: 23	19	4	27	6	21
										ITE	Data				Trin	s (T)		
Development	Description	# of	Unit	L and Use Description	Maximum Lot	Independen	t Variable	AM F	Peak		PM Peak			AM Peak		(.)	PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbo	ound % Outbound	l Total	In	Out	Total	In	Out
Horseshoe Bay	Low Density Residential	42	du	210: Single Family Residential	-	Dwelling Units	42	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53 639	% 37%	39	10	29	49	31	18
					Tota	al Dwelling Units	42					Total Trips	: 39	10	29	49	31	18
						Independent	4 Variabla			ITE	Data				Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	Independen	it variable	AM F	Peak		PM Peak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbo	ound % Outbound	I Total	In	Out	Total	In	Out
	Single Family Residential	904	du	210: Single Family Residential	-	Dwelling Units	904	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53 639	% 37%	642	161	482	778	490	288
Uplands	Multi Family Residential	480	du	230: Residential Condo/Townhouse	-	Dwelling Units	480	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32 679	% <u>33%</u>	181	31	150	218	146 52	72
Maximum site coverage for H	Health Care & Mixed Use assumed to be 50%	5.0	Пă	620: Nursing Home	50% Tota	al Dwelling Units	1.384	0.38	03%	4770	0.42 477	Total Trips	102 : 926	246	48 680	1.108	53 689	419
AM directional split for Nursin	ng Home, by 1000 sq. ft., not available. Assume reve	rse of PM direc	tional split	Total H	lealth Care & Mixed	Use (1000 sq.ft)	269.1							·				
SUPTRACT																		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	Independen	it variable	AM F	Peak		PM Peak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbo	ound % Outbound	i Total	In	Out	Total	In	Out
	902 10 Street	0.11	hec	770: Business Park	50%	1000 sq.ft	5.9	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 239	% 77%	9	8	1	11	3	9
	904 10 Street	0.07	hec	770: Business Park	50%	1000 sq.ft	3.7	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78 239	% 77%	6	5	1	7	2	6
Lakeshore ARP	901 9 Avenue 803 10 Avenue	0.11	hec	770: Business Park 770: Business Park	50%	1000 sq.ft	6.0 12 1	Ln(1) = 0.98Ln(X) + 0.45 Ln(T) = 0.98Ln(X) + 0.45	84% 84%	16%	Ln(1) = 0.92Ln(X) + 0.78 239 Ln(T) = 0.92Ln(X) + 0.78 239	% 77%	9	15	3	22	3	9
	Fire Hall / Community Hall	0.34	hec	495: Recreational Community Center ⁵	50%	1000 sq.ft	18.4	22.88	50%	50%	10 % of All Day	0 ///0	422	211	211	42	21	21
For Fire Hall, assumed same	e trip rate as future community centre. Trips will remain	n the same ess	entially.		Total Comme	ercial (1000 sq.ft)	27.7					Total Trips	: <mark>464</mark>	246	218	94	33	61
				Total Fi	re Hall / Community	Hall (1000 sq.ft)	18.4											
						Independen	4 Variabla			ITE	Data				Trip	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independen		AM F	eak		PM Peak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Inbo	ound % Outbound	i Total	In	Out	Total	In	Out
	Vacant parcel on 12 Street and 8 Avenue	38	du	230: Residential Condo/Townhouse	-	Dwelling Units	38	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32 679	% 33%	24	4	20	27	18	9
	902 10 Street	15	du	223: Mid-Rise Apartment ⁶	-	Dwelling Units	15	0.3	31%	69%	0.39 589	% <u>42%</u>	4	1	3	6	3	2
	904 10 Street	9	du	223: Mid-Rise Apartment	-	Dwelling Units	9 15	0.3	31%	69% 69%	0.39 589	% 42% % 42%	3		2	4	2	2
Lakeshore ARP	803 10 Avenue	3	du	210: Single Family Residential	-	Dwelling Units	3	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53 639	% 37%	12	3	9	5	3	2
	Triangle Park	0.11	hec	411: City Park ⁷	100%	Acres	0.3	1.59	50%	50%	10 % of All Day		0	0	0	0	0	0
	Bibeau Park	1.16	hec	411: City Park	100%	Acres	2.9	1.59	50%	50%	10 % of All Day		5	2	2	0	0	0
	Centoaph Park	0.26	hec	411: City Park	100%	Acres	0.6	1.59	50%	50%	10 % of All Day		1	1	1	0	0	0
A	Fire Hall / Community Hall	0.34	hec	495: Recreational Community Center °	50%	1000 sq.ft	18.4	22.88	50%	50%	10 % of All Day	T - (- T - '	422	211	211	42	21	21
Average rate used instead of Trip rate for park is for all day	weekday. PM trips assumed to be 10% of all day th	es.	under AM Tr	inc)	Total	ai Dweiling Units	2.0	-				Total Trips	4/5	223	201	90	51	38
Trip rate for community centr	re is for all-day, weekday. PM trips assumed to be 10% of all-day if	% of all-day trip	s (presented	l under AM Trips). To be used for special events only. Total Fi	re Hall / Community	Hall (1000 sq.ft)	18.4											
					-								_					
					Maximum Lot	Independen	t Variable	AME)ook	ITE	Data PM Book			AM Book	Trips	5 (T)	DM Book	
Development	Description	# of	Unit	Land Use Description	Coverage		11-24- 00			a	Fini Feak			AWFeak		Tree 1	FIVI Feak	
		150				Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate % Indo	ouna % Outbound	i iotai	in	Out	Total	in	Out
	Low Density Residential	153	du	210: Single Family Residential	- Tot:	Dwelling Units	153	I = 0.70X + 9.43	25%	/5%	Ln(1) = 0.90Ln(X) + 0.53 63%	6 3/% Total Trips	117 117	29	87 87	157	99	58
Lakewood					Tota		100	_						20	01	107		00
Lakewood										ITE	D-1-					e (T)		
Lakewood						Independen	t Variable			116	Data				I rip.	3(1)		-
Lakewood Development	Description	# of	Unit	Land Use Description	Maximum Lot	Independen	t Variable	AM F	eak		PM Peak			AM Peak	Trip	3(1)	PM Peak	
Lakewood Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independen Description	t Variable Units (X)	AM F Equation or Average Rate	eak % Inbound	% Outbound	PM Peak Equation or Average Rate % Inbo	ound % Outbound	i Total	AM Peak In	Out	Total	PM Peak In	Out
Lakewood Development	Description Low Density Residential	# of 594	Unit	Land Use Description 210: Single Family Residential	Maximum Lot Coverage	Independen Description Dwelling Units	Units (X)	AM F Equation or Average Rate T = 0.70X + 9.43	Peak % Inbound 25%	% Outbound 75%	PM Peak Equation or Average Rate % Inbot Ln(T) = 0.90Ln(X) + 0.53 639	ound % Outbound	i Total 425	AM Peak In 106	Out 319	Total	PM Peak In 336	Out 197

107,639.1 2.4711

1 hectare =

1 hectare =

sq.ft.

acre

City of Cold Lake Transportation Study

Project No: 2010-3050 Date: April 9, 2011

City of Cold Lake Transportation Study Project No: 2010-3050 Date: April 9, 2011	1 hectare = 1 hectare =	107,639.1 2.4711	sq.ft. acre
Table 4.2 Future Developments Trip Generation Trip Generation - ITE Trip Generation Handbook			

						Independent	Variable			ITE	Data					Trips	5 (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independent	variable	AM P	Peak		PM P	eak			AM Peak			PM Peak	
					Coverage		Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound % Out	bound	Total	In	Out	Total	In	Out
Parkviow	Low Density Residential	367	du	210: Single Family Residential	-	Dwelling Units	367	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63% 37	%	266	67	200	345	218	128
Faikview	Commercial	2.6	ha	770: Business Park	50%	1000 sq.ft	141.7	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23% 77	%	201	169	32	208	48	160
					Tota	I Dwelling Units	367					Total	Trips:	467	236	232	553	265	288
				Total C	Total Commercial/Industria		141.7												
										ITE	Data					Tring	(T)		
					Maximum Lot	Independent	Variable	AM P	Peak		PM P	eak			AM Peak	Inpa		PM Peak	
Development	Description	# of	Unit	Land Use Description	Coverage										- in i cak			- Mir cuk	
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound % Out	bound	Iotal	In	Out	Iotal	In	Out
MD - Hills of Cold Lake	Option 2 - 300 1/2 Acre Lot Subdivision	300	du	210: Single Family Residential	-	Dwelling Units	300	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63% 37	%	219	55	165	288	182	107
	-				Tota	Dwelling Units	300					Total	Trips:	219	55	165	288	182	107
						-													
						Independent	Variable				Tri			ips (T)					
Development	Description	# of	Unit	Land Use Description	Maximum Lot			AM Peak			PM P	eak	AM Peak				PM Peak		
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound % Out	oound	Total	In	Out	Total	In	Out
MD - Fawn Ridge Estates ⁹	Country Residential Lots	0	du	210: Single Family Residential	-	Dwelling Units	54	0.77	26%	74%	1.02	64% 36	%	42	11	31	55	35	20
9. Information, including dwelling un	nits, trip generation rates and percentage splits, as p	er 2010 TIA			Tota	I Dwelling Units	54					Total	Trips:	42	11	31	55	35	20
						Independent	Variable			ITE	Data	-				Trips	s (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot			AM F	Peak		PM P	eak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound % Out	oound	Total	In	Out	Total	In	Out
IDD Residential Development 1	Low Density Residential	283	du	210: Single Family Residential	-	Dwelling Units	283	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63% 37	%	208	52	156	273	172	101
IDP - Residential Development 1	Multi Family Residential	236	du	230: Residential Condo/Townhouse	-	Dwelling Units	236	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67% 33	%	103	17	85	122	81	40
					Tota	I Dwelling Units	519					Total	Trips:	310	69	241	395	254	141
						Independent	Variable			ITE	Data					Trips	5 (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	maoponaon	Tanabio	AM F	Peak		PM P	eak			AM Peak			PM Peak	
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound % Out	bound	Total	In	Out	Total	In	Out
IDD Desidential Development 2	Low Density Residential	379	du	210: Single Family Residential	-	Dwelling Units	379	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63% 37	%	275	69	206	356	224	132
Residential Development 2	Multi Family Residential	316	du	230: Residential Condo/Townhouse	-	Dwelling Units	316	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67% 33	%	130	22	108	154	104	51
					Tota	I Dwelling Units	696					Total	Trips:	405	91	314	510	328	183
								-											

Multi Family Residential	316	du	230: Residential Condo/Townhouse	-	Dwelling Units	316	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	130	22	108	154	104	51
				Tota	al Dwelling Units	s <u>696</u>	1					Total Trips	: <mark>405</mark>	91	314	510	328	183
					Indonondor	nt Variabla			ITE	Data					Trip	s (T)		
Description	# of	Unit	Land Use Description	Maximum Lot	t	it variable	AM Pe	eak		PM Peak			AM Peak			PM Peak		
·				Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rat	e % Inboun	d % Outbound	Total	In	Out	Total	In	Out
Low Density Residential	1,880	du	210: Single Family Residential	-	Dwelling Units	1,880	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	1326	331	994	1503	947	556
Multi Family Residential	1,567	du	230: Residential Condo/Townhouse	-	Dwelling Units	1,567	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	467	79	387	574	385	189
				Totr	al Dwelling Units	s 3,447						Total Trips	1,792	411	1,381	2,077	1,331	746
							-											
					Indonondon	at Variable			ITE	Data					Trip	s (T)	1	
Description	# of	Unit	Land Use Description	Maximum Lot	t	it variable	AM Pe	eak		PM	Peak			AM Peal	(PM Peak	
Description	<i>"</i> 0.	0		Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rat	e % Inboun	d % Outbound	Total	In	Out	Total	In	Out
Industrial - Light & Heavy Industrial	78	ha	130: Industrial Park	25%	1000 sq.ft	2,109.4	Ln(T) = 0.77Ln(X) + 1.09	82%	18%	T = 0.77(X) + 42.11	21%	79%	1,079	885	194	1,666	350	1,316
- Industial Developments assumed to be 25%			Total (Commercial/Indu	strial (1000 sq.ft	.) 2,109						Total Trips	: 1,079	885	194	1,666	350	1,316
							-											
	1								ITE	Data					Trip	(T)		
	N N	() ()			Independent	4 Maniah la										·s (I)		
Description	# of	Unit	Land Use Description	Maximum Lot	Independen	nt Variable	AM Pe	eak		PM	Peak			AM Peal		(I)	PM Peak	
Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independer Description	nt Variable Units (X)	AM Pe Equation or Average Rate	eak % Inbound	% Outbound	PM Equation or Average Rat	e % Inboun	d % Outbound	Total	AM Peal	Out	Total	PM Peak In	Out
Description Commercial - Arterial	# of 47.2	Unit	Land Use Description 770: Business Park	Maximum Lot Coverage 25%	Independent Description 1000 sq.ft	Units (X)	AM Pe Equation or Average Rate Ln(T) = 0.98Ln(X) + 0.45	eak % Inbound 84%	% Outbound	PM Equation or Average Rat Ln(T) = 0.92Ln(X) + 0.78	e % Inboun	d % Outbound	Total	AM Peal In 1,451	Out 276	Total	PM Peak In 360	Out
Description Commercial - Arterial - Industial Developments assumed to be 25%	# of 47.2	Unit ha	Land Use Description 770: Business Park Total C	Maximum Lot Coverage 25% Commercial/Indus	Independer Description 1000 sq.ft strial (1000 sq.ft)	Units (X)	AM Pe Equation or Average Rate Ln(T) = 0.98Ln(X) + 0.45	eak % Inbound 84%	% Outbound	PM Equation or Average Rat Ln(T) = 0.92Ln(X) + 0.78	e % Inboun 23%	d % Outbound 77% Total Trips	Total 1,727	AM Peal In 1,451 1,451	C Out 276 276	Total 1,565	PM Peak In 360 360	; 0 1,: 1,:
Description Commercial - Arterial - Industial Developments assumed to be 25%	# of 47.2	Unit	Land Use Description 770: Business Park Total C	Maximum Lot Coverage 25% Commercial/Indus	t Description 1000 sq.ft strial (1000 sq.ft	Units (X) 1,270.8 1,271	AM Pe Equation or Average Rate Ln(T) = 0.98Ln(X) + 0.45	eak % Inbound 84%	% Outbound	PM Equation or Average Rat Ln(T) = 0.92Ln(X) + 0.78	Peak e % Inboun 23%	d % Outbound 77% Total Trips	Total 1,727 1,727	AM Peal In 1,451 1,451	Out 276 276	Total 1,565 1,565	PM Peak In 360 360	Cout 1,205 1,205
Description Commercial - Arterial ' - Industial Developments assumed to be 25%	# of	Unit ha	Land Use Description 770: Business Park Total C	Maximum Lot Coverage 25% Commercial/Indus	t Description 1000 sq.ft strial (1000 sq.ft)	Units (X) 1,270.8 1,271	AM Pe Equation or Average Rate Ln(T) = 0.98Ln(X) + 0.45	eak % Inbound 84%	% Outbound	PM Equation or Average Rat Ln(T) = 0.92Ln(X) + 0.78	e % Inboun 23%	d % Outbound 77% Total Trips	Total 1,727 1,727	AM Peal In 1,451 1,451	Cout 276 276	Total 1,565 1,565	PM Peak In 360 360	COut 1,205 1,205
Description Commercial - Arterial Commercial Developments assumed to be 25%	# of	Unit	Land Use Description 770: Business Park Total C	Maximum Lot Coverage 25% Commercial/Indus	t Description 1000 sq.ft strial (1000 sq.ft	Units (X) 1,270.8 1,271	AM Pe Equation or Average Rate Ln(T) = 0.98Ln(X) + 0.45	eak % Inbound 84%	% Outbound 16%	PM Equation or Average Rat Ln(T) = 0.92Ln(X) + 0.78	Peak e % Inbour 23%	d % Outbound 77% Total Trips	Total 1,727 : 1,727	AM Peal In 1,451 1,451	Out 276 276	Total 1,565 1,565	PM Peak In 360 360	0ut 1,205 1,205
Description Commercial - Arterial ? - Industial Developments assumed to be 25%	# of	Unit	Total (Maximum Lot Coverage 25% Commercial/Indu	Independer Description 1000 sq.ft strial (1000 sq.ft)	Units (X) 1,270.8) 1,271	AM Pe Equation or Average Rate Ln(T) = 0.98Ln(X) + 0.45	eak % Inbound 84%	% Outbound 16%	PM Equation or Average Rat Ln(T) = 0.92Ln(X) + 0.78	e % Inbourn 23%	d % Outbound 77% Total Trips	Total 1,727 : 1,727	AM Peal In 1,451 1,451	Out 276 276	Total 1,565 1,565	PM Peak In 360 360	0ut 1,205 1,205
	Multi Family Residential	Multi Family Residential 316 Description # of Low Density Residential 1,880 Multi Family Residential 1,567 Description # of Industrial - Light & Heavy Industrial 78 P - Industial Developments assumed to be 25%	Multi Family Residential 316 du Description # of Unit Low Density Residential 1,880 du Multi Family Residential 1,567 du Description # of Unit Industrial - Light & Heavy Industrial 78 ha P - Industial Developments assumed to be 25% 0 0	Multi Family Residential 316 du 230: Residential Condo/Townhouse Description # of Unit Land Use Description Low Density Residential 1,880 du 210: Single Family Residential Multi Family Residential 1,867 du 210: Single Family Residential Multi Family Residential 1,567 du 230: Residential Condo/Townhouse Description # of Unit Land Use Description Industrial - Light & Heavy Industrial 78 ha 130: Industrial Park P - Industial Developments assumed to be 25% Total Total	Multi Family Residential 316 du 230: Residential Condo/Townhouse - Description # of Unit Land Use Description Maximum Loi Coverage Low Density Residential 1,880 du 210: Single Family Residential - Multi Family Residential 1,567 du 230: Residential Condo/Townhouse - Description # of Unit Land Use Description Maximum Loi Coverage Industrial - Light & Heavy Industrial 78 ha 130: Industrial Park 25% P - Industial Developments assumed to be 25% Total Commercial/Industrial Total Commercial/Industrial	Multi Family Residential 316 du 230: Residential Condo/Townhouse - Dwelling Units Description # of Unit Land Use Description Maximum Lot Coverage Independent Description Low Density Residential 1,880 du 210: Single Family Residential - Dwelling Units Multi Family Residential 1,567 du 230: Residential Condo/Townhouse - Dwelling Units Description # of Unit Land Use Description Maximum Lot Coverage Independent Description # of Unit Land Use Description - Dwelling Units Industrial - Light & Heavy Industrial 78 ha 130: Industrial Park 25% 1000 sq.ft P - Industial Developments assumed to be 25% Total Commercial/Industrial (1000 sq.ft Total Commercial/Industrial (1000 sq.ft	Multi Family Residential 316 du 230: Residential Condo/Townhouse	Multi Family Residential 316 du 230: Residential Condo/Townhouse - Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 Total Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 Maximum Lot Coverage Independent Xariable Coverage # of Unit Land Use Description Maximum Lot Coverage Independent Xariable Equation or Average Rate Multi Family Residential 1.880 du 210: Single Family Residential - Dwelling Units 1.880 T = 0.70X + 9.43 Multi Family Residential 1.567 du 230: Residential Condo/Townhouse - Dwelling Units 1.880 T = 0.70X + 9.43 Multi Family Residential 1.567 du 230: Residential Condo/Townhouse - Dwelling Units 3.447 Description # of Unit Land Use Description Maximum Lot Coverage Independent Variable Americal/Medital Industrial - Light & Heavy Industrial 78 ha 130: Industrial Park 25% 1000 sq.ft 2,109 Ln(T) = 0.77Ln(X) + 1.09 P - Industrial Developments assumed to be 25% Americal/Industrial Park<	Multi Family Residential 316 du 230: Residential Condo/Townhouse - Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 17% Total Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 17% Total Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 17% Total Dwelling Units 696 # of Unit Land Use Description Maximum Lot Coverage Independent / Equation or Average Rate % Inbound Low Density Residential 1.880 du 210: Single Family Residential - Dwelling Units 1.880 T = 0.70X + 9.43 25% Multi Family Residential 1.567 du 230: Residential Condo/Townhouse - Dwelling Units 3.467 In(T) = 0.80Ln(X) + 0.26 17% Description # of Unit Land Use Description Maximum Lot Coverage Independent Variable Equation or Average Rate % Inbound Industrial - Light & Heavy Industrial 78 ha 130: Industrial Park 25% 1000 sq.ft 2,109.4 Ln(T) = 0.77Ln(X) + 1.09 82% P - Industial Developments assumed to be 25% Maximum Lot Maximum	Multi Family Residential 316 du 230: Residential Condo/Townhouse - Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 17% 83% Total Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 17% 83% Total Dwelling Units 316 Ln(T) = 0.80Ln(X) + 0.26 17% 83% Maximum Lot Coverage Imdependent Variable Obscription Intervalues Coverage Rate % Inbound % Outbound Low Density Residential 1.880 du 210: Single Family Residential - Dwelling Units 1.880 T = 0.70X + 9.43 25% 75% Multi Family Residential 1.567 du 230: Residential Condo/Townhouse - Dwelling Units 1.867 Ln(T) = 0.80Ln(X) + 0.26 17% 83% Maximum Lot Coverage Maximum Lot Coverage Independent Variable AM Peak Description # of Maximum Lot Coverage Independent Variable AM Peak Independent Variable AM Peak Description # of ha 130: Industrial Park 25% 1000 sq,ft 2,109.4 Ln(T) = 0.77Ln(X)	$\begin{tabular}{ c c c c c c c c c $	Multi Family Residential 316 du 236 du 236 conductive Conducting	Multi Family Residential 316 du 230: Residential Condo/Townhouse - Dwelling Units 316 Ln(1) = 0.80Ln(X) + 0.26 17% 83% Ln(1) = 0.82Ln(X) + 0.32 67% 338 Total Type Total Welling Units 696 TE Date TE Date Description Intit (1) = 0.80Ln(X) + 0.26 17% 83% Ln(1) = 0.82Ln(X) + 0.32 67% 33% Description Intit (1) = 0.80Ln(X) + 0.26 17% 83% Ln(1) = 0.82Ln(X) + 0.32 67% 33% Outer the total t	Multi Family Residential 316 du 230: Residential Condo/Townhouse - Duelling Units 316 (n(1) = 0.80Ln(2) + 0.26 17% 83% Ln(1) = 0.82Ln(2) + 0.32 67% 33% 130 Description # of du 230: Residential Condo/Townhouse 696 Independent Secret Independent Secret Image: Secret Se	Multi Family Residential 316 du 238 Residential Condo/Townhouse - Duwelling Units 316 $Ln(1) = 0.80, Ln(X) + 0.26 17% 83% Ln(1) = 0.82, Ln(X) + 0.23 67% 33% 130 22 Volt Family Residential Other Condo/Townhouse Volt Family Residential Maximum Log Maximum Log Maximum Log Maximum Log Residential Residential 1.880 du 210: Single Family Residential - Description Units (X) Equation or Average Rate Nhooud Notout Residential Notout Not$	Multi Family Residential 316 du 236 du 236 Ln(1) = 0.82Ln(3) + 0.26 17% 83% Ln(1) = 0.82Ln(3) + 0.23 67% 33% 130 22 108 total Trip: 366 Ln(1) = 0.80Ln(3) + 0.26 17% 83% Ln(1) = 0.82Ln(3) + 0.23 67% 33% 130 22 108 total Trip: 676 37% 130 23 67% 33% 130 22 108 total Trip: 676 400 200; Residential Condo/Townhouse 676 37% 130 72 108 Telependential 1.880 40 200; Residential 1.669 17% 83% 1.600 90.000 70% 70% 17% 83% 100 70% 107 83% 130 75% 10(1) = 0.90Ln(3) + 0.53 63% 33% 467 79 337 130 94 34% 101 0.801(1) = 0.80Ln(3) + 0.26 17% 83% 10(1) = 0.80Ln(3) + 0.32 67% 33% 467 79 337 130 94 34 100	Multi Family Residential Out 230: Residential Condo/Townhouse - Dwelling Units 316 L(T) = 0.80Ln(X) + 0.26 17% 83% L(T) = 0.82Ln(X) + 0.22 67% 33% 130 22 108 144 Value <td colspan="</td> <td>Multi amily Residential 316 du 200 Residential Condo/Townhouse - Dwelling Units 316 In(1) = 0.80ln(2) + 0.26 17% 83% In(1) = 0.82ln(2) + 0.32 33% 130 22 108 154 104 Value Value</td>	Multi amily Residential 316 du 200 Residential Condo/Townhouse - Dwelling Units 316 In(1) = 0.80ln(2) + 0.26 17% 83% In(1) = 0.82ln(2) + 0.32 33% 130 22 108 154 104 Value Value

					Maximum Lot		Maximum Lot		ion Maximum Lot		Variable	ITE Data								Trip	os (T)		
Development	Description	# of	Unit	Land Use Description							variable	AM Peak			PM Peak			AM Peak			PM Peak		ĸ
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out				
IDP - Industrial Developments ¹⁰	Industrial - Light & Heavy Industrial	78	ha	130: Industrial Park	25%	1000 sq.ft	2,109.4	Ln(T) = 0.77Ln(X) + 1.09	82%	18%	T = 0.77(X) + 42.11	21%	79%	1,079	885	194	1,666	350	1,316				
10. Maximum site coverage for IDP	P - Industial Developments assumed to be 25%			Total C	ommercial/Indus	strial (1000 sq.ft)	2,109						Total Trips:	1,079	885	194	1,666	350	1,316				

						Independent		Independent Vo		ITE Data							Tr			rips (T)		
Development	Description	# of	Unit	Land Use Description	Maximum Lot	independen	variable	AM Peak			PM Peak			AM Peak			PM Peak					
					Coverage	Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out			
IDP - Commercial 11	Commercial - Arterial	47.2	ha	770: Business Park	25%	1000 sq.ft	1,270.8	Ln(T) = 0.98Ln(X) + 0.45	84%	16%	Ln(T) = 0.92Ln(X) + 0.78	23%	77%	1,727	1,451	276	1,565	360	1,205			
11. Maximum site coverage for IDP	- Industial Developments assumed to be 25%			Total C	ommercial/Indus	strial (1000 sq.ft)	1,271						Total Trips:	1,727	1,451	276	1,565	360	1,205			



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.2 5 YEAR (2015) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.3 10 YEAR (2020) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK

PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.4 15 YEAR (2025) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK



PROJECT NO:	2010-3050	CITY OF COLD LAKE
DATE:	APRIL 2011	TRANSPORTATION STUDY
SCALE: DWG NO:	NTS	FIGURE 4.5 20 YEAR (2030) TRIP GENERATION FROM PLANNED DEVELOPMENT PM PEAK



F	Associated Engineering

PROJECT NO:	2010-3050
DATE:	FEBRUARY 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.6 TRAFFIC ANALYSIS ZONES WITHIN CITY OF COLD LAKE The development trips presented above in Figure 4.2 through Figure 4.5 were broken down by location and the corresponding TAZ. Table 4.3 through Table 4.6 summarizes the p.m. peak hour trips generated by each zone, for the 5-year, 10-year, 15-year, and 20-year planning horizons respectively.

Zone	Total Trips	Inbound Trips	Outbound Trips
1	347	85	262
2	755	400	355
3	277	172	105
4	974	224	750
5	412	259	154
6	84	18	66
7	0	0	0
8	90	56	33
9	0	0	0
External Zones	86	54	32
Total	3,025	1,268	1,757

Table 4.3
5-year (2015) - Trip Generation from Planned Developments by Zone

Table 4.4
0-year (2020) - Trip Generation from Planned Developments by Zone

Zone	Total Trips	Inbound Trips	Outbound Trips		
1	667	163	504		
2	1,510	800	710		
3	554	344	210		
4	1,949	448	1,500		
5	825	518	307		
6	167	35	132		
7	0	0	0		
8	180	113	67		
9	0	0	0		
External Zones	710	353	356		
Total	6,023	2,530	3,493		



Zone	Total Trips	Inbound Trips	Outbound Trips		
1	987	241	745		
2	2,777	1,426	1,351		
3	944	589	355		
4	1,949	448	1,500		
5	1,237	777	461		
6	359	78	281		
7	223	142	81		
8	270	169	100		
9	0	0	0		
External Zones	1,334	652	681		
Total	9,003	4,033	4,970		

Table 4.515-year (2025) - Trip Generation from Planned Developments by Zone

Table 4.620-year (2030) - Trip Generation from Planned Developments by Zone

Zone	Total Trips	Inbound Trips	Outbound Trips		
1	1,307	320	987		
2	3,507	1,811	1,696		
3	1,335	834	501		
4	1,949	448	1,500		
5	1,650	1,036	614		
6	551	120	431		
7	447	284	162		
8	360	226	134		
9	0	0	0		
External Zones	2,041	969	1,072		
Total	11,447	5,295	6,152		

4.3 TRIP DISTRIBUTION

A simplified gravity model was originally selected to determine the distribution of trips within the City generated by the proposed development/redevelopment. The gravity model assumes that the number of trips between two zones is directly proportional to the trips produced and attracted by both zones and inversely proportional to the square of travel time between the two zones. The procedure for the simplified gravity model was illustrated in detail in the Traffic Demand Forecast Work Plan (included in Appendix B) and the trip distribution calculations for the 5-year planning horizon are presented in Appendix C.

A trip distribution table was established for the 5-year planning horizon using the simplified gravity model. The trip distribution established for each TAZ was not reflective of the local travel patterns within the City; therefore, the trip distribution was revised after discussions with the City to reflect the local characteristic of the City. Table 4.7 presents the trip distribution used for the traffic volume forecast. The same trip distribution was used for each planning horizon (5-year, 10-year, 15-year, and 20-year).

From	То							CLIM		
FIOII	1	2	3	4	5	6	7	8	9	50 W
1	5%	23%	23%	5%	8%	5%	10%	8%	13%	100%
2	20%	15%	10%	15%	10%	8%	7%	5%	10%	100%
3	20%	10%	15%	15%	10%	8%	7%	5%	10%	100%
4	6%	15%	15%	5%	15%	8%	12%	12%	12%	100%
5	16%	12%	12%	15%	15%	8%	7%	5%	10%	100%
6	5%	5%	5%	5%	15%	5%	25%	25%	10%	100%
7	10%	5%	5%	15%	10%	18%	12%	15%	10%	100%
8	10%	5%	5%	15%	10%	20%	10%	15%	10%	100%
9	8%	10%	10%	10%	7%	20%	10%	10%	15%	100%
SUM	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

Table 4.7Trip Distribution Table (Within City Limits)

The trip distribution presented above is only applicable to development trips within the City. The developments located outside the City, within the MD of Bonnyville, were distributed using the trip distribution presented in Table 4.8.


Table 4.8 Trip Distribution Table (Outside City Limits)

Development	Inbound Trips	Outbound Trips
Hills of Cold	20% from Cold Lake North business area	5% to Cold Lake North business area
Lake	20% from Tri-City Mall area	25% to Tri-City Mall area
	20% from Cold Lake South business area	25% to Cold Lake South business area
	20% from the commercial area in the south	40% to the commercial area in the south
	(near 43 Avenue)	(near 43 Avenue)
	20% from Medley	5% to Medley
Fawn Ridge	20% from Cold Lake North business area	5% to Cold Lake North business area
Estates	20% from Tri-City Mall area	25% to Tri-City Mall area
	20% from Cold Lake South business area	25% to Cold Lake South business area
	20% from the commercial area in the south	40% to the commercial area in the south
	(near 43 Avenue)	(near 43 Avenue)
	20% from Medley	5% to Medley
IDP	25% Internal	30% Internal
Residential 1	15% from Cold Lake North business area	5% to Cold Lake North business area
IDP	15% from Tri-City Mall area	20% to Tri-City Mall area
Residential 2	15% from Cold Lake South business area	20% to Cold Lake South business area
IDP	15% from the commercial area in the south	20% to the commercial area in the south
Residential 3	(near 43 Avenue)	(near 43 Avenue)
	15% from Medley	5% to Medley
IDP Industrial	25% Internal	25% Internal
	25% Cold Lake North residential	25% Cold Lake North residential
	10% Residential behind Tri-City Mall	10% Residential behind Tri-City Mall
	35% Cold Lake South residential	35% Cold Lake South residential
	5% Medley	5% Medley
IDP	25% Internal	25% Internal
Commercial	25% Cold Lake North residential	25% Cold Lake North residential
	10% Residential behind Tri-City Mall	10% Residential behind Tri-City Mall
	35% Cold Lake South residential	35% Cold Lake South residential
	5% Medley	5% Medley

4.4 TRIP ASSIGNMENT

The development trips were assigned onto the future road network by considering the logical routes that would be taken by the commuters between the origin and destinations, on the basis of impedance and travel time. To capture worst-case traffic scenarios, the development trips were primarily assigned to the skeletal road network established for the planning horizon.

To simplify the trip assignment process, selected intersections were used to represent each study zone and development trips were assumed to enter/exit the zone from those intersections. As a result, some roadways within the skeletal road network do not appear to have background or development traffic assigned to it. The traffic volumes on these roadways were forecasted using growth patterns established from the other roadways.

4.5 FORECASTED DEVELOPMENT TRAFFIC VOLUMES

Figure 4.7 presents the forecasted daily development traffic volumes for the 5-year (2015) Horizon. Figure 4.8 presents the forecasted daily development traffic volumes for the 10-year (2020) Horizon. Figure 4.9 presents the forecasted daily development traffic volumes for the 15-year (2025) Horizon. Figure 4.10 presents the forecasted daily development traffic volumes for the 20-year (2030) Horizon.







PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.7 5 YEAR (2015) DAILY DEVELOPMENT TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.8 10 YEAR (2020) DAILY DEVELOPMENT TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.9 15 YEAR (2025) DAILY DEVELOPMENT TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 4.10 20 YEAR (2030) DAILY DEVELOPMENT TRAFFIC VOLUMES 5

Traffic Forecast: Total Traffic Volumes

Total traffic volumes were calculated by combining the background traffic volumes with the development traffic volumes for common planning horizons. The average traffic growth for each road classification established in the 2000 Transportation Study (collectors, two-lane arterials, and four-lane arterials) was used to forecast future traffic volumes on the roadways which were not included in the trip assignment. The total traffic volumes for each planning horizon are presented in the following section.

5.1 FORECASTED TOTAL TRAFFIC VOLUMES

Figure 5.1 presents the forecasted daily total traffic volumes for the 5-year (2015) Horizon. Figure 5.2 presents the forecasted daily total traffic volumes for the 10-year (2020) Horizon. Figure 5.3 presents the forecasted daily total traffic volumes for the 15-year (2025) Horizon. Figure 5.4 presents the forecasted daily total traffic volumes for the 20-year (2030) Horizon







PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.1 5 YEAR (2015) DAILY TOTAL TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.2 10 YEAR (2020) DAILY TOTAL TRAFFIC VOLUMES





PROJECT NO:	2010-3050
DATE:	APRIL 2011
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.3 15 YEAR (2025) DAILY TOTAL TRAFFIC VOLUMES



Associated Engineering

PROJECT NO:	2012-3703
DATE:	FEB 2013
APPROVED:	
SCALE:	NTS
DWG NO:	

FIGURE 5.4 (REVISED) 20 YEAR (2030) DAILY TOTAL TRAFFIC VOLUMES 6

Roadway Requirements

6.1 METHODOLOGY

Table 6.1 presents the City's roadway design standards obtained from the Municipal Engineering Servicing Standards And Standard Construction Specifications (2008). The table presents the City's roadway designation/classification and the daily service volumes for each roadway classification.

Roadway Designation	Daily Service Volume (vpd)	Daily Service Volume Range (vpd)
Urban Expressway	>30,000	>30,000
Divided Arterial	>20,000	20,000 - 30,000
Undivided Arterial	<20,000	10,000 - 20,000
Divided Residential Collector	<10,000	3,000 - 10,000
Undivided Residential Collector	<10,000	3,000 - 10,000
Divided Residential Local	<3,000	500 - 3,000
11m Undivided Residential Local	<3,000	500 - 3,000
10m Undivided Residential Local	<3,000	500 - 3,000
Rural Industrial Collector	<10,000	3,000 - 10,000
Urban Industrial Collector	<10,000	3,000 - 10,000
Rural Industrial Local	<3,000	500 - 3,000
Urban Industrial Local	<3,000	500 - 3,000
Frontage (Service) Road	<3,000	500 - 3,000
Lanes	<500	<500

Table 6-1 City of Cold Lake – Roadway Classification and Daily Service Volumes

Table 6.2 presents typical lane capacities, in vehicles per hour, for various road classifications.



Road Classification	City of Cold Lake Road Classification	Capacity (vehicles per hour, per lane)	Capacity (vehicles per day, per lane)
Provincial Controlled Access Highway	Expressway	1,800	18,000
County Arterial Road	Divided Arterial	1,000	10,000
Local Major and Minor Arterial Roads	Undivided Arterial	800	8,000
Local Collector Road	Collector (Residential or Industrial)	400	4,000
Local Road (Other)	Local (Residential or Industrial)	100	1,000

Table 6-2Lane Capacity by Road Classification

NOTE: Capacities are generalized based on typical engineering design standards.

Lane capacity per day based on assumption that peak hour traffic volumes are 10% of daily traffic volumes.

The forecasted total traffic volumes for each planning horizon were compared with the daily service volumes provided in Table 6.1 to determine the required roadway classification, as per the City's standards. The lane volumes were also compared with the lane capacity for the given road classification provided in Table 6.2, to determine the number of lanes required along each roadway.

6.2 RESULTS

The required road classification and number of lanes for the future road network are summarized and provided in Appendix D for each planning horizon. The results presented in the appendix were determined from the forecasted traffic volumes and does not account for continuous roadway functionality and lane balancing along a single corridor.

As mentioned, the road classification and number of lanes required to accommodate traffic under the 20year (2030) horizon will be used by the City to retain the right-of-way required to accommodate future roadway expansion. All the major corridors under the 20-year (2030) horizon were reviewed independently to establish continuous roadway function and lane balance along the corridor, where possible.

Figure 6.1 presents the recommended road classification and number of lanes, for the 20-year (2030) horizon.

According to the preliminary analysis completed for the 20-year planning horizon, 1 Avenue (25 Street to 16 Street) should be classified as a two-lane undivided arterial roadway. However, in order to maintain continuous roadway functionality, AE recommends that the road segment be classified as a collector roadway. This portion of 1 Avenue is adjacent to Kinosoo Beach, a major tourist attraction in Cold Lake North, and has been identified in the In-Service Road Safety Review technical memorandum, as an ideal location to implement traffic calming and beautification measures. A collector road classification would better suit the functionality of the area. Table 6.3 summarizes the road corridors in the 20-year planning horizon, along with the recommended road classification, number of lanes, and expected capacities. Table 6.4 summarizes the major road network in the 20-year planning horizon, along with a comparison of the existing and future road classification and number of lanes. The table also summarizes the improvements required to upgrade the corridors from the existing horizon to the 20-year planning horizon.





ROJECT NO:	2012-3703
DATE:	FEB 2013
APPROVED :	
SCALE:	NTS
DWG NO:	

FIGURE 6.1 (REVISED) ROADWAY CLASSIFICATION 20 YEAR (2030) HORIZON

City of Cold Lake - Transportation Study Project No: 2012-3703 Date: Janaury 22, 2013

TABLE 6.3: CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON - ROAD CLASSIFICATION, NUMBER OF LANES AND CAPACITIES

	Intersec	ction		Forecaster	d Volumes	Read Classification	Read Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	To	Direction	Daily Traffic -	Daily Traffic -	2000 TPS ¹	City of Cold Lake ²	for Road Classification	for Road Classification	Required (One
	11011	10	Eastbound	Directional 3,360	Two Way			(ven/nou/nane)	(ven/day/lane)	1
1 Avenue	28 Street	25 Street	Westbound	2,210	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
1 Avenue	25 Street	Nelson Street	Westbound	5,560	12,210	Collector	Undivided Arterial	800	8,000	1
1 Avenue	Nelson Street	16 Street	Eastbound Westbound	6,240 6,580	12,820	Collector	Undivided Arterial	800	8,000	1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	21,470	42,370	4-Lane Arterial	Expressway	1,800	18,000	2
8 Avenue	25 Street	16 Street	Eastbound	11,990	20.050	4-I ane Arterial	Divided Arterial	1.000	10.000	2
			Westbound Eastbound	8,060 4,630				.,		1 2
8 Avenue	16 Street	10 Street	Westbound	3,910	8,540	4-Lane Artenal	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	10 Street	Lakeshore Drive	Westbound	3,210	5,930	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	West City Limit	25 Street	Eastbound Westbound	7,370	10,690	2-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 55	25 Street	Hwy 28	Eastbound	14,440	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2
16 Avenue	Hwy 28	16 Street	Eastbound	8,250	14.370	2-I ane Arterial	Undivided Arterial	800	8.000	2
			Westbound Eastbound	6,120 4.880						1
16 Avenue ^o	16 Street	10 Street	Westbound	3,820	8,700	2-Lane Artenal	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	10 Street	8 Street	Westbound	3,520	7,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	8 Street	East City Limit	Eastbound Westbound	1,530	3,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
English Bay Road 6	North City Limit	Lake Avenue	Northbound	6,430	12,350	Collector	Undivided Arterial	800	8,000	1
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24 700	Collector	Divided Arterial	1.000	10.000	2
English Buy Road	Latoritoria		Southbound Northbound	11,840 14,740	24,700	0.1		1,000	10,000	2
English Bay Road	1 Avenue	25 Street	Southbound	12,380	27,120	Collector	Divided Arterial	1,000	10,000	2
English Bay Road	25 Street	Hwy 28	Southbound	12,300	25,810	Collector	Divided Arterial	1,000	10,000	2
25 Street	English Bay Road	Hwy 55	Northbound Southbound	6,690 5,370	12,060	Collector	Undivided Arterial	800	8,000	1
25 Street ⁷	1 Avenue	English Bay Road	Northbound	4,450	8,410	Collector	Collector (Residential or Industrial)	400	4,000	1
English Bay Road/25	English Bay Road	25 Street	Eastbound	2,500	4.580		Collector (Residential or Industrial)	400	4.000	1
Street Connector	Ligion Bay Road	20 0000	Westbound Eastbound	2,080	1,000			400	4,000	1
Nelson Street	1 Avenue	16 Street	Westbound	1,600	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street ⁸	1 Avenue	8 Avenue	Southbound	3,570	8,680	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	8 Avenue	16 Avenue	Northbound Southbound	3,240 3.580	6,820	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	16 Avenue	75 Avenue	Northbound	3,810	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Avenue/16 Street	8 Avenue	16 Avenue	Northbound	1,270	2 760		Local (Residential or Industrial)	150	1 500	1
Connector 16 Avenue/16 Street	40 August	40.0000	Southbound Eastbound	1,490 1,550	2,700		Level (Residential or Indebute)	150	1,000	1
Connector	16 Avenue	16 Street	Westbound	840	2,390		Local (Residential or Industrial)	150	1,500	1
10 Street	1 Avenue	8 Avenue	Southbound	3,320	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street ⁹	8 Avenue	16 Avenue	Northbound Southbound	3,560 4,250	7,810	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	16 Avenue	16 Street	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
8 Street	16 Avenue	75 Avenue	Northbound	2,550	4,780	Collector	Collector (Residential or Industrial)	400	4.000	1
10	40.4	04.4	Southbound Northbound	2,230 2,380	4,000	0-11		100	1,000	1
6 Street	16 Avenue	21 Avenue	Southbound	2,300	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Southbound	31,810	62,490	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	75 Avenue	69 Avenue	Northbound Southbound	31,690 33,860	65,550	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	22,820	50,210	4-Lane Arterial	Expressway	1,800	18,000	2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,390	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2
60 Auropuio	Clanwood	Huer 29/55	Eastbound	4,730 5,590	10.070	2 Long Artorial	Lindbided Attoriel	800	8.000	2 1
69 Avenue	Gieriwood	Hwy 28/35	Westbound	4,480	10,070	2-Larie Arterial	Undivided Artena	800	8,000	1
69 Avenue	Hwy 28/55	Future Arterial	Westbound	7,440	15,790	Collector	Undivided Arterial	800	8,000	1
49 Street	75 Avenue	69 Avenue	Southbound	680	1,800	Collector	Local (Residential or Industrial)	150	1,500	1
47 Street	75 Avenue	69 Avenue	Northbound	960 600	1,560	Collector	Local (Residential or Industrial)	150	1,500	1
47 Street/49 Street	47 Street	49 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1
47 Street	69 Анериа	61 Avenue/62	Northbound	1,520	3 270	Collector	Collector (Residential or Industrial)	400	4.000	1
47 Gudet		Avenue	Southbound Northbound	1,750 1,030	3,210	001001001		400	4,000	1
47 Street**	ol Avenue/62 Avenue	54 Avenue	Southbound	1,590	2,620	Collector	Local (Residential or Industrial)	150	1,500	1
61 Avenue/62 Avenue ¹²	Hwy 28/55	47 Street	Westbound	3,880	8,000	Collector	Collector (Residential or Industrial)	400	4,000	1
61 Avenue/62 Avenue	47 Street	45 Street	Eastbound Westbound	3,990 1,810	5,800	Collector	Collector (Residential or Industrial)	400	4,000	1
61 Avenue/62 Avenue	45 Street	Future Arterial	Eastbound	1,440	2,350	Collector	Collector (Residential or Industrial)	400	4,000	1
47 Street/45 Street	47 Street	45 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1
Connector 45 Street	61 Avenue #2 Aven	54 Augouro	vv estbound Northbound	720 1,280	2,000		Local (Residential or Industrial)	150	1 500	1
45 511661	61 Avenue/62 Avenue	54 Avenue	Southbound	800	2,000	-	Local (Residential of Industrial)	150	1,500	1
54 Avenue ¹³	56 Street	Hwy 28/55	Westbound	5,190	8,570	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue ¹⁴	Hwy 28/55	51 Street	Eastbound Westbound	4,160 3,680	7,840	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	51 Street	45 Street	Eastbound	3,950	6,800	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue ¹⁵	45 Street	41 Street	Eastbound	3,095	5,515	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avecus	d1 Strant	Future Arterial	Westbound Eastbound	2,420	4 220	Collector	Collector (Pasidantial or Industrial)	400	4.000	1
J4 Avenue	+1 OUUU	i atare Artenal	Westbound	1,990	4,230	COllector	Conscion (residential of Industrial)	400	4,000	1
52 Avenue	59 Street	57 Street	Westbound	3,190	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	57 Street	Hwy 28/55	Eastbound Westbound	3,920 3,850	7,770	Collector	Collector (Residential or Industrial)	400	4,000	1
Centre Avenue	59 Street	57 Street	Eastbound	17,310	24,740	2-Lane Arterial	Divided Arterial	1,000	10,000	2
Centre Avenue	57 Street	Hwy 28/55	Eastbound	14,500	25,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2
50 Aurorus ¹⁶	Hwy 29/55	51 Street	Eastbound	11,410 6,355	10 830	2-Lane Arterial	Collector (Residential or Industrial)	400	4 000	2
SU AVENUE	11wy 20/00	51 Stielet	Westbound	4,475	10,030	2-Land Alterial			4,000	1
50 Avenue ¹⁷	51 Street	50 Street	Westbound	3,300	8,740	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue ¹⁸	50 Street	45 Street	Westbound	5,290 2,180	7,470	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue ¹⁹	45 Street	41 Street	Eastbound Westbound	4,940 2,440	7,380	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial	Eastbound	3,900	6,650	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
	1	1	vvestoound	2,700	1	1		1	1	1

City of Cold Lake - Transportation Study Project No: 2012-3703 Date: Janaury 22, 2013

TABLE 6.3: CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON - ROAD CLASSIFICATION, NUMBER OF LANES AND CAPACITIES

Nume Pair Annue Nume Pair Annue Pair Annue Nume Pair Annue Nume Num<		Intersec	tion		Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
PortP	Corridor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Direction)
Image Image <th< td=""><td>50 Avenue</td><td>Future Arterial</td><td>Baywood Road</td><td>Eastbound Westbound</td><td>2,070 1,560</td><td>3,630</td><td>2-Lane Arterial</td><td>Collector (Residential or Industrial)</td><td>400</td><td>4,000</td><td>1</td></th<>	50 Avenue	Future Arterial	Baywood Road	Eastbound Westbound	2,070 1,560	3,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Point Oxada and bases	43 Avenue ²⁰	Hwy 28/55	45 Street	Eastbound Westbound	4,830 3,530	8,360	Collector	Collector (Residential or Industrial)	400	4,000	1
19 9 Advance 0 0 4400 4400 4400 17 Tesse 30 Anver 0 4400 4400 19 Tesse 30 Anver 0 4400 4400 4400 4400 19 50 Anver 0 3000 4400 Eperation 1000 4400 19 50 Anver 50 Anver<	59 Street	52 Avenue	Centre Avenue	Northbound Southbound	3,050 1,350	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1
1 1 0	57 Street	54 Avenue	52 Avenue	Northbound Southbound	2,130 1,400	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1
Import Markan Sharan Status Status<	57 Street	52 Avenue	Centre Avenue	Northbound Southbound	3,960 2,510	6,470	Collector	Collector (Residential or Industrial)	400	4,000	1
Imposition Contraction Participant	Hwy 28/55	54 Avenue	52 Avenue	Northbound Southbound	20,930 22,150	43,080	4-Lane Arterial	Expressway	1,800	18,000	2
Imp Op Op Monta Description Description <thdescription< th=""> Description <</thdescription<>	Hwy 28/55	52 Avenue	50 Avenue	Northbound Southbound	18,500 21,950	40,450	4-Lane Arterial	Expressway	1,800	18,000	2
Inv. 2020 0.9 Some 0.4 Annu Vectors of 1.100 1.100 1.000 2 Hug 2050 0.3 Annu 9.4 Annu 9.4 Annu 9.4 Annu 9.000 2 Hug 2050 0.3 Annu 0.4 Annu 10.00 10.000 2 Hug 2050 0.3 Annu 0.4 Annu Hug 2050 11.000 4.000 1 Annu Hug 2050 0.4 Annu Hug 2050 10.000 1 1 A Annu Hug 2050 10.000 1.000 1.000 1 1 A Annu Hug 2050 10.000 1.000 1.000 1 1 A Annu Shannu 19.000 1.000 1.000 1.000 1 A Shannu Shannu 19.0000 1.000	Hwy 28/55	50 Avenue	50 Street	Northbound Southbound	10,700 13,030	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Image G Aname Subsect 1.000 1.000 1.000 1.000 Type 205 3 Aname Subsect 1.000 4.200 Animal Deckad Animal 0.000 -2 Aname Hay 205 47 Bent Subsect 2.000 4.200 Animal 0.000 -2 Aname Hay 205 47 Bent Subsect 2.000 4.000 -1 47 Bent 43 Aname Hay 205 47 Bent Subsect 2.000 4.000 -1 51 Bent 64 Anama Shame Subsect 2.200 4.400 -0 Codectry finisteniar or hava10 4.000 -1 51 Stem 69 Anama Shame Subsect 2.200 4.400 Codectry Undeckor finisteniar or hava10 4.000 -1 51 Stem 69 Anama Shame Subsect 2.200 Codectry Load Reademinar or hava10 4.000 -1 41 Stame Shame Shame Stame Stame Stame 5.0000 -1 <td< td=""><td>Hwy 28/55</td><td>50 Street</td><td>43 Avenue</td><td>Northbound Southbound</td><td>13,120 16,420</td><td>29,540</td><td>4-Lane Arterial</td><td>Divided Arterial</td><td>1,000</td><td>10,000</td><td>2</td></td<>	Hwy 28/55	50 Street	43 Avenue	Northbound Southbound	13,120 16,420	29,540	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Image: biology 34 Annual Section 4220 10.07 4-Line Annual Underland Annual 800 8.000 2 40 Annual May 2005 Vietabooli 2.000 1.000 - Colector Residentia or Industrial 400 4.000 - 41 Annual May 2005 4.98004 2.000 4.000 - Colector Residentia or Industrial 400 4.000 - 47 Street 4.98004 2.000 4.000 - Colector Residentia or Industrial 400 4.000 - 51 Street 64 Annual 54 Annual Street Cole Colector Residentia or Industrial 400 4.000 - 45 Street 50 Annual <	Hwy 28/55	43 Avenue	34 Avenue	Northbound Southbound	9,960 11,690	21,650	4-Lane Arterial	Divided Arterial	1,000	10,000	1 2
International matrix	Hwy 28/55	34 Avenue	South City Limit	Northbound Southbound	9,220 10,450	19,670	4-Lane Arterial	Undivided Arterial	800	8,000	2
JA. Arous My 2050 47 Street Existence 2400 4.300 - Catesor Residence instanting 440 4.000 - 47 Street 54 Arous 54 Arous 54 Arous 50 Arous 500000 - Catesor Residence instanting 440 4.000 - 51 Street 54 Arous 50 Arous Netributed 2.000 4.000 - Catesor Residence instanting 4400 4.000 - 50 Street 54 Arous 50 Arous Netributed 7.100 1.300 Catesor Local (Residencia or Instanting 440 8.000 - 45 Street 50 Arous 50 Arous 50 Arous 50.0000 4.000 -	40 Avenue	43 Avenue	Hwy 28/55	Eastbound Westbound	2,260 2,790	5,050	-	Collector (Residential or Industrial)	400	4,000	1
47 Ditest 43 Anora Methodical 2200 4.400 · Collector Oelector Oelec	34 Avenue	Hwy 28/55	47 Street	Eastbound Westbound	2,400 1,990	4,390	-	Collector (Residential or Industrial)	400	4,000	1
91 Smet 94 Annue 50 Annue Annue Statistication 4.20 Caleboard Calebo	47 Street	43 Avenue	34 Avenue	Northbound Southbound	2,280 2,210	4,490	-	Collector (Residential or Industrial)	400	4,000	1
50 Street 50 Street 50 Annual Herr 2000 1.380 Calector Unside Anteal 800 8.000 1 46 Street 64 Annual 60 Annual Statistication 460 1.100 1.000 <td>51 Street</td> <td>54 Avenue</td> <td>50 Avenue</td> <td>Northbound Southbound</td> <td>1,980 2,230</td> <td>4,210</td> <td>Collector</td> <td>Collector (Residential or Industrial)</td> <td>400</td> <td>4,000</td> <td>1</td>	51 Street	54 Avenue	50 Avenue	Northbound Southbound	1,980 2,230	4,210	Collector	Collector (Residential or Industrial)	400	4,000	1
46 Street 54 Annua 50 Annua Nethboard 700 Street 1.150 Calescer Local (Readenial or Industria) 1150 1.500 1 45 Street 50 Annua 40 Annua Street 50 Annua 150 1.500 1 44 Street 51 Annua 50 Annua Street 30 Annua Netthours 2.510 0.300 Calescer	50 Street	50 Avenue	Hwy 28/55	Northbound Southbound	7,170	13,980	Collector	Undivided Arterial	800	8,000	1
d6 Streat 60 Annua 41 Annua Nethboard 990 Southboard 2.420 Collector Local (Residential or Industrial) 150 1,500 1 41 Street 54 Annua 60 Annua Mathcard 3.870 6.380 Collector Collector (Residential or Industrial) 400 4.000 1 Future Antralal 00 Annua Boarthouard 5.770 12,260 2-Lane Antralal Undvided Antraial 800 8.000 1 Future Antrala 01 Annua Boarthouard 6.870 12,260 2-Lane Antralal Undvided Antraial 800 8.000 1 Future Antralal 61 Annua Boarthouard 6.870 12,260 2-Lane Antralal Undvided Antraial 800 8.000 1 Future Antralal 64 Annua 60 Annua Southboard 6.720 11,350 2-Lane Antralal Undvided Antraial 800 8.000 1 Krigmany Tentific and Gueenway Timboard 6.720 20,860 2-Lane Antralal Undvided Antraial 800	45 Street	54 Avenue	50 Avenue	Northbound Southbound	700 450	1,150	Collector	Local (Residential or Industrial)	150	1,500	1
41 Stret 54 Annu 50 Annu Suffixion 3.00 6.380 Collector (Residential or Industrial) 400 4.000 1 Future Antrait 09 Annua 01 Annual 50 Annual 5000 12.070 2-Lane Antrait 000 8.000 1 Future Antrait 09 Annua 01 Annual 570 12.000 2-Lane Antrait Undvided Annual 800 8.000 1 Future Antrait 61 Annual Stance 570 12.000 2-Lane Antrait Undvided Annual 800 8.000 1 Future Antrait 64 Annual 50 Annua 570 12.200 2-Lane Antrait Undvided Annual 800 8.000 1 Kingsewy 99 Streat Glimecod Eatiboard 12.200 2-Lane Antrait Undvided Antrait 10.000 2 2 Kingsewy Destroard Glimecod Eatiboard 12.210 Collector Undvided Antrait 10.000 1 1 1 1 1 1 1 1 1	45 Street	50 Avenue	43 Avenue	Northbound	960 1.460	2,420	Collector	Local (Residential or Industrial)	150	1,500	1
Future Antenial 75 Avenue 60 Avenue 60 Avenue 61 Avenue® 6000 1.2070 2-Lune Antenial Undivided Antenial 8000 8.000 1. Future Antenial 61 Avenue® 61 Avenue® 61 Avenue® 6100 1.2600 2-Lune Antenial Undivided Antenial 800 8.000 1 Future Antenial 61 Avenue® 64 Avenue 6500 1.2000 2-Lune Antenial Undivided Antenial 800 8.000 1 Future Antenial 61 Avenue® 54 Avenue 5200 2-Lune Antenial Undivided Antenial 800 8.000 1 Future Antenial 54 Avenue 59 Strete Generood 4.000 2.200 2.4me Antenial 1.000 10.000 1 Kingsway 9 Strete Generood 8.800 4.000 1 1.200 2.4me Antenial 1.000 10.000 1 Kingsway Theretine Generood 8.800 6.700 1.210 Celector Undivided Antenial 8.000 4.000 1	41 Street	54 Avenue	50 Avenue	Northbound	3,870	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1
Future Arterial 69 Avenue 61 Avenue® 64 Avenue® 64 Bit bood 550 12,650 2-Lare Arterial Undvided Arterial 800 8,000 1 Future Arterial 61 Avenue® 54 Avenue 54 Avenue 56 Avenue 56,000 12,800 2-Lare Arterial Undvided Arterial 800 8,000 1 Future Arterial 54 Avenue 54 Avenue 54 Avenue 56,000 1 50,000 1 Kingsway 59 Street Glanwood 42,000 2-Lare Arterial Undvided Arterial 800 8,000 1 Kingsway 59 Street Glanwood Eastboard 12,200 2-Lare Arterial Undvided Arterial 800 8,000 1 Kingsway Timebrine Glanwood Eastboard 12,210 Collector Undvided Arterial 800 8,000 1 Kingsway Termisfica Collector Undvided Arterial 800 4,000 1 1 Kingsway Termisfica Street 5,750 <td< td=""><td>Future Arterial</td><td>75 Avenue</td><td>69 Avenue</td><td>Northbound</td><td>6,900 5,170</td><td>12,070</td><td>2-Lane Arterial</td><td>Undivided Arterial</td><td>800</td><td>8,000</td><td>1</td></td<>	Future Arterial	75 Avenue	69 Avenue	Northbound	6,900 5,170	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
Future Artenial Ef Avenuebe Avenue Solutioscuri 6.8/00 12.800 2.Lane Artenial Undwided Artenial B00 8.000 1 Future Artenial 61 Avenuebe Xavenue Solutioscuri 5.590 10.300 2.Lane Artenial Undwided Artenial 800 8.000 1 Kingsway 59 Street Gienecord 4.520 2.2ue Artenial Undwided Artenial 10.000 10.000 2 Kingsway Timberline Gienecord 4.520 2.2ue Artenial Duided Artenial 10.000 10.000 1 Kingsway Timberline Gienecord 4.540 2.21780 Collector Duided Artenial 800 8.000 1 Kingsway Queersway Timberline Statutorial 14.200 2.120 Collector Undwided Artenial 800 8.000 1 Kingsway Tennis Court Road Tennis Court Road Eastbarned 1.440 3.400 Collector Lone N/A N/A N/A Oueersway Kingsway	Future Arterial	69 Avenue	61 Avenue/62	Northbound	6,760	12,660	2-Lane Arterial	Undivided Arterial	800	8,000	1
Future Arterial 64 Avenue 60 Avenue Northboard 4730 10.350 2 Lane Arterial Undwided Arterial 800 8.000 1 Kingsway 59 Streat Glemocod Eastboard 8.200 20.820 24.ane Arterial Divided Arterial 1,000 10.000 2 Kingsway Timberline Glemocod Eastboard 6.710 22.750 Collector Divided Arterial 10.000 10.000 1 Kingsway Tennis Court Road Queensway Timberline Weetboard 2.200 3.000 Collector Undwided Arterial 800 8.000 1 Kingsway Tennis Court Road Queensway Weetboard 2.200 3.000 Collector Collector (Residential or Industrial) 400 4.000 1 Tennis Court Road Gueensway Kingsway Soutboard 3.130 Collector Collector (Residential or Industrial) 400 4.000 1 Oweensway Kingsway Hangsway Hangsway Soutboard 5.770	Future Arterial	61 Avenue/62 Avenue	54 Avenue	Northbound	6,810	12,800	2-Lane Arterial	Undivided Arterial	800	8,000	1
Kingsway 99 Street Glerwood Wetbourd 12.400 20.620 2.Lane Arterial Divided Arterial 1.000 10.000 2 Kingsway Timberline Glerwood Wetbourd 8.710 22.750 Collector Divided Arterial 1.000 10.000 1 Kingsway Timberline Glerwood 8.710 22.750 Collector Undvided Arterial 800 8.000 1 Kingsway Tennis Court Road Queensway Timberline 12.210 Collector Collector Collector Collector A.000 1 </td <td>Future Arterial</td> <td>54 Avenue</td> <td>50 Avenue</td> <td>Northbound</td> <td>5,730</td> <td>10,350</td> <td>2-Lane Arterial</td> <td>Undivided Arterial</td> <td>800</td> <td>8,000</td> <td>1</td>	Future Arterial	54 Avenue	50 Avenue	Northbound	5,730	10,350	2-Lane Arterial	Undivided Arterial	800	8,000	1
Kingsway Timberline Glerwood Fissibility 1/10 22,750 Collector Divided Anterial 1,000 10,000 2 Kingsway Queensway Timberline Eastboard 7,020 Collector Undivided Anterial 800 8,000 1 Kingsway Ternis Court Road Queensway Weitboard 5,190 12,210 Collector Collector (Residential or Industrial) 400 4,000 1 Kingsway Ternis Court Road Ternis Court Road Ternis Court Road Ternis Court Road 4,000 4,000 1 Ternis Court Road Ternis Court Road Kingsway Southboard 3,100 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Ternis Court Road Kingsway Southboard 2,440 5,570 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Hanger Ln Nothboard 3,20 Collector Collector (Residential or Industrial)	Kingsway	59 Street	Glenwood	Eastbound	12,400	20,620	2-Lane Arterial	Divided Arterial	1,000	10,000	2
Kingsway Queensway Timberine Westbound 5/30 12.210 Collector Undvided Attarial 800 8.000 1 Kingsway Ternis Court Road Queensway Westbourd 5/30 12.280 3.300 Collector Collector Collector Restbourd 4/00 4/000 1 Kingsway End Road Ternis Court Road Queensway Kingsway Northbourd 3.300 Collector Collector Collector Restbourd 4/00 4/000 1 Ternis Court Road Queensway Kingsway Northbourd 3.310 5.770 Collector Collector Collector Restbourd 4/00 4/000 1 Queensway Kingsway Northbourd 4/10 5.010 Collector Coll	Kingsway	Timberline	Glenwood	Eastbound	8,220 14,040	22,750	Collector	Divided Arterial	1,000	10,000	2
Kingsway Tennis Court Road Queensway Kestbourd 2.200 3.300 Collector Collector Collector Residual 4.000 1 Kingsway End d Road Tennis Court Road Kestbourd 1.440 3.480 Collector Collector Collector Collector Residual 4.000 1 Tennis Court Road Queensway Kingsway Southbourd 330 400 Collector Lane N/A N/A N/A Queensway Tennis Court Road Kingsway Southbourd 3.130 5.570 Collector Collector Collector Residential or Industrial) 400 4.000 1 Queensway Kingsway Hangt Ln Southbourd 3.130 5.570 Collector Collector (Residential or Industrial) 400 4.000 1 Timberline Juniper Avenue Kingsway Nothbourd 1.400 5.210 Collector Collector (Residential or Industrial) 400 4.000 1 Timberline Kingsway <td>Kingsway</td> <td>Queensway</td> <td>Timberline</td> <td>Eastbound</td> <td>7,020</td> <td>12,210</td> <td>Collector</td> <td>Undivided Arterial</td> <td>800</td> <td>8,000</td> <td>1</td>	Kingsway	Queensway	Timberline	Eastbound	7,020	12,210	Collector	Undivided Arterial	800	8,000	1
Kingsway End of Road Tennis Court Road Westbound 2.040 3.480 Collector Collector (Residential or Industrial) 400 4.000 1 Tennis Court Road Queensway Kingsway	Kingsway	Tennis Court Road	Queensway	Eastbound	1,280	3,300	Collector	Collector (Residential or Industrial)	400	4,000	1
Tennis Court Road Queensway Kingsway Nothbound 320 400 Collector Lane NA NA NA Queensway Tennis Court Road Kingsway Southbound 3130 5.570 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Hanger Ln Nothbound 4100 5.010 Collector Collector (Residential or Industrial) 400 4,000 1 Queensway Kingsway Hanger Ln Southbound 4100 5.010 Collector Collector (Residential or Industrial) 400 4,000 1 Timberline Juniper Avenue Kingsway Athabasa Rod Northbound 4170 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Timberline Kingsway Athabasa Rod Northbound 5270 13,730 2-Lane Anterial Undwided Arterial 800 8,000 2 1 1. Road classification based on Daly Servide Volanue Stipal and In (Sunicola Edginenering Servicing	Kingsway	End of Road	Tennis Court Road	Eastbound	1,440	3,480	Collector	Collector (Residential or Industrial)	400	4,000	1
Cueensway Tennis Court Road Kingsway Northbound 3.130 5.570 Collector Collector (Residential or Industrial) 400 4.000 11 Queensway Kingsway Hanger Ln Southbound 2.440 5.010 Collector (Residential or Industrial) 400 4.000 1 Queensway Kingsway Hanger Ln Northbound 1.00 5.010 Collector (Residential or Industrial) 400 4.000 1 Timberline Juniper Avenue Kingsway Antabasca Row Southbound 1.400 5.010 Collector (Residential or Industrial) 400 4.000 1 Timberline Kingsway Antabasca Row Southbound 4.100 6.480 Collector Collector (Residential or Industrial) 400 4.000 1 2	Tennis Court Road	Queensway	Kingsway	Northbound	330	400	Collector	Lane	N/A	N/A	N/A
L L Southbound 2,440 1 Queensway Kingsway Hanger Ln Northbound 4,100 5,010 Collector Collector (Residential or Industrial) 400 4,000 1 Timbetine Juniper Avenue Kingsway Antabasca Rad 910 3,220 Collector Collector (Residential or Industrial) 400 4,000 1 Timbetine Kingsway Antabasca Rad Northbound 4,400 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Interview Kingsway Antabasca Rad Northbound 6,480 Collector Collector Residential or Industrial) 400 4,000 1 Int Root disselfication based on Datify Sender Volume situatiation Industrial Northbound 6,480 Collector Collector Residential or Industrial 800 8,000 1 Int Root disselfication based on Datify Sender Volume situatiation Industrial Northbound 6,480 1,730 2-Lane Anterial Undvided Anterial 800 8,000 1 Int Roo	Queensway	Tennis Court Road	Kingsway	Northbound	3,130	5,570	Collector	Collector (Residential or Industrial)	400	4,000	N/A 1
Image: Note: Control of the second	Queensway	Kingsway	Hanger Ln	Northbound	2,440 4,100	5.010	Collector	Collector (Residential or Industrial)	400	4.000	2
Image Southbound 1,400 1 Timberline Kingsway Athabase Road 1,400 1 Southbound 4,100 4,170 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Southbound 2,310 5,000 2,310 5,000 1 1 1 Read classification based on 2000 Transportation Study 8,000 2,270 1,3730 2-Lane Anterial Undivided Anterial 800 8,000 1 2 Road classification based on 2000 Transportation Study 5,070 5,070 1,3730 2-Lane Anterial Undivided Anterial 800 8,000 1 2 Road classification based on 2000 Transportation Study 5,070 1,3730 2-Lane Anterial Undivided Anterial 8000 8,000 1 3 Based on Lace Quacity Table (transportation Study 5,070 Standard Classification based on 200 5 5 5 5 5 5 5 5 5 5 5 5 5 5 </td <td>Timberline</td> <td>Juniper Avenue</td> <td>Kingsway</td> <td>Northbound</td> <td>910 1,920</td> <td>3.320</td> <td>Collector</td> <td>Collector (Residential or Industrial)</td> <td>400</td> <td>4.000</td> <td>1</td>	Timberline	Juniper Avenue	Kingsway	Northbound	910 1,920	3.320	Collector	Collector (Residential or Industrial)	400	4.000	1
Source Source Source Control C	Timberline	Kingsway	Athabasca Road	Southbound Northbound	1,400 4,170	6.480	Collector	Collector (Residential or Industrial)	400	4.000	1 2
Instruction Southbound 5,270 Instruction Construction Construction <thconstruction< th=""> <thconstruction< th=""></thconstruction<></thconstruction<>	Glenwood Drive	Glenwood	Kingsway	Southbound Northbound	2,310 8,460	13,730	2-I ane Arterial	Undivided Arterial	800	8,000	1 2
19. A 2-lane collector cross section is appropriate for 50 Avenue between 45 Street and 41 Street as the AADT is less than 9000 20. A 2-lane collector cross section is appropriate for 34 Avenue hetween Hwy 28 and 45 Street as the AADT is less than 9000	 Road classification ba Road classification ba Based on Lane Capae. Based on Lane Capae. Based an Saximption A 2-lane collector cross <l< td=""><td colspan="10"></td></l<>										

City of Cold Lake - Transportation Study Project No: 2010-3050 Date: April 11, 2011

TABLE 6.4: COMPARISON OF EXISTING AND 20-YEAR ROAD NETWORK

Operations	Interse	ection	Existing (2010) Road	Existing (201	0) Number of	Recommended 20-Year (2030) Road	Recommended 20-Year	Income Described
Corridor	From	То	Classification ¹	Lanes (One	Direction)	Classification	(One Direction)	improvements Requirea
8 Avenue	10 Street	Lakeshore Drive	Undivided Arterial	-	1	Divided Arterial	2	Widen to provide centre median and 2 travel lanes in each direction
8 Avenue	25 Street	10 Street	Divided Arterial	-	2	Divided Arterial	2	
Hwy 28/55	Hwy 55/16 Avenue	53 Avenue	Divided Arterial		2	Expressway	2	-
Hwy 28/55	53 Avenue	52 Avenue	Undivided Arterial		2	Expressway	2	Widen to provide centre median
Hwy 28/55	52 Avenue	50 Avenue	Divided Arterial		2	Expresswav	2	
Hury 28/55	50 Avenue	52 Street	Divided Arterial		2	Divided Arterial	2 2	
Hwy 20/55	SU AVEILLE	52 Stieet	Divided Artenal		2	Divided Artenai	2	-
Hwy 28/55	52 Street	47 Avenue	Undivided Arterial		2	Divided Artenal	2	Widen to provide centre median
Hwy 28/55	47 Avenue	40 Avenue	Divided Arterial		2	Divided Arterial	2	-
Hwy 28/55	40 Avenue	South City Limit	Undivided Arterial		1	Undivided Arterial	1	-
1 Avenue	28 Street	1 Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-
Hwy 55 ²	West City Limit	28 Street	Collector (Residential or Industrial)		1	Undivided Arterial	1	-
Hwy 55	28 Street	Hwy 28	Collector (Residential or Industrial)		1	Divided Arterial	2	Build pavement structure to Arterial standard (centre median and 2 travel lanes in each direction)
16 Avenue	Hwy 28	16 Street	Collector (Residential or Industrial)		11	Undivided Arterial	2	Build pavement structure to Arterial standard (2 travel lanes in each direction)
16 Avenue	16 Street	8 Street	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	2	Widen to provide 2 travel lanes in each direction
16 Avenue	8 Street	East City Limit	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	
English Bay Road	North City Limit	Lake Avenue	Collector (Residential or Industrial)		1	Undivided Arterial	1	-
English Bay Road	Lake Avenue	Hwy 28	Collector (Residential or Industrial)		1	Divided Arterial	2	Build pavement structure to Arterial standard (centre median and 2 trave
28 Street	English Bay Road	Hwy 55	Collector (Residential or Industrial)		1	Undivided Arterial	1	Realion 28 Street and build pavement structure to Arterial standard
25 Street	1 Δυρομο	English Bay Road	Collector (Residential or Industrial)		1	Lindivided Arterial	1	
Notices Otreat	1 Avenue	40 Owner	Collector (Residential or Industrial)		1	Collector (Decidential or la dustrial)	1	-
Nelson Street	1 Avenue	To Street	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	*
16 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)		1	Undivided Arterial	1	-
16 Street	16 Avenue	75 Avenue	Local		1	Undivided Arterial	1	Build pavement structure to Arterial standard
Future Arterial	75 Avenue	50 Avenue	Non-existant		-	Undivided Arterial	1	Build out as per 20-year horizon
10 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-
10 Street	16 Avenue	16 Street	Local		1 1	Collector (Residential or Industrial)	1	-
8 Street	16 Avenue	75 Avenue	Local		1	Collector (Residential or Industrial)	1	Build pavement structure to Collector standard
6 Street	16 Avenue	21 Avenue	Local		1	Collector (Residential or Industrial)	1	-
20 Avenue	12 Street	8 Street	Non-existant			Collector (Residential or Industrial)	1	Build out as per 20-year horizon
75 Avenue	Hwy 28/55	Future Arterial	Local	-	1	Collector (Residential or Industrial)	2	Build pavement structure to Collector standard (2 travel lanes in each
69 Avenue	Glenwood	Hwy 28/55	Non-existant		-	Undivided Arterial	1	Build out as per 20-year horizon
69 Avenue	Hwy 28/55	Future Arterial	Local		- 1	Undivided Arterial	1	
47 Street	69 Avenue	61/62 Avenue	Local		1	Collector (Residential or Industrial)	1	
54 Avenue	56 Street	49 Street	Collector (Residential or Industrial)		1 1	Collector (Residential or Industrial)	1 2	Widen to provide 2 travel lanes in each direction
54 Avenue	40 Otreat	Fotors Asterial	Nas evistant		-	Collector (Residential or Industrial)	2	
54 Avenue	49 Street	Future Artenai	Non-existant		-	Collector (Residential or Industrial)	2	Build out as per 20-year horizon
52 Avenue	59 Street	57 Street	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-
52 Avenue	57 Street	Hwy 28/55	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	2	Widen to provide 2 travel lanes in each direction
Centre Avenue	59 Street	57 Street	Undivided Arterial		1	Divided Arterial	2	Widen to provide centre median and 2 travel lanes in each direction
Centre Avenue	57 Street	Hwy 28/55	Undivided Arterial		2	Divided Arterial	2	Widen to provide centre median
50 Avenue	Hwy 28/55	Future Arterial	Undivided Arterial		1	Undivided Arterial	1	-
50 Avenue	Future Arterial	Baywood Road	Undivided Arterial		1	Collector (Residential or Industrial)	1	-
43 Avenue	Hwy 28/55	45 Street	Local		1	Collector (Residential or Industrial)	2	Build pavement structure to Collector standard (2 travel lanes in each direction)
59 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-
57 Street	54 Avenue	52 Avenue	Local		1	Collector (Residential or Industrial)	1	
57 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	
51 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	
50 Street	50 Avenue	Huay 28/55	Collector (Residential or Industrial)		1 1	Lindivided Arterial	1	
30 Street	50 Avenue	70 Aurous	Collector (Residential or Industrial)		1	Collector (Decidential or la dustrial)	1	
40 Street	54 AVENUE	JU AVENUE	Conector (residential or industrial)	-	1	Collector (Residential or industrial)	1	-
45 Street	50 Avenue	43 Avenue	Local		1	Collector (Residential or Industrial)	1	-
41 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)		1 1	Collector (Residential or Industrial)	1	-
Kingsway	59 Street	Glenwood	Undivided Arterial		1	Divided Arterial	2	Widen to provide centre median and 2 travel lanes in each direction
Kingsway	Timberline	Glenwood	Collector (Residential or Industrial)	-	1	Divided Arterial	2 2	lanes in each direction)
Kingsway	Queensway	Timberline	Collector (Residential or Industrial)		1	Undivided Arterial	1	-
Kingsway	Queensway	End of Road	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-
Queensway	Tennis Court Road	Hanger Ln	Collector (Residential or Industrial)		1	Collector (Residential or Industrial)	1	-
Timberline	Juniper Avenue	Athabasca Road	Collector (Residential or Industrial)	-	1	Collector (Residential or Industrial)	1	
Glenwood Drive	Glenwood	Kingsway	Collector (Residential or Industrial)		1	Undivided Arterial	2	Build pavement structure to Arterial standard (2 travel lanes in each
1 Based on 2000 Trans	nortation Study Bood	Clossifications with a	appointeration for Highway 29 Twinning	(10 Street and F	4 (1000110)	1	4	unection)

Based on 2000 Transportation Study Road Classifications with consideration for Highway 28 Twinning (10 Street and 54 Avenue)
 Following the reclassification of a roadway, no improvements are required to upgrade the pavement structure unless widening is also required.



Summary of Findings

AE was retained by the City to forecast the future traffic volumes for the next 20 years. Traffic volumes were forecasted for the 5-year, 10-year, 15-year, and 20-year planning horizons and analyzed to determine roadway classification and number of lanes required to accommodate the future traffic volumes.

Figure 5.1 through Figure 5.4 present the forecasted daily traffic volumes for the 5-year, 10-year, 15-year, and 20-year planning horizons respectively.

The forecasted total traffic volumes for each planning horizon were compared with the City's daily service volumes to determine the required roadway classification. The lane volumes were also compared with the lane capacity for the given road classification, to determine the required number of lanes required along each roadway. The results of the analysis are summarized in Appendix D for each planning horizon.

The 20-year (2030) road classification and number of lanes will be used by the City to determine the rightof-way that should be retained to accommodate future expansion of the road network. The major corridors in the 20-year road network were reviewed independently to establish consistent road classification and numbers of lanes along the corridor, where possible. The recommended road classification and number of lanes is presented in Figure 6.1.

Table 6.4 summarizes the major road network in the 20-year planning horizon, along with a comparison of the existing and future road classification and number of lanes. The table also summarizes the improvements required to upgrade the corridors from the existing horizon to the 20-year planning horizon.



Appendix A - ASP, ARP and Outline Plan Information



FISCHER ESTATES - LAND USE INFORMATION

	Total Dev	/elopable	Develope	ed in 2010	Undeveloped in 2010		
Land Ose Type	Area (ha.)	Dwelling Units	Areas (ha)	Dwelling Units	Area (ha)	Dwelling Units	
Low-Density Residential	25.0	449	-	0	-	449	
Multi-Family Residential	5.9	295	-	0	-	295	
Commercial - Arterial	3.6	-	3.6	-	0.0	-	
Commercial - Neighbourhood	6.7	-	0.9	-	5.8	-	
Municipal Reserve	5.0	-	0.0	-	5.0	-	
Stormwater	4.7	-	0.0	-	4.7	-	
Other (Roadway/Pathway)	12.6	-	0.0	-	12.6	-	
Total	63.5	744	4.5	0	28.1	744	

IRON HORSE - LAND USE INFORMATION

Land Use	Total Dev	/elopable	Develope	ed in 2010	Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Low-Density Residential	19.7	323	-	0	-	323
Medium-Density Residential	0.6	18	-	0	-	18
High-Density Residential	0.9	45	-	0	-	45
Municipal Reserve	2.24	-	0.0	-	0.0	-
Other (Roadways)	7.36	-	0.0	-	0.0	-
Total	30.8	386	0.0	0	0.0	386

COLD LAKE CENTRAL - LAND USE INFORMATION

	Total Developable		Develope	ed in 2010	Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Low-Density Residential	90.1	1,559	-	205	-	1,354
Medium-Density Residential	20.7	622	-	44	-	578
High-Density Residential	10.5	1,046	-	444	-	602
Manufactured Housing	12.3	243	-	243	-	0
Commercial - Arterial	37.7	-	18.9	-	18.7	-
Institutional	2.6	-	2.6	-	0.0	-
Parks/Municipal Reserve	25.8	-	0.0	-	0.0	-
Stormwater Facility/PUL (Sanitary Forcemain)	13.9	-	0.0	-	0.0	-
Circulation	36.9	-	0.0	-	0.0	-
Total	250.6	3,470	21.6	936	18.7	2,534

GRAND CENTRE SE - LAND USE INFORMATION

	Total Developable		Develope	ed in 2010	Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Low-Density Residential	21.6	370	-	89	-	281
Mobile Home	8.4	240	-	90	-	150
Commercial - Arterial	10.1	-	10.1	-	0.0	-
Industrial	15.8	-	9.9	-	5.9	-
Utility	6.4	-	0.0	-	6.4	-
Open Space	1.8	-	0.0	-	1.8	-
Fairgrounds	40.1	-	0.0	-	40.1	-
Cementary	0.8	-	0.8	-	0.0	-
Total	105.0	610	20.8	179	54.3	431

FOREST HEIGHTS - LAND USE INFORMATION

	Total Developable		Developed in 2010		Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Developed in 2007 (120 Residential Lots & School Site)	19.6	120	19.6	120	0.0	0
Single-Family Residential	20.6	345	0.0	0	20.6	345
Multi-Family Residential	8.3	248	0.0	0	8.3	248
Municipal Reserve	4.4	-	0.0	-	4.4	-
Storm Water Management	1.7	-	0.0	-	1.7	-
Roadways	9.4	-	0.0	-	9.4	-
Total Residential	64.0	713	19.6	120	44.4	593

NORTHSHORE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

TOTAL AREA

	Total Area ¹	Creekside ASP ²	Parkview ASP ³	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	244.1	60.5	36.8	146.8
Non-Residential Subtotal	125.6	17.8	13.2	94.6
Linear Parks (Parkways/Trails)	4.9	0.0	0.0	4.9
Local Parks	10.4	1.3	5.7	3.5
Special Study Area	20.8	9.8	0.0	11.0
Stormwater Management Facilities	10.1	3.6	0.0	6.5
Public Utility Lots	1.6	0.0	0.0	1.6
Roads	53.6	2.8	7.5	43.3
School Site	4.6	0.0	0.0	4.6
Institutional	5.6	0.0	0.0	5.6
Religious Assembly	0.3	0.3	0.0	0.0
Neighbourhood Commercial	1.8	0.0	0.0	1.8
Highway Commercial	11.9	0.0	0.0	11.9
Residential	118.5	42.7	23.6	52.2
Low Density Residential	91.9	38.4	21.0	32.6
Medium Density Residential	14.9	4.4	0.0	10.6
Mixed Use Commercial	9.1	0.0	2.6	6.5
Mixed Use Institutional	2.6	0.0	0.0	2.6

1. From Northshore ASP

2. From Creekside ASP

3. From Parkview ASP

2007 HORIZON - DEVELOPED

	Total Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	244.1	60.5	36.8	146.8
Non-Residential Subtotal	5.9	0.3	0.0	5.6
Linear Parks (Parkways/Trails)	0.0	0.0	0.0	0.0
Local Parks	0.0	0.0	0.0	0.0
Special Study Area	0.0	0.0	0.0	0.0
Stormwater Management Facilities	0.0	0.0	0.0	0.0
Public Utility Lots	0.0	0.0	0.0	0.0
Roads	0.0	0.0	0.0	0.0
School Site	0.0	0.0	0.0	0.0
Institutional	5.6	0.0	0.0	5.6
Religious Assembly	0.3	0.3	0.0	0.0
Neighbourhood Commercial	0.0	0.0	0.0	0.0
Highway Commercial	0.0	0.0	0.0	0.0
Residential	5.1	0.0	0.0	5.1
Low Density Residential	5.1	0.0	0.0	5.1
Medium Density Residential	0.0	0.0	0.0	0.0
Mixed Use Commercial	0.0	0.0	0.0	0.0
Mixed Use Institutional	0.0	0.0	0.0	0.0
Developable Area	233.1	60.2	36.8	136.1

NORTHSHORE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

2010 HORIZON - DEVELOPED

	Total Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	233.1	60.2	36.8	136.1
Non-Residential Subtotal	0.9	0.9	0.0	0.0
Linear Parks (Parkways/Trails)	0.0	0.0	0.0	0.0
Local Parks	0.0	0.0	0.0	0.0
Special Study Area	0.0	0.0	0.0	0.0
Stormwater Management Facilities	0.9	0.9	0.0	0.0
Public Utility Lots	0.0	0.0	0.0	0.0
Roads	0.0	0.0	0.0	0.0
School Site	0.0	0.0	0.0	0.0
Institutional	0.0	0.0	0.0	0.0
Religious Assembly	0.0	0.0	0.0	0.0
Neighbourhood Commercial	0.0	0.0	0.0	0.0
Highway Commercial	0.0	0.0	0.0	0.0
Residential	7.4	5.7	1.7	0.0
Low Density Residential	7.4	5.7	1.7	0.0
Medium Density Residential	0.0	0.0	0.0	0.0
Mixed Use Commercial ¹	0.0	0.0	0.0	0.0
Mixed Use Institutional	0.0	0.0	0.0	0.0
Developable Area	224.8	53.7	35.1	136.1

2010 - DEVELOPABLE

	Total Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	(ha)	(ha)	(ha)	(ha)
Gross Area	224.8	53.7	35.1	136.1
Non-Residential Subtotal	118.8	16.6	13.2	89.0
Linear Parks (Parkways/Trails)	4.9	0.0	0.0	4.9
Local Parks	10.4	1.3	5.7	3.5
Special Study Area	20.8	9.8	0.0	11.0
Stormwater Management Facilities	9.2	2.8	0.0	6.5
Public Utility Lots	1.6	0.0	0.0	1.6
Roads	53.6	2.8	7.5	43.3
School Site	4.6	0.0	0.0	4.6
Institutional	0.0	0.0	0.0	0.0
Religious Assembly	0.0	0.0	0.0	0.0
Neighbourhood Commercial	1.8	0.0	0.0	1.8
Commercial - Arterial	11.9	0.0	0.0	11.9
Residential	106.0	37.1	21.9	47.1
Low Density Residential	79.4	32.7	19.2	27.5
Medium Density Residential	14.9	4.4	0.0	10.6
Mixed-Use Commercial ⁴	9.1	0.0	2.6	6.5
Mixed-Use Institutional	2.6	0.0	0.0	2.6

4. To maintain consistency with Northshore ASP, Parkview's Commercial as been considered as Mixed Use Commercial - To account for total land area

NORTHSHORE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

TOTAL DEVELOPABLE - SCHOOL/RESIDENTIAL

	Total	Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	1,958	0	0	1,958
Low-Density Residential	Dwelling Units	1,654	659	401	594
Medium-Density Residential	Dwelling Units	671	196	0	475
Mixed-Use Commercial	Dwelling Units	547	0	0	547
Mixed-Use Institutional	Dwelling Units	157	0	0	157

2007 DEVELOPED - SCHOOL/RESIDENTIAL

	Total	Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	0	0	0	0
Low-Density Residential	Dwelling Units	57	0	0	57
Medium-Density Residential	Dwelling Units	0	0	0	0
Mixed-Use Commercial	Dwelling Units	0	0	0	0
Mixed-Use Institutional	Dwelling Units	0	0	0	0

2010 DEVELOPED - SCHOOL/RESIDENTIAL

	Total	Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	0	0	0	0
Low-Density Residential	Dwelling Units	99	65	34	0
Medium-Density Residential	Dwelling Units	0	0	0	0
Mixed-Use Commercial	Dwelling Units	0	0	0	0
Mixed-Use Institutional	Dwelling Units	0	0	0	0

2010 DEVELOPABLE - SCHOOL/RESIDENTIAL

	Total	Area	Creekside ASP	Parkview ASP	Remaining Area
Land Use	Unit	# of	# of	# of	# of
School	Students	1,958	0	0	1,958
Low-Density Residential	Dwelling Units	1,498	594	367	537
Medium-Density Residential	Dwelling Units	671	196	0	475
Mixed-Use Commercial	Dwelling Units	547	0	0	547
Mixed-Use Institutional	Dwelling Units	157	0	0	157

LOT 2, PLAN 982 1024 - LAND USE INFORMATION

	Total Developable		Develope	ed in 2010	Undeveloped in 2010		
Land Use	Area (s.ft.)	Dwelling Units	Area (s.ft.)	Dwelling Units	Area (s.ft.)	Dwelling Units	
Residential							
Building 1	5,506.0	12	5,506.0	12	0.0	0	
Building 2	5,506.0	12	5,506.0	12	0.0	0	
Building 3	19,394.0	54	19,394.0	54	0.0	0	
Building 6 - Will not be built	0.0	0	0.0	0	0.0	0	
Total Residential	30,406.0	78	30,406.0	78	0.0	0	
Commercial							
Building 4	11,295.9	0	0.0	0	11,295.9	0	
Building 5	4,068.6	0	0.0	0	4,068.6	0	
Total Commercial	15,364.5	0	0.0	0	15,364.5	0	

HORSESHOE BAY - LAND USE INFORMATION

Land Use	Area (acres)	Area (ha)	% of Planned Area	Lots	Population Estimate
Existing 50 ft width lot (Beach Avenue)	4.0	1.6	2.0%	21	65
Existing 0.5 acre lots	3.7	1.5	2.0%	7	22
Existing 1.0 acre lots	14.0	5.7	7.4%	11	34
Potential Serviced Residential Estates	105.0	42.5	55.3%	182	564
Natural Area Park	5.0	2.0	2.6%		
Lakeshore Trail System	5.0	2.0	2.6%		
Environmental Reserve	26.0	10.5	13.7%		
English Bay Road	7.0	2.8	3.7%		
Local Roads (by dedication)	20.0	8.0	10.5%		
Total	190.0	77.0	100.0%	219	651

	Total Developable	Developed in 2010	Undeveloped in 2010
Land Use	(Dwelling Unit)	(Dwelling Unit)	(Dwelling Unit)
Low Density Residential	219	177	42

UPLANDS - LAND USE INFORMATION

	Total Developable		Develope	ed in 2010	Undeveloped in 2010	
Land Use	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Single-Family Residential	45.2	904	0.0	0	45.2	904
Multi-Family Residential	9.6	480	0.0	0	9.6	480
Health Services and Mixed Use	5.0	-	0.0	-	5.0	-
Municipal Reserve	12.7	-	0.0	-	12.7	-
SWMF and Existing Wetlands	7.9	-	0.0	-	7.9	-
Roads and Lanes	21.5	-	0.0	-	21.5	-
Total	101.9	1,384	0.0	0	101.9	1,384

LAKESHORE REDEVELOPMENT - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

	Description	Existing Land Use	Area (s.m.)	Area (hec)	Max. Site Coverage	Developable Area (hec)	Area (sq.ft)
1	Vacant parcel on 12 Street and 8 Avenue	Vacant	16,938.6	1.7	0%	0.0	0.0
2	902 10 Street ¹	Commercial	1,097.2	0.1	50%	0.1	5,905.0
3	904 10 Street	Commercial	690.4	0.1	50%	0.0	3,715.9
4	901 9 Avenue	Commercial	1,118.8	0.1	50%	0.1	6,021.3
5	803 10 Avenue	Commercial	2,248.6	0.2	50%	0.1	12,102.1
6	Triangle Park ²	Park / Open Space	1,135.7	0.1	100%	0.1	12,224.7
7	Bibeau Park	Park / Open Space	11,648.9	1.2	100%	1.2	125,387.8
8	Centoaph Park	Park / Open Space	2,605.4	0.3	100%	0.3	28,044.2
9	Fire Hall ³	Fire Hall	3,427.9	0.3	50%	0.2	18,449.1

1. Assume maximum site coverage for HDR is the same for MDR (50%)

2. Will not include in existing trip generation since not currently used. Following redevelopment, parks will be used and generate traffic.

3. From address map, fire hall building is approximately 50% of site.

	Description	Future Land Use	Area (s.m.)	Area (hec)	Max. Site Coverage	Developable Area (hec)	Area (sq.ft)	Dwelling Units
1	Vacant parcel on 12 Street and 8 Avenue ⁴	Medium Density Residential	16,938.6	1.7	50%	0.8	91,162.6	38
2	902 10 Street ⁵	High Density Residential	1,097.2	0.1	50%	0.1	5,905.0	15
3	904 10 Street ⁵	High Density Residential	690.4	0.1	50%	0.0	3,715.9	9
4	901 9 Avenue ⁵	High Density Residential	1,118.8	0.1	50%	0.1	6,021.3	15
5	803 10 Avenue ⁶	Low Density Residential	2,248.6	0.2	45%	0.1	10,891.9	3
6	Triangle Park	Park / Open Space	1,135.7	0.1	100%	0.1	12,224.7	-
7	Bibeau Park	Park / Open Space	11,648.9	1.2	100%	1.2	125,387.8	-
8	Centoaph Park	Park / Open Space	2,605.4	0.3	100%	0.3	28,044.2	-
9	Fire Hall	Community Hall	3,427.9	0.3	50%	0.2	18,449.1	-

4. Maximum Density of 45 units/ha

5. HDR assumed to have 1 dwelling unit per 400 sq.ft of building footprint. Derived using ratio from Lot 2 buildings.

6. 803 10 Avenue can be subdivided into three single family lots

LAKEWOOD ESTATES - LAND USE INFORMATION

		Total Developable		Develope	ed in 2010	Undevelop	oed in 2010
Land Use	Area (s.m.)	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Total ASP Area	213,281.7	21.3	198				
Low-Density Residential	103,315.2	10.3					
Phase I		-	45	-	45	-	0
Phase II		-	32	-	0	-	32
Phase III		-	21	-	0	-	21
Phase IV		-	31	-	0	-	31
Phase V		-	21	-	0	-	21
Phase VI		-	28	-	0	-	28
Phase VII		-	20	-	0	-	20
Municipal Reserve	25,619.5	2.6	-	0.0	-	2.6	-
Others (Roadway/Pathways)	84,347.0	8.4	-	0.0	-	8.4	-
Total	213,281.7	21.3	198	0.0	45	11.0	153

CREEKSIDE ESTATES - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

	Total Developable				Developed in 2010		Undeveloped in 2010	
Land Use	Area (s.m.)	Area (ha)	Density (Units/ha) ¹	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Total ASP Area	605,034.5	60.5						
Developed - In 2010								
Low-Density Residential	56,734.3	5.7	-	65	-	65	-	0
SWMF	-	0.9	-	-	0.9	-		
Undeveloped - In 2010								
Low-Density Residential	330,059.3	33.0	18.0	594	-	0	-	594
Medium-Density Residential	-	4.4	45.0	196	-	0	-	196
Park	-	1.3	-	-	0.0	-	1.3	-
SWMF	-	2.8	-		0.0	-	2.8	-
Special Study Area	-	9.8	-	-	0.0	-	9.8	-
Other (Roadways / Pathways)	-	2.8					2.8	
Total		60.5		855	0.9	65	16.6	790

1. From Northshore ASP

PARKVIEW ESTATES - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

	Total Developable			2010 Developed		2010 Undeveloped		
Land Use	Area (s.m.)	Area (ha)	Density (Units/ha) ¹	Dwelling Units	Area (ha)	Dwelling Units	Area (ha)	Dwelling Units
Total ASP Area	367,975.6	36.8	-	-				
Developed - In 2010								
Low-Density Residential (R1B)	17,287.5	1.7	-	34	-	34	-	0
Undeveloped - In 2010								
Low-Density Residential - Divided Lots	51,906.5	5.2	-	114	-	0		114
Low-Density Residential - Undivided Lots	140,448.2	14.0	18.0	253	-	0		253
Neighbourhood Commercial ²	26,325.8	2.6	-	-	0.0	-	2.6	
Open Space	56,814.5	5.7	-	-	0.0	-	5.7	
Other (Roadways / Pathways)	75,193.1	7.5	-	-	0.0	-	7.5	
Total	292,782.5	29.3		401	0.0	34	15.8	367

1. From Northshore ASP

2. Outline Plan shows this area as C3 - Neighbourhood Commercial but Northshore ASP shows as Mixed Use Commercial

HILLS OF COLD LAKE - LAND USE INFORMATION

* Land uses highlighted in yellow will be used to generate development traffic volumes *

Description of Land Use	Unserviced Lots (Acres)	Serviced Lots (Acres)
Total area available for development	294.9	294.9
Land to be allocated to the MD. Land marked as MR reserve.	45.7	64.5
Area of road reserve and public utility lanes	46.3	59.5
Area planned for establishment of building lots	202.9	170.9

Phasing

Phase	Unserviced Lot Subdivision	Serviced Lot Subdivision
Phase A - Year 1	40	40
Phase B - Year 2-3	40	40
Phase C - Year 4-5	40	40
Phase D - Year 6-8	60	60
Phase E - Year 9	20	20
Phase F - Year 10-11	-	40
Phase G - Year 12-13	-	40
Phase H - Year 14	-	20
Total	200	300
City of Cold Lake Transportation Study Traffic Volume Forecast Project No: 2010-3050 Date: January 28, 2011

FAWN RIDGE ESTATES - LAND USE INFORMATION

		Developable Area	
Subdivisions and Legal Description	Land Use	(Acres)	Dwelling Units
NW 23-62-3-4 (Fawn Ridge Estates Subdivision)	Country Residential (CR)	86.3	54

			Direction Distribution (%)		Direction Distribution (%)			
	Trip Generation Rate (Trips per Dwelling							
Time Period	Units)	Generated Trips	Inbound	Outbound	Inbound	Outbound		
	NW 23-62-3-4 (Fawn Ridge Estates Subdivision)							
	Country Residential (Fawn Ridg	ge Estates Subdivisio	n) Code 210					
Weekday (AADT)	9.57	517	50%	50%	258	258		
AM Peak Hour	0.77	42	26%	74%	11	31		
PM Peak Hour	1.02	55	64%	36%	35	20		

MD BONNYVILLE - RESIDENTIAL

Source: Intermunicipal Development Plan (Feb 2009)

Future Land Uses:

- Residential developments

Land Use Location		Developable Area (m ²)	Developable Area (Hec)	Developed Area by 2030 (Hec)
Residential Development 1 - 30% Developed by 2030	Along north side of Highway 55, west of Cold Lake	629,116.85	63	19
Residential Development 2 - 30% Developed by 2030	West of IDP Commercial Development, between 75 Avenue and south of 61/62 Avenue	843,132.02	84	25
Residential Development 3 - 30% Developed by 2030	East of Cold Lake Central, between Energy Centre to 55 Avenue	4,178,346.10	418	125

Assumed:

- Single family: 20 dwelling units/ha

- Multi family: 50 dwelling units/ha

- 75/25 split between single family and multi family residential developments

Land Use	Building Type	Developable Area (Hec)	Dwelling Units
	75% - Single Family Residential	14	283
Residential Development 1	25% - Multi Family Residential	5	236
	Total	19	519
	75% - Single Family Residential	19	379
Residential Development 2	25% - Multi Family Residential	6	316
	Total	25	696
	75% - Single Family Residential	94	1,880
Residential Development 3	25% - Multi Family Residential	31	1,567
	Total	125	3,447

MD BONNYVILLE - IDP INDUSTRIAL

Source: Intermunicipal Development Plan (Feb 2009)

Location:

- Either side of Highway 55, west of Cold Lake

Future Land Uses:

- Industrial

			Developed Area
Land Use	Developable Area (m ²)	Developable Area (Hec)	by 2030 (Hec)
Industrial Development - 20% Developed by 2030	3,919,353.21	392	78

Assumed:

- 60% max site coverage (as per City of Cold Lake Bylaw)

MD BONNYVILLE - IDP COMMERCIAL

Source: Intermunicipal Development Plan (Feb 2009)

Location:

- Along west side of Highway 28, from Energy Centre to 55 Avenue

Future Land Uses:

- Commercial

Land Use	Developable Area (m²)	Developable Area (Hec)	Developed Area by 2030 (Hec)
Commercial Development - 30% developed by 2030	1,574,100.10	157	47

Assumed:

- Arterial Commercial: 80% site coverage (as per City of Cold Lake Bylaw)

B Appendix B - Traffic Demand Forecast Work Plan



MEMO		Subject:	Traffic Demand Fored	cast Worl	< Plan
		Project:	City of Cold Lake Tra	nsportati	on Study
		From:	Rohit Vij		
		To:	Bob Kitchen		
Associated	GLOBAL PERSPECTIVE.	Date:	February 25, 2011	File:	20103050.00.01.10

1 OBJECTIVE

The objective of this work plan is to develop a methodology by which to forecast future traffic demand within Cold Lake, using the ASP, ARP and Outline Plans. **Highlighted text illustrates our assumptions for Cold Lake Transportation Study.** Please review the assumptions and provide your consensus.

2 BACKGROUND INFORMATION

Associated Engineering (AE) has obtained the following information from the City of Cold Lake.

2.1 AREA STRUCTURE PLANS (ASP)

- Fischer Estates
- Horseshoe Bay
- Iron Horse
- Cold Lake Central
- Southeast
- Forest Heights
- North Shore
- Lot 2, Plan 982 1024
- Uplands

2.2 AREA REDEVELOPMENT PLAN (ARP)

Cold Lake Downtown (Cold Lake North)

2.3 OUTLINE PLANS

- Lakewood Estates
- Creekside Estates
- Parkview Estates

Figure 1 presents the Outline Plan for Lakewood Estates. The Outline Plan presents the breakdown of the subdivision to parcels and indicates the phasing anticipated; however, the land use is not indicated. Based on the layout, it will be assumed that subdivision will be solely low-density residential.





Figure 1

OVERALL DEVELOPMENT CONCEPT



CREEKSIDE

OVERALL DESIGN CONCEPT



N: \102255\Pianning\102255-12\102255-12-TLP-1.dwa\Overall

Figure 2





Memo To: Bob Kitchen July 20, 2010 - 2 -

Figure 2 presents the Outline Plan for Creekside Estates. The Outline Plan presents the breakdown of the subdivision into parcels and indicates the land use. For parcels where the land use is not indicated, low-density residential will be assumed.

The available ASP, ARP and Outline Plans are shown in Figure 3.

2.4 CITY OF COLD LAKE LAND USE BY-LAW

The different land use districts within the City of Cold Lake was presented and described in the Land Use By-law. The following table summarizes the information of interest for the purpose of the Traffic Demand Forecast.

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density
RE – Residential Estates District	35%	108.0	-	1 unit/lot
R1A – Residential District (Single Detached)	45%	84.0	-	1 unit/lot
R1B – Residential District (Single Detached – Small Lots)	45%	72.0	-	1 unit/lot
R1B-1 – Residential District (Single Detached – Small Lots)	45%	72.0	-	1 unit/lot
R2 – Residential District (Semi- Detached/Duplex)	45%	72.0	-	2 units/lot
R3 – Medium Density Residential (Row Housing)	50%	63.0	-	42 units/ha
R4 – High Density Residential	-	-	1.3	95 units/ha
RMX – Residential Mixed Use	-	At discretion of Development Authority	-	-

Table 2.1 – Information from City of Cold Lake Land Use Bylaw





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Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density
RMHC – Residential Manufactured Home Community District	40%	a) single wide – 65.0 b) double wide – 85.0	-	16 units/ha
RMHS – Residential Manufactured Home Subdivision	40%	49.5	-	-
C1 – Downtown Commercial (Central Business District)	80%	At discretion of Development Authority	-	-
C2 – Arterial Commercial (Along Major Arterial Roads, Highway 28)	80%	At discretion of Development Authority	-	-
C3 – Neighbourhood Commercial	50%	Permitted Use – 250.0 Discretionary Use – 1000.0	-	-
LC – Lakeshore Commercial	80%	Commercial – Min. 30% of all floors, 50% of ground floor Residential – Max. 70% of all, 50% of ground floor	-	-
BD – Beach District	At discretion of Development Authority			
LI – Light Industrial	60%	-	-	-
HI – Heavy Industrial	60%	-	-	-





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Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density	
PS – Public Service (Educational, government, health care and recreational services)		At discretion c	of Development Authority		
IP – Imperial Park District		At discretion c	of Development Authority		
UR – Urban Reserve	At discretion of Development Authority				
CON - Conservation	At discretion of Development Authority				
DC – Direct Control District	-	-	-	-	
DC-SR – Spinnaker Ridge Direct Control District	-	-	-	45 units/ha 8 units/row house	
DC-TCE – Tri City Estates Direct Control District	40%	63.0	-	40 units/ha	
DC-RMHC – Residential Manufactured Home Community Direct Control District	45%	49.5	-	25.2 units/ha or 19.76 per gross ha.	
FW – National Defense	At discretion of Department of National Defense				

2.5 MD OF BONNYVILLE NO. 87 LAND USE BYLAW

The different land use districts within the MD of Bonnyville was presented and described in the Land Use Bylaw. The following table summarizes the information of interest for the purpose of the Traffic Demand Forecast.

Table 2.2 – Information	from N	ID of	Bonnyville	Land Use	e Bylaw

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m ²)	Maximum Floor Area Ratio	Maximum Density
A – Agricultural	-	-	-	1 unit/lot
CR – Country Residential (Resort)	-	-	-	1 unit/lot





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Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)	Maximum Floor Area Ratio	Maximum Density
CR1 – Country Residential	-	-	-	1 unit/lot
CR2 – Country Residential (Large Lot)	-	-	-	1 unit/lot
CUD – Controlled Urban Development	-	-	-	-
DC – Direct Control	-	-	-	-
HG – Hamlet General	-	Unserviced – 1860.0 Serviced – 420.0 Sewer only – 930.0 Water only – 1400.0	-	1 unit/lot
HR1 – Hamlet Single Family Residential	-	Unserviced – 1860.0 Serviced – 560.0 Sewer only – 930.0 Water only – 1400.0	-	1 unit/lot
HR2 – Hamlet Multi Family Residential (Duplex)	35%	Interior Site – 697.0 Corner Site – 744.0	-	2 units/lot
HR2 – Hamlet Multi Family Residential (Triplex/Fourplex)	-	297.0 / unit	At discretion of Development Authority	At discretion of Development Authority
HR2 – Hamlet Multi Family Residential (Townhouse)	At discretion of Development Authority	Interior Lot – 185.5 Corner Lot – 297.0	At discretion of Development Authority	30 units/ha
HR2 – Hamlet Multi Family Residential (Apartment)	30%	800.0	0.60	At discretion of Development Authority
HUR – Hamlet Urban Reserve District	-	-	-	-
IR – Intensive Recreation		At discretion of Deve	elopment Authority	





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Land Use District	Maximum Lot Coverage	Minimum Floor Area (m²)		Maximum Floor Area Ratio	Maximum Density	
MHC – Manufactured Home Community	-	a) single wide – 465.0 b) double wide – 510.0		-	20 units/ha	
RC – Rural Commercial	At discretion of Development Authority					
RI – Rural Industrial	At discretion of Development Authority					

3 WORKPLAN

A spreadsheet model will be utilized to forecast the future traffic demand of Cold Lake in the 5-year, 10-year, 15-year, and 20-year horizons. The spreadsheet model will comprise of 9 steps, which are explained in detail below.

3.1 STEP 1: DEVELOP NETWORK

- Draw road network. The road network for the City of Cold Lake will consist of collector and arterial roads within the existing City limits.
- Divide study areas into traffic analysis zones (TAZ). The City will be divided into different TAZs that are homogenous in terms of land use. AE anticipates that nine TAZs will be established for Cold Lake to represent the following:
 - TAZ 1: Cold Lake North Commercial
 - TAZ 2: Cold Lake North Residential North/West
 - TAZ 3: Cold Lake North Residential South/East
 - TAZ 4: Central Corridor Commercial (between Cold Lake North and Cold Lake South, including 75 Avenue and 61/62 Avenue)
 - TAZ 5: Central Corridor Residential (between Cold Lake North and Cold Lake South, including Energy Centre Access and 61/62 Avenue)
 - TAZ 6: Cold Lake South Commercial
 - TAZ 7: Cold Lake South Residential West
 - TAZ 8: Cold Lake South Residential East
 - TAZ 9: Medley
- Identify intersections with counts within each zone.
- Determine the centroid for each zone. The centroid may be chosen to be the geographic center or the "center" of the road network.





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- Calculate the area of each zone (A₁, A₂, etc.)
- Calculate the distance between the centroid of each zone and the furthest point of the zone (d_{ii}) and calculate the distance between each centroid (d_{ij}). Where i denotes the study zone and j denotes the destination zone.

3.2 STEP 2 – EXISTING VOLUME

• Build a spreadsheet in Excel to summarize the existing traffic volumes. The table would be similar to the following table.

Intersection		Zone 1			Zone 2		Zone		ne 9
		I _{1,1}	I _{1,2}	I _{1,x}	I _{2,1}	I _{2,2}	l _{i,x}	I _{9,1}	I _{9,x}
	Left	5	9	15					
NB	Through	85	211	150					
	Right	3	15	7					
SB	Left								
	Through								
	Right								
	Left								
EB	Through								
	Right								
WB	Left								
	Through								
	Right								

Existing Traffic Volumes (2010 Horizon)

Where $I_{i,x}$ denotes intersection number x in Zone i.





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3.3 STEP 3 – FUTURE BACKGROUND VOLUMES

- Grow the existing traffic volumes using an annual growth factor to the 5-year, 10-year, 15-year, and 20-year horizons.
- An annual growth rate of 2.0% has been chosen to since it was used in the Municipal Development Plan and represents the median between the moderate (1.5%) and high (2.5%) projection growth in the Inter-municipal Development Plan.
- Future traffic volume n years = Existing traffic volumes + (Existing traffic volume x n x growth %). Therefore for n = 5 years, Future traffic volume = Existing traffic volume + (Existing traffic volume x 5 x 0.02).
- Build spreadsheets similar to Step 2 to summarize the Future Background Traffic.
- Four future background traffic volume spreadsheets will be developed for Cold Lake to represent the future background traffic volumes in the 5-year, 10-year, 15-year, and 20-year horizons.

5-year Background Traffic Volumes (2015)





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Intersection		Zone 1			Zone 2			Zone 9	
		I _{1,1}	I _{1,2}	I _{1,x}	I _{2,1}	I _{2,2}	l _{i,x}	I _{9,1}	I _{9,x}
	Left	6 = 5+(5x5x 0.02)	10 = 9+(9x5x 0.02)	17 =15+(15 x5x0.02)					
NB	Through	94	232	165					
	Right	3	17	8					
	Left								
SB	Through								
	Right								
	Left								
EB	Through								
	Right								
	Left								
WB	Through								
	Right								

3.4 STEP 4 – FUTURE PRODUCTION

- Calculate the trip production for each horizon using the information provided by the City in the ASPs, ARPs and Outline Plans.
- The City does not have projected growth information available for the four horizons. The City of Cold Lake is subject to boom/bust cycles of population growth or contraction tied to the resource section. This makes growth forecasting difficult.
- For the transportation study, growth assumptions are necessary. Associated Engineering assumed that the following development staging would be implemented for each study horizon:





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Development / Redevelopment	Land Use	5-Year (2015) Horizon	10-Year (2020) Horizon	15-Year (2025) Horizon	20-Year (2030) Horizon	Total % Developed
Fischer Estates	Residential	0%	0%	25%	25%	50%
	Commercial	0%	0%	25%	25%	50%
Iron Horse	Residential	0%	0%	25%	25%	50%
Cold Lako Control	Residential	25%	25%	25%	25%	100%
	Commercial	50%	50%	0%	0%	100%
Grand Centre	Residential	25%	25%	25%	25%	100%
Southeast	Industrial	25%	25%	25%	25%	100%
Forest Heights	Residential	0%	0%	25%	25%	50%
	Residential	25%	25%	25%	25%	100%
Northshoro	Commercial	25%	25%	25%	25%	100%
Nottistiore	Institutional	25%	25%	25%	25%	100%
	School	0%	0%	100%	0%	100%
Lot 2, Plan 982 1024	Commercial	100%	0%	0%	0%	100%
Horseshoe Bay	Residential	50%	50%	0%	0%	100%
Liplands	Residential	25%	25%	25%	25%	100%
opianus	Health Services & Mixed Use	25%	25%	25%	25%	100%

Assumed Development Staging by Study Horizon





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Development / Redevelopment	Land Use	5-Year (2015) Horizon	10-Year (2020) Horizon	15-Year (2025) Horizon	20-Year (2030) Horizon	Total % Developed
Lakeshore Area Redevelopment	All	25%	25%	25%	25%	100%
Lakewood Estates	Residential 25% 25% 25%		25%	25%	100%	
Creekside Estates	Residential	25%	25%	25%	25%	100%
Dorkview Estatos	Residential	25%	25%	25%	25%	100%
	Commercial	25%	25%	25%	25%	100%
Hills of Cold Lake	Residential	25%	25%	25%	25%	100%
Fawn Ridge Estates Development	Residential	25%	25%	25%	25%	100%

- The trips produced by the new developments for each future horizon will be generated using the Institute of Transportation Engineers (ITE) Trip Generation Handbook, 7th Edition and summarized in a spreadsheet similar to the one below.
- Four trip production spreadsheets will be produced to represent the trip production in the 5-year, 10-year, 15-year, and 20-year horizons.

Zone (i)	Trip Produced
1	
2	
3	
4	
5	
6	

Trip Production (Pi) - Horizon





GLOBAL PERSPECTIVE. LOCAL FOCUS.

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 Total (ΣPi)

3.5 STEP 5 – FUTURE ATTRACTION

- Calculate attraction from land use and origin-destination (OD) surveys.
- For the spreadsheet model this is normally not available and this step is bypassed.
- This is the case for the Cold Lake project.

3.6 STEP 6 – TRIP TABLE

- Calculate the trips T_{ij} between origin zone i and destination zone j, using the gravity model illustrated in the following table.
- The gravity model states that the interaction (trips) between two zones declines with increasing distance between them.

From/To Zone	Weight	%	Final Trip
Zone 1 to Zone 1	$A_1/(d_{11})^2$	$[A_1/(d_{11})^2] / \sum_1$	$P_1 \ge [A_1/(d_{11})^2] / \sum_1$
Zone 1 to Zone 2	$A_1/(d_{12})^2$	$[A_1/(d_{12})^2] / \sum_1$	$P_1 x [A_1/(d_{12})^2] / \sum_1$
Zone 1 to Zone 3	A ₁ /(d ₁₃) ²	$[A_1/(d_{13})^2] / \sum_1$	P₁ x [A₁/(d₁₃)²] / ∑₁
Zone 1 to Zone 4	$A_1/(d_{14})^2$	$[A_1/(d_{14})^2] / \sum_1$	$P_1 x [A_1/(d_{14})^2] / \sum_1$
Zone 1 to Zone 5	A ₁ /(d ₁₅) ²	$[A_1/(d_{15})^2] / \sum_1$	P₁ x [A₁/(d₁₅)²] / ∑₁
Zone 1 to Zone 6	$A_1/(d_{16})^2$	$[A_1/(d_{16})^2] / \sum_1$	$P_1 x [A_1/(d_{16})^2] / \sum_1$
Zone 1 to Zone 7	$A_1/(d_{17})^2$	$[A_1/(d_{17})^2] / \sum_1$	$P_1 \ge [A_1/(d_{17})^2] / \sum_1$
Zone 1 to Zone 8	A ₁ /(d ₁₈) ²	$[A_1/(d_{18})^2] / \sum_1$	$P_1 \ge [A_1/(d_{18})^2] / \sum_1$
Zone 1 to Zone 9	A ₁ /(d ₁₉) ²	$[A_1/(d_{19})^2] / \sum_1$	$P_1 x [A_1/(d_{19})^2] / \sum_1$





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- Repeat above table for all zones (Zone 1 through Zone 9).
- Compile the final trip table, similar to the one shown below, for each time horizon.
- Four trip tables will be produced to represent the trip distribution in the 5-year, 10-year, 15-year and 20-year horizons.

O D	1	2	3	4	5	6	7	8	9	Total
1	$P_1 x$ $[A_1/(d_{11})^2] / \sum_1$	P ₁ x [A ₁ /(d ₁₂) ²] / Σ ₁	P ₁ x [A ₁ /(d ₁₃) ²] / Σ ₁	$P_1 x$ [A ₁ /(d ₁₄) ²] / Σ_1	P ₁ x [A ₁ /(d ₁₅) ²] / Σ ₁	$P_1 x$ [A ₁ /(d ₁₆) ²] / Σ_1	$P_1 x$ [A ₁ /(d ₁₇) ²] / Σ_1	P ₁ x [A ₁ /(d ₁₈) ²] / Σ ₁	$P_1 x$ [A ₁ /(d ₁₉) ²] / Σ_1	$\Sigma = P_1$
2										$\sum = P_2$
3										$\Sigma = P_3$
4										$\sum = P_4$
5										$\Sigma = P_5$
6										$\sum = P_6$
7										$\sum = P_7$
8										$\Sigma = P_8$
9										$\sum = P_9$
Total	$\sum = A_1$	$\sum = A_2$	$\sum = A_3$	$\sum = A_4$	$\sum = A_5$	$\sum = A_6$	$\sum = A_7$	$\sum = A_8$	$\Sigma = A_9$	

• If Step 5 had been completed, the sum of the attraction for each zone should equal the sum of production for the same zone.

3.7 STEP 7 – ASSIGNMENT

- Assign the trips to intersections using the minimum path algorithm for each zone, for each study horizon.
- 3.8 STEP 8 EXTERNAL TRIP (IF AVAILABLE)
- Collect external trips from Cordon points





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- Distribute external-external trips to intersections.
- This step will be bypassed for Cold Lake as there is no information available for external trips

3.9 STEP 9 – ADD DEVELOPMENT TRIPS TO BACKGROUND TRIPS

- Add the trip distribution from Step 7 to the future background traffic volumes established in Step 3.
- The volumes provided at each intersection are the total traffic volume anticipated for each of the study horizons and can be used to analysis the future intersection capacity.



C Appendix C - Gravity Model (Trip Distribution) Calculations



Traffic Demand Model: Zones & Intersections

Zono	Description	Intersection with Counts			
Zone	Description	Node # Intersection			
		104 1 Avenue & 16 Street			
		105 1 Avenue / 2 Avenue & 10 Street			
		106 8 Avenue & Lakeshore Drive			
1	Cold Lake North - Commercial/Recreational	107 8 Avenue & 10 Street			
		108 8 Avenue & 16 Street			
		109 Highway 28 & 25 Street			
		111 Highway 55/ 16 Avenue & Highway 28			
		101 1 Avenue & 28 Street / English Bay Road			
2	Cold Lake North Residential (North of Hum 28)	102 1 Avenue & 25 Street			
2	Cold Lake North - Residential (North of Hwy 20)	103 1 Avenue & Nelson Street			
		110 Highway 55 & 28 Street / English Bay Road			
2	Cold Lake North Residential (South of Hun 28)	112 16 Avenue & 16 Street			
3	Cold Lake North - Residential (South of Hwy 20)	113 16 Avenue & 10 Street			
		202 Highway 28 / 55 & 75 Avenue			
4	Cold Lake Control Commercial	203 Highway 28 / 55 & 69 Avenue / Museum Road			
4	Cold Lake Central - Commercial	204 Highway 28 / 55 & Tri-City Mall Access			
		205 Highway 28 / 55 & 62 Avenue / 61 Avenue			
5	Cold Lake Central - Residential	201 Highway 28 / 55 & Energy Centre Access			
		301 Highway 28 / 55 & 54 Avenue			
		302 Highway 28 / 55 & 52 Avenue			
		303 Highway 28 / 55 & 50 Avenue			
		304 Highway 28 / 55 & 52 Street			
		305 Highway 28 / 55 & 51 Street			
	Cold Lake South - CBD/Commercial	306 Highway 28 / 55 & 50 Street			
6		307 Highway 28 / 55 & 46 Avenue			
		308 Highway 28 / 55 & 43 Avenue			
		316 50 Avenue & 53 Street			
		317 50 Avenue & 52 Street			
		318 50 Avenue & 51 Street			
		319 50 Avenue & 50 Street			
		320 50 Avenue & 49 Street			
		309 57 Street & 52 Avenue (North)			
		310 57 Street & 52 Avenue (South)			
7	Cold Lake South - Residential (West of Hww 28)	311 50 Avenue & 59 Street			
'	Cold Eake South - Residential (West of Hwy 20)	312 50 Avenue & 57 Street			
		313 Centre Avenue & 59 Street			
		314 Centre Avenue & 57 Street			
		315 54 Avenue & 51 Street			
8	Cold Lake South - Residential (East of Hwy 28)	321 50 Avenue & 45 Street			
0	Cold Eake Could's Residential (East of Twy 20)	322 50 Avenue & 41 Street			
		323 50 Avenue / Twp Rd 630 & Baywood Road / RR 20			
		401 Kingsway & Medley Road			
		402 Kingsway & Glenwood Drive (West)			
		403 Kingsway & Glenwood Drive (East)			
9	Medley	404 Kingsway & Timberline Drive			
		405 Kingsway & Queensway			
		406 Kingsway & Tennis Court Road			
		407 Queensway & Tennis Court Road			

Zone	Description	Area (m ²)	Area (hec)
1	Cold Lake North - Commercial/Recreational	818,544	81.9
2	Cold Lake North - Residential (North of Hwy 28)	5,302,120	530.2
3	Cold Lake North - Residential (South of Hwy 28)	4,499,137	449.9
4	Cold Lake Central - Commercial	622,964	62.3
5	Cold Lake Central - Residential	2,710,956	271.1
6	Cold Lake South - CBD/Commercial	1,171,259	117.1
7	Cold Lake South - Residential (West of Hwy 28)	4,519,673	452.0
8	Cold Lake South - Residential (East of Hwy 28)	5,295,608	529.6
9	Medley	34,603,627	3,460.4
	Total	59,543,887	5,954.4

Traffic Demand Model: Zones & Areas

Traffic Demand Model: Distances

				Distance fro	om Zone X to	Zone Y (m)			
	1	2	3	4	5	6	7	8	9
1	2,190	1,674	1,348	3,747	4,019	6,077	6,321	6,077	7,799
2	1,674	3,277	2,896	4,055	4,535	6,504	6,521	6,691	7,336
3	1,348	2,896	2,729	3,251	3,312	5,299	5,706	5,161	7,650
4	3,747	4,055	3,251	1,144	649	2,450	2,576	2,688	4,476
5	4,019	4,535	3,312	649	2,191	2,058	2,395	2,155	4,704
6	6,077	6,504	5,299	2,450	2,058	1,701	888	747	3,890
7	6,321	6,521	5,706	2,576	2,395	888	2,813	1,630	3,002
8	6,077	6,691	5,161	2,688	2,155	747	1,630	3,068	4,632
9	7,799	7,336	7,650	4,476	4,704	3,890	3,002	4,632	5,380

Distance from Centroid to furthest point in same zone

Traffic Demand Model - Distances²

				Distance fro	om Zone X to	Zone Y (m)			
	1	2	3	4	5	6	7	8	9
1	4,796,930	2,801,310	1,817,598	14,039,176	16,154,592	36,928,963	39,957,131	36,929,607	60,825,891
2	2,801,310	10,741,309	8,388,242	16,441,732	20,568,375	42,307,265	42,528,271	44,762,992	53,815,958
3	1,817,598	8,388,242	7,449,558	10,572,188	10,970,754	28,074,900	32,557,480	26,631,180	58,527,941
4	14,039,176	16,441,732	10,572,188	1,309,087	421,173	6,002,192	6,637,264	7,225,079	20,033,666
5	16,154,592	20,568,375	10,970,754	421,173	4,801,520	4,235,053	5,734,169	4,645,231	22,125,180
6	36,928,963	42,307,265	28,074,900	6,002,192	4,235,053	2,893,811	789,007	557,471	15,134,766
7	39,957,131	42,528,271	32,557,480	6,637,264	5,734,169	789,007	7,911,770	2,658,492	9,014,252
8	36,929,607	44,762,992	26,631,180	7,225,079	4,645,231	557,471	2,658,492	9,410,559	21,456,287
9	60,825,891	53,815,958	58,527,941	20,033,666	22,125,180	15,134,766	9,014,252	21,456,287	28,949,736

Distance from Centroid to furthest point in same zone

Traffic Demand Model: Future Production, 5 Year (2015)

Zone	Total Trips	In Trips	Out Trips
1	347	85	262
2	755	400	355
3	277	172	105
4	974	224	750
5	412	259	154
6	84	18	66
7	0	0	0
8	90	56	33
9	0	0	0
Outside of City	86	54	32
Total	3,025	1,268	1,757

Traffic Demand Model: Future Production, 10 Year (2020)

Zone	Total Trips	In Trips	Out Trips
1	667	163	504
2	1,510	800	710
3	554	344	210
4	1,949	448	1,500
5	825	518	307
6	167	35	132
7	0	0	0
8	180	113	67
9	0	0	0
Outside of City	172	108	63
Total	6,023	2,530	3,493

Traffic Demand Model: Future Production, 15 Year (2025)

Zone	Total Trips	In Trips	Out Trips		
1	987	241	745		
2	2,777	2,777 1,426			
3	944	589	355		
4	1,949	448	1,500		
5	1,237	777	461		
6	359	78	281		
7	223	142	81		
8	270	169	100		
9	0	0	0		
Outside of City	257	163	95		
Total	9,003	4,033	4,970		

Traffic Demand Model: Future Production, 20 Year (2030)

Zone	Total Trips	In Trips	Out Trips
1	1,307	320	987
2	3,507	1,811	1,696
3	1,335	834	501
4	1,949	448	1,500
5	1,650	1,036	614
6	551	120	431
7	447	284	162
8	360	226	134
9	0	0	0
Outside of City	343	217	126
Total	11,447	5,295	6,152

Traffic Demand Model, 5 Year Horizon: Future Production Weight based on Gravity Model. Weight of Zone X to Zone Y = (Area of Zone Y) / (Distance between Zone X & Y ^ 2)

From Zone	To Zone	Weight ¹	%	Final Trip
	1	0.17	3.0%	11
	2	1.89	33.8%	117
	3	2.48	44.1%	153
	4	0.04	0.8%	3
1	5	0.17	3.0%	10
1	6	0.03	0.6%	2
	7	0.11	2.0%	7
	8	0.14	2.6%	9
	9	0.57	10.1%	35
	SUM	5.61	100.0%	347
	1	0.29	12.2%	92
	2	0.49	20.7%	156
	3	0.54	22.5%	170
	4	0.04	1.6%	12
	5	0,13	5.5%	42
2	6	0.03	1.2%	9
	7	0,11	4.5%	34
	8	0,12	5.0%	37
	9	0.64	26.9%	203
	SUM	2.39	100.0%	755
	1	0.45	15.2%	42
	2	0.63	21.3%	59
	3	0.60	20.4%	56
	4	0.06	2.0%	6
	5	0.00	8.3%	23
3	6	0.20	1.4%	<u> </u>
	7	0.04	4.7%	13
	8	0.14	6.7%	10
	9	0.20	20.0%	55
	SUM	2.96	100.0%	277
	1	0.06	0.5%	5
	2	0.00	2.9%	28
	3	0.32	3.8%	38
	<u> </u>	0.43	4.3%	42
	5	6.44	58.2%	567
4	6	0.44	1.8%	17
	7	0.20	6.2%	60
	8	0.00	6.6%	65
	9	1.73	15.6%	152
	SUM	11.06	100.0%	97/
	1	0.05	0.8%	2
	2	0.05	3.0%	16
	2	0.20	6.3%	26
	1	1.48	22.6%	03
	<u>4</u> Б	0.56	22.0% 8.6%	36
5	6	0.00	0.070 1 20/	17
	7	0.20	+.∠% 10.10/	50
	/ 8	0.79	17.1%	72
	0	1.14	22.00/	00
	SUM	6.53	100 0%	<u> </u>
1	0.0111	0.00	100.070	714

Traffic Demand Model, 5 Year Horizon: Future Production Weight based on Gravity Model. Weight of Zone X to Zone Y = (Area of Zone Y) / (Distance between Zone X & Y ^ 2)

From Zone	To Zone	Weight ¹	%	Final Trip
	1	0.02	0.1%	0
	2	0.13	0.7%	1
	3	0.16	0.8%	1
	4	0.10	0.5%	0
6	5	0.64	3.4%	3
0	6	0.40	2.1%	2
	7	5.73	30.2%	25
	8	9.50	50.1%	42
	9	2.29	12.1%	10
	SUM	18.97	100.0%	84
	1	0.02	0.2%	0
	2	0.12	1.4%	0
	3	0.14	1.6%	0
	4	0.09	1.1%	0
7	5	0.47	5.4%	0
1	6	1.48	17.0%	0
	7	0.57	6.5%	0
	8	1.99	22.8%	0
	9	3.84	43.9%	0
	SUM	8.74	100.0%	0
	1	0.02	0.3%	0
	2	0.12	1.7%	2
	3	0.17	2.4%	2
	4	0.09	1.2%	1
8	5	0.58	8.4%	8
0	6	2.10	30.2%	27
	7	1.70	24.4%	22
	8	0.56	8.1%	7
	9	1.61	23.2%	21
	SUM	6.96	100.0%	90
	1	0.01	0.6%	0
	2	0.10	4.2%	0
	3	0.08	3.3%	0
	4	0.03	1.3%	0
9	5	0.12	5.2%	0
J	6	0.08	3.3%	0
	7	0.50	21.2%	0
	8	0.25	10.4%	0
	9	1.20	50.6%	0
	SUM	2.36	100.0%	0

					Trips					
From	1	2	3	4	5	6	7	8	9	SUM
1	11	117	153	3	10	2	7	9	35	347
2	92	156	170	12	42	9	34	37	203	755
3	42	59	56	6	23	4	13	19	55	277
4	5	28	38	42	567	17	60	65	152	974
5	3	16	26	93	36	17	50	72	99	412
6	0	1	1	0	3	2	25	42	10	84
7	0	0	0	0	0	0	0	0	0	0
8	0	2	2	1	8	27	22	7	21	90
9	0	0	0	0	0	0	0	0	0	0
SUM	154	379	445	157	688	78	211	251	576	

Traffic Demand Model, 5 Year Horizon: Future Production

Note: Sum of column for Zone 1 must match sum of row for Zone 1 IF both production and attraction information available. No attraction information.

TRIP DISTRIBUTION FROM GRAVITY MODEL

_					Trips					
From	1	2	3	4	5	6	7	8	9	SUM
1	3%	34%	44%	1%	3%	1%	2%	3%	10%	100%
2	12%	21%	22%	2%	6%	1%	4%	5%	27%	100%
3	15%	21%	20%	2%	8%	1%	5%	7%	20%	100%
4	1%	3%	4%	4%	58%	2%	6%	7%	16%	100%
5	1%	4%	6%	23%	9%	4%	12%	17%	24%	100%
6	0%	1%	1%	1%	3%	2%	30%	50%	12%	100%
7	0%	1%	2%	1%	5%	17%	7%	23%	44%	100%
8	0%	2%	2%	1%	8%	30%	24%	8%	23%	100%
9	1%	4%	3%	1%	5%	3%	21%	10%	51%	100%

ADJUSTED TRIP DISTRIBUTION

					Trips					
From	1	2	3	4	5	6	7	8	9	SUM
1	5%	23%	23%	5%	8%	5%	10%	8%	13%	100%
2	20%	15%	10%	15%	10%	8%	7%	5%	10%	100%
3	20%	10%	15%	15%	10%	8%	7%	5%	10%	100%
4	6%	15%	15%	5%	15%	8%	12%	12%	12%	100%
5	16%	12%	12%	15%	15%	8%	7%	5%	10%	100%
6	5%	5%	5%	5%	15%	5%	25%	25%	10%	100%
7	10%	5%	5%	15%	10%	18%	12%	15%	10%	100%
8	10%	5%	5%	15%	10%	20%	10%	15%	10%	100%
9	8%	10%	10%	10%	7%	20%	10%	10%	15%	100%
SUM	100%	100%	100%	100%	100%	100%	100%	100%	100%	

Appendix D - Capacity Analysis



City of Cold Lake - Transportation Study Project No: 2010-3050 Date: April 11, 2011

CAPACITY ANALYSIS - EXISTING (2010) HORIZON

	Inters	ection		Forecast	ed Volumes	Dead Cleasification	Deed Classification	Lane Capacity	Lane Capacity	
Corridor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	for Road Classification (veh/hour/lane) ³	for Road Classification (veh/day/lane) ⁴	Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	960 850	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
1 Avenue	25 Street	Nelson Street	Eastbound	1,640	3,110	Collector	Collector (Residential or Industrial)	400	4,000	1
1 Avenue	Nelson Street	16 Street	Eastbound	1,470 1,290	2.650	Collector	Local (Residential or Industrial)	100	1.000	2
	11	05 Onest	Westbound Northbound	1,360 5,410	0,050		Collecter (Desidential or laduatia)	490	4,000	2
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	4,240	9,650	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
8 Avenue	25 Street	16 Street	Westbound	2,600	7,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	16 Street	10 Street	Eastbound Westbound	1,880 1,100	2,980	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
8 Avenue	10 Street	Lakeshore Drive	Eastbound	950 770	1,720	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	1
Hwy 55	West City Limit	28 Street	Eastbound	3,360	4,930	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	28 Street	Hwy 28	Eastbound	1,570 3,250	4 980	Collector	Collector (Residential or Industrial)	400	4 000	1
	20 04/00		Westbound Eastbound	1,730 1.820	4,000	Concortor		100	1,000	1
16 Avenue	Hwy 28	16 Street	Westbound	1,390	3,210	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	16 Street	10 Street	Westbound	780	2,050	Collector	Local (Residential or Industrial)	100	1,000	1
16 Avenue	10 Street	8 Street	Eastbound	1,320	2,430	Collector	Local (Residential or Industrial)	100	1,000	2
English Bay Road	North City Limit	1 Avenue	Northbound	1,450	2,540	Collector	Local (Residential or Industrial)	100	1,000	2
English Bay Road	1 Avenue	25 Street	Northbound	1,150	1.930	Collector	Local (Residential or Industrial)	100	1.000	2
English Roy Bood	2E Street	Hung 28	Southbound Northbound	780 1,490	2 100	Collector	Collector (Residential or Industrial)	400	4.000	1
English Bay Road	25 511661	riwy 20	Southbound	1,610	3,100	Collector	Collector (Residential of Industrial)	400	4,000	1
28 Street	English Bay Road	Hwy 55	Southbound	390	1,050	Collector	Local (Residential or Industrial)	100	1,000	1
25 Street	1 Avenue	English Bay Road	Southbound	840 770	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
Nelson Street	1 Avenue	16 Street	Eastbound	570 330	900	Collector	Local (Residential or Industrial)	100	1,000	1
16 Street	1 Avenue	8 Avenue	Northbound	2,070	2,840	Collector	Local (Residential or Industrial)	100	1,000	3
16 Street	8 Avenue	16 Avenue	Northbound	420	870	Collector	Local (Residential or Industrial)	100	1.000	1
10 01 01	6746466		Southbound	450 780	4.040			100	1,000	1
10 Street	1 Avenue	8 Avenue	Southbound	830	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
10 Street	8 Avenue	16 Avenue	Southbound	910	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound Southbound	6,810 6,170	12,980	2-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	75 Avenue	69 Avenue	Northbound	7,480	15,160	2-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	69 Avenue	54 Avenue	Northbound	7,500	14,650	2-Lane Arterial	Undivided Arterial	800	8,000	1
54 Avenue	56 Street	Hwy 28/55	Eastbound	7,150 1,330	2 860	Collector	Local (Residential or Industrial)	100	1.000	1 2
54 Avenue	30 01/66	11wy 20/35	Westbound Eastbound	1,530 2.320	2,000	CONSCION		100	1,000	2
54 Avenue	Hwy 28/55	51 Street	Westbound	2,280	4,600	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	51 Street	45 Street	Westbound	1,170	2,610	Collector	Local (Residential or Industrial)	100	1,000	2
52 Avenue	57 Street	Hwy 28/55	Eastbound Westbound	810 1,180	1,990	Collector	Local (Residential or Industrial)	100	1,000	2
50 Avenue	62 Street	59 Street	Eastbound	220 370	590	Collector	Local (Residential or Industrial)	100	1,000	1
50 Avenue	59 Street	57 Street	Eastbound	420	950	Collector	Local (Residential or Industrial)	100	1,000	1
50 Avenue	57 Street	55 Street	Eastbound	530 180	520	Collector	Local (Residential or Industrial)	100	1.000	1
	50 00 0	57 01 01	Westbound Eastbound	340 8,340	10.010			100	1,000	1 2
Centre Avenue	59 Street	57 Street	Westbound	3,700	12,040	2-Lane Arterial	Undivided Arterial	800	8,000	1
Centre Avenue	57 Street	Hwy 28/55	Westbound	4,300	12,800	4-Lane Arterial	Undivided Arterial	800	8,000	1
50 Avenue	Hwy 28/55	51 Street	Eastbound Westbound	3,280 2,610	5,890	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	51 Street	50 Street	Eastbound	3,080	5,050	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	50 Street	45 Street	Eastbound	3,210	5,100	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
	45 Street	41 Street	Eastbound	1,890 2,620	4 130	2-I ane Arterial	Collector (Residential or Industrial)	400	4,000	1
30 Avenue	40 011061	41 Oliber	Westbound	1,510	4,150	2-Lane Artenia	Conector (Residential of Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial	Westbound	1,140	2,960	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
50 Avenue	Future Arterial	Baywood Road	Westbound	1,510 960	2,470	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	1
59 Street	50 Avenue	Centre Avenue	Northbound Southbound	630 280	910	Collector	Local (Residential or Industrial)	100	1,000	1
57 Street	52 Avenue	50 Avenue	Northbound	770	1,240	Collector	Local (Residential or Industrial)	100	1,000	1
57 Street	50 Avenue	Centre Avenue	Northbound	820	1.340	Collector	Local (Residential or Industrial)	100	1.000	1
0, 0,00	514	50.4	Southbound	520 6.970	1,010			100	1,000	1
Hwy 28/55	54 Avenue	52 Avenue	Southbound	6,870	13,840	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	52 Avenue	50 Avenue	Southbound	5,700	13,340	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	50 Avenue	50 Street	Northbound Southbound	5,280 5,450	10,730	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	50 Street	43 Avenue	Northbound	5,930	12,600	4-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 28/55	43 Avenue	South City Limit	Northbound	5,500	11,730	2-Lane Arterial	Undivided Arterial	800	8,000	1
E1 C++	E4 A	50 A	Southbound Northbound	6,230 870	1 770	Collector	Local (Bosidosti-Les le dunt : "	100	1,000	1
51 Street	54 Avenue	50 Avenue	Southbound	900	1,770	Collector	Local (Residential or Industrial)	100	1,000	1
50 Street	50 Avenue	Hwy 28/55	Southbound	2,900	5,880	Collector	Collector (Residential or Industrial)	400	4,000	1
45 Street	54 Avenue	50 Avenue	Northbound Southbound	410 280	690	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street	54 Avenue	50 Avenue	Northbound	800 520	1,320	Collector	Local (Residential or Industrial)	100	1,000	1
-										

City of Cold Lake - Transportation Study Project No: 2010-3050 Date: April 11, 2011

CAPACITY ANALYSIS - EXISTING (2010) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
Kingsway 59 Stree	50 Street	Glenwood	Eastbound	7,290	10,510	2-Lane Arterial	Undivided Arterial	800	8,000	1
	39 30 66	Cieriwood	Westbound	3,220						1
Kingsway	Timberline	Glenwood	Eastbound	6,200	8,870	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,670						1
Kingsway	Queensway	Timberline	Eastbound	2,840	4,480	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,640						1
Kingsway	Tennis Court Road	Queensway	Eastbound	540	1,170	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	630						1
Kingsway	End of Road	Tennis Court Road	Eastbound	740	1,520	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	780						1
Tennis Court Road	Queensway	Kingsway	Northbound	220	270	Collector	Lane	N/A	N/A	N/A
			Southbound	50						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	1,020	1,790	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	770						1
Queensway	Kingsway	Hanger Ln	Northbound	1,870	2,200	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	330						1
Timberline	Juniper Avenue	Kingsway	Northbound	740	1,340	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	600						1
Timberline	Kingsway	Athabasca Road	Northbound	1,720	2,520	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	800						1
Glenwood Drive	Glenwood	Kingsway	Northbound	2,600	3,920	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,320						1

I. Road classification based on 2000 Transportation Study
 I. Road classification based on 2000 Transportation Study
 I. Road classification based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 S. Based on Lane Capacity Table (latched). Using road classification according to City's standards.
 A Based on assumption that PM peak hour traffic is 10% of the daily traffic

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City of Cold Lake - Transportation Study Project No: 2010-3050 Date: April 11, 2011

CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

	Intersection			Forecasted Volumes		Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes	
Corridor	From	То	Direction	Daily Traffic -	Daily Traffic -	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)	
1 Avenue	28 Street	25 Street	Eastbound	1,600	2,800	Collector	Local (Residential or Industrial)	100	1,000	2	
1 Avenue	25 Street	Nelson Street	Eastbound	2,490	4.630	Collector	Collector (Residential or Industrial)	400	4 000	1	
4 August	Nelses Street	40 Otreat	Westbound Eastbound	2,140 2,680	5,500	Collector	Collector (Residential or Industrial)	400	4,000	1	
1 Avenue	Nelson Street	TO Street	Westbound	2,820	5,500	Collector	Collector (Residential of Industrial)	400	4,000	1	
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	8,240	17,840	4-Lane Arterial	Undivided Arterial	800	8,000	2	
8 Avenue	25 Street	16 Street	Westbound	4,020	10,890	4-Lane Arterial	Undivided Arterial	800	8,000	1	
8 Avenue	16 Street	10 Street	Eastbound Westbound	2,470 1,740	4,210	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
8 Avenue	10 Street	Lakeshore Drive	Eastbound Westbound	1,300 1,310	2,610	4-Lane Arterial	Local (Residential or Industrial)	100	1,000	2	
Hwy 55	West City Limit	28 Street	Eastbound Westbound	3,700	5,430	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
Hwy 55	28 Street	Hwy 28	Eastbound	5,130	9,040	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2	
16 Avenue	Hwy 28	16 Street	Eastbound	3,720	6,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
16 Avenue	16 Street	10 Street	Eastbound	2,770 2,490	4.010	2-I ane Arterial	Collector (Residential or Industrial)	400	4.000	1	
16 Америе	10 Street	8 Street	Westbound Eastbound	1,520 2,450	4.240	2-Lane Arterial	Collector (Residential or Industrial)	400	4 000	1	
Facial Day David	North City Limit	4 August	Westbound Northbound	1,790 4,740	4,240	2-Laite Artenar	Collector (Residential or Industrial)	400	4,000	1 2	
English Bay Road	North City Limit	T Avenue	Southbound	3,860	8,600	Collector	Collector (Residential or Industrial)	400	4,000	1	
English Bay Road	1 Avenue	25 Street	Southbound	4,130	9,710	Collector	Collector (Residential or Industrial)	400	4,000	2	
English Bay Road	25 Street	Hwy 28	Southbound	4,730	8,950	Collector	Collector (Residential or Industrial)	400	4,000	2	
28 Street	English Bay Road	Hwy 55	Southbound	2,650	4,460	Collector	Collector (Residential or Industrial)	400	4,000	1	
25 Street	1 Avenue	English Bay Road	Northbound Southbound	1,620 1,400	3,020	Collector	Collector (Residential or Industrial)	400	4,000	1	
Nelson Street	1 Avenue	16 Street	Eastbound Westbound	1,180	1,860	Collector	Local (Residential or Industrial)	100	1,000	2	
16 Street	1 Avenue	8 Avenue	Northbound	4,840	6,600	Collector	Collector (Residential or Industrial)	400	4,000	2	
16 Street	8 Avenue	16 Avenue	Northbound	970	2,060	Collector	Local (Residential or Industrial)	100	1,000	1	
16 Street	16 Avenue	10 Street	Northbound	1,090	1.780	Collector	Local (Residential or Industrial)	100	1.000	2	
10 Street	1 Америе	8 Америю	Southbound Northbound	750 1,340	2,610	Collector	Local (Residential or Industrial)	100	1,000	1 2	
10 011061	Avenue	0 Avenue	Southbound Northbound	1,270	2,010			100	1,000	2	
TO Street	8 Avenue	To Avenue	Southbound Northbound	1,710	3,290	Collector	Collector (Residential or Industrial)	400	4,000	1	
10 Street	16 Avenue	16 Street	Southbound	980	2,020	Collector	Local (Residential or Industrial)	100	1,000	1	
6 Street ⁵	16 Avenue	21 Avenue	Southbound	980	2,020	Collector	Local (Residential or Industrial)	100	1,000	1	
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Southbound	12,020	25,070	4-Lane Arterial	Divided Arterial	1,000	10,000	2	
Hwy 28/55	75 Avenue	69 Avenue	Southbound	13,970 13,860	27,830	4-Lane Arterial	Divided Arterial	1,000	10,000	2	
Hwy 28/55	69 Avenue	54 Avenue	Northbound Southbound	13,310 15,550	28,860	4-Lane Arterial	Divided Arterial	1,000	10,000	2	
75 Avenue	Hwy 28/55	Future Arterial	Eastbound Westbound	1,750 3.080	4,830	Collector	Collector (Residential or Industrial)	400	4,000	1	
54 Avenue	56 Street	Hwy 28/55	Eastbound Westbound	1,820	4,110	Collector	Collector (Residential or Industrial)	400	4,000	1	
54 Avenue	Hwy 28/55	51 Street	Eastbound	3,800	7,350	Collector	Collector (Residential or Industrial)	400	4,000	1	
54 Avenue	51 Street	45 Street	Eastbound	2,990	5,420	Collector	Collector (Residential or Industrial)	400	4,000	1	
52 Avenue	59 Street	57 Street	Eastbound	980	2,350	Collector	Local (Residential or Industrial)	100	1,000	1	
52 Avenue	57 Street	Hwy 28/55	Eastbound	1,370	4 130	Collector	Collector (Residential or Industrial)	400	4 000	1	
Centre Avenue	59 Street	57 Street	Westbound Eastbound	2,450 12,290	17 560	2-Lane Arterial	Lindivided Arterial	800	8,000	1 2	
Centre Avenue	53 Otreet	5/ 00/66	Westbound Eastbound	5,270 11,020	40,400	2-Lane Arterial	Undivided Arterial	800	8,000	1 2	
Centre Avenue	57 311661	Fill 20/35	Westbound Eastbound	7,400	0,700	4-Lane Arteria		600	8,000	1 2	
50 Avenue	Hwy 28/55	51 Street	Westbound	3,640	8,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
50 Avenue	51 Street	50 Street	Westbound	2,640	6,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
50 Avenue	50 Street	45 Street	Westbound	2,320	6,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
50 Avenue	45 Street	41 Street	Westbound	2,060	5,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
50 Avenue	41 Street	Future Arterial		2,840	4,620	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
50 Avenue	Future Arterial	Baywood Road	Eastbound Westbound	2,360 1,500	3,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1	
43 Avenue	Hwy 28/55	45 Street	Eastbound Westbound	3,410 3,100	6,510	Collector	Collector (Residential or Industrial)	400	4,000	1	
59 Street	52 Avenue	Centre Avenue	Northbound	1,310	1,890	Collector	Local (Residential or Industrial)	100	1,000	2	
57 Street	54 Avenue	52 Avenue	Northbound	910	1,510	Collector	Local (Residential or Industrial)	100	1,000	1	
57 Street	52 Avenue	Centre Avenue	Northbound	1,700	2,780	Collector	Local (Residential or Industrial)	100	1,000	2	
Hwy 28/55	54 Avenue	52 Avenue	Northbound	11,440	24,400	4-Lane Arterial	Divided Arterial	1,000	10,000	2	
Hwy 28/55	52 Avenue	50 Avenue	Northbound	12,960 11,980	23,440	4-Lane Arterial	Divided Arterial	1,000	10,000	2	
Hwy 28/55	50 Avenue	50 Street	Southbound Northbound	11,460 5,180	11 660	4-I ane Arterial	Undivided Arterial	800	8,000	2	
Huny 20/55	50 Street	43 Auguro	Southbound Northbound	6,480 8,070	17 510	All ane Artorial	Lindivided Astorial	800	8,000	1 2	
riwy 28/55	ou otreet	43 Avenue	Southbound	9,440 6,520	17,510	4-Lane Arterial	Unavided Arterial	000	6,000	2	
Hwy 28/55	43 Avenue	South City Limit	Southbound	7,360	13,880	4-Lane Arterial	Undivided Arterial	800	8,000	1	
51 Street	54 Avenue	50 Avenue	Southbound	1,480	2,800	Collector	Local (Residential or Industrial)	100	1,000	2	
50 Street	50 Avenue	Hwy 28/55	Southbound	4,770 4,530	9,300	Collector	Collector (Residential or Industrial)	400	4,000	2	
45 Street	54 Avenue	50 Avenue	Northbound Southbound	520 340	860	Collector	Local (Residential or Industrial)	100	1,000	1	
45 Street	50 Avenue	43 Avenue	Northbound Southbound	370 580	950	Collector	Local (Residential or Industrial)	100	1,000	1	
41 Street	54 Avenue	50 Avenue	Northbound Southbound	1,660 1,080	2,740	Collector	Local (Residential or Industrial)	100	1,000	2	
CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

Corridor	Interse	ection	Direction	Forecasted		Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Contrast	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
Kingsway	50 Street	Glenwood	Eastbound	9,530	15 530	2-Lane Arterial	Undivided Arterial	800	8,000	2
Ringaway	33 00000	Clerwood	Westbound	6,000	10,000			000		1
Kingeway	Timberline	Glenwood	Eastbound	7,950	12 240	Collector	Lindivided Arterial	800	8,000	1
rungaway	TITIDETITIE	Clerwood	Westbound	4,290	12,240	Conscion	Chaindea Aitenai	800		1
Kingeway	Queensway	Timberline	Eastbound	3,770	6 360	Collector	Collector (Residential or Industrial)	400	4,000	1
rungaway	Queenaway	Timberiine	Westbound	2,590	0,000	Conscion	Collector (Residential or Industrial)	4		1
Kingeway	Tennis Court Road	Queensway	Eastbound	770	1,770	Collector	Local (Residential or Industrial)	100	1.000	1
Ringaway	ungsway Terinis Court Road		Westbound	1,000		CONSCIO	Eocal (Residential of Industrial)	100	1,000	1
Kingsway	End of Road	Tennis Court Road	Eastbound	900	2,020	Collector	Local (Residential or Industrial)	100	1 000	1
rangonay	End of Houd		Westbound	1,120		Condeter	Loodi (Rooldonida or madorida)		1,000	2
Tennis Court Road	Queensway	Kingeway	Northbound	250	310	Collector	Lane	N/A	N/A	N/A
Tonino obartitoda	quoonomay	rangonay	Southbound	60						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	1,790	3 1 1 0	Collector	Collector (Residential or Industrial)	400	4,000	1
dationary	Torino Oburt Roda	rangonay	Southbound	1,320	0,110	Condeter				1
Queensway	Kingsway	Hanger I n	Northbound	2,370	2 860	Collector	Local (Residential or Industrial)	100	1 000	3
Queensway	rangaway	Hanger En	Southbound	490	2,000	Conscion	Local (Residential or Industrial)	100	1,000	1
Timberline	luniner Avenue	Kingeway	Northbound	1,050	1.830	Collector	Local (Residential or Industrial)	100	1 000	2
Timberline Sumper Avenue	Ringaway	Southbound	780	1,030	Conscion	Eddal (Residential or Industrial)	100	1,000	1	
Timberline Kingsway	Kingsway	Athabasca Road	Northbound	2,270	3 470	Collector	Collector (Residential or Industrial)	400	4 000	1
	rangaway	Anabasta Kudu	Southbound	1,200	3,470	Condetto	Concertor (reconcertitian or interestinal)		-,,000	1
Glenwood Drive	Glenwood	Kingsway	Northbound	3,430	5 1 3 0	Collector	Collector (Residential or Industrial)	400	4,000	1
Gieriwood Drive Gieriwood	Clarwood	rungsway	Southbound	1,700	5,130					1

Control of the second reaction based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 Read classification based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 Read classification based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 Read on Lane Capacity Table (attached). Using read classification according to City's standards.
 Read on assumption that PM peak hour traffic is 10% of the daily traffic
 S. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

	Inters	ection		Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two	2000 TPS ¹	City of Cold Lake ²	for Road Classification (veh/hour/lane) ³	for Road Classification (veh/day/lane) ⁴	Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	2,190	3,690	Collector	Collector (Residential or Industrial)	400	4,000	1
1 Avenue	25 Street	Nelson Street	Eastbound	4,250	7.630	Collector	Collector (Residential or Industrial)	400	4 000	2
1 August	Nalaza Otazat	40.0	Westbound Eastbound	3,380 4,120	1,000	Oollosta	Collector (Residential or Industrial)	100	4,000	1 2
1 Avenue	Nelson Street	16 Street	Westbound Northbound	4,350 14,280	8,470	Collector	Collector (Residential or Industrial)	400	4,000	2
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	12,480	26,760	4-Lane Arterial	Divided Artenal	1,000	10,000	2
8 Avenue	25 Street	16 Street	Westbound	5,750	14,780	4-Lane Arterial	Undivided Arterial	800	8,000	1
8 Avenue	16 Street	10 Street	Westbound	3,250 2,500	5,750	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	10 Street	Lakeshore Drive	Eastbound Westbound	1,780 1,920	3,700	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	West City Limit	28 Street	Eastbound Westbound	4,640 2,210	6,850	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
Hwy 55	28 Street	Hwy 28	Eastbound	7,690	14,100	2-Lane Arterial	Undivided Arterial	800	8,000	1
16 Avenue	Hwy 28	16 Street	Eastbound	5,720	9,850	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
16 Avenue	16 Street	10 Street	Eastbound	4,130 3,810	6.130	2-I ane Arterial	Collector (Residential or Industrial)	400	4.000	1
16 Анерие	10 Street	8 Street	Eastbound	2,320 3,590	6,060	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
TO AVGINGE	it sheet	0.01661	Westbound Northbound	2,470 7,390	0,000	2-Laite Arteilai		400	4,000	1
English Bay Road	North City Limit	1 Avenue	Southbound	6,090	13,480	Collector	Undivided Arterial	800	8,000	1
English Bay Road	1 Avenue	25 Street	Southbound	6,800	15,900	Collector	Undivided Arterial	800	8,000	1
English Bay Road	25 Street	Hwy 28	Northbound Southbound	7,980 6,740	14,720	Collector	Undivided Arterial	800	8,000	1
28 Street	English Bay Road	Hwy 55	Northbound Southbound	4,620 3,300	7,920	Collector	Collector (Residential or Industrial)	400	4,000	2
25 Street	1 Avenue	English Bay Road	Northbound	3,310	6,010	Collector	Collector (Residential or Industrial)	400	4,000	1
Nelson Street	1 Avenue	16 Street	Eastbound	1,820	2,870	Collector	Local (Residential or Industrial)	100	1,000	2
16 Street	1 Avenue	8 Avenue	Northbound	6,230	8,760	Collector	Collector (Residential or Industrial)	400	4.000	2
16 Street	8 Анерие	16 Δυρομο	Southbound Northbound	2,530 1,540	3,490	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	6 Avenue	10 Avenue	Southbound Northbound	1,950 1,740	3,490	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	16 Avenue	10 Street	Southbound	1,510	3,250	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	1 Avenue	8 Avenue	Southbound	1,870	3,820	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	8 Avenue	16 Avenue	Southbound	2,530	4,810	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	16 Avenue	16 Street	Northbound Southbound	1,820 1,690	3,510	Collector	Collector (Residential or Industrial)	400	4,000	1
6 Street ⁵	16 Avenue	21 Avenue	Northbound Southbound	1,820	3,510	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	20,290	38,580	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	21,650	42,820	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	21,170 17,000	37.270	4-I ane Arterial	Expressway	1.800	18,000	1
75 Avenue	Huay 28/55	Euture Arterial	Eastbound	20,270 3,710	9.240	Collector	Collector (Residential or Industrial)	400	4,000	2 1
CO Average	Olemand	Line 00/55	Westbound Eastbound	5,530 3,080	5,240		Collector (Residential or Industrial)	100	4,000	2
69 Avenue	Gienwood	HWy 28/55	Westbound	2,450	5,530	2-Lane Arteriai	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	56 Street	Hwy 28/55	Westbound	3,210	5,560	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	Hwy 28/55	51 Street	Westbound	4,280	9,410	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	51 Street	45 Street	Westbound	4,600 3,740	8,340	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	59 Street	57 Street	Eastbound Westbound	1,500 2,110	3,610	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	57 Street	Hwy 28/55	Eastbound	2,590	6,360	Collector	Collector (Residential or Industrial)	400	4,000	1
Centre Avenue	59 Street	57 Street	Eastbound	12,560	17,950	2-Lane Arterial	Undivided Arterial	800	8,000	2
Centre Avenue	57 Street	Hwy 28/55	Eastbound	11,140	19,350	4-Lane Arterial	Undivided Arterial	800	8,000	2
50 Avenue	Hwy 28/55	51 Street	Eastbound	6,560	11.410	2-I ane Arterial	Undivided Arterial	800	8.000	1
50 Auenue	E1 Street	E0 Street	Westbound Eastbound	4,850 5,190	8 600	2 Lone Arterial	Collector (Residential or Industrial)	400	4,000	1 2
50 AVenue	51 Stielet		Westbound	3,500 5,420	0,090	2-Lane Arterial	Collector (Residential or industrial)	400	4,000	1 2
SU Avenue	ou Street	45 Street	Westbound	3,090	8,510	2+∟ane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	45 Street	41 Street	Westbound	2,710	7,270	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial	Westbound	2,470	6,420	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	Future Arterial	Baywood Road	Eastbound Westbound	3,270 2,080	5,350	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
43 Avenue	Hwy 28/55	45 Street	Eastbound Westbound	4,710 3,930	8,640	Collector	Collector (Residential or Industrial)	400	4,000	2
59 Street	52 Avenue	Centre Avenue	Northbound	2,010	2,990	Collector	Local (Residential or Industrial)	100	1,000	3
57 Street	54 Avenue	52 Avenue	Northbound	1,410	2,340	Collector	Local (Residential or Industrial)	100	1,000	2
57 Street	52 Avenue	Centre Avenue	Northbound	2,620	4,280	Collector	Collector (Residential or Industrial)	400	4,000	1
Hun: 29/55	E4 Augnug	52 Augoug	Southbound Northbound	1,660 14,270	33 000	4 Long Arterial	Everenceurou	1 800	18.000	1
1 wy 20/33	CO.A.	52 AVEITUE	Southbound	17,730 14,590	32,000	4 Lane Atterial	Expressway	1,000	10,000	1
Hwy 28/55	52 Avenue	50 Avenue	Southbound	15,870	30,460	4-Lane Arterial	Expressway	1,800	18,000	1
Hwy 28/55	50 Avenue	50 Street	Southbound	9,270	16,490	4-Lane Arterial	Undivided Arterial	800	8,000	2
Hwy 28/55	50 Street	43 Avenue	Southbound	10,360 12,550	22,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	43 Avenue	South City Limit	Northbound Southbound	7,700 8,610	16,310	4-Lane Arterial	Undivided Arterial	800	8,000	1 2
51 Street	54 Avenue	50 Avenue	Northbound Southbound	1,550 1,690	3,240	Collector	Collector (Residential or Industrial)	400	4,000	1
50 Street	50 Avenue	Hwy 28/55	Northbound	5,520	10,760	Collector	Undivided Arterial	800	8,000	1
45 Street	54 Avenue	50 Avenue	Northbound	640	1,060	Collector	Local (Residential or Industrial)	100	1,000	1
45 Street	50 Avenue	43 Avenue	Northbound	420 450	1,160	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street	54 Δυσριμο	50 Δυσομο	Southbound Northbound	710 2,560	4 220	Collector	Collector (Residential or Industrial)	400	4,000	1
- Sueer	34 AVENUE	30 AVEILUE	Southbound	1,660	7,220	CONBULUI	conductor (reacentited or industrial)	400	4,000	1

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

Corridor	Inters	ection	Direction	Forecasted Volumes		Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Comuor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	Two 2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
Kingsway	59 Street	Glenwood	Eastbound Westbound	9,220 6,220	15,440	2-Lane Arterial	Undivided Arterial	800	8,000	2
Kingsway	Timberline	Glenwood	Eastbound Westbound	9,960 6,010	15,970	Collector	Undivided Arterial	800	8,000	2
Kingsway	Queensway	Timberline	Eastbound Westbound	4,840	8,440	Collector	Collector (Residential or Industrial)	400	4,000	2
Kingsway	Tennis Court Road	Queensway	Eastbound	890 1,400	2,290	Collector	Local (Residential or Industrial)	100	1,000	1
Kingsway	End of Road	Tennis Court Road	Eastbound	1,080	2,550	Collector	Local (Residential or Industrial)	100	1,000	2
Tennis Court Road	Queensway	Kingsway	Northbound	270	330	Collector	Lane	N/A	N/A	N/A N/A
Queensway	Tennis Court Road	Kingsway	Northbound	2,300	3,990	Collector	Collector (Residential or Industrial)	400	4,000	1
Queensway	Kingsway	Hanger Ln	Northbound	2,940	3,590	Collector	Collector (Residential or Industrial)	400	4,000	1
Timberline	Juniper Avenue	Kingsway	Northbound	1,390	2,370	Collector	Local (Residential or Industrial)	100	1,000	2
Timberline	Kingsway	Athabasca Road	Northbound	2,890	4,520	Collector	Collector (Residential or Industrial)	400	4,000	1
Glenwood Drive	Glenwood	Kingsway	Northbound	6,290	9,880	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2

 I. Road classification based on 2000 Transportation Study
 3.590

 I. Road classification based on Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)

 Saeed on Lace Capacity Table (attrobed). Using road classification according to City's standards.

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CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

	Inters	ection		Forecasted	Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	То	Direction	Daily Traffic -	Daily Traffic -	2000 TPS ¹	City of Cold Lake ²	for Road Classification (veh/hour/lane) ³	for Road Classification (veh/day/lane) ⁴	Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	2,870	4.780	Collector	Collector (Residential or Industrial)	400	4.000	1
4.4	05 01-1-1	Nolosa Orean	Westbound Eastbound	1,910 5,660	40.040	0-11		000	0,000	1
1 Avenue	25 Street	Nelson Street	Westbound	4,680	10,340	Collector	Undivided Artenai	800	8,000	1
1 Avenue	Nelson Street	16 Street	Westbound	5,990	11,670	Collector	Undivided Arterial	800	8,000	1
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	18,790 17,380	36,170	4-Lane Arterial	Expressway	1,800	18,000	1
8 Avenue	25 Street	16 Street	Eastbound Westbound	11,040 7,320	18,360	4-Lane Arterial	Undivided Arterial	800	8,000	2
8 Avenue	16 Street	10 Street	Eastbound	3,930	7,150	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,250	4,850	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Hway 55	West City Limit	28 Street	Eastbound	2,600 5,560	8 270	2-I ane Arterial	Collector (Residential or Industrial)	400	4 000	2
1100	00 00000	11	Westbound Eastbound	2,710 11,050	00.440		Divided Associal	4.000	40.000	1 2
Hwy 55	28 Street	Hwy 28	Westbound	9,390	20,440	2-Lane Artenai	Divided Arterial	1,000	10,000	1
16 Avenue	Hwy 28	16 Street	Westbound	5,550	12,910	2-Lane Arterial	Undivided Arterial	800	8,000	1
16 Avenue	16 Street	10 Street	Westbound	4,850 3,110	7,960	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	10 Street	8 Street	Eastbound Westbound	4,640 3,190	7,830	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
English Bay Road	North City Limit	1 Avenue	Northbound	10,550	20,090	Collector	Divided Arterial	1,000	10,000	2
English Bay road	1 Avenue	25 Street	Northbound	13,350	24.350	Collector	Divided Arterial	1.000	10.000	2
English Bay road	25 Street	Hwy 28	Northbound	11,000	21.150	Collector	Divided Arterial	1.000	10.000	2
en er	20 01100t	1111, 20	Southbound Northbound	10,060	21,100	e il c	Divided / Konda	1,000	10,000	2
28 Street	English Bay Road	Hwy 55	Southbound	5,590	12,690	Collector	Undivided Arterial	800	8,000	1
25 Street	1 Avenue	English Bay Road	Southbound	4,070	8,710	Collector	Collector (Residential or Industrial)	400	4,000	2
Nelson Street	1 Avenue	16 Street	Eastbound Westbound	2,510 1,450	3,960	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	1 Avenue	8 Avenue	Northbound Southbound	7,870	11,530	Collector	Undivided Arterial	800	8,000	1
16 Street	8 Avenue	16 Avenue	Northbound	2,180	5,090	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	16 Avenue	10 Street	Northbound	2,550	4.880	Collector	Collector (Residential or Industrial)	400	4.000	1
10 Street	1 Augenue	0 Augoug	Southbound Northbound	2,330 2,800	5 510	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	1 Avenue	8 Avenue	Southbound	2,710	5,510	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	8 Avenue	16 Avenue	Southbound	3,480	6,500	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	16 Avenue	16 Street	Southbound	2,440 2,150	4,590	Collector	Collector (Residential or Industrial)	400	4,000	1
6 Street ⁵	16 Avenue	75 Avenue	Northbound Southbound	2,440 2,150	4,590	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	27,060	52,890	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	28,420	56,990	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	28,570 21,360	46,290	4-Lane Arterial	Expressway	1.800	18.000	2
75 4 4 4 4 4	United and the second s	Eutore Asterial	Southbound Eastbound	24,930 4,950	44,500	- Collector	Linglished Astronaut	1,000	0,000	2 1
75 Avenue	Hwy 28/55	Future Artenai	Westbound	6,610 4 320	11,000	Collector	Undivided Artenai	800	8,000	1
69 Avenue	Glenwood	Hwy 28/55	Westbound	3,680	8,000	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
69 Avenue	Hwy 28/55	Future Arterial	Westbound	8,130	16,970	Collector	Undivided Arterial	800	8,000	2
47 Street 6	69 Avenue	61/62 Avenue	Northbound	4,420 4,065	8,485	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	56 Street	Hwy 28/55	Eastbound	3,160	7,520	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,310	9,910	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	51 Street	45 Street	Eastbound	4,600 6,340	11.490	Collector	Undivided Arterial	800	8.000	1
7	45 01	44 00000	Westbound Eastbound	5,150 3,795	7,400	0-11	Collector (Decidential or last state)	400	4,000	1
54 Avenue	45 Street	41 Street	Westbound	3,335	7,130	Collector	Collector (Residential or Industrial)	400	4,000	1
54 Avenue	41 Street	Future Arterial	Westbound	1,520	2,770	Collector	Local (Residential or Industrial)	100	1,000	2
52 Avenue	59 Street	57 Street	Westbound	2,070 2,910	4,980	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	57 Street	Hwy 28/55	Eastbound Westbound	3,570 5,200	8,770	Collector	Collector (Residential or Industrial)	400	4,000	1 2
Centre Avenue	59 Street	57 Street	Eastbound	15,000	21,440	2-Lane Arterial	Divided Arterial	1,000	10,000	2
Centre Avenue	57 Street	Hwy 28/55	Eastbound	13,460	23,590	4-Lane Arterial	Divided Arterial	1,000	10,000	2
50 Avenue	Hwy 28/55	51 Street	Eastbound	7,440	12.700	2-Lane Arterial	Undivided Arterial	800	8.000	1
50 Arearia	51 Circuit	50 Street	Westbound Eastbound	5,260 6,140	0.750	2-Lane Artorial	Collector (Residential or laduat-1)	400	4,000	1 2
50 Avenue	51 Street	50 Street	Westbound	3,610	9,750	2-Lane Artenai	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	50 Street	45 Street	Westbound	2,440	8,430	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	45 Street	41 Street	Westbound	2,180	7,290	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	41 Street	Future Arterial	Eastbound Westbound	2,980	4,640	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,630	4,450	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
43 Avenue	Hwy 28/55	45 Street	Eastbound	5,430	9,940	Collector	Collector (Residential or Industrial)	400	4,000	2
59 Street	52 Avenue	Centre Avenue	Northbound	4,510 2,780	4.010	Collector	Collector (Residential or Industrial)	400	4.000	1
57 Otreat	54.4	50.4	Southbound Northbound	1,230 1,940	0,010	0-11	Collector (Providential or Industrial)	100	4,000	1
57 Street	34 AVenue	JZ AVENUE	Southbound	1,280	3,220	Collector	Collector (residential or industrial)	400	4,000	1
57 Street	52 Avenue	Centre Avenue	Southbound	2,290	5,900	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28/55	54 Avenue	52 Avenue	Southbound	21,530	39,620	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	52 Avenue	50 Avenue	Northbound Southbound	18,190 19,410	37,600	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	50 Avenue	50 Street	Northbound	9,090	20,390	4-Lane Arterial	Divided Arterial	1,000	10,000	1 2
Hwy 28/55	50 Street	43 Avenue	Northbound	12,470	27,470	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwv 28/55	43 Avenue	South City Limit	Northbound	9,020	18.910	4-Lane Arterial	Undivided Arterial	800	8.000	2
51 Street	54 Δυσουσ	50 Auronuo	Southbound Northbound	9,890 1,760	3 700	Collector	Collector (Residential or Indust1)	400	4,000	2
51 Street	54 AVenue	JU AVENUE	Southbound	1,940	3,700	Collector	Conector (residential or industrial)	400	4,000	1
50 Street	50 Avenue	Hwy 28/55	Southbound	5,990	12,290	Collector	Undivided Arterial	800	8,000	1
45 Street	54 Avenue	50 Avenue	Southbound	440	1,130	Collector	Local (Residential or Industrial)	100	1,000	1

CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

Corridor	Interse	ection	Forecasted V		Volumes Road Classification		Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Contaor	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Required (One Direction)
45 Street	50 Avenue	43 Avenue	Northbound Southbound	510 870	1,380	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street	54 Avenue	50 Avenue	Northbound Southbound	3,520 2,290	5,810	Collector	Collector (Residential or Industrial)	400	4,000	1
Future Arterial	69 Avenue	54 Avenue	Northbound Southbound	2,320 2,170	4,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1 1
Future Arterial	54 Avenue	50 Avenue	Northbound Southbound	1,880 1,420	3,300	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
Kingsway	59 Street	Glenwood	Eastbound Westbound	10,870 7,200	18,070	2-Lane Arterial	Undivided Arterial	800	8,000	2
Kingsway	Timberline	Glenwood	Eastbound Westbound	12,120 7,510	19,630	Collector	Undivided Arterial	800	8,000	2
Kingsway	Queensway	Timberline	Eastbound Westbound	5,990 4,480	10,470	Collector	Undivided Arterial	800	8,000	1
Kingsway	Tennis Court Road	Queensway	Eastbound Westbound	1,090 1,750	2,840	Collector	Local (Residential or Industrial)	100	1,000	2 2
Kingsway	End of Road	Tennis Court Road	Eastbound Westbound	1,270 1,780	3,050	Collector	Collector (Residential or Industrial)	400	4,000	1 1
Tennis Court Road	Queensway	Kingsway	Northbound Southbound	300 70	370	Collector	Lane	N/A	N/A	N/A N/A
Queensway	Tennis Court Road	Kingsway	Northbound Southbound	2,760 2,080	4,840	Collector	Collector (Residential or Industrial)	400	4,000	1 1
Queensway	Kingsway	Hanger Ln	Northbound Southbound	3,550 790	4,340	Collector	Collector (Residential or Industrial)	400	4,000	1
Timberline	Juniper Avenue	Kingsway	Northbound Southbound	1,680 1,200	2,880	Collector	Local (Residential or Industrial)	100	1,000	2 2
Timberline	Kingsway	Athabasca Road	Northbound Southbound	3,570 2,010	5,580	Collector	Collector (Residential or Industrial)	400	4,000	1
Glenwood Drive	Glenwood	Kingsway	Northbound Southbound	7,310 4,550	11,860	2-Lane Arterial	Undivided Arterial	800	8,000	1 1
Road classification ba Road classification ba Road classification ba Based on Lane Capa 4. Based on assumptior 5. Assumed daily traffic 6. Assumed daily traffic 7. Assumed daily traffic	Read classification based on 2000 Transportation Study Read classification based on 2000 Transportation Study Read classification based on 2000 Transportation Study Read classification based on 2000 Stroke Volumes estipulated in City's Readway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008) Read on Lare Capacity Table (attached). Using road classification according to City's standards. Read classification based on 2000 From Volume Capacity Table (attached). Using road classification according to City's standards. Read on Lare Capacity Table (attached). Using road classification according to City's standards. Read on assumption hate M posted hour traffic is 01% encode utaffic Assumed daily traffic for 54 Street to be similar to 10 Street (16 Avenue end 16 Street) Assumed daily traffic for 54 Avenue (45 Street to be 1 and daily traffic on 54 Avenue (51 Street to 45 Street) and 54 Avenue (41 Street to Future Arteria)									

CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON

	Interse	ection		Forecasted	I Volumes	Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
Corridor	From	То	Direction	Daily Traffic -	Daily Traffic -	2000 TPS 1	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Direction)
1 Avenue	28 Street	25 Street	Eastbound	3,360	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
1 Δυσουσ	25 Street	Noloon Street	Westbound Eastbound	2,210 6,650	12,210	Collector	Lindi ided Arteriel	800	8,000	1
TAvenue	25 Street	Nelson Street	Westbound	5,560	12,210	Collector	Undivided Anenal	800	0,000	1
1 Avenue	Nelson Street	16 Street	Westbound	6,580	12,820	Collector	Undivided Arterial	800	8,000	1
Hwy 28	Hwy 55/16 Avenue	25 Street	Southbound	21,470 20,900	42,370	4-Lane Arterial	Expressway	1,800	18,000	2
8 Avenue	25 Street	16 Street	Eastbound	11,990 8,580	20,570	4-Lane Arterial	Divided Arterial	1,000	10,000	2
8 Avenue	16 Street	10 Street	Eastbound	4,630	8.540	4-Lane Arterial	Collector (Residential or Industrial)	400	4.000	2
0.4	40.01	Laborhana Dabar	Eastbound	3,910 2,720	5.000	All and Astronom	Collector (Decidential or industrial)	400	4.000	1
8 Avenue	10 Street	Lakeshore Drive	Westbound	3,210	5,930	4-Lane Artenai	Collector (Residential or Industrial)	400	4,000	1
Hwy 55	West City Limit	28 Street	Westbound	3,320	10,690	2-Lane Arterial	Undivided Arterial	800	8,000	1
Hwy 55	28 Street	Hwy 28	Eastbound Westbound	14,440 11,280	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2
16 Avenue	Hwy 28	16 Street	Eastbound	8,660	15,310	2-Lane Arterial	Undivided Arterial	800	8,000	2
16 Avenue	16 Street	10 Street	Eastbound	5,820	9.640	2-I ane Arterial	Collector (Residential or Industrial)	400	4.000	2
40.4	40 01	0.01	Westbound Eastbound	3,820 4,510	0.000		Collector (Decidential or industrial)	100	4.000	2
16 Avenue	10 Street	8 Street	Westbound	3,520	8,030	2-Lane Artenai	Collector (Residential or Industrial)	400	4,000	1
16 Avenue	8 Street	East City Limit	Westbound	1,660	4,030	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
English Bay Road ⁵	North City Limit	Lake Avenue	Northbound Southbound	6,430 5,920	12,350	Collector	Undivided Arterial	800	8,000	1
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24,700	Collector	Divided Arterial	1,000	10,000	2
English Bay Road	1 Avenue	25 Street	Northbound	16,370	30.130	Collector	Expressway	1.800	18.000	1
			Southbound Northbound	13,760 13,510		0-11	Divide d Astroiat	4,000	10,000	2
English Bay Road	25 Street	Hwy 28	Southbound	12,300	25,810	Collector	Divided Artenai	1,000	10,000	2
28 Street	English Bay Road	Hwy 55	Southbound	7,040	15,680	Collector	Undivided Arterial	800	8,000	1
25 Street	1 Avenue	English Bay Road	Northbound Southbound	5,560 4,950	10,510	Collector	Undivided Arterial	800	8,000	1
Nelson Street	1 Avenue	16 Street	Eastbound	2,760	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	1 Avenue	8 Avenue	Northbound	9,290	13,820	Collector	Undivided Arterial	800	8,000	2
			Southbound Northbound	4,530 3.850						1
16 Street	o Avenue	16 Avenue	Southbound	4,280	8,130	Collector	Collector (Residential or Industrial)	400	4,000	2
16 Street	16 Avenue	10 Street	Southbound	3,200	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1
16 Street	10 Street	75 Avenue	Northbound Southbound	5,720 4,600	10,320	Collector	Undivided Arterial	800	8,000	1
10 Street	1 Avenue	8 Avenue	Northbound	3,400	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1
10 Street	8 Avenue	16 Avenue	Northbound	3,560	7.810	Collector	Collector (Residential or Industrial)	400	4.000	1
			Southbound Northbound	4,250 2.380						2
10 Street	16 Avenue	16 Street	Southbound	2,300	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
8 Street	16 Avenue	75 Avenue	Southbound	2,840 2,480	5,320	Collector	Collector (Residential or Industrial)	400	4,000	1
6 Street ⁶	16 Avenue	21 Avenue	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	30,680	62,490	4-Lane Arterial	Expressway	1,800	18,000	2
Huay 28/55	75 Avenue	69 Avenue	Northbound	31,810 31,690	65 550	4-Lane Arterial	Evoreeway	1 800	18.000	2
Tiwy 20/33	75 Avenue	03 Avenue	Southbound	33,860	03,330	4-Earle Artenai	Expressway	1,000	10,000	2
Hwy 28/55	69 Avenue	54 Avenue	Southbound	28,920	52,940	4-Lane Arterial	Expressway	1,800	18,000	2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound Westbound	4,390 4,730	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2
69 Avenue	Glenwood	Hwy 28/55	Eastbound	5,590	10,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,350	15,790	Collector	Undivided Arterial	800	8,000	2
47 Street 7	69 Avenue	61/62 Δυσομο	Westbound Northbound	3,720	7 895	Collector	Collector (Residential or Industrial)	400	4.000	1
47 Street	09 Avenue	61/02 Avenue	Southbound	4,175	7,095	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	56 Street	Hwy 28/55	Westbound	5,610	9,460	Collector	Collector (Residential or Industrial)	400	4,000	2
54 Avenue	Hwy 28/55	51 Street	Eastbound Westbound	5,850 4,710	10,560	Collector	Undivided Arterial	800	8,000	1
54 Avenue	51 Street	45 Street	Eastbound	6,960 5,660	12,620	Collector	Undivided Arterial	800	8,000	1
54 Avenue 8	45 Street	41 Street	Eastbound	4,600	8,425	Collector	Collector (Residential or Industrial)	400	4,000	2
EAA	41 8	Eutore Antonio'	Westbound Eastbound	3,825 2,240	4,000	Collector	Collector (Booldentini - Industrial)	400	4,000	1
54 AVENUE	41 Street	Future Afterial	Westbound	1,990	4,230	Collector	Conector (Residential or Industrial)	400	4,000	1
52 Avenue	59 Street	57 Street	Westbound	3,190	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1
52 Avenue	57 Street	Hwy 28/55	Eastbound Westbound	3,920 5,710	9,630	Collector	Collector (Residential or Industrial)	400	4,000	1 2
Centre Avenue	59 Street	57 Street	Eastbound	17,310 7.430	24,740	2-Lane Arterial	Divided Arterial	1,000	10,000	2
Centre Avenue	57 Street	Hwy 28/55	Eastbound	15,540	27,490	4-Lane Arterial	Divided Arterial	1,000	10,000	2
50 4.0000	Hun: 29/55	51 Street	Westbound Eastbound	11,950 7,940	12 540	2-1 and Artorial	Individed Astorial	800	8,000	2
SU AVENUE	riwy 28/55	o i otreet	Westbound	5,570	13,510	Z*Larie Arterial	Unaviaed Artenal	UUo	0,000	1
50 Avenue	51 Street	50 Street	Westbound	4,120	10,920	2-Lane Arterial	Undivided Arterial	800	8,000	1
50 Avenue	50 Street	45 Street	Eastbound Westbound	6,610 2,730	9,340	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
50 Avenue	45 Street	41 Street	Eastbound	6,170	9,220	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
50 Avenue	41 Street	Future Arterial	Eastbound	4,880	8.320	2-Lane Arterial	Collector (Residential or Industrial)	400	4.000	2
50 Augure	Euture Artorio	Researced Roard	Westbound Eastbound	3,440 2,070	3,620	2-1 and Artorial	Collector (Residential or Industrial)	400	4,000	1
9URIVA UC	Future Arterial	baywood Koad	Westbound	1,560	3,630	2-Lane Arterial	Conector (Residential or Industrial)	400	4,000	1
43 Avenue	Hwy 28/55	45 Street	Westbound	5,020	11,240	Collector	Undivided Arterial	800	8,000	1
59 Street	52 Avenue	Centre Avenue	Northbound Southbound	3,050 1,350	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1
57 Street	54 Avenue	52 Avenue	Northbound	2,130	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1
57 Street	52 Δυρομο	Centre Avenue	Northbound	1,400 3,960	6.470	Collector	Collector (Residential or Industrial)	400	4,000	1
57 Stielet	32 Avenue	Contro Avenue	Southbound	2,510	0,470	Condictor	-	400	4,000	1
Hwy 28/55	54 Avenue	52 Avenue	Southbound	24,610	45,540	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	52 Avenue	50 Avenue	Northbound Southbound	20,540 21,950	42,490	4-Lane Arterial	Expressway	1,800	18,000	2
Hwy 28/55	50 Avenue	50 Street	Northbound	10,700	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2
Hwy 28/55	50 Street	43 Avenue	Northbound	14,520	32,070	4-Lane Arterial	Expressway	1,800	18,000	1
Hwy 28/55	43 Δυσομο		Northbound	17,550	21 420	4-I ane Arterial	Divided Arterial	1.000	10.000	2
			Southbound	11,090	21,420	- Curio Arteria	Critical Alterial	.,000	10,000	2
Hwy 28/55 ⁹	40 Avenue	South City Limit	Southbound	5.545	10,710	4-Lane Arterial	Undivided Arterial	800	8,000	1

CAPACITY ANALYSIS - 20 YEAR (2030) HORIZON

Colling Decisional Designational SouthoursTo Decisional Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional To Decisional Decisional To Decisional<	Inter		ection	Direction	Forecasted Volumes		Road Classification	Road Classification	Lane Capacity	Lane Capacity	Number of Lanes
51 Steet 54 Avenue 50 Avenue Northbound 1.980 Southbound 4.210 Southbound Callector Collector (Residential or Industrial) 400 4.000 1 50 Street 50 Avenue Hwy 285 Southbound Northbound 7.170 Southbound 13.80 Callector Undwided Arterial 800 8.000 1 45 Street 50 Avenue 43 Avenue Southbound 4.000 1 1 1 100 1.000 1 1 45 Street 50 Avenue 43 Avenue Northbound 4.000 2.420 Collector Collector (Residential or Industrial) 100 1.000 1 1 41 Street 50 Avenue 50 Avenue Northbound 5.700 12.070 24.ane Arterial Undwided Arterial 8000 8.000 1	Comadi	From	То	Direction	Daily Traffic - Directional	Daily Traffic - Two Way	2000 TPS ¹	City of Cold Lake ²	(veh/hour/lane) ³	(veh/day/lane) ⁴	Direction)
Solver Solverset S	51 Street	54 Avenue	50 Avenue	Northbound	1,980	4.210	Collector	Collector (Residential or Industrial)	400	4.000	1
SD Street 50 Avenue Hwy 2865 Metribuord 7.170 13.980 Callector Undvided Antarial 800 8.000 1 44 Street 54 Avenue 50 Avenue 50 Avenue 50 Avenue 43 Avenue 860 2.420 Callector Local (Residential or Industrial) 100 1.000 1.000 1 44 Street 50 Avenue 43 Avenue 860 2.420 Collector Collector (Residential or Industrial) 400 4.000 1.0				Southbound	2,230	.,=		,		.,	1
Lobert Kingsaw Southound Southound Action Local (Residential or Industrial) Local (Re	50 Street	50 Avenue	Hwy 28/55	Northbound	7,170	13,980	Collector	Undivided Arterial	800	8,000	1
44 Street54 Avenue50 AvenueNorthbound700 Soluthound1,150CallectorLocal (Residential or Industrial)1001,0001,000145 Street50 Avenue43 AvenueNorthbound960 Soluthound2,420CallectorLocal (Residential or Industrial)1001,00011141 Street54 Avenue50 AvenueS0 AvenueNorthbound3,870 Soluthound6,380CallectorCollector (Residential or Industrial)4004,000111Future Arterial75 Avenue69 AvenueS0 AvenueNorthbound6,57012,0702 Lane ArterialUndvided Arterial8008,00011<			,	Southbound	6,810					-,	1
SouthoundSouthound450CollectorCollectorCollector (Residential or Industrial)1001,000143 Street50 Avenue50 Avenue50 Avenue50 Avenue50 Avenue50 Avenue50 Avenue6,380CollectorCollector (Residential or Industrial)4004,0001Future Arterial75 Avenue69 Avenue69 Avenue69 Avenue69 Avenue50 Avenue6001Future Arterial69 Avenue54 Avenue54 Avenue50 Avenue50012,0702-Lane ArterialUndivided Arterial8008,0001Future Arterial69 Avenue54 Avenue50 Avenue50012,0702-Lane ArterialUndivided Arterial8008,0001Future Arterial54 Avenue50 Avenue50012,0802-Lane ArterialCollector (Residential or Industrial)4004,0002Kingsway59 StreetGlenwoodEatbound1,240020,6202-Lane ArterialDivided Arterial1,00010,0002KingswayTimberlineGlenwoodEatbound6,19022,750CollectorDivided Arterial1,00010,0001KingswayTennis Court RoadQueenswayTimberlineFatbound7,1022,210CollectorCollector (Residential or Industrial)4004,0001KingswayTennis Court RoadQueenswayKingswayTennis Court RoadKingsway3,300CollectorCollectorCollector (45 Street	54 Avenue	50 Avenue	Northbound	700	1.150	Collector	Local (Residential or Industrial)	100	1.000	1
45 Street50 Avenue43 AvenueNorthbourd1460 14602,420CollectorLocal (Residential or Industrial)1001,0001141 Street56 Avenue50 AvenueS0 AvenueNorthbourd3,870 4,0006,380CollectorCollector (Residential or Industrial)4004,00011Future Arterial75 Avenue69 AvenueNorthbourd6,510 4,07012,0702-Lane ArterialUndivided Arterial8008,00011Future Arterial69 Avenue54 AvenueNorthbourd6,510 4,07012,0802-Lane ArterialUndivided Arterial8008,00011Future Arterial54 Avenue50 AvenueNorthbourd4,730 4,8408,5702-Lane ArterialCollector (Residential or Industrial)4004,00012Kingsway59 StreetGlenwoodEastbourd12,40022,500CollectorDivided Arterial1,00010,00011KingswayOueenswayTimberlineGlenwoodEastbourd1,200CollectorCollector (Residential or Industrial)4004,00011KingswayOueenswayTimberlineGlenwoodEastbourd2,2750CollectorDivided Arterial8008,000111KingswayTimberlineGlenwoodEastbourd7,020CollectorCollector (Residential or Industrial)4004,000111KingswayT				Southbound	450	,					1
A 1 Street56 AvenueSouthound1.480CallectorCollector (Residential or Industrial)4004,0001Future Arterial75 Avenue69 Avenue69 Avenue69 Avenue69 Avenue69 Avenue69 Avenue69 Avenue69 Avenue517012,0702-Lane ArterialUndivided Arterial8008,0001Future Arterial69 Avenue54 Avenue54 Avenue50 Avenue54 Avenue50 Avenue6,5702 Lane ArterialCollector (Residential or Industrial)4004,0001Kingsway59 StreetGlenwood6,22020,6202 Lane ArterialDivided Arterial1,00010,0001KingswayTimberlineGlenwood6,140 du2,2750CollectorDivided Arterial8008,0001KingswayTimberlineGlenwood6,190 du12,210CollectorCollectorCollector (Residential or Industrial)4004,0001KingswayTenris Court RoadAueenswayKingswayTenris Co	45 Street	50 Avenue	43 Avenue	Northbound	960	2,420	Collector	Local (Residential or Industrial)	100	1,000	1
41 Street56 Avenue50 Avenue6.380CollectorCollector (Residential or Industrial)4004.0004.0001Future Arterial75 Avenue69 Avenue69 Avenue64 Avenue6.51012.0702-Lane ArterialUndivided Arterial8008.0001Future Arterial69 Avenue54 Avenue50 Avenue8.5702-Lane ArterialCollector (Residential or Industrial)4004.0002Kingsway59 StreetGienvocoEastbound1.2.0020.6202-Lane ArterialDivided Arterial1.00010.0001KingswayTimberlineGienvocoEastbound1.0.0011.00011KingswayTimberlineGienvocoEastbound7.020CollectorCollector (Residential or Industrial)4004.0001KingswayTimberlineGienvocoEastbound1.2803.300CollectorCollector (Residential or Industrial)4004.0001KingswayTimberlineEastbound1.2803.300CollectorCollector (Residential or Industrial)4004.0001TimberlineEastbound1.2803.400CollectorCollector (Residenti				Southbound	1,460					-	2
Future Arterial75 AvenueSouthbound 2.300 12.070 2.4 ane ArterialUndivided Arterial800 8.000 1 Future Arterial69 Avenue69 Avenue 64 Avenue 6.500 3.000 1 <td>41 Street</td> <td>54 Avenue</td> <td>50 Avenue</td> <td>Northbound</td> <td>3,870</td> <td>6,380</td> <td>Collector</td> <td>Collector (Residential or Industrial)</td> <td>400</td> <td>4,000</td> <td>1</td>	41 Street	54 Avenue	50 Avenue	Northbound	3,870	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1
Future Arterial75 Avenue96 Avenue100000000.510012.0702-Lane ArterialUndivided Arterial8008.0001Future Arterial96 Avenue54 AvenueNombound6.51012.0802-Lane ArterialUndivided Arterial8008.0001Future Arterial54 Avenue50 AvenueS0 AvenueS0 AvenueS0 AvenueS0 AvenueS0 AvenueS0 Avenue6.51012.0802-Lane ArterialCollector (Residential or Industrial)4004.0001Kingsway59 StrettGierwoodEstiburid12.40020.6202-Lane ArterialDivided Arterial1.00010.0001KingswayTimberlineGierwoodEstiburid1.20022.50CollectorDivided Arterial1.00010.0001KingswayTumberlineGierwoodEstiburid1.20012.10CollectorCollector (Residential or Industrial)4.0004.0001KingswayTumberlineGierwoodEstiburid1.20012.10CollectorCollector (Residential or Industrial)4.0004.0001KingswayTumberlineGierwoodEstiburid1.2003.000CollectorCollector (Residential or Industrial)4.0004.0001KingswayTumberlineGierwoodEstiburid1.2003.000CollectorCollector (Residential or Industrial)4.0004.0001Collector Residential or IndustrialGueenswayKingswayKingsw				Southbound	2,510						1
Future Arterial69 Avenue54 AvenueSouthound6,1012,0802-Lane ArterialUndivided Arterial8008,0001Future Arterial54 Avenue50 AvenueSouthound6,5708,5702-Lane ArterialCollector (Residential or Industrial)4004,0002Kingsway59 StreetGlerwoodEstbound1,4002,2502-Lane ArterialDivided Arterial1,00010,0002KingswayTimberlineGlerwoodEstbound1,4002,2750CollectorDivided Arterial1,00010,0001KingswayQueenswayTimberlineGlerwood8,71022,750CollectorDivided Arterial8008,0001KingswayTennis Court RoadQueenswayTimberlineEstbound5,19012,210CollectorCollectorCollector (Residential or Industrial)4004,0001KingswayTennis Court RoadQueenswayEstbound2,0403,480CollectorCollectorCollector (Residential or Industrial)4004,0001Tennis Court RoadKingswaySouthound7.00400CollectorCollectorCollector (Residential or Industrial)4004,0001QueenswayKingswayKingswaySouthound7.00400CollectorCollectorCollector (Residential or Industrial)4004,0001QueenswayKingswayKingswaySouthound7.01400Collector	Future Arterial	75 Avenue	69 Avenue	Northbound	6,900	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	
Future Arterial69 Avenue54 Avenue54 Avenue54 Avenue54 Avenue54 Avenue54 Avenue50 Avenue12.0802.4ane ArterialUndivided Arterial8008.0001Future Arterial54 Avenue50 Avenue50 Avenue50 Avenue3.6004.707Collector (Residential or Industrial)4004.0001Kingsway59 StreetGlerwoodEastboard1.240020.6202.4ane ArterialDivided Arterial1.00010.0001KingswayTimberlineGlerwoodEastboard1.240022.750CollectorDivided Arterial1.00010.0001KingswayTumberlineGlerwoodEastboard1.2002.2750CollectorDivided Arterial8008.0001KingswayTumberlineGlerwoodEastboard1.2002.2750CollectorCollector (Residential or Industrial)4004.0001KingswayTumberlineGlerwoodEastboard1.20012.210CollectorCollector (Residential or Industrial)4004.0001KingswayTenis Court RoadGueenswayTenis Court RoadNembourd2.2003.300CollectorCollector (Residential or Industrial)4004.0004.0001Tenis Court RoadKingswayNembourd2.030CollectorCollector (Residential or Industrial)4004.00011GueenswayFenis Court RoadKingswayNembourd2.030Coll				Northbound	6,510				+		1
Future Arterial56 Avenue50 AvenueNorthbound $4,730$ Southbound $8,570$ 24 Lane ArterialCollector (Residential or Industrial) 400 $4,000$ 2 Kingsway59 StreetGierwoodGierwood $8,200$ Westbourd $2,20620$ 24 Lane ArterialDivided Arterial $1,000$ $10,000$ 2 KingswayTimberlineGierwoodGierwood $8,220$ Westbourd $2,2750$ CollectorDivided Arterial $1,000$ $10,000$ 2 KingswayQueenswayTimberlineGierwood $8,710$ Westbourd $22,750$ CollectorUndivided Arterial 8000 $8,000$ 1 KingswayTennis Court RoadQueenswayTennis Court RoadQueensway $2,202$ Westbourd $3,480$ CollectorCollectorCollector (Residential or Industrial) 400 $4,000$ 1 KingswayTennis Court RoadQueenswayKingswaySouthbound $3,30$ CollectorCollectorCollector (Residential or Industrial) 400 $4,000$ 1 Tennis Court RoadKingswayKingswaySouthbound 70 400 CollectorCollectorCollector (Residential or Industrial) 400 $4,000$ 1 QueenswayKingswayKingswaySouthbound 70 400 CollectorCollectorCollector (Residential or Industria) 400 $4,000$ 1 QueenswayKingswayKingswaySouthbound $5,570$ CollectorCollectorCollec	Future Arterial	69 Avenue	54 Avenue	Southbound	5,570	12,080	2-Lane Arterial	Undivided Arterial	800	8,000	1
Future Artarial54 Avenue50 Aven				Northbound	4 730		2-Lane Arterial				2
Kingsway59 StreetGlerwoodEatbourd12.40020.6202-Lane ArterialDivided Arterial1,00010,0002KingswayTimberlineGlerwoodEatbourd14,04022.750CollectorDivided Arterial1,00010,0001KingswayQueenswayTimberlineEatbourd7.02012.210CollectorUndivided Arterial8008.0001KingswayTennis Court RoadQueenswayEatbourd7.02012.210CollectorUndivided Arterial8008.0001KingswayTennis Court RoadQueenswayEatbourd7.0203.300CollectorCollectorCollector (Residential or Industria)4004.0001KingswayEnd of RoadTennis Court RoadEatbourd7.023.000CollectorCollectorCollector (Residential or Industria)4004.0001QueenswayKingswaySouthbourd7.00400CollectorCollectorLaneN/AN/AN/AQueenswayKingswayHanger LnSouthbourd5.570CollectorCollectorCollector (Residential or Industria)4004.00011QueenswayKingswayHanger LnSouthbourd5.570CollectorCollectorCollector (Residential or Industria)4004.00011QueenswayKingswayHanger LnSouthbourd5.570CollectorCollectorCollector (Residential or Industria)400 <td>Future Arterial</td> <td>54 Avenue</td> <td>50 Avenue Sour</td> <td>Southbound</td> <td>3,840</td> <td>8,570</td> <td>Collector (Residential or Industrial)</td> <td>400</td> <td>4,000</td> <td>- 1</td>	Future Arterial	54 Avenue	50 Avenue Sour	Southbound	3,840	8,570		Collector (Residential or Industrial)	400	4,000	- 1
Kingsway59 StreetGlenwoodWestbourd6.22020.6222.4ne AfterialDwded Arterial1,00010,00010,0001KingswayTimberlineGlenwood4.1040022,750CollectorDivided Arterial1,00010,00010,0001KingswayTimberlineGlenwood4.71022,750CollectorDivided Arterial8008,0006,0001KingswayTemis Court RoadQueenswayTimberlineEstbound1,2203,300CollectorCollectorCollector (Residential or Industrial)4004,0004,0001KingswayTemis Court RoadQueenswayKingsway				Fastbound	12,400	20,620 2-Lane Arterial				2	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Kingsway	59 Street	Glenwood	Westbound	8.220		2-Lane Arterial	Divided Arterial	1,000	10,000	
KingswayLimberlineGenevoluWestbourd $\delta.710$ 22.70 CallectorDivided Arterial $1,000$ $10,000$ <	10	200 A A		Eastbound	14.040				1.000	10,000	2
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Kingsway	Timberline	Glenwood	Westbound	8,710	22,750	Collector	Divided Arterial	1,000	10,000	1
KingswayCollector	Kinan	0	Timberline	Eastbound	7,020	10.010	Outleaster	Lindivided Artorial	000	0.000	1
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Kingsway	Queensway	Timberline	Westbound	5,190	12,210	Collector	Undivided Arterial	800	8,000	1
Kingway Tenis Court Road Westbound 2.020 3.00 Collector Collector Collector Collector Residuated in floatisming 4.00 4.000 1 Kingway End Road Tenis Court Road Tenis Court Road Vestbound 2.040 3.480 Collector Collector (Residential or Industrial) 400 4.000 1 Tenis Court Road Kingsway Kingsway Kingsway Southbound 70 400 Collector Lane N/A N/A N/A Queensway Tenis Court Road Kingsway Southbound 7.00 400 Collector Collector (Residential or Industrial) 400 4.000 1 Queensway Tenis Court Road Kingsway Southbound 2.440 5.570 Collector Collector (Residential or Industrial) 400 4.000 1 Queensway Kingsway Hanger Ln Southbound 5.010 Collector Collector (Residential or Industrial) 400 4.000 1 Timberine Ninper Avenue Kingsway Kingsway Southbound 1.400 3.20 Collecto	Kinggungu	Toppio Court Road	Queeneurou	Eastbound	1,280	2 200	Collector	Collector (Residential or Industrial)	400	4.000	1
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Killysway	Termis Court Road	Queensway	Westbound	2,020	3,300	CONNECTOR	Collector (Residential or Industrial)	400	4,000	1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Kingeway	End of Road	Tennie Court Road	Eastbound	1,440	3.490	Collector	Collector (Residential or Industrial)	400	4 000	1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Kingaway	End or Road	Terrina Court Road	Westbound	2,040	3,400	CONSCIO	Collector (Residential or Industrial)	400	4,000	1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Tennis Court Road	Queensway	Kingsway	Northbound	330	400	Collector	Lane	N/A	N/A	N/A
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Torino Obdit Hodd	accontinuty	rangoway	Southbound	70	400	00100101			1071	N/A
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Queensway	Tennis Court Road	Kingsway	Northbound	3,130	5.570	Collector	Collector (Residential or Industrial)	400	4.000	1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			ingsway	Southbound	2,440	0,010		,	400	.,	1
Image: Southound 910 648 648 648 648 648 1 Timberline Juniper Avenue Kingsway Monthound 1,920 3,320 Collector Collector (Residential or Industrial) 400 4,000 1 Timberline Kingsway Athabasca Road Monthound 1,400 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Timberline Kingsway Athabasca Road Southound 2,210 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 V Venthound 2,210 6,480 Collector Collector (Residential or Industrial) 400 4,000 1	Queensway	Kingsway Hanger Ln	Hanger I n	Northbound	4,100	5.010	Collector	Collector (Residential or Industrial)	400	4.000	2
Timberline Juniper Avenue Kingsway Northbound 1,920 3,320 Collector Collector Residential or Industrial 400 4,000 1 Timberline Kingsway Athabasca Road Northbound 1,400 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Timberline Kingsway Athabasca Road Northbound 2,310 6,480 Collector Collector (Residential or Industrial) 400 4,000 1 Output Southbound 2,310 6,480 Collector Collector (Residential or Industrial) 400 4,000 1		0.1.7	igor En	Southbound	910	.,				,	1
Timberline Kingsway Athabasca Road Southbound 1,400 1 7 Mathabasca Road Southbound 2,310 6,480 Collector (Residential or Industrial) 400 4,000 1 1 Southbound 2,310 6,480 Collector Collector (Residential or Industrial) 400 4,000 1	Timberline	Juniper Avenue Kingsway	Northbound	1,920	3,320	Collector	Collector (Residential or Industrial)	400	4,000	1	
Timberline Kingsway Athabasca Road Normcourno 4,170 6,480 Collector Collector (Residential or Industrial) 400 4,000 2 1 Southbound 2,310 6,480 Collector Collector (Residential or Industrial) 400 4,000 1			gowdy	Southbound	1,400		2 2	, , , , , , , , , , , , , , , , , , , ,		,	1
Sournouria 2,310 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Timberline	Kingsway	Athabasca Road	Northbound	4,170	6,480	Collector	Collector (Residential or Industrial)	400	4,000	2
				Northbound	2,310					1	1
Glenwood Drive Glenwood Kingsway Crucia Control 0,700 13,730 2-Lane Arterial Undivided Arterial 800 8,000 4	Glenwood Drive	Glenwood	Kingsway	Southhound	5.270	13,730	2-Lane Arterial	Undivided Arterial	800	8,000	2

 Glemwood Drwe
 Glemwood
 Kingsway
 Southbound
 5,270
 13,730
 2-Lane Arterial
 Undwided Arterial

 1. Road classification based or Dool Transportation Study
 2. Road classification based or Dool Transportation Study
 2. Road classification based or Dool Transportation Study
 2. Road classification based or Dool Transportation Study

 2. Road classification based or Daily Service Volumes stipulated in City's Roadway Design Standards (Municipal Engineering Servicing Standards and Standard Construction Specifications, Jan 2008)
 3. Based on Lane Compacity Table (attached). Using road classification according to City's standards.
 4. Based on assumption that PM peek hour traffic is 10% of the daily traffic
 5. Stauned daily traffic for English Bay Road (Noth Cit V): Illin to Lake Avenue to be shall for 10 Street (15 Avenue and 16 Street)
 5. Assumed daily traffic for Street to be similar to 10 Street (15 Avenue, and 15 Street)
 5. Assumed daily traffic for 47 Street to be Fail of daily traffic on 65 Avenue, 61 Street (15 Avenue (45 Street to 14 Street) to a servage of daily traffic on 64 Avenue (51 Street to 41 Street) to 8 average of daily traffic on 64 Avenue (51 Street to 41 Street)
 8. Assumed daily traffic for 7 Haven (45 Street to 14 Street) to 8 average of daily traffic on 64 Avenue (15 Street to Future Arterial)

 8. Assumed daily traffic for 7 Haven (45 Street to 14 Street) to 8 average of daily traffic on 64 Avenue (51 Street to 64 Street)
 8. Assumed daily traffic for 7 Haven (45 Street to 41 Street) to 8 average of daily traffic on 64 Avenue (15 Street to 64 Avenue)

 8. Assumed d

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