Final Report

The City of Cold Lake

Cold Lake Transportation Study

February 2012

Table of Contents

List of Tables

List of Figures

1 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.

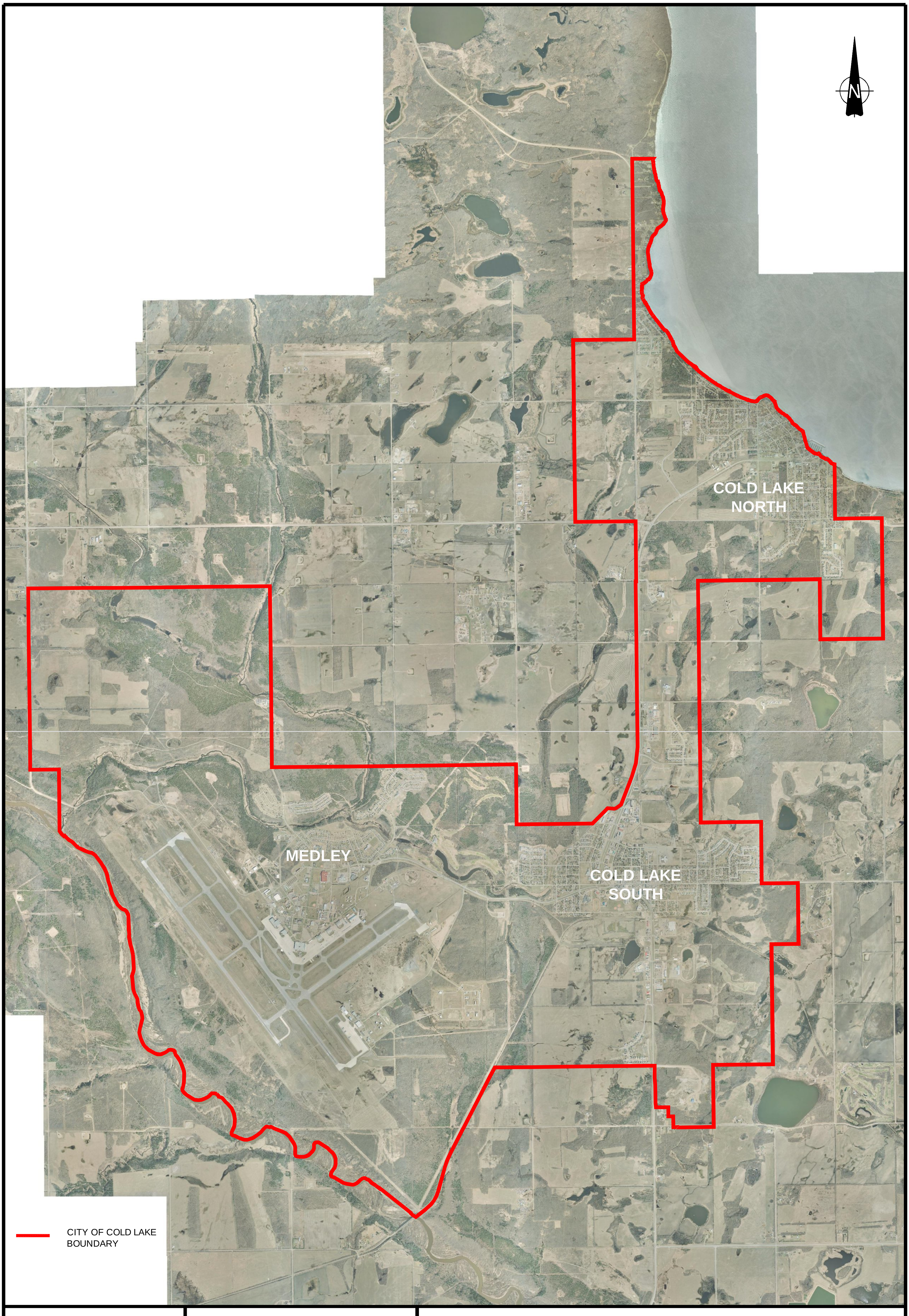
1.1 PROJECT BACKGROUND

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.



Associated Engineering

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.

Table 1.1
Transportation Study Tasks

Project Stage	Project Task Number	Project Task Description
1	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
	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
2	2A.1	Capacity Analysis for Planning Horizons
	2A.2	Development and Evaluation of Roadway Improvements
	2A.3	Traffic Calming
	2A.4	Parking Management
	2A.5	In-Service Safety Reviews
	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

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	3.1	Draft Report
	3.2	Plan Submission
	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.

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 right-of-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.

Table 2.1
Summary of Safety Issues and Improvement Options

Study Corridor	Safety Issues	Improvement Options
1 Avenue	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.
	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.
	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.

Study Corridor	Safety Issues	Improvement Options
50 Avenue	Highway 28 intersection	Complete detailed intersection analysis to review intersection geometry and lane configuration.
		Close 55 Street intersection.
		Conduct Main Street Analysis.
	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:

1. 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 reflect 2010 values and do not include GST

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
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	$362,377
								Mobilization Fee	$10,000
								8 Avenue Corridor Improvements - Subtotal	**$372,377**
								10% Contingency and 12% Engineering/Testing	**$81,923**
								8 Avenue Corridor Improvements - Total	**$454,300**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
Highway 28/55			75 Avenue	Existing (2010) Traffic Operational Analysis	Provide traffic signal	1	LS	$350,000.00	$350,000
Highway 28/55			61/62 Avenue	Existing (2010) Traffic Operational Analysis	Provide traffic signal	1	LS	$350,000.00	$350,000
Highway 28/55			61/62 Avenue	Existing (2010) Traffic Operational Analysis	Channelize northbound right turn lane	1	LS	$116,960.56	$116,961
Highway 28/55			52 Avenue	Existing (2010) Traffic Operational Analysis	Provide traffic signal	1	LS	$350,000.00	$350,000
Highway 28/55			52 Avenue	Existing (2010) Traffic Operational Analysis	Channelize northbound right turn lane	1	LS	$116,960.56	$116,961
Highway 28/55			52 Street	Existing (2010) Traffic Operational Analysis	Provide traffic signal	1	LS	$350,000.00	$350,000
Highway 28/55			52 Street	Existing (2010) Traffic Operational Analysis	Channelize northbound right turn lane	1	LS	$85,761.64	$85,762
Highway 28/55	53 Avenue	52 Avenue	-	Traffic Volume Forecast and Analysis	Widen to provide centre median (4-lane Divided Expressway with curb and gutter)	230	LM	$1,258.04	$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	$540,958
								Mobilization Fee	$10,000
								Highway 28/55 Corridor Improvements - Subtotal	**$2,559,991**
								10% Contingency and 12% Engineering/Testing	**$563,198**
								Highway 28/55 Corridor Improvements - Total	**$3,123,189**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
1 Avenue	25 Street	10 Street	-	Cold Lake North Parking Study	Provide marked (painted) on-street parallel parking stalls	240	stalls	$4.80	$1,153
1 Avenue	25 Street	10 Street	-	Cold Lake North Parking Study	Pave and paint parking stalls in Gravel Lot at Kinosoo Beach. No beautification.	1	LS	$205,273.50	$205,273
1 Avenue	25 Street	10 Street	-	Cold Lake North Parking Study	Install parking control (RB-51, RB-52) signs	1	LS	$988.08	$988
1 Avenue	25 Street	10 Street	2 Avenue/10 Street	In-Service Road Safety Reviews	Improve intersection configuration at 1 Avenue/2 Avenue/10 Street. Provide roundabout after further conceptual design. [1]	1	LS	$250,000.00	$250,000
1 Avenue	25 Street	10 Street	-	In-Service Road Safety Reviews	Repave corridor	1,220	LM	$826.61	$1,008,464
1 Avenue	25 Street	10 Street	19 Street	In-Service Road Safety Reviews	Provide pavement marking and signage at 19 Street crosswalk	1	LS	$733.82	$734
								Mobilization Fee	$10,000
								1 Avenue Corridor Improvements - Subtotal	**$1,476,612**
								10% Contingency and 12% Engineering/Testing	**$324,855**
								1 Avenue Corridor Improvements - Total	**$1,801,467**

1. Price reflects single-lane roundabout

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
Highway 55	28 Street	Highway 28	-	Traffic Volume Forecast and Analysis	Build pavement structure to Arterial standard (4-lane Divided Arterial with curb and gutter)	555	LM	$2,990.14	$1,659,525
								Mobilization Fee	$10,000
								Highway 55 Corridor Improvements - Subtotal	**$1,669,525**
								10% Contingency and 12% Engineering/Testing	**$417,381**
								Highway 55 Corridor Improvements - Total	**$2,086,906**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
16 Avenue	Highway 28	16 Street	-	Traffic Volume Forecast and Analysis	Build pavement structure to Arterial standard (4-lane Undivided Arterial with curb and gutter)	1,430	LM	$2,214.01	$3,166,037
16 Avenue	16 Street	8 Street	-	Traffic Volume Forecast and Analysis	Widen to provide one additional travel lane in each direction (4-lane Collector with curb and gutter)	825	LM	$1,201.39	$991,146
								Mobilization Fee	$10,000
								16 Avenue Corridor Improvements - Subtotal	**$4,167,183**
								10% Contingency and 12% Engineering/Testing	**$916,780**
								16 Avenue Corridor Improvements - Total	**$5,083,963**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
English Bay Road	Lake Avenue	Highway 28	-	Traffic Volume Forecast and Analysis	Build pavement structure to Arterial standard (4-lane Divided Arterial with curb and gutter)	2,345	LM	$2,998.64	$7,031,800
								Mobilization Fee	$10,000
								English Bay Corridor Improvements - Subtotal	**$7,041,800**
								10% Contingency and 12% Engineering/Testing	**$1,549,196**
								English Bay Corridor Improvements - Total	**$8,590,996**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
28 Street	Lake Avenue	Highway 28	-	Traffic Volume Forecast and Analysis	Remove existing 28 Street roadway	1,165	LM	$379.52	$442,146
28 Street	Lake Avenue	Highway 28	-	Traffic Volume Forecast and Analysis	Relocate stop signs	2	signs	$331.88	$664
28 Street	Lake Avenue	Highway 28	-	Traffic Volume Forecast and Analysis	Realign 28 Street and build pavement structure to Arterial standard (2-lane Undivided Arterial with curb and gutter)	1,075	LM	$1,094.18	$1,176,239
								Mobilization Fee	$10,000
								28 Street Corridor Improvements - Subtotal	**$1,629,049**
								10% Contingency and 12% Engineering/Testing	**$358,391**
								28 Street Corridor Improvements - Total	**$1,987,440.33**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
16 Street	16 Avenue	75 Avenue	-	Traffic Volume Forecast and Analysis	Build pavement structure to Arterial standard (2-lane Undivided Arterial)	1,625	LM	$1,295.08	$2,104,507
Future Arterial	75 Avenue	50 Avenue	-	Traffic Volume Forecast and Analysis	Build out as per 20-year horizon (2-lane Undivided Arterial)	3,300	LM	$1,052.58	$3,473,518
								Mobilization Fee	$10,000
								16 Street/Future Arterial Corridor Improvements - Subtotal	**$5,588,025**
								10% Contingency and 12% Engineering/Testing	**$1,229,365**
								16 Street/Future Arterial Corridor Improvements - Total	**$6,817,390**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
10 Street	1 Avenue	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	$815,252
								Mobilization Fee	$10,000
								10 Street Corridor Improvements - Subtotal	**$825,746**
								10% Contingency and 12% Engineering/Testing	**$181,664**
								10 Street Corridor Improvements - Total	**$1,007,410**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
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	$1,969,240
								Mobilization Fee	$10,000
								8 Street Corridor Improvements - Subtotal	**$1,979,240**
								10% Contingency and 12% Engineering/Testing	**$435,433**
								8 Street Corridor Improvements - Total	**$2,414,673**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
20 Avenue	12 Street	8 Street	-	Traffic Volume Forecast and Analysis	Build as per 20-year horizon (2-lane Collector with curb and gutter)	550	LM	$965.62	$531,092
								Mobilization Fee	$10,000
								20 Avenue Corridor Improvements - Subtotal	**$541,092**
								10% Contingency and 12% Engineering/Testing	**$119,040**
								20 Avenue Corridor Improvements - Total	**$660,133**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
Lakeshore Drive	10 Street	7 Street	-	Cold Lake North Parking Study	Provide marked (painted) on-street parallel parking stalls	117	stalls	$4.80	$562
Lakeshore Drive	10 Street	7 Street	-	Cold Lake North Parking Study	Install parking control (RB-51, RB-52) signs	1	LS	$2,717.22	$2,717
Lakeshore Drive	10 Street	8 Avenue	-	In-Service Road Safety Reviews	Repave corridor (2-lane Local)	1,055	LM	$781.09	$824,046
Lakeshore Drive	10 Street	8 Avenue	-	In-Service Road Safety Reviews	Improve pedestrian crosswalks (8 Avenue, midblock between 8 Avenue and 7 Avenue, 7 Avenue, 6 Avenue and 2 Avenue)	5	LS	$9,985.34	$49,927
								Mobilization Fee	$10,000
								Lakeshore Drive Corridor Improvements - Subtotal	**$887,252**
								10% Contingency and 12% Engineering/Testing	**$195,195**
								Lakeshore Drive Corridor Improvements - Total	**$1,082,447**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
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	$4,530,912
								Mobilization Fee	$10,000
								75 Avenue Corridor Improvements - Subtotal	**$4,540,912**
								10% Contingency and 12% Engineering/Testing	**$999,001**
								75 Avenue Corridor Improvements - Total	**$5,539,912**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	**From**	**To**	**Intersection**						
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	$4,441,893
								Mobilization Fee	$10,000
								69 Avenue Corridor Improvements - Subtotal	**$4,451,893**
								10% Contingency and 12% Engineering/Testing	**$979,416**
								69 Avenue Corridor Improvements - 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

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	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 Arterial	-	Traffic Volume Forecast and Analysis	Build out as per 20-year horizon (4-lane Collector with curb and gutter)	1,230	LM	$1,622.07	$1,995,149
								Mobilization Fee	$10,000
								54 Avenue Corridor Improvements - Subtotal	**$3,590,983**
								10% Contingency and 12% Engineering/Testing	**$790,016**
								54 Avenue Corridor Improvements - Total	**$4,380,999**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	Intersection						
52 Avenue	57 Street	Highway 28	-	Traffic Volume Forecast and Analysis	Widen to provide one additional travel lane in each direction (4-lane Collector with curb and gutter)	305	LM	$1,161.39	$354,224
								Mobilization Fee	$10,000
								52 Avenue Corridor Improvements - Subtotal	**$364,224**
								10% Contingency and 12% Engineering/Testing	**$80,129**
								52 Avenue Corridor Improvements - Total	**$444,353**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	Intersection						
51 Avenue	56 Street	Service Road	-	School Zone Safety Analysis	Relocate crosswalk	1	LS	$773.18	$773
								Mobilization Fee	$10,000
								51 Avenue Corridor Improvements - Subtotal	**$10,773**
								10% Contingency and 12% Engineering/Testing	**$2,370**
								52 Avenue Corridor Improvements - Total	**$13,143**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	Intersection						
Centre Avenue			59 Street	Existing (2010) Traffic Operational Analysis	Provide traffic signal	1	LS	$350,000.00	$350,000
Centre Avenue			57 Street	Existing (2010) Traffic Operational Analysis	Provide traffic signal	1	LS	$350,000.00	$350,000
Centre Avenue	59 Street	57 Street	-	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)	330	LM	$2,017.63	$665,818
Centre Avenue	57 Street	Highway 28	-	Traffic Volume Forecast and Analysis	Widen to provide centre median (4-lane Divided Arterial with curb and gutter)	440	LM	$1,258.04	$553,539
								Mobilization Fee	$10,000
								Centre Avenue Corridor Improvements - Subtotal	**$1,929,357**
								10% Contingency and 12% Engineering/Testing	**$424,458**
								Centre Avenue Corridor Improvements - Total	**$2,353,815**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	Intersection						
50 Avenue	Highway 28	49 Street	-	In-Service Road Safety Reviews	Provide back-in angle parking stalls (back in angle parking pavement markings)	76	stalls	$534.20	$40,599
50 Avenue	Highway 28	49 Street	-	In-Service Road Safety Reviews	Repaint pavement markings	1	LS	$8,134.70	$8,135
50 Avenue	Highway 28	49 Street	-	In-Service Road Safety Reviews	Provide curb extensions and signage at crosswalks	1	LS	$57,834.21	$57,834
								Mobilization Fee	$10,000
								50 Avenue Corridor Improvements - Subtotal	**$116,568**
								10% Contingency and 12% Engineering/Testing	**$25,645**
								50 Avenue Corridor Improvements - Total	**$142,213**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	Intersection						
43 Avenue	Highway 28	45 Street	Highway 28	Highway 28 Functional Review	Provide intersection improvements at 43 Avenue	1	LS	###########	$2,871,930
43 Avenue	Highway 28	45 Street	-	Traffic Volume Forecast and Analysis	Build pavement structure to Collector standard (4-lane Collector with curb and gutter)	625	LM	$1,898.57	$1,186,608
								Mobilization Fee	$10,000
								43 Avenue Corridor Improvements - Subtotal	**$4,068,538**
								10% Contingency and 12% Engineering/Testing	**$895,078**
								43 Avenue Corridor Improvements - Total	**$4,963,617**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	Intersection						
Kingsway	59 Street	Medley Gate	-	Traffic Volume Forecast and Analysis	Widen to provide centre median and one additional travel lane in each direction (4-lane Divided Arterial)	1,580	LM	$1,976.04	$3,122,137
Kingsway	Medley Gate	Glenwood	-	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)	1,075	LM	$2,017.63	$2,168,952
Kingsway	Glenwood	Timberline Drive	-	Traffic Volume Forecast and Analysis	Build pavement structure to Arterial Standard (4-lane Divided Arterial with curb and gutter)	530	LM	$3,104.14	$1,645,192
								Mobilization Fee	$10,000
								Kingsway Corridor Improvements - Subtotal	**$6,946,281**
								10% Contingency and 12% Engineering/Testing	**$1,528,182**
								Kingsway Corridor Improvements - Total	**$8,474,463**

Location				Recommendation from	Item	Quantity	Unit	Unit Rate	Total Cost
Corridor	From	To	Intersection						
Glenwood Drive	69 Avenue Arterial	Kingsway	-	Traffic Volume Forecast and Analysis	Build pavement structure to Arterial Standard (4-lane Undivided Arterial with curb and gutter)	485	LM	$2,214.01	$1,073,795.84
								Mobilization Fee	$10,000
								Glenwood Drive Corridor Improvements - Subtotal	**$1,083,795.84**
								10% Contingency and 12% Engineering/Testing	**$238,435**
								Glenwood Drive Corridor Improvements - Total	**$1,322,230.93**

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

PROFESSIONAL ENGINEER ALBERTA

ROHIT VIJ

Feb 22

ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF	
Signature:	
Date:	Feb. 22, 2012

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

Table of Contents

List of Tables

List of Figures

1 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.

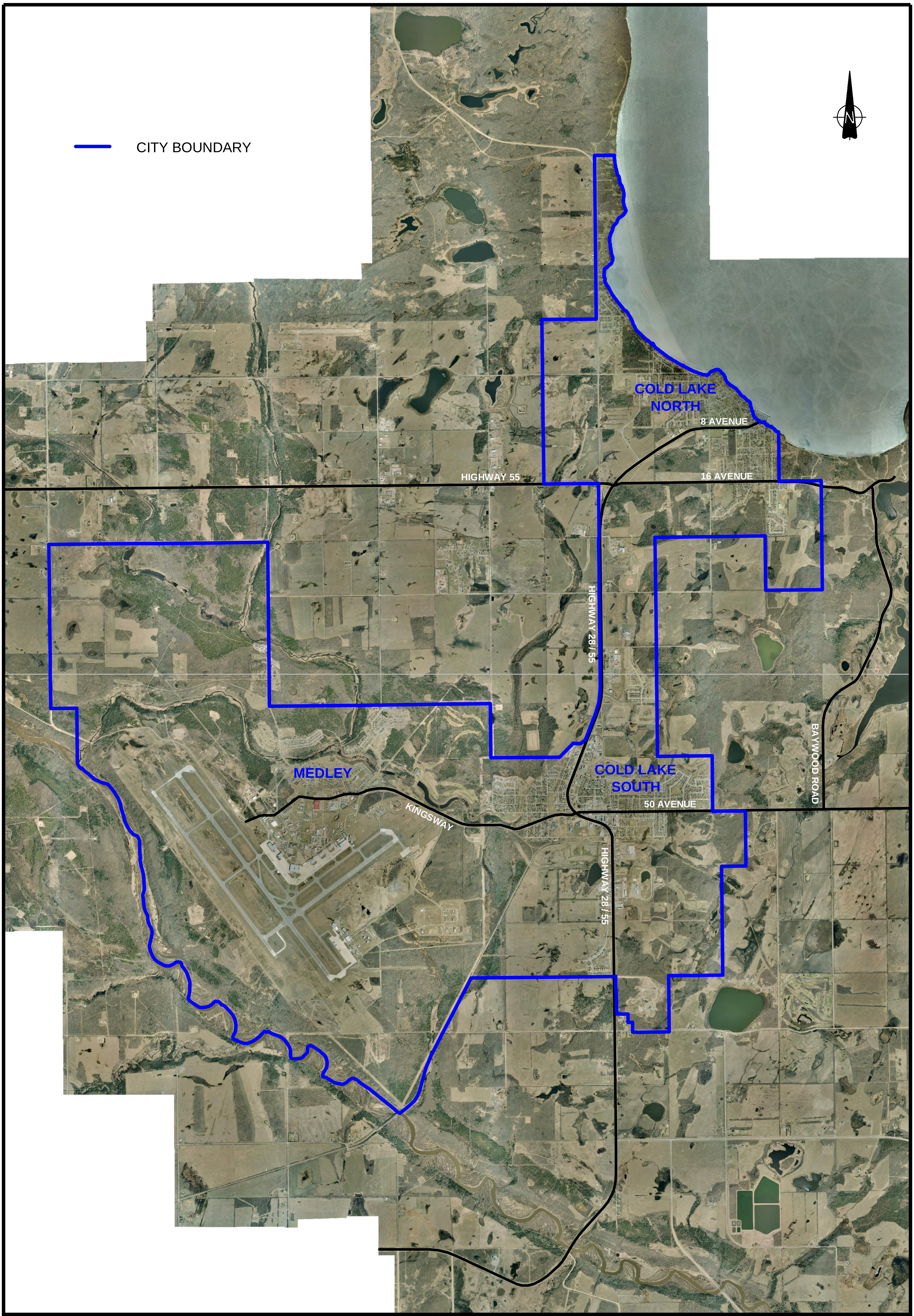
The study area was broken down into the following areas:

- 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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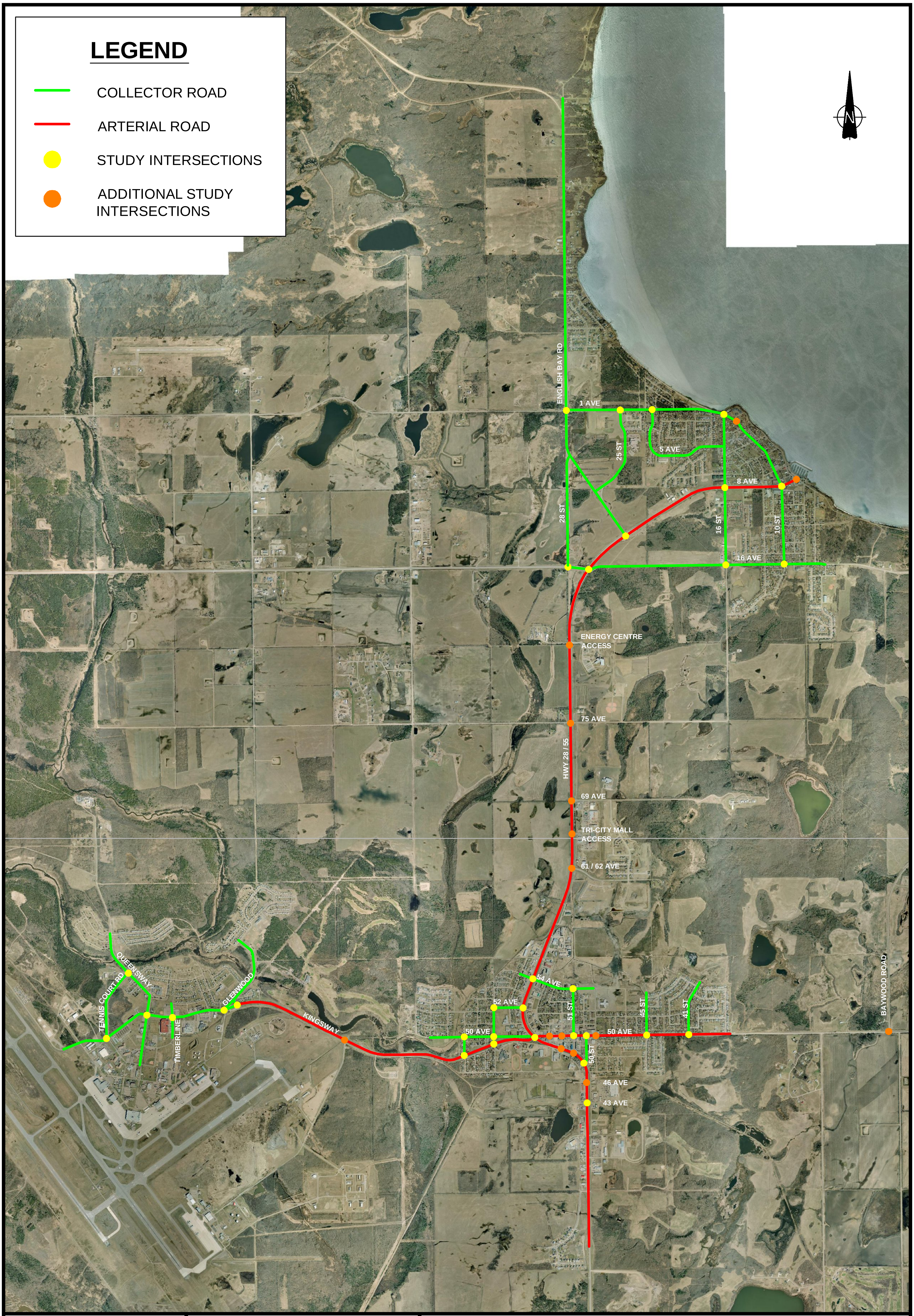
PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 1.1
CITY OF COLD LAKE BOUNDARY



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DATE:	SEPTEMBER 2010
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SCALE:	NTS
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CITY OF COLD LAKE
TRANSPORTATION STUDY

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

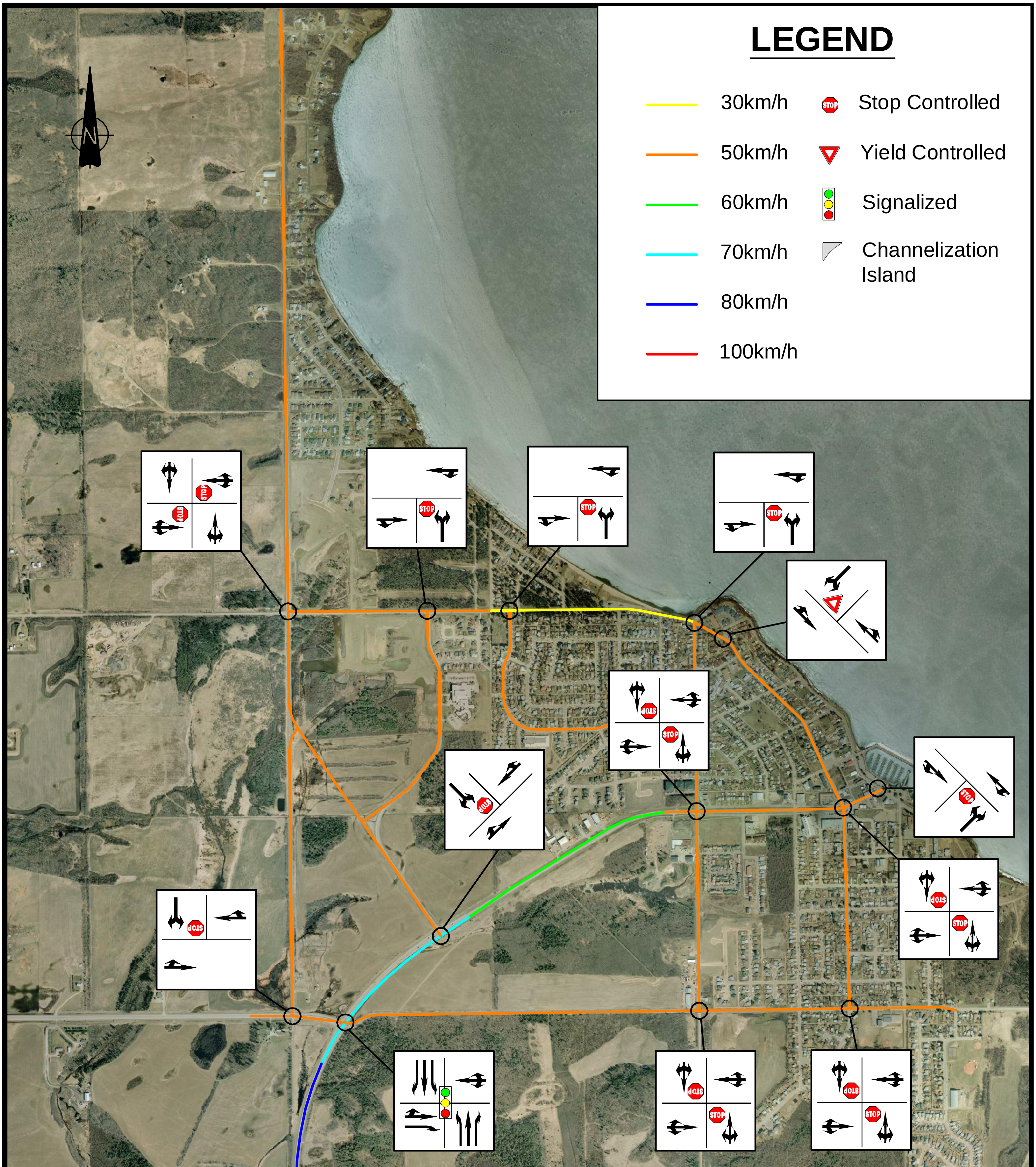
- 50 Avenue and 49 Street
- 50 Avenue and 45 Street
- 50 Avenue and 41 Street
- 50 Avenue and Baywood Road
- Highway 28 and 52 Street
- Highway 28 and 51 Street
- Highway 28 and 43 Avenue
- Kingsway and Medley Road
- Kingsway and Queensway
- Kingsway and Tennis Court Road
- Queensway and Tennis Court 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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PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
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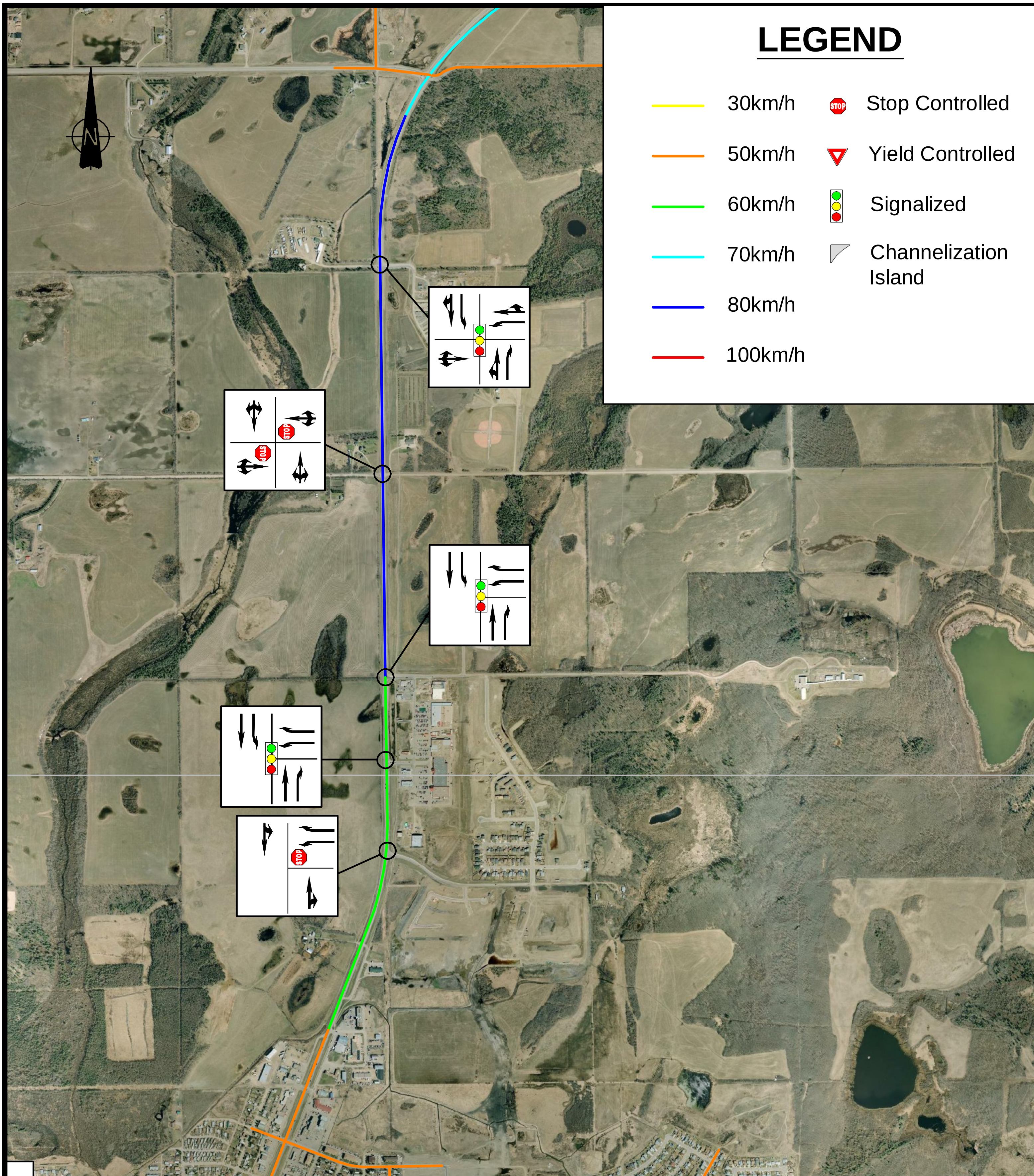
FIGURE 2.1 - COLD LAKE NORTH EXISTING LANE CONFIGURATION, TRAFFIC CONTROL AND POSTED SPEED LIMIT

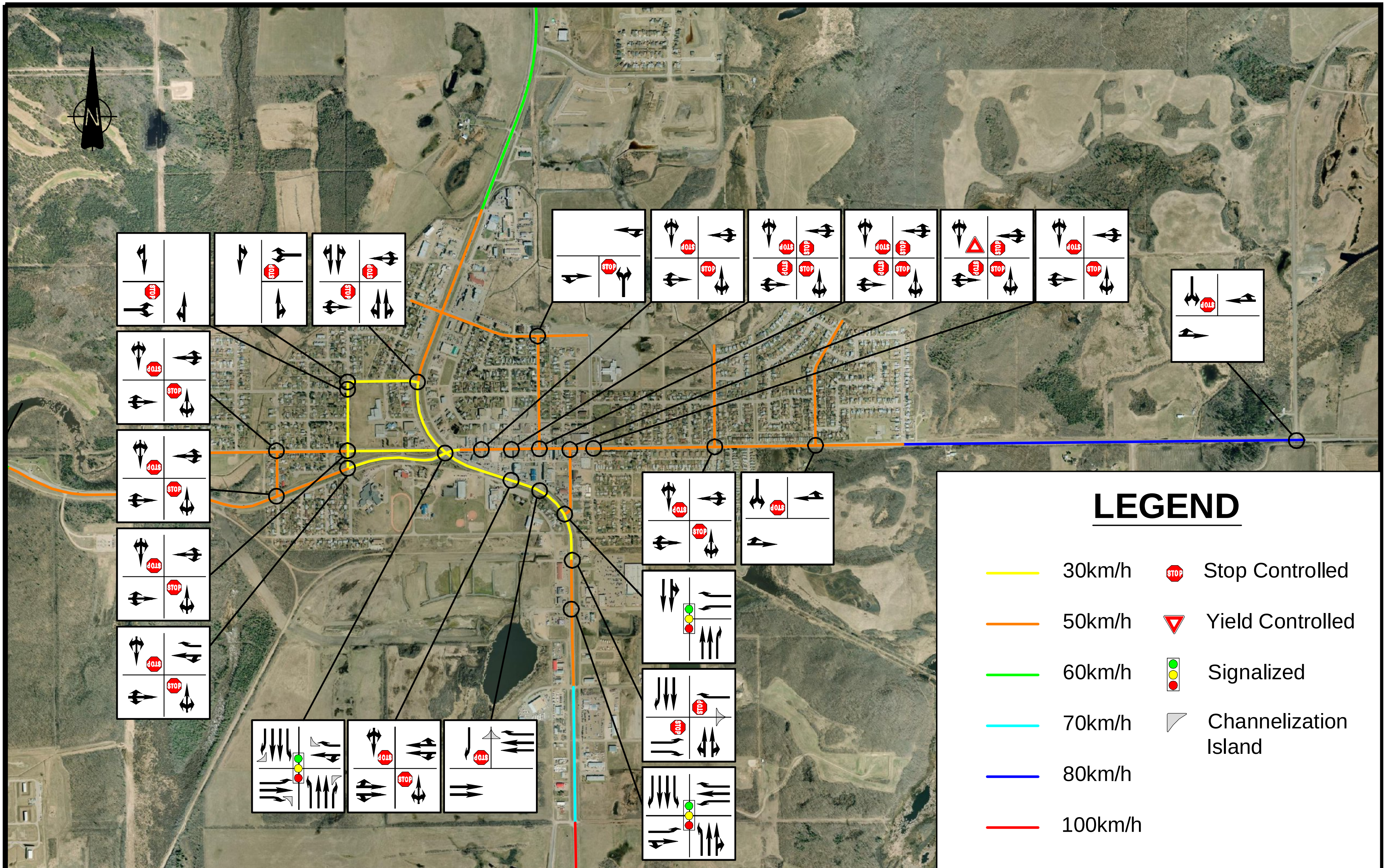


PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

Associated Engineering

CITY OF COLD LAKE
TRANSPORTATION STUDY

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



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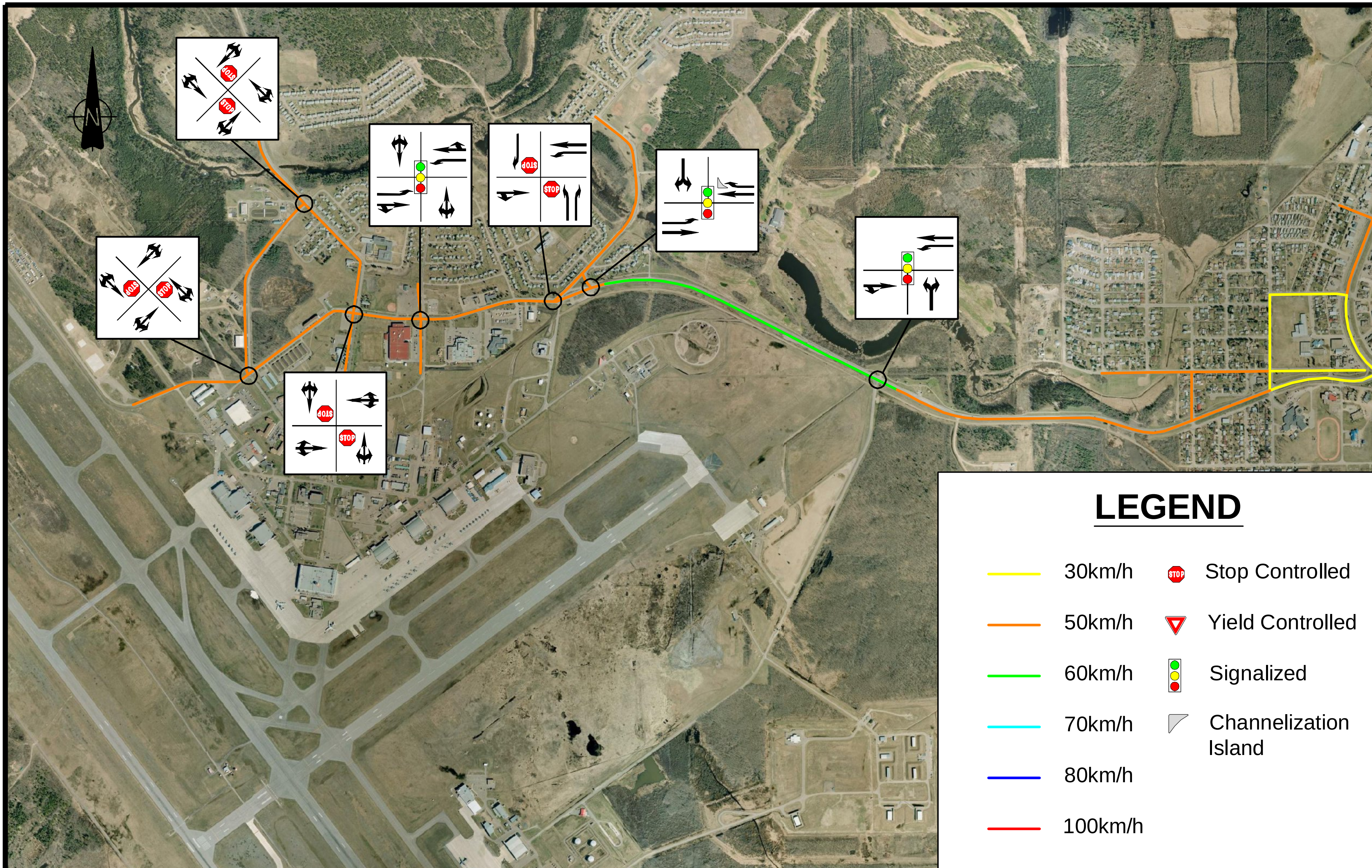
PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 2.3 - COLD LAKE SOUTH
EXISTING LANE CONFIGURATION, TRAFFIC CONTROL AND POSTED SPEED LIMIT



LEGEND

(yellow line)	30km/h	(stop sign)	Stop Controlled
(orange line)	50km/h	(yield sign)	Yield Controlled
(green line)	60km/h	(signal)	Signalized
(cyan line)	70km/h	(channelization island)	Channelization Island
(blue line)	80km/h		
(red line)	100km/h		

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PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 2.4 - MEDLEY
EXISTING LANE CONFIGURATION, TRAFFIC CONTROL AND POSTED SPEED LIMIT

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.

Table 2.1
Growth Rate Calculation

Roadway	Location	Direction	Source 1 Oct 2003	Source 1 June 2004	Source 1 % Growth	Source 2	Source 3	Source 4
Highway 28	North of Highway 55	Northbound	3,785	4,100		17.0%	1.5% Average Annual Growth (1986 - 2001) 2.0% Assumed Annual Growth 3.0% Annual Growth if growth continues in oil sands, tourism and service-based industries.	5.5% in Five Years (1996-2001) 2.5% - High Projected Growth 1.5% - Moderation Projected Growth 0.5% - Low Projected Growth
	North of Highway 55	Southbound	3,890	4,386				
	North of Highway 55	**Two-way Total**	**7,675**	**8,487**	**10.6%**			
	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%**			
Highway 28	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**	**4.3%**			
	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**	**14.9%**			
Highway 28	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**	**-1.4%**			
	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 (Tri-City) Access	East of Highway 28	Northbound	2,158	2,502				
	East of Highway 28	Southbound	2,074	3,870				
	East of Highway 28	**Two-way Total**	**4,232**	**6,372**	**50.6%**			
Average Annual Growth Rate					**21.7%**			

PROJECT NO: 2010-3050

DATE: SEPTEMBER 2010

APPROVED:

SCALE: NTS

DWG NO:

Associated Engineering

CITY OF COLD LAKE

TRANSPORTATION STUDY

FIGURE 2.5 - COLD LAKE NORTH EXISTING (2010) PM PEAK TRAFFIC VOLUMES

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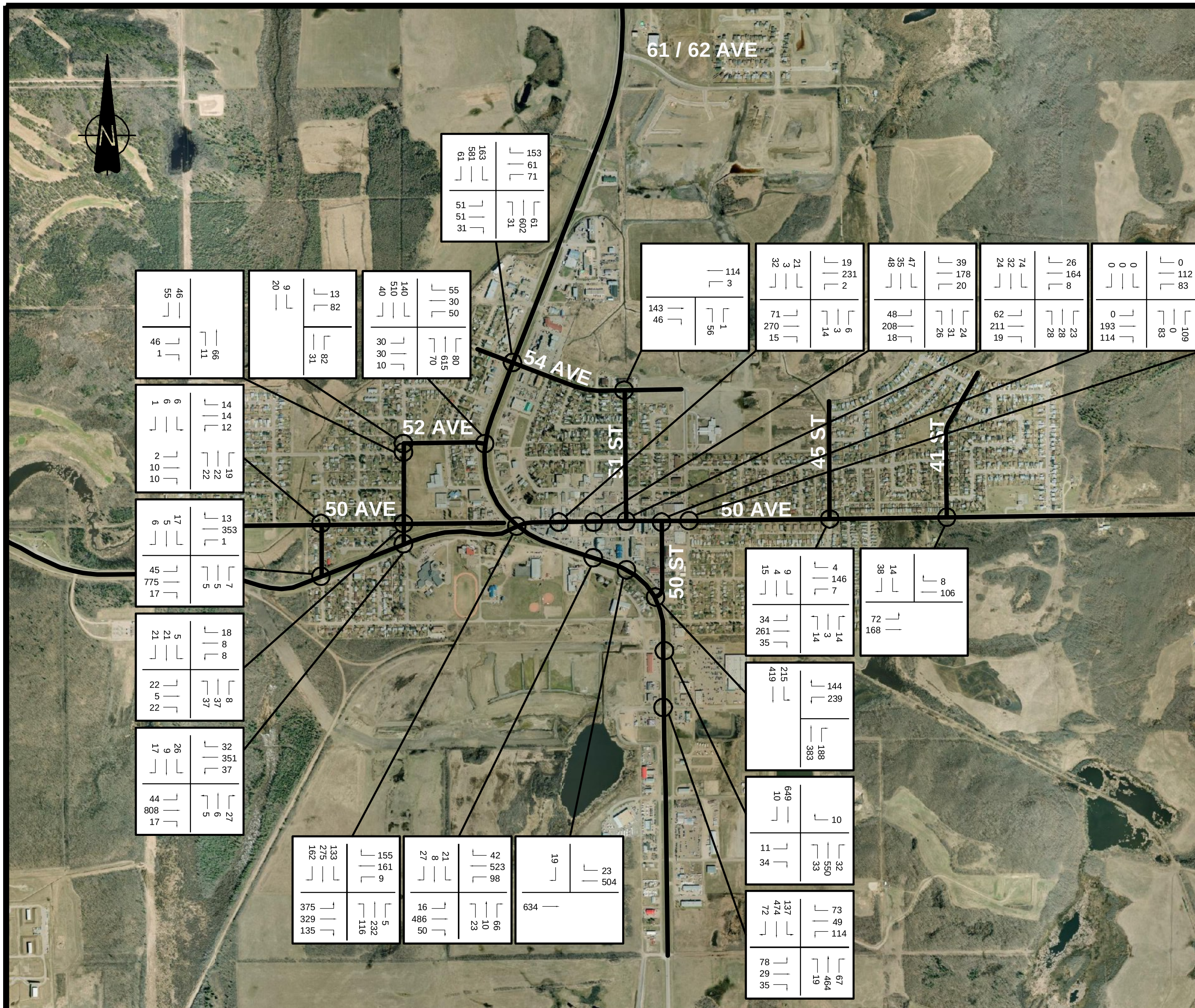
PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

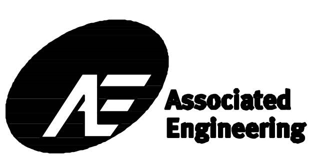
CITY OF COLD LAKE
TRANSPORTATION STUDY

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



LEGEND

\## PM Peak Traffic Volume



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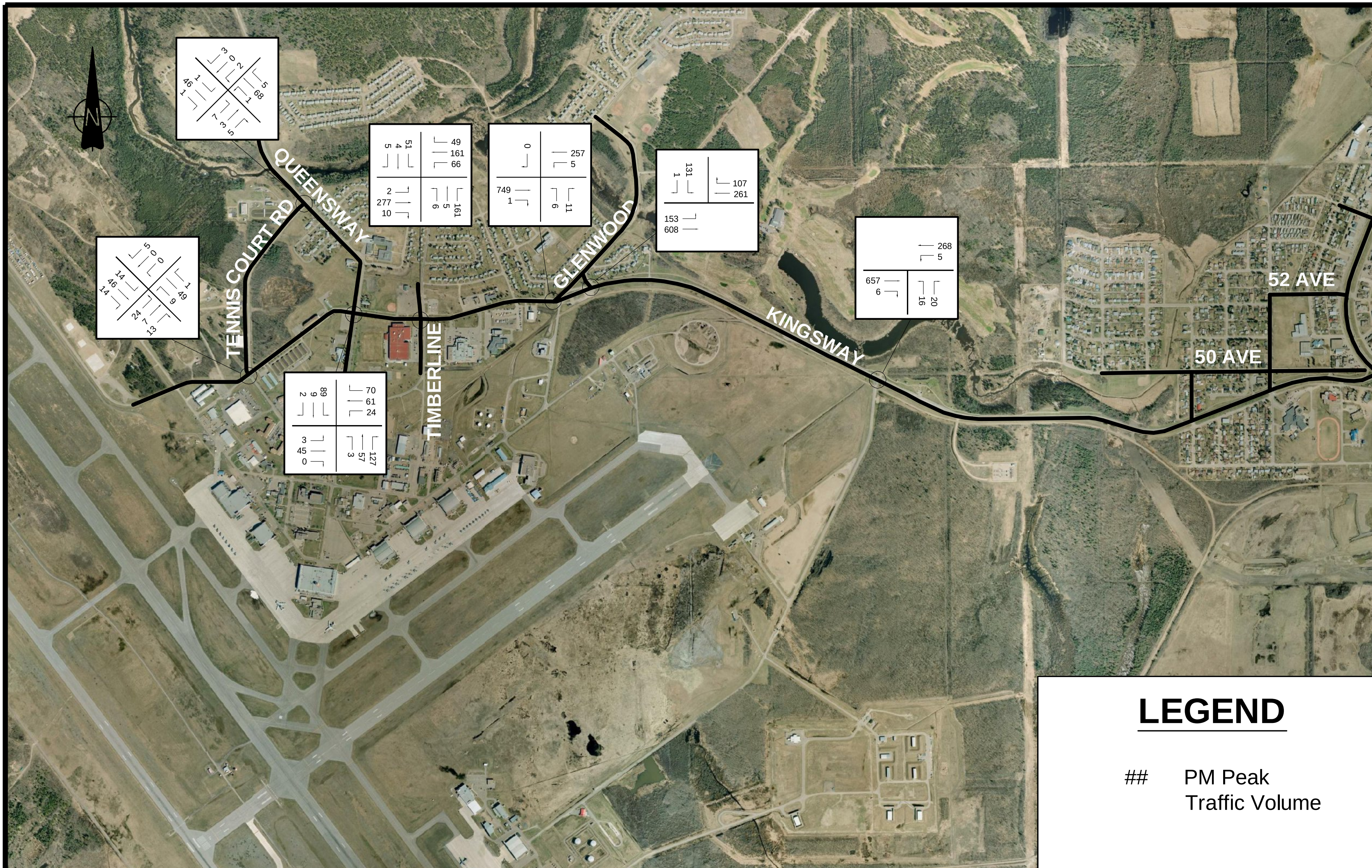
PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 2.7 - COLD LAKE SOUTH
EXISTING (2010) PM PEAK TRAFFIC VOLUMES



LEGEND

PM Peak Traffic Volume

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PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 2.8 - MEDLEY
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

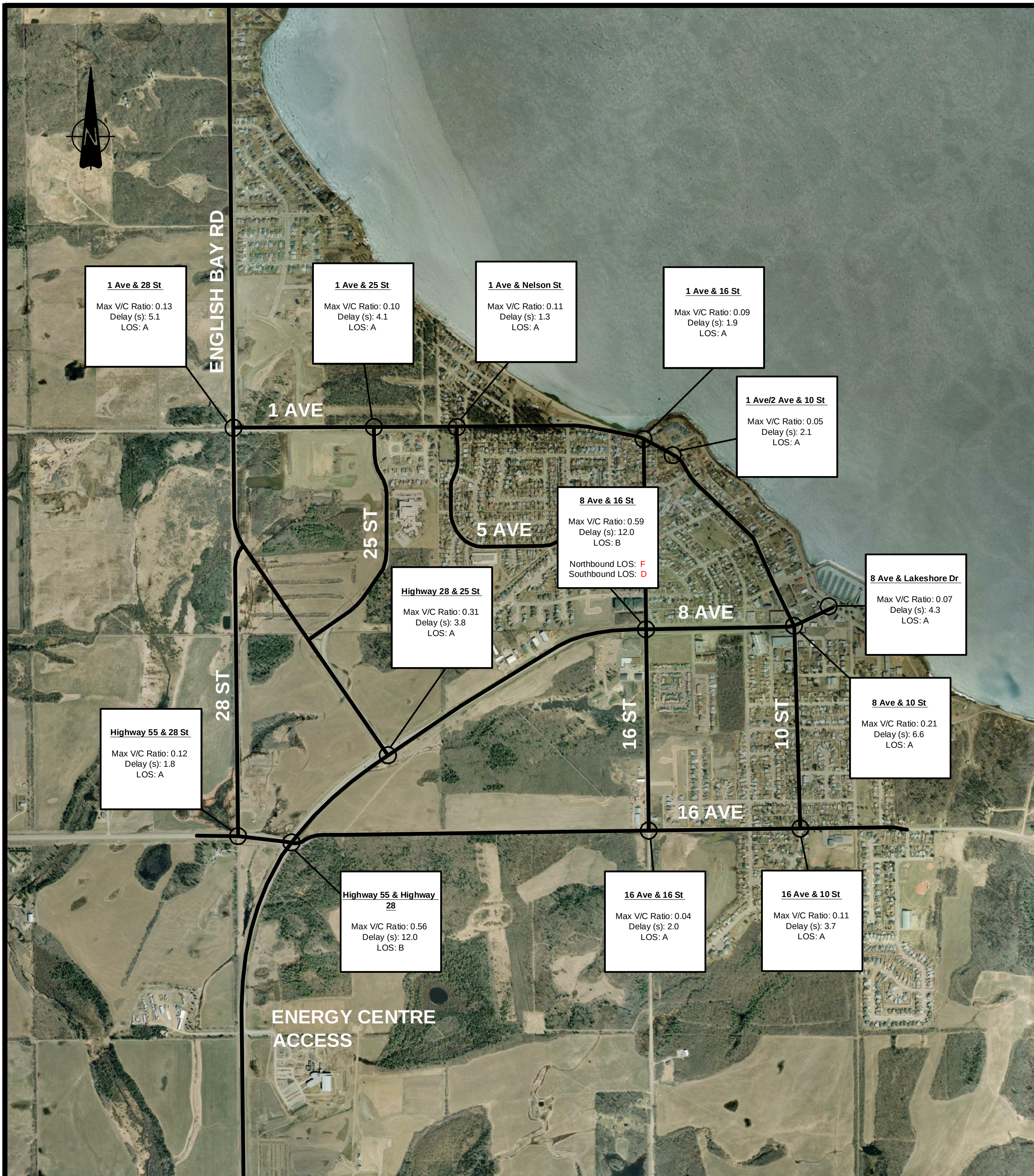
Figure 3.2 presents the overall intersection capacity results for the study intersections along the Highway 28/Highway 55 corridor.

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.



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PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.1 - COLD LAKE NORTH
EXISTING (2010) CAPACITY RESULTS

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PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
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SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.2 - HIGHWAY 28 / 55 CORRIDOR
EXISTING (2010) CAPACITY RESULTS

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.

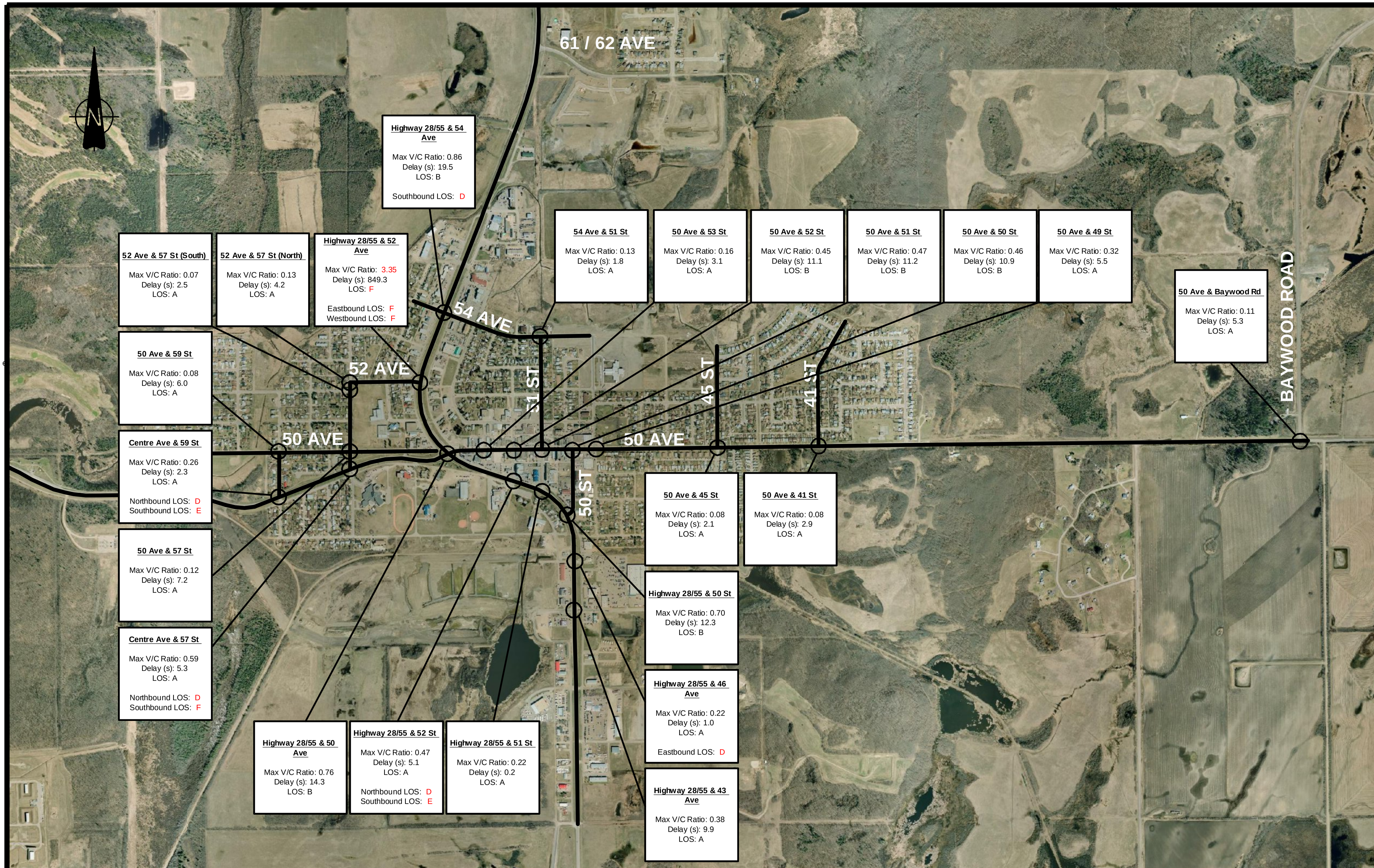
The intersection of Centre Avenue and 59 Street is currently operating with an overall intersection LOS A, maximum v/c ratio of 0.26, and intersection delays of 2.3 seconds. While the intersection is operating well overall, the northbound and southbound approaches are operating poorly. The northbound 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.



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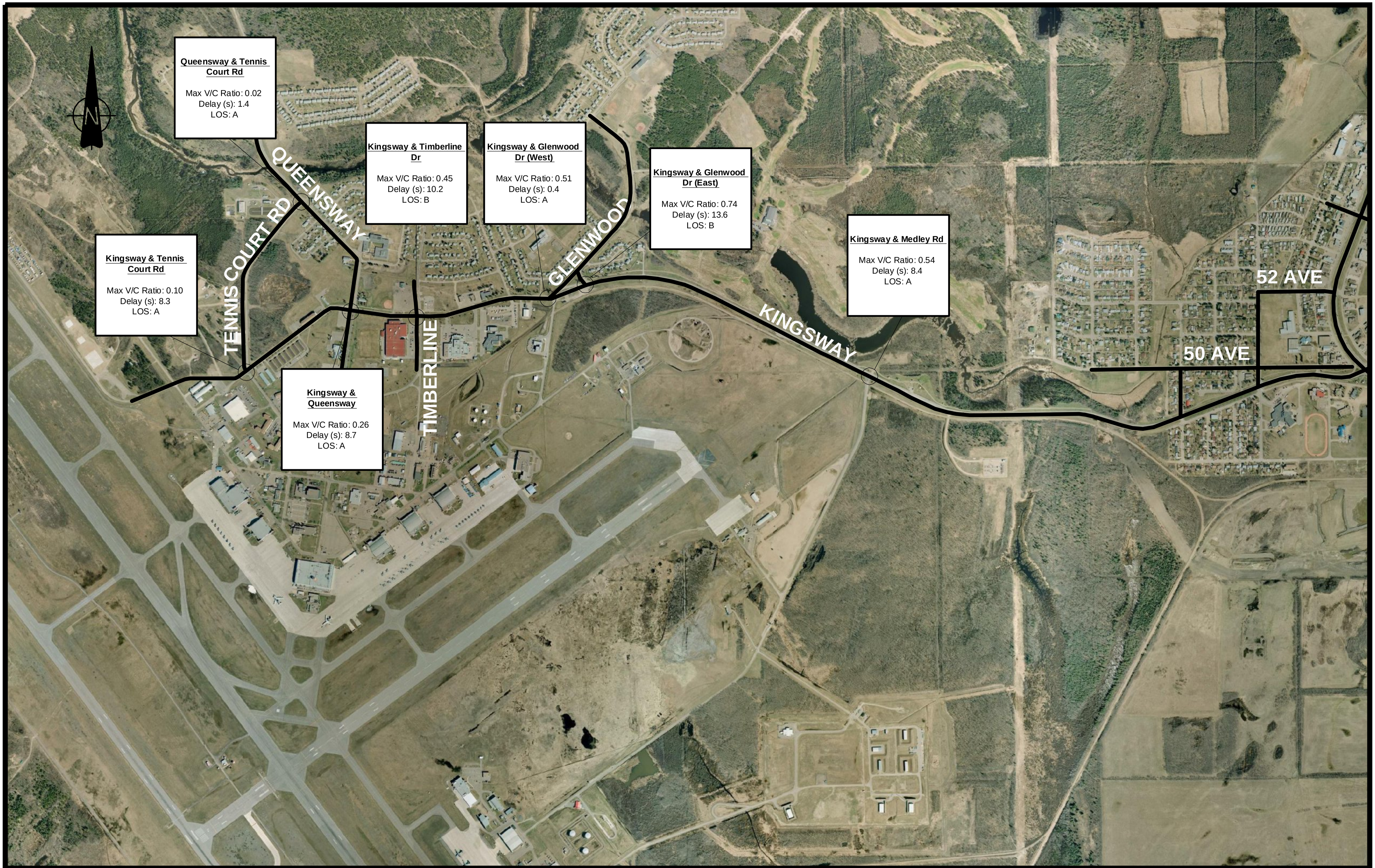
PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.3 - COLD LAKE SOUTH
EXISTING (2010) CAPACITY RESULTS



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PROJECT NO:	2010-3050
DATE:	SEPTEMBER 2010
APPROVED:	
SCALE:	NTS
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CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.4 - MEDLEY
EXISTING (2010) CAPACITY RESULTS

4 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

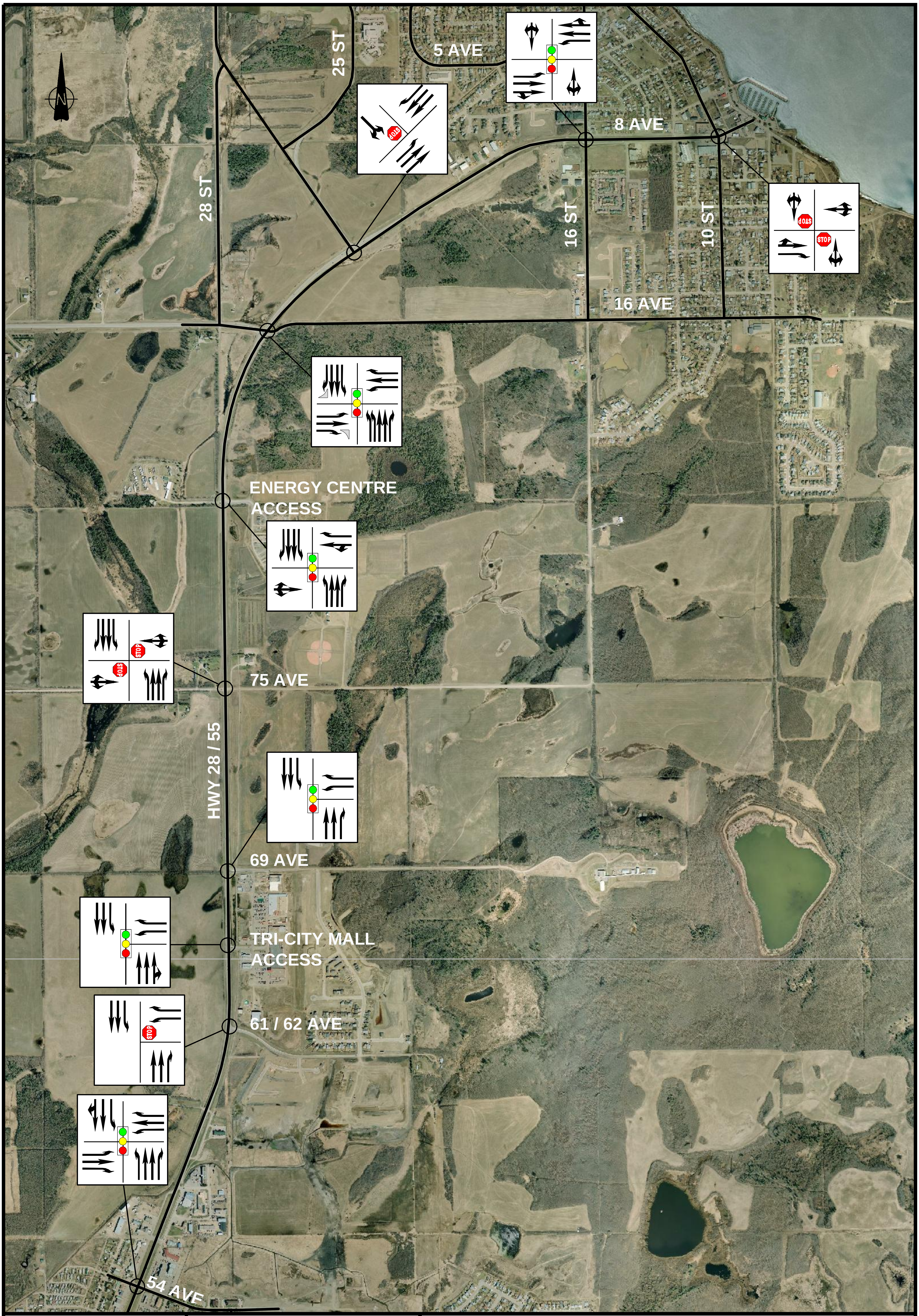
After the Highway 28 Twinning project, the intersection of Highway 28/55 with the Energy Centre Access, 69 Avenue, and the Tri-City Mall Access are expected to continue operating well, with overall intersection LOS B or higher and intersection delays of 14.9 seconds or less.

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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PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
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CITY OF COLD LAKE
TRANSPORTATION STUDY

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

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PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
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SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 4.2
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.

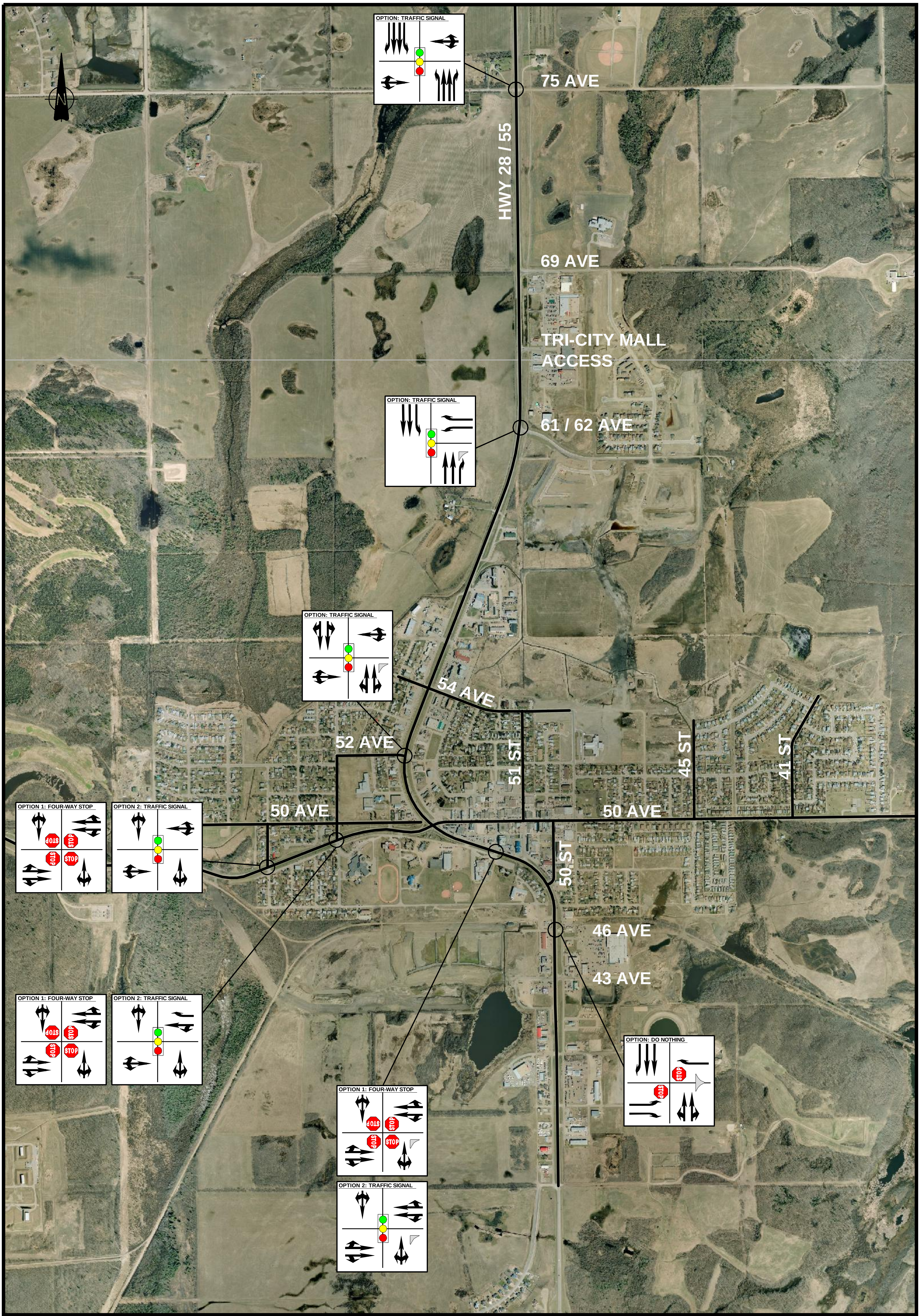
With the recommended Option 2, the intersection is expected to operate at LOS B, with a maximum v/c ratio of 0.66 and intersection delays of 11.8 seconds. All intersection approaches are expected to operate at LOS B or better.

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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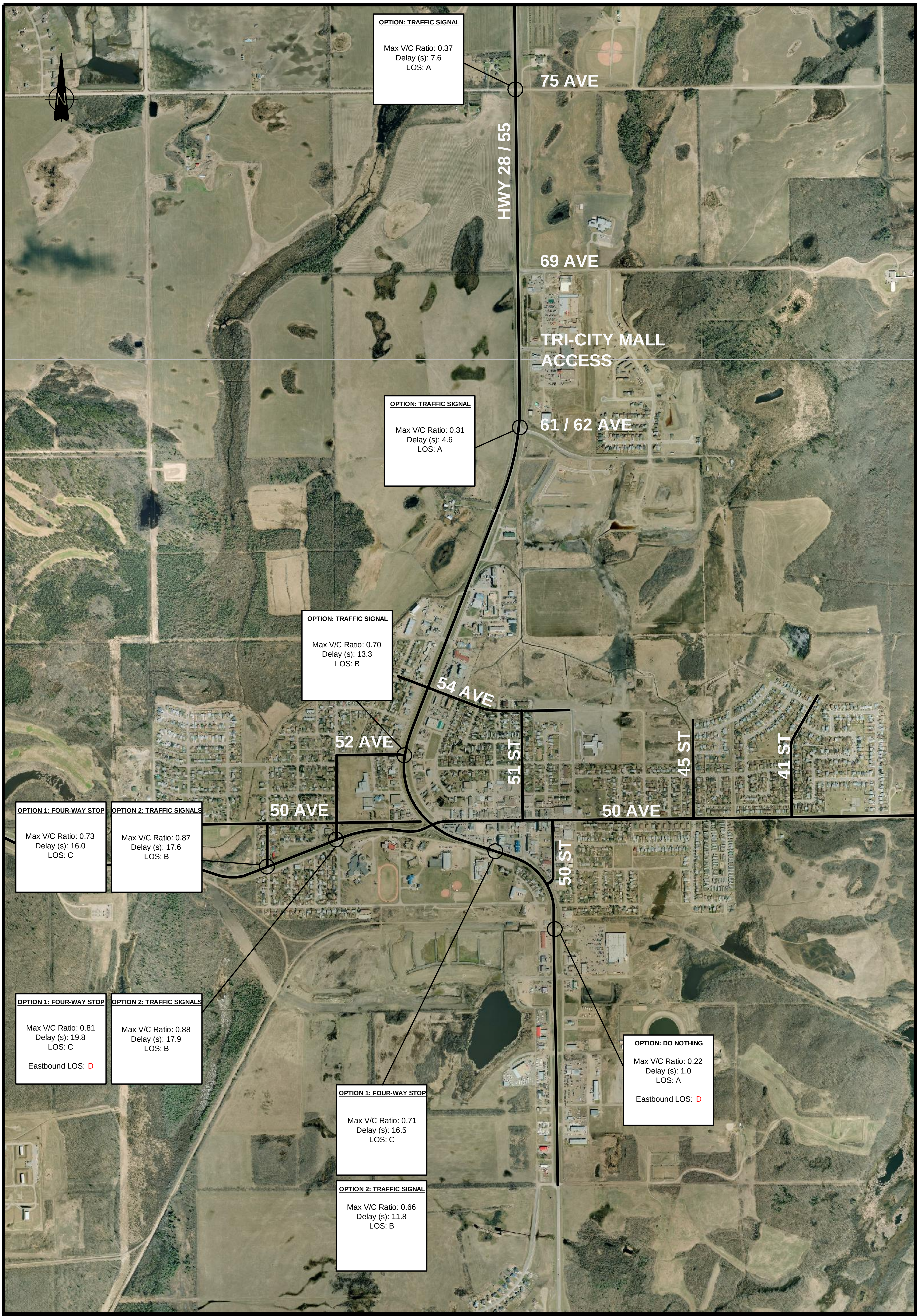
PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 5.1
REQUIRED LANE CONFIGURATION AND TRAFFIC CONTROL IMPROVEMENTS



Associated Engineering

PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

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.

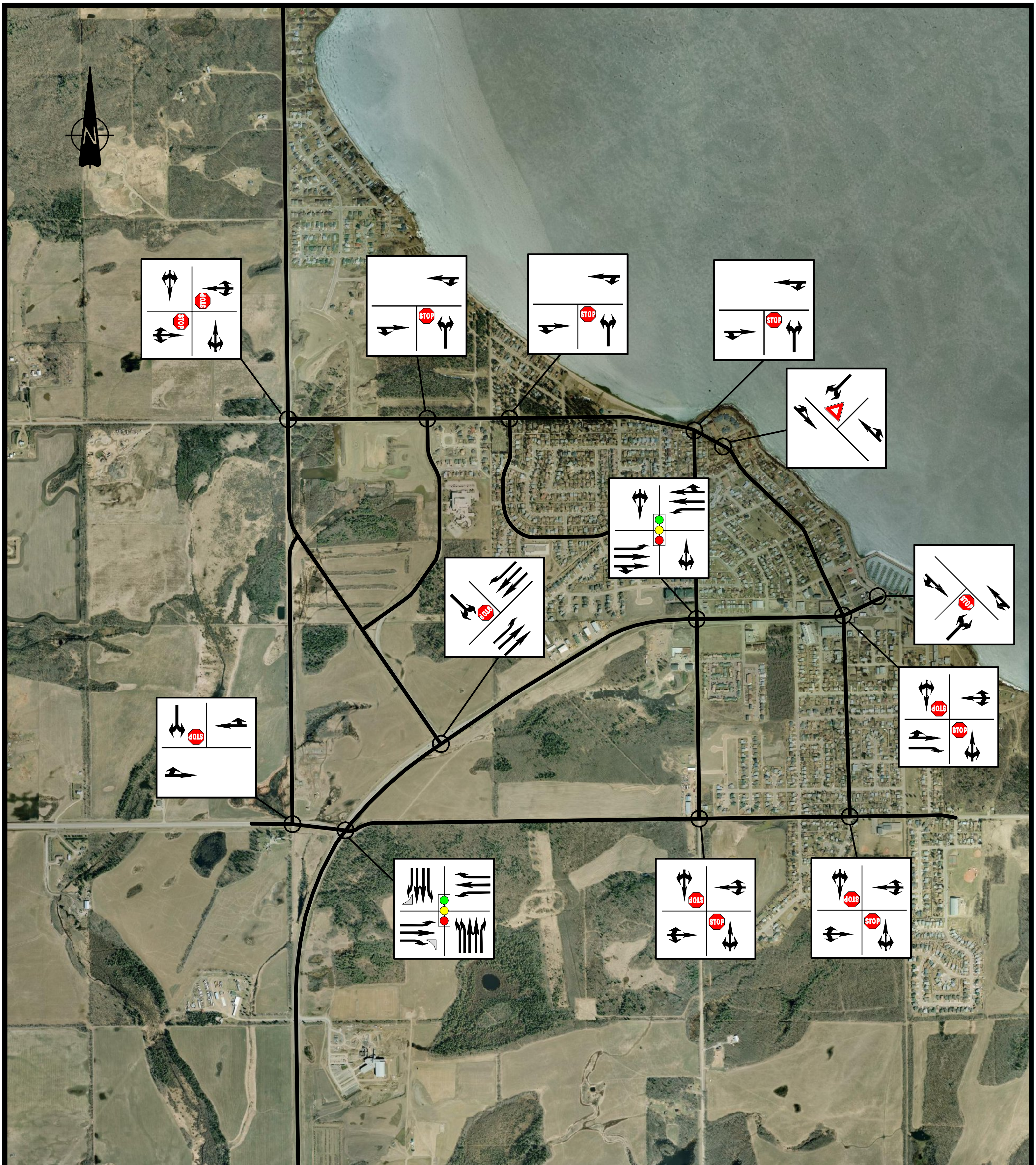
6.1 HIGHWAY 28/55 CORRIDOR

- 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.

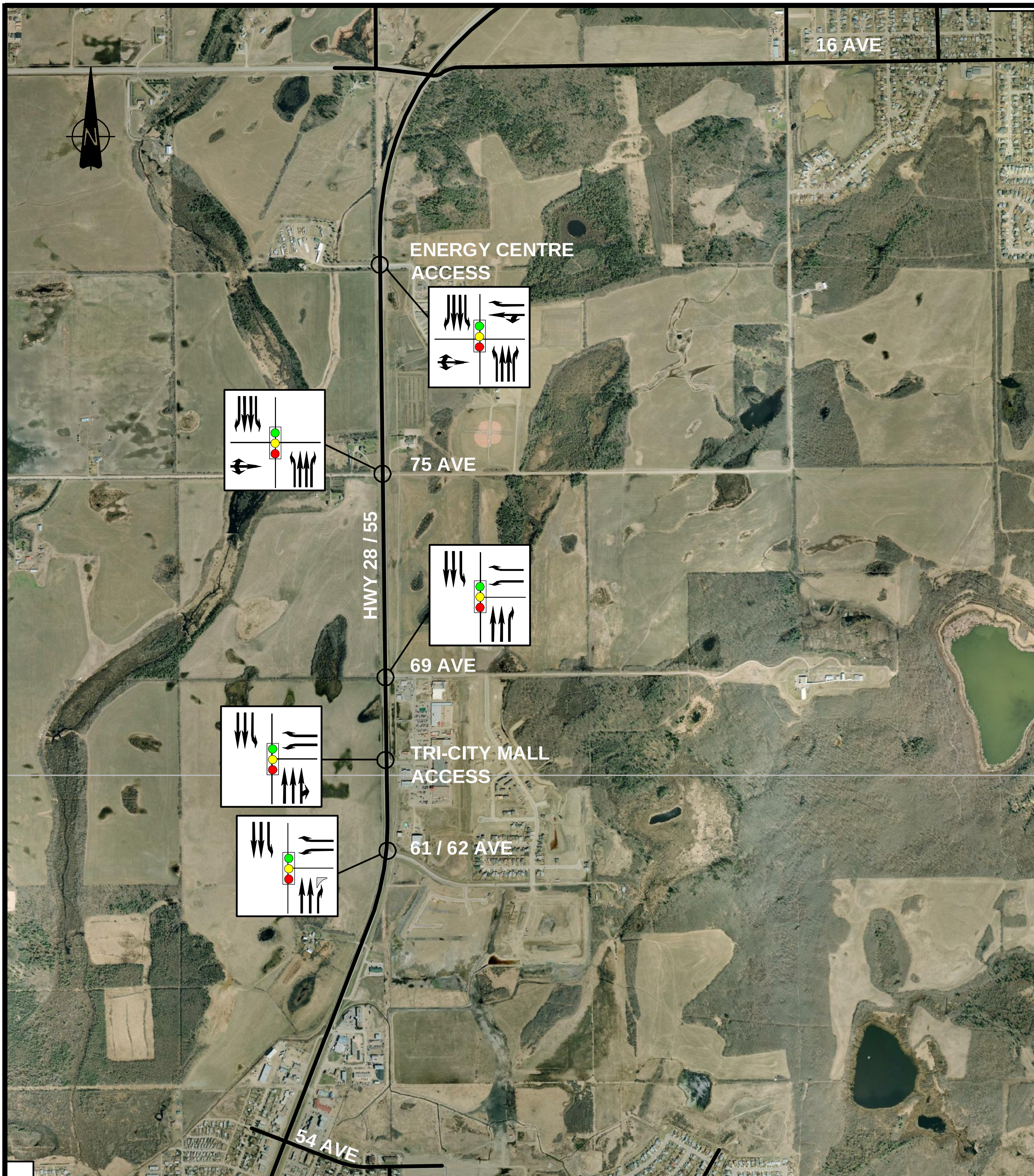
Figure 6.1 through Figure 6.4 presents the recommended lane configuration and traffic control for Cold Lake North, the Highway 28/55 Corridor, Cold Lake South and Medley, respectively.



PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.1 - COLD LAKE NORTH RECOMMENDED LANE CONFIGURATION AND TRAFFIC CONTROL

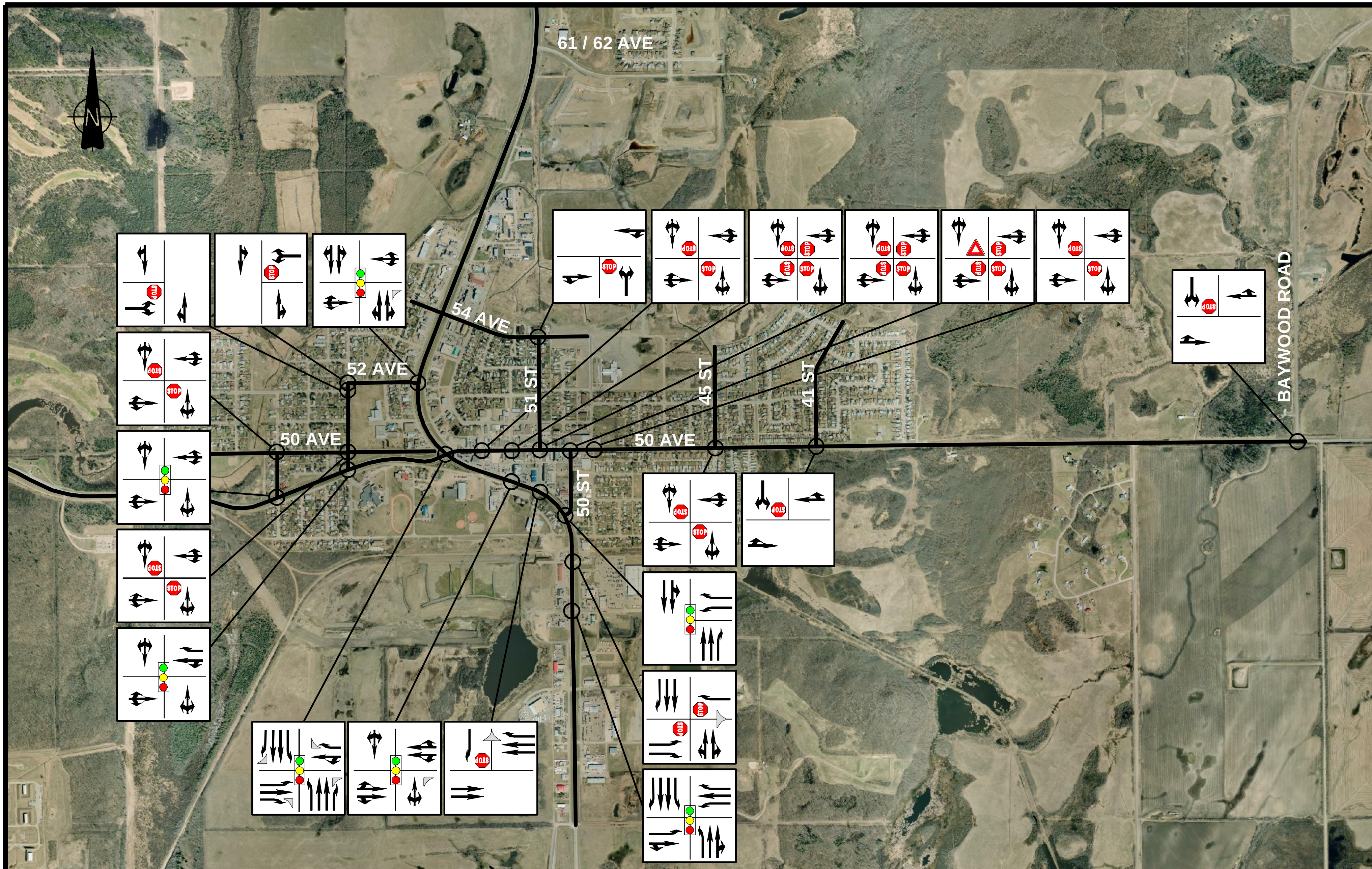


Associated Engineering

PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

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



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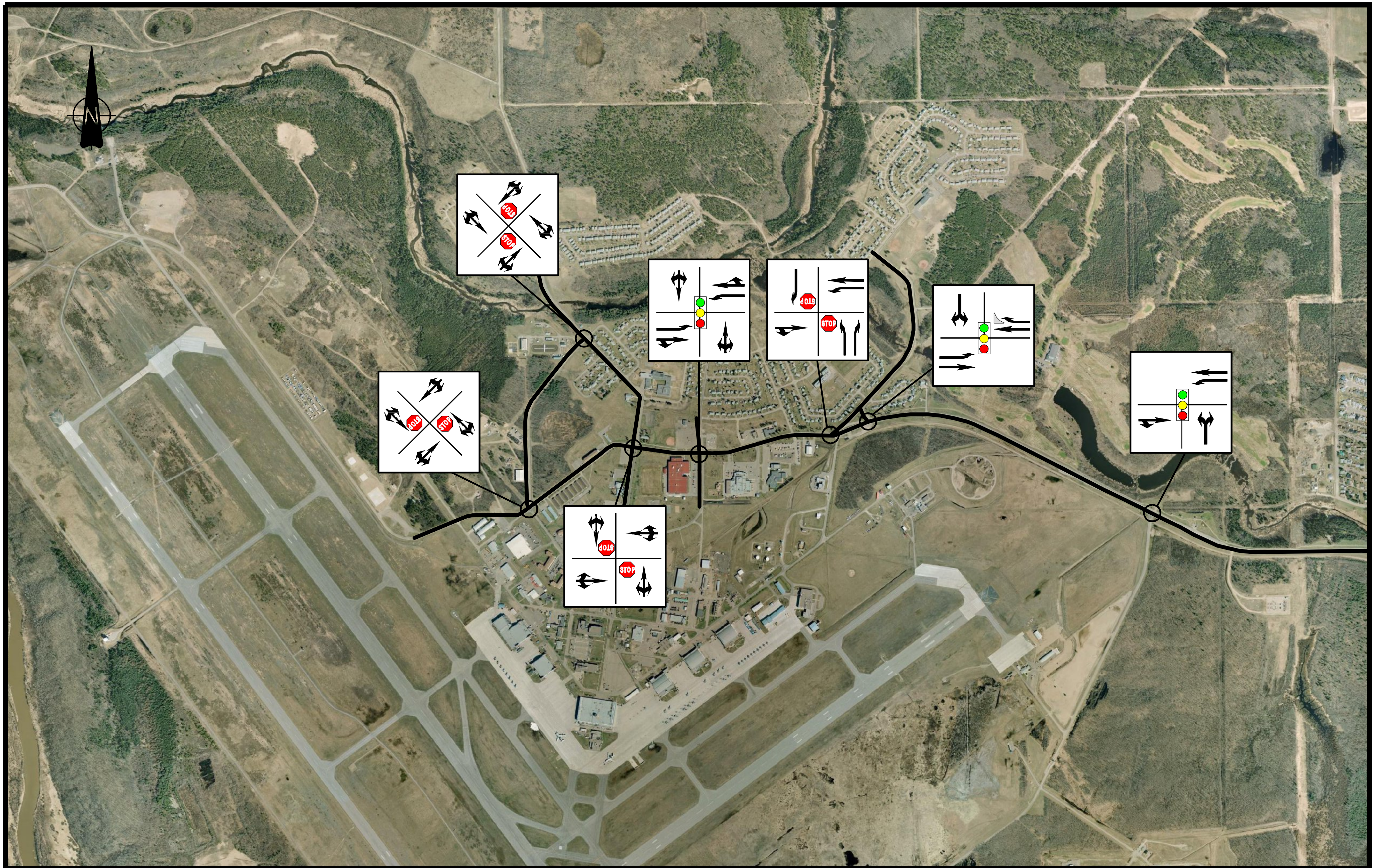
PROJECT NO: 2010-3050
DATE: SEPTEMBER 2010
APPROVED:
SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.3 - COLD LAKE SOUTH
RECOMMENDED LANE CONFIGURATION AND TRAFFIC CONTROL



PROJECT NO:	2010-3050
DATE:	SEPTEMBER 2010
APPROVED:	
SCALE:	NTS
DWG NO:	

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.4 - MEDLEY
RECOMMENDED LANE CONFIGURATION AND TRAFFIC CONTROL

7 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.

A 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
Highway 28 [1]	North of 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**
	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**
16th 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**

[1]counts completed using classifier counters
[2]counts completed using pneumatic counters

Source 2: Provided by City of Cold Lake, Cold Lake Halley Test 2009

MALE 10-YEAR SURVIVAL RATE BY AGE GROUP sM 10 x	FEMALE 5-YEAR SURVIVAL RATE BY AGE GROUP sF 5 x	MALE 5-YEAR SURVIVAL RATE BY AGE GROUP sM 5 x	EXACT AGE INTERVALS x to x+n	***	(Enter growth rate below in AJ13)
ages 0-4	ages 0-4			***	GROWTH RATE
1.0000	1.0000	1.0000	0-4	***	0.170000
1.0000	1.0000	1.0000	5-9	***	
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	***	
indeterminate	0.9982	0.8443	80-84	***	
indeterminate	indeterminate	indeterminate	85+	***	

2.0 HISTORIC AND PROJECTED POPULATION GROWTH

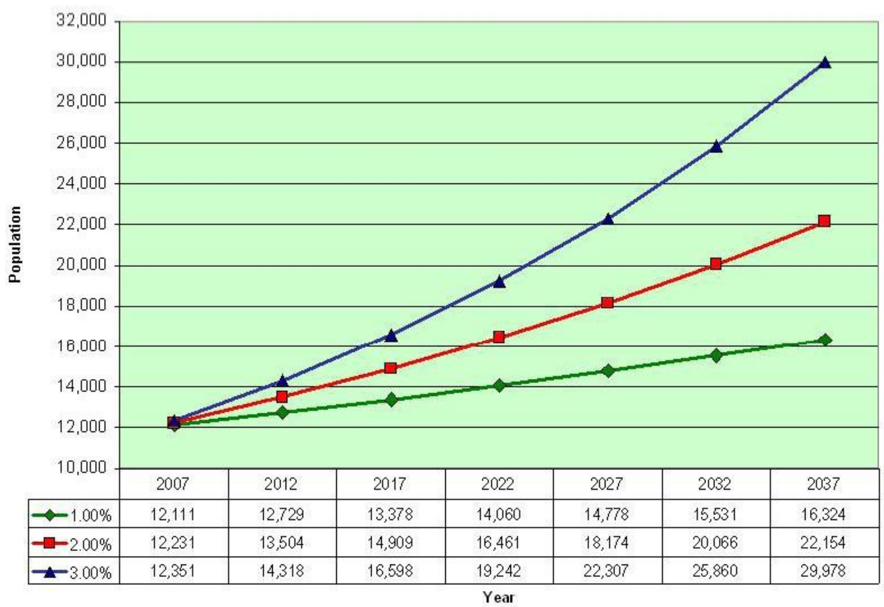
Overall, Cold Lake's population has experienced considerable growth in the past 15 years. This growth has been driven primarily by the 4 Wing Air Force Base, oil and gas exploration as well as tourism related to the lake. Between 1986 and 2001, the population of the three communities that now comprises 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.

Figure 1.0: City of Cold Lake Historic Population Growth

	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

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

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.

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:

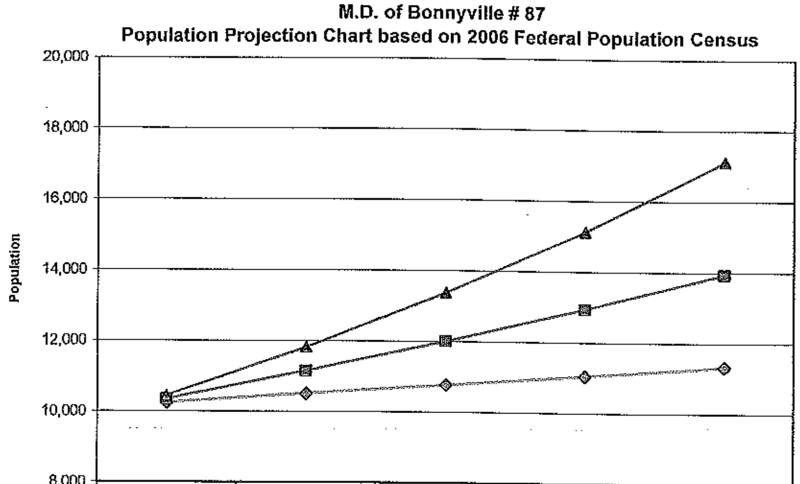
http://culture.alberta.ca/heritage/resourcemanagement/landuseplanning/default.aspx.

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.



	2007	2012	2017	2022	2027
0.50%	10,245	10,504	10,769	11,041	11,320
1.50%	10,347	11,147	12,008	12,936	13,936
2.50%	10,449	11,822	13,375	15,133	17,122

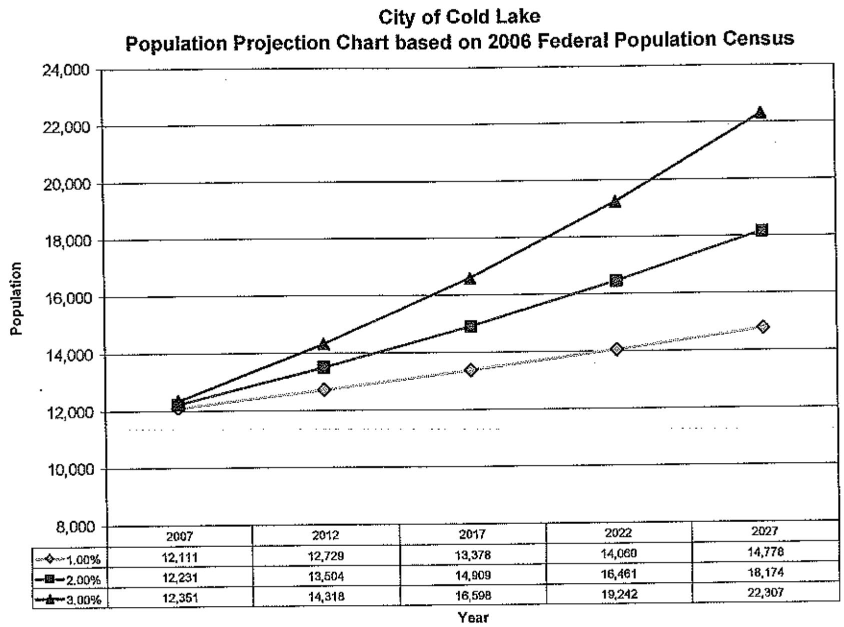
Figure 1 - M.D. of Bonnyville # 87 Population Projection Chart based on 2006 Federal Population Census

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.



	2007	2012	2017	2022	2027
1.00%	12,111	12,729	13,378	14,060	14,778
2.00%	12,231	13,504	14,909	16,461	18,174
3.00%	12,351	14,318	16,598	19,242	22,307

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.

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.

Table 1.1 Level of Service Definitions

Level of Service (LOS)	Overall Average Delay at Unsignalized Intersection	Overall Average Delay at Signalized Intersection
A	≤ 10 seconds	≤ 10 seconds
B	> 10 and ≤ 15 seconds	> 10 and ≤ 20 seconds
C	> 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

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 95^{th} 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.

Table 2.2 Traffic Analysis Assumptions for Synchro

Traffic Analysis Parameters					
Parameter	**RMWB***	**City of Calgary**	**City of Lethbridge**	**City of Medicine Hat**	**Recommended**
Link Speed	Existing posted speed limits				Existing posted speed limits
Lane Widths	3.7m				3.7m
Storage Length	Minimum 60m				Minimum 60m
Adjacent Parking Lanes	Apply data where 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

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	-	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.

C Appendix C - Synchro Results

Project: Cold Lake Transportation Study
Project No: 2010-3050
Date Revised: April 5, 2011

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
101	1 Avenue & 28 Street / English Bay Road	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.13	5.1	A	
			EB	Left		11	0.09	11.8	B	2.3
				Through	LTR	27	0.09	11.8	B	2.3
				Right		5	0.09	11.8	B	2.3
			WB	Left		11	0.13	10.5	B	3.7
				Through	LTR	21	0.13	10.5	B	3.7
				Right		55	0.13	10.5	B	3.7
			NB	Left		6	0.00	0.0	A	0.1
				Through	LTR	79	0.00	0.4	A	0.1
				Right		30	0.00	0.4	A	0.1
			SB	Left		42	0.03	0.3	A	0.8
				Through	LTR	62	0.03	3.1	A	0.8
				Right		5	0.03	3.1	A	0.8
102	1 Avenue & 25 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.10	4.1	A	
			EB	Left						
				Through	TR	81	0.06	0.0	A	0.0
				Right		11	0.06	0.0	A	0.0
			WB	Left		66	0.05	0.4	A	1.3
				Through	LT	81	0.05	3.6	A	1.3
				Right						
			NB	Left		1	0.10	9.3	A	2.8
				Through	LR					
				Right		83	0.10	9.3	A	2.8
			SB	Left						
				Through						
				Right						
103	1 Avenue & Nelson Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.11	1.3	A	
			EB	Left						
				Through	TR	116	0.11	0.0	A	0.0
				Right		48	0.11	0.0	A	0.0
			WB	Left		9	0.01	0.1	A	0.2
				Through	LT	127	0.01	0.6	A	0.2
				Right						
			NB	Left		20	0.05	10.3	B	1.4
				Through	LR					
				Right		13	0.05	10.3	B	1.4
			SB	Left						
				Through						
				Right						
104	1 Avenue & 16 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.09	1.9	A	
			EB	Left						
				Through	TR	91	0.09	0.0	A	0.0
				Right		38	0.09	0.0	A	0.0
			WB	Left		7	0.01	0.0	A	0.1
				Through	LT	100	0.01	0.5	A	0.1
				Right						
			NB	Left		36	0.07	10.2	B	1.9
				Through	LR					
				Right		12	0.07	10.2	B	1.9
			SB	Left						
				Through						
				Right						
105	1 Avenue / 2 Avenue & 10 Street	Unsignalized Yield Control - SB Approach	Overall Intersection				0.05	2.1	A	
			EB	Left		12	0.01	0.1	A	0.2
				Through	LT	95	0.01	0.9	A	0.2
				Right						
			WB	Left						
				Through						
				Right						
			NB	Left						
				Through	TR	75	0.05	0.0	A	0.0
				Right		4	0.05	0.0	A	0.0
			SB	Left		0	-	-	-	-
				Through	LR					
				Right		41	0.05	9.2	A	1.3

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
106	8 Avenue & Lakeshore Drive	Unsignalized Stop Control - EB Approach	Overall Intersection				0.07	4.3	A	
			EB	Left		14	0.07	9.1	A	1.7
				Through	LR					
				Right		40	0.07	9.1	A	1.7
			WB	Left						
				Through						
				Right						
			NB	Left		27	0.02	0.2	A	0.5
				Through	LT	39	0.02	3.1	A	0.5
				Right						
			SB	Left						
				Through	TR	25	0.03	0.0	A	0.0
				Right		17	0.03	0.0	A	0.0
107	8 Avenue & 10 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.21	6.6	A	
			EB	Left		7	0.01	0.0	A	0.1
				Through	LTR	61	0.01	0.6	A	0.1
				Right		29	0.01	0.6	A	0.1
			WB	Left		37	0.03	0.2	A	0.7
				Through	LTR	55	0.03	2.7	A	0.7
				Right		17	0.03	2.7	A	0.7
			NB	Left		17	0.21	11.4	B	6.3
				Through	LTR	52	0.21	11.4	B	6.3
				Right		60	0.21	11.4	B	6.3
			SB	Left		15	0.14	12.2	B	4.0
				Through	LTR	51	0.14	12.2	B	4.0
				Right		5	0.14	12.2	B	4.0
108	8 Avenue & 16 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.59	12.0	B	
			EB	Left		319	0.27	2.9	A	8.7
				Through	LTR	247	0.27	5.8	A	8.7
				Right		53	0.27	5.8	A	8.7
			WB	Left		4	0.00	0.0	A	0.1
				Through	LTR	110	0.00	0.3	A	0.1
				Right		28	0.00	0.3	A	0.1
			NB	Left		32	0.59	77.7	F	22.5
				Through	LTR	18	0.59	77.7	F	22.5
				Right		4	0.59	77.7	F	22.5
			SB	Left		27	0.47	30.1	D	19.1
				Through	LTR	8	0.47	30.1	D	19.1
				Right		74	0.47	30.1	D	19.1
109	Highway 28 & 25 Street	Unsignalized Stop Control - SB Approach	Overall Intersection				0.31	3.8	A	
			EB	Left		119	0.12	1.4	A	3.2
				Through	LT	422	0.12	2.9	A	3.2
				Right						
			WB	Left						
				Through	TR	273	0.21	0.0	A	0.0
				Right		30	0.21	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		10	0.31	13.7	B	10.6
				Through	LR					
				Right		151	0.31	13.7	B	10.6
110	Highway 55 & 28 Street/ English Bay Road	Unsignalized Stop Control - SB Approach	Overall Intersection				0.12	1.8	A	
			EB	Left		43	0.04	0.4	A	0.9
				Through	LT	293	0.04	1.3	A	0.9
				Right						
			WB	Left						
				Through	TR	150	0.12	0.0	A	0.0
				Right		23	0.12	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		32	0.10	13.6	B	2.6
				Through	LR					
				Right		7	0.10	13.6	B	2.6

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
111	Highway 28 & Highway 55 / 16 Avenue	Signalized [1]	Overall Intersection				0.56	12.0	B	
			EB	Left		145	-	-	-	-
				Through	LT	31	0.43	15.0	B	29.8
				Right	R	149	0.24	3.3	A	8.5
			WB	Left		133	-	-	-	-
				Through	LTR	10	0.47	14.2	B	30.6
				Right		51	-	-	-	-
			NB	Left	L	88	0.29	13.3	B	15.7
				Through	T	345	0.56	15.4	B	50.0
				Right	R	118	0.20	3.2	A	7.3
			SB	Left	L	45	0.17	11.6	B	9.0
				Through	T	304	0.49	14.3	B	43.2
				Right	R	75	0.13	3.5	A	6.0
112	16 Avenue & 16 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.04	2.0	A	
			EB	Left		17	0.01	0.1	A	0.3
				Through	LTR	137	0.01	0.8	A	0.3
				Right		15	0.01	0.8	A	0.3
			WB	Left		0	-	-	-	-
				Through	LTR	63	0.00	0.0	A	0.0
				Right		7	0.00	0.0	A	0.0
			NB	Left		9	0.03	11.1	B	0.7
				Through	LTR	5	0.03	11.1	B	0.7
				Right		0	-	-	-	-
			SB	Left		12	0.04	10.1	B	1.0
				Through	LTR	2	0.04	10.1	B	1.0
				Right		11	0.04	10.1	B	1.0
113	16 Avenue & 10 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.11	3.7	A	
			EB	Left		8	0.01	0.1	A	0.2
				Through	LTR	86	0.01	0.6	A	0.2
				Right		10	0.01	0.6	A	0.2
			WB	Left		13	0.01	0.1	A	0.2
				Through	LTR	64	0.01	0.9	A	0.2
				Right		34	0.01	0.9	A	0.2
			NB	Left		6	0.04	10.3	B	0.9
				Through	LTR	9	0.04	10.3	B	0.9
				Right		8	0.04	10.3	B	0.9
			SB	Left		38	0.11	10.8	B	2.9
				Through	LTR	11	0.11	10.8	B	2.9
				Right		16	0.11	10.8	B	2.9
201	Highway 28 / 55 & Energy Centre Access	Signalized [2]	Overall Intersection				0.70	12.6	B	
			EB	Left		10	-	-	-	-
				Through	LTR	10	0.09	12.5	B	7.1
				Right		10	-	-	-	-
			WB	Left	L	131	0.46	22.3	C	26.6
				Through	TR	10	0.30	6.9	A	11.5
				Right		111	-	-	-	-
			NB	Left		10	-	-	-	-
				Through	LT	645	0.70	14.5	B	#132.6
				Right	R	72	0.09	2.7	A	5.8
			SB	Left		61	0.26	10.7	B	13.7
				Through	L	526	0.57	10.8	B	88.4
				Right	TR	10	-	-	-	-
202	Highway 28 / 55 & 75 Avenue	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				1.61	26.8	D	
			EB	Left		0	-	-	-	-
				Through	LTR	10	0.24	24.6	C	7.3
				Right		40	0.24	24.6	C	7.3
			WB	Left		71	1.61	440.6	F	74.4
				Through	LTR	10	1.61	440.6	F	74.4
				Right		10	1.61	440.6	F	74.4
			NB	Left		10	0.01	0.3	A	0.3
				Through	LTR	717	0.01	0.4	A	0.3
				Right		20	0.01	0.4	A	0.3
			SB	Left		0	-	-	-	-
				Through	LTR	657	0.00	0.0	A	0.0
				Right		10	0.00	0.0	A	0.0

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
203	Highway 28 / 55 & 69 Avenue	Signalized [1]	Overall Intersection				0.69	14.3	B	
			EB	Left						
				Through						
				Right						
			WB	Left	L	7	0.02	18.1	B	3.5
				Through						
				Right	R	104	0.25	6.2	A	10.7
			NB	Left						
				Through	T	644	0.69	14.8	B	102.4
				Right	R	26	0.03	3.4	A	3.2
			SB	Left	L	118	0.50	17.3	B	27.1
				Through	T	650	0.69	15.0	B	103.8
				Right						
204	Highway 28 / 55 & Tri-City Mall Access	Signalized [2]	Overall Intersection				0.58	9.7	B	
			EB	Left						
				Through						
				Right						
			WB	Left	L	83	0.30	18.9	B	17.6
				Through						
				Right	R	10	0.04	8.8	A	3.0
			NB	Left						
				Through	TR	659	0.58	10.3	B	#126.2
				Right		72	0.08	2.3	A	5.8
			SB	Left		55	0.16	7.2	A	11.4
				Through	LT	602	0.53	9.0	A	105.7
				Right						
205	Highway 28 / 55 & 62 Avenue / 61 Avenue	Unsignalized Stop Control - WB Approach	Overall Intersection				0.58	2.9	A	
			EB	Left						
				Through						
				Right						
			WB	Left	L	37	0.58	106.5	F	20.2
				Through						
				Right	R	8	0.03	15.9	C	0.7
			NB	Left						
				Through	TR	723	0.54	0.0	A	0.0
				Right		70	0.54	0.0	A	0.0
			SB	Left		9	0.01	0.3	A	0.4
				Through	LT	676	0.01	0.4	A	0.4
				Right						
301	Highway 28 / 55 & 54 Avenue	Signalized [1]	Overall Intersection				0.86	19.5	B	
			EB	Left	L	51	0.16	20.2	C	14.0
				Through	T	51	0.11	19.3	B	13.6
				Right	R	31	0.08	7.5	A	5.7
			WB	Left	L	71	0.22	21.1	C	18.2
				Through	T	61	0.14	19.5	B	15.5
				Right	R	153	0.34	8.5	A	16.9
			NB	Left	L	31	0.15	9.1	A	6.3
				Through	TR	602	0.76	17.6	B	108.4
				Right		61	-	-	-	-
			SB	Left	L	163	0.86	52.5	D	#57.3
				Through	TR	581	0.74	16.5	B	102.3
				Right		61	-	-	-	-
302	Highway 28 / 55 & 52 Avenue	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				3.35	849.3	F	
			EB	Left		30	2.25	812.5	F	72.3
				Through	LTR	30	2.25	812.5	F	72.3
				Right		10	2.25	812.5	F	72.3
			WB	Left		50	3.35	Error	F	Error
				Through	LTR	30	3.35	Error	F	Error
				Right		55	3.35	Error	F	Error
			NB	Left		70	0.09	1.1	A	2.3
				Through	LTTR	615	0.27	1.3	A	2.3
				Right		80	0.27	0.0	A	0.0
			SB	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

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
303	Highway 28 / 55 & 50 Avenue	Signalized [2]	Overall Intersection				0.76	14.3	B	
			EB	Left	L	375	0.76	22.5	C	76.5
				Through	T	329	0.42	11.4	B	48.0
				Right	R [C]	135	0.19	2.3	A	7.1
			WB	Left		9	-	-	-	-
				Through	LT	161	0.22	9.3	A	24.4
				Right	R [C]	155	0.21	2.2	A	7.5
			NB	Left	L	133	0.40	22.9	C	29.3
				Through	2T	275	0.23	17.3	B	22.8
				Right	R [C]	162	0.01	10.8	B	2.3
			SB	Left	L	116	0.44	23.5	C	33.1
				Through	2T	232	0.28	17.6	B	26.7
				Right	R [C]	5	0.30	4.7	A	11.4
304	Highway 28 / 55 & 52 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.47	5.1	A	
			EB	Left		16	0.02	0.2	A	0.5
				Through	LTTR	486	0.20	0.4	A	0.5
				Right		50	0.20	0.0	A	0.0
			WB	Left		98	0.12	1.4	A	3.2
				Through	LTTR	523	0.21	1.8	A	3.2
				Right		42	0.21	0.0	A	0.0
			NB	Left		23	0.47	32.2	D	18.7
				Through	LTR	10	0.47	32.2	D	18.7
				Right		66	0.47	32.2	D	18.7
			SB	Left		21	0.41	42.6	E	14.5
				Through	LTR	8	0.41	42.6	E	14.5
				Right		27	0.41	42.6	E	14.5
305	Highway 28 / 55 & 51 Street	Unsignalized Stop Control - SB Approach	Overall Intersection				0.22	0.2	A	
			EB	Left						
				Through	2T	634	0.22	0.0	A	0.0
				Right						
			WB	Left						
				Through	2T	504	0.17	0.0	A	0.0
				Right	R [C]	23	0.02	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left						
				Through						
				Right	R [C]	19	0.03	10.3	B	0.8
306	Highway 28 / 55 & 50 Street	Signalized [1]	Overall Intersection				0.70	12.3	B	
			EB	Left						
				Through						
				Right						
			WB	Left	L	239	0.43	16.3	B	44.6
				Through						
				Right	R	144	0.25	4.0	A	9.9
			NB	Left						
				Through	2T	383	0.29	10.4	B	23.3
				Right	R	188	0.28	2.6	A	8.2
			SB	Left		215	-	-	-	-
				Through	LTT	419	0.70	16.7	B	47.5
				Right						
307	Highway 28 / 55 & 46 Avenue	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.22	1.0	A	
			EB	Left	L	11	0.09	33.2	D	2.4
				Through						
				Right	R	34	0.07	11.4	B	1.7
			WB	Left						
				Through						
				Right	R [C]	10	0.02	10.7	B	0.4
			NB	Left		33	0.05	0.6	A	1.2
				Through	LTTR [C]	550	0.21	0.8	A	1.2
				Right		32	0.21	0.0	A	0.0
			SB	Left						
				Through	2T	649	0.22	0.0	A	0.0
				Right	R	10	0.01	0.0	A	0.0

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
308	Highway 28 / 55 & 43 Avenue	Signalized [1]	Overall Intersection				0.38	9.9	A	
			EB	Left	L	78	0.19	13.1	B	15.8
				Through	TR	29	0.12	7.5	A	9.5
				Right		35	-	-	-	-
			WB	Left	L	114	0.28	14.0	B	2.2
				Through	T	49	0.08	11.9	B	10.6
				Right	R	73	0.14	4.4	A	7.1
			NB	Left	L	19	0.05	8.9	A	4.2
				Through	TTR	464	0.33	9.6	A	28.4
				Right		67	-	-	-	-
			SB	Left	L	137	0.38	14.2	B	23.0
				Through	2T	474	0.29	9.7	A	26.0
				Right	R	72	0.10	2.8	A	5.0
309	52 Avenue & 57 Street (North)	Unsignalized Stop Control - WB Approach	Overall Intersection				0.13	4.2	A	
			EB	Left						
				Through						
				Right						
			WB	Left		82	0.13	9.8	A	3.5
				Through	LR					
				Right		13	0.13	9.8	A	3.5
			NB	Left						
				Through	TR	31	0.08	0.0	A	0.0
				Right		82	0.08	0.0	A	0.0
			SB	Left		9	0.01	0.1	A	0.2
				Through	LT	20	0.01	2.4	A	0.2
				Right						
310	52 Avenue & 57 Street (South)	Unsignalized Stop Control - EB Approach	Overall Intersection				0.07	2.5	A	
			EB	Left		46	0.07	10.0	A	1.8
				Through	LR					
				Right		1	0.07	10.0	A	1.8
			WB	Left						
				Through						
				Right						
			NB	Left		11	0.01	0.1	A	0.2
				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
311	50 Avenue & 59 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.08	6.0	A	
			EB	Left		2	0.00	0.0	A	0.0
				Through	LTR	10	0.00	0.7	A	0.0
				Right		10	0.00	0.7	A	0.0
			WB	Left		12	0.01	0.1	A	0.2
				Through	LTR	14	0.01	2.2	A	0.2
				Right		14	0.01	2.2	A	0.2
			NB	Left		22	0.08	9.5	A	2.2
				Through	LTR	22	0.08	9.5	A	2.2
				Right		19	0.08	9.5	A	2.2
			SB	Left		6	0.02	9.6	A	0.5
				Through	LTR	6	0.02	9.6	A	0.5
				Right		1	0.02	9.6	A	0.5
312	50 Avenue & 57 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.12	7.2	A	
			EB	Left		22	0.02	0.1	A	0.4
				Through	LTR	5	0.02	3.4	A	0.4
				Right		22	0.02	3.4	A	0.4
			WB	Left		8	0.01	0.0	A	0.1
				Through	LTR	8	0.01	1.8	A	0.1
				Right		18	0.01	1.8	A	0.1
			NB	Left		37	0.12	10.4	B	3.4
				Through	LTR	37	0.12	10.4	B	3.4
				Right		8	0.12	10.4	B	3.4
			SB	Left		5	0.06	9.5	A	1.7
				Through	LTR	21	0.06	9.5	A	1.7
				Right		21	0.06	9.5	A	1.7

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
313	Centre Avenue & 59 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.26	2.3	A	
			EB	Left		45	0.05	0.9	A	1.2
				Through	LTR	775	0.05	1.3	A	1.2
				Right		17	0.05	1.3	A	1.2
			WB	Left		1	0.00	0.0	A	0.0
				Through	LTR	353	0.00	0.0	A	0.0
				Right		13	0.00	0.0	A	0.0
			NB	Left		5	0.13	32.7	D	3.6
				Through	LTR	5	0.13	32.7	D	3.6
				Right		7	0.13	32.7	D	3.6
			SB	Left		17	0.26	44.5	E	7.9
				Through	LTR	5	0.26	44.5	E	7.9
				Right		6	0.26	44.5	E	7.9
314	Centre Avenue & 57 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.59	5.3	A	
			EB	Left		44	0.05	0.9	A	1.2
				Through	LTR	808	0.05	1.3	A	1.2
				Right		17	0.05	1.3	A	1.2
			WB	Left		37	0.06	0.8	A	1.6
				Through	LT	351	0.06	1.8	A	1.6
				Right	R	32	0.02	0.0	A	0.0
			NB	Left		5	0.26	33.0	D	7.8
				Through	LTR	6	0.26	33.0	D	7.8
				Right		27	0.26	33.0	D	7.8
			SB	Left		26	0.59	81.7	F	22.5
				Through	LTR	9	0.59	81.7	F	22.5
				Right		17	0.59	81.7	F	22.5
315	54 Avenue & 51 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.13	1.8	A	
			EB	Left						
				Through	TR	143	0.13	0.0	A	0.0
				Right		46	0.13	0.0	A	0.0
			WB	Left		3	0.00	0.0	A	0.1
				Through	LT	114	0.00	0.2	A	0.1
				Right						
			NB	Left		56	0.10	11.1	B	2.7
				Through	LR					
				Right		1	0.10	11.1	B	2.7
			SB	Left						
				Through						
				Right						
316	50 Avenue & 53 Street	Unsignalized Stop Control - NB/SB Approach	Overall Intersection				0.16	3.1	A	
			EB	Left		71	0.07	0.7	A	1.8
				Through	LTR	270	0.07	2.2	A	1.8
				Right		15	0.07	2.2	A	1.8
			WB	Left		2	0.00	0.0	A	0.0
				Through	LTR	231	0.00	0.1	A	0.0
				Right		19	0.00	0.1	A	0.0
			NB	Left		14	0.09	18.2	C	2.3
				Through	LTR	3	0.09	18.2	C	2.3
				Right		6	0.09	18.2	C	2.3
			SB	Left		21	0.16	15.9	C	4.7
				Through	LTR	3	0.16	15.9	C	4.7
				Right		32	0.16	15.9	C	4.7
317	50 Avenue & 52 Street	Unsignalized Stop Control - All Approaches	Overall Intersection				0.45	11.1	B	
			EB	Left		48	0.45	12.0	B	-
				Through	LTR	208	0.45	12.0	B	-
				Right		18	0.45	12.0	B	-
			WB	Left		20	0.38	11.1	B	-
				Through	LTR	178	0.38	11.1	B	-
				Right		39	0.38	11.1	B	-
			NB	Left		26	0.15	9.6	A	-
				Through	LTR	31	0.15	9.6	A	-
				Right		24	0.15	9.6	A	-
			SB	Left		47	0.23	10.1	B	-
				Through	LTR	35	0.23	10.1	B	-
				Right		48	0.23	10.1	B	-

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
318	50 Avenue & 51 Street	Unsignalized Stop Control - All Approaches	Overall Intersection				0.47	11.2	B	
			EB	Left		62	0.47	12.5	B	-
				Through	LTR	211	0.47	12.5	B	-
				Right		19	0.47	12.5	B	-
			WB	Left		8	0.33	10.6	B	-
				Through	LTR	164	0.33	10.6	B	-
				Right		26	0.33	10.6	B	-
			NB	Left		28	0.14	9.5	A	-
				Through	LTR	28	0.14	9.5	A	-
				Right		23	0.14	9.5	A	-
			SB	Left		74	0.23	10.3	B	-
				Through	LTR	32	0.23	10.3	B	-
				Right		24	0.23	10.3	B	-
319	50 Avenue & 50 Street	Unsignalized Stop Control - EB/WB/NB Approaches Assumed Yield Control - SB Approach	Overall Intersection				0.46	10.9	B	
			EB	Left		0	-	-	-	-
				Through	LTR	193	0.46	11.4	B	-
				Right		114	0.46	11.4	B	-
			WB	Left		83	0.32	10.4	B	-
				Through	LTR	112	0.32	10.4	B	-
				Right		0	-	-	-	-
			NB	Left		83	0.31	10.4	B	-
				Through	LTR	0	-	-	-	-
				Right		109	0.31	10.4	B	-
			SB	Left		0	-	-	-	-
				Through	LTR	0	-	-	-	-
				Right		0	-	-	-	-
320	50 Avenue & 49 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.32	5.5	A	
			EB	Left		50	0.04	0.4	A	1.1
				Through	LTR	253	0.04	1.5	A	1.1
				Right		25	0.04	1.5	A	1.1
			WB	Left		23	0.02	0.2	A	0.5
				Through	LTR	135	0.02	1.2	A	0.5
				Right		29	0.02	1.2	A	0.5
			NB	Left		10	0.19	15.5	C	5.5
				Through	LTR	28	0.19	15.5	C	5.5
				Right		31	0.19	15.5	C	5.5
			SB	Left		40	0.32	17.6	C	10.9
				Through	LTR	23	0.32	17.6	C	10.9
				Right		53	0.32	17.6	C	10.9
321	50 Avenue & 45 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.08	2.1	A	
			EB	Left		34	0.03	0.3	A	0.7
				Through	LTR	261	0.03	1.0	A	0.7
				Right		35	0.03	1.0	A	0.7
			WB	Left		7	0.01	0.1	A	0.2
				Through	LTR	146	0.01	0.4	A	0.2
				Right		4	0.01	0.4	A	0.2
			NB	Left		14	0.08	13.6	B	2.1
				Through	LTR	3	0.08	13.6	B	2.1
				Right		14	0.08	13.6	B	2.1
			SB	Left		9	0.06	12.3	B	1.6
				Through	LTR	4	0.06	12.3	B	1.6
				Right		15	0.06	12.3	B	1.6
322	50 Avenue & 41 Street	Unsignalized Stop Control - SB Approaches	Overall Intersection				0.08	2.9	A	
			EB	Left		72	0.06	0.5	A	1.5
				Through	LT	168	0.06	2.7	A	1.5
				Right						
			WB	Left						
				Through	TR	106	0.08	0.0	A	0.0
				Right		8	0.08	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		14	0.08	10.4	B	2.2
				Through	LR					
				Right		38	0.08	10.4	B	2.2

Synchro Results - Existing 2010 Horizon
PHF = 0.86

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
323	50 Avenue / Twp Rd 630 & "Baywood Road" / RR 20	Unsignalized Stop Control - SB Approaches	Overall Intersection				0.11	5.3	A	
			EB	Left		82	0.06	0.5	A	1.5
				Through	LT	69	0.06	4.3	A	1.5
				Right						
			WB	Left						
				Through	TR	26	0.03	0.0	A	0.0
				Right		11	0.03	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		18	0.11	9.4	A	3.0
				Through	LR					
				Right		70	0.11	9.4	A	3.0
401	Kingsway & Medley Road	Signalized [1]	Overall Intersection				0.54	8.4	A	
			EB	Left						
				Through	TR	657	0.54	9.4	A	102.9
				Right		6	-	-	-	-
			WB	Left	L	5	0.01	6.4	A	1.7
				Through	T	268	0.22	5.8	A	31.5
				Right						
			NB	Left		16	0.11	10.9	B	8.0
				Through	LR					
				Right		20	-	-	-	-
			SB	Left						
				Through						
				Right						
402	Kingsway & Glenwood Drive (East)	Signalized [1]	Overall Intersection				0.74	13.6	B	
			EB	Left	L	153	0.33	10.5	B	21.7
				Through	T	608	0.74	17.1	B	92.6
				Right						
			WB	Left						
				Through	T	261	0.32	9.4	A	30.9
				Right	R [C]	107	0.15	2.0	A	5.4
			NB	Left						
				Through						
				Right						
			SB	Left		131	0.29	18.9	B	29.5
				Through	LR					
				Right		1	-	-	-	-
403	Kingsway & Glenwood Drive (West)	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.51	0.4	A	
			EB	Left						
				Through	TR	749	0.51	0.0	A	0.0
				Right		1	0.51	0.0	A	0.0
			WB	Left	L	5	0.01	9.8	A	0.2
				Through	T	257	0.18	0.0	A	0.0
				Right						
			NB	Left	L	6	0.04	20.6	C	1.1
				Through						
				Right	R	11	0.04	20.6	C	1.1
			SB	Left						
				Through						
				Right	R	0	-	-	-	-
404	Kingsway & Timberline Drive	Signalized [1]	Overall Intersection				0.45	10.2	B	
			EB	Left	L	20	0.05	9.7	A	4.4
				Through	TR	277	0.45	13.4	B	37.6
				Right		10	-	-	-	-
			WB	Left	L	66	0.21	11.7	B	11.2
				Through	TR	161	0.34	11.1	B	25.7
				Right		49	-	-	-	-
			NB	Left		6	-	-	-	-
				Through	LT	5	0.02	9.3	A	3.0
				Right	R	161	0.27	3.1	A	8.1
			SB	Left		51	-	-	-	-
				Through	LTR	4	0.12	9.6	A	9.3
				Right		5	-	-	-	-

Synchro Results - Existing 2010 Horizon
PHF = 0.86

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

Project: Cold Lake Transportation Study
Project No: 2010-3050
Date Revised: April 5, 2011

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)
101	1 Avenue & 28 Street / English Bay Road	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.13	5.1	A	
			EB	Left		11	0.09	11.8	B	2.3
				Through	LTR	27	0.09	11.8	B	2.3
				Right		5	0.09	11.8	B	2.3
			WB	Left		11	0.13	10.5	B	3.7
				Through	LTR	21	0.13	10.5	B	3.7
				Right		55	0.13	10.5	B	3.7
			NB	Left		6	0.00	0.0	A	0.1
				Through	LTR	79	0.00	0.4	A	0.1
				Right		30	0.00	0.4	A	0.1
			SB	Left		42	0.03	0.3	A	0.8
				Through	LTR	62	0.03	3.1	A	0.8
				Right		5	0.03	3.1	A	0.8
102	1 Avenue & 25 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.10	4.1	A	
			EB	Left						
				Through	TR	81	0.06	0.0	A	0.0
				Right		11	0.06	0.0	A	0.0
			WB	Left		66	0.05	0.4	A	1.3
				Through	LT	81	0.05	3.6	A	1.3
				Right						
			NB	Left		1	0.10	9.3	A	2.8
				Through	LR					
				Right		83	0.10	9.3	A	2.8
			SB	Left						
				Through						
				Right						
103	1 Avenue & Nelson Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.11	1.3	A	
			EB	Left						
				Through	TR	116	0.11	0.0	A	0.0
				Right		48	0.11	0.0	A	0.0
			WB	Left		9	0.01	0.1	A	0.2
				Through	LT	127	0.01	0.6	A	0.2
				Right						
			NB	Left		20	0.05	10.3	B	1.4
				Through	LR					
				Right		13	0.05	10.3	B	1.4
			SB	Left						
				Through						
				Right						
104	1 Avenue & 16 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.09	1.9	A	
			EB	Left						
				Through	TR	91	0.09	0.0	A	0.0
				Right		38	0.09	0.0	A	0.0
			WB	Left		7	0.01	0.0	A	0.1
				Through	LT	100	0.01	0.5	A	0.1
				Right						
			NB	Left		36	0.07	10.2	B	1.9
				Through	LR					
				Right		12	0.07	10.2	B	1.9
			SB	Left						
				Through						
				Right						
105	1 Avenue / 2 Avenue & 10 Street	Unsignalized Yield Control - SB Approach	Overall Intersection				0.05	2.1	A	
			EB	Left		12	0.01	0.1	A	0.2
				Through	LT	95	0.01	0.9	A	0.2
				Right						
			WB	Left						
				Through						
				Right						
			NB	Left						
				Through	TR	75	0.05	0.0	A	0.0
				Right		4	0.05	0.0	A	0.0
			SB	Left		0	-	-	-	-
				Through	LR					
				Right		41	0.05	9.2	A	1.3

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

Synchro Results - 2010 Horizon with Highway 28 Upgrades
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
111	Highway 28 & Highway 55 / 16 Avenue	Signalized [2]	Overall Intersection				0.42	18.1	B	-
			EB	Left	L	145	0.32	15.6	B	28.3
				Through	T	31	0.10	25.5	C	11.6
				Right	R	149	0.40	8.2	A	14.1
			WB	Left	L	133	0.31	17.5	B	26.3
				Through	T	10	0.03	24.8	C	5.7
				Right	R	51	0.15	9.1	A	8.7
			NB	Left	2L	88	0.27	29.7	C	13.1
				Through	2T	345	0.42	21.9	C	36.0
				Right	R	118	0.27	6.0	A	11.0
			SB	Left	L	45	0.27	31.8	C	15.8
				Through	2T	304	0.41	22.9	C	31.4
				Right	R	75	0.20	6.7	A	9.0
112	16 Avenue & 16 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.04	2.0	A	
			EB	Left		17	0.01	0.1	A	0.3
				Through	LTR	137	0.01	0.8	A	0.3
				Right		15	0.01	0.8	A	0.3
			WB	Left		0	-	-	-	-
				Through	LTR	63	0.00	0.0	A	0.0
				Right		7	0.00	0.0	A	0.0
			NB	Left		9	0.03	11.1	B	0.7
				Through	LTR	5	0.03	11.1	B	0.7
				Right		0	-	-	-	-
			SB	Left		12	0.04	10.1	B	1.0
				Through	LTR	2	0.04	10.1	B	1.0
				Right		11	0.04	10.1	B	1.0
113	16 Avenue & 10 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.11	3.7	A	
			EB	Left		8	0.01	0.1	A	0.2
				Through	LTR	86	0.01	0.6	A	0.2
				Right		10	0.01	0.6	A	0.2
			WB	Left		13	0.01	0.1	A	0.2
				Through	LTR	64	0.01	0.9	A	0.2
				Right		34	0.01	0.9	A	0.2
			NB	Left		6	0.04	10.3	B	0.9
				Through	LTR	9	0.04	10.3	B	0.9
				Right		8	0.04	10.3	B	0.9
			SB	Left		38	0.11	10.8	B	2.9
				Through	LTR	11	0.11	10.8	B	2.9
				Right		16	0.11	10.8	B	2.9
201	Highway 28 / 55 & Energy Centre Access	Signalized [2]	Overall Intersection				0.59	14.2	B	-
			EB	Left		10	-	-	-	-
				Through	LTR	10	0.09	14.0	B	7.7
				Right		10	-	-	-	-
			WB	Left	LT	131	0.49	24.1	C	30.7
				Through	R	10	0.26	5.7	A	9.6
				Right		111	-	-	-	-
			NB	Left	L	10	0.03	7.8	A	2.5
				Through	2T	645	0.59	17.4	B	57.1
				Right	R	72	0.14	5.1	A	7.6
			SB	Left	L	61	0.17	7.3	A	8.3
				Through	2T	526	0.39	11.6	B	43.7
				Right	R	10	0.02	6.9	A	2.9
202	Highway 28 / 55 & 75 Avenue	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				1.00	10.2	B	
			EB	Left		0	-	-	-	-
				Through	LTR	10	0.20	20.4	C	5.8
				Right		40	0.20	20.4	C	5.8
			WB	Left		71	1.00	161.2	F	50.2
				Through	LTR	10	1.00	161.2	F	50.2
				Right		10	1.00	161.2	F	50.2
			NB	Left	L	10	0.01	9.5	A	0.3
				Through	2T	717	0.25	0.0	A	0.0
				Right	R	20	0.01	0.0	A	0.0
			SB	Left	L	0	-	-	-	-
				Through	2T	657	0.22	0.0	A	0.0
				Right	R	10	0.01	0.0	A	0.0

Synchro Results - 2010 Horizon with Highway 28 Upgrades
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
203	Highway 28 / 55 & 69 Avenue	Signalized [2]		Overall Intersection			0.47	10.1	B	-
			EB	Left						
				Through						
				Right						
			WB	Left	L	7	0.02	18.6	B	3.6
				Through						
				Right	R	104	0.30	6.8	A	10.1
			NB	Left						
				Through	2T	644	0.47	15.3	B	49.4
				Right	R	26	0.04	5.9	A	4.2
			SB	Left	L	118	0.28	6.0	A	10.4
				Through	2T	650	0.34	6.4	A	28.1
				Right						
204	Highway 28 / 55 & Tri-City Mall Access	Signalized [2]		Overall Intersection			0.29	8.3	A	
			EB	Left						
				Through						
				Right						
			WB	Left	L	83	0.28	19.8	B	20.5
				Through						
				Right	R	10	0.04	11.2	B	3.5
			NB	Left						
				Through	TTTR	659	0.29	9.9	A	32.6
				Right		72	-	-	-	-
			SB	Left	L	55	0.13	4.9	A	5.6
				Through	2T	602	0.28	5.0	A	25.4
				Right						
205	Highway 28 / 55 & 62 Avenue / 61 Avenue	Unsignalized Stop Control - WB Approach		Overall Intersection			0.27	1.0	A	
			EB	Left						
				Through						
				Right						
			WB	Left	L	37	0.27	36.2	E	8.4
				Through						
				Right	R	8	0.02	11.4	B	0.4
			NB	Left						
				Through	2T	723	0.25	0.0	A	0.0
				Right	R	70	0.05	0.0	A	0.0
			SB	Left	L	9	0.01	10.1	B	0.4
				Through	2T	676	0.23	0.0	A	0.0
				Right						
301	Highway 28 / 55 & 54 Avenue	Signalized [2]		Overall Intersection			0.67	20.6	C	
			EB	Left	L	51	0.14	15.9	B	12.7
				Through	T	51	0.15	25.3	C	16.8
				Right	R	31	0.10	9.4	A	6.5
			WB	Left	L	71	0.18	15.7	B	16.5
				Through	T	61	0.15	23.7	C	19.0
				Right	R	153	0.34	6.2	A	12.7
			NB	Left	L	31	0.15	21.3	C	11.7
				Through	2T	602	0.67	26.1	C	80.0
				Right	R	61	0.14	6.8	A	9.1
			SB	Left	L	163	0.46	25.1	C	44.7
				Through	2T	581	0.53	19.8	B	84.1
				Right	R	61	-	-	-	-
302	Highway 28 / 55 & 52 Avenue	Unsignalized Stop Control - EB/WB Approaches		Overall Intersection			3.35	849.3	F	
			EB	Left		30	2.25	812.5	F	72.3
				Through	LTR	30	2.25	812.5	F	72.3
				Right		10	2.25	812.5	F	72.3
			WB	Left		50	3.35	Error	F	Error
				Through	LTR	30	3.35	Error	F	Error
				Right		55	3.35	Error	F	Error
			NB	Left		70	0.09	1.1	A	2.3
				Through	LTTR	615	0.27	1.3	A	2.3
				Right		80	0.27	0.0	A	0.0
			SB	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

Synchro Results - 2010 Horizon with Highway 28 Upgrades
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
303	Highway 28 / 55 & 50 Avenue	Signalized [3]	Overall Intersection				0.76	14.3	B	
			EB	Left	L	375	0.76	22.5	C	76.5
				Through	T	329	0.42	11.4	B	48.0
				Right	R [C]	135	0.19	2.3	A	7.1
			WB	Left		9	-	-	-	-
				Through	LT	161	0.22	9.3	A	24.4
				Right	R [C]	155	0.21	2.2	A	7.5
			NB	Left	L	133	0.40	22.9	C	29.3
				Through	2T	275	0.23	17.3	B	22.8
				Right	R [C]	162	0.01	10.8	B	2.3
			SB	Left	L	116	0.44	23.5	C	33.1
				Through	2T	232	0.28	17.6	B	26.7
				Right	R [C]	5	0.30	4.7	A	11.4
304	Highway 28 / 55 & 52 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.47	5.1	A	
			EB	Left		16	0.02	0.2	A	0.5
				Through	LTTR	486	0.20	0.4	A	0.5
				Right		50	0.20	0.0	A	0.0
			WB	Left		98	0.12	1.4	A	3.2
				Through	LTTR	523	0.21	1.8	A	3.2
				Right		42	0.21	0.0	A	0.0
			NB	Left		23	0.47	32.2	D	18.7
				Through	LTR	10	0.47	32.2	D	18.7
				Right		66	0.47	32.2	D	18.7
			SB	Left		21	0.41	42.6	E	14.5
				Through	LTR	8	0.41	42.6	E	14.5
				Right		27	0.41	42.6	E	14.5
305	Highway 28 / 55 & 51 Street	Unsignalized Stop Control - SB Approach	Overall Intersection				0.22	0.2	A	
			EB	Left						
				Through	2T	634	0.22	0.0	A	0.0
				Right						
			WB	Left						
				Through	2T	504	0.17	0.0	A	0.0
				Right	R [C]	23	0.02	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left						
				Through						
				Right	R [C]	19	0.03	10.3	B	0.8
306	Highway 28 / 55 & 50 Street	Signalized [3]	Overall Intersection				0.70	12.3	B	
			EB	Left						
				Through						
				Right						
			WB	Left	L	239	0.43	16.3	B	44.6
				Through						
				Right	R	144	0.25	4.0	A	9.9
			NB	Left						
				Through	2T	383	0.29	10.4	B	23.3
				Right	R	188	0.28	2.6	A	8.2
			SB	Left		215	-	-	-	-
				Through	LTT	419	0.70	16.7	B	47.5
				Right						
307	Highway 28 / 55 & 46 Avenue	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.22	1.0	A	
			EB	Left	L	11	0.09	33.2	D	2.4
				Through						
				Right	R	34	0.07	11.4	B	1.7
			WB	Left						
				Through						
				Right	R [C]	10	0.02	10.7	B	0.4
			NB	Left		33	0.05	0.6	A	1.2
				Through	LTTR [C]	550	0.21	0.8	A	1.2
				Right		32	0.21	0.0	A	0.0
			SB	Left						
				Through	2T	649	0.22	0.0	A	0.0
				Right	R	10	0.01	0.0	A	0.0

Synchro Results - 2010 Horizon with Highway 28 Upgrades
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
308	Highway 28 / 55 & 43 Avenue	Signalized [3]	Overall Intersection				0.38	9.9	A	
			EB	Left	L	78	0.19	13.1	B	15.8
				Through	TR	29	0.12	7.5	A	9.5
				Right		35	-	-	-	-
			WB	Left	L	114	0.28	14.0	B	2.2
				Through	T	49	0.08	11.9	B	10.6
				Right	R	73	0.14	4.4	A	7.1
			NB	Left	L	19	0.05	8.9	A	4.2
				Through	TTR	464	0.33	9.6	A	28.4
				Right		67	-	-	-	-
			SB	Left	L	137	0.38	14.2	B	23.0
				Through	2T	474	0.29	9.7	A	26.0
				Right	R	72	0.10	2.8	A	5.0
309	52 Avenue & 57 Street (North)	Unsignalized Stop Control - WB Approach	Overall Intersection				0.13	4.2	A	
			EB	Left						
				Through						
				Right						
			WB	Left		82	0.13	9.8	A	3.5
				Through	LR					
				Right		13	0.13	9.8	A	3.5
			NB	Left						
				Through	TR	31	0.08	0.0	A	0.0
				Right		82	0.08	0.0	A	0.0
			SB	Left		9	0.01	0.1	A	0.2
				Through	LT	20	0.01	2.4	A	0.2
				Right						
310	52 Avenue & 57 Street (South)	Unsignalized Stop Control - EB Approach	Overall Intersection				0.07	2.5	A	
			EB	Left		46	0.07	10.0	A	1.8
				Through	LR					
				Right		1	0.07	10.0	A	1.8
			WB	Left						
				Through						
				Right						
			NB	Left		11	0.01	0.1	A	0.2
				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
311	50 Avenue & 59 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.08	6.0	A	
			EB	Left		2	0.00	0.0	A	0.0
				Through	LTR	10	0.00	0.7	A	0.0
				Right		10	0.00	0.7	A	0.0
			WB	Left		12	0.01	0.1	A	0.2
				Through	LTR	14	0.01	2.2	A	0.2
				Right		14	0.01	2.2	A	0.2
			NB	Left		22	0.08	9.5	A	2.2
				Through	LTR	22	0.08	9.5	A	2.2
				Right		19	0.08	9.5	A	2.2
			SB	Left		6	0.02	9.6	A	0.5
				Through	LTR	6	0.02	9.6	A	0.5
				Right		1	0.02	9.6	A	0.5
312	50 Avenue & 57 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.12	7.2	A	
			EB	Left		22	0.02	0.1	A	0.4
				Through	LTR	5	0.02	3.4	A	0.4
				Right		22	0.02	3.4	A	0.4
			WB	Left		8	0.01	0.0	A	0.1
				Through	LTR	8	0.01	1.8	A	0.1
				Right		18	0.01	1.8	A	0.1
			NB	Left		37	0.12	10.4	B	3.4
				Through	LTR	37	0.12	10.4	B	3.4
				Right		8	0.12	10.4	B	3.4
			SB	Left		5	0.06	9.5	A	1.7
				Through	LTR	21	0.06	9.5	A	1.7
				Right		21	0.06	9.5	A	1.7

Synchro Results - 2010 Horizon with Highway 28 Upgrades
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
313	Centre Avenue & 59 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.26	2.3	A	
			EB	Left		45	0.05	0.9	A	1.2
				Through	LTR	775	0.05	1.3	A	1.2
				Right		17	0.05	1.3	A	1.2
			WB	Left		1	0.00	0.0	A	0.0
				Through	LTR	353	0.00	0.0	A	0.0
				Right		13	0.00	0.0	A	0.0
			NB	Left		5	0.13	32.7	D	3.6
				Through	LTR	5	0.13	32.7	D	3.6
				Right		7	0.13	32.7	D	3.6
			SB	Left		17	0.26	44.5	E	7.9
				Through	LTR	5	0.26	44.5	E	7.9
				Right		6	0.26	44.5	E	7.9
314	Centre Avenue & 57 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.59	5.3	A	
			EB	Left		44	0.05	0.9	A	1.2
				Through	LTR	808	0.05	1.3	A	1.2
				Right		17	0.05	1.3	A	1.2
			WB	Left		37	0.06	0.8	A	1.6
				Through	LT	351	0.06	1.8	A	1.6
				Right	R	32	0.02	0.0	A	0.0
			NB	Left		5	0.26	33.0	D	7.8
				Through	LTR	6	0.26	33.0	D	7.8
				Right		27	0.26	33.0	D	7.8
			SB	Left		26	0.59	81.7	F	22.5
				Through	LTR	9	0.59	81.7	F	22.5
				Right		17	0.59	81.7	F	22.5
315	54 Avenue & 51 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.13	1.8	A	
			EB	Left						
				Through	TR	143	0.13	0.0	A	0.0
				Right		46	0.13	0.0	A	0.0
			WB	Left		3	0.00	0.0	A	0.1
				Through	LT	114	0.00	0.2	A	0.1
				Right						
			NB	Left		56	0.10	11.1	B	2.7
				Through	LR					
				Right		1	0.10	11.1	B	2.7
			SB	Left						
				Through						
				Right						
316	50 Avenue & 53 Street	Unsignalized Stop Control - NB/SB Approach	Overall Intersection				0.16	3.1	A	
			EB	Left		71	0.07	0.7	A	1.8
				Through	LTR	270	0.07	2.2	A	1.8
				Right		15	0.07	2.2	A	1.8
			WB	Left		2	0.00	0.0	A	0.0
				Through	LTR	231	0.00	0.1	A	0.0
				Right		19	0.00	0.1	A	0.0
			NB	Left		14	0.09	18.2	C	2.3
				Through	LTR	3	0.09	18.2	C	2.3
				Right		6	0.09	18.2	C	2.3
			SB	Left		21	0.16	15.9	C	4.7
				Through	LTR	3	0.16	15.9	C	4.7
				Right		32	0.16	15.9	C	4.7
317	50 Avenue & 52 Street	Unsignalized Stop Control - All Approaches	Overall Intersection				0.45	11.1	B	
			EB	Left		48	0.45	12.0	B	-
				Through	LTR	208	0.45	12.0	B	-
				Right		18	0.45	12.0	B	-
			WB	Left		20	0.38	11.1	B	-
				Through	LTR	178	0.38	11.1	B	-
				Right		39	0.38	11.1	B	-
			NB	Left		26	0.15	9.6	A	-
				Through	LTR	31	0.15	9.6	A	-
				Right		24	0.15	9.6	A	-
			SB	Left		47	0.23	10.1	B	-
				Through	LTR	35	0.23	10.1	B	-
				Right		48	0.23	10.1	B	-

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)
318	50 Avenue & 51 Street	Unsignalized Stop Control - All Approaches	Overall Intersection				0.47	11.2	B	
			EB	Left		62	0.47	12.5	B	-
				Through	LTR	211	0.47	12.5	B	-
				Right		19	0.47	12.5	B	-
			WB	Left		8	0.33	10.6	B	-
				Through	LTR	164	0.33	10.6	B	-
				Right		26	0.33	10.6	B	-
			NB	Left		28	0.14	9.5	A	-
				Through	LTR	28	0.14	9.5	A	-
				Right		23	0.14	9.5	A	-
			SB	Left		74	0.23	10.3	B	-
				Through	LTR	32	0.23	10.3	B	-
				Right		24	0.23	10.3	B	-
319	50 Avenue & 50 Street	Unsignalized Stop Control - EB/WB/NB Approaches Assumed Yield Control - SB Approach	Overall Intersection				0.46	10.9	B	
			EB	Left		0	-	-	-	-
				Through	LTR	193	0.46	11.4	B	-
				Right		114	0.46	11.4	B	-
			WB	Left		83	0.32	10.4	B	-
				Through	LTR	112	0.32	10.4	B	-
				Right		0	-	-	-	-
			NB	Left		83	0.31	10.4	B	-
				Through	LTR	0	-	-	-	-
				Right		109	0.31	10.4	B	-
			SB	Left		0	-	-	-	-
				Through	LTR	0	-	-	-	-
				Right		0	-	-	-	-
320	50 Avenue & 49 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.32	5.5	A	
			EB	Left		50	0.04	0.4	A	1.1
				Through	LTR	253	0.04	1.5	A	1.1
				Right		25	0.04	1.5	A	1.1
			WB	Left		23	0.02	0.2	A	0.5
				Through	LTR	135	0.02	1.2	A	0.5
				Right		29	0.02	1.2	A	0.5
			NB	Left		10	0.19	15.5	C	5.5
				Through	LTR	28	0.19	15.5	C	5.5
				Right		31	0.19	15.5	C	5.5
			SB	Left		40	0.32	17.6	C	10.9
				Through	LTR	23	0.32	17.6	C	10.9
				Right		53	0.32	17.6	C	10.9
321	50 Avenue & 45 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.08	2.1	A	
			EB	Left		34	0.03	0.3	A	0.7
				Through	LTR	261	0.03	1.0	A	0.7
				Right		35	0.03	1.0	A	0.7
			WB	Left		7	0.01	0.1	A	0.2
				Through	LTR	146	0.01	0.4	A	0.2
				Right		4	0.01	0.4	A	0.2
			NB	Left		14	0.08	13.6	B	2.1
				Through	LTR	3	0.08	13.6	B	2.1
				Right		14	0.08	13.6	B	2.1
			SB	Left		9	0.06	12.3	B	1.6
				Through	LTR	4	0.06	12.3	B	1.6
				Right		15	0.06	12.3	B	1.6
322	50 Avenue & 41 Street	Unsignalized Stop Control - SB Approaches	Overall Intersection				0.08	2.9	A	
			EB	Left		72	0.06	0.5	A	1.5
				Through	LT	168	0.06	2.7	A	1.5
				Right						
			WB	Left						
				Through	TR	106	0.08	0.0	A	0.0
				Right		8	0.08	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		14	0.08	10.4	B	2.2
				Through	LR					
				Right		38	0.08	10.4	B	2.2

Synchro Results - 2010 Horizon with Highway 28 Upgrades
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
323	50 Avenue / Twp Rd 630 & "Baywood Road" / RR 20	Unsignalized Stop Control - SB Approaches	Overall Intersection				0.11	5.3	A	
			EB	Left		82	0.06	0.5	A	1.5
				Through	LT	69	0.06	4.3	A	1.5
				Right						
			WB	Left						
				Through	TR	26	0.03	0.0	A	0.0
				Right		11	0.03	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		18	0.11	9.4	A	3.0
				Through	LR					
				Right		70	0.11	9.4	A	3.0
401	Kingsway & Medley Road	Signalized [3]	Overall Intersection				0.54	8.4	A	
			EB	Left						
				Through	TR	657	0.54	9.4	A	102.9
				Right		6	-	-	-	-
			WB	Left	L	5	0.01	6.4	A	1.7
				Through	T	268	0.22	5.8	A	31.5
				Right						
			NB	Left		16	0.11	10.9	B	8.0
				Through	LR					
				Right		20	-	-	-	-
			SB	Left						
				Through						
				Right						
402	Kingsway & Glenwood Drive (East)	Signalized [3]	Overall Intersection				0.74	13.6	B	
			EB	Left	L	153	0.33	10.5	B	21.7
				Through	T	608	0.74	17.1	B	92.6
				Right						
			WB	Left						
				Through	T	261	0.32	9.4	A	30.9
				Right	R [C]	107	0.15	2.0	A	5.4
			NB	Left						
				Through						
				Right						
			SB	Left		131	0.29	18.9	B	29.5
				Through	LR					
				Right		1	-	-	-	-
403	Kingsway & Glenwood Drive (West)	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.51	0.4	A	
			EB	Left						
				Through	TR	749	0.51	0.0	A	0.0
				Right		1	0.51	0.0	A	0.0
			WB	Left	L	5	0.01	9.8	A	0.2
				Through	T	257	0.18	0.0	A	0.0
				Right						
			NB	Left	L	6	0.04	20.6	C	1.1
				Through						
				Right	R	11	0.04	20.6	C	1.1
			SB	Left						
				Through						
				Right	R	0	-	-	-	-
404	Kingsway & Timberline Drive	Signalized [3]	Overall Intersection				0.45	10.2	B	
			EB	Left	L	20	0.05	9.7	A	4.4
				Through	TR	277	0.45	13.4	B	37.6
				Right		10	-	-	-	-
			WB	Left	L	66	0.21	11.7	B	11.2
				Through	TR	161	0.34	11.1	B	25.7
				Right		49	-	-	-	-
			NB	Left		6	-	-	-	-
				Through	LT	5	0.02	9.3	A	3.0
				Right	R	161	0.27	3.1	A	8.1
			SB	Left		51	-	-	-	-
				Through	LTR	4	0.12	9.6	A	9.3
				Right		5	-	-	-	-

Synchro Results - 2010 Horizon with Highway 28 Upgrades
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
405	Kingsway & Queensway	Unsignalized Stop Control - All Approaches	Overall Intersection				0.26	8.7	A	
			EB	Left		3	0.08	8.6	A	-
				Through	LTR	45	0.08	8.6	A	-
				Right		0	-	-	-	-
			WB	Left		24	0.23	8.8	A	-
				Through	LTR	61	0.23	8.8	A	-
				Right		70	0.23	8.8	A	-
			NB	Left		3	0.26	8.7	A	-
				Through	LTR	57	0.26	8.7	A	-
				Right		127	0.26	8.7	A	-
			SB	Left		89	0.16	8.8	A	-
				Through	LTR	9	0.16	8.8	A	-
				Right		2	0.16	8.8	A	-
406	Kingsway & Tennis Court Road	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.10	8.3	A	
			EB	Left		14	0.10	9.9	A	2.8
				Through	LTR	46	0.10	9.9	A	2.8
				Right		14	0.10	9.9	A	2.8
			WB	Left		9	0.09	10.0	B	2.3
				Through	LTR	49	0.09	10.0	B	2.3
				Right		1	0.09	10.0	B	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
			SB	Left		0	-	-	-	-
				Through	LTR	0	-	-	-	-
				Right		5	0.00	0.0	A	0.0
407	Queensway & Tennis Court Road	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.02	1.4	A	
			EB	Left		1	0.00	0.0	A	0.0
				Through	LTR	46	0.00	0.2	A	0.0
				Right		1	0.00	0.2	A	0.0
			WB	Left		1	0.00	0.0	A	0.0
				Through	LTR	68	0.00	0.1	A	0.0
				Right		5	0.00	0.1	A	0.0
			NB	Left		7	0.02	9.4	A	0.5
				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 & 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

Project: Cold Lake Transportation Study
Project No: 2010-3050
Date Revised: April 5, 2011

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

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
101	1 Avenue & 28 Street / English Bay Road	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.13	5.1	A	
			EB	Left	LTR	11	0.09	11.8	B	2.3
				Through		27	0.09	11.8	B	2.3
				Right		5	0.09	11.8	B	2.3
			WB	Left	LTR	11	0.13	10.5	B	3.7
				Through		21	0.13	10.5	B	3.7
				Right		55	0.13	10.5	B	3.7
			NB	Left	LTR	6	0.00	0.0	A	0.1
				Through		79	0.00	0.4	A	0.1
				Right		30	0.00	0.4	A	0.1
			SB	Left	LTR	42	0.03	0.3	A	0.8
				Through		62	0.03	3.1	A	0.8
				Right		5	0.03	3.1	A	0.8
102	1 Avenue & 25 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.10	4.1	A	
			EB	Left	TR					
				Through		81	0.06	0.0	A	0.0
				Right		11	0.06	0.0	A	0.0
			WB	Left	LT	66	0.05	0.4	A	1.3
				Through		81	0.05	3.6	A	1.3
				Right						
			NB	Left	LR	1	0.10	9.3	A	2.8
				Through						
				Right		83	0.10	9.3	A	2.8
			SB	Left						
				Through						
				Right						
103	1 Avenue & Nelson Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.11	1.3	A	
			EB	Left	TR					
				Through		116	0.11	0.0	A	0.0
				Right		48	0.11	0.0	A	0.0
			WB	Left	LT	9	0.01	0.1	A	0.2
				Through		127	0.01	0.6	A	0.2
				Right						
			NB	Left	LR	20	0.05	10.3	B	1.4
				Through						
				Right		13	0.05	10.3	B	1.4
			SB	Left						
				Through						
				Right						
104	1 Avenue & 16 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.09	1.9	A	
			EB	Left	TR					
				Through		91	0.09	0.0	A	0.0
				Right		38	0.09	0.0	A	0.0
			WB	Left	LT	7	0.01	0.0	A	0.1
				Through		100	0.01	0.5	A	0.1
				Right						
			NB	Left	LR	36	0.07	10.2	B	1.9
				Through						
				Right		12	0.07	10.2	B	1.9
			SB	Left						
				Through						
				Right						
105	1 Avenue / 2 Avenue & 10 Street	Unsignalized Yield Control - SB Approach	Overall Intersection				0.05	2.1	A	
			EB	Left	LT	12	0.01	0.1	A	0.2
				Through		95	0.01	0.9	A	0.2
				Right						
			WB	Left						
				Through						
				Right						
			NB	Left	TR					
				Through		75	0.05	0.0	A	0.0
				Right		4	0.05	0.0	A	0.0
			SB	Left	LR	0	-	-	-	-
				Through						
				Right		41	0.05	9.2	A	1.3

Synchro Results - 2010 Horizon with Highway 28 Upgrades - With Improvements
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
106	8 Avenue & Lakeshore Drive	Unsignalized Stop Control - EB Approach	Overall Intersection				0.07	4.3	A	
			EB	Left		14	0.07	9.1	A	1.7
				Through	LR					
				Right		40	0.07	9.1	A	1.7
			WB	Left						
				Through						
				Right						
			NB	Left		27	0.02	0.2	A	0.5
				Through	LT	39	0.02	3.1	A	0.5
				Right						
			SB	Left						
				Through	TR	25	0.03	0.0	A	0.0
				Right		17	0.03	0.0	A	0.0
107	8 Avenue & 10 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.20	6.5	A	
			EB	Left		7	0.01	0.0	A	0.1
				Through	LT	61	0.01	0.8	A	0.1
				Right	R	29	0.02	0.0	A	0.0
			WB	Left		37	0.03	0.2	A	0.7
				Through	LTR	55	0.03	2.7	A	0.7
				Right		17	0.03	2.7	A	0.7
			NB	Left		17	0.20	11.2	B	6.1
				Through	LTR	52	0.20	11.2	B	6.1
				Right		60	0.20	11.2	B	6.1
			SB	Left		15	0.14	12.2	B	3.9
				Through	LTR	51	0.14	12.2	B	3.9
				Right		5	0.14	12.2	B	3.9
108	8 Avenue & 16 Street	Signalized [1]	Overall Intersection				0.79	14.9	B	
			EB	Left	L	319	0.79	27.5	C	#73.5
				Through	TTR	247	0.25	8.5	A	18.1
				Right		53	-	-	-	-
			WB	Left	L	4	0.01	9.2	A	1.9
				Through	TTR	110	0.12	7.6	A	9.1
				Right		28	-	-	-	-
			NB	Left		32	-	-	-	-
				Through	LTR	18	0.12	12.0	B	10.0
				Right		4	-	-	-	-
			SB	Left		27	-	-	-	-
				Through	LTR	8	0.22	6.6	A	10.7
				Right		74	-	-	-	-
109	Highway 28 & 25 Street	Unsignalized Stop Control - SB Approach	Overall Intersection				0.25	2.9	A	
			EB	Left	L	119	0.12	8.5	A	3.2
				Through	2T	422	0.14	0.0	A	0.0
				Right						
			WB	Left						
				Through	2T	273	0.09	0.0	A	0.0
				Right	R	30	0.02	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		10	0.25	11.5	B	8.0
				Through	LR					
				Right		151	0.25	11.5	B	8.0
110	Highway 55 & 28 Street/ English Bay Road	Unsignalized Stop Control - SB Approach	Overall Intersection				0.12	1.8	A	
			EB	Left		43	0.04	0.4	A	0.9
				Through	LT	293	0.04	1.3	A	0.9
				Right						
			WB	Left						
				Through	TR	150	0.12	0.0	A	0.0
				Right		23	0.12	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		32	0.10	13.6	B	2.6
				Through	LR					
				Right		7	0.10	13.6	B	2.6

Synchro Results - 2010 Horizon with Highway 28 Upgrades - With Improvements
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
111	Highway 28 & Highway 55 / 16 Avenue	Signalized [2]	Overall Intersection				0.42	18.1	B	-
			EB	Left	L	145	0.32	15.6	B	28.3
				Through	T	31	0.10	25.5	C	11.6
				Right	R	149	0.40	8.2	A	14.1
			WB	Left	L	133	0.31	17.5	B	26.3
				Through	T	10	0.03	24.8	C	5.7
				Right	R	51	0.15	9.1	A	8.7
			NB	Left	2L	88	0.27	29.7	C	13.1
				Through	2T	345	0.42	21.9	C	36.0
				Right	R	118	0.27	6.0	A	11.0
			SB	Left	L	45	0.27	31.8	C	15.8
				Through	2T	304	0.41	22.9	C	31.4
				Right	R	75	0.20	6.7	A	9.0
112	16 Avenue & 16 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.04	2.0	A	
			EB	Left		17	0.01	0.1	A	0.3
				Through	LTR	137	0.01	0.8	A	0.3
				Right		15	0.01	0.8	A	0.3
			WB	Left		0	-	-	-	-
				Through	LTR	63	0.00	0.0	A	0.0
				Right		7	0.00	0.0	A	0.0
			NB	Left		9	0.03	11.1	B	0.7
				Through	LTR	5	0.03	11.1	B	0.7
				Right		0	-	-	-	-
			SB	Left		12	0.04	10.1	B	1.0
				Through	LTR	2	0.04	10.1	B	1.0
				Right		11	0.04	10.1	B	1.0
113	16 Avenue & 10 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.11	3.7	A	
			EB	Left		8	0.01	0.1	A	0.2
				Through	LTR	86	0.01	0.6	A	0.2
				Right		10	0.01	0.6	A	0.2
			WB	Left		13	0.01	0.1	A	0.2
				Through	LTR	64	0.01	0.9	A	0.2
				Right		34	0.01	0.9	A	0.2
			NB	Left		6	0.04	10.3	B	0.9
				Through	LTR	9	0.04	10.3	B	0.9
				Right		8	0.04	10.3	B	0.9
			SB	Left		38	0.11	10.8	B	2.9
				Through	LTR	11	0.11	10.8	B	2.9
				Right		16	0.11	10.8	B	2.9
201	Highway 28 / 55 & Energy Centre Access	Signalized [2]	Overall Intersection				0.59	14.2	B	-
			EB	Left		10	-	-	-	-
				Through	LTR	10	0.09	14.0	B	7.7
				Right		10	-	-	-	-
			WB	Left	LT	131	0.49	24.1	C	30.7
				Through	R	10	0.26	5.7	A	9.6
				Right		111	-	-	-	-
			NB	Left	L	10	0.03	7.8	A	2.5
				Through	2T	645	0.59	17.4	B	57.1
				Right	R	72	0.14	5.1	A	7.6
			SB	Left	L	61	0.17	7.3	A	8.3
				Through	2T	526	0.39	11.6	B	43.7
				Right	R	10	0.02	6.9	A	2.9
202	Highway 28 / 55 & 75 Avenue	**Only Option:** Signalized Intersection	Overall Intersection				0.37	7.6	A	
			EB	Left		0	-	-	-	-
				Through	LTR	10	0.15	7.2	A	6.9
				Right		40	-	-	-	-
			WB	Left		71	-	-	-	-
				Through	LTR	10	0.35	15.4	B	16.3
				Right		10	-	-	-	-
			NB	Left	L	10	0.03	7.4	A	2.4
				Through	2T	717	0.37	7.3	A	35.3
				Right	R	20	0.02	3.6	A	2.5
			SB	Left	L	0	-	-	-	-
				Through	2T	657	0.34	7.0	A	31.8
				Right	R	10	0.01	4.1	A	1.8

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

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
203	Highway 28 / 55 & 69 Avenue	Signalized [2]	Overall Intersection				0.47	10.1	B	-
			EB	Left						
				Through						
				Right						
			WB	Left	L	7	0.02	18.6	B	3.6
				Through						
				Right	R	104	0.30	6.8	A	10.1
			NB	Left						
				Through	2T	644	0.47	15.3	B	49.4
				Right	R	26	0.04	5.9	A	4.2
			SB	Left	L	118	0.28	6.0	A	10.4
				Through	2T	650	0.34	6.4	A	28.1
				Right						
204	Highway 28 / 55 & Tri-City Mall Access	Signalized [2]	Overall Intersection				0.29	8.3	A	
			EB	Left						
				Through						
				Right						
			WB	Left	L	83	0.28	19.8	B	20.5
				Through						
				Right	R	10	0.04	11.2	B	3.5
			NB	Left						
				Through	TTTR	659	0.29	9.9	A	32.6
				Right		72	-	-	-	-
			SB	Left	L	55	0.13	4.9	A	5.6
				Through	2T	602	0.28	5.0	A	25.4
				Right						
205	Highway 28 / 55 & 62 Avenue / 61 Avenue	**Only Option**: Signalize Intersection. Channelize NB R	Overall Intersection				0.31	4.6	A	
			EB	Left						
				Through						
				Right						
			WB	Left	L	37	0.15	13.7	B	8.4
				Through						
				Right	R	8	0.03	8.5	A	2.5
			NB	Left						
				Through	2T	723	0.31	4.5	A	33.3
				Right	R [C]	70	0.07	2.0	A	4.3
			SB	Left	L	9	0.02	5.6	A	2.0
				Through	2T	676	0.29	4.4	A	30.7
				Right						
301	Highway 28 / 55 & 54 Avenue	Signalized [2]	Overall Intersection				0.67	20.6	C	
			EB	Left	L	51	0.14	15.9	B	12.7
				Through	T	51	0.15	25.3	C	16.8
				Right	R	31	0.10	9.4	A	6.5
			WB	Left	L	71	0.18	15.7	B	16.5
				Through	T	61	0.15	23.7	C	19.0
				Right	R	153	0.34	6.2	A	12.7
			NB	Left	L	31	0.15	21.3	C	11.7
				Through	2T	602	0.67	26.1	C	80.0
				Right	R	61	0.14	6.8	A	9.1
			SB	Left	L	163	0.46	25.1	C	44.7
				Through	2T	581	0.53	19.8	B	84.1
				Right	R	61	-	-	-	-
302	Highway 28 / 55 & 52 Avenue	**Only Option:** Signalize Intersection Channelize NB R	Overall Intersection				0.70	13.3	B	
			EB	Left		30	-	-	-	-
				Through	LTR	30	0.22	15.0	B	13.4
				Right		10	-	-	-	-
			WB	Left		50	-	-	-	-
				Through	LTR	30	0.39	13.1	B	18.7
				Right		55	-	-	-	-
			NB	Left		70	-	-	-	-
				Through	LTTR [C]	615	0.59	11.4	B	60.7
				Right		80	-	-	-	-
			SB	Left		140	-	-	-	-
				Through	LTTR	510	0.70	15.3	B	#73.7
				Right		40	-	-	-	-

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

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
303	Highway 28 / 55 & 50 Avenue	Signalized [3]	Overall Intersection				0.76	14.3	B	
			EB	Left	L	375	0.76	22.5	C	76.5
				Through	T	329	0.42	11.4	B	48.0
				Right	R [C]	135	0.19	2.3	A	7.1
			WB	Left		9	-	-	-	-
				Through	LT	161	0.22	9.3	A	24.4
				Right	R [C]	155	0.21	2.2	A	7.5
			NB	Left	L	133	0.40	22.9	C	29.3
				Through	2T	275	0.23	17.3	B	22.8
				Right	R [C]	162	0.01	10.8	B	2.3
			SB	Left	L	116	0.44	23.5	C	33.1
				Through	2T	232	0.28	17.6	B	26.7
				Right	R [C]	5	0.30	4.7	A	11.4
304	Highway 28 / 55 & 52 Street	**Option 1:** Convert to 4-way stop. Channelize NB R	Overall Intersection				0.71	16.5	C	
			EB	Left		16	0.52	14.5	B	-
				Through	LTTR	486	0.57	15.1	C	-
				Right		50	0.57	15.7	C	-
			WB	Left		98	0.71	21.8	C	-
				Through	LTTR	523	0.71	18.7	C	-
				Right		42	0.58	15.5	C	-
			NB	Left		23	0.21	11.1	B	-
				Through	LTR [C]	10	0.21	11.1	B	-
				Right		66	0.21	11.1	B	-
			SB	Left		21	0.12	10.7	B	-
				Through	LTR	8	0.12	10.7	B	-
				Right		27	0.12	10.7	B	-
304	Highway 28 / 55 & 52 Street	**Option 2:** Signalize intersection. Channelize NB R	Overall Intersection				0.66	11.8	B	
			EB	Left		16	-	-	-	-
				Through	LTTR	486	0.46	10.5	B	37.6
				Right		50	-	-	-	-
			WB	Left		98	-	-	-	-
				Through	LTTR	523	0.66	14.0	B	51.8
				Right		42	-	-	-	-
			NB	Left		23	-	-	-	-
				Through	LTR [C]	10	0.22	7.0	A	10.3
				Right		66	-	-	-	-
			SB	Left		21	-	-	-	-
				Through	LTR	8	0.13	8.5	A	8.1
				Right		27	-	-	-	-
305	Highway 28 / 55 & 51 Street	Unsignalized Stop Control - SB Approach	Overall Intersection				0.22	0.2	A	
			EB	Left						
				Through	2T	634	0.22	0.0	A	0.0
				Right						
			WB	Left						
				Through	2T	504	0.17	0.0	A	0.0
				Right	R [C]	23	0.02	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left						
				Through						
				Right	R [C]	19	0.03	10.3	B	0.8
306	Highway 28 / 55 & 50 Street	Signalized [3]	Overall Intersection				0.70	12.3	B	
			EB	Left						
				Through						
				Right						
			WB	Left	L	239	0.43	16.3	B	44.6
				Through						
				Right	R	144	0.25	4.0	A	9.9
			NB	Left						
				Through	2T	383	0.29	10.4	B	23.3
				Right	R	188	0.28	2.6	A	8.2
			SB	Left		215	-	-	-	-
				Through	LTT	419	0.70	16.7	B	47.5
				Right						

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

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
307	Highway 28 / 55 & 46 Avenue	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.22	1.0	A	
			EB	Left	L	11	0.09	33.2	D	2.4
				Through						
				Right	R	34	0.07	11.4	B	1.7
			WB	Left						
				Through						
				Right	R [C]	10	0.02	10.7	B	0.4
			NB	Left		33	0.05	0.6	A	1.2
				Through	LTTR [C]	550	0.21	0.8	A	1.2
				Right		32	0.21	0.0	A	0.0
			SB	Left						
				Through	2T	649	0.22	0.0	A	0.0
				Right	R	10	0.01	0.0	A	0.0
308	Highway 28 / 55 & 43 Avenue	Signalized [3]	Overall Intersection				0.38	9.9	A	
			EB	Left	L	78	0.19	13.1	B	15.8
				Through	TR	29	0.12	7.5	A	9.5
				Right		35	-	-	-	-
			WB	Left	L	114	0.28	14.0	B	2.2
				Through	T	49	0.08	11.9	B	10.6
				Right	R	73	0.14	4.4	A	7.1
			NB	Left	L	19	0.05	8.9	A	4.2
				Through	TTR	464	0.33	9.6	A	28.4
				Right		67	-	-	-	-
			SB	Left	L	137	0.38	14.2	B	23.0
				Through	2T	474	0.29	9.7	A	26.0
				Right	R	72	0.10	2.8	A	5.0
309	52 Avenue & 57 Street (North)	Unsignalized Stop Control - WB Approach	Overall Intersection				0.13	4.2	A	
			EB	Left						
				Through						
				Right						
			WB	Left		82	0.13	9.8	A	3.5
				Through	LR					
				Right		13	0.13	9.8	A	3.5
			NB	Left						
				Through	TR	31	0.08	0.0	A	0.0
				Right		82	0.08	0.0	A	0.0
			SB	Left		9	0.01	0.1	A	0.2
				Through	LT	20	0.01	2.4	A	0.2
				Right						
310	52 Avenue & 57 Street (South)	Unsignalized Stop Control - EB Approach	Overall Intersection				0.07	2.5	A	
			EB	Left		46	0.07	10.0	A	1.8
				Through	LR					
				Right		1	0.07	10.0	A	1.8
			WB	Left						
				Through						
				Right						
			NB	Left		11	0.01	0.1	A	0.2
				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
311	50 Avenue & 59 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.08	6.0	A	
			EB	Left		2	0.00	0.0	A	0.0
				Through	LTR	10	0.00	0.7	A	0.0
				Right		10	0.00	0.7	A	0.0
			WB	Left		12	0.01	0.1	A	0.2
				Through	LTR	14	0.01	2.2	A	0.2
				Right		14	0.01	2.2	A	0.2
			NB	Left		22	0.08	9.5	A	2.2
				Through	LTR	22	0.08	9.5	A	2.2
				Right		19	0.08	9.5	A	2.2
			SB	Left		6	0.02	9.6	A	0.5
				Through	LTR	6	0.02	9.6	A	0.5
				Right		1	0.02	9.6	A	0.5

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

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
312	50 Avenue & 57 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.12	7.2	A	
			EB	Left		22	0.02	0.1	A	0.4
				Through	LTR	5	0.02	3.4	A	0.4
				Right		22	0.02	3.4	A	0.4
			WB	Left		8	0.01	0.0	A	0.1
				Through	LTR	8	0.01	1.8	A	0.1
				Right		18	0.01	1.8	A	0.1
			NB	Left		37	0.12	10.4	B	3.4
				Through	LTR	37	0.12	10.4	B	3.4
				Right		8	0.12	10.4	B	3.4
			SB	Left		5	0.06	9.5	A	1.7
				Through	LTR	21	0.06	9.5	A	1.7
				Right		21	0.06	9.5	A	1.7
313	Centre Avenue & 59 Street	**Option 1**: Convert to 4-way stop. Provide additional lane on EB/WB approaches.	Overall Intersection				0.73	16.0	C	
			EB	Left		45	0.73	20.2	C	-
				Through	LTTR	775	0.73	18.6	C	-
				Right		17	0.68	17.1	C	-
			WB	Left		1	0.33	10.5	B	-
				Through	LTTR	353	0.35	10.6	B	-
				Right		13	0.35	10.7	B	-
			NB	Left		5	0.03	9.5	A	-
				Through	LTR	5	0.03	9.5	A	-
				Right		7	0.03	9.5	A	-
			SB	Left		17	0.06	9.8	A	-
				Through	LTR	5	0.06	9.8	A	-
				Right		6	0.06	9.8	A	-
313	Centre Avenue & 59 Street	**Option 2:** Signalize intersection	Overall Intersection				0.87	17.6	B	
			EB	Left		45	-	-	-	-
				Through	LTR	775	0.87	21.9	C	#229.6
				Right		17	-	-	-	-
			WB	Left		1	-	-	-	-
				Through	LTR	353	0.37	7.3	A	52.0
				Right		13	-	-	-	-
			NB	Left		5	-	-	-	-
				Through	LTR	5	0.06	20.5	C	6.8
				Right		7	-	-	-	-
			SB	Left		17	-	-	-	-
				Through	LTR	5	0.11	23.4	C	10.2
				Right		6	-	-	-	-
314	Centre Avenue & 57 Street	**Option 1:** Convert to 4-way stop. Provide additional lane on EB/WB approaches.	Overall Intersection				0.81	19.8	C	
			EB	Left		44	0.81	26.8	D	-
				Through	LTTR	808	0.81	24.4	C	-
				Right		17	0.75	22.0	C	-
			WB	Left		37	0.43	12.7	B	-
				Through	LTTR	351	0.43	12.3	B	-
				Right		32	0.41	11.9	B	-
			NB	Left		5	0.08	9.9	A	-
				Through	LTR	6	0.08	9.9	A	-
				Right		27	0.08	9.9	A	-
			SB	Left		26	0.11	10.4	B	-
				Through	LTR	9	0.11	10.4	B	-
				Right		17	0.11	10.4	B	-
314	Centre Avenue & 57 Street	**Option 2:** Signalize intersection	Overall Intersection				0.88	17.9	B	-
			EB	Left		44	-	-	-	-
				Through	LTR	808	0.88	22.6	C	#244.7
				Right		17	-	-	-	-
			WB	Left		37	-	-	-	-
				Through	LT	351	0.44	8.3	A	61.2
				Right	R	32	0.04	2.3	A	3.3
			NB	Left		5	-	-	-	-
				Through	LTR	6	0.14	14.4	B	9.1
				Right		27	-	-	-	-
			SB	Left		26	-	-	-	-
				Through	LTR	9	0.22	21.9	C	14.4
				Right		17	-	-	-	-

Synchro Results - 2010 Horizon with Highway 28 Upgrades - With Improvements
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Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
315	54 Avenue & 51 Street	Unsignalized Stop Control - NB Approach	Overall Intersection				0.13	1.8	A	
			EB	Left						
				Through	TR	143	0.13	0.0	A	0.0
				Right		46	0.13	0.0	A	0.0
			WB	Left		3	0.00	0.0	A	0.1
				Through	LT	114	0.00	0.2	A	0.1
				Right						
			NB	Left		56	0.10	11.1	B	2.7
				Through	LR					
				Right		1	0.10	11.1	B	2.7
			SB	Left						
				Through						
				Right						
316	50 Avenue & 53 Street	Unsignalized Stop Control - NB/SB Approach	Overall Intersection				0.16	3.1	A	
			EB	Left		71	0.07	0.7	A	1.8
				Through	LTR	270	0.07	2.2	A	1.8
				Right		15	0.07	2.2	A	1.8
			WB	Left		2	0.00	0.0	A	0.0
				Through	LTR	231	0.00	0.1	A	0.0
				Right		19	0.00	0.1	A	0.0
			NB	Left		14	0.09	18.2	C	2.3
				Through	LTR	3	0.09	18.2	C	2.3
				Right		6	0.09	18.2	C	2.3
			SB	Left		21	0.16	15.9	C	4.7
				Through	LTR	3	0.16	15.9	C	4.7
				Right		32	0.16	15.9	C	4.7
317	50 Avenue & 52 Street	Unsignalized Stop Control - All Approaches	Overall Intersection				0.45	11.1	B	
			EB	Left		48	0.45	12.0	B	-
				Through	LTR	208	0.45	12.0	B	-
				Right		18	0.45	12.0	B	-
			WB	Left		20	0.38	11.1	B	-
				Through	LTR	178	0.38	11.1	B	-
				Right		39	0.38	11.1	B	-
			NB	Left		26	0.15	9.6	A	-
				Through	LTR	31	0.15	9.6	A	-
				Right		24	0.15	9.6	A	-
			SB	Left		47	0.23	10.1	B	-
				Through	LTR	35	0.23	10.1	B	-
				Right		48	0.23	10.1	B	-
318	50 Avenue & 51 Street	Unsignalized Stop Control - All Approaches	Overall Intersection				0.47	11.2	B	
			EB	Left		62	0.47	12.5	B	-
				Through	LTR	211	0.47	12.5	B	-
				Right		19	0.47	12.5	B	-
			WB	Left		8	0.33	10.6	B	-
				Through	LTR	164	0.33	10.6	B	-
				Right		26	0.33	10.6	B	-
			NB	Left		28	0.14	9.5	A	-
				Through	LTR	28	0.14	9.5	A	-
				Right		23	0.14	9.5	A	-
			SB	Left		74	0.23	10.3	B	-
				Through	LTR	32	0.23	10.3	B	-
				Right		24	0.23	10.3	B	-
319	50 Avenue & 50 Street	Unsignalized Stop Control - EB/WB/NB Approaches Assumed Yield Control - SB Approach	Overall Intersection				0.46	10.9	B	
			EB	Left		0	-	-	-	-
				Through	LTR	193	0.46	11.4	B	-
				Right		114	0.46	11.4	B	-
			WB	Left		83	0.32	10.4	B	-
				Through	LTR	112	0.32	10.4	B	-
				Right		0	-	-	-	-
			NB	Left		83	0.31	10.4	B	-
				Through	LTR	0	-	-	-	-
				Right		109	0.31	10.4	B	-
			SB	Left		0	-	-	-	-
				Through	LTR	0	-	-	-	-
				Right		0	-	-	-	-

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

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
320	50 Avenue & 49 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.32	5.5	A	
			EB	Left		50	0.04	0.4	A	1.1
				Through	LTR	253	0.04	1.5	A	1.1
				Right		25	0.04	1.5	A	1.1
			WB	Left		23	0.02	0.2	A	0.5
				Through	LTR	135	0.02	1.2	A	0.5
				Right		29	0.02	1.2	A	0.5
			NB	Left		10	0.19	15.5	C	5.5
				Through	LTR	28	0.19	15.5	C	5.5
				Right		31	0.19	15.5	C	5.5
			SB	Left		40	0.32	17.6	C	10.9
				Through	LTR	23	0.32	17.6	C	10.9
				Right		53	0.32	17.6	C	10.9
321	50 Avenue & 45 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.08	2.1	A	
			EB	Left		34	0.03	0.3	A	0.7
				Through	LTR	261	0.03	1.0	A	0.7
				Right		35	0.03	1.0	A	0.7
			WB	Left		7	0.01	0.1	A	0.2
				Through	LTR	146	0.01	0.4	A	0.2
				Right		4	0.01	0.4	A	0.2
			NB	Left		14	0.08	13.6	B	2.1
				Through	LTR	3	0.08	13.6	B	2.1
				Right		14	0.08	13.6	B	2.1
			SB	Left		9	0.06	12.3	B	1.6
				Through	LTR	4	0.06	12.3	B	1.6
				Right		15	0.06	12.3	B	1.6
322	50 Avenue & 41 Street	Unsignalized Stop Control - SB Approaches	Overall Intersection				0.08	2.9	A	
			EB	Left		72	0.06	0.5	A	1.5
				Through	LT	168	0.06	2.7	A	1.5
				Right						
			WB	Left						
				Through	TR	106	0.08	0.0	A	0.0
				Right		8	0.08	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		14	0.08	10.4	B	2.2
				Through	LR					
				Right		38	0.08	10.4	B	2.2
323	50 Avenue / Twp Rd 630 & "Baywood Road" / RR 20	Unsignalized Stop Control - SB Approaches	Overall Intersection				0.11	5.3	A	
			EB	Left		82	0.06	0.5	A	1.5
				Through	LT	69	0.06	4.3	A	1.5
				Right						
			WB	Left						
				Through	TR	26	0.03	0.0	A	0.0
				Right		11	0.03	0.0	A	0.0
			NB	Left						
				Through						
				Right						
			SB	Left		18	0.11	9.4	A	3.0
				Through	LR					
				Right		70	0.11	9.4	A	3.0
401	Kingsway & Medley Road	Signalized [3]	Overall Intersection				0.54	8.4	A	
			EB	Left						
				Through	TR	657	0.54	9.4	A	102.9
				Right		6	-	-	-	-
			WB	Left	L	5	0.01	6.4	A	1.7
				Through	T	268	0.22	5.8	A	31.5
				Right						
			NB	Left		16	0.11	10.9	B	8.0
				Through	LR					
				Right		20	-	-	-	-
			SB	Left						
				Through						
				Right						

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

Node #	Intersection	Traffic Control	Approach	Movement	Laning	Volume	V/C Ratio	Delay (s)	LOS	95th Queue (m)
402	Kingsway & Glenwood Drive (East)	Signalized [3]	Overall Intersection				0.74	13.6	B	
			EB	Left	L	153	0.33	10.5	B	21.7
				Through	T	608	0.74	17.1	B	92.6
				Right						
			WB	Left						
				Through	T	261	0.32	9.4	A	30.9
				Right	R [C]	107	0.15	2.0	A	5.4
			NB	Left						
				Through						
				Right						
			SB	Left		131	0.29	18.9	B	29.5
				Through	LR					
				Right		1	-	-	-	-
403	Kingsway & Glenwood Drive (West)	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection				0.51	0.4	A	
			EB	Left						
				Through	TR	749	0.51	0.0	A	0.0
				Right		1	0.51	0.0	A	0.0
			WB	Left	L	5	0.01	9.8	A	0.2
				Through	T	257	0.18	0.0	A	0.0
				Right						
			NB	Left	L	6	0.04	20.6	C	1.1
				Through						
				Right	R	11	0.04	20.6	C	1.1
			SB	Left						
				Through						
				Right	R	0	-	-	-	-
404	Kingsway & Timberline Drive	Signalized [3]	Overall Intersection				0.45	10.2	B	
			EB	Left	L	20	0.05	9.7	A	4.4
				Through	TR	277	0.45	13.4	B	37.6
				Right		10	-	-	-	-
			WB	Left	L	66	0.21	11.7	B	11.2
				Through	TR	161	0.34	11.1	B	25.7
				Right		49	-	-	-	-
			NB	Left		6	-	-	-	-
				Through	LT	5	0.02	9.3	A	3.0
				Right	R	161	0.27	3.1	A	8.1
			SB	Left		51	-	-	-	-
				Through	LTR	4	0.12	9.6	A	9.3
				Right		5	-	-	-	-
405	Kingsway & Queensway	Unsignalized Stop Control - All Approaches	Overall Intersection				0.26	8.7	A	
			EB	Left		3	0.08	8.6	A	-
				Through	LTR	45	0.08	8.6	A	-
				Right		0	-	-	-	-
			WB	Left		24	0.23	8.8	A	-
				Through	LTR	61	0.23	8.8	A	-
				Right		70	0.23	8.8	A	-
			NB	Left		3	0.26	8.7	A	-
				Through	LTR	57	0.26	8.7	A	-
				Right		127	0.26	8.7	A	-
			SB	Left		89	0.16	8.8	A	-
				Through	LTR	9	0.16	8.8	A	-
				Right		2	0.16	8.8	A	-
406	Kingsway & Tennis Court Road	Unsignalized Stop Control - EB/WB Approaches	Overall Intersection				0.10	8.3	A	
			EB	Left		14	0.10	9.9	A	2.8
				Through	LTR	46	0.10	9.9	A	2.8
				Right		14	0.10	9.9	A	2.8
			WB	Left		9	0.09	10.0	B	2.3
				Through	LTR	49	0.09	10.0	B	2.3
				Right		1	0.09	10.0	B	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
			SB	Left		0	-	-	-	-
				Through	LTR	0	-	-	-	-
				Right		5	0.00	0.0	A	0.0

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

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

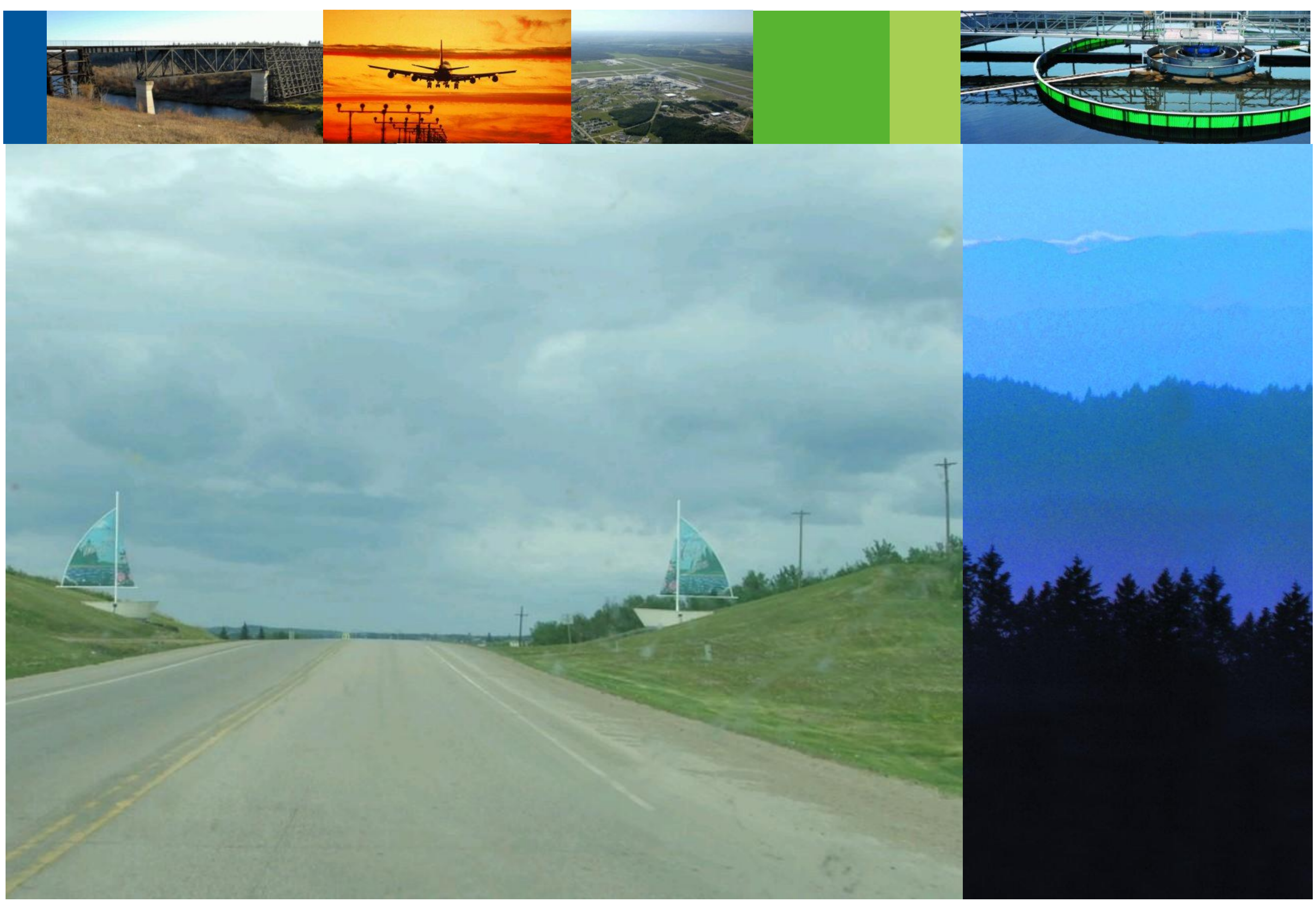


Table of Contents

List of Tables

List of Figures

1 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.

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

YEAR	NUMBER OF COLLISIONS	NUMBER OF 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**

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.

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

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
4	55 STREET & 54 AVENUE	21	0	5	5	4	7
	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	9	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	5	1	0	1	1	2

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 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.

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 2.1
HIGH COLLISION LOCATIONS

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.

5 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

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 5.1
CHRYSLER INTERSECTION

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.

A Appendix A - Alberta Transportation Data

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY EVENT
1315753	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				6/2/2005	11	2	2	1	0	2	8
1315753	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				6/2/2005	11	2	2	1	0	2	8
1637677	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				1/3/2005	13	2	4	3	0	2	8
1637677	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				1/3/2005	13	2	4	3	0	2	8
1637677	2005	3	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				1/3/2005	13	2	4	3	0	2	8
1637677	2005	4	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				1/3/2005	13	2	4	3	0	2	8
1637706	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE			INTERSECTION BY LAKELAND INN & EXTRA FOODS	1/11/2005	16	3	2	0	0	2	5
1637706	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE			INTERSECTION BY LAKELAND INN & EXTRA FOODS	1/11/2005	16	3	2	0	0	2	5
1637722	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				7/21/2005	10	2	2	1	0	2	5
1637722	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				7/21/2005	10	2	2	1	0	2	5
1637738	2005	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				1/22/2005	15	3	2	0	0	2	8
1637738	2005	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				1/22/2005	15	3	2	0	0	2	8
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	HWY 28	54 AVENUE	28	1		54 AVENUE				8/30/2005	13	3	3	0	0	2	8
1720811	2005	3	1137	1	COLD LAK	HWY 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	HWY 28	54 AVENUE	28	1		54 AVE				3/10/2006	9	3	2	0	0	2	5
1778739	2006	2	1137	1	COLD LAK	HWY 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	COLD LAK	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	COLD LAK	HWY 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	0	0	2	5
Z541958	2007	1	1137	1	COLD LAK	HWY 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	HWY 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	0	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	0	0	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	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				6/10/2008	16	3	3	0	0	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	0	0	2	8
2041736	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE			IN CITY - DO NOT PLOT	1/29/2008	9	3	3	0	0	2	8
2041736	2008	3	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE			IN CITY - DO NOT PLOT	1/29/2008	9	3	3	0	0	2	8
2041750	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54AVE			IN CITY - DO NOT PLOT	1/30/2008	14	3	2	0	0	2	13
2041750	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54AVE			IN CITY - DO NOT PLOT	1/30/2008	14	3	2	0	0	2	13
2041785	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				2/29/2008	1	2	1	1	0	2	1
2041785	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				2/29/2008	1	2	1	1	0	2	1
2209654	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				11/23/2008	11	3	2	0	0	2	8
2209654	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				11/23/2008	11	3	2	0	0	2	8
2209688	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE			(IN CITY)	10/2/2008	17	3	2	0	0	2	97
2209688	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE			(IN CITY)	10/2/2008	17	3	2	0	0	2	97
2209750	2008	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1			1.5	54 AVE		11/3/2008	10	3	2	0	0	2	97
2209750	2008	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1			1.5	54 AVE		11/3/2008	10	3	2	0	0	2	97
2307453	2009	1	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				2/22/2009	12	3	2	0	0	2	8
2307453	2009	2	1137	1	COLD LAK	HWY 28	54 AVENUE	28	1		54 AVE				2/22/2009	12	3	2	0	0	2	8

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
1315753	1	1	1	2	2	1	1	24	F		10	1	97	2	1		1	1	1	1						
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	60	F	8	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	M	8	6	1	97	2	1		1	1	1	3						
1637706	1	1	1	2	2	1	1	44	M	8	1	3	97	2	1		97	1	1	3						
1637706	1	1	1	2	2	1	2	30	M	3	9	3	97	2	1		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	3	41	F	8	6	1	97	2	1		1	1	1	3						
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	17	M	4	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						
1720963	1	1	1	2	2	1	1	31	F	8	6	1	97	2	97		1	1	1	1						
1720963	1	1	1	2	2	1	2	41	F	4	1	1	97	2	97		1	1	1	1						
1720982	1	1	1	2	2	1	5	36	M	1	10	1	1	2	97		1	4	2	2	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	97	97	97		97	97	97	97						
1721219	1	1	1	2	2	1	1	41	M	3	97	97	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	M	8	97	3	97	2	1		1	1	1	1						
1721287	97	7	1	2	2	1	2	43	M	3	97	3	97	2	1		1	1	1	1						
1721236	1	1	1	2	2	1	2	52	M	1	1	1	97	1			1	1	1	2						
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	F	8	1	1	97	2	1		1	1	1	2						
1721296	1	1	1	2	2	1	3	16	M	2	9	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	7	1	2	2	1	1	26	M	6	1	1	97	2	1		97	1	1	99						
1778740	97	7	1	2	2	1	2	16	F	1	10	1	97	2	1		97	1	1	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	M	3	9	1	97	2	1		1	1	1	1						
1778861	1	1	1	2	2	1	1	61	F	3	1	1	97	2	1		1	1	1	1						
1778861	1	1	1	2	2	1	3	48	M		97	1	97	2	1		97	1	1	1						
1778913	1	1	1	2	2	1	1	17	M	7	1	1	1	2	1		1	1	1	1						
1778913	1	1	1	2	2	1	1	18	F	7	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	1	18	F	8		1	1	2				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						
Z563444	1	1	1	2	2	1	1	24	M	5		1	1	2				1	1	1						
Z586822	1	1	1	2	2	1	1	46	F	8		3	97	2				1	1	3						
Z586822	1	1	1	2	2	1	1	53	F	2		3	97	2				1	1	3						
1721140	97	1	1	2	2	1	1	54	M	97	1	1	97	3	97		1	1	1	3						
1721140	97	1	1	2	2	1	2	42	F	6	4	1	97	3	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	57	F	3	9	1	1	2	1		1	1	1	1						
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	3	30	M	3	97	97	97	97	97		97	97	97	97						
1873122	97	1	1	4	2	1	2	49	M	97	97	97	97	97	97		97	97	97	97						
1873126	97	1	1	2	2	1	2	46	M	8	1	1	97	2	1		1	1	1	1						
1873126	97	1	1	2	2	1	1	26	F	2	9	1	97	2	1		1	1	1	1						
2040867	1	1	1	2	2	1	1	64	F	5	1	1	1	2	1		1	1	1	1						
2040867	1	1	1	2	2	1	2	29	M	1	10	1	1	2	1		1	1	1	1						
2041156	97	7	7	97	97	1	3	48	F	4	1	3	97	2	1		1	4	4	3						
2041156	97	7	7	97	97	1	1	16	F		6	3	97	2	1		1	4	4	3						
2041861	1	1	1	2	2	1	3	16	M	8	9	1	1	2	1		1	1	1	2						
2041861	1	1	1	2	2	1	1	51	M		1	1	1	2	1		1	1	1	2						
Z541958	1	1	1	2	2	1	2	43	M	4		1	1	2				1	4	3						
Z541958	1	1	1	2	2	1	2	18	M			1	1	2				1	4	3						
2041003	97	1	1	2	1	1	2	43	M	2	1	3	97	3	97		1	4	4	3						
2041003	97	1	1	2	1	1	2	24	M	8	1	3	97	1			1	4	4	3						
2041040	1	1	1	2	2	1	1	20	M	8	97	1	1	2	1		1	1	1	1						
2041040	1	1	1	2	2	1	1	41	F	4	1	1	1	2	1		1	1	1	1						
2041040	1	1	1	2	2	1	3	36	F	4	1	1	1	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	97	1	1	2	2	1	1	32	F	4	1	1	97	2	1		97	1	1	1						
2041049	97	1	1	2	2	1	3	23	F	8	97	97	97	97	97		97	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	M	2	10	1	1	1			1	1	1	1						
2041539	97	1	1	2	2	1	1	23	F	8	1	1	97	2	1		97	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	97	7	7	97	97	1	2	37	F	4	1	1	2	2	1		1	1	5	3						
2041736	97	7	7	97	97	1	2	68	M	8	1	1	2	2	1		1	1	5	3						
2041736	97	7	7	97	97	1	2	36	M	5	1	1	97	2	1		1	1	5	3						
2041750	97	1	1	4	2	1	2	25	M	4	8	1	1	2	97		1	1	1	3						
2041750	97	1	1	4	2	1	1	37	M	8	1	1	1	2	97		1	1	1	3						
2041785	97	1	1	2	2	1	2	51	M	1	99	3	97	2	1		2	1	1	1						
2041785	97	1	1	2	2	2	7	18	F			3	97	2	1	2	97		1	1						
2209654	1	1	1	2	2	1	1	23	M	4	1	1	99	2	1		1	1	97	3						
2209654	1	1	1	2	2	1	1	82	M		97	97	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						
2209688	1	1	1	2	1	1	3				97	1	99	2	1		99	1	1	1						
2209750	97	1	1	2	2	1	1	16	M	97	10	1	99	1			1	1	2	2						
2209750	97	1	1	2	2	1	2	49	M	1	1	1	99	1			1	1	2	2						
2307453	1	1	1	2	2	1	3	42	F	4	1	1	99	2	1		1	1	1	2						
2307453	1	1	1	2	2	1	1	18	F	8	6	1	99	2	1		1	1	1	2						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY EVENT
1637703	2005	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL	1/13/2005	13	3	2	0	0	2	8
1637703	2005	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL	1/13/2005	13	3	2	0	0	2	8
1637726	2005	1	1137	1	COLD LAK	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	0	0	2	3
1721007	2005	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL				11/2/2005	17	3	3	0	0	2	8
1721007	2005	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL				11/2/2005	17	3	3	0	0	2	8
1721007	2005	3	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		TRI CITY MALL				11/2/2005	17	3	3	0	0	2	8
1721193	2005	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			AT TRICITY MALL INTERSECTION NORTHBOUND	12/4/2005	16	2	2	1	0	2	8
1721193	2005	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			AT TRICITY MALL INTERSECTION NORTHBOUND	12/4/2005	16	2	2	1	0	2	8
1721234	2005	1	1137	1	COLD LAK	HWY 28	TRI CITY 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	TRI CITY 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
1873421	2006	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL EXIT/ENTRANCE	12/15/2006	18	3	2	0	0	2	8
1873421	2006	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI CITY MALL EXIT/ENTRANCE	12/15/2006	18	3	2	0	0	2	8
2040868	2007	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					@ TRI CITY MALL	12/14/2007	15	3	2	0	0	2	12
2040868	2007	2	1137	1	COLD LAK	HWY 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					@ TRI CITY MALL INTERSECTION	12/10/2007	7	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
Z449583	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
Z449583	2007	2	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
2040958	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		65AVE			TRI CITY MALL LIGHTS	1/9/2008	18	3	2	0	0	1	8
2040958	2008	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		65AVE			TRI CITY MALL LIGHTS	1/9/2008	18	3	2	0	0	1	8
2041056	2008	1	1137	1	COLD LAK	HWY 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					TRI CITY 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	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
2041800	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI-CITY MALL INTERSECTION - IN CITY DO NOT PLOT	3/4/2008	16	2	2	1	0	2	8
2041800	2008	2	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1					TRI-CITY MALL INTERSECTION - IN CITY DO NOT PLOT	3/4/2008	16	2	2	1	0	2	8
2083165	2008	1	1137	1	COLD LAK	HWY 28	TRI CITY MALL INTERSECTION	28	1		66 AVE			TRI CITY MALL	2/2/2008	12	3	2	0	0	2	3
2083165	2008	2	1137	1	COLD LAK	HWY 28	TRI CITY 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

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
1637703	1	1	1	2	2	1	3	73	M	4	1	1	97	2	1		1	1	1	3						
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		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	19	M	8	97	1	97	2	1		1	1	1	1						
1721193	1	1	1	2	2	1	1	50	F	4	99	99	99	2	1		99	97	1	3						
1721193	1	1	1	2	2	1	4	18	M	8	99	99	99	2	1		99	97	1	3						
1721234	1	1	1	2	2	1	2	31	M	8	6	1	1	2	1		1	1	1	2						
1721234	1	1	1	2	2	1	3	27	M	4	1	1	1	2	1		1	1	1	2						
Z524820	97	7	1	2	1	1	1	19	F	9		1	97	1				1	1	1						
Z524820	97	7	1	2	1	9	13											97								
1778727	1	1	1	2	2	1	2	34	M	7	97	1	97	2	1		1	1	1	97						
1778727	1	1	1	2	2	1	1	49	M	4	97	1	97	2	1		1	1	1	97						
1778742	1	7	1	2	2	1	3	34	F	8	1	1	97	2	97		1	98	1	3						
1778742	1	7	1	2	2	1	3	31	F	4	1	97	97	2	97		1	98	1	3						
1778780	1	1	1	2	2	1	1	37	M	8	99	1	97	2	1		1	1	2	2						
1778780	1	1	1	2	2	1	1	60	F	9	1	1	97	2	1		1	1	2	2						
1778780	1	1	1	2	2	1	1	45	F	4	1	1	97	2	1		1	1	2	2						
1778817	1	1	1	2	1	1	3	23	F	4	1	1	97	2	1		1	1	1	1						
1778817	1	1	1	2	1	1	1	18	F	8	6	1	97	6	1		1	1	1	1						
1873196	1	1	1	2	2	1	2	37	M	4	1	3	2	2	1		1	1	2	2	1	1				
1873196	1	1	1	2	2	1	2	17	M	8	98	97	97	2	1		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	7	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	7	7	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	F	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	9					1	1	41	F	4	1	1	97	2	1		97	98	1	3						
2041888	9					1	3	48	F		6	1	97	2	1		97	98	1	3						
Z449583	97	7	7	97	97	1	3	56	M	8		1	97	1				97	4	3						
Z449583	97	7	7	97	97	1	2	29	M			1	97	1				97	4	3						
2040958	97	1	1	2	2	1	2	68	M	4	1	3	2	2	1		1	1	1	1						
2040958	97	1	1	2	2	1	2			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	M	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	97	1	1	4	2	1	2	19	M	8	6	1	97	1			1	1	1	1						
2041562	1	1	1	3	2	1	1	21	F	8	1	1	97	2	1		1	1	1	1						
2041562	1	1	1	3	2	1	3	46	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						
2041757	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	7	1	1	1	2	1		1	1	4	3						
2041760	97	7	7	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						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY 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	0	0	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	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVENUE			CENTRE	11/29/2005	12	3	2	0	0	2	8
1721176	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVENUE			CENTRE	11/29/2005	12	3	2	0	0	2	8
1721178	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVENUE				11/29/2005	14	2	3	2	0	2	8
1721178	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVENUE				11/29/2005	14	2	3	2	0	2	8
1721178	2005	3	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVENUE				11/29/2005	14	2	3	2	0	2	8
Z542325	2005	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVE			@ INTERSECTION NW SIDE HIT L POLE WEST OF HWY 28	11/29/2005	11	3	1	0	0		9
Z542325	2005	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVE			@ INTERSECTION NW SIDE HIT L POLE WEST OF HWY 28	11/29/2005	11	3	1	0	0		9
1778756	2006	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				5/1/2006	9	3	2	0	0	2	8
1778756	2006	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				5/1/2006	9	3	2	0	0	2	8
1778793	2006	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				7/21/2006	15	2	2	1	0	2	8
1778793	2006	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				7/21/2006	15	2	2	1	0	2	8
1873172	2006	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVE			MIDDLE OF INTERSECTION	8/29/2006	17	2	2	1	0	1	3
1873172	2006	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50TH AVE			MIDDLE OF INTERSECTION	8/29/2006	17	2	2	1	0	1	3
1528741	2007	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			CENTRE AVE	10/15/2007	11	3	2	0	0	2	12
1528741	2007	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE			CENTRE AVE	10/15/2007	11	3	2	0	0	2	12
1721047	2007	1	1137	1	COLD LAK	HWY 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 28	50 AVENUE	28	1		50 AVE NB				2/23/2007	13	3	2	0	0	2	5
1873170	2007	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/12/2007	7	3	2	0	0	2	5
1873170	2007	2	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				3/12/2007	7	3	2	0	0	2	5
2040921	2007	1	1137	1	COLD LAK	HWY 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				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	0	0	2	13
2041275	2008	1	1137	1	COLD LAK	HWY 28	50 AVENUE	28	1		50 AVE				7/31/2008	9	3	2	0	0	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	0	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

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	8	1	1	97	2	1		1	1	1	3						
1637727	1	0	2	3	2	1	1	59	M	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	M	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	M		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	M	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	M	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	M	4	1	1	97	4	97		1	1	2	2						
1778756	1	1	2	3	2	1	2	48	M	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	M	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	97	97	97						
2040921	1	1	1	2	2	1	2	32	M		97	97	97	97	97		97	97	97	97						
2040982	1	1	1	2	2	1	1	33	M	8	1	3	97	2	1		1	1	1	3						
2040982	1	1	1	2	2	1	2	34	M		8	3	97	2	1		1	1	1	3						
2041275	97	1	1	3	2	1	1	53	F	8	97	1	97	2	1		1	1	1	1						
2041275	97	1	1	3	2	1	2	87	M	2	97	1	97	2	1		1	1	1	1						
2209626	1	1	1	8	2	1	3	57	M	5	1	1	99	2	1		1	1	1	1						
2209626	1	1	1	8	2	1	3	30	F	7	11	1	99	2	1		1	1	1	1						
Z586385	1	1	1	8	2	1	5	30	M	6		1	1	2				1	1	1						
Z586385	1	1	1	8	2	9	13											97								

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY 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
1873422	2006	1	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE		5	55 ST	SERVICE ROAD INTERSECTION	12/15/2006	18	3	2	0	0	2	97
1873422	2006	2	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE		5	55 ST	SERVICE ROAD INTERSECTION	12/15/2006	18	3	2	0	0	2	97
1721138	2007	1	1137	1	COLD LAK	55 STREET	54 AVENUE							INTERSECTION@MACH 5451 55 ST	2/8/2007	7	3	2	0	0	2	3
1721138	2007	2	1137	1	COLD LAK	55 STREET	54 AVENUE							INTERSECTION@MACH 5451 55 ST	2/8/2007	7	3	2	0	0	2	3
1721145	2007	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				2/2/2007	18	3	2	0	0	2	5
1721145	2007	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	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
2041398	2008	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 SE	54 AVE				12/31/2008	15	3	2	0	0	1	8
2209660	2008	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				11/25/2008	14	3	2	0	0	2	12
2209660	2008	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				11/25/2008	14	3	2	0	0	2	12
2209759	2008	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				9/8/2008	8	2	2	3	0	2	8
2209759	2008	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				9/8/2008	8	2	2	3	0	2	8
2041420	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	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	0	2	3
2307225	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST				4/18/2009	14	3	2	0	0	2	7
2307225	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST				4/18/2009	14	3	2	0	0	2	7
2307240	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				7/3/2009	12	3	2	0	0	2	8
2307240	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			55 ST	54 AVE				7/3/2009	12	3	2	0	0	2	8
2307411	2009	1	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST				9/2/2009	17	3	3	0	0	2	5
2307411	2009	2	1137	1	COLD LAK	55 STREET	54 AVENUE			54 AVE	55 ST				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

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	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	M	3	9	1	1	2	1		1	1	1	1	2					
1873037	97	1	1	2	1	1	1	17	M	8	3	1	1	2	1		1	1	1	1						
2040903	97	1	1	2	2	1	1	17	M	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	M	8	99	97	97	97	97		97	97	97	97						
2041289	97	7	7	97	97	1	2	24	M		99	97	97	97	97		97	97	97	97						
2041359	97	1	1	2	1	1	1	50	M	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	M	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	M	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	M	6	99	1	1	97	97		99	97	97	97						
2041650	1	1	1	2	2	1	3	28	M	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	99	1	1	3	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		14	1	1	1			1	3	2	2	1	1	1	2	1	2
2307240	97	1	1	2	2	1	5	45	M	8	99	1	1	2	1		1	1	2	2	1	1	1	5	1	97
2307240	97	1	1	2	2	1	2	52	M	4	1	1	1	2	1		1	1	2	2						
2307411	1	1	1	2	2	1	2	75	M	8	9	1	1	2	1		1	1	1	1						
2307411	1	1	1	2	2	1	2	18	M	11	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						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY 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

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
1315702	1	1	1	2	2	1	1	25	F	8	11	3	97	2	1		1	1	98	3						
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	M	5	8	1	97	1			1	1	1	1						
1721245	97	7	7	97	97	1	3	43	M	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	M	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	M	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	M	4	1	1	97	3	97		1	1	1	3						
1873463	97	0	1	2	2	8	17	21	M	8	1	1	97	3	97		1	1	1	3						
2041546	97	1	1	2	1	1	3	48	M	4	3	1	97	3	1		97	1	1	1						
2041546	97	1	1	2	1	1	3	27	M	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	M	5	8	1	97	97	97		97	1	1	1						
Z586393	97	7	7	97	97	1	1	21	M	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	M	8	6	1	1	97	97		97	1	1	3						
2307447	97	1	1	2	1	1	1	18	M	3	1	1	1	6	1		1	1	1	1						
2307447	97	1	1	2	1	1	2	25	M	4	8	1	1	97	97		97	1	1	1						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY EVENT
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 NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	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	M	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	M	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	M	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	M	6	1	1	1	3	1		1	1	1	1						
1721077	97	1	1	2	1	1	1	17	M	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	M	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						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY 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	HWY 28	28	1		50 ST				8/9/2005	7	3	2	0	0	2	8
1720829	2005	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				8/9/2005	7	3	2	0	0	2	8
1720926	2005	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				11/8/2005	13	2	2	1	0	2	3
1720926	2005	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				11/8/2005	13	2	2	1	0	2	3
1721003	2005	1	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50 ST				11/4/2005	17	3	2	0	0	2	8
1721003	2005	2	1137	1	COLD LAK	50 STREET	HWY 28	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	HWY 28	28	1		50ST			IN CITY	12/9/2008	10	3	1	0	0		1
Z680603	2008	2	1137	1	COLD LAK	50 STREET	HWY 28	28	1		50ST			IN CITY	12/9/2008	10	3	1	0	0		1

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	7	97	97	97	97	97		97	97	97	97						
1721045	1	1	1	1	1	1	3	34	M	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	M	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	M	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								

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY 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

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	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						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY EVENT
1552910	2005	1	1137	1	COLD LAK	50 STREET	43 AVENUE			43 AVE	50 ST			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 ST			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 ST			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 ST			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 LANE	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 LANE	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

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY 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

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	7	97	3	2	3	1		1	1	1	1						
1637846	1	1	1	4	1	1	2	69	M	4	8	1	1	1			1	1	1	1						
1637846	1	1	1	4	1	1	1	25	F	3	1	1	1	1			1	1	1	1						
1720868	1	1	1	2	2	1	1	19	M	8	6	1	1	3	1		1	1	1	1						
1720868	1	1	1	2	2	1	2	20	M	4	1	1	1	3	1		1	1	1	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	M	6	1	1	1	1			1	1	1	3						
1873362	1	1	1	1	1	1	2	37	F	4	8	1	1	1			1	1	1	3						
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	M	2	1	1	97	1			1	1	1	1						
2041508	97	7	7	97	97	1	2	78	F	4	8	1	97	1			1	1	1	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	M	4	1	1	1	3	1		1	1	4	3						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY EVENT	SPECIAL FACILITY
1637732	2005	1	1137	1	COLD LAK	49 STREET	51 AVENUE			49 STREET	51 AVENUE				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

COLLISION CASE NUMBER	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	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	M	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	M		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	M	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	M	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						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY EVENT	SPECIAL FACILITY
1721201	2005	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVENUE			MACDONALD/TIM HORTON INTERSECTION	12/10/2005	12	2	2	2	0	2	3	1
1721201	2005	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVENUE			MACDONALD/TIM HORTON INTERSECTION	12/10/2005	12	2	2	2	0	2	3	1
1778737	2006	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				3/8/2006	8	3	2	0	0	2	8	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	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
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	COLD LAK	HWY 28	43 AVENUE	28	1		43AVE			AT INTERSECTION OF HWY28& 43AVE	2/17/2008	13	3	2	0	0	2	8	97
2040989	2008	2	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43AVE			AT INTERSECTION OF HWY28& 43AVE	2/17/2008	13	3	2	0	0	2	8	97
2209616	2008	1	1137	1	COLD LAK	HWY 28	43 AVENUE	28	1		43 AVE				11/12/2008	13	3	2	0	0	2	8	1
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 NUMBER	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE SPEEDS
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	M	5	1	1	1	1			1	1	1	1						
2209686	1	1	2	2	1	3	56	M	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						

COLLISION CASE NUMBER	CASE YEAR	OBJECT NUMBER	POLICE SERVICE	IN/ NEAR	CITY NAME	NORTH/SOUTH ROAD NAME	EAST/WEST ROAD NAME	ON HWY #	AT INTERSECTION 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)	OCCURRENCE HOUR	COLLISION SEVERITY	NUMBER OF VEHICLES	NUMBER INJURED	NUMBER FATALITIES	HIT AND RUN	PRIMARY 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	HWY 28	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	HWY 28	55 AVENUE	28	1		55 AVE				11/7/2006	15	3	1	0	0	2	1
1721231	2006	1	1137	1	COLD LAK	HWY 28	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	HWY 28	55 AVENUE	28	1		55 AVE				2/6/2008	8	2	2	1	0	2	5
2209659	2008	1	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				11/25/2008	12	2	2	2	0	2	3
2209659	2008	2	1137	1	COLD LAK	HWY 28	55 AVENUE	28	1		55 AVE				11/25/2008	12	2	2	2	0	2	3
2307093	2009	1	1137	1	COLD LAK	HWY 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	HWY 28	55 AVENUE	28	1					SB NEAR HUSKY SS	11/7/2009	17	3	2	0	0	2	8

COLLISION CASE NUMBER	SPECIAL FACILITY	ROAD ALIGNMENT A	ROAD ALIGNMENT B	ROAD CLASS	COLLISION LOCATION	OBJECT TYPE	OBJECT ID	DRIVER/PED AGE	DRIVER/PED SEX	POINT OF IMPACT	DRIVER ACTION	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	TRAILER TYPE	VEHICLE CONDITION/ CONTRIBUTING FACTORS	UNSAFE 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						

B Appendix B - Collision Analysis Summaries

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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

Collision by Day

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		**29**	**100%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Month

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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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		**13**	**100%**

Collision by Day

DAY		NO. OF COLLISIONS	% 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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Month

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		**13**	**100%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

51 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	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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

52 STREET & 50 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	4	36%
2006	2	18%
2007	2	18%
2008	1	9%
2009	2	18%
Total	**11**	**100%**

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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

49 STREET & 51 AVENUE COLLISION ANALYSIS

Collision by Year

YEAR	NO. OF COLLISIONS	% OF TOTAL
2005	2	20%
2006	1	10%
2007	2	20%
2008	0	0%
2009	5	50%
Total	**10**	**100%**

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%**

Collision by Hour

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 by Type

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

HWY 28 & 43 AVENUE COLLISION ANALYSIS

Collision by Year

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%**

Collision by Hour

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 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	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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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%**

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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
1	January	1	10%
2	February	1	10%
3	March	0	0%
4	April	1	10%
5	May	0	0%
6	June	1	10%
7	July	0	0%
8	August	0	0%
9	September	1	10%
10	October	0	0%
11	November	5	50%
12	December	0	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%**

Collision by Hour

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%**

Collision 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

COLD LAKE TRANSPORTATION STUDY
Project No: 2010-3050
Date: February 15, 2011

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%**

Collision by Light Condition - Natural Light

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

Table of Contents

List of Tables

List of Figures

1 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

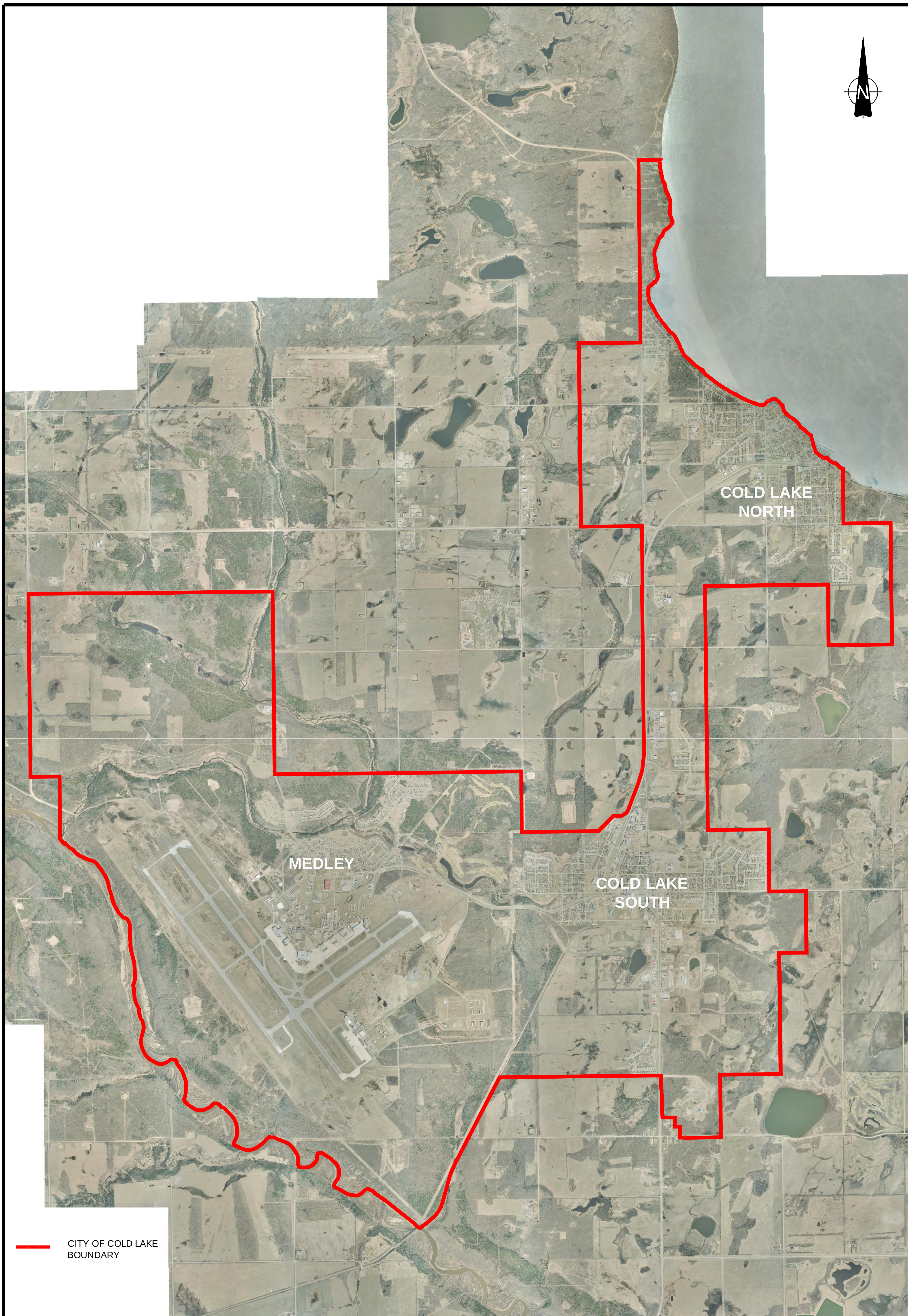
The objectives for the traffic volume forecast and analysis were:

- 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.

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.



Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.1
EXISTING (2010) DAILY TRAFFIC VOLUMES

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DATE: APRIL 2011
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SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.2
5 YEAR (2015) DAILY BACKGROUND TRAFFIC VOLUMES

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DATE:	APRIL 2011
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CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.3
10 YEAR (2020) DAILY BACKGROUND TRAFFIC VOLUMES

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PROJECT NO: 2010-3050
DATE: APRIL 2011
APPROVED:
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CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.4
15 YEAR (2025) DAILY BACKGROUND TRAFFIC VOLUMES

Associated Engineering

PROJECT NO: 2010-3050
DATE: APRIL 2011
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TRANSPORTATION STUDY

FIGURE 3.5
20 YEAR (2030) DAILY BACKGROUND TRAFFIC VOLUMES

4 Traffic Forecast: Future Development Traffic Volumes

4.1 FUTURE DEVELOPMENTS

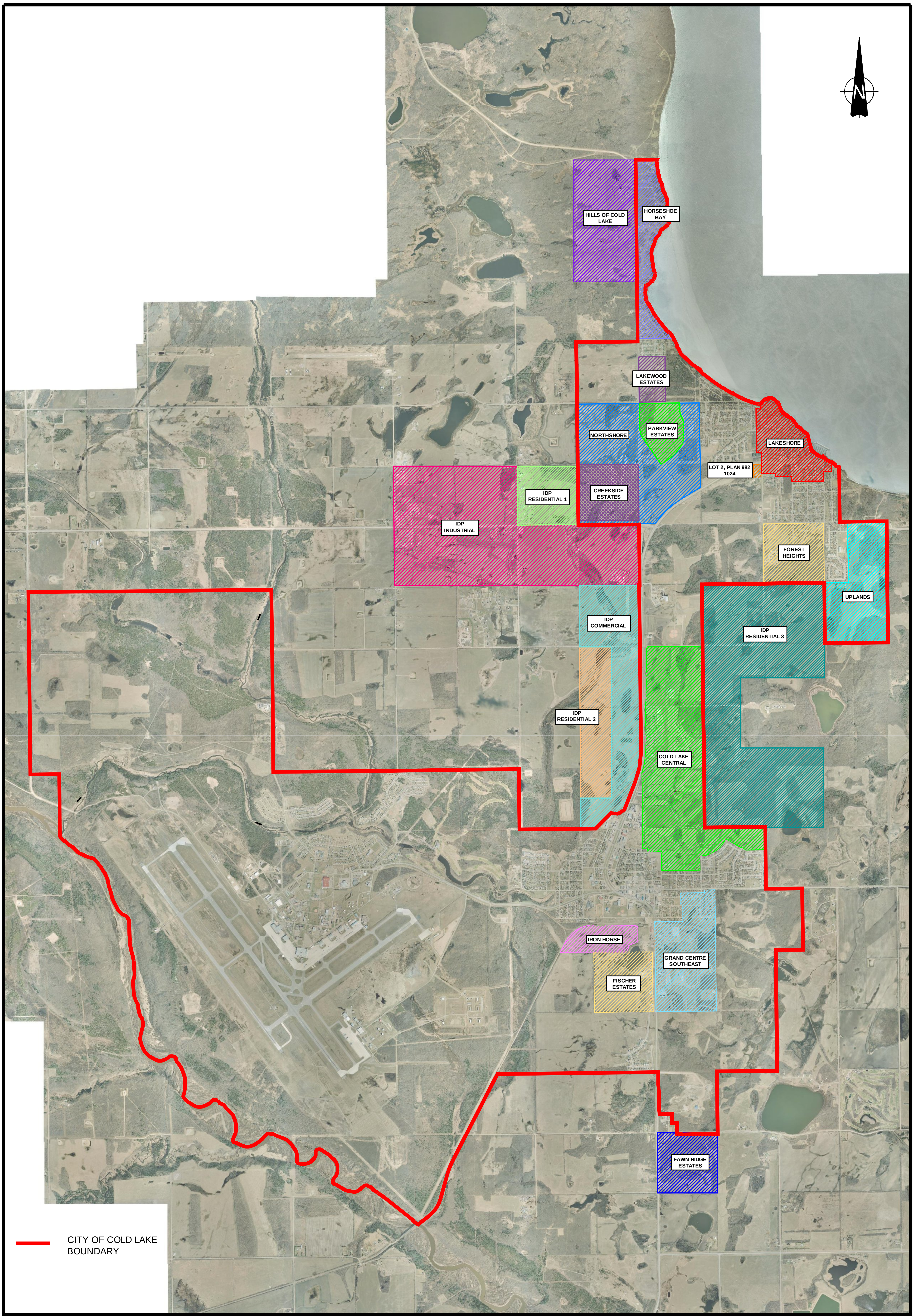
There are 20 development/redevelopment projects identified for the City and surrounding area in the next 20 years; 13 are located within the City and seven are located outside the City, in the MD of Bonnyville. The development/redevelopment projects are shown in Figure 4.1 and are discussed in the following 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 ¼ 22-63-2-4)
- **Parkview Estates**: 36.8 hectares located in Cold Lake North (NW 23-63-2-4).



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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.

Table 4-1
Development Phasing Assumption

Development / Redevelopment	Land Use	5-year (2015) Horizon	10-year (2020) Horizon	15-year (2025) Horizon	20-year (2030) Horizon
Fischer Estates	Residential	0%	0%	25%	50%
	Commercial	0%	0%	25%	50%
Iron Horse	Residential	0%	0%	25%	50%
Cold Lake Central	Residential	25%	50%	75%	100%
	Commercial	50%	100%	100%	100%
Grand Centre Southeast	Residential	25%	50%	75%	100%
	Industrial	25%	50%	75%	100%
Forest Heights	Residential	0%	0%	25%	50%
Northshore	Residential	25%	50%	75%	100%
	Commercial	25%	50%	75%	100%
	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%
Uplands	Residential	25%	50%	75%	100%
	Health Services & Mixed Use	25%	50%	75%	100%
Lakeshore Area Redevelopment	All	25%	50%	75%	100%

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%
Parkview Estates	Residential	25%	50%	75%	100%
	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.

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

1 hectare = 107,639.1 sq.ft.
1 hectare = 2.4711 acre

Table 4.2 Future Developments Trip Generation

Trip Generation - ITE Trip Generation Handbook

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Fischer	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
	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
	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
						Total Dwelling Units	744						**Total Trips:**	**884**	**470**	**415**	**992**	**458**	**534**
						Total Commercial/Industrial (1000 sq.ft)	313												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Iron Horse	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
	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**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Cold Lake Central Area	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
	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
	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
						Total 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												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Grand Centre SE	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
	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
						Total Dwelling Units	431						**Total Trips:**	**559**	**301**	**258**	**694**	**296**	**398**
						Total Commercial/Industrial (1000 sq.ft)	380.1												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Forest 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
	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**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Northshore	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 Use 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
		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
	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
		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
						Total Dwelling Units	1,716						**Total Trips:**	**3,516**	**2,229**	**1,286**	**3,394**	**1,305**	**2,089**
						Total Commercial/Instutional (1000 sq.ft)	1,338.5												
						School Site (Students)	1,958												

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%

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

1 hectare = 107,639.1 sq.ft.
1 hectare = 2.4711 acre

Table 4.2 Future Developments Trip Generation

Trip Generation - ITE Trip Generation Handbook

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	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	23%	77%	23	19	4	27	6	21
						Total Commercial/Industrial (1000 sq.ft)	15.4						**Total Trips:**	**23**	**19**	**4**	**27**	**6**	**21**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	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	63%	37%	39	10	29	49	31	18
						Total Dwelling Units	42						**Total Trips:**	**39**	**10**	**29**	**49**	**31**	**18**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Uplands	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
	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
	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
						Total Dwelling Units	1,384						**Total Trips:**	**926**	**246**	**680**	**1,108**	**689**	**419**
						Total Health Care & Mixed Use (1000 sq.ft)	269.1												

3. Maximum site coverage for Health Care & Mixed Use assumed to be 50%
4. AM directional split for Nursing Home, by 1000 sq. ft., not available. Assume reverse of PM directional split

TO SUBTRACT

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Lakeshore ARP	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	23%	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	23%	77%	6	5	1	7	2	6
	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
	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
	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
						Total Commercial (1000 sq.ft)	27.7						**Total Trips:**	**464**	**246**	**218**	**94**	**33**	**61**
						Total Fire Hall / Community Hall (1000 sq.ft)	18.4												

5. For Fire Hall, assumed same trip rate as future community centre. Trips will remain the same essentially.

TO ADD

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Lakeshore ARP	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	67%	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	58%	42%	4	1	3	6	3	2
	904 10 Street	9	du	**223:** Mid-Rise Apartment	-	Dwelling Units	9	0.3	31%	69%	0.39	58%	42%	3	1	2	4	2	2
	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
	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
	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
	Fire Hall / Community Hall	0.34	hec	**495:** Recreational Community Center [8]	50%	1000 sq.ft	18.4	22.88	50%	50%	10 % of All Day			422	211	211	42	21	21
						Total Dwelling Units	80						**Total Trips:**	**475**	**225**	**251**	**90**	**51**	**38**
						Total City Park (Acres)	3.8												
						Total Fire Hall / Community Hall (1000 sq.ft)	18.4												

6. Average rate used instead of equation since equation results in negative trip values.
7. Trip rate for park is for all-day, weekday. PM trips assumed to be 10% of all-day trips (presented under AM Trips)
8. Trip rate for community centre is for all-day, weekday. PM trips assumed to be 10% of all-day trips (presented under AM Trips). To be used for special events only.

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Lakewood	Low Density Residential	153	du	**210:** Single Family Residential	-	Dwelling Units	153	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	117	29	87	157	99	58
						Total Dwelling Units	153						**Total Trips:**	**117**	**29**	**87**	**157**	**99**	**58**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Creekside	Low Density Residential	594	du	**210:** Single Family Residential	-	Dwelling Units	594	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	425	106	319	533	336	197
	Medium Density Residential	196	du	**230:** Residential Condo/Townhouse	-	Dwelling Units	196	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	88	15	73	104	70	34
						Total Dwelling Units	790						**Total Trips:**	**514**	**121**	**392**	**637**	**406**	**232**

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

1 hectare =	107,639.1	sq.ft.
1 hectare =	2.4711	acre

Table 4.2 Future Developments Trip Generation

Trip Generation - ITE Trip Generation Handbook

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						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
	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
						Total Dwelling Units	367						**Total Trips:**	**467**	**236**	**232**	**553**	**265**	**288**
						Total Commercial/Industrial (1000 sq.ft)	141.7												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% 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
						Total Dwelling Units	300						**Total Trips:**	**219**	**55**	**165**	**288**	**182**	**107**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	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
						Total Dwelling Units	54						**Total Trips:**	**42**	**11**	**31**	**55**	**35**	**20**

9. Information, including dwelling units, trip generation rates and percentage splits, as per 2010 TIA

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% 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
						Total Dwelling Units	519						**Total Trips:**	**310**	**69**	**241**	**395**	**254**	**141**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						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
						Total Dwelling Units	696						**Total Trips:**	**405**	**91**	**314**	**510**	**328**	**183**

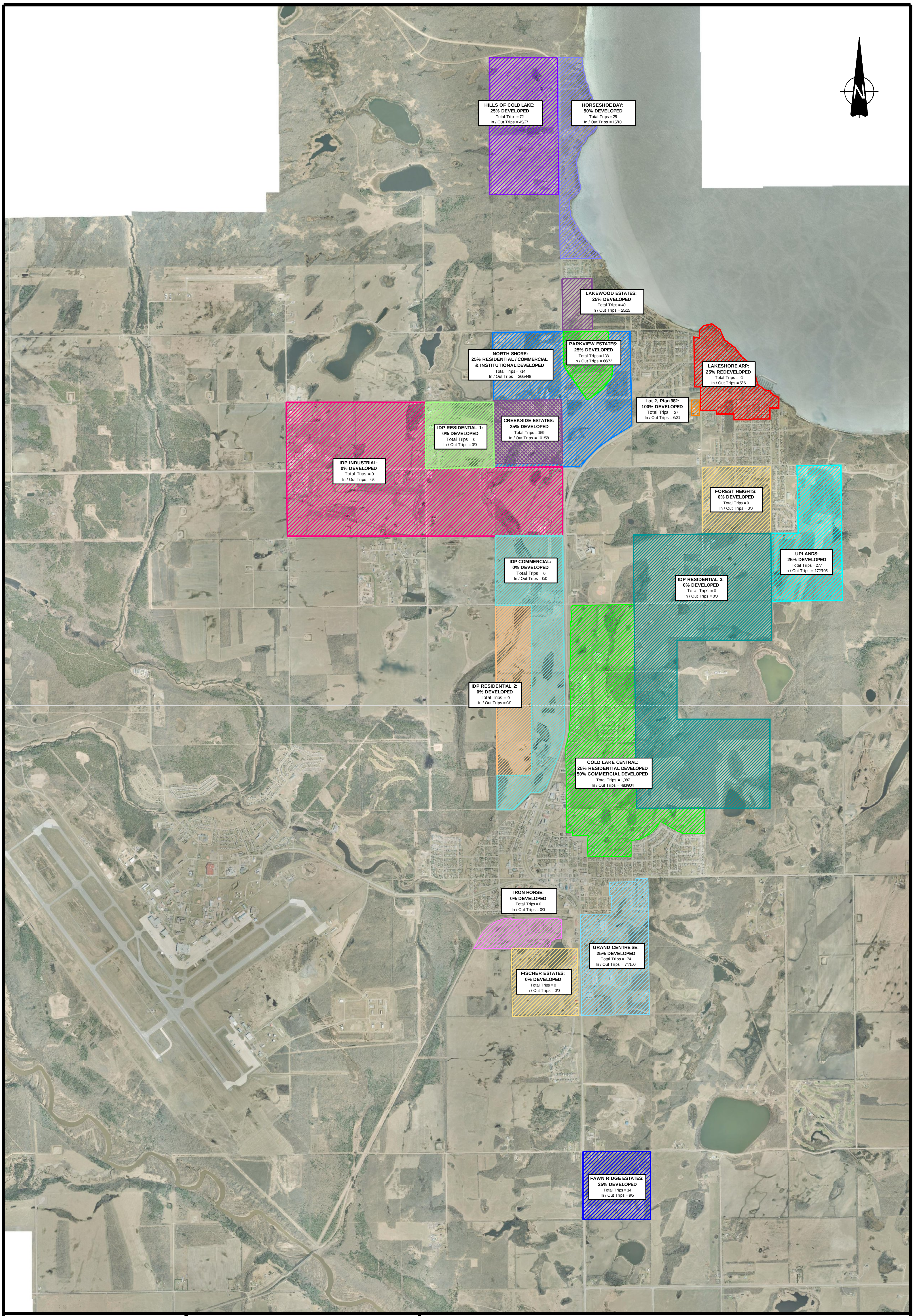
Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
IDP - Residential 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	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
						Total Dwelling Units	3,447						**Total Trips:**	**1,792**	**411**	**1,381**	**2,077**	**1,331**	**746**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						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
						Total Commercial/Industrial (1000 sq.ft)	2,109						**Total Trips:**	**1,079**	**885**	**194**	**1,666**	**350**	**1,316**

10. Maximum site coverage for IDP - Industial Developments assumed to be 25%

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						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
						Total Commercial/Industrial (1000 sq.ft)	1,271						**Total Trips:**	**1,727**	**1,451**	**276**	**1,565**	**360**	**1,205**

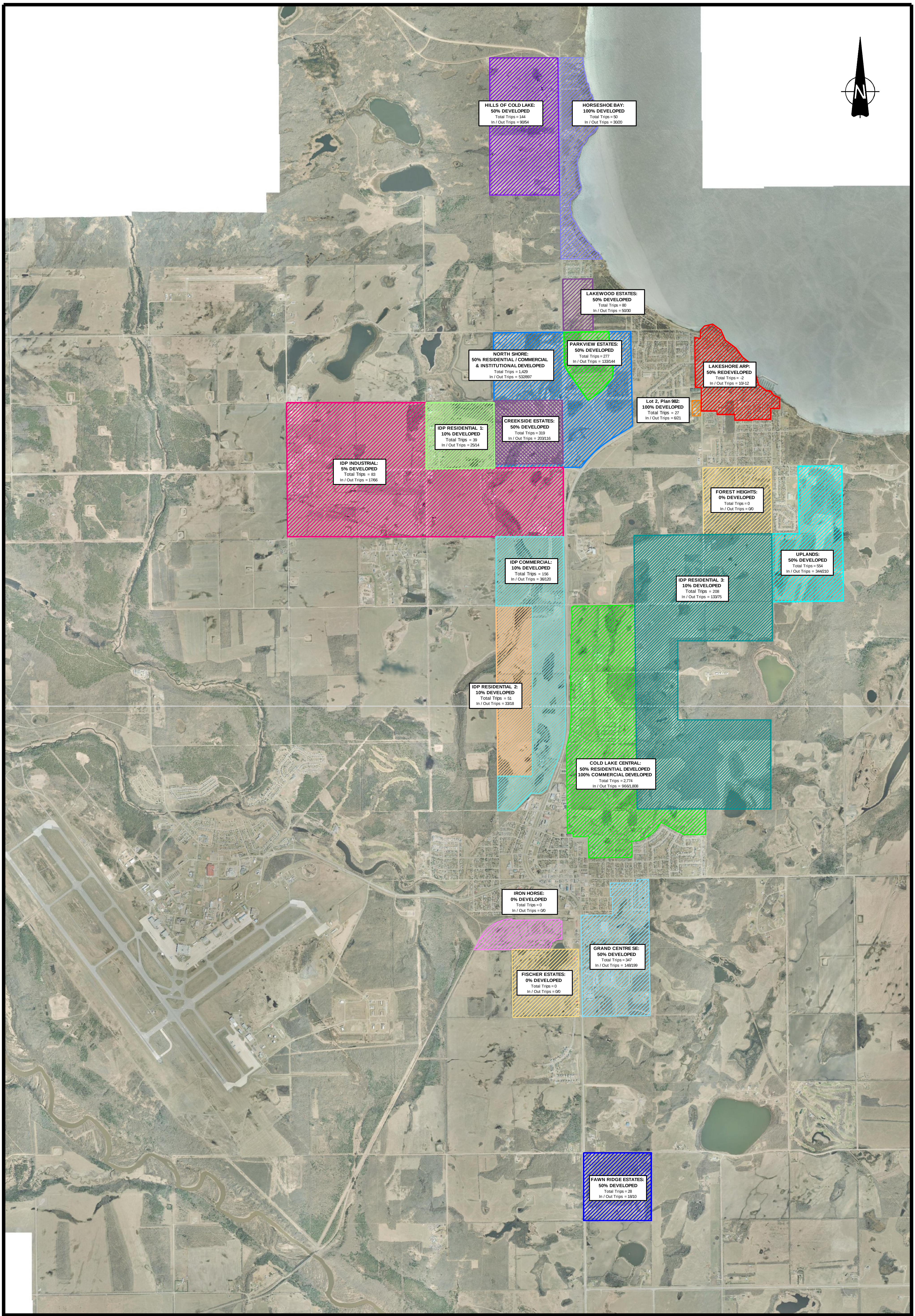
11. Maximum site coverage for IDP - Industial Developments assumed to be 25%



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

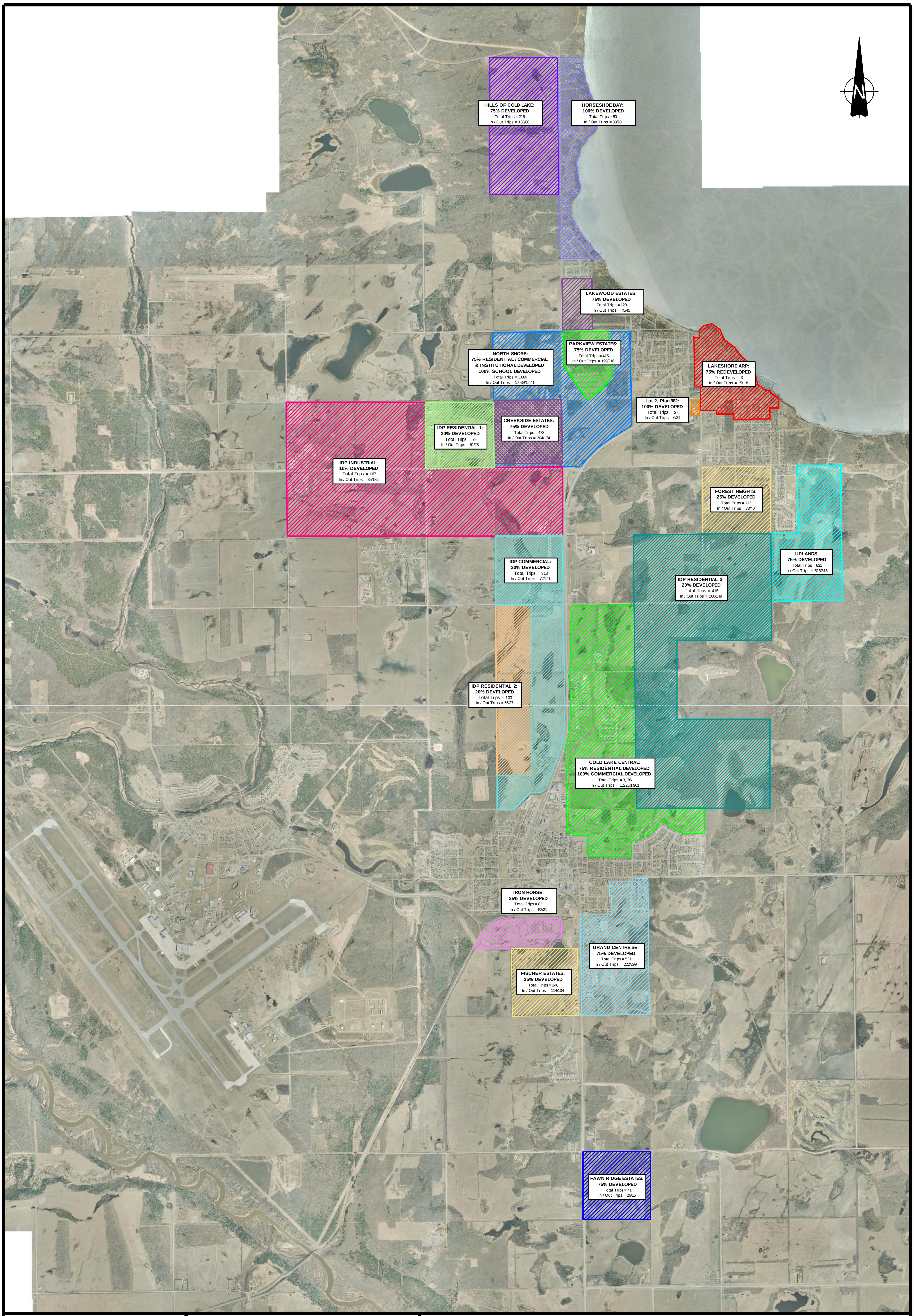
FIGURE 4.2
5 YEAR (2015) TRIP GENERATION FROM PLANNED DEVELOPMENT
PM PEAK



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

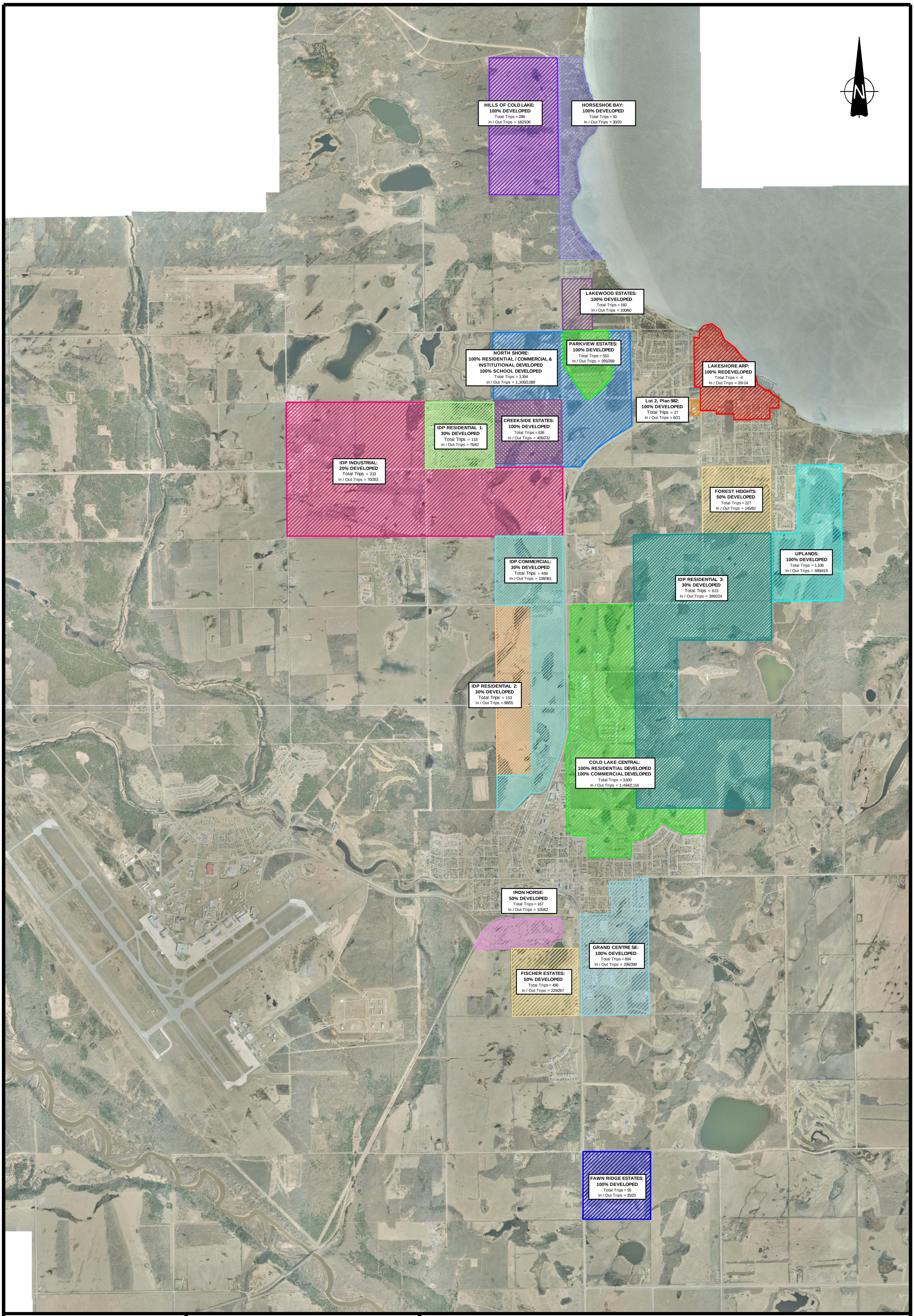
FIGURE 4.3
10 YEAR (2020) TRIP GENERATION FROM PLANNED DEVELOPMENT
PM PEAK



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

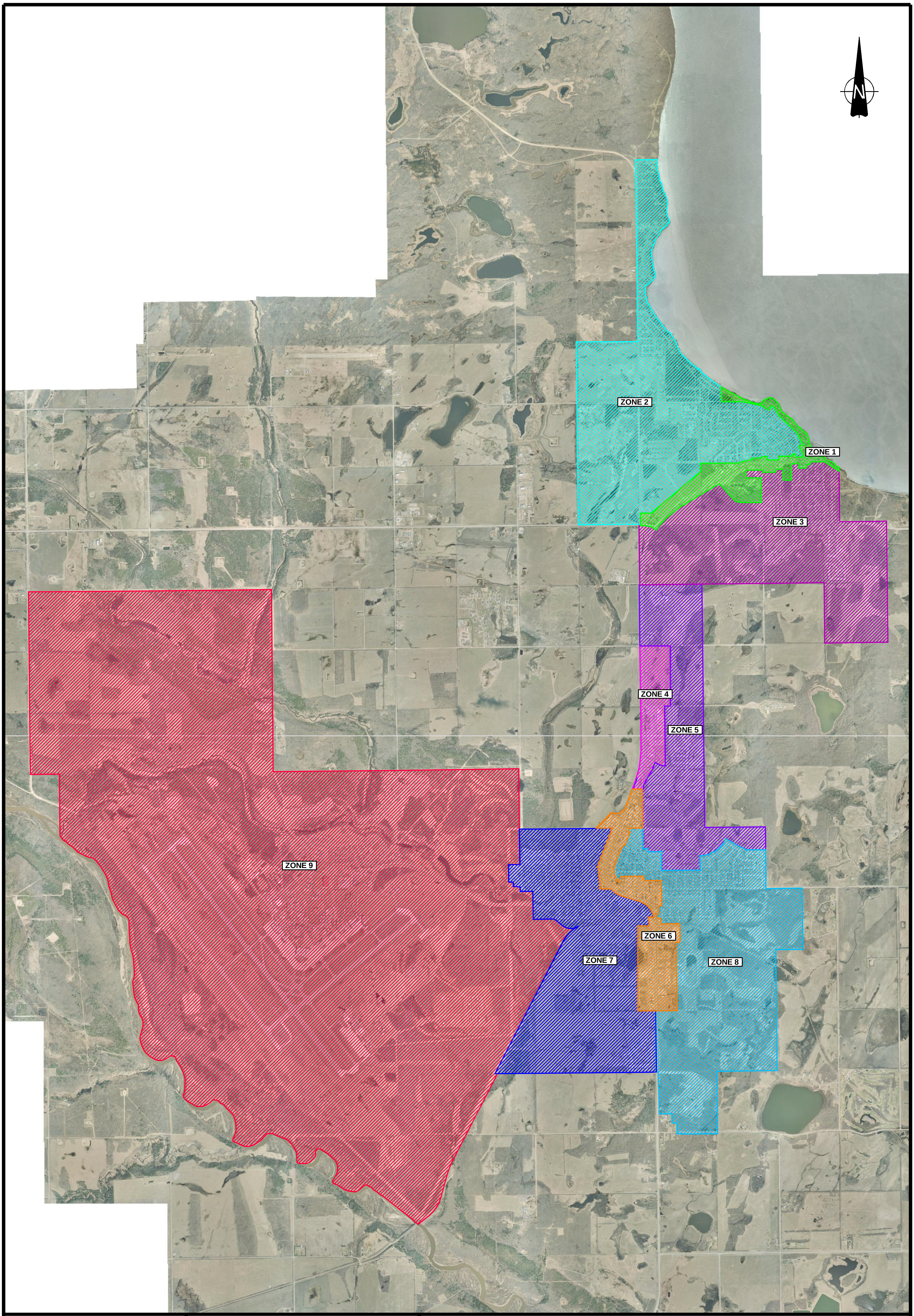
FIGURE 4.4
15 YEAR (2025) TRIP GENERATION FROM PLANNED DEVELOPMENT
PM PEAK



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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:

CITY OF COLD LAKE
TRANSPORTATION STUDY

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.

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

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 4.4
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**

Table 4.5
15-year (2025) - Trip Generation from Planned Developments by Zone

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 4.6
20-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).

Table 4.7
Trip Distribution Table (Within City Limits)

From	To									SUM
	1	2	3	4	5	6	7	8	9	
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%**	-

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 Lake	20% from Cold Lake North business area 20% from Tri-City Mall area 20% from Cold Lake South business area 20% from the commercial area in the south (near 43 Avenue) 20% from Medley	5% to Cold Lake North business area 25% to Tri-City Mall area 25% to Cold Lake South business area 40% to the commercial area in the south (near 43 Avenue) 5% to Medley
Fawn Ridge Estates	20% from Cold Lake North business area 20% from Tri-City Mall area 20% from Cold Lake South business area 20% from the commercial area in the south (near 43 Avenue) 20% from Medley	5% to Cold Lake North business area 25% to Tri-City Mall area 25% to Cold Lake South business area 40% to the commercial area in the south (near 43 Avenue) 5% to Medley
IDP Residential 1 IDP Residential 2 IDP Residential 3	25% Internal 15% from Cold Lake North business area 15% from Tri-City Mall area 15% from Cold Lake South business area 15% from the commercial area in the south (near 43 Avenue) 15% from Medley	30% Internal 5% to Cold Lake North business area 20% to Tri-City Mall area 20% to Cold Lake South business area 20% to the commercial area in the south (near 43 Avenue) 5% to Medley
IDP Industrial	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 5% Medley	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 5% Medley
IDP Commercial	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 5% Medley	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 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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FIGURE 4.7
5 YEAR (2015) DAILY DEVELOPMENT TRAFFIC VOLUMES

Associated Engineering

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DATE:	APRIL 2011
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SCALE:	NTS
DWG NO:	

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FIGURE 4.8
10 YEAR (2020) DAILY DEVELOPMENT TRAFFIC VOLUMES

Associated Engineering

PROJECT NO: 2010-3050
DATE: APRIL 2011
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DWG NO:

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FIGURE 4.9
15 YEAR (2025) DAILY DEVELOPMENT TRAFFIC VOLUMES

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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

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FIGURE 5.1
5 YEAR (2015) DAILY TOTAL TRAFFIC VOLUMES

Associated Engineering

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FIGURE 5.2
10 YEAR (2020) DAILY TOTAL TRAFFIC VOLUMES

Associated Engineering

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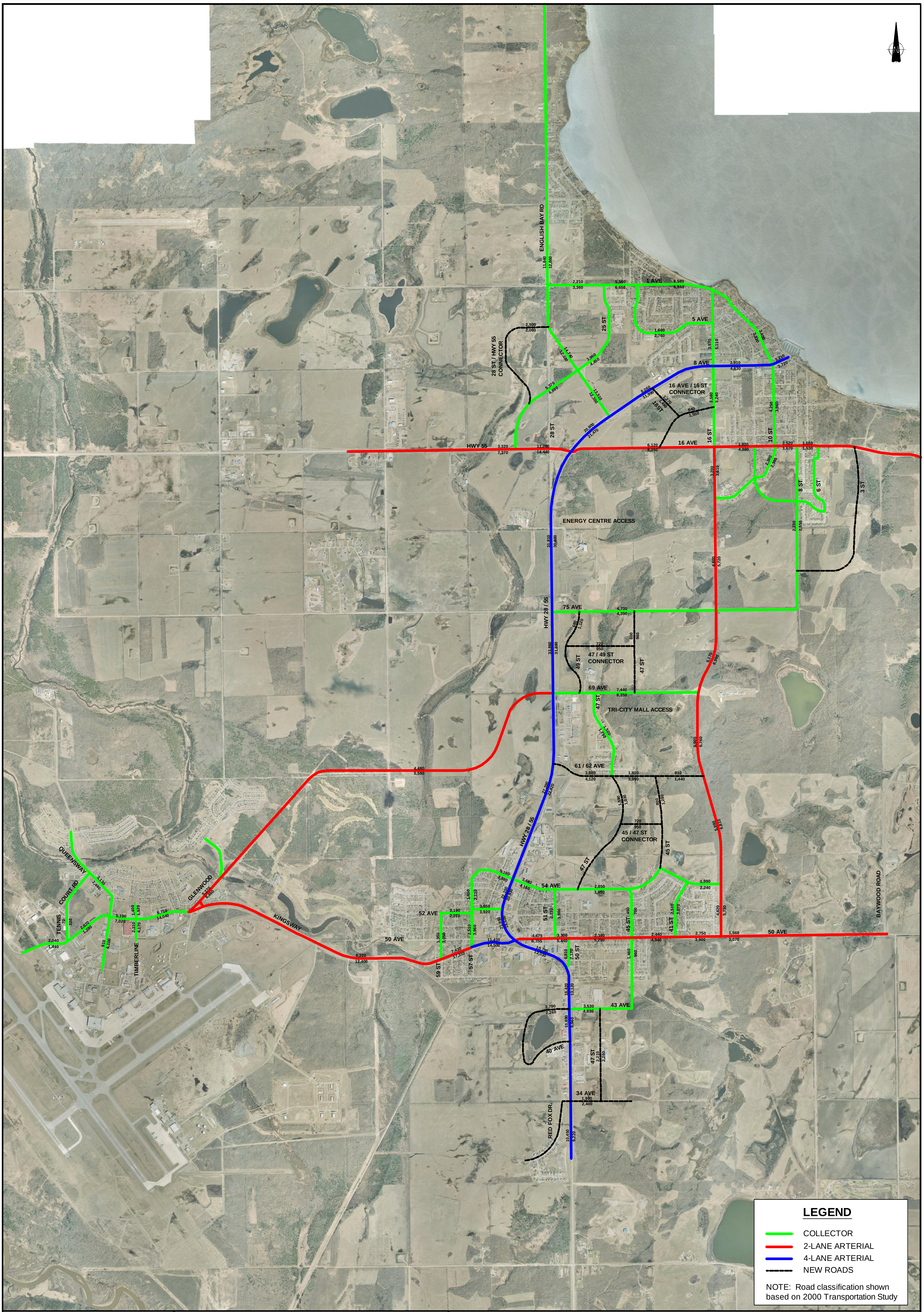
FIGURE 5.3
15 YEAR (2025) DAILY TOTAL TRAFFIC VOLUMES



Associated Engineering

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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.

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

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

Table 6-2
Lane Capacity by Road Classification

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

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.

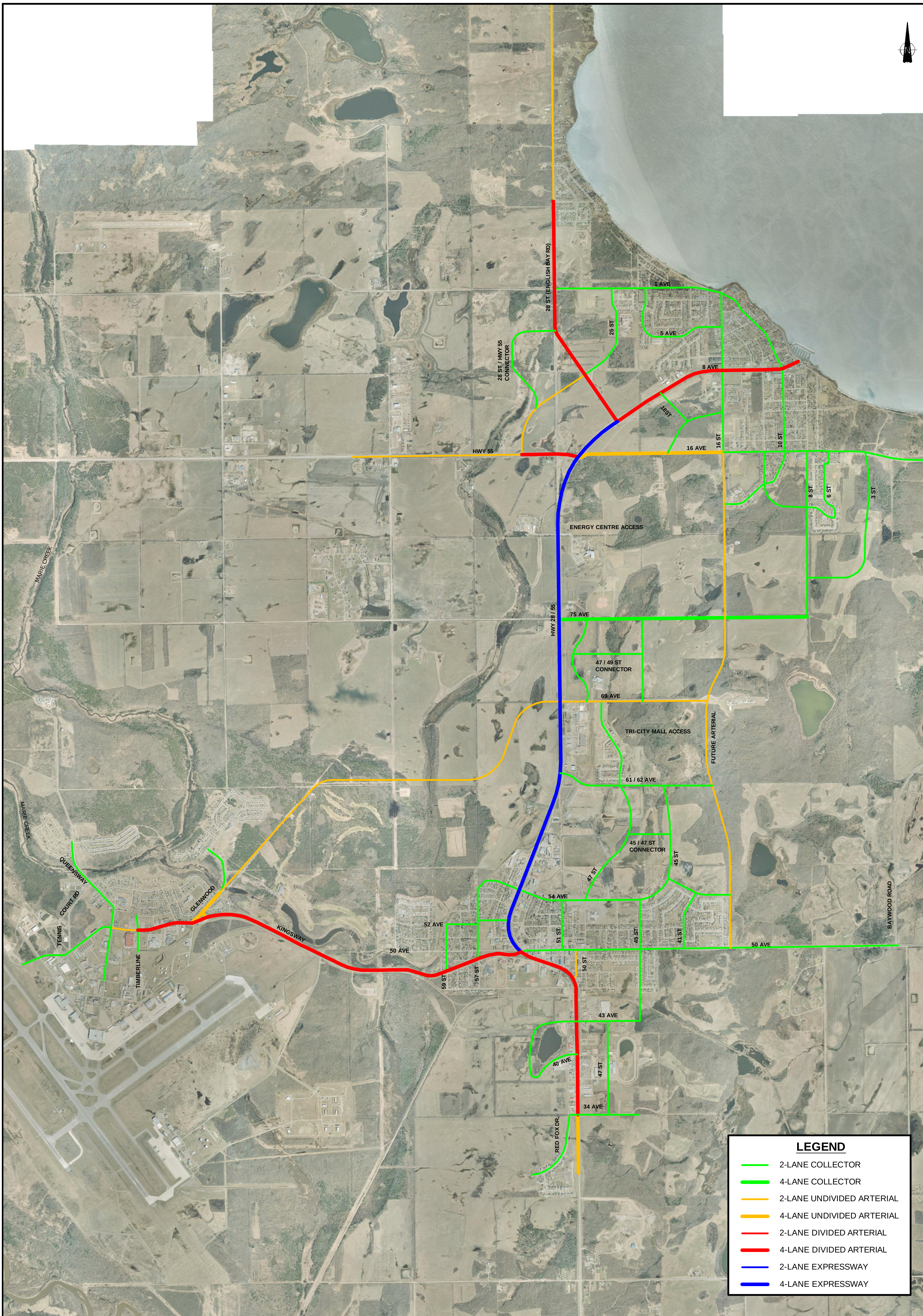
6.2 RESULTS

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 20-year (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.



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DATE: FEB 2013
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CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.1 (REVISED)
ROADWAY CLASSIFICATION
20 YEAR (2030) HORIZON

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

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	3,360	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,210						1
1 Avenue	25 Street	Nelson Street	Eastbound	6,650	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,560						1
1 Avenue	Nelson Street	16 Street	Eastbound	6,240	12,820	Collector	Undivided Arterial	800	8,000	1
			Westbound	6,580						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	21,470	42,370	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	20,900						2
8 Avenue	25 Street	16 Street	Eastbound	11,990	20,050	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,060						1
8 Avenue	16 Street	10 Street	Eastbound	4,630	8,540	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,910						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,720	5,930	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,210						1
Hwy 55	West City Limit	25 Street	Eastbound	7,370	10,690	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	3,320						1
Hwy 55	25 Street	Hwy 28	Eastbound	14,440	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,280						2
16 Avenue	Hwy 28	16 Street	Eastbound	8,250	14,370	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,120						1
16 Avenue[5]	16 Street	10 Street	Eastbound	4,880	8,700	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,820						1
16 Avenue	10 Street	8 Street	Eastbound	3,670	7,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,520						1
16 Avenue	8 Street	East City Limit	Eastbound	1,530	3,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,660						1
English Bay Road [6]	North City Limit	Lake Avenue	Northbound	6,430	12,350	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,920						1
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24,700	Collector	Divided Arterial	1,000	10,000	2
			Southbound	11,840						2
English Bay Road	1 Avenue	25 Street	Northbound	14,740	27,120	Collector	Divided Arterial	1,000	10,000	2
			Southbound	12,380						2
English Bay Road	25 Street	Hwy 28	Northbound	13,510	25,810	Collector	Divided Arterial	1,000	10,000	2
			Southbound	12,300						2
25 Street	English Bay Road	Hwy 55	Northbound	6,690	12,060	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,370						1
25 Street[7]	1 Avenue	English Bay Road	Northbound	4,450	8,410	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,960						1
English Bay Road/25 Street Connector	English Bay Road	25 Street	Eastbound	2,500	4,580	-	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,080						1
Nelson Street	1 Avenue	16 Street	Eastbound	2,760	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,600						1
16 Street[8]	1 Avenue	8 Avenue	Northbound	5,110	8,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,570						1
16 Street	8 Avenue	16 Avenue	Northbound	3,240	6,820	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,580						1
16 Street	16 Avenue	75 Avenue	Northbound	3,810	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,200						1
16 Avenue/16 Street Connector	8 Avenue	16 Avenue	Northbound	1,270	2,760	-	Local (Residential or Industrial)	150	1,500	1
			Southbound	1,490						1
16 Avenue/16 Street Connector	16 Avenue	16 Street	Eastbound	1,550	2,390	-	Local (Residential or Industrial)	150	1,500	1
			Westbound	840						1
10 Street	1 Avenue	8 Avenue	Northbound	3,400	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,320						1
10 Street[9]	8 Avenue	16 Avenue	Northbound	3,560	7,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,250						1
10 Street	16 Avenue	16 Street	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
8 Street	16 Avenue	75 Avenue	Northbound	2,550	4,780	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,230						1
6 Street [10]	16 Avenue	21 Avenue	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	30,680	62,490	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	31,810						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	31,690	65,550	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	33,860						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	22,820	50,210	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	27,390						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,390	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,730						2
69 Avenue	Glenwood	Hwy 28/55	Eastbound	5,590	10,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,480						1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,350	15,790	Collector	Undivided Arterial	800	8,000	2
			Westbound	7,440						1
49 Street	75 Avenue	69 Avenue	Northbound	1,120	1,800	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	680						1
47 Street	75 Avenue	69 Avenue	Northbound	960	1,560	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	600						1
47 Street/49 Street Connector	47 Street	49 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1
			Westbound	720						1
47 Street	69 Avenue	61 Avenue/62 Avenue	Northbound	1,520	3,270	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,750						1
47 Street[11]	61 Avenue/62 Avenue	54 Avenue	Northbound	1,030	2,620	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	1,590						1
61 Avenue/62 Avenue[12]	Hwy 28/55	47 Street	Eastbound	4,120	8,000	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,880						1
61 Avenue/62 Avenue	47 Street	45 Street	Eastbound	3,990	5,800	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,810						1
61 Avenue/62 Avenue	45 Street	Future Arterial	Eastbound	1,440	2,350	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	910						1
47 Street/45 Street Connector	47 Street	45 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1
			Westbound	720						1
45 Street	61 Avenue/62 Avenue	54 Avenue	Northbound	1,280	2,080	-	Local (Residential or Industrial)	150	1,500	1
			Southbound	800						1
54 Avenue[13]	56 Street	Hwy 28/55	Eastbound	3,380	8,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,190						1
54 Avenue[14]	Hwy 28/55	51 Street	Eastbound	4,160	7,840	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,680						1
54 Avenue	51 Street	45 Street	Eastbound	3,950	6,800	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,850						1
54 Avenue[15]	45 Street	41 Street	Eastbound	3,095	5,515	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,420						1
54 Avenue	41 Street	Future Arterial	Eastbound	2,240	4,230	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,990						1
52 Avenue	59 Street	57 Street	Eastbound	2,270	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,190						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	3,920	7,770	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,850						1
Centre Avenue	59 Street	57 Street	Eastbound	17,310	24,740	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	7,430						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	14,500	25,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,410						2
50 Avenue[16]	Hwy 28/55	51 Street	Eastbound	6,355	10,830	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	4,475						1
50 Avenue[17]	51 Street	50 Street	Eastbound	5,440	8,740	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,300						1
50 Avenue[18]	50 Street	45 Street	Eastbound	5,290	7,470	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,180						1
50 Avenue[19]	45 Street	41 Street	Eastbound	4,940	7,380	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,440						1
50 Avenue	41 Street	Future Arterial	Eastbound	3,900	6,650	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,750						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

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,070	3,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,560						1
43 Avenue[20]	Hwy 28/55	45 Street	Eastbound	4,830	8,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,530						1
59 Street	52 Avenue	Centre Avenue	Northbound	3,050	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,350						1
57 Street	54 Avenue	52 Avenue	Northbound	2,130	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
57 Street	52 Avenue	Centre Avenue	Northbound	3,960	6,470	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	20,930	43,080	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	22,150						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	18,500	40,450	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,950						2
Hwy 28/55	50 Avenue	50 Street	Northbound	10,700	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	13,030						2
Hwy 28/55	50 Street	43 Avenue	Northbound	13,120	29,540	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	16,420						2
Hwy 28/55	43 Avenue	34 Avenue	Northbound	9,960	21,650	4-Lane Arterial	Divided Arterial	1,000	10,000	1
			Southbound	11,690						2
Hwy 28/55	34 Avenue	South City Limit	Northbound	9,220	19,670	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	10,450						2
40 Avenue	43 Avenue	Hwy 28/55	Eastbound	2,260	5,050	-	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,790						1
34 Avenue	Hwy 28/55	47 Street	Eastbound	2,400	4,390	-	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,990						1
47 Street	43 Avenue	34 Avenue	Northbound	2,280	4,490	-	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,210						1
51 Street	54 Avenue	50 Avenue	Northbound	1,980	4,210	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,230						1
50 Street	50 Avenue	Hwy 28/55	Northbound	7,170	13,980	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,810						1
45 Street	54 Avenue	50 Avenue	Northbound	700	1,150	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	450						1
45 Street	50 Avenue	43 Avenue	Northbound	960	2,420	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	1,460						1
41 Street	54 Avenue	50 Avenue	Northbound	3,870	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Future Arterial	75 Avenue	69 Avenue	Northbound	6,900	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,170						1
Future Arterial	69 Avenue	61 Avenue/62 Avenue	Northbound	6,760	12,660	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,900						1
Future Arterial	61 Avenue/62 Avenue	54 Avenue	Northbound	6,810	12,800	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,990						1
Future Arterial	54 Avenue	50 Avenue	Northbound	5,730	10,350	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	4,620						1
Kingsway	59 Street	Glenwood	Eastbound	12,400	20,620	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,220						1
Kingsway	Timberline	Glenwood	Eastbound	14,040	22,750	Collector	Divided Arterial	1,000	10,000	2
			Westbound	8,710						1
Kingsway	Queensway	Timberline	Eastbound	7,020	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,190						1
Kingsway	Tennis Court Road	Queensway	Eastbound	1,280	3,300	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,020						1
Kingsway	End of Road	Tennis Court Road	Eastbound	1,440	3,480	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,040						1
Tennis Court Road	Queensway	Kingsway	Northbound	330	400	Collector	Lane	N/A	N/A	N/A
			Southbound	70						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	3,130	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,440						1
Queensway	Kingsway	Hanger Ln	Northbound	4,100	5,010	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	910						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,920	3,320	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
Timberline	Kingsway	Athabasca Road	Northbound	4,170	6,480	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	2,310						1
Glenwood Drive	Glenwood	Kingsway	Northbound	8,460	13,730	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	5,270						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. A 2-lane collector cross section would be appropriate for 16 Avenue between 16 Street and 10 Street as the AADT is less than 9000.
6. Assumed daily traffic for English Bay Road (North City Limit to Lake Avenue) to be half of daily traffic on English Bay Road (Lake Avenue to 1 Avenue)
7. A 2-lane collector cross section would be appropriate 25 Street between 1 Avenue and English Bay Road as the AADT is less than 9000
8. A 2-lane collector cross section would be appropriate for 16 Street between 1 Avenue and 8 Avenue as the AADT is less than 9000
9. A 2-lane collector cross section would be appropriate f0r 10 Street between 8 Avenue and 16 Avenue as the AADT is less than 9000
10. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)
11. A 2-lane collector cross section would be appropriate for 47 Street between 62 Avenue and 54 Avenue as the AADt is less than 9000
12. A 2-lane collector cross section is appropriate for 61 Avenue/62 Avenue between 47 Street and 45 Street as the AADT is less than 9000
13. A 2-lane collector cross section would be appropriate for 54 Avenue between 56 Street and Highway 28 as the AADT is less than 9000
14. A 2-lane collector cross section would be appropriate for 54 Avenue between Highway 28 and 51 Street as the AADT is less than 9000
15. Assumed daily traffic for 54 Avenue (45 Street to 41 Street) to be average of daily traffic on 54 Avenue (51 Street to 45 Street) and 54 Avenue (41 Street to Future Arterial)
16. Although the AADT along 50 Avenue between Hwy 28 and 51 Street is 10,830, a 2-lane collector cross section is aprropriate because of the characteristics of the adjacent land use i.e. Downtown
17. A 2-lane collector cross section is appropriate for 50 Avenue between 51 Street and 50 Street as the AADT is less than 9000
18. A 2-lane collector cross section is appropriate for 50 Avenue between 50 Street and 45 Street as the AADT is less than 9000
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 43 Avenue between 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

Corridor	Intersection		Existing (2010) Road Classification[1]	Existing (2010) Number of Lanes (One Direction)	Recommended 20-Year (2030) Road Classification	Recommended 20-Year (2030) Number of Lanes (One Direction)	Improvements Required
	From	To					
8 Avenue	10 Street	Lakeshore Drive	Undivided Arterial	1 1	Divided Arterial	2 2	Widen to provide centre median and 2 travel lanes in each direction
8 Avenue	25 Street	10 Street	Divided Arterial	2 2	Divided Arterial	2 2	-
Hwy 28/55	Hwy 55/16 Avenue	53 Avenue	Divided Arterial	2 2	Expressway	2 2	-
Hwy 28/55	53 Avenue	52 Avenue	Undivided Arterial	2 2	Expressway	2 2	Widen to provide centre median
Hwy 28/55	52 Avenue	50 Avenue	Divided Arterial	2 2	Expressway	2 2	-
Hwy 28/55	50 Avenue	52 Street	Divided Arterial	2 2	Divided Arterial	2 2	-
Hwy 28/55	52 Street	47 Avenue	Undivided Arterial	2 2	Divided Arterial	2 2	Widen to provide centre median
Hwy 28/55	47 Avenue	40 Avenue	Divided Arterial	2 2	Divided Arterial	2 2	-
Hwy 28/55	40 Avenue	South City Limit	Undivided Arterial	1 1	Undivided Arterial	1 1	-
1 Avenue	28 Street	1 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Hwy 55[2]	West City Limit	28 Street	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
Hwy 55	28 Street	Hwy 28	Collector (Residential or Industrial)	1 1	Divided Arterial	2 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)	1 1	Undivided Arterial	2 2	Build pavement structure to Arterial standard (2 travel lanes in each direction)
16 Avenue	16 Street	8 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	2 2	Widen to provide 2 travel lanes in each direction
16 Avenue	8 Street	East City Limit	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
English Bay Road	North City Limit	Lake Avenue	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
English Bay Road	Lake Avenue	Hwy 28	Collector (Residential or Industrial)	1 1	Divided Arterial	2 2	Build pavement structure to Arterial standard (centre median and 2 travel lanes in each direction)
28 Street	English Bay Road	Hwy 55	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	Realign 28 Street and build pavement structure to Arterial standard
25 Street	1 Avenue	English Bay Road	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
Nelson Street	1 Avenue	16 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
16 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
16 Street	16 Avenue	75 Avenue	Local	1 1	Undivided Arterial	1 1	Build pavement structure to Arterial standard
Future Arterial	75 Avenue	50 Avenue	Non-existant	- -	Undivided Arterial	1 1	Build out as per 20-year horizon
10 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
10 Street	16 Avenue	16 Street	Local	1 1	Collector (Residential or Industrial)	1 1	-
8 Street	16 Avenue	75 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	Build pavement structure to Collector standard
6 Street	16 Avenue	21 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
20 Avenue	12 Street	8 Street	Non-existant	- -	Collector (Residential or Industrial)	1 1	Build out as per 20-year horizon
75 Avenue	Hwy 28/55	Future Arterial	Local	1 1	Collector (Residential or Industrial)	2 2	Build pavement structure to Collector standard (2 travel lanes in each direction)
69 Avenue	Glenwood	Hwy 28/55	Non-existant	- -	Undivided Arterial	1 1	Build out as per 20-year horizon
69 Avenue	Hwy 28/55	Future Arterial	Local	1 1	Undivided Arterial	1 1	-
47 Street	69 Avenue	61/62 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
54 Avenue	56 Street	49 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	2 2	Widen to provide 2 travel lanes in each direction
54 Avenue	49 Street	Future Arterial	Non-existant	- -	Collector (Residential or Industrial)	2 2	Build out as per 20-year horizon
52 Avenue	59 Street	57 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
52 Avenue	57 Street	Hwy 28/55	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	2 2	Widen to provide 2 travel lanes in each direction
Centre Avenue	59 Street	57 Street	Undivided Arterial	1 1	Divided Arterial	2 2	Widen to provide centre median and 2 travel lanes in each direction
Centre Avenue	57 Street	Hwy 28/55	Undivided Arterial	2 2	Divided Arterial	2 2	Widen to provide centre median
50 Avenue	Hwy 28/55	Future Arterial	Undivided Arterial	1 1	Undivided Arterial	1 1	-
50 Avenue	Future Arterial	Baywood Road	Undivided Arterial	1 1	Collector (Residential or Industrial)	1 1	-
43 Avenue	Hwy 28/55	45 Street	Local	1 1	Collector (Residential or Industrial)	2 2	Build pavement structure to Collector standard (2 travel lanes in each direction)
59 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
57 Street	54 Avenue	52 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
57 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
51 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
50 Street	50 Avenue	Hwy 28/55	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
45 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
45 Street	50 Avenue	43 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
41 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Kingsway	59 Street	Glenwood	Undivided Arterial	1 1	Divided Arterial	2 2	Widen to provide centre median and 2 travel lanes in each direction
Kingsway	Timberline	Glenwood	Collector (Residential or Industrial)	1 1	Divided Arterial	2 2	Build pavement structure to Arterial standard (centre median and 2 travel lanes in each direction)
Kingsway	Queensway	Timberline	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
Kingsway	Queensway	End of Road	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Queensway	Tennis Court Road	Hanger Ln	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Timberline	Juniper Avenue	Athabasca Road	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Glenwood Drive	Glenwood	Kingsway	Collector (Residential or Industrial)	1 1	Undivided Arterial	2 2	Build pavement structure to Arterial standard (2 travel lanes in each direction)

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

7 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 right-of-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.

A Appendix A - ASP, ARP and Outline Plan Information

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

FISCHER ESTATES - LAND USE INFORMATION

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

Land Use Type	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

IRON HORSE - LAND USE INFORMATION

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

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

COLD LAKE CENTRAL - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

GRAND CENTRE SE - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

FOREST HEIGHTS - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

NORTHSHORE - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

TOTAL AREA

Land Use	Total Area[1] (ha)	Creekside ASP [2] (ha)	Parkview ASP [3] (ha)	Remaining Area (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

Land Use	Total Area (ha)	Creekside ASP (ha)	Parkview ASP (ha)	Remaining Area (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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

NORTHSHORE - LAND USE INFORMATION

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

2010 HORIZON - DEVELOPED

Land Use	Total Area (ha)	Creekside ASP (ha)	Parkview ASP (ha)	Remaining Area (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

Land Use	Total Area (ha)	Creekside ASP (ha)	Parkview ASP (ha)	Remaining Area (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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

NORTHSHORE - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

TOTAL DEVELOPABLE - SCHOOL/RESIDENTIAL

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

LOT 2, PLAN 982 1024 - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

HORSESHOE BAY - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

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**

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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

UPLANDS - LAND USE INFORMATION

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

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

LAKEWOOD ESTATES - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable			Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

CREEKSIDE ESTATES - LAND USE INFORMATION

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

Land Use	Total Developable				Developed in 2010		Undeveloped in 2010	
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

PARKVIEW ESTATES - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable				2010 Developed		2010 Undeveloped	
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

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

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

Time Period	Trip Generation Rate (Trips per Dwelling Units)	Generated Trips	Direction Distribution (%)		Direction Distribution (%)	
			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

MD BONNYVILLE - RESIDENTIAL

Source: Intermunicipal Development Plan (Feb 2009)

<u>Future Land Uses:</u>
- 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
Residential Development 1	75% - Single Family Residential	14	283
	25% - Multi Family Residential	5	236
	Total	**19**	**519**
Residential Development 2	75% - Single Family Residential	19	379
	25% - Multi Family Residential	6	316
	Total	**25**	**696**
Residential Development 3	75% - Single Family Residential	94	1,880
	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

Land Use	Developable Area (m^2)	Developable Area (Hec)	Developed Area 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 (m^2)	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

Associated Engineering GLOBAL PERSPECTIVE. LOCAL FOCUS.

Date:	February 25, 2011	**File:**	20103050.00.01.10
To:	Bob Kitchen		
From:	Rohit Vij		
Project:	City of Cold Lake Transportation Study		
Subject:	Traffic Demand Forecast Work Plan		

MEMO

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

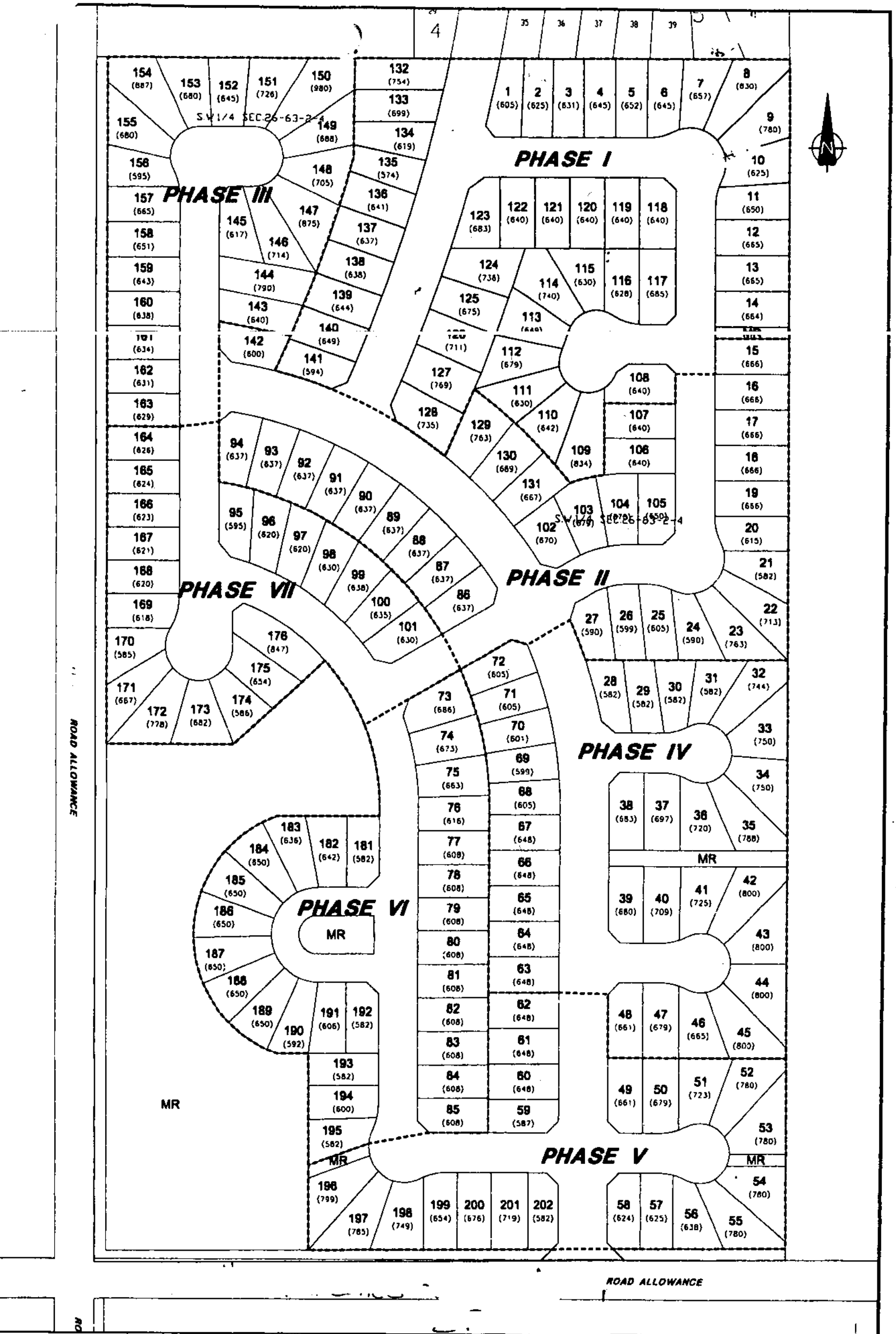
2.2 AREA REDEVELOPMENT PLAN (ARP)

- 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**.



SCALE 1:1750	PROJECT No. 29-05-01
DESIGNED BY SBE	DRAWN BY SBE
CHECKED BY	DATE

SE DESIGN AND CONSULTING
SUITE 203, 4801 - 51 STREET COLD LAKE ALBERTA T9M 1P4 PH (780) 207-5380

LAKEWOOD DEVELOPMENTS

LAKEWOOD ESTATES SUBDIVISION
PROPOSED RESIDENTIAL SUBDIVISION

OVERALL DEVELOPMENT CONCEPT

Figure 1

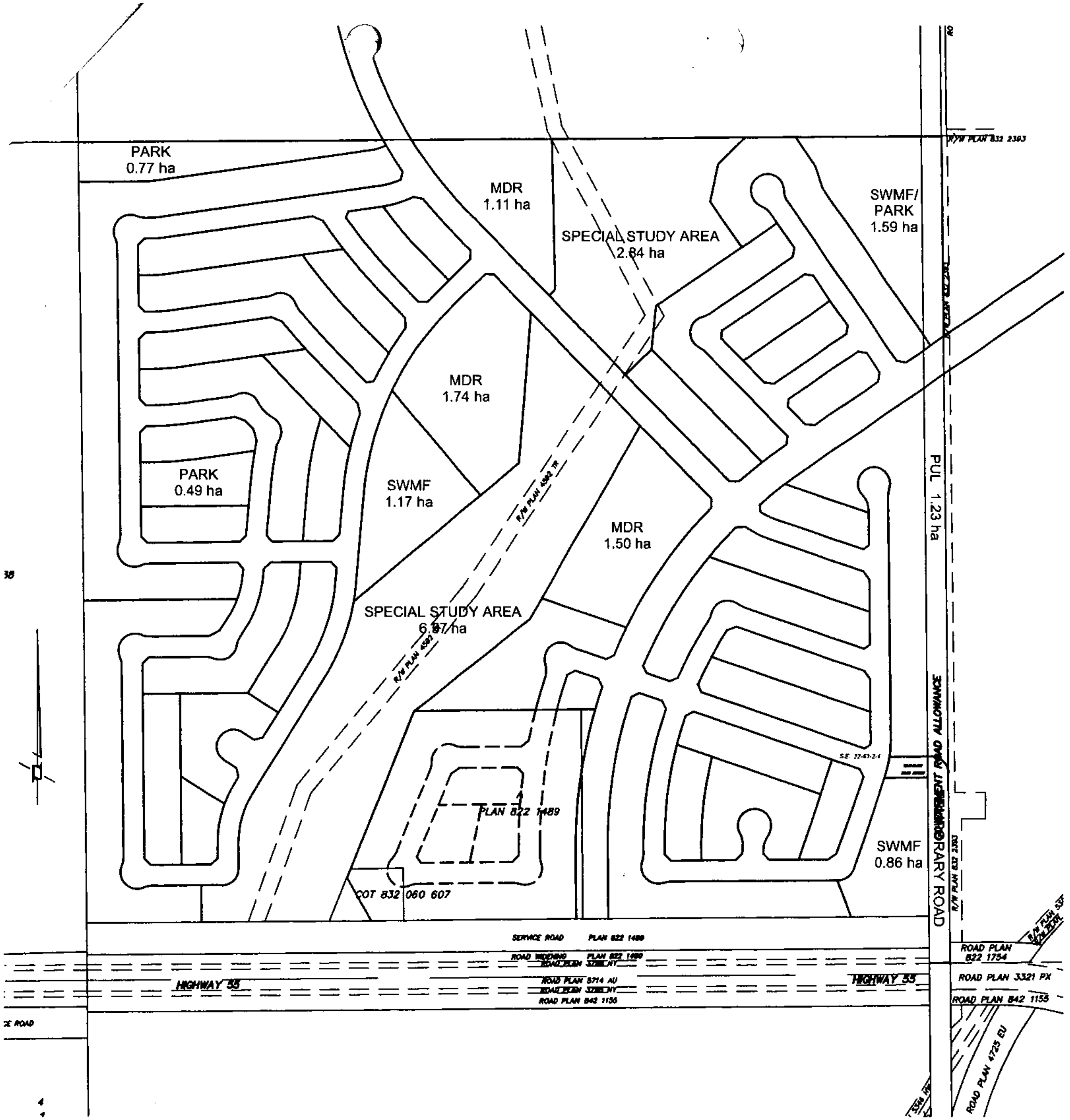


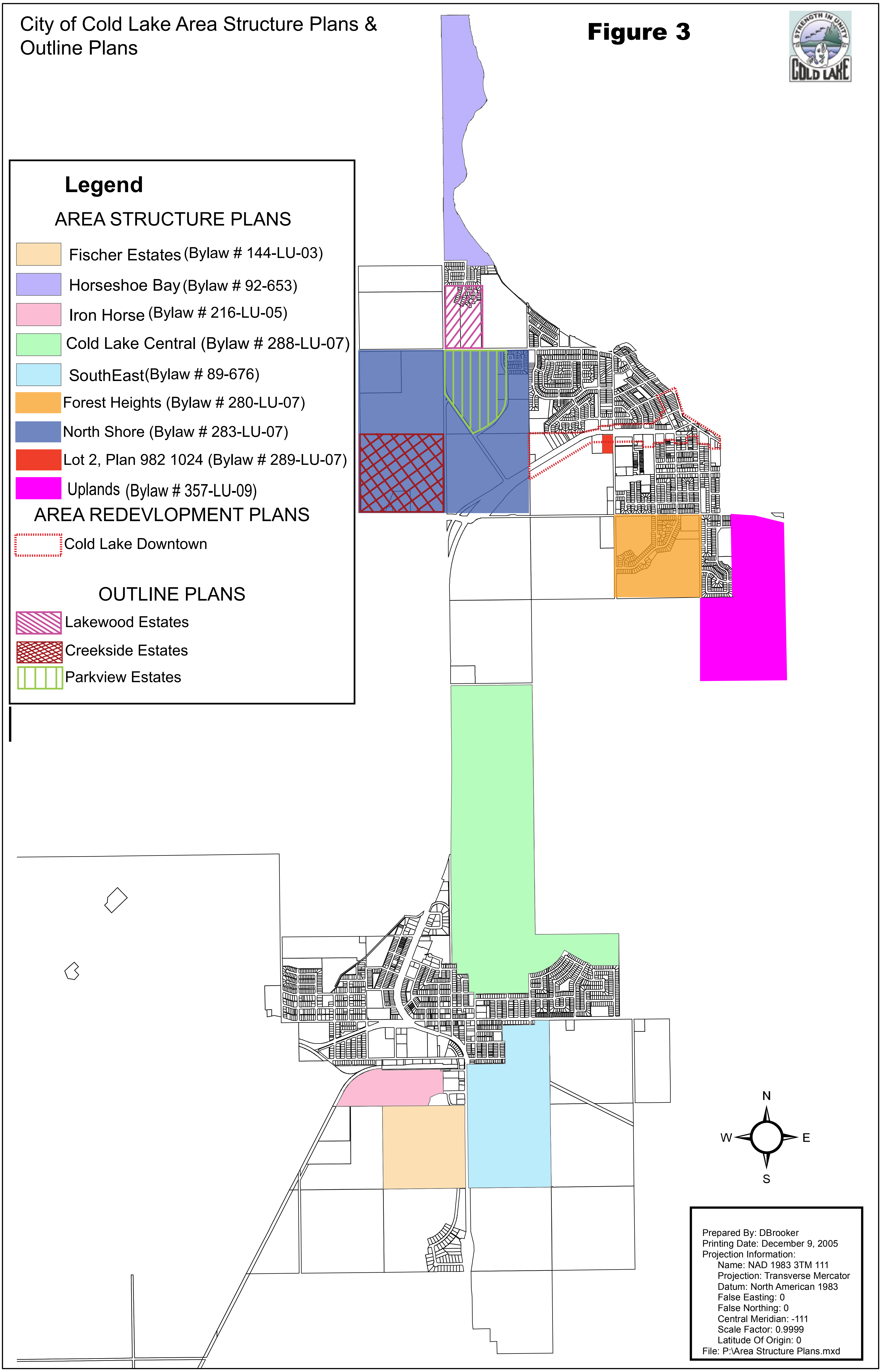
Figure 2

CREEKSIDE

OVERALL DESIGN CONCEPT

FOCUS

N:\102255\Planning\102255-12\102255-12-TLP-1.dwg\Overall



City of Cold Lake Area Structure Plans & Outline Plans
Figure 3
STRENGTH IN UNITY
COLD LAKE
Legend
AREA STRUCTURE PLANS
Fischer Estates (Bylaw # 144-LU-03)
Horseshoe Bay (Bylaw # 92-653)
Iron Horse (Bylaw # 216-LU-05)
Cold Lake Central (Bylaw # 288-LU-07)
SouthEast(Bylaw # 89-676)
Forest Heights (Bylaw # 280-LU-07)
North Shore (Bylaw # 283-LU-07)
Lot 2, Plan 982 1024 (Bylaw # 289-LU-07)
Uplands (Bylaw # 357-LU-09)
AREA REDEVLOPMENT PLANS
Cold Lake Downtown
OUTLINE PLANS
Lakewood Estates
Creekside Estates
Parkview Estates
N
W
E
S
Prepared By: DBrooker
Printing Date: December 9, 2005
Projection Information:
Name: NAD 1983 3TM 111
Projection: Transverse Mercator
Datum: North American 1983
False Easting: 0
False Northing: 0
Central Meridian: -111
Scale Factor: 0.9999
Latitude Of Origin: 0
File: P:\Area Structure Plans.mxd

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.

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

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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	-	-

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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%	-	-	-

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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 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 MD of Bonnyville Land Use 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

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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 Development Authority			

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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.**

- Calculate the area of each zone (A_1, A_2, 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.

Existing Traffic Volumes (2010 Horizon)

Intersection		Zone 1			Zone 2		…	Zone 9	
		$I_{1,1}$	$I_{1,2}$	$I_{1,x}$	$I_{2,1}$	$I_{2,2}$	$I_{i,x}$	$I_{9,1}$	$I_{9,x}$
NB	Left	5	9	15					
	Through	85	211	150					
	Right	3	15	7					
SB	Left								
	Through								
	Right								
EB	Left								
	Through								
	Right								
WB	Left								
	Through								
	Right								

Where $\mathbf{I}_{i,x}$ denotes intersection number x in Zone i.

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)

Intersection		Zone 1			Zone 2		…	Zone 9	
		$I_{1,1}$	$I_{1,2}$	$I_{1,x}$	$I_{2,1}$	$I_{2,2}$	$I_{i,x}$	$I_{9,1}$	$I_{9,x}$
NB	Left	6 = 5+(5x5x 0.02)	10 = 9+(9x5x 0.02)	17 =15+(15 x5x0.02)					
	Through	94	232	165					
	Right	3	17	8					
SB	Left								
	Through								
	Right								
EB	Left								
	Through								
	Right								
WB	Left								
	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:**

Assumed Development Staging by Study Horizon

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 Lake Central	Residential	25%	25%	25%	25%	100%
	Commercial	50%	50%	0%	0%	100%
Grand Centre Southeast	Residential	25%	25%	25%	25%	100%
	Industrial	25%	25%	25%	25%	100%
Forest Heights	Residential	0%	0%	25%	25%	50%
Northshore	Residential	25%	25%	25%	25%	100%
	Commercial	25%	25%	25%	25%	100%
	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%
Uplands	Residential	25%	25%	25%	25%	100%
	Health Services & Mixed Use	25%	25%	25%	25%	100%

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%
Parkview Estates	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.

Trip Production (Pi) - Horizon

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

7	
8	
9	
Total (∑Pi)	

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	$A_1/(d_{11})^2$	$[A_1/(d_{11})^2] / \sum_1$	$P_1 \times [A_1/(d_{11})^2] / \sum_1$
Zone 1 to Zone 2	$A_1/(d_{12})^2$	$[A_1/(d_{12})^2] / \sum_1$	$P_1 \times [A_1/(d_{12})^2] / \sum_1$
Zone 1 to Zone 3	$A_1/(d_{13})^2$	$[A_1/(d_{13})^2] / \sum_1$	$P_1 \times [A_1/(d_{13})^2] / \sum_1$
Zone 1 to Zone 4	$A_1/(d_{14})^2$	$[A_1/(d_{14})^2] / \sum_1$	$P_1 \times [A_1/(d_{14})^2] / \sum_1$
Zone 1 to Zone 5	$A_1/(d_{15})^2$	$[A_1/(d_{15})^2] / \sum_1$	$P_1 \times [A_1/(d_{15})^2] / \sum_1$
Zone 1 to Zone 6	$A_1/(d_{16})^2$	$[A_1/(d_{16})^2] / \sum_1$	$P_1 \times [A_1/(d_{16})^2] / \sum_1$
Zone 1 to Zone 7	$A_1/(d_{17})^2$	$[A_1/(d_{17})^2] / \sum_1$	$P_1 \times [A_1/(d_{17})^2] / \sum_1$
Zone 1 to Zone 8	$A_1/(d_{18})^2$	$[A_1/(d_{18})^2] / \sum_1$	$P_1 \times [A_1/(d_{18})^2] / \sum_1$
Zone 1 to Zone 9	$A_1/(d_{19})^2$	$[A_1/(d_{19})^2] / \sum_1$	$P_1 \times [A_1/(d_{19})^2] / \sum_1$

Total	$\sum_1$	100%	P_1

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

- 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

- 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

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

Traffic Demand Model: Zones & Intersections

Zone	Description	Intersection with Counts	
		Node #	Intersection
1	Cold Lake North - Commercial/Recreational	104	1 Avenue & 16 Street
		105	1 Avenue / 2 Avenue & 10 Street
		106	8 Avenue & Lakeshore Drive
		107	8 Avenue & 10 Street
		108	8 Avenue & 16 Street
		109	Highway 28 & 25 Street
		111	Highway 55/ 16 Avenue & Highway 28
2	Cold Lake North - Residential (North of Hwy 28)	101	1 Avenue & 28 Street / English Bay Road
		102	1 Avenue & 25 Street
		103	1 Avenue & Nelson Street
		110	Highway 55 & 28 Street / English Bay Road
3	Cold Lake North - Residential (South of Hwy 28)	112	16 Avenue & 16 Street
		113	16 Avenue & 10 Street
4	Cold Lake Central - Commercial	202	Highway 28 / 55 & 75 Avenue
		203	Highway 28 / 55 & 69 Avenue / Museum Road
		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
6	Cold Lake South - CBD/Commercial	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
		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
7	Cold Lake South - Residential (West of Hwy 28)	309	57 Street & 52 Avenue (North)
		310	57 Street & 52 Avenue (South)
		311	50 Avenue & 59 Street
		312	50 Avenue & 57 Street
		313	Centre Avenue & 59 Street
		314	Centre Avenue & 57 Street
8	Cold Lake South - Residential (East of Hwy 28)	315	54 Avenue & 51 Street
		321	50 Avenue & 45 Street
		322	50 Avenue & 41 Street
		323	50 Avenue / Twp Rd 630 & Baywood Road / RR 20
9	Medley	401	Kingsway & Medley Road
		402	Kingsway & Glenwood Drive (West)
		403	Kingsway & Glenwood Drive (East)
		404	Kingsway & Timberline Drive
		405	Kingsway & Queensway
		406	Kingsway & Tennis Court Road
		407	Queensway & Tennis Court Road

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

Traffic Demand Model: Zones & Areas

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**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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 - Distances^2

	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

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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	1	0.17	3.0%	11
	2	1.89	33.8%	117
	3	2.48	44.1%	153
	4	0.04	0.8%	3
	5	0.17	3.0%	10
	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**
2	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
	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**
3	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	0.25	8.3%	23
	6	0.04	1.4%	4
	7	0.14	4.7%	13
	8	0.20	6.7%	19
	9	0.59	20.0%	55
	SUM	**2.96**	**100.0%**	**277**
4	1	0.06	0.5%	5
	2	0.32	2.9%	28
	3	0.43	3.8%	38
	4	0.48	4.3%	42
	5	6.44	58.2%	567
	6	0.20	1.8%	17
	7	0.68	6.2%	60
	8	0.73	6.6%	65
	9	1.73	15.6%	152
	SUM	**11.06**	**100.0%**	**974**
5	1	0.05	0.8%	3
	2	0.26	3.9%	16
	3	0.41	6.3%	26
	4	1.48	22.6%	93
	5	0.56	8.6%	36
	6	0.28	4.2%	17
	7	0.79	12.1%	50
	8	1.14	17.5%	72
	9	1.56	23.9%	99
	SUM	**6.53**	**100.0%**	**412**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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
6	1	0.02	0.1%	0
	2	0.13	0.7%	1
	3	0.16	0.8%	1
	4	0.10	0.5%	0
	5	0.64	3.4%	3
	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**
7	1	0.02	0.2%	0
	2	0.12	1.4%	0
	3	0.14	1.6%	0
	4	0.09	1.1%	0
	5	0.47	5.4%	0
	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**
8	1	0.02	0.3%	0
	2	0.12	1.7%	2
	3	0.17	2.4%	2
	4	0.09	1.2%	1
	5	0.58	8.4%	8
	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**
9	1	0.01	0.6%	0
	2	0.10	4.2%	0
	3	0.08	3.3%	0
	4	0.03	1.3%	0
	5	0.12	5.2%	0
	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**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

Traffic Demand Model, 5 Year Horizon: Future Production

	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**	

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.

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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%**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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%**	

D Appendix D - Capacity Analysis

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 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	960	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	850						1
1 Avenue	25 Street	Nelson Street	Eastbound	1,640	3,110	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,470						1
1 Avenue	Nelson Street	16 Street	Eastbound	1,290	2,650	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,360						2
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	5,410	9,650	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,240						2
8 Avenue	25 Street	16 Street	Eastbound	5,260	7,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,600						1
8 Avenue	16 Street	10 Street	Eastbound	1,880	2,980	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,100						2
8 Avenue	10 Street	Lakeshore Drive	Eastbound	950	1,720	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	1
			Westbound	770						1
Hwy 55	West City Limit	28 Street	Eastbound	3,360	4,930	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,570						1
Hwy 55	28 Street	Hwy 28	Eastbound	3,250	4,980	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,730						1
16 Avenue	Hwy 28	16 Street	Eastbound	1,820	3,210	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,390						1
16 Avenue	16 Street	10 Street	Eastbound	1,270	2,050	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	780						1
16 Avenue	10 Street	8 Street	Eastbound	1,320	2,430	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,110						2
English Bay Road	North City Limit	1 Avenue	Northbound	1,450	2,540	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,090						2
English Bay Road	1 Avenue	25 Street	Northbound	1,150	1,930	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	780						1
English Bay Road	25 Street	Hwy 28	Northbound	1,490	3,100	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,610						1
28 Street	English Bay Road	Hwy 55	Northbound	660	1,050	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	390						1
25 Street	1 Avenue	English Bay Road	Northbound	840	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	770						1
Nelson Street	1 Avenue	16 Street	Eastbound	570	900	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	330						1
16 Street	1 Avenue	8 Avenue	Northbound	2,070	2,840	Collector	Local (Residential or Industrial)	100	1,000	3
			Southbound	770						1
16 Street	8 Avenue	16 Avenue	Northbound	420	870	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	450						1
10 Street	1 Avenue	8 Avenue	Northbound	780	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	830						1
10 Street	8 Avenue	16 Avenue	Northbound	900	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	910						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	6,810	12,980	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,170						1
Hwy 28/55	75 Avenue	69 Avenue	Northbound	7,480	15,160	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	7,680						1
Hwy 28/55	69 Avenue	54 Avenue	Northbound	7,500	14,650	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	7,150						1
54 Avenue	56 Street	Hwy 28/55	Eastbound	1,330	2,860	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,530						2
54 Avenue	Hwy 28/55	51 Street	Eastbound	2,320	4,600	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,280						1
54 Avenue	51 Street	45 Street	Eastbound	1,440	2,610	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,170						2
52 Avenue	57 Street	Hwy 28/55	Eastbound	810	1,990	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,180						2
50 Avenue	62 Street	59 Street	Eastbound	220	590	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	370						1
50 Avenue	59 Street	57 Street	Eastbound	420	950	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	530						1
50 Avenue	57 Street	55 Street	Eastbound	180	520	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	340						1
Centre Avenue	59 Street	57 Street	Eastbound	8,340	12,040	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	3,700						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	8,500	12,800	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	4,300						1
50 Avenue	Hwy 28/55	51 Street	Eastbound	3,280	5,890	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,610						1
50 Avenue	51 Street	50 Street	Eastbound	3,080	5,050	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,970						1
50 Avenue	50 Street	45 Street	Eastbound	3,210	5,100	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,890						1
50 Avenue	45 Street	41 Street	Eastbound	2,620	4,130	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,510						1
50 Avenue	41 Street	Future Arterial	Eastbound	1,820	2,960	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,140						2
50 Avenue	Future Arterial	Baywood Road	Eastbound	1,510	2,470	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	960						1
59 Street	50 Avenue	Centre Avenue	Northbound	630	910	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	280						1
57 Street	52 Avenue	50 Avenue	Northbound	770	1,240	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	470						1
57 Street	50 Avenue	Centre Avenue	Northbound	820	1,340	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	520						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	6,970	13,840	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,870						1
Hwy 28/55	52 Avenue	50 Avenue	Northbound	7,640	13,340	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,700						1
Hwy 28/55	50 Avenue	50 Street	Northbound	5,280	10,730	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,450						1
Hwy 28/55	50 Street	43 Avenue	Northbound	5,930	12,600	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,670						1
Hwy 28/55	43 Avenue	South City Limit	Northbound	5,500	11,730	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,230						1
51 Street	54 Avenue	50 Avenue	Northbound	870	1,770	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	900						1
50 Street	50 Avenue	Hwy 28/55	Northbound	2,980	5,880	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,900						1
45 Street	54 Avenue	50 Avenue	Northbound	410	690	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	280						1
41 Street	54 Avenue	50 Avenue	Northbound	800	1,320	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	520						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 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
Kingsway	59 Street	Glenwood	Eastbound	7,290	10,510	2-Lane Arterial	Undivided Arterial	800	8,000	1
			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

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic

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

CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	1,600	2,800	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,200						2
1 Avenue	25 Street	Nelson Street	Eastbound	2,490	4,630	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,140						1
1 Avenue	Nelson Street	16 Street	Eastbound	2,680	5,500	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,820						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	9,600	17,840	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	8,240						2
8 Avenue	25 Street	16 Street	Eastbound	6,870	10,890	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,020						1
8 Avenue	16 Street	10 Street	Eastbound	2,470	4,210	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,740						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	1,300	2,610	4-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,310						2
Hwy 55	West City Limit	28 Street	Eastbound	3,700	5,430	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,730						1
Hwy 55	28 Street	Hwy 28	Eastbound	5,130	9,040	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,910						1
16 Avenue	Hwy 28	16 Street	Eastbound	3,720	6,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,770						1
16 Avenue	16 Street	10 Street	Eastbound	2,490	4,010	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,520						1
16 Avenue	10 Street	8 Street	Eastbound	2,450	4,240	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,790						1
English Bay Road	North City Limit	1 Avenue	Northbound	4,740	8,600	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,860						1
English Bay Road	1 Avenue	25 Street	Northbound	5,580	9,710	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,130						2
English Bay Road	25 Street	Hwy 28	Northbound	4,730	8,950	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,220						2
28 Street	English Bay Road	Hwy 55	Northbound	2,650	4,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,810						1
25 Street	1 Avenue	English Bay Road	Northbound	1,620	3,020	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
Nelson Street	1 Avenue	16 Street	Eastbound	1,180	1,860	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	680						1
16 Street	1 Avenue	8 Avenue	Northbound	4,840	6,600	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	1,760						1
16 Street	8 Avenue	16 Avenue	Northbound	970	2,060	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	1,090						2
16 Street	16 Avenue	10 Street	Northbound	1,030	1,780	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	750						1
10 Street	1 Avenue	8 Avenue	Northbound	1,340	2,610	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,270						2
10 Street	8 Avenue	16 Avenue	Northbound	1,580	3,290	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,710						1
10 Street	16 Avenue	16 Street	Northbound	1,040	2,020	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	980						1
6 Street [5]	16 Avenue	21 Avenue	Northbound	1,040	2,020	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	980						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	13,050	25,070	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,020						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	13,970	27,830	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	13,860						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	13,310	28,860	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	15,550						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	1,750	4,830	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,080						1
54 Avenue	56 Street	Hwy 28/55	Eastbound	1,820	4,110	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,290						1
54 Avenue	Hwy 28/55	51 Street	Eastbound	3,800	7,350	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,550						1
54 Avenue	51 Street	45 Street	Eastbound	2,990	5,420	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,430						1
52 Avenue	59 Street	57 Street	Eastbound	980	2,350	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,370						2
52 Avenue	57 Street	Hwy 28/55	Eastbound	1,680	4,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,450						1
Centre Avenue	59 Street	57 Street	Eastbound	12,290	17,560	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	5,270						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	11,020	18,420	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	7,400						1
50 Avenue	Hwy 28/55	51 Street	Eastbound	5,080	8,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,640						1
50 Avenue	51 Street	50 Street	Eastbound	4,080	6,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,640						1
50 Avenue	50 Street	45 Street	Eastbound	4,310	6,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,320						1
50 Avenue	45 Street	41 Street	Eastbound	3,660	5,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,060						1
50 Avenue	41 Street	Future Arterial	Eastbound	2,840	4,620	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,780						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,360	3,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,500						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	3,410	6,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,100						1
59 Street	52 Avenue	Centre Avenue	Northbound	1,310	1,890	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	580						1
57 Street	54 Avenue	52 Avenue	Northbound	910	1,510	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	600						1
57 Street	52 Avenue	Centre Avenue	Northbound	1,700	2,780	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,080						2
Hwy 28/55	54 Avenue	52 Avenue	Northbound	11,440	24,400	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,960						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	11,980	23,440	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	11,460						2
Hwy 28/55	50 Avenue	50 Street	Northbound	5,180	11,660	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,480						1
Hwy 28/55	50 Street	43 Avenue	Northbound	8,070	17,510	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	9,440						2
Hwy 28/55	43 Avenue	South City Limit	Northbound	6,520	13,880	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	7,360						1
51 Street	54 Avenue	50 Avenue	Northbound	1,320	2,800	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,480						2
50 Street	50 Avenue	Hwy 28/55	Northbound	4,770	9,300	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,530						2
45 Street	54 Avenue	50 Avenue	Northbound	520	860	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	340						1
45 Street	50 Avenue	43 Avenue	Northbound	370	950	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	580						1
41 Street	54 Avenue	50 Avenue	Northbound	1,660	2,740	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,080						2

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

CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
Kingsway	59 Street	Glenwood	Eastbound	9,530	15,530	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,000						1
Kingsway	Timberline	Glenwood	Eastbound	7,950	12,240	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,290						1
Kingsway	Queensway	Timberline	Eastbound	3,770	6,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,590						1
Kingsway	Tennis Court Road	Queensway	Eastbound	770	1,770	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,000						1
Kingsway	End of Road	Tennis Court Road	Eastbound	900	2,020	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,120						2
Tennis Court Road	Queensway	Kingsway	Northbound	250	310	Collector	Lane	N/A	N/A	N/A
			Southbound	60						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	1,790	3,110	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,320						1
Queensway	Kingsway	Hanger Ln	Northbound	2,370	2,860	Collector	Local (Residential or Industrial)	100	1,000	3
			Southbound	490						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,050	1,830	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	780						1
Timberline	Kingsway	Athabasca Road	Northbound	2,270	3,470	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,200						1
Glenwood Drive	Glenwood	Kingsway	Northbound	3,430	5,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,700						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)

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

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	2,190	3,690	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,500						1
1 Avenue	25 Street	Nelson Street	Eastbound	4,250	7,630	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,380						1
1 Avenue	Nelson Street	16 Street	Eastbound	4,120	8,470	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,350						2
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	14,280	26,760	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,480						2
8 Avenue	25 Street	16 Street	Eastbound	9,030	14,780	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	5,750						1
8 Avenue	16 Street	10 Street	Eastbound	3,250	5,750	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,500						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	1,780	3,700	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,920						1
Hwy 55	West City Limit	28 Street	Eastbound	4,640	6,850	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,210						1
Hwy 55	28 Street	Hwy 28	Eastbound	7,690	14,100	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	6,410						1
16 Avenue	Hwy 28	16 Street	Eastbound	5,720	9,850	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,130						2
16 Avenue	16 Street	10 Street	Eastbound	3,810	6,130	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,320						1
16 Avenue	10 Street	8 Street	Eastbound	3,590	6,060	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,470						1
English Bay Road	North City Limit	1 Avenue	Northbound	7,390	13,480	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,090						1
English Bay Road	1 Avenue	25 Street	Northbound	9,100	15,900	Collector	Undivided Arterial	800	8,000	2
			Southbound	6,800						1
English Bay Road	25 Street	Hwy 28	Northbound	7,980	14,720	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,740						1
28 Street	English Bay Road	Hwy 55	Northbound	4,620	7,920	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,300						1
25 Street	1 Avenue	English Bay Road	Northbound	3,310	6,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,700						1
Nelson Street	1 Avenue	16 Street	Eastbound	1,820	2,870	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,050						2
16 Street	1 Avenue	8 Avenue	Northbound	6,230	8,760	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	2,530						1
16 Street	8 Avenue	16 Avenue	Northbound	1,540	3,490	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,950						1
16 Street	16 Avenue	10 Street	Northbound	1,740	3,250	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,510						1
10 Street	1 Avenue	8 Avenue	Northbound	1,950	3,820	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,870						1
10 Street	8 Avenue	16 Avenue	Northbound	2,280	4,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,530						1
10 Street	16 Avenue	16 Street	Northbound	1,820	3,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
6 Street [5]	16 Avenue	21 Avenue	Northbound	1,820	3,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	20,290	38,580	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	18,290						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	21,650	42,820	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,170						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	17,000	37,270	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	20,270						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	3,710	9,240	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,530						2
69 Avenue	Glenwood	Hwy 28/55	Eastbound	3,080	5,530	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,450						1
54 Avenue	56 Street	Hwy 28/55	Eastbound	2,350	5,560	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,210						1
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,130	9,410	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,280						2
54 Avenue	51 Street	45 Street	Eastbound	4,600	8,340	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,740						1
52 Avenue	59 Street	57 Street	Eastbound	1,500	3,610	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,110						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	2,590	6,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,770						1
Centre Avenue	59 Street	57 Street	Eastbound	12,560	17,950	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	5,390						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	11,140	19,350	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	8,210						2
50 Avenue	Hwy 28/55	51 Street	Eastbound	6,560	11,410	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,850						1
50 Avenue	51 Street	50 Street	Eastbound	5,190	8,690	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,500						1
50 Avenue	50 Street	45 Street	Eastbound	5,420	8,510	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,090						1
50 Avenue	45 Street	41 Street	Eastbound	4,560	7,270	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,710						1
50 Avenue	41 Street	Future Arterial	Eastbound	3,950	6,420	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,470						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	3,270	5,350	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,080						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	4,710	8,640	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,930						1
59 Street	52 Avenue	Centre Avenue	Northbound	2,010	2,990	Collector	Local (Residential or Industrial)	100	1,000	3
			Southbound	980						1
57 Street	54 Avenue	52 Avenue	Northbound	1,410	2,340	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	930						1
57 Street	52 Avenue	Centre Avenue	Northbound	2,620	4,280	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,660						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	14,270	32,000	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	17,730						1
Hwy 28/55	52 Avenue	50 Avenue	Northbound	14,590	30,460	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	15,870						1
Hwy 28/55	50 Avenue	50 Street	Northbound	7,220	16,490	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	9,270						2
Hwy 28/55	50 Street	43 Avenue	Northbound	10,360	22,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,550						2
Hwy 28/55	43 Avenue	South City Limit	Northbound	7,700	16,310	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	8,610						2
51 Street	54 Avenue	50 Avenue	Northbound	1,550	3,240	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
50 Street	50 Avenue	Hwy 28/55	Northbound	5,520	10,760	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,240						1
45 Street	54 Avenue	50 Avenue	Northbound	640	1,060	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	420						1
45 Street	50 Avenue	43 Avenue	Northbound	450	1,160	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	710						1
41 Street	54 Avenue	50 Avenue	Northbound	2,560	4,220	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,660						1

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

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
Kingsway	59 Street	Glenwood	Eastbound	9,220	15,440	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,220						1
Kingsway	Timberline	Glenwood	Eastbound	9,960	15,970	Collector	Undivided Arterial	800	8,000	2
			Westbound	6,010						1
Kingsway	Queensway	Timberline	Eastbound	4,840	8,440	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,600						1
Kingsway	Tennis Court Road	Queensway	Eastbound	890	2,290	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,400						2
Kingsway	End of Road	Tennis Court Road	Eastbound	1,080	2,550	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,470						2
Tennis Court Road	Queensway	Kingsway	Northbound	270	330	Collector	Lane	N/A	N/A	N/A
			Southbound	60						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	2,300	3,990	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
Queensway	Kingsway	Hanger Ln	Northbound	2,940	3,590	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	650						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,390	2,370	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	980						1
Timberline	Kingsway	Athabasca Road	Northbound	2,890	4,520	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,630						1
Glenwood Drive	Glenwood	Kingsway	Northbound	6,290	9,880	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,590						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)

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

CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	2,870	4,780	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,910						1
1 Avenue	25 Street	Nelson Street	Eastbound	5,660	10,340	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,680						1
1 Avenue	Nelson Street	16 Street	Eastbound	5,680	11,670	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,990						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	18,790	36,170	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	17,380						1
8 Avenue	25 Street	16 Street	Eastbound	11,040	18,360	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	7,320						1
8 Avenue	16 Street	10 Street	Eastbound	3,930	7,150	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,220						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,250	4,850	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,600						1
Hwy 55	West City Limit	28 Street	Eastbound	5,560	8,270	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,710						1
Hwy 55	28 Street	Hwy 28	Eastbound	11,050	20,440	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	9,390						1
16 Avenue	Hwy 28	16 Street	Eastbound	7,360	12,910	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	5,550						1
16 Avenue	16 Street	10 Street	Eastbound	4,850	7,960	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,110						1
16 Avenue	10 Street	8 Street	Eastbound	4,640	7,830	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,190						1
English Bay Road	North City Limit	1 Avenue	Northbound	10,550	20,090	Collector	Divided Arterial	1,000	10,000	2
			Southbound	9,540						1
English Bay road	1 Avenue	25 Street	Northbound	13,350	24,350	Collector	Divided Arterial	1,000	10,000	2
			Southbound	11,000						2
English Bay road	25 Street	Hwy 28	Northbound	11,090	21,150	Collector	Divided Arterial	1,000	10,000	2
			Southbound	10,060						2
28 Street	English Bay Road	Hwy 55	Northbound	7,100	12,690	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,590						1
25 Street	1 Avenue	English Bay Road	Northbound	4,640	8,710	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,070						2
Nelson Street	1 Avenue	16 Street	Eastbound	2,510	3,960	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,450						1
16 Street	1 Avenue	8 Avenue	Northbound	7,870	11,530	Collector	Undivided Arterial	800	8,000	1
			Southbound	3,660						1
16 Street	8 Avenue	16 Avenue	Northbound	2,180	5,090	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,910						1
16 Street	16 Avenue	10 Street	Northbound	2,550	4,880	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,330						1
10 Street	1 Avenue	8 Avenue	Northbound	2,800	5,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,710						1
10 Street	8 Avenue	16 Avenue	Northbound	3,020	6,500	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,480						1
10 Street	16 Avenue	16 Street	Northbound	2,440	4,590	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,150						1
6 Street [5]	16 Avenue	75 Avenue	Northbound	2,440	4,590	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,150						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	27,060	52,890	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	25,830						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	28,420	56,990	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	28,570						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	21,360	46,290	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	24,930						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,950	11,560	Collector	Undivided Arterial	800	8,000	1
			Westbound	6,610						1
69 Avenue	Glenwood	Hwy 28/55	Eastbound	4,320	8,000	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,680						1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,130	16,970	Collector	Undivided Arterial	800	8,000	2
			Westbound	8,840						2
47 Street [6]	69 Avenue	61/62 Avenue	Northbound	4,420	8,485	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,065						2
54 Avenue	56 Street	Hwy 28/55	Eastbound	3,160	7,520	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	4,360						2
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,310	9,910	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,600						2
54 Avenue	51 Street	45 Street	Eastbound	6,340	11,490	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,150						1
54 Avenue [7]	45 Street	41 Street	Eastbound	3,795	7,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,335						1
54 Avenue	41 Street	Future Arterial	Eastbound	1,250	2,770	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,520						2
52 Avenue	59 Street	57 Street	Eastbound	2,070	4,980	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,910						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	3,570	8,770	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,200						2
Centre Avenue	59 Street	57 Street	Eastbound	15,000	21,440	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	6,440						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	13,460	23,590	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	10,130						2
50 Avenue	Hwy 28/55	51 Street	Eastbound	7,440	12,700	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	5,260						1
50 Avenue	51 Street	50 Street	Eastbound	6,140	9,750	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,610						1
50 Avenue	50 Street	45 Street	Eastbound	5,990	8,430	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,440						1
50 Avenue	45 Street	41 Street	Eastbound	5,110	7,290	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,180						1
50 Avenue	41 Street	Future Arterial	Eastbound	2,980	4,640	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,660						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,630	4,450	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,820						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	5,430	9,940	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,510						2
59 Street	52 Avenue	Centre Avenue	Northbound	2,780	4,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,230						1
57 Street	54 Avenue	52 Avenue	Northbound	1,940	3,220	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,280						1
57 Street	52 Avenue	Centre Avenue	Northbound	3,610	5,900	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,290						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	18,090	39,620	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,530						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	18,190	37,600	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	19,410						2
Hwy 28/55	50 Avenue	50 Street	Northbound	9,090	20,390	4-Lane Arterial	Divided Arterial	1,000	10,000	1
			Southbound	11,300						2
Hwy 28/55	50 Street	43 Avenue	Northbound	12,470	27,470	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	15,000						2
Hwy 28/55	43 Avenue	South City Limit	Northbound	9,020	18,910	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	9,890						2
51 Street	54 Avenue	50 Avenue	Northbound	1,760	3,700	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,940						1
50 Street	50 Avenue	Hwy 28/55	Northbound	6,300	12,290	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,990						1
45 Street	54 Avenue	50 Avenue	Northbound	690	1,130	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	440						1

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

CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
45 Street	50 Avenue	43 Avenue	Northbound	510	1,380	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	870						1
41 Street	54 Avenue	50 Avenue	Northbound	3,520	5,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,290						1
Future Arterial	69 Avenue	54 Avenue	Northbound	2,320	4,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,170						1
Future Arterial	54 Avenue	50 Avenue	Northbound	1,880	3,300	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,420						1
Kingsway	59 Street	Glenwood	Eastbound	10,870	18,070	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	7,200						1
Kingsway	Timberline	Glenwood	Eastbound	12,120	19,630	Collector	Undivided Arterial	800	8,000	2
			Westbound	7,510						1
Kingsway	Queensway	Timberline	Eastbound	5,990	10,470	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,480						1
Kingsway	Tennis Court Road	Queensway	Eastbound	1,090	2,840	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,750						2
Kingsway	End of Road	Tennis Court Road	Eastbound	1,270	3,050	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,780						1
Tennis Court Road	Queensway	Kingsway	Northbound	300	370	Collector	Lane	N/A	N/A	N/A
			Southbound	70						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	2,760	4,840	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,080						1
Queensway	Kingsway	Hanger Ln	Northbound	3,550	4,340	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	790						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,680	2,880	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,200						2
Timberline	Kingsway	Athabasca Road	Northbound	3,570	5,580	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,010						1
Glenwood Drive	Glenwood	Kingsway	Northbound	7,310	11,860	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	4,550						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)
6. Assumed daily traffic for 47 Street to be half of daily traffic on 69 Avenue, east of Highway 28/55
7. Assumed daily traffic for 54 Avenue (45 Street to 41 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

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	3,360	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,210						1
1 Avenue	25 Street	Nelson Street	Eastbound	6,650	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,560						1
1 Avenue	Nelson Street	16 Street	Eastbound	6,240	12,820	Collector	Undivided Arterial	800	8,000	1
			Westbound	6,580						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	21,470	42,370	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	20,900						2
8 Avenue	25 Street	16 Street	Eastbound	11,990	20,570	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,580						1
8 Avenue	16 Street	10 Street	Eastbound	4,630	8,540	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,910						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,720	5,930	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,210						1
Hwy 55	West City Limit	28 Street	Eastbound	7,370	10,690	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	3,320						1
Hwy 55	28 Street	Hwy 28	Eastbound	14,440	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,280						2
16 Avenue	Hwy 28	16 Street	Eastbound	8,660	15,310	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,650						1
16 Avenue	16 Street	10 Street	Eastbound	5,820	9,640	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,820						1
16 Avenue	10 Street	8 Street	Eastbound	4,510	8,030	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,520						1
16 Avenue	8 Street	East City Limit	Eastbound	2,370	4,030	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,660						1
English Bay Road [5]	North City Limit	Lake Avenue	Northbound	6,430	12,350	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,920						1
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24,700	Collector	Divided Arterial	1,000	10,000	2
			Southbound	11,840						2
English Bay Road	1 Avenue	25 Street	Northbound	16,370	30,130	Collector	Expressway	1,800	18,000	1
			Southbound	13,760						1
English Bay Road	25 Street	Hwy 28	Northbound	13,510	25,810	Collector	Divided Arterial	1,000	10,000	2
			Southbound	12,300						2
28 Street	English Bay Road	Hwy 55	Northbound	8,640	15,680	Collector	Undivided Arterial	800	8,000	2
			Southbound	7,040						1
25 Street	1 Avenue	English Bay Road	Northbound	5,560	10,510	Collector	Undivided Arterial	800	8,000	1
			Southbound	4,950						1
Nelson Street	1 Avenue	16 Street	Eastbound	2,760	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,600						1
16 Street	1 Avenue	8 Avenue	Northbound	9,290	13,820	Collector	Undivided Arterial	800	8,000	2
			Southbound	4,530						1
16 Street	8 Avenue	16 Avenue	Northbound	3,850	8,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,280						2
16 Street	16 Avenue	10 Street	Northbound	3,810	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,200						1
16 Street	10 Street	75 Avenue	Northbound	5,720	10,320	Collector	Undivided Arterial	800	8,000	1
			Southbound	4,600						1
10 Street	1 Avenue	8 Avenue	Northbound	3,400	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,320						1
10 Street	8 Avenue	16 Avenue	Northbound	3,560	7,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,250						2
10 Street	16 Avenue	16 Street	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
8 Street	16 Avenue	75 Avenue	Northbound	2,840	5,320	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,480						1
6 Street [6]	16 Avenue	21 Avenue	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	30,680	62,490	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	31,810						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	31,690	65,550	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	33,860						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	24,020	52,940	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	28,920						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,390	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,730						2
69 Avenue	Glenwood	Hwy 28/55	Eastbound	5,590	10,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,480						1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,350	15,790	Collector	Undivided Arterial	800	8,000	2
			Westbound	7,440						1
47 Street [7]	69 Avenue	61/62 Avenue	Northbound	3,720	7,895	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,175						2
54 Avenue	56 Street	Hwy 28/55	Eastbound	3,850	9,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,610						2
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,850	10,560	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,710						1
54 Avenue	51 Street	45 Street	Eastbound	6,960	12,620	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,660						1
54 Avenue [8]	45 Street	41 Street	Eastbound	4,600	8,425	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,825						1
54 Avenue	41 Street	Future Arterial	Eastbound	2,240	4,230	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,990						1
52 Avenue	59 Street	57 Street	Eastbound	2,270	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,190						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	3,920	9,630	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,710						2
Centre Avenue	59 Street	57 Street	Eastbound	17,310	24,740	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	7,430						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	15,540	27,490	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,950						2
50 Avenue	Hwy 28/55	51 Street	Eastbound	7,940	13,510	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	5,570						1
50 Avenue	51 Street	50 Street	Eastbound	6,800	10,920	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,120						1
50 Avenue	50 Street	45 Street	Eastbound	6,610	9,340	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,730						1
50 Avenue	45 Street	41 Street	Eastbound	6,170	9,220	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,050						1
50 Avenue	41 Street	Future Arterial	Eastbound	4,880	8,320	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,440						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,070	3,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,560						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	6,220	11,240	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,020						1
59 Street	52 Avenue	Centre Avenue	Northbound	3,050	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,350						1
57 Street	54 Avenue	52 Avenue	Northbound	2,130	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
57 Street	52 Avenue	Centre Avenue	Northbound	3,960	6,470	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	20,930	45,540	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	24,610						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	20,540	42,490	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,950						2
Hwy 28/55	50 Avenue	50 Street	Northbound	10,700	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	13,030						2
Hwy 28/55	50 Street	43 Avenue	Northbound	14,520	32,070	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	17,550						1
Hwy 28/55	43 Avenue	40 Avenue	Northbound	10,330	21,420	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	11,090						2
Hwy 28/55 [9]	40 Avenue	South City Limit	Northbound	5,165	10,710	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,545						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 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
51 Street	54 Avenue	50 Avenue	Northbound	1,980	4,210	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,230						1
50 Street	50 Avenue	Hwy 28/55	Northbound	7,170	13,980	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,810						1
45 Street	54 Avenue	50 Avenue	Northbound	700	1,150	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	450						1
45 Street	50 Avenue	43 Avenue	Northbound	960	2,420	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	1,460						2
41 Street	54 Avenue	50 Avenue	Northbound	3,870	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Future Arterial	75 Avenue	69 Avenue	Northbound	6,900	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,170						1
Future Arterial	69 Avenue	54 Avenue	Northbound	6,510	12,080	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,570						1
Future Arterial	54 Avenue	50 Avenue	Northbound	4,730	8,570	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,840						1
Kingsway	59 Street	Glenwood	Eastbound	12,400	20,620	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,220						1
Kingsway	Timberline	Glenwood	Eastbound	14,040	22,750	Collector	Divided Arterial	1,000	10,000	2
			Westbound	8,710						1
Kingsway	Queensway	Timberline	Eastbound	7,020	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,190						1
Kingsway	Tennis Court Road	Queensway	Eastbound	1,280	3,300	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,020						1
Kingsway	End of Road	Tennis Court Road	Eastbound	1,440	3,480	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,040						1
Tennis Court Road	Queensway	Kingsway	Northbound	330	400	Collector	Lane	N/A	N/A	N/A
			Southbound	70						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	3,130	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,440						1
Queensway	Kingsway	Hanger Ln	Northbound	4,100	5,010	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	910						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,920	3,320	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
Timberline	Kingsway	Athabasca Road	Northbound	4,170	6,480	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	2,310						1
Glenwood Drive	Glenwood	Kingsway	Northbound	8,460	13,730	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	5,270						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for English Bay Road (North City Limit to Lake Avenue) to be half of daily traffic on English Bay Road (Lake Avenue to 1 Avenue)
6. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)
7. Assumed daily traffic for 47 Street to be half of daily traffic on 69 Avenue, east of Highway 28/55
8. Assumed daily traffic for 54 Avenue (45 Street to 41 Street) to be average of daily traffic on 54 Avenue (51 Street to 45 Street) and 54 Avenue (41 Street to Future Arterial)
9. Assumed daily traffic for Highway 28 (40 Avenue to South City Limit) to be half of daily traffic on Highway 28 (43 Avenue to 40 Avenue)

D Appendix D - Transportation Study Cold Lake North - Parking Study

Technical Memorandum

City of Cold Lake

Transportation Study
Cold Lake North - Parking Study

April 2011

Table of Contents

List of Tables

List of Figures

1 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.

Study Boundary

PROJECT No.	2010–3050
DATE:	SEPT 2010
APPROVED:	
SCALE:	N.T.S.
DWG. No.	

Associated Engineering

CITY OF COLD LAKE
COLD LAKE NORTH PARKING STUDY

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.

Study Boundary

2-Hour Parking Zone

No Parking Zone

PROJECT No. 2010–3050
DATE: SEPT 2010
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FIGURE 2.1
OBSERVED PARKED RESTRICTIONS

Study Boundary

\#\# On-Street Parking Stalls

PROJECT No. 2010–3050
DATE: SEPT 2010
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FIGURE 2.2
ON-STREET PARKING INVENTORY

Study Boundary

Off-Street Parking Lots

PROJECT No. 2010–3050
DATE: SEPT 2010
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FIGURE 2.3
OFF-STREET PARKING INVENTORY

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%).

PROJECT No.	2010–3050
DATE:	SEPT 2010
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SCALE:	N.T.S.
DWG. No.	

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COLD LAKE NORTH PARKING STUDY

FIGURE 3.1
PARKING STUDY ZONES

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 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.

4.2.2 Parking Duration

Zone 1
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 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.

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.

5 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.

Table 6.1
Expected Parking Supply for Design Options

Design Option	Parking Supply
Option 1	35
Option 2	31
Option 3	34
Option 4	35

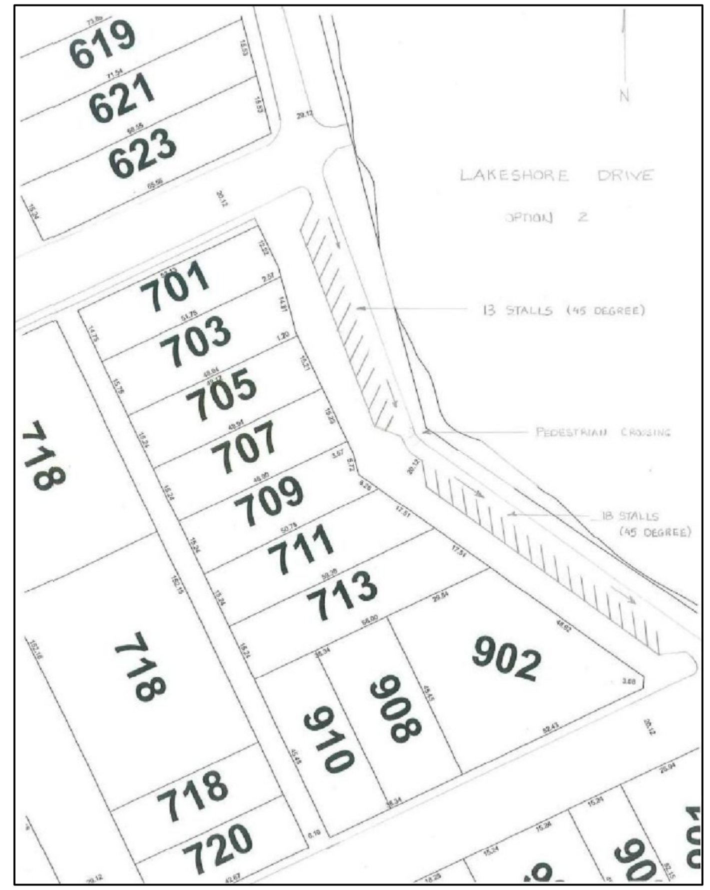
Table 6.2
Observed Parking Demand

Time	Parking Demand (Vehicles)	
	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

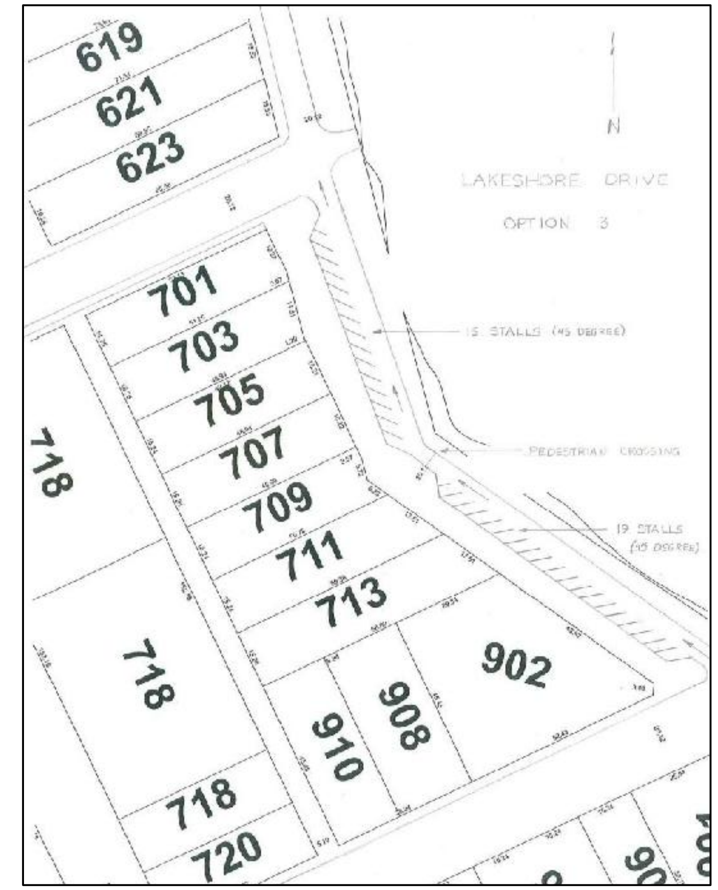
A comparison of the expected parking supply versus the existing parking demand indicates that regardless of the design option implemented, the expected parking supply along Lakeshore Drive (between 7 Avenue and 8 Avenue) will accommodate the demand.

OPTION 1

OPTION 2



OPTION 3



OPTION 4

FROM APPENDIX B, CITY OF COLD LAKE, LAKESHORE REDEVELOPMENT PLAN (MARCH 2010)

PROJECT No.	2010–3050
DATE:	SEPT 2010
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SCALE:	N.T.S.
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FIGURE 6.1
LAKESHORE REDEVELOPMENT PLAN
DESIGN OPTIONS

7 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 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. 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.

A Appendix A - Parking Survey Data

City of Cold Lake
Project No: 2010-3050
Date: September 10, 2010

(yellow)	No Parking Zones
(green)	2-Hour Parking

COLD LAKE NORTH - PARKING UTILIZATION - JULY 1, 2010

Zone	Type	Road	From	To	Side	Parking Stalls Available	PARKED VEHICLES 11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	PARKING UTILIZATION (%) 11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	PARKING DURATION 1 Hour	2 Hours	3 Hours	4 Hours	5 Hours	6 Hours	PARKING TURNOVER Unique Veh.	Turnover Rate
1	On Street	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	7	2	1	6	7	7	7	29%	14%	86%	100%	100%	100%	4	3	2	2	0	1	12	1.71
		Lakeshore Drive	7 Avenue	8 Avenue	East	19	5	4	12	8	8	1	26%	21%	63%	42%	42%	5%	26	6	0	0	0	0	31	1.63
		Lakeshore Drive	7 Avenue	8 Avenue	West	16	5	7	9	9	6	3	31%	44%	56%	56%	38%	19%	19	2	2	1	1	0	25	1.56
		Lakeshore Drive	6 Avenue	7 Avenue	East	0	0	1	0	0	0	0	-	-	-	-	-	-	1	0	0	0	0	0	1	-
		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	-
		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 Lot				63	50	78	76	73	75	78	79%	124%	121%	116%	119%	124%	130	37	19	15	10	10	206	3.27
Zone #1 Total						180	69	98	120	116	115	104	24%	28%	49%	49%	48%	38%	189	53	32	23	11	14	306	1.14
2	On Street	10 Street	1 Avenue	3 Avenue	West	3	2	2	2	2	0	0	67%	67%	67%	67%	0%	0%	0	4	0	0	0	0	4	1.33
		10 Street	1 Avenue	3 Avenue	East	9	3	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
		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	North	11	5	4	3	8	3	3	45%	36%	27%	73%	27%	27%	6	2	0	1	0	2	10	0.91
		6 Avenue	Lakeshore Drive	10 Street	South	14	4	2	4	3	2	2	29%	14%	29%	21%	14%	14%	3	0	0	2	0	1	6	0.43
		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	0.79
		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
3	On Street	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
		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
		1 Avenue	23 Street	Nelson Street / 22 Street	South	8	6	4	2	3	3	3	75%	50%	25%	38%	38%	38%	6	3	3	0	0	0	12	1.50
		1 Avenue	Nelson Street / 22 Street	19 Street	South	41	41	41	34	37	33	34	100%	100%	83%	90%	80%	83%	48	20	8	9	1	11	95	2.32
		1 Avenue	19 Street	Nelson Street / 18 Street	South	13	7	9	10	8	7	8	54%	69%	77%	62%	54%	62%	20	9	2	0	1	0	32	2.46
		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 Lot				86	31	38	39	39	34	34	36%	44%	45%	45%	40%	40%	9	13	2	6	6	20	54	0.63
		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
4	On Street	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
		Birch Avenue	23 Street	Tamarak Street	South	29	7	8	14	15	14	14	24%	28%	48%	52%	48%	48%	5	7	0	3	1	6	21	0.72
		Pine Avenue	23 Street	Tamarak Street	North	31	14	11	14	12	12	13	45%	35%	45%	39%	39%	42%	9	4	1	2	0	8	24	0.77
		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
5	On Street	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	West	11	6	10	10	11	8	11	55%	91%	91%	100%	73%	100%	16	10	4	2	0	0	32	2.91
		19 Street	1 Avenue	2 Avenue	East	10	7	9	7	6	9	8	70%	90%	70%	60%	90%	80%	12	11	4	0	0	0	25	2.50
		Nelson Street / 18 Street	1 Avenue	2 Avenue	West	7	6	5	5	5	4	3	86%	71%	71%	71%	57%	43%	3	3	1	4	0	0	11	1.57
		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
		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
		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

No Parking Zones
2-Hour Parking

COLD LAKE NORTH - PARKING UTILIZATION - JULY 2, 2010

Zone	Type	Road	From	To	Side	Parking Stalls Available	PARKED VEHICLES 11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	PARKING UTILIZATION (%) 11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	PARKING DURATION 1 Hour	2 Hours	3 Hours	4 Hours	5 Hours	6 Hours	PARKING TURNOVER Unique Veh.	Turnover Rate
1	On Street	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%	29%	43%	43%	43%	50%	1	0	0	2	4	0	7	0.50
		Lakeshore Drive	8 Avenue	8 Street	North	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
		Lakeshore Drive	8 Avenue	8 Street	South	7	0	0	2	1	2	2	0%	0%	29%	14%	29%	29%	4	0	1	0	0	0	5	0.71
		Lakeshore Drive	7 Avenue	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	7 Avenue	8 Avenue	West	16	3	6	5	3	3	2	19%	38%	31%	19%	19%	13%	9	4	0	0	1	0	14	0.88
		Lakeshore Drive	6 Avenue	7 Avenue	East	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
		Lakeshore Drive	6 Avenue	7 Avenue	West	8	1	3	4	6	5	4	13%	38%	50%	75%	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 Lot			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
2	On Street	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
		10 Street	7 Avenue	8 Avenue	East	14	0	1	2	2	2	2	0%	7%	14%	14%	14%	14%	1	0	0	2	0	0	3	0.21
		5 Avenue	Lakeshore Drive	10 Street	North	12	1	1	4	2	2	1	8%	8%	33%	17%	17%	8%	4	0	1	1	0	0	6	0.50
		5 Avenue	Lakeshore Drive	10 Street	South	12	5	7	4	4	4	4	42%	58%	33%	33%	33%	33%	2	1	0	0	0	4	7	0.58
		6 Avenue	Lakeshore Drive	10 Street	North	11	2	2	2	2	2	2	18%	18%	18%	18%	18%	18%	1	0	0	0	1	1	3	0.27
		6 Avenue	Lakeshore Drive	10 Street	South	14	2	2	1	2	2	2	14%	14%	7%	14%	14%	14%	0	1	1	0	0	1	2	0.14
		7 Avenue	Lakeshore Drive	10 Street	North	14	2	2	1	2	2	1	14%	14%	7%	14%	14%	7%	2	1	0	0	0	1	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	1	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	7	0.39
		8 Avenue	Lakeshore Drive	10 Street	South	9	2	1	3	2	3	3	22%	11%	33%	22%	33%	33%	7	2	1	0	0	0	9	1.00
			Zone #2 Total			242	40	38	42	38	40	37	17%	16%	18%	16%	17%	16%	33	12	8	3	2	22	73	0.32
3	On Street	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
		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
		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
		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 Lot			86	5	7	20	30	19	5	6%	8%	23%	35%	22%	6%	29	16	7	1	0	0	53	0.62
			Unmarked Parking 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
4	On Street	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	0	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	0	2	1	4	11	0.35
		Pine Avenue	23 Street	Spruce Street	South	12	5	5	5	5	4	4	42%	42%	42%	42%	33%	33%	0	0	0	1	0	4	5	0.42
		Pine Avenue	Spruce Street	Tamarak Street	South	16	3	3	2	2	2	4	19%	19%	13%	13%	13%	25%	2	1	0	0	0	2	4	0.25
		Spruce Street	Pine Avenue	1 Avenue	West	12	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
		Spruce Street	Pine Avenue	1 Avenue	East	17	0	1	1	0	0	0	0%	6%	6%	0%	0%	0%	0	1	0	0	0	0	1	0.06
		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
		Tamarak Street	Birch Avenue	1 Avenue	East	16	1	2	1	1	1	0	6%	13%	6%	6%	6%	0%	1	0	0	0	1	0	2	0.13
			Zone #4 Total			240	42	41	40	36	29	34	18%	17%	17%	16%	12%	13%	31	9	1	6	4	21	65	0.26
5	On Street	Nelson 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
		Nelson 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
		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
		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
		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
		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 Avenue	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
		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
			Route #5 Total			180	33	31	26	24	25	21	18%	17%	15%	13%	13%	12%	11	8	9	2	4	13	44	0.23

City of Cold Lake
Project No: 2010-3050
Date: September 10, 2010

(yellow)	No Parking Zones
(green)	2-Hour Parking

COLD LAKE NORTH - PARKING UTILIZATION - JULY 3, 2010

Zone	Type	Road	From	To	Side	Parking Stalls	PARKED VEHICLES						PARKING UTILIZATION (%)						PARKING DURATION						PARKING TURNOVER	
						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	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	Unique Veh.	Turnover Rate
1	On Street	Lakeshore Drive	8 Street	7 Street	North	0	6	6	5	2	2	3	-	-	-	-	-	-	1	1	3	0	0	2	7	-
		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	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
		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	East	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	7 Avenue	East	0	0	0	0	0	0	0	-	-	-	-	-	-	0	0	0	0	0	0	0	-
		Lakeshore Drive	6 Avenue	7 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	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	1	1	1	1	2	2	3%	3%	3%	3%	7%	7%	0	1	0	0	0	1	2	0.07
		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	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	0.00
	Off Street	Marina Parking Lot				63	61	64	67	67	64	47	97%	102%	106%	106%	102%	75%	122	38	15	9	11	6	198	3.14
Zone #1 Total						180	103	95	97	101	93	72	41%	34%	34%	38%	32%	26%	185	62	24	12	12	12	301	1.13
2	On Street	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	1	1	1	1	1	1	11%	11%	11%	11%	11%	11%	0	0	0	0	0	1	1	0.11
		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	2	2	2	2	2	2	13%	13%	13%	13%	13%	13%	0	0	0	0	0	2	2	0.13
		10 Street	5 Avenue	6 Avenue	West	15	1	1	1	1	1	1	7%	7%	7%	7%	7%	7%	0	0	0	0	0	1	1	0.07
		10 Street	5 Avenue	6 Avenue	East	15	2	3	3	2	2	1	13%	20%	20%	13%	13%	7%	0	1	0	0	1	1	3	0.20
		10 Street	6 Avenue	7 Avenue	West	15	5	7	4	4	4	5	33%	47%	27%	27%	27%	33%	3	2	0	1	0	3	9	0.60
		10 Street	6 Avenue	7 Avenue	East	14	4	3	5	5	6	6	29%	21%	36%	36%	43%	43%	2	1	1	1	0	3	8	0.57
		10 Street	7 Avenue	8 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	7 Avenue	8 Avenue	East	14	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%	0	0	0	0	0	0	0	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
		6 Avenue	Lakeshore Drive	10 Street	South	14	3	2	1	1	1	1	21%	14%	7%	7%	7%	7%	1	1	0	0	0	1	3	0.21
		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
		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
		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
		8 Avenue	Lakeshore Drive	10 Street	South	9	7	4	2	2	1	1	78%	44%	22%	22%	11%	11%	11	3	0	0	0	0	14	1.56
Route #2 Total						242	49	47	38	41	32	31	21%	20%	16%	17%	13%	13%	44	15	3	6	2	20	88	0.38
3	On Street	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
		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	9	4	2	2	2	2	18%	8%	4%	4%	4%	4%	7	1	0	0	0	2	10	0.20
		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
		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
		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
		1 Avenue	Nelson Street / 22 Street	19 Street	South	41	8	9	10	11	9	9	20%	22%	24%	27%	22%	22%	5	1	1	3	2	4	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	1	1	0	0	0	0	11%	11%	0%	0%	0%	0%	0	1	0	0	0	0	1	0.11
		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 Lot				86	0	9	18	14	16	15	0%	10%	21%	16%	19%	17%	34	7	2	2	2	0	46	0.53
		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
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
4	On Street	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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
		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
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
5	On Street	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
		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 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
		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
		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
		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
		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
		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	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	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	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	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	North	12	1	1	2	2	2	2	8%	8%	17%	17%	17%	17%	1	0	1	0	0	1	3	0.25
		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

B 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

Survey	Survey	Street Location	Time of Day	Driver/Passenger	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?	
1-Jul-10	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 Blocks		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	3rd Ave & 16th Street	15:45	Passenger	Cold Lake South		Main Ave 50th Ave & 45th St	Kinosoo Beach		2 Blocks		> 2 Blocks		4 Hours		Leisure	
	20	1st Ave & Nelson Street	15:20	Passenger	Cold Lake North		11st near 8th Ave	Kinosoo Beach		2 Blocks		> 2 Blocks		2 Hours		Leisure	
	21	2nd Ave & Nelson Street	15:30	Driver	Cold Lake South		52nd Ave	Kinosoo Beach		2 Blocks		> 2 Blocks		3 Hours		Leisure	
	22	3rd Ave & 16th Street	16:45	Passenger	Out-of-Town (within AB)		Red Deer	Kinosoo Beach		1 Block		> 2 Blocks		1 Hour		Leisure	
	23	No Response	No Response	No Response	Cold Lake South		Cold Lake South	Waterfront/Marina		< 1 Block		> 2 Blocks		1 Hour		Other	Walk
	24	No Response	No Response	No Response	Cold Lake North		Cold Lake	Waterfront/Marina		> 2 Blocks		1 Block		3 Hours		Leisure	
	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 Day
	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	
	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	< 1 Block		> 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	Kinosoo Beach		< 1 Block		2 Blocks		< 30 Minutes		Leisure	
	45	Pine	15:21	Driver	Cold Lake North		11 Street	Kinosoo Beach		< 1 Block		2 Blocks		2 Hours		Leisure	
	46	Birch	16:06	Driver	Cold Lake South		50th Street	Kinosoo Beach		< 1 Block		1 Block		< 30 Minutes		Leisure	
	47	Pine Ave	16:19	Passenger	Cold Lake North		26th Street	Kinosoo Beach		< 1 Block		1 Block		3 Hours		Leisure	
	48	Pine	16:20	Passenger	Cold Lake South		Wildwood	Kinosoo Beach		< 1 Block		2 Blocks		4 Hours		Leisure	
	49	1st	No Response	No Response	Cold Lake South		Home	Kinosoo Beach		1 Block		< 1 Block		< 30 Minutes		Other	Canada
	50	No Response	No Response	No Response	Out-of-Town (within AB)		Edmonton	Kinosoo Beach		< 1 Block		Other	Anytime	2 Hours		Other	Canada Day
	51	No Response	No Response	No Response	Out-of-Town (Outside AB)	Golden BC	Home	Kinosoo Beach		< 1 Block		> 2 Blocks		> 4 hours		Other	Canada Day
	52	No Response	No Response	No Response	Cold Lake South		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 Block		3 Hours		Other	Canada Day
	54	No Response	No Response	No Response	Out-of-Town (within AB)		Edmonton	Kinosoo Beach		< 1 Block		< 1 Block		2 Hours		Other	Canada Day
	55	No Response	No Response	No Response	Cold Lake South		Beach	Other	Home	< 1 Block		> 2 Blocks		1 Hour		Other	Canada Day
	56	No Response	No Response	No Response	Cold Lake North		Home	Kinosoo Beach		< 1 Block		> 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	
2-Jul-10	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	
	66	10 Street	11:10	Driver	Cold Lake South		Residence	Other	Work	< 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
	68	10 Street & 7 Ave	11:45	Passenger	Cold Lake South		Work	Other	Work	< 1 Block		< 1 Block		1 Hour		Business	
	69	10 Street & Ave	13:15	Driver	Cold Lake North		Work	Other	Cold Lake South	< 1 Block		< 1 Block		3 Hours		Personal	
3-Jul-10	70	10 Street & 7 Ave	13:00	Driver	Cold Lake South		Work	Other	Working	< 1 Block		< 1 Block		1 Hour		Business	
	71	Spruce Street	11:30	Driver	Out-of-Town (Outside AB)	MD of Bonnyville	No Response	Other	Garage Sale	< 1 Block		1 Block		< 30 Minutes		Personal	
	72	Spruce	No Response	Driver	Out-of-Town (Outside AB)	Saskatchewan	Loon Lake	Other	Yard Sale	< 1 Block		< 1 Block		< 30 Minutes		Personal	Yard Sale
	73	23 Street	14:00	Driver	Cold Lake South		53 Ave	MD Campground		< 1 Block		1 Block		1 Hour		Personal	
	74	No Response	No Response	No Response	Cold Lake North		Home	Kinosoo Beach		< 1 Block		> 2 Blocks		3 Hours		Other	Jogging & Swim
	75	No Response	No Response	No Response	Cold Lake North		Cold Lake South	Other	Home	< 1 Block		1 Block		Other	Home	Other	Home
	76	10 Street	11:10	Driver	Cold Lake North		Visiting	Other	Visiting	< 1 Block		1 Block		Other	Half a day	Personal	

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.

Table C.1
Parking Utilization - Entire Study Area

Time Period	Parking Stalls Available	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
		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	960	363	39%	137	14%	199	22%	233	25%
12:00 AM		338	36%	141	15%	176	19%	218	23%
1:00 PM		400	44%	150	17%	166	18%	239	26%
2:00 PM		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.2
Parking Duration - Entire Study Area

Duration	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	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.3
Parking Turnover - Entire Study Area

Parking Turnover Rate (6-Hour Period)			
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.

Table C.4
Parking Utilization - By Study Zone

Zone	Time Period	Parking Stalls	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
			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
Zone 1	11:00 AM	117	19	17%	11	10%	36	34%	22	20%
	12:00 AM		19	16%	20	18%	25	25%	21	20%
	1:00 PM		44	40%	30	29%	25	25%	33	31%
	2:00 PM		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%
Zone 2	11:00 AM	242	48	23%	40	17%	49	21%	46	20%
	12:00 AM		39	20%	38	16%	47	20%	41	19%
	1:00 PM		51	24%	42	18%	38	16%	44	20%
	2:00 PM		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%
Zone 3	11:00 AM	181	139	69%	11	7%	24	12%	58	29%
	12:00 AM		131	59%	11	7%	20	11%	54	26%
	1:00 PM		132	59%	12	7%	19	11%	54	26%
	2:00 PM		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%
Zone 4	11:00 AM	240	72	35%	42	18%	47	18%	54	23%
	12:00 AM		71	35%	41	17%	42	17%	51	23%
	1:00 PM		84	41%	40	17%	42	18%	55	25%
	2:00 PM		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%

Zone	Time Period	Parking Stalls	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
			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
Zone 5	11:00 AM	180	85	51%	33	18%	43	24%	54	31%
	12:00 AM		78	49%	31	17%	42	23%	50	30%
	1:00 PM		89	54%	26	15%	42	22%	52	30%
	2:00 PM		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.5
Parking Duration - By Study Zone

Zone	Duration	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
		Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total
Zone 1	1 Hour	58	59%	48	70%	62	63%	56	63%
	2 Hours	15	15%	7	10%	23	23%	15	17%
	3 Hours	13	13%	3	4%	6	6%	7	8%
	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%
Zone 2	1 Hour	62	50%	33	41%	44	49%	46	47%
	2 Hours	25	20%	12	15%	15	17%	17	18%
	3 Hours	13	10%	8	10%	3	3%	8	8%
	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%
Zone 3	1 Hour	216	53%	2	11%	14	38%	80	51%
	2 Hours	115	28%	6	33%	5	14%	42	27%
	3 Hours	32	8%	1	6%	2	5%	12	7%
	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%

Zone	Duration	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
		Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total
Zone 4	1 Hour	75	40%	6	13%	28	36%	45	40%
	2 Hours	46	25%	9	19%	15	19%	23	21%
	3 Hours	18	10%	1	2%	4	5%	8	7%
	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%
Zone 5	1 Hour	90	40%	11	23%	17	25%	39	35%
	2 Hours	76	34%	8	17%	9	13%	31	27%
	3 Hours	27	12%	9	19%	8	12%	15	13%
	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

Zone	Parking Turnover Rate (6-Hour Period)			
	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.

Table C.7
Parking Utilization - By Study Corridor

Corridor	Time Period	Parking Stalls	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
			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
Lakeshore Drive	11:00 AM	108	16	14%	8	7%	36	39%	20	20%
	12:00 AM		16	14%	19	19%	25	29%	20	20%
	1:00 PM		42	42%	28	30%	25	28%	32	34%
	2:00 PM		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%
10 Street	11:00 AM	139	20	19%	20	14%	15	11%	18	15%
	12:00 AM		17	18%	19	14%	17	12%	18	15%
	1:00 PM		17	18%	20	14%	16	11%	18	15%
	2:00 PM		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%
1 Avenue	11:00 AM	181	139	69%	11	7%	24	12%	58	29%
	12:00 AM		131	59%	11	7%	20	11%	54	26%
	1:00 PM		132	59%	12	7%	19	11%	55	26%
	2:00 PM		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.8
Parking Duration - By Study Corridor

Corridor	Duration	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
		Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total
Lakeshore Drive	1 Hour	58	60%	46	71%	62	63%	55	64%
	2 Hours	14	15%	7	11%	23	23%	15	17%
	3 Hours	12	13%	2	3%	6	6%	7	8%
	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%
10 Street	1 Hour	16	39%	8	27%	5	21%	10	31%
	2 Hours	11	27%	4	13%	4	17%	6	20%
	3 Hours	4	10%	2	7%	1	4%	2	7%
	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 Avenue	1 Hour	216	53%	9	36%	14	38%	80	51%
	2 Hours	115	28%	6	24%	5	14%	42	27%
	3 Hours	32	8%	1	4%	2	5%	12	7%
	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.9
Parking Turnover - By Study Corridor

Corridor	Parking Turnover Rate (6-Hour Period)			
	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

D 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.

Table D.1
Parking Utilization – By Parking Lot

Parking Lot	Time Period	Parking Stalls	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
			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
Marina Lot	11:00 AM	63	50	79%	38	60%	61	97%	50	79%
	12:00 AM		78	124%	52	83%	64	102%	65	103%
	1:00 PM		76	121%	64	102%	67	106%	69	110%
	2:00 PM		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%
1 Avenue Lot	11:00 AM	86	31	36%	5	6%	0	0%	12	14%
	12:00 AM		38	44%	7	8%	9	10%	18	21%
	1:00 PM		39	45%	20	23%	18	21%	26	30%
	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%
Gravel Lot	11:00 AM	58	32	55%	1	2%	2	3%	12	20%
	12:00 AM		38	66%	3	5%	4	7%	15	26%
	1:00 PM		47	81%	4	7%	3	5%	18	31%
	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.2
Parking Duration – By Parking Lot

Parking Lot	Duration	July 1, 2010		July 2, 2010		July 3, 2010		3-Day Period	
		Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total	Number of Vehicles	Percentage of Total
Marina Lot	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%
	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 Avenue Lot	1 Hour	9	16%	29	55%	34	72%	24	46%
	2 Hours	13	23%	16	30%	7	15%	12	23%
	3 Hours	2	4%	7	13%	2	4%	4	7%
	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%
Gravel Lot	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%
	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.3
Parking Turnover – By Parking Lot

Parking Lot	Parking Turnover Rate (6-Hour Period)			
	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

E 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.

Table E.1
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%**

The majority of commuters interviewed lived within the City, with 45% living in Cold Lake North and 33% living in Cold Lake South.

Table E.2
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%**

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.

Table E.3
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%**

Half the commuters (50%) interviewed were destined for Kinosoo Beach and 14% were destined for the Waterfront/Marina.

Table E.4
How far from your destination did you park?

	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%**

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.

Table E.5
How far are you willing to walk from where you park to your destination?

	Response	Percentage of Total
< 1 Block	13	17%
1 Block	13	17%
2 Blocks	11	14%
> 2 Blocks	33	43%
Other	5	7%
No Response	1	1%
Total	**76**	**100%**

Most commuters (43%) interviewed are willing to park further than 2 blocks from their destination.

Table E.6
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%**

Most commuters (28%) interviewed will be parked in their parking spot for a duration of 2 hours.

Table E.7
What was your reason for parking today?

	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%**

The predominant trip purpose for most commuters interviewed in Cold Lake North was leisure (43%).

F Appendix F - On-Street Parking Analysis

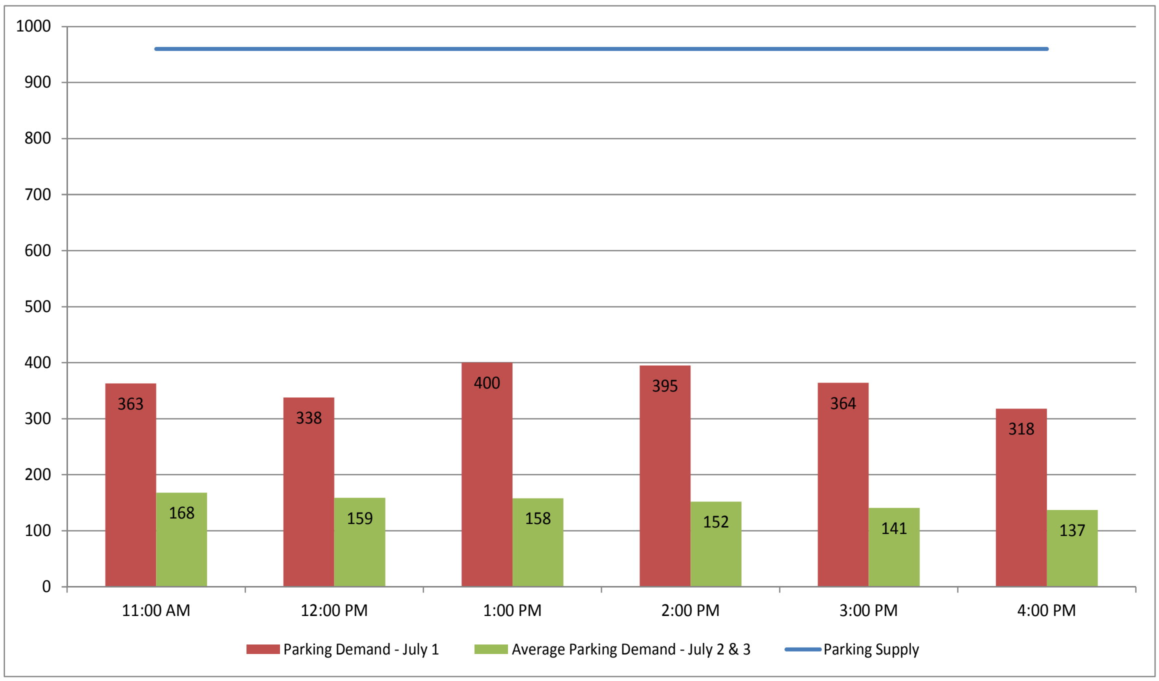
Appendix F – On Street Parking Analysis

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

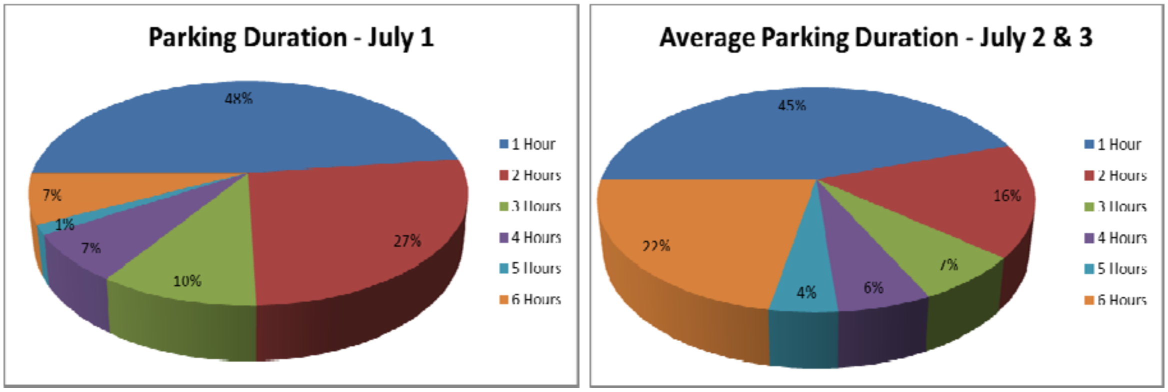


The existing on-street parking supply was able to accommodate the overall on-street parking demand in the entire study area. The parking demand on July 1 was higher than the parking demand on July 2 and July 3; the parking demand on July 1 was almost double the parking demand on July 2 and July 3. The 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
Parking Duration – Entire Study Area



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

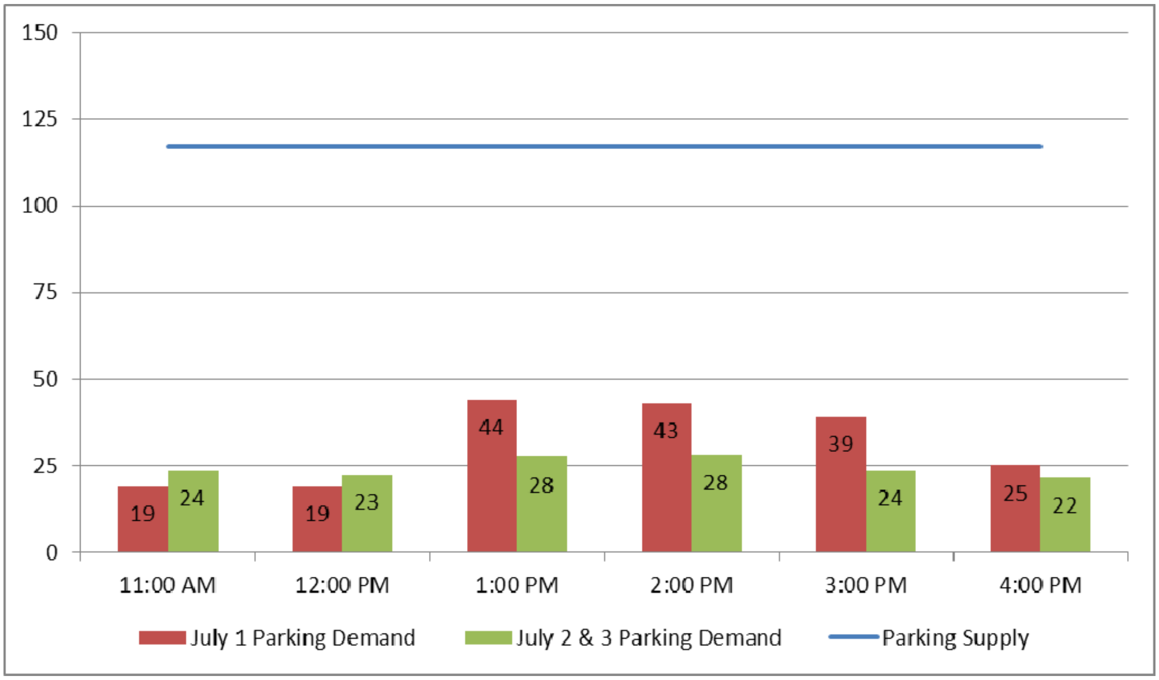


Figure F.4
On-Street Parking Supply vs. Demand – Study Zone 2

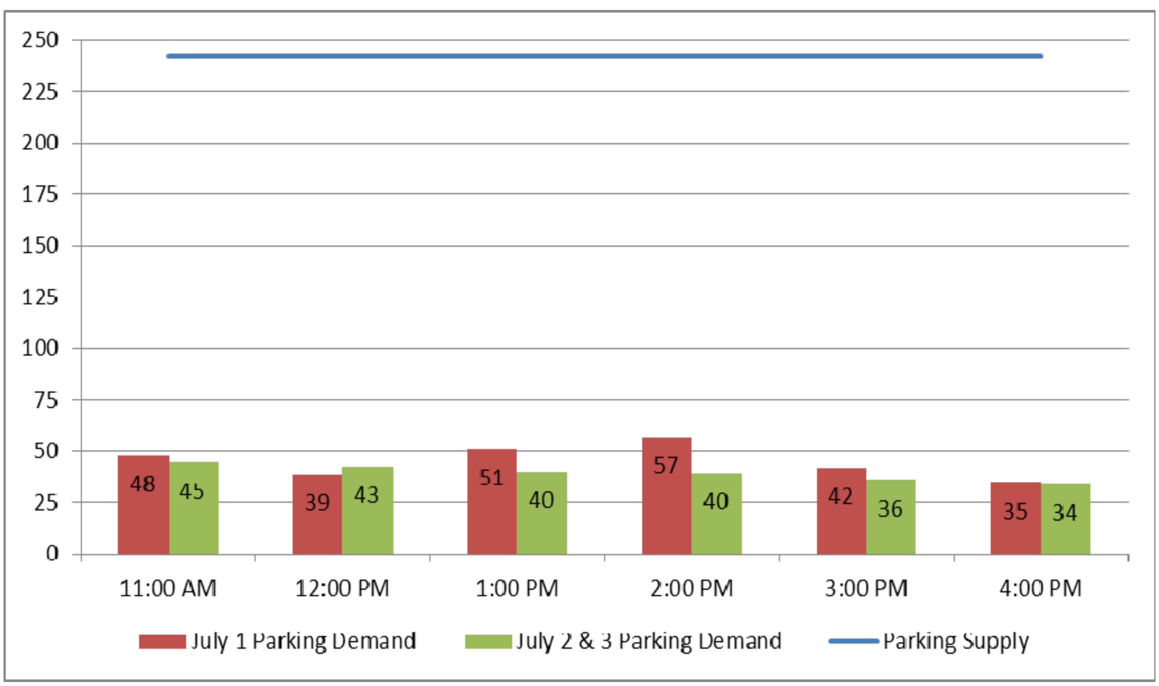


Figure F.5
On-Street Parking Supply vs. Demand – Study Zone 3

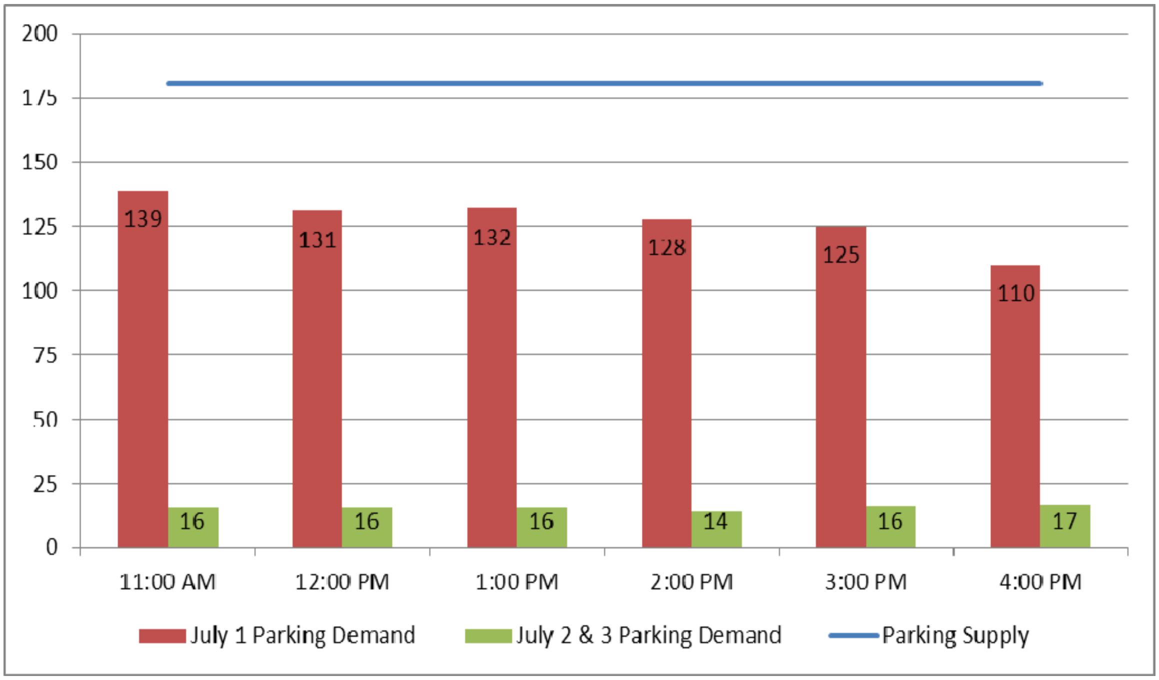


Figure F.6
On-Street Parking Supply vs. Demand – Study Zone 4

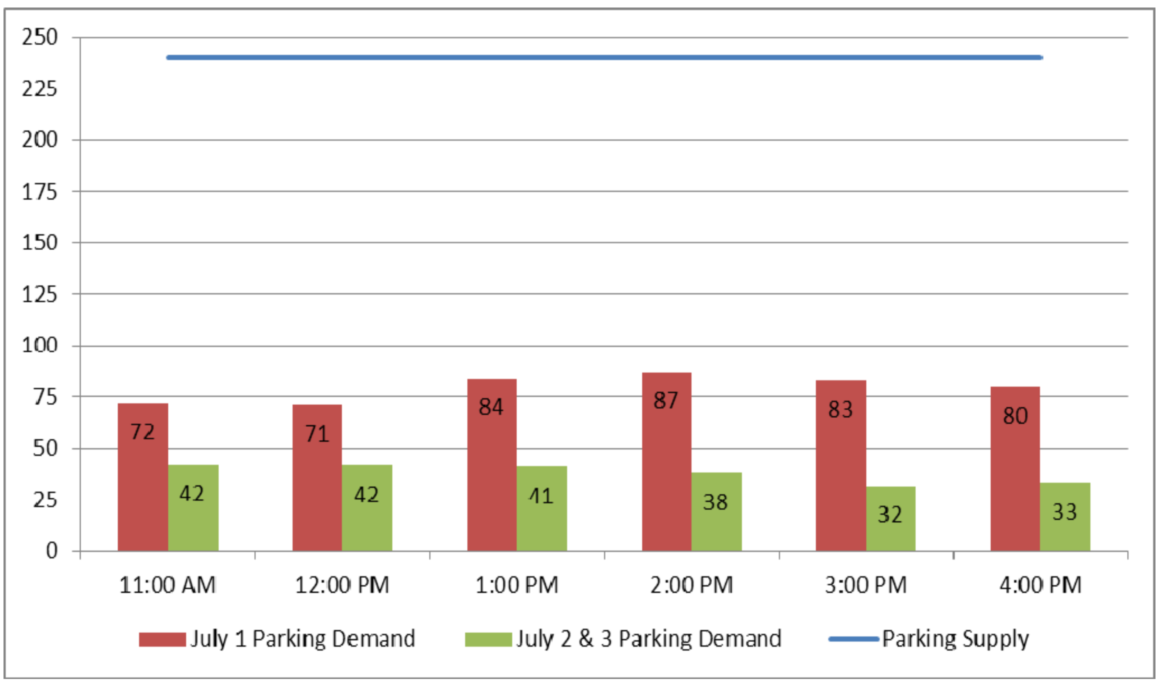
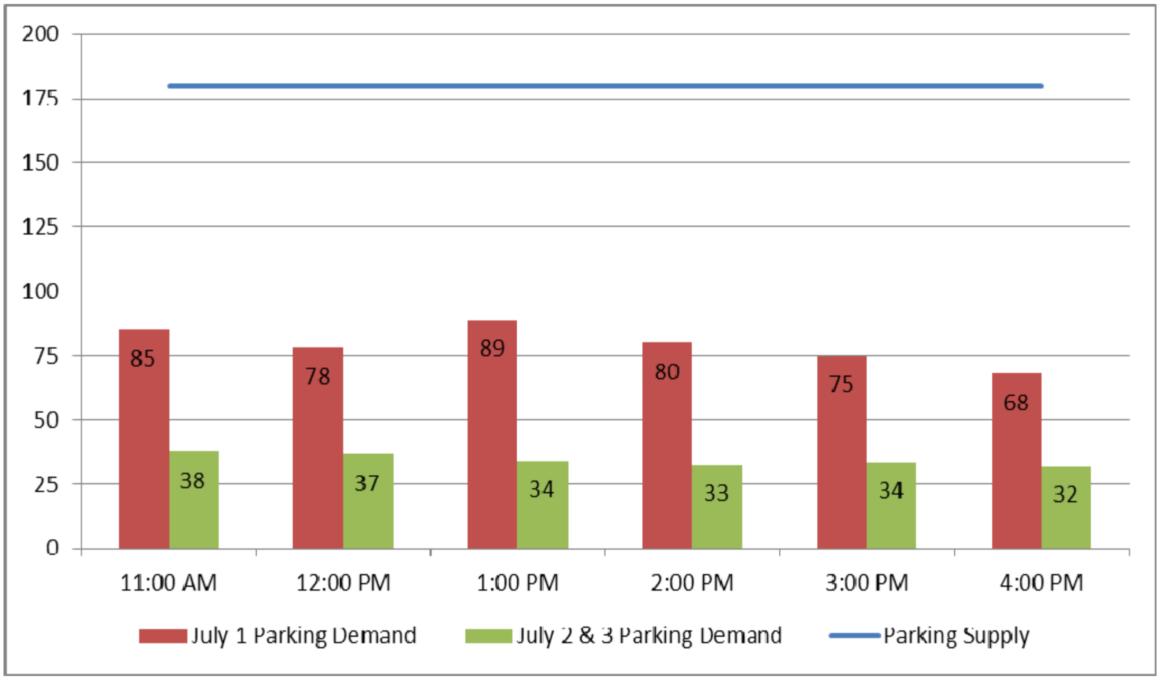


Figure F.7
On-Street Parking Supply vs. Demand – Study Zone 5



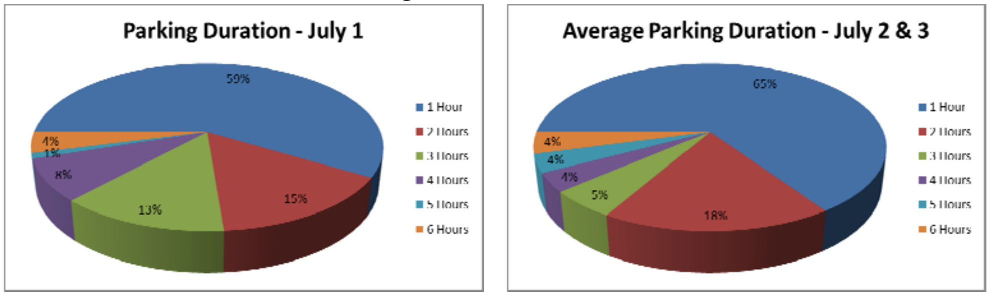
The graphs presented in **Figure F.3** through **Figure F.7** illustrate that the existing on-street parking supply within each parking zone was able to accommodate the on-street parking demand for the zone.

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

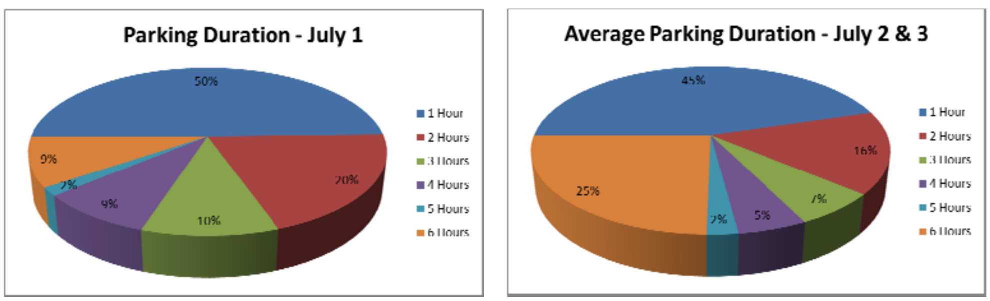
Figure F.8 through **Figure F.12** present the parking duration observed on July 1 and the average parking duration observed on July 2 and July 3, for each of the parking zones.

Figure F.8
Parking Duration – Zone 1



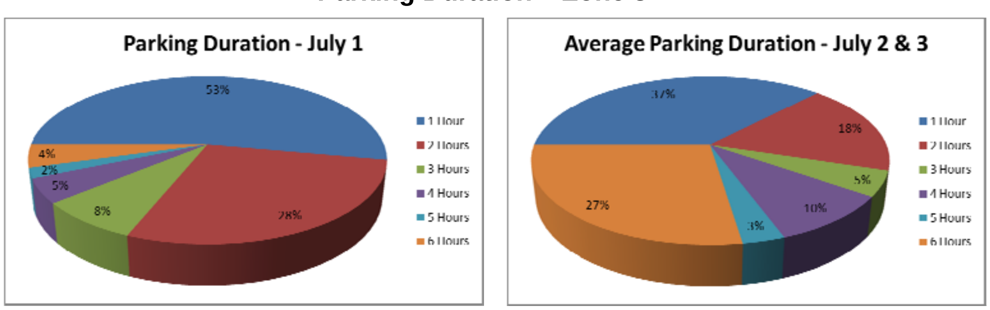
The majority of commuters in Zone 1 parked for a duration of 2 hours or less. On July 1, 59% of commuters parked for 1 hour and 15% parked for 2 hours. On July 2 and July 3, an average of 65% of commuters parked for 1 hour and an average of 18% parked for 2 hours.

Figure F.9
Parking Duration – Zone 2



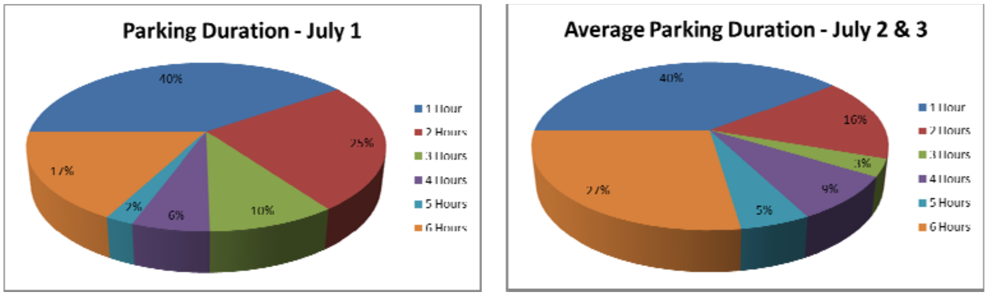
The majority of commuters in Zone 2 parked for a duration of 2 hours or less. On July 1, 50% of commuters parked for 1 hour and 20% parked for 2 hours. On July 2 and July 3, an average of 45% of commuters parked for 1 hour and an average of 16% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 25% of commuters parked for 6 hours.

Figure F.10
Parking Duration – Zone 3



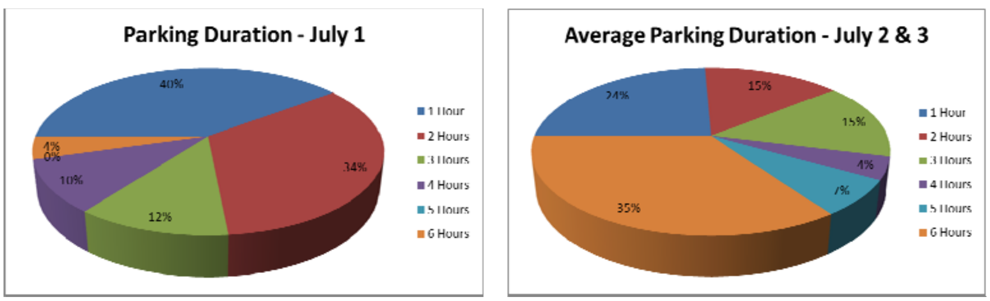
The majority of commuters in Zone 3 parked for a duration of 2 hours or less. On July 1, 53% of commuters parked for 1 hour and 28% parked for 2 hours. On July 2 and July 3, an average of 37% of commuters parked for 1 hour and an average of 18% parked for 2 hours. It should be noted that on July 2 and July 3, and average of 27% of commuters parked for 6 hours.

Figure F.11
Parking Duration – Zone 4



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.

Figure F.12
Parking Duration – Zone 5



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 re-summarized 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.

Table F.1
Parking Turnover – Study Zones

Zone	Parking Turnover Rate (6-Hour Period)	
	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

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

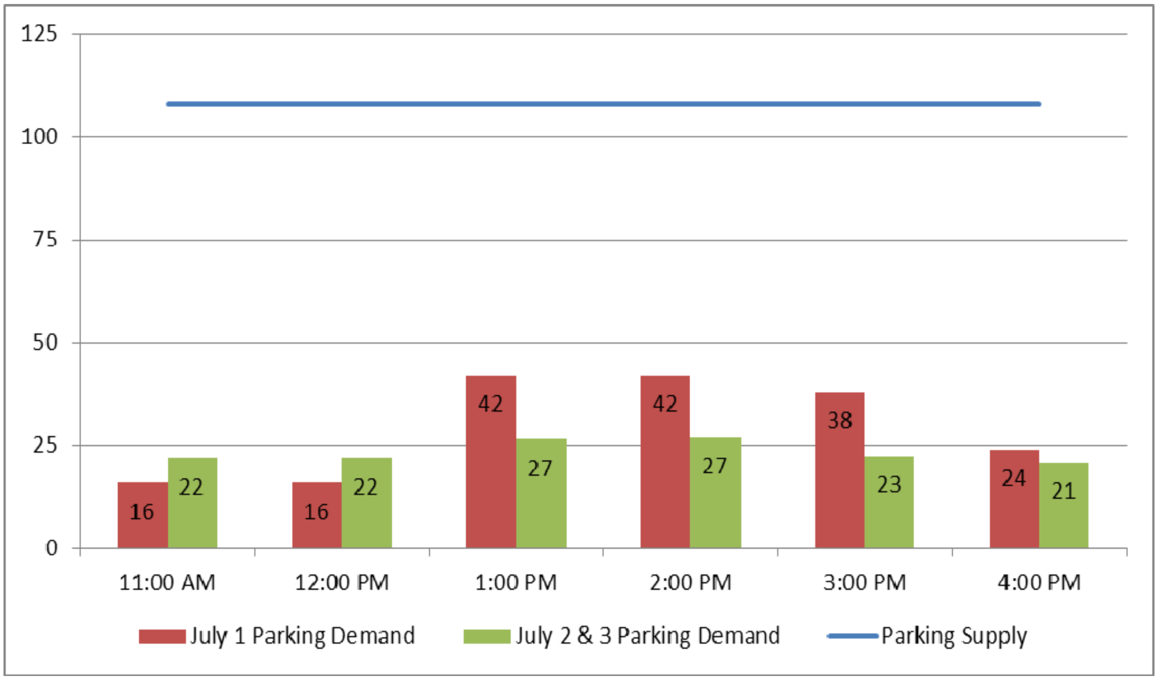


Figure F.14
On-Street Parking Supply vs. Demand – 10 Street

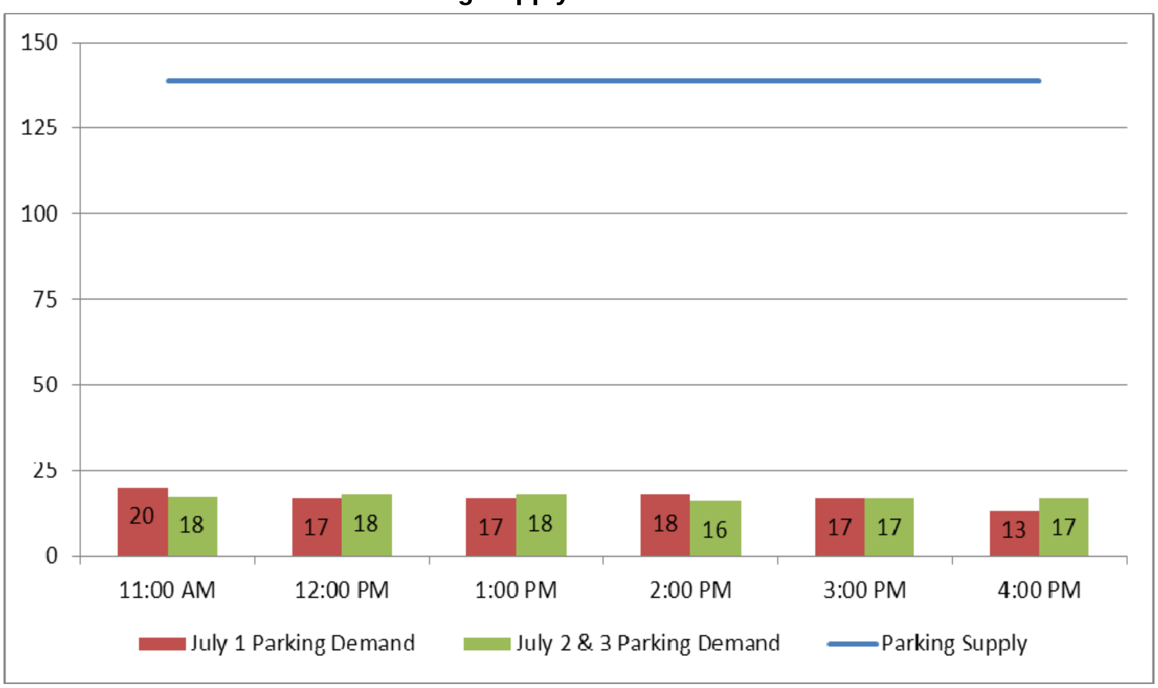
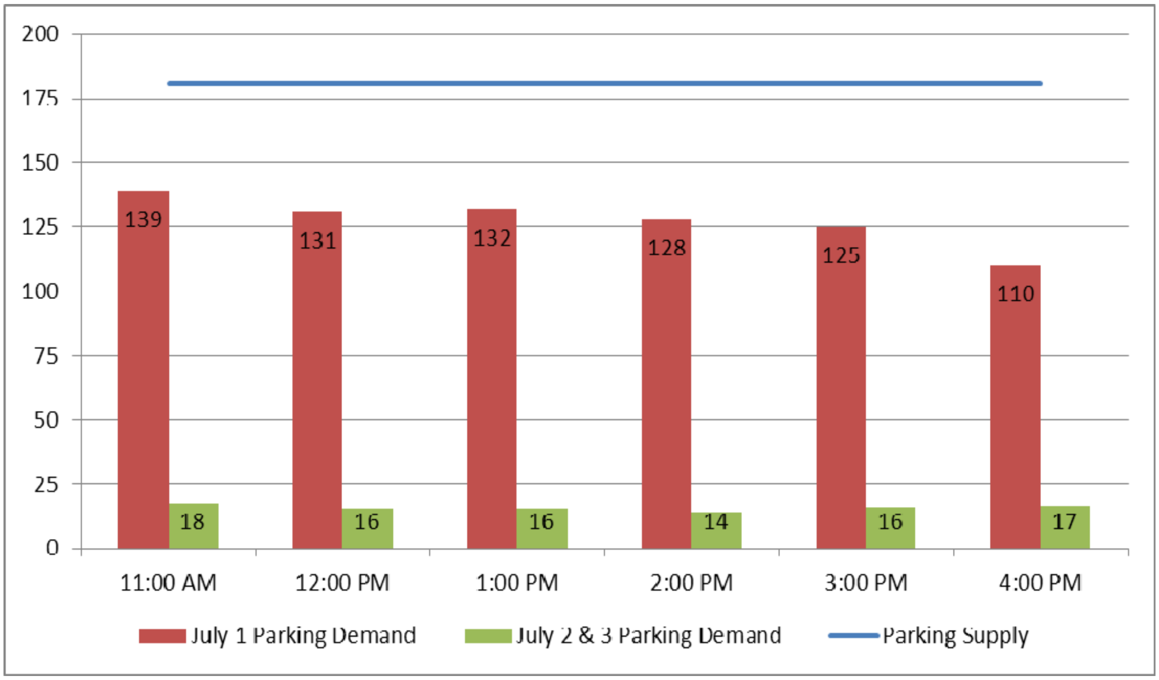


Table F.15
On-Street Parking Supply vs. Demand – 1 Avenue

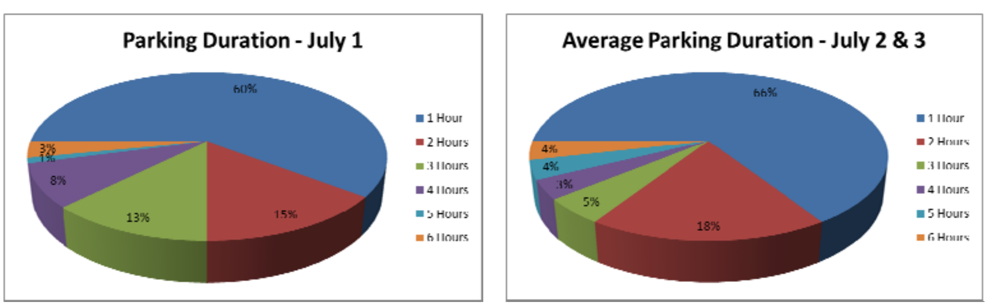


The graphs presented in **Figure F.13** through **Figure F.15** illustrate that the existing on-street parking supply within each study corridor was able to accommodate the on-street parking demand for the corridor. The parking demand along Lakeshore Drive and 10 Street remained relatively consistent 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

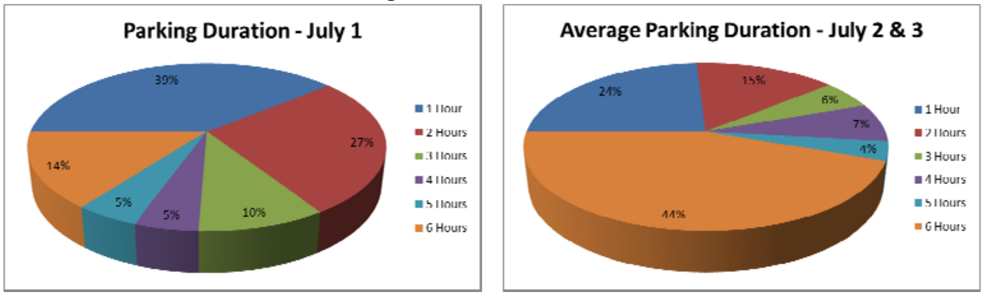
Figure F.16 through **Figure F.18** present the parking duration observed on July 1 and the average parking duration observed on July 2 and 3, for each of the study corridors.

Figure F.16
Parking Duration – Lakeshore Drive



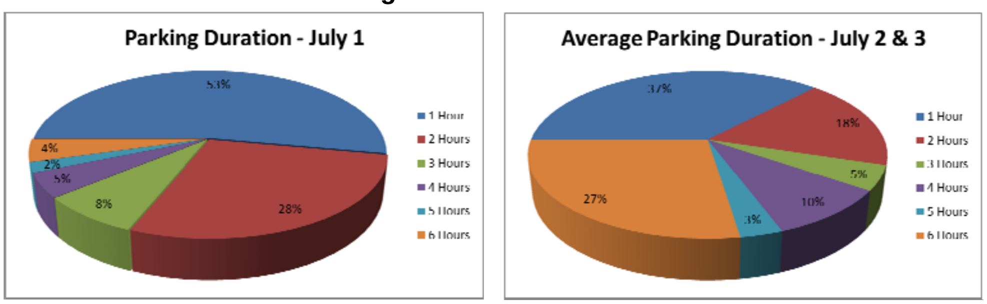
The majority of commuters along Lakeshore Drive parked for a duration of 2 hours or less. On July 1, 60% of commuters parked for 1 hour and 15% parked for 2 hours. On July 2 and July 3, an average of 66% of commuters parked for 1 hour and an average of 18% parked for 2 hours.

Figure F.17
Parking Duration – 10 Street



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%).

Figure F.18
Parking Duration – 1 Avenue



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.

Table F.2
Parking Turnover – Study Corridors

Zone	Parking Turnover Rate (6-Hour Period)	
	July 1, 2010	July 2 & 3 2010 - Average
Lakeshore Drive	0.95	0.85

Zone	Parking Turnover Rate (6-Hour Period)	
	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 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 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.

Table F.3
On-Street Vehicle Type – July 1, 2010

Zone	Vehicle Type						
	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.4
On-Street Vehicle Type – July 2, 2010

Zone	Vehicle Type						
	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

Entire Study Area	257	1	0	2	13	0	2

Table F.5
On-Street Vehicle Type – July 3, 2010

Zone	Vehicle Type						
	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

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.

G Appendix G - Off-Street Parking Analysis

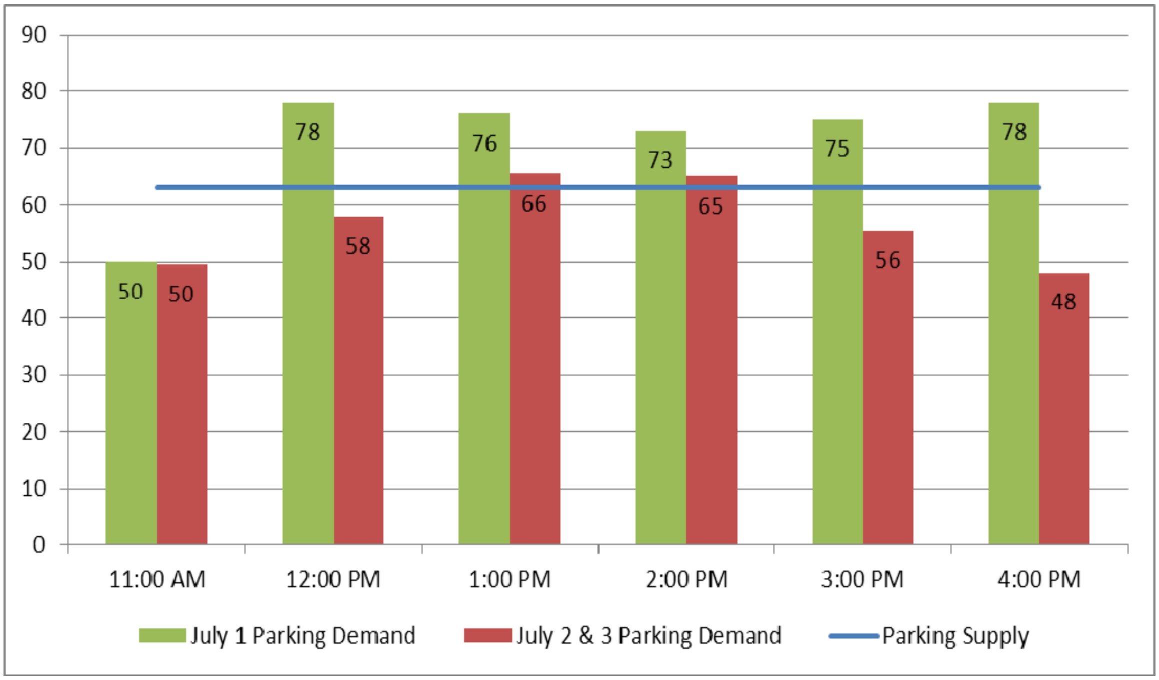
Appendix G – Off Street Parking Analysis

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

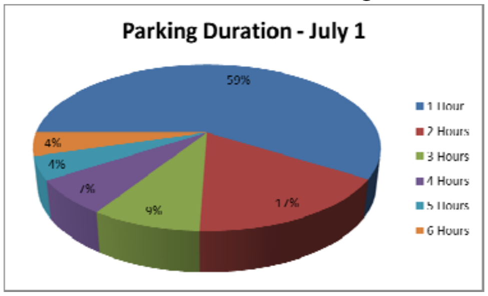


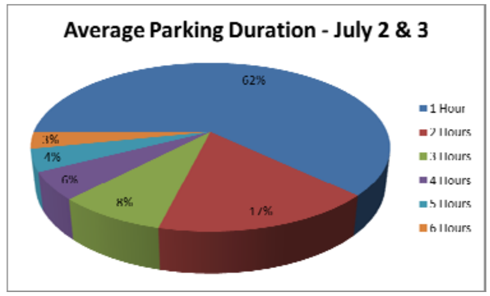
The existing parking supply provided in the Marina Lot was unable to accommodate the parking in several time periods, over the three days observed. The parking demand exceeded the parking supply from 12:00 pm to 5:00 pm on July 1 and the average parking demand exceeded the parking supply from 1:00 pm 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.

Figure G.2
Parking Duration – 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

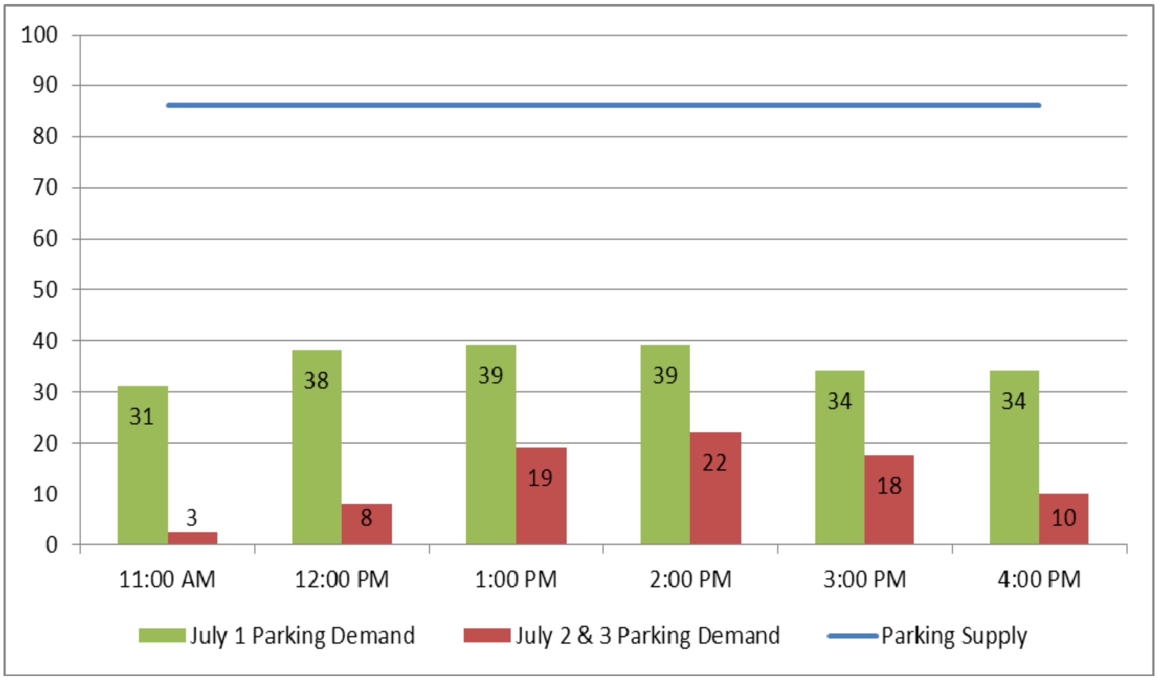
The parking turnover rate for the Marina Lot was 3.27 on July 1, 2.56 on July 2 and 3.14 on July 3. The turnover rate for the Marina Lot was relatively consistent over the course of the 3 day study period and was high when compared to the turnover rates for on-street parking and for the other two off-street 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

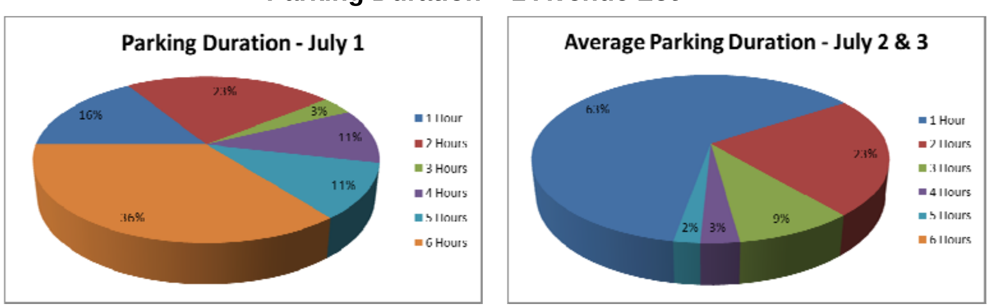


The existing parking supply provided in the 1 Avenue Lot was able to accommodate the parking demand, for the entire study period. On July 1, parking in the 1 Avenue Lot was only available to vendors participating in the Canada Day parade. Public parking was not allowed.

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.

Figure G.4
Parking Duration – 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

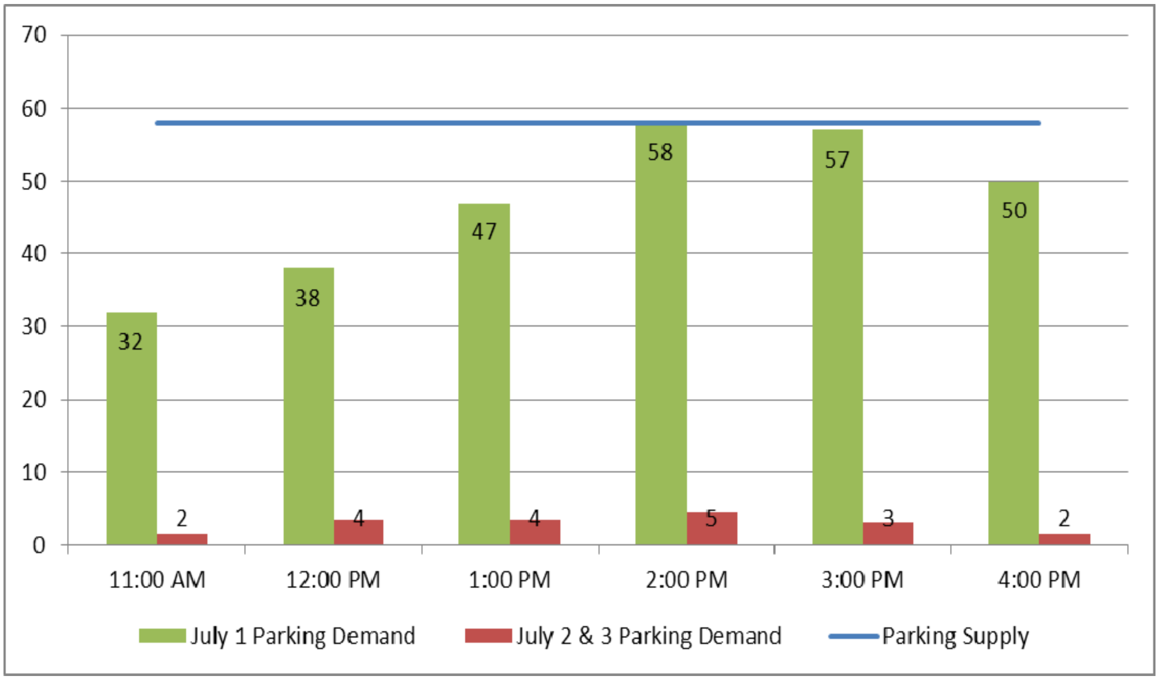
The parking turnover rate for the 1 Avenue Lot was 0.63 on July 1, 0.62 on July 2 and 0.53 on July 3. The turnover rate for the 1 Avenue Lot was relatively consistent over the course of the 3 day study period and was low when compared to the Marina Lot.

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

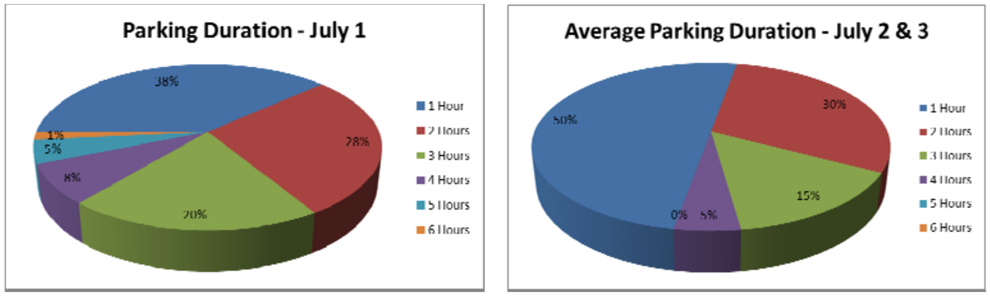


The existing parking supply provided in the Gravel Lot was able to accommodate the parking demand, for the entire study period. It should be noted that the parking demand on July 1 is significantly higher than the average parking demand on July 2 and July 3.

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.

Figure G.6
Parking Duration – 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.

Table G.1
Off-Street Vehicle Type – July 1, 2010

Zone	Vehicle Type						
	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.2
Off-Street Vehicle Type – July 2, 2010

Zone	Vehicle Type						
	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.3
Off-Street Vehicle Type – July 3, 2010

Zone	Vehicle Type						
	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.

E Appendix E - Transportation Study Cold Lake South - Parking Study

Technical Memorandum

City of Cold Lake

Transportation Study
Cold Lake South - Parking Study

April 2011

Table of Contents

List of Tables

List of Figures

1 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 Verification Study

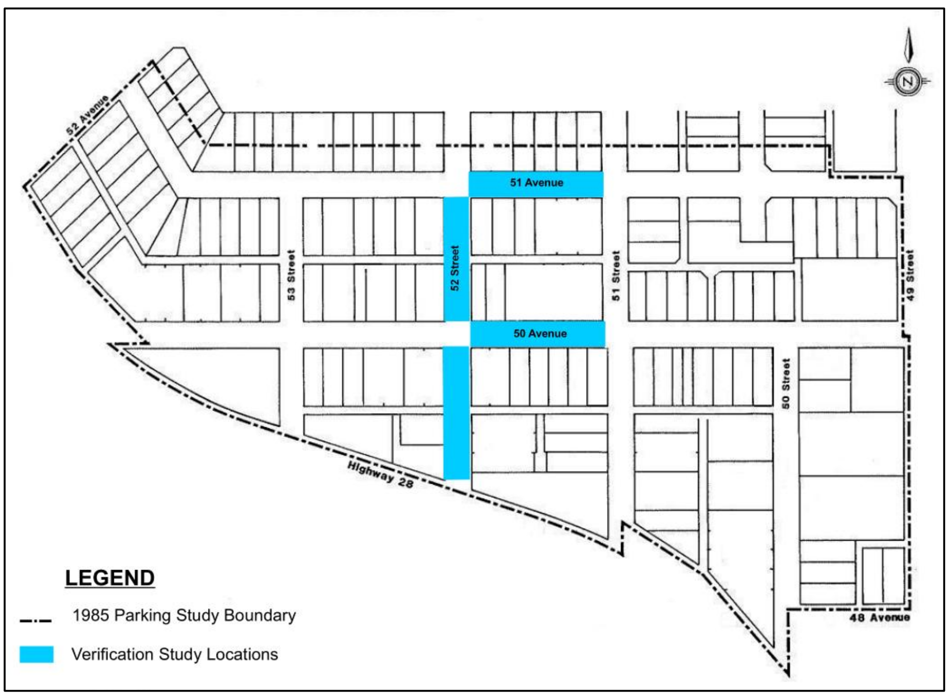
4.1 METHODOLOGY

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.

Figure 4.1
On-Street Locations for Verification Study



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.

Table 4.1
Parking Utilization (1985 Parking Study vs 2010 Verification Study)

ROAD	SIDE OF ROAD	PARKING UTILIZATION (2:30 PM)		PARKING UTILIZATION GROWTH (1985 - 2010)	ANNUAL GROWTH
		1985 Parking Study	2010 Verification Study		
51 Avenue (51 Street to 52 Street)	North	15%	23%	8%	0.3%
	South	27%	0%	-27%	-1.1%
	Both Sides	**21%**	**12%**	**-9%**	**-0.4%**
50 Avenue (51 Street to 52 Street)	North	50%	62%	12%	0.5%
	South	52%	73%	21%	0.8%
	Both Sides	**51%**	**67%**	**16%**	**0.6%**
52 Street (51 Avenue to 50 Avenue)	East	11%	55%	44%	1.7%
	West	22%	54%	32%	1.3%
	Both Sides	**17%**	**54%**	**38%**	**1.5%**
52 Street (50 Avenue to Highway 28/55)	East	89%	80%	-9%	-0.4%
	West	63%	40%	-23%	-0.9%
	Both Sides	**76%**	**60%**	**-16%**	**-0.6%**

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.

A 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

TABLE OF CONTENTS

List of Figures

APPENDIX

LIST OF TABLES

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.

8. 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).

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.

<u>Recommendations</u>

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.

<u>Observations</u>

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.

4. 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

This involved walking a predetermined route on an hourly basis over 3 days (Thursday, Friday, Saturday) and identifying and recording occupied and vacant parking spaces (Figure 2). This was conducted on Thursday (9:30am - 8:30pm), Friday (8:30am - 12:15pm), Saturday (8:45am - 4:45pm).
(Note: an in-out survey was conducted Friday from (1:00pm - 3:00pm).

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.

PARKING STUDY – TOWN OF GRAND CENTRE

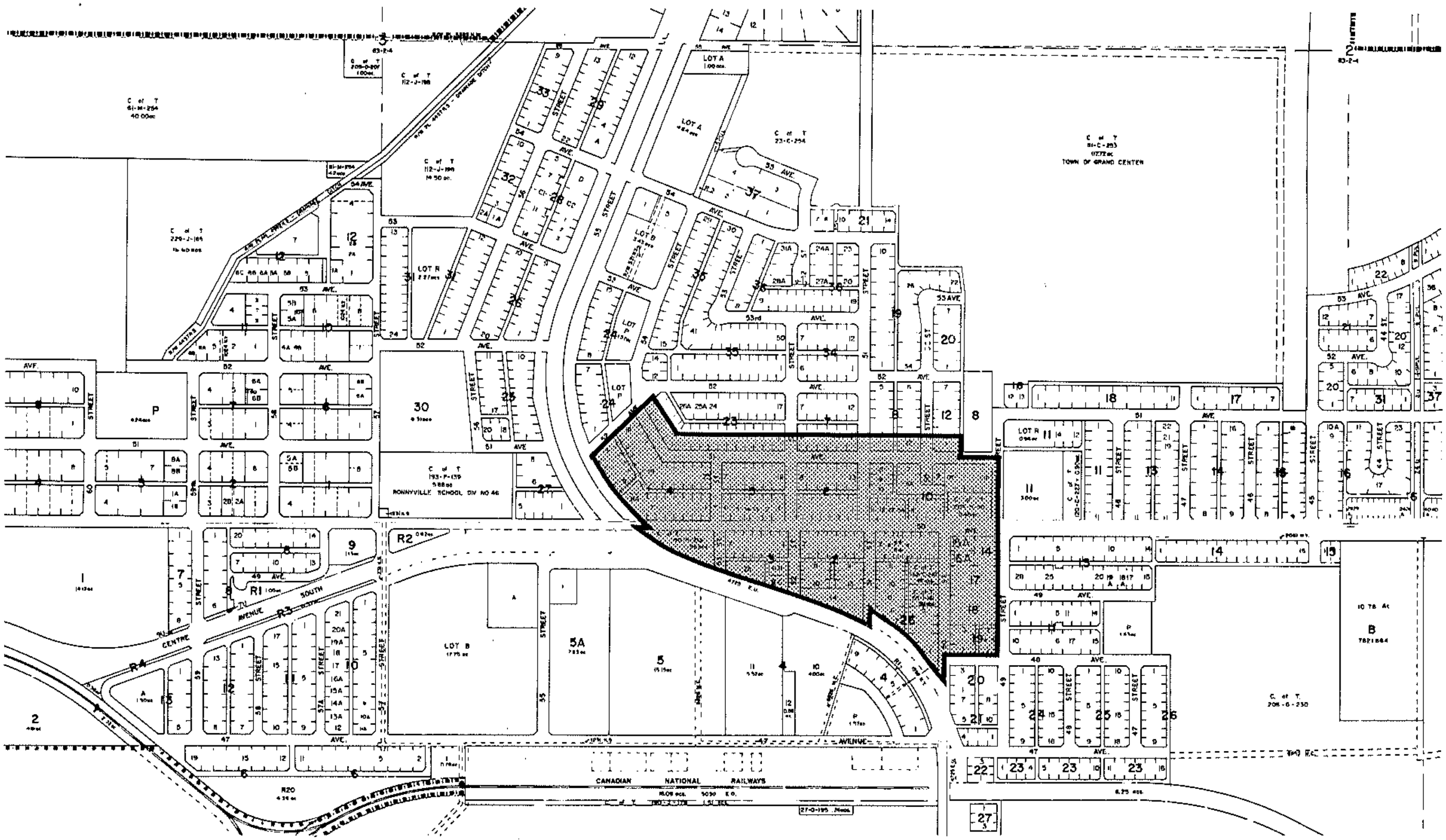


Figure 1
STUDY AREA

Alberta
MUNICIPAL AFFAIRS
PLANNING BRANCH

JULY, 1985

PARKING STUDY – TOWN OF GRAND CENTRE

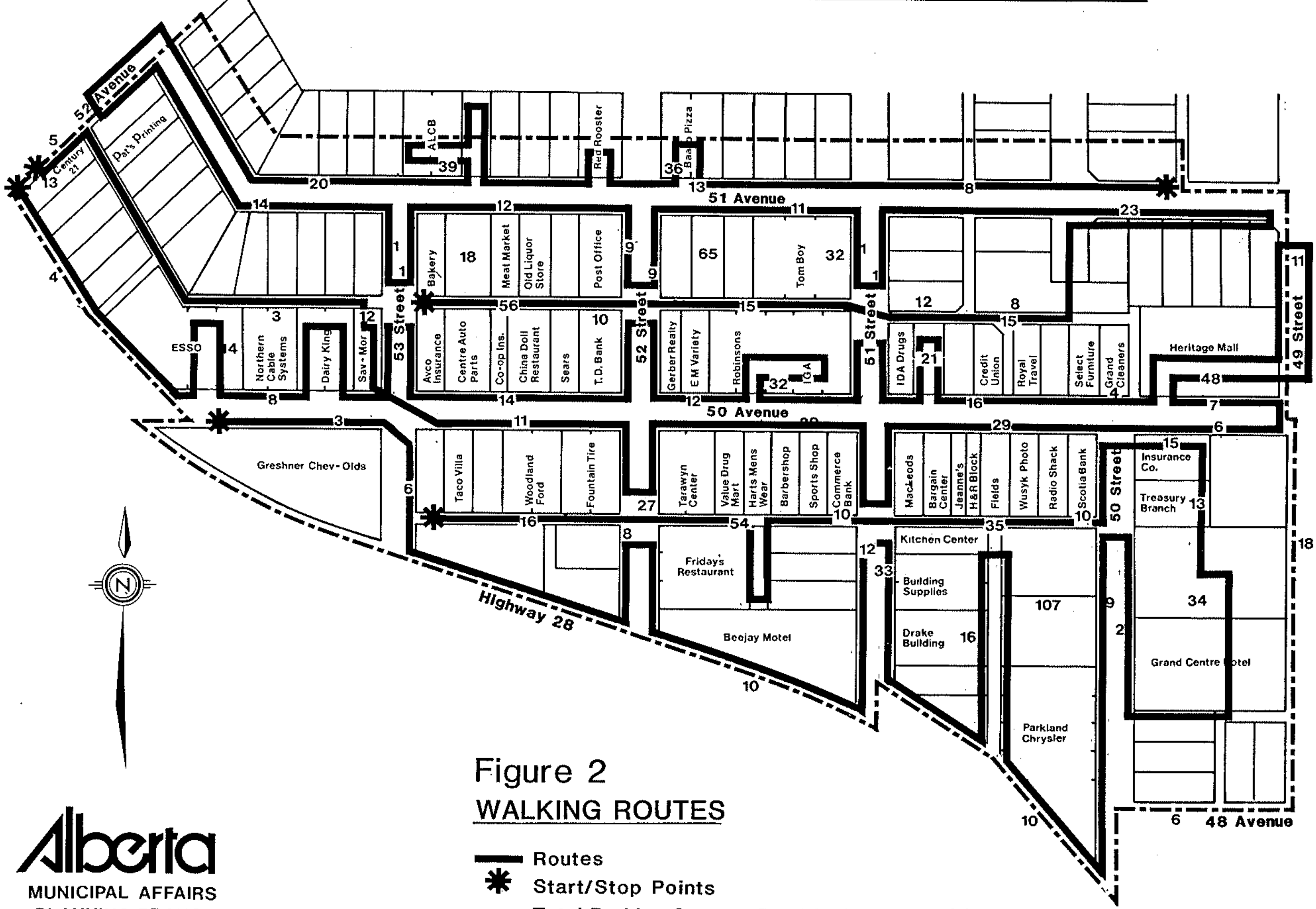


Figure 2

WALKING ROUTES

Routes

* Start/Stop Points

24 Total Parking Spaces Per Block Face and Lot

Alberta
MUNICIPAL AFFAIRS
PLANNING BRANCH

JULY, 1985

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.

PARKING STUDY – TOWN OF GRAND CENTRE

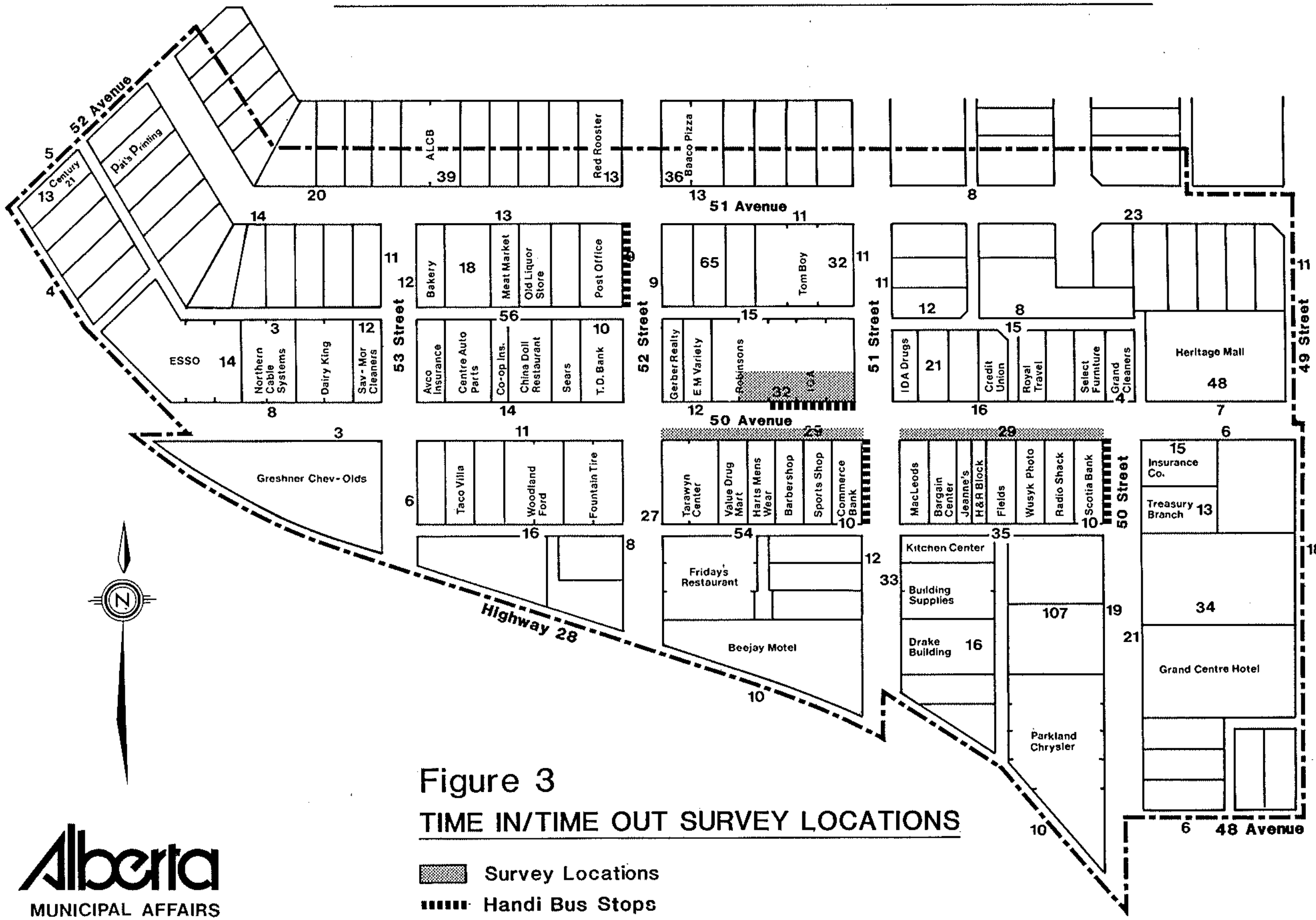


Figure 3

TIME IN/TIME OUT SURVEY LOCATIONS

Survey Locations

Handi Bus Stops

24 Total Parking Spaces Per Block Face and Lot

ALBERTA
MUNICIPAL AFFAIRS
PLANNING BRANCH

JULY, 1985

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

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 off-street parking. In Grand Centre, 481 spaces or 39% of the Town's actual supply is on-street 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:

Existing Parking Supply Characteristics

Community	On-street Number	(%)	Off-street (Number	(%)	Total	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

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.

PARKING STUDY – TOWN OF GRAND CENTRE

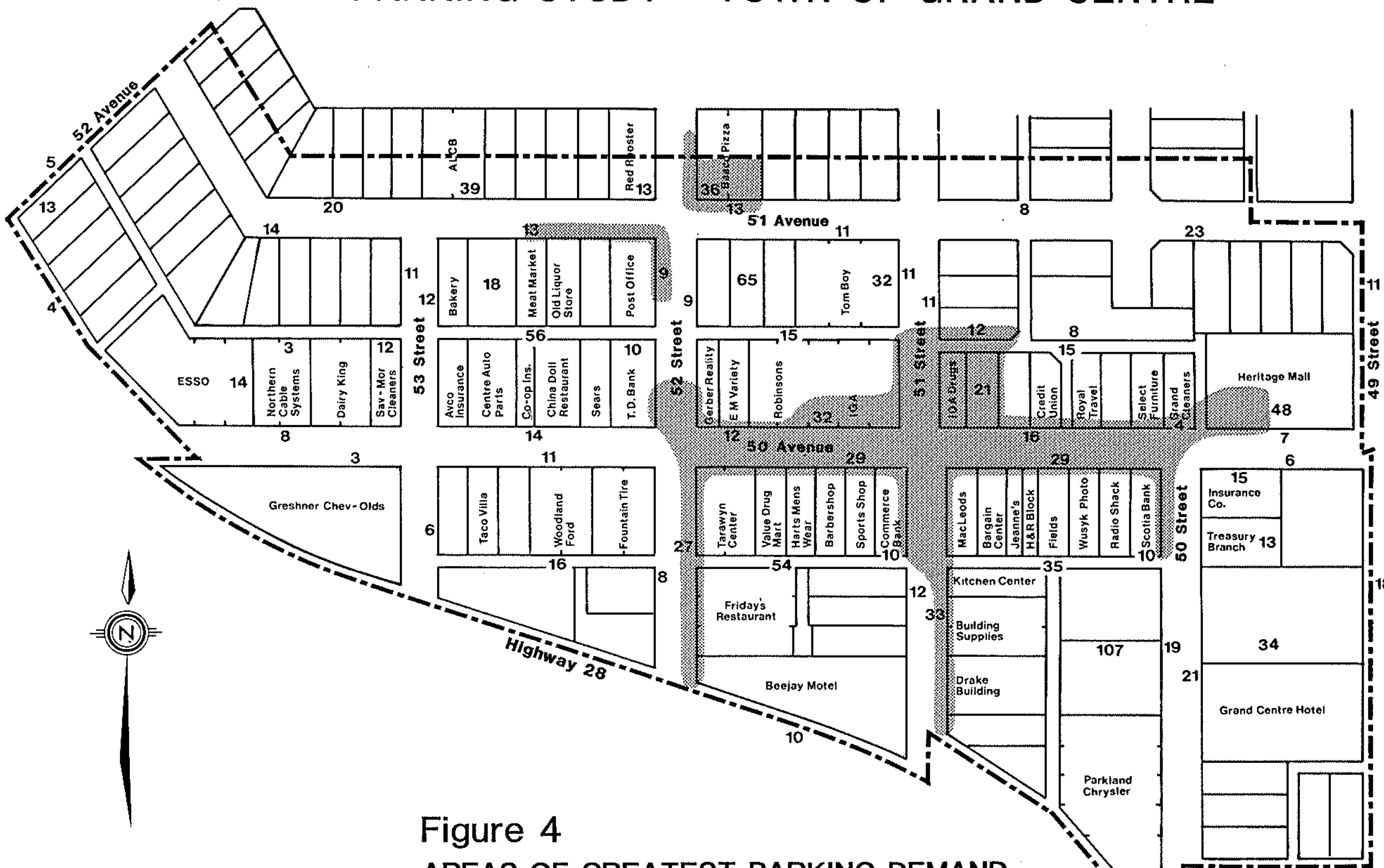


Figure 4

AREAS OF GREATEST PARKING DEMAND

Areas of Greatest Parking Demand

24 Total Parking Spaces Per Block Face and Lot

Alberta
MUNICIPAL AFFAIRS
PLANNING BRANCH

JULY, 1985

PARKING STUDY – TOWN OF GRAND CENTRE

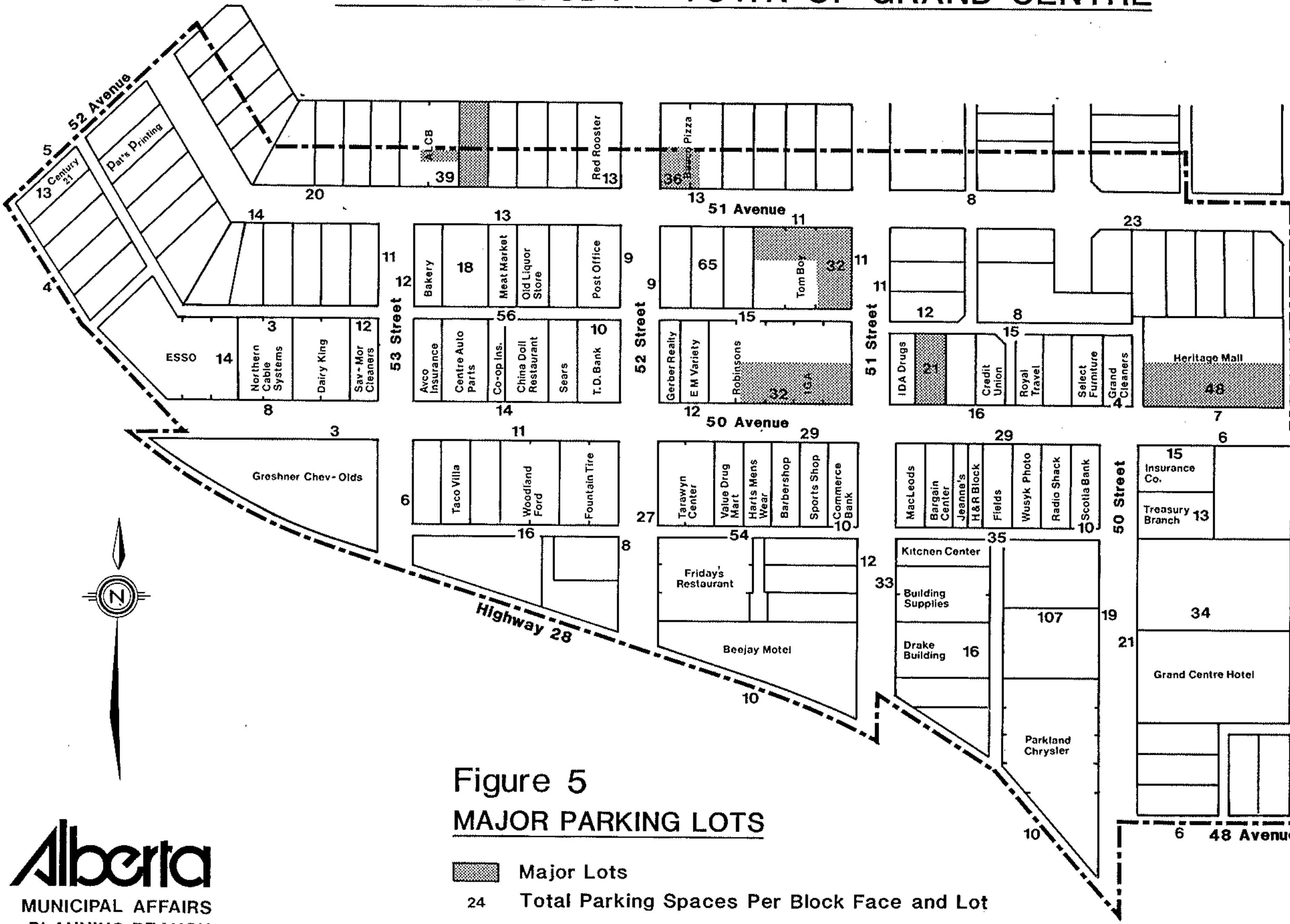


Figure 5

MAJOR PARKING LOTS

Major Lots

24 Total Parking Spaces Per Block Face and Lot

Alberta

MUNICIPAL AFFAIRS

PLANNING BRANCH

JULY, 1985

5.3.6 Major Parking Lots (Table #6) (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 Minor Parking Lots (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 Vacant Lots Currently Used for Parking (Table #8) (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 Peripheral Streets and Avenues (Table #9)

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.

PARKING STUDY – TOWN OF GRAND CENTRE

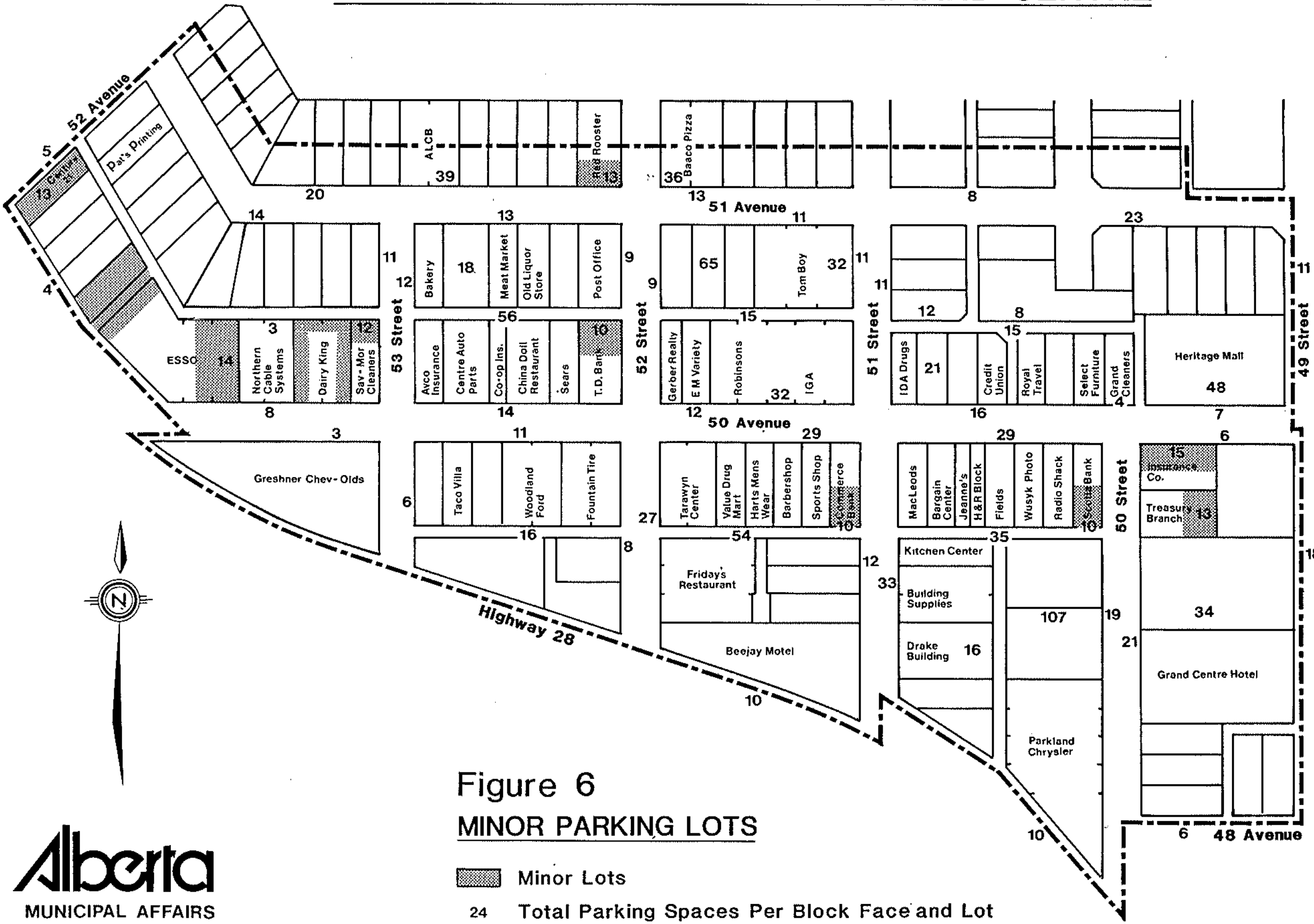


Figure 6

MINOR PARKING LOTS

Minor Lots

24 Total Parking Spaces Per Block Face and Lot

Alberta

MUNICIPAL AFFAIRS
PLANNING BRANCH

JULY, 1985

PARKING STUDY - TOWN OF GRAND CENTRE

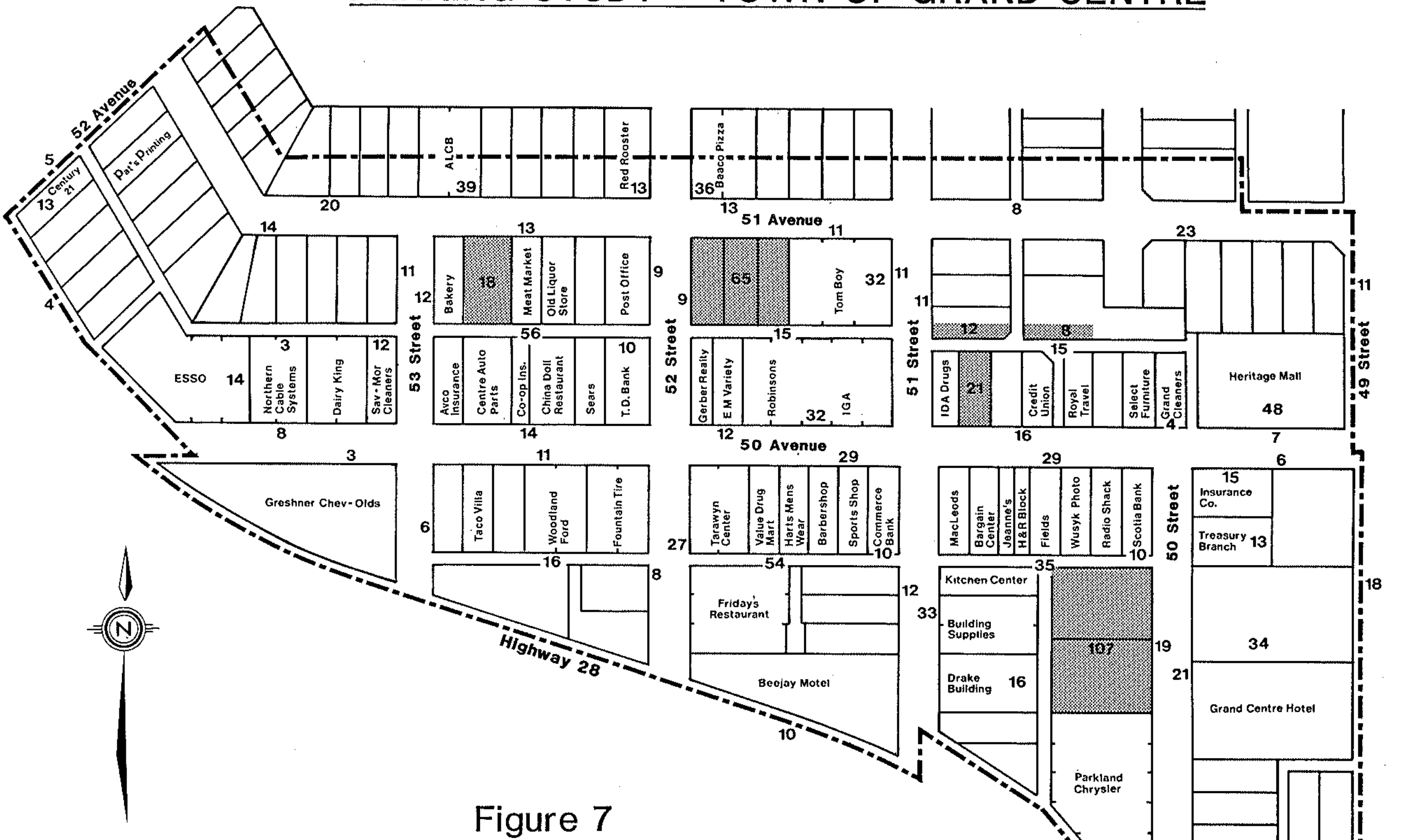


Figure 7

VACANT LOTS USED FOR PARKING

Vacant Lots

24 Total Parking Spaces Per Block Face and Lot

Alberta
MUNICIPAL AFFAIRS
PLANNING BRANCH

JULY, 1985

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	39%
	Friday	38%
	Saturday	38%
	Average	38%
Off-Street	Thursday	38%
	Friday	37%
	Saturday	32%
	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 clearly defined 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	151	92	61%
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:

	Minutes	Vehicles	% of Total Vehicles
Parking Duration	0-14	107	65.6%
50 Avenue	15-29	36	22.1%
(50-51 Street)	30-44	12	7.4%
	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	46.3%
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	4.1%
	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	0%
	120+	4	3.3%
TOTAL		123	100%

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	27%
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	67	(69)	27	(28)	3	(3)	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 Summary Observations/Alternatives

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 Conclusions

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

TABLE #1

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	79	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	0	52	83	82
FRIDAY							
8:30	14	8	6	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	90	73
11:15	93	75	75	0	69	100	91
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

TABLE #2

OCCUPANCY RATE OF PARKING STALLS
51 AVENUE
ON-STREET
(Figures Show Percent Occupied)

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.	South Side 52-51 St.	(Tom Boy) South Side 51-49 St.
NUMBER OF SPACES	8	13	20	14	13	11	23
THURSDAY							
9:30	0	8	15	43	69	0	0
10:45	0	8	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	8	10	21	69	18	35
6:30	0	38	0	7	15	0	9
7:30	0	38	5	7	23	0	17
FRIDAY							
8:30	0	15	20	21	38	27	0
9:45	0	23	30	29	77	27	0
11:45	0	0	25	21	54	18	0
SATURDAY							
8:45	0	23	30	21	46	9	0
10:00	0	23	55	21	77	18	9
11:15	0	23	55	21	69	18	13
1:00	0	23	50	14	69	9	0
2:15	0	38	40	21	46	9	0
3:15	0	15	40	14	23	9	0

TABLE #3

OCCUPANCY RATE OF PARKING STALLS
STREETS NORTH OF 50 AVENUE
ON-STREET
(FIGURES SHOW PERCENT OCCUPIED)

LOCATION	53 St. W	53 St. E	52 St. W	52 St. E	51 St. W	51 St. E	49 St. W
NUMBER OF SPACES	11	12	9	9	11	11	11
THURSDAY							
9:30	9	33	0	0	9	0	27
10:45	9	58	22	33	27	27	27
1:30	0	50	0	33	27	36	27
2:30	0	25	22	11	18	36	28
4:00	9	8	56	44	9	18	36
5:30	9	17	33	44	27	0	0
6:30	18	17	11	1	36	27	0
7:30	9	8	22	44	45	27	9
FRIDAY							
8:30	0	50	44	11	73	36	73
9:45	0	42	67	44	82	27	64
11:45	0	50	56	67	64	36	64
SATURDAY							
8:45	0	33	11	11	45	18	0
10:00	9	42	33	33	64	27	0
11:15	9	50	33	67	56	36	0
1:00	0	33	67	33	73	82	0
2:15	0	17	44	33	64	73	0
3:15	9	0	44	33	45	45	0

TABLE #4

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	6	9	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	71	0
1:30	50	75	70	33	48	21	43	0
2:30	67	63	89	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	6	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

TABLE #5

OCCUPANCY RATE OF LANEWAY PARKING
EACH BLOCK IDENTIFIED BY A PROMINENT BUILDING
(FIGURES SHOW PERCENT OCCUPIED)

BLOCK	Sears	I.G.A.	Select Furniture	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	6	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	6	38	35	37	41
AVERAGE OCCUPANCY	33	47	32	38	44	43	39

TABLE #6

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	89	71	85
2:30	8	33	47	81	76	60
4:00	23	50	25	85	67	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	6	25	47	42
9:45	8	17	28	59	79	60
11:15	22	31	31	94	68	60
SATURDAY						
8:45	5	22	6	44	33	35
10:00	10	39	38	81	43	46
11:15	44	53	56	81	43	69
1:00	36	64	69	97	57	63
2:15	41	64	78	94	67	79
3:14	26	39	75	91	57	60

TABLE #7

OCCUPANCY RATE OF
MINOR PARKING LOTS
(FIGURES SHOW PERCENT OCCUPIED)

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	23
10:45	38	20	53	62	100	70	23
1:30	23	10	60	62	90	50	31
2:30	46	70	40	69	100	50	31
4:00	15	80	33	38	90	40	31
5:30	23	30	0	8	80	20	31
6:30	23	0	0	0	0	0	15
7:30	31	0	0	0	0	0	0
FRIDAY							
8:30	23	20	47	54	60	40	8
9:45	15	80	60	54	80	90	15
11:15	15	70	53	46	80	60	8
SATURDAY							
8:45	36	0	0	0	0	0	31
10:00	50	0	0	0	0	20	46
11:15	43	0	0	0	0	30	54
1:00	7	10	0	0	0	30	38
2:15	21	30	0	0	0	20	38
3:15	7	40	0	0	0	30	0

TABLE #8

OCCUPANCY RATE OF VACANT LOTS
CURRENTLY USED FOR PARKING
(FIGURES SHOW PERCENT OCCUPIED)

LOCATION	Next to Bakery (51 Ave)	Kowalski Lot	Behind I.D.A.	Behind Credit Union	North of Parkland Chrysler
NUMBER OF SPACES	18	65	12	8	107
THURSDAY					
9:30	11	3	75	50	4
10:45	22	6	75	63	6
1:30	22	15	83	63	5
2:30	28	6	92	75	3
4:00	22	18	92	38	5
5:30	17	14	30	25	7
6:30	0	9	8	38	7
7:30	0	3	50	38	4
FRIDAY					
8:30	6	8	75	25	3
9:45	22	14	83	13	3
11:15	22	14	92	13	5
SATURDAY					
8:45	0	3	42	13	0
10:00	6	3	75	13	2
11:15	11	6	75	13	4
1:00	6	5	100	0	5
2:15	6	14	92	0	3
3:15	6	11	67	13	3

TABLE #9

OCCUPANCY RATE OF PERIPHERAL STREETS AND AVENUES (FIGURES SHOW PERCENT OCCUPIED)

LOCATION	52 Avenue 55 St - 51 Ave	55 Street 52-50 Ave	50 Avenue 55-53 St	Highway 28 (Beejay Motel)	Highway 28 51-50 St.	48 Avenue 50-49 St
NUMBER OF SPACES	5	4	8	10	10	6
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	0
4:00	0	0	25	20	40	0
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	90	0
SATURDAY						
8:45	0	0	13	40	10	0
10:00	0	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

TABLE #10

OCCUPANCY RATE OF
SELECTED PRIVATE PARKING LOTS
(FIGURES SHOW PERCENT OCCUPIED)

LOCATION	Esso Parking Lot	Behind Northern Cable	Behind Sav-Mor	Grand Cleaners
NUMBER OF SPACES	14	3	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	71	67	50	0
9:45	71	100	42	100
11:15	64	100	50	25
SATURDAY				
8:45	71	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
3:15	86	0	17	50

TABLE 11

OCCUPANCY RATE OF PARKING STALLS
50 AVENUE ON-STREET
INCLUDING ADJACENT SIDE STREETS
(FIGURES SHOW PERCENT OCCUPIED)

LOCATION	China Doll Block	Robinsons Block	Select Furniture Block	Fields Block	Tarawyn Center Block	Woodland Ford Block
NUMBER OF SPACES	35	32	45	81	68	25
THURSDAY						
9:30	23	9	29	48	66	60
10:45	46	44	31	54	59	60
1:30	34	41	38	54	71	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	71	44
3:15	26	56	42	56	63	36

TABLE #12

LONG TERM PARKERS AS PERCENTAGE OF TOTAL OBSERVATIONS
(Parked at least 4 hours 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							
TOTAL	57	52	61	151	129	151	53
LTP	0	2	0	5	1	2	1
%	0%	4%	0%	3%	0.8%	1.3%	2%
FRIDAY							
TOTAL	16	11	21	45	33	45	20
LTP	0	0	0	2	0	1	1
%	0%	0%	0%	4%	0%	2%	5%
SATURDAY							
TOTAL	44	46	51	132	96	144	34
LTP	0	1	1	5	3	0	2
%	0%	2%	2%	4%	3%	0%	6%

TABLE #13

LONG TERM PARKERS AS
PERCENT OF TOTAL SPACES
(parked at least 4 hours 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	2	0	5	1	2	1
%	0%	0%	0%	3%	9%	7%	9%
FRIDAY							
SPACES	14	12	16	32	29	29	11
LTP	0	0	0	2	0	1	1
%	0%	0%	0%	6%	0%	3%	9%
SATURDAY							
SPACES	14	12	16	32	29	29	11
LTP	0	1	1	5	3	0	2
%	0%	8%	6%	16%	10%	0%	18%

TABLE #14

PROFILE OF OUT-OF-PROVINCE PARKERS

DAY	TOTAL # OF PARKERS	OUT OF PROVINCE SASK			
		SASK	B.C.	OTHER	TOTAL
THURSDAY	2287	88	8	7	103
		3.8%	0.8%	0.3%	4.5%
FRIDAY	845	23	1	3	27
		2.7%	0.1%	0.4%	3.2%
SATURDAY	1608	75	7	15	97
		4.7%	0.4%	0.9%	6.0%
ALL DAYS	4740	186	16	25	227
		3.9%	0.3%	0.5%	4.8%

B 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	TO	SIDE OF STREET	PARKING SUPPLY	PARKED VEHICLES		PARKING UTILIZATION	
					1st Pass	2nd Pass	1st Pass	2nd Pass
51 Avenue	51 Street	52 Street	North	13	3	2	23%	15%
			South	11	0	1	0%	9%
			Total	**24**	**3**	**3**	**12%**	**12%**
50 Avenue	51 Street	52 Street	North	13	8	8	62%	62%
			South	22	16	20	73%	91%
			Total	**35**	**24**	**28**	**67%**	**76%**
52 Street	51 Avenue	50 Avenue	East	11	6	7	55%	64%
			West	13	7	6	54%	46%
			Total	**24**	**13**	**13**	**54%**	**55%**
52 Street	50 Avenue	Highway 28/55	East	20	16	12	80%	60%
			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, 2010
WEATHER: Sunny
SURVEYOR: M.R.
Password: Locked

ROAD	FROM	TO	SIDE OF STREET	PARKING SUPPLY	PARKING RESTRICTIONS	PARKED VEHICLES		COMMENTS (ie: parking restrictions)
						2:45 PM	3:45 PM	
51 Avenue	51 Street	52 Street	North	13	2 Hour Parking	CWA706	JET679	Parallel Parking
					9:00 AM - 6:00 PM	ZAV885	ZAV885	Lots of empty spaces
					Monday - Saturday	EPL189		
			South	11	2 Hour Parking		YRP689	Parallel Parking
					9:00 AM - 6:00 PM			All empty at 2:45 pm
					Monday - Saturday			

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	TO	SIDE OF STREET	PARKING SUPPLY	PARKING RESTRICTIONS	PARKED VEHICLES 2:30 PM	PARKED VEHICLES 3:30 PM	COMMENTS (ie: parking restrictions)
50 Avenue	51 Street	52 Street	North	13	Handicap			Parallel Parking
					Handicap			
					2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	EBY826	MEU927	
						KEF878	KEF878	
						CJE983	CJE983	
						ZVP394		
						921HBW	EYZ564	
						WGY000		
						HJE726	HJE726	
							GXY158	
							GXU047	
						EFW200	ELW771	
			South	22	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday			Angle parking
						ZVP413		
						H74502	H74502	
						BBJ7325	BBJ7325	
						TUW398	TUW398	
						EWU071	EWU071	
						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	

City of Cold Lake
Project No: 2010-3050
Date: January 7, 2011

COLD LAKE SOUTH CONFIRMATION STUDY - 52 STREET PARKING SURVEY DATA SHEET -

DATE: October 20, 2010
WEATHER: Sunny
SURVEYOR: B.T.
Password: Locked

ROAD	FROM	TO	SIDE OF STREET	PARKING SUPPLY	PARKING RESTRICTIONS	PARKED VEHICLES 2:30 PM	PARKED VEHICLES 3:30 PM	COMMENTS (ie: parking restrictions)
52 Street	51 Avenue	50 Avenue	West	13	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday			Parallel Parking
						CAM670	CAM670	
						LLY026		
						LYC661	LYC661	
						ZRM327	ZSX680	
						PXA001		
						STY555	TBU932	
						MUB794	MUB794	
							ZWZ021	
	50 Avenue	Highway 28/55	West	10	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday			Parallel Parking
						ESS675	ESS675	
						MAN025	MAN025	
						Parked trailer	Parked trailor	
						YYB502		
	50 Avenue	Highway 28/55	East	20	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	SYB084	SYB084	Angle Parking
						KYU100	KYU100	
						SYS324		
						JET502	JET502	
							KYW917	
						ZAS773	ZAS773	
						FZE582	FZE582	
						JET920	JET920	
							FUS224	
						ZPX006		
						ZHS906		
						VRJ223	VRJ223	
						BBVX130		
						FAR203	YMU000	
						EHB376		
						RWV443	RWV443	
						LYL962	SYX709	
						YNB502		
	51 Avenue	50 Avenue	East	11	2 Hour Parking 9:00 AM - 6:00 PM Monday - Saturday	LEN300		Parallel Parking
							MCV770	
						CBY080	CBY080	
							ZZT722	
						FUS373	FUS373	
						ZVP530	ZVP530	
						RAX383	RAX383	
						77J787	ZSX568	

F

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

Table of Contents

List of Tables

PAGE NO.

List of Figures

1 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.

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE1.1
COLD LAKE NORTH
1 AVENUE CORRIDOR - STUDY AREA

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 1.2
COLD LAKE NORTH
10 STREET CORRIDOR - STUDY AREA

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

Associated Engineering

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 1.3
COLD LAKE NORTH
LAKESHORE DRIVE CORRIDOR - STUDY AREA

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 1.4
COLD LAKE SOUTH
50 AVENUE CORRIDOR - STUDY AREA

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.

3 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

3.1.1 Physical Characteristics

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 between 1 Avenue and 8 Avenue. The study section is relatively straight with no vertical curves, except at 3 Avenue where there is a vertical crest curve.

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.1
COLD LAKE NORTH
1 AVENUE CORRIDOR - 2010 TRAFFIC VOLUMES

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.

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.2
COLD LAKE NORTH
10 STREET CORRIDOR - 2010 TRAFFIC VOLUMES

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.

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.3
COLD LAKE NORTH
LAKESHORE DRIVE CORRIDOR - 2010 TRAFFIC VOLUMES

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.

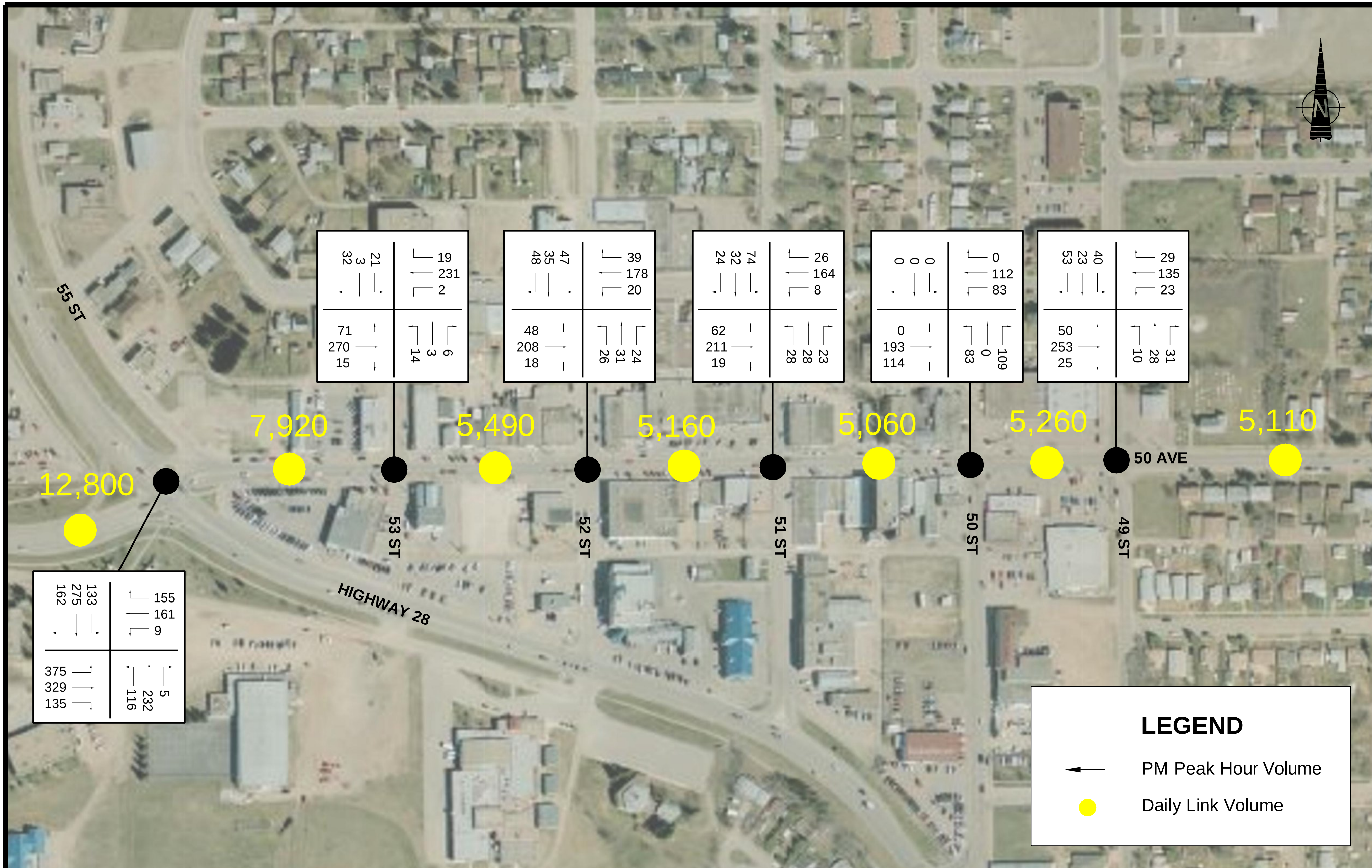
Sidewalks are provided along both sides of 50 Avenue and multiple driveways are located along the corridor. Marked crosswalks have been provided at all the intersections except for 55 Street and a midblock crosswalk has been provided between 50 Street and 51 Street. Pedestrian crossing (RA-4) signs have 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.



Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.4
COLD LAKE SOUTH
50 AVENUE CORRIDOR - 2010 TRAFFIC VOLUMES

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.

Table 4.1
Overall Intersection Capacity Results - 1 Avenue Corridor

Intersection	Maximum V/C Ratio	Delay (s)	LOS
Nelson Street/22 Street	0.11	1.3	A
16 Street	0.09	1.9	A
2 Avenue/10 Street	0.05	2.1	A

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	A

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	A
8 Avenue	0.07	4.3	A

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.

Table 4.4
Overall Intersection Capacity Results – 50 Avenue Corridor

Intersection	Maximum V/C Ratio	Delay (sec)	LOS
Highway 28	0.76	14.3	B
53 Street	0.16	3.1	A
52 Street	0.45	11.1	B
51 Street	0.47	11.2	B
50 Street	0.46	10.9	B
49 Street	0.32	5.5	A

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.

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
Concealed Road (WA-13) Sign

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.

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.2 - TRAFFIC FLOW
TWO-WAY TRAFFIC ON LAKESHORE DRIVE

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PROJECT NO: 2010-3050
DATE: JANUARY 2011
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SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.3 - TRAFFIC FLOW
ONE-WAY NORTHBOUND TRAFFIC ON
LAKESHORE DRIVE

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PROJECT NO: 2010-3050
DATE: JANUARY 2011
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SCALE: NTS
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.4 - TRAFFIC FLOW
ONE-WAY SOUTHBOUND TRAFFIC ON
LAKESHORE DRIVE

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.

7 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.

Table 7.1
Summary of Safety Issues and Improvement Options

Study Corridor	Safety Issues	Improvement Options
1 Avenue	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.
	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.

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.
50 Avenue	Highway 28 intersection	Complete detailed intersection analysis to review intersection geometry and lane configuration.
		Close 55 Street intersection.
		Conduct Main Street Analysis
	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.

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FIGURE 7.1 - COLD LAKE NORTH
SUMMARY OF RECOMMENDATIONS

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FIGURE 7.2 - COLD LAKE SOUTH
SUMMARY OF RECOMMENDATIONS

A Appendix A - Operational Analysis Results

Synchro Results - Existing 2010 Horizon

Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay (s)	LOS	95th Queue (m)
103	1 Avenue & Nelson Street	Unsignalized Stop Control - NB Approach	Overall Intersection	0.11	1.3	A	
			EB				
				0.11	0.0	A	0.0
				0.11	0.0	A	0.0
			WB	0.01	0.1	A	0.2
				0.01	0.6	A	0.2
			NB	0.05	10.3	B	1.4
				0.05	10.3	B	1.4
			SB				
104	1 Avenue & 16 Street	Unsignalized Stop Control - NB Approach	Overall Intersection	0.09	1.9	A	
			EB				
				0.09	0.0	A	0.0
				0.09	0.0	A	0.0
			WB	0.01	0.0	A	0.1
				0.01	0.5	A	0.1
			NB	0.07	10.2	B	1.9
				0.07	10.2	B	1.9
			SB				
105	1 Avenue / 2 Avenue & 10 Street	Unsignalized Yield Control - SB Approach	Overall Intersection	0.05	2.1	A	
			EB	0.01	0.1	A	0.2
				0.01	0.9	A	0.2
			WB				
			NB				
				0.05	0.0	A	0.0
				0.05	0.0	A	0.0
			SB	-	-	-	-
				0.05	9.2	A	1.3

Project: Cold Lake Transportation Study
Project No: 2010-3050
Date Revised: September 16, 2010

Synchro Results - Existing 2010 Horizon

Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay (s)	LOS	95th Queue (m)
105	1 Avenue / 2 Avenue & 10 Street	Unsignalized Yield Control - SB Approach	Overall Intersection	0.05	2.1	A	
			EB	0.01	0.1	A	0.2
				0.01	0.9	A	0.2
			WB				
			NB				
				0.05	0.0	A	0.0
				0.05	0.0	A	0.0
			SB	-	-	-	-
				0.05	9.2	A	1.3
107	8 Avenue & 10 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection	0.21	6.6	A	
			EB	0.01	0.0	A	0.1
				0.01	0.6	A	0.1
				0.01	0.6	A	0.1
			WB	0.03	0.2	A	0.7
				0.03	2.7	A	0.7
				0.03	2.7	A	0.7
			NB	0.21	11.4	B	6.3
				0.21	11.4	B	6.3
				0.21	11.4	B	6.3
			SB	0.14	12.2	B	4.0
				0.14	12.2	B	4.0
				0.14	12.2	B	4.0

Project: Cold Lake Transportation Study
Project No: 2010-3050
Date Revised: September 16, 2010

Synchro Results - Existing 2010 Horizon

Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay (s)	LOS	95th Queue (m)
105	1 Avenue / 2 Avenue & 10 Street	Unsignalized Yield Control - SB Approach	Overall Intersection	0.05	2.1	A	
			EB	0.01	0.1	A	0.2
				0.01	0.9	A	0.2
			WB				
			NB				
				0.05	0.0	A	0.0
				0.05	0.0	A	0.0
			SB	-	-	-	-
				0.05	9.2	A	1.3
106	8 Avenue & Lakeshore Drive	Unsignalized Stop Control - EB Approach	Overall Intersection	0.07	4.3	A	
			EB	0.07	9.1	A	1.7
				0.07	9.1	A	1.7
			WB				
			NB	0.02	0.2	A	0.5
				0.02	3.1	A	0.5
			SB				
				0.03	0.0	A	0.0
				0.03	0.0	A	0.0

Project: Cold Lake Transportation Study
Project No: 2010-3050
Date Revised: September 16, 2010

Synchro Results - Existing 2010 Horizon

Node #	Intersection	Traffic Control	Approach	V/C Ratio	Delay (s)	LOS	95th Queue (m)
303	Highway 28 / 55 & 50 Avenue	Signalized [2]	Overall Intersection	0.76	14.3	B	
			EB	0.76	22.5	C	76.5
				0.42	11.4	B	48.0
				0.19	2.3	A	7.1
			WB	-	-	-	-
				0.22	9.3	A	24.4
				0.21	2.2	A	7.5
			NB	0.40	22.9	C	29.3
				0.23	17.3	B	22.8
				0.01	10.8	B	2.3
			SB	0.44	23.5	C	33.1
				0.28	17.6	B	26.7
				0.30	4.7	A	11.4
316	50 Avenue & 53 Street	Unsignalized Stop Control - NB/SB Approach	Overall Intersection	0.16	3.1	A	
			EB	0.07	0.7	A	1.8
				0.07	2.2	A	1.8
				0.07	2.2	A	1.8
			WB	0.00	0.0	A	0.0
				0.00	0.1	A	0.0
				0.00	0.1	A	0.0
			NB	0.09	18.2	C	2.3
				0.09	18.2	C	2.3
				0.09	18.2	C	2.3
			SB	0.16	15.9	C	4.7
				0.16	15.9	C	4.7
				0.16	15.9	C	4.7
317	50 Avenue & 52 Street	Unsignalized Stop Control - All Approaches	Overall Intersection	0.45	11.1	B	
			EB	0.45	12.0	B	-
				0.45	12.0	B	-
				0.45	12.0	B	-
			WB	0.38	11.1	B	-
				0.38	11.1	B	-
				0.38	11.1	B	-
			NB	0.15	9.6	A	-
				0.15	9.6	A	-
				0.15	9.6	A	-
			SB	0.23	10.1	B	-
				0.23	10.1	B	-
				0.23	10.1	B	-
318	50 Avenue & 51 Street	Unsignalized Stop Control - All Approaches	Overall Intersection	0.47	11.2	B	
			EB	0.47	12.5	B	-
				0.47	12.5	B	-
				0.47	12.5	B	-
			WB	0.33	10.6	B	-
				0.33	10.6	B	-
				0.33	10.6	B	-
			NB	0.14	9.5	A	-
				0.14	9.5	A	-
				0.14	9.5	A	-
			SB	0.23	10.3	B	-
				0.23	10.3	B	-
				0.23	10.3	B	-
319	50 Avenue & 50 Street	Unsignalized Stop Control - EB/WB/NB Approaches Assumed Yield Control - SB Approach	Overall Intersection	0.46	10.9	B	
			EB	-	-	-	-
				0.46	11.4	B	-
				0.46	11.4	B	-
			WB	0.32	10.4	B	-
				0.32	10.4	B	-
				-	-	-	-
			NB	0.31	10.4	B	-
				-	-	-	-
				0.31	10.4	B	-
			SB	-	-	-	-
				-	-	-	-
				-	-	-	-
320	50 Avenue & 49 Street	Unsignalized Stop Control - NB/SB Approaches	Overall Intersection	0.32	5.5	A	
			EB	0.04	0.4	A	1.1
				0.04	1.5	A	1.1
				0.04	1.5	A	1.1
			WB	0.02	0.2	A	0.5
				0.02	1.2	A	0.5
				0.02	1.2	A	0.5
			NB	0.19	15.5	C	5.5
				0.19	15.5	C	5.5
				0.19	15.5	C	5.5
			SB	0.32	17.6	C	10.9
				0.32	17.6	C	10.9
				0.32	17.6	C	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

Table of Contents

List of Tables

List of Figures

1 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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FIGURE 2.1 - HIGHWAY 28 / 43 AVENUE
EXISTING (2010) INTERSECTION CONFIGURATION

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DATE: MARCH 2011
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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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PROJECT NO:	2010-3050
DATE:	APRIL 2011
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SCALE:	NTS
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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.

Table 4.1
Capacity Analysis Results - 20 Year (2030) Forecasted p.m. Traffic Volumes

Intersection	Traffic Control	Approach	Movement	Laning	Volume (veh)	V/C Ratio	Delay (s)	LOS	95th Queue (m)
Highway 28 / 43 Avenue	Signalized	Overall Intersection				1.10	50.1	D	-
		EB	Left	L	334	1.05	98.4	F	#109.5
			Through	TR	64	0.43	39.2	D	41.6
			Right		54	-	-	-	-
		WB	Left	L	171	0.56	38.8	D	56.4
			Through	T	106	0.39	48.9	D	44.7
			Right	R	225	0.55	10.1	B	19.7
		NB	Left	L	33	0.22	34.0	C	16.0
			Through	TTR	893	1.02	73.0	E	#188.5
			Right		107	-	-	-	
		SB	Left	L	452	1.10	106.2	F	#186.7
			Through	2T	884	0.49	14.6	B	82.4
			Right	R	419	0.44	2.2	A	10.3

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)
Highway 28 / 43 Avenue	Signalized	Overall Intersection				**0.91**	29.7	C	-
		EB	Left	L	334	**0.89**	48.6	D	#87.7
			Through	TR	64	0.42	25.4	C	28.6
			Right		54	-	-	-	-
		WB	Left	L	`	0.48	24.0	C	38.4
			Through	T	106	0.45	37.6	D	33.3
			Right	R [C]	225	0.58	9.9	A	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	A	12.9
		SB	Left	2L	452	**0.85**	48.4	D	#73.0
			Through	2T	884	0.65	22.4	C	107.3
			Right	R [C]	419	0.51	4.4	A	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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DATE: MARCH 2011
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FIGURE 4.1 - HIGHWAY 28 / 43 AVENUE
20-YEAR (2030) REQUIRED INTERSECTION CONFIGUATION

5 Intersection Template

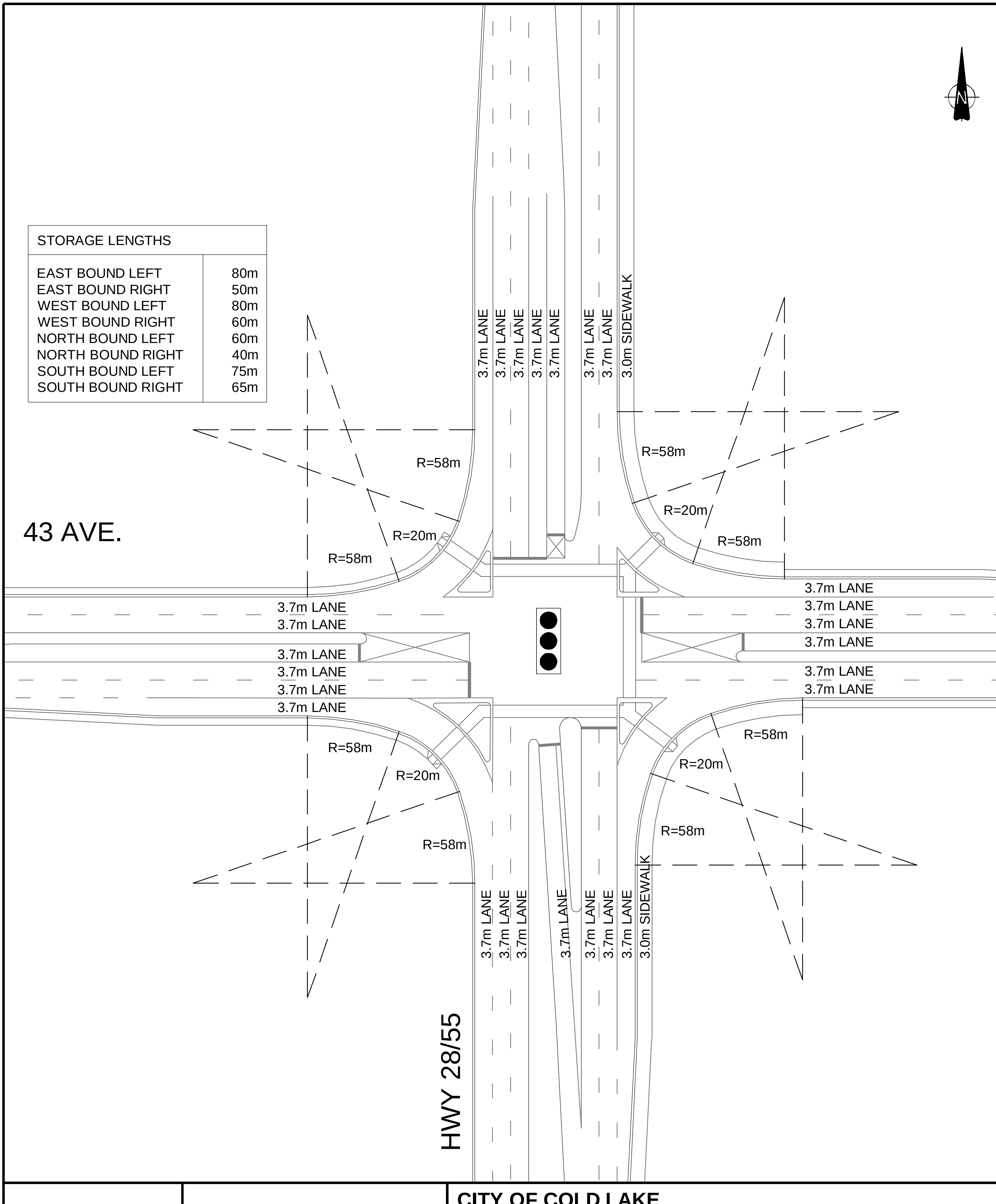
The City requested that a standard intersection template be developed with designated turn lanes and channelization. The template will be used by the City to determine and reserve the necessary right-of-way to accommodate future intersection improvements along Highway 28.

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.

STORAGE LENGTHS	
EAST BOUND LEFT	80m
EAST BOUND RIGHT	50m
WEST BOUND LEFT	80m
WEST BOUND RIGHT	60m
NORTH BOUND LEFT	60m
NORTH BOUND RIGHT	40m
SOUTH BOUND LEFT	75m
SOUTH BOUND RIGHT	65m



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PROJECT NO: 2010-3050
DATE: MARCH 2011
APPROVED:
SCALE: 1:1000
DWG NO:

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 5.1
INTERSECTION IMPROVEMENT TEMPLATE

6 Conclusion

The scope of the Highway 28 Functional Review was revised to:

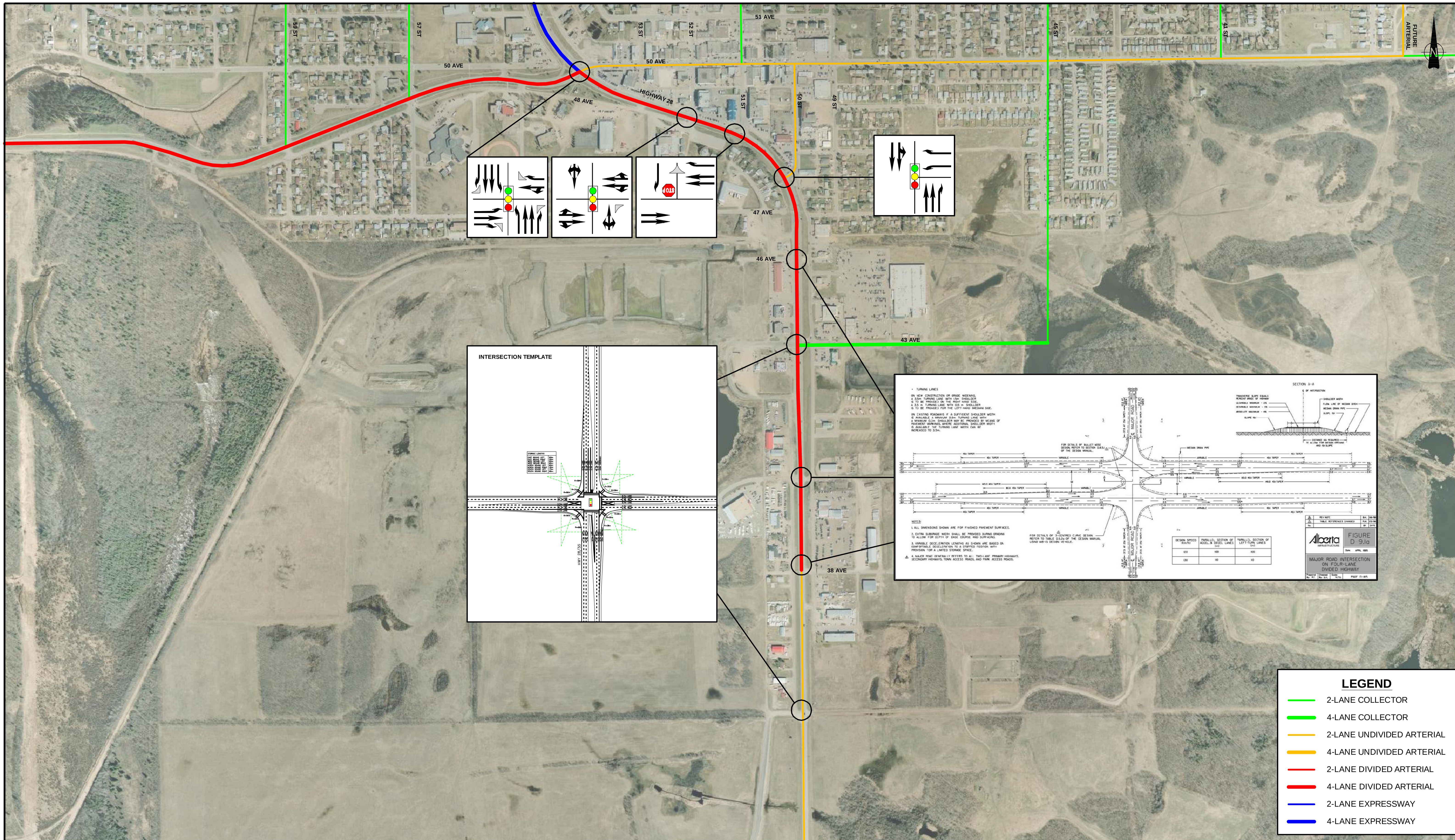
- Select and analyze the traffic operations at a representative intersection under the 20-year planning horizon to determine the required traffic control and intersection configuration
- Develop a standard intersection template with designated turn lanes, storage lengths, and channelization, if required.

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.



Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 6.1
HIGHWAY 28 FUNCTIONAL REVIEW - SUMMARY

A

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.

Table 1.1 Level of Service Definitions

Level of Service (LOS)	Overall Average Delay at Unsignalized Intersection	Overall Average Delay at Signalized Intersection
A	≤ 10 seconds	≤ 10 seconds
B	> 10 and ≤ 15 seconds	> 10 and ≤ 20 seconds
C	> 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

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.

Table 2.2 Traffic Analysis Assumptions for Synchro

Traffic Analysis Parameters					
Parameter	**RMWB***	**City of Calgary**	**City of Lethbridge**	**City of Medicine Hat**	**Recommended**
Link Speed	Existing posted speed limits				Existing posted speed limits
Lane Widths	3.7m				3.7m
Storage Length	Minimum 60m				Minimum 60m
Adjacent Parking Lanes	Apply data where 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

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	-	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.

H Appendix H - School Zone Safety Analysis

Technical Memorandum

City of Cold Lake

School Zone Safety Analysis

April 2011

Table of Contents

List of Tables

List of Figures

1 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.

3 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.

Table 3.1
TAC School Zone Worksheet Results

School Site	Adjacent Road	Warranted Designation
Nelson Heights Middle School	5 Avenue	School Area
St. Dominic Elementary School	Lakeshore Drive	School Area or School Zone
	7 Street	School Zone
Lakesland Christian Academy	10 Street	School Area or School Zone
	14 Avenue	School Zone
Cold Lake Elementary	16 Avenue	School Area
	8 Street	School Area or School Zone
Ecole Voyageur	49 Street	School Zone
Trinity Christian School	51 Avenue	School Area or School Zone
	61 Street	School Area or School Zone

School Site	Adjacent Road	Warranted Designation
Grand Centre Middle School	57 Street	Nothing
	52 Avenue	Nothing
	56 Street	School Area
Grand Centre Elementary School	57 Street	School Area
	50 Avenue	School Area
	51 Avenue	School Zone
Grand Centre High School	48 Avenue	School Area
	57 Street	School Area
	47 Avenue	School Area
Assumption School	48 Avenue	School Area or School Zone
	47 Avenue	School Area or School Zone
Holy Cross Elementary	49 Street	School Zone
MacKenzie School	Hickory Street	School Zone
RA Reynolds School	Queensway	School Area or School Zone
	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.

Table 3.2
TAC Playground Zone Worksheet Results

Playground Site	Adjacent Road	Warranted Designation
St. Dominic Elementary School	7 Street	Playground Area
Grand Centre Elementary School	57 Street	Playground Area
	50 Avenue	Nothing
MacKenzie School	Oak Drive	Playground Area
RA Reynolds School	Queensway	Playground Area
	Spruce Crescent	Playground Area

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.

A Appendix A - School Zone Worksheets

Table A.1 presents the School Zone Input Worksheet from the TAC Guideline

Table A.1
TAC 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)
School Type	40	Elementary		1.00		**T=**
		Middle / Junior High		0.40		
		High School		0.20		
		Post-Secondary / College / University		0.00		
Road Classification	20	Urban Land Use	Rural Land Use			**C=**
		Local		1.00		
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		
Fencing	20	Fully Traversable		1.00		**F=**
		Partially Traversable		0.50		
		Non-Traversable		0.10		
Property Line Separation	10	Abuts Roadway		1.00		**L=**
		Within 50 metres		0.50		
		Further than 50 metres		0.00		
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		**E=**
		Secondary Entrance		0.60		
		None		0.00		
Sidewalks	5	None or Non-School Site		1.00		**S=**
		School Side		0.60		

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**.

Table A.2
TAC School Zone Results Matrix

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.	

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40	0.40	
		High School		0.20		
		Post Secondary / College / University		0.00		T= 16
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						**56**
						School Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	0.60	
		None		0.00		E= 3
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						**70**
						School Area or School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Table 2.1 School 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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50	0.50	
		Non-Traversable		0.10		F= 10
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		None or Non-School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						**85**
						School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 11, 2010

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60		
		None		0.00	0.00	E= 0
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						**80**
						School Area or School Zone

P:\20103050\00__\Engineering\03.00_Conceptual_Feasibility_Design\School & Playground Zone\3_Lakesland Christian Academy_20100611\School Zone -10 Street

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						95
						School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 11, 2010

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 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

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	1.00	
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						77
						School Area or School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 11, 2010

Table 2.1 School Zone Input Worksheet
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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60	0.60	
		Both Sides		0.00		S= 3
TOTAL SCORE (sum of T,C,F,L,E and S)						**88**
						School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 11, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60	0.60	
		Both Sides		0.00		S= 3
TOTAL SCORE (sum of T,C,F,L,E and S)						80
						School Area or School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Trinity Christian School - 61 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)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	0.60	
		None		0.00		E= 3
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60	0.60	
		Both Sides		0.00		S= 3
TOTAL SCORE (sum of T,C,F,L,E and S)						**73**
						School Area or School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 11, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Grand Centre Middle 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)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40	0.40	
		High School		0.20		
		Post Secondary / College / University		0.00		T= 16
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	0.60	
		None		0.00		E= 3
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						**36**
						Nothing

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 11, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

Grand Centre Middle School - 52 Avenue

INSTALLATION CRITERION	MAXIMUM POINT VALUE (MPV)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40	0.40	
		High School		0.20		
		Post Secondary / College / University		0.00		T= 16
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60		
		None		0.00	0.00	E= 0
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						**33**
						Nothing

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 11, 2010

Table 2.1 School Zone Input Worksheet
Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40	0.40	
		High School		0.20		
		Post Secondary / College / University		0.00		T= 16
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50	0.50	
		Non-Traversable		0.10		F= 10
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						61
						School Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School 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)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	0.60	
		None		0.00		E= 3
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						**60**
						School Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School 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)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						62
						School Area

P:\20103050\00__\Engineering\03.00_Conceptual_Feasibility_Design\School & Playground Zone\8_Grand Centre Elementary School_20100614\School Zone - 50 Avenue

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50	0.50	
		Non-Traversable		0.10		F= 10
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						**85**
						School Zone

P:\20103050\00__\Engineering\03.00_Conceptual_Feasibility_Design\School & Playground Zone\8_Grand Centre Elementary School_20100614\School Zone - 51 Avenue

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40		
		High School		0.20	0.20	
		Post Secondary / College / University		0.00		T= 8
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						**58**
						School Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40		
		High School		0.20	0.20	
		Post Secondary / College / University		0.00		T= 8
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						**63**
						School Area

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 14, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40		
		High School		0.20	0.20	
		Post Secondary / College / University		0.00		T= 8
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						**58**
						School Area

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School Zone Input Worksheet
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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00		
		Middle / Junior High		0.40	0.40	
		High School		0.20		
		Post Secondary / College / University		0.00		T= 16
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						**66**
						School Area or School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School Zone Input Worksheet
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)	SCORE (MPV * WF)
School **T**ype	40	Elementary		1.00		
		Middle / Junior High		0.40	0.40	
		High School		0.20		
		Post Secondary / College / University		0.00		T= 16
Road **C**lassification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property **L**ine Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
School **E**ntrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						**66**
						School Area or School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 14, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		L= 5
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						**90**
						School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 14, 2010

Table 2.1 School Zone Input Worksheet

Source: TAC School & Playground Areas & Zones: Guidelines for Application and Implementation

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		F= 20
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00		
		School Side		0.60	0.60	
		Both Sides		0.00		S= 3
TOTAL SCORE (sum of T,C,F,L,E and S)						98
						School Zone

Project Name: Cold Lake Transportation Study
Project No: 2010-3050
Date: June 14, 2010

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School Type	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		T= 40
Road Classification	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		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
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
School Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						72
						School Area or School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School **T**ype	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		**T= 40**
Road **C**lassification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		**C= 20**
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable		0.10	0.10	**F= 2**
Property **L**ine Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		**L= 10**
School **E**ntrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	0.60	
		None		0.00		**E= 3**
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		**S= 5**
TOTAL SCORE (sum of T,C,F,L,E and S)						**80**
						School Area or School Zone

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

Table 2.1 School Zone Input Worksheet

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)	SCORE (MPV * WF)
School **T**ype	40	Elementary		1.00	1.00	
		Middle / Junior High		0.40		
		High School		0.20		
		Post Secondary / College / University		0.00		**T= 40**
Road **C**lassification	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector Collector	Local Collector	0.75 0.50		
		Major Collector Minor Arterial	Arterial	0.25		
		Major Arterial Expressway	Freeway	0.00		**C= 20**
Fencing	20	Fully Traversable		1.00	1.00	
		Partially Traversable		0.50		
		Non-Traversable		0.10		**F= 20**
Property **L**ine Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50	0.50	
		Further than 50 metres		0.00		**L= 5**
School **E**ntrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		**E= 5**
Sidewalks	5	None or Non-School Side		1.00	1.00	
		School Side		0.60		
		Both Sides		0.00		**S= 5**
TOTAL SCORE (sum of T,C,F,L,E and S)						**95**
						School Zone

B Appendix B - Playground Zone Worksheets

Table B.1 presents the Playground Zone Input Worksheet from the TAC Guideline

Table B.1
TAC Playground 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)
Playground Type	40	Frontage	Playground Capacity (number of children)	n/a		T=
		≥ 50 m	16 or more	1.00		
			5 to 15	0.75		
			1 to 4	0.40		
			No play equipment: sport field or open field only	0.20		
		< 50 m	Any Facilities	0.20		
Road Classification	20	Urban Land Use	Rural Land Use			C=
		Local		1.00		
		Minor Collector	Local	0.75		
		Collector	Collector	0.50		
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		
Fencing	20	Fully Traversable		1.00		F=
		Partially Traversable		0.50		
		Non-Traversable/Indoor Facility		0.10		
Property Line Separation	10	Abuts Roadway		1.00		L=
		Within 50 metres		0.50		
		Further than 50 metres		0.00		
Playground Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		E=

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		
Sidewalks	5	None (or Non-Playground Side)	1.00		S=
		Playground Side	0.40		
		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.2
TAC 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)	SCORE (MPV * WF)
Playground Type	40	Frontage	Playground Capacity (number of children)			
		≥ 50 m	16 or more	1.00		
			5 to 15	0.75		
			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
Road Classifcation	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector	Local	0.75		
		Collector	Collector	0.50		
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable/Indoor Facility		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
Playground Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60		
		None		0.00	0.00	E= 0
Sidewalks	5	None (or Non-Playground Side)		1.00	1.00	
		Playground Side		0.40		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						45
						Playground Area

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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 **T**ype	40	Frontage	Playground Capacity (number of children)			
		≥ 50 m	16 or more	1.00	1.00	
			5 to 15	0.75		
			1 to 4	0.40		
			No play equipment: sport field or open field only	0.20		
		< 50 m	Any Facilities	0.20		T= 40
Road **C**lassifcation	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		Minor Collector	Local	0.75		
		Collector	Collector	0.50	0.50	
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		C= 10
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable/Indoor Facility		0.10	0.10	F= 2
Property **L**ine Separation	10	Abuts Roadway		1.00		
		Within 50 metres		0.50		
		Further than 50 metres		0.00	0.00	L= 0
Playground **E**ntrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60		
		None		0.00	0.00	E= 0
Sidewalks	5	None (or Non-Playground Side)		1.00	1.00	
		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)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)
Playground Type	40	Frontage	Playground Capacity (number of children)			
		≥ 50 m	16 or more	1.00		
			5 to 15	0.75		
			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
Road Classifcation	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		Minor Collector	Local	0.75		
		Collector	Collector	0.50	0.50	
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		C= 10
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable/Indoor Facility		0.10	0.10	F= 2
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
Playground Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00	1.00	
		Secondary Entrance		0.60		
		None		0.00		E= 5
Sidewalks	5	None (or Non-Playground Side)		1.00		
		Playground Side		0.40		
		Both Sides		0.00	0.00	S= 0
TOTAL SCORE (sum of T,C,F,L,E and S)						35
						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)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)
Playground Type	40	Frontage	Playground Capacity (number of children)			
		≥ 50 m	16 or more	1.00		
			5 to 15	0.75		
			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**
Road Classifcation	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector	Local	0.75		
		Collector	Collector	0.50		
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		**C= 20**
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50	0.50	
		Non-Traversable/Indoor Facility		0.10		**F= 10**
Property Line Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		**L= 10**
Playground Entrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60		
		None		0.00	0.00	**E= 0**
Sidewalks	5	None (or Non-Playground Side)		1.00		
		Playground Side		0.40	0.40	
		Both Sides		0.00		**S= 2**
TOTAL SCORE (sum of T,C,F,L,E and S)						**50**
						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)	DESCRIPTION		WEIGHTING FACTOR (WF)	WEIGHTING FACTOR FOR STUDY SITE (Pick one from category on left)	SCORE (MPV * WF)
Playground **T**ype	40	Frontage	Playground Capacity (number of children)			
		≥ 50 m	16 or more	1.00	1.00	
			5 to 15	0.75		
			1 to 4	0.40		
			No play equipment: sport field or open field only	0.20		
		< 50 m	Any Facilities	0.20		**T= 40**
Road **C**lassifcation	20	Urban Land Use	Rural Land Use			
		Local		1.00		
		Minor Collector	Local	0.75		
		Collector	Collector	0.50	0.50	
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		**C= 10**
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable/Indoor Facility		0.10	0.10	**F= 2**
Property **L**ine Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		**L= 10**
Playground **E**ntrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	0.60	
		None		0.00		**E= 3**
Sidewalks	5	None (or Non-Playground Side)		1.00	1.00	
		Playground Side		0.40		
		Both Sides		0.00		**S= 5**
TOTAL SCORE (sum of T,C,F,L,E and S)						**70**
						Playground Area

P:\20103050\00__\Engineering\03.00_Conceptual_Feasibility_Design\School & Playground Zone\13_RA Reynolds School_20100614\Playground Zone - Queensway

Project Name:	Cold Lake Transportation Study
Project No:	2010-3050
Date:	June 14, 2010

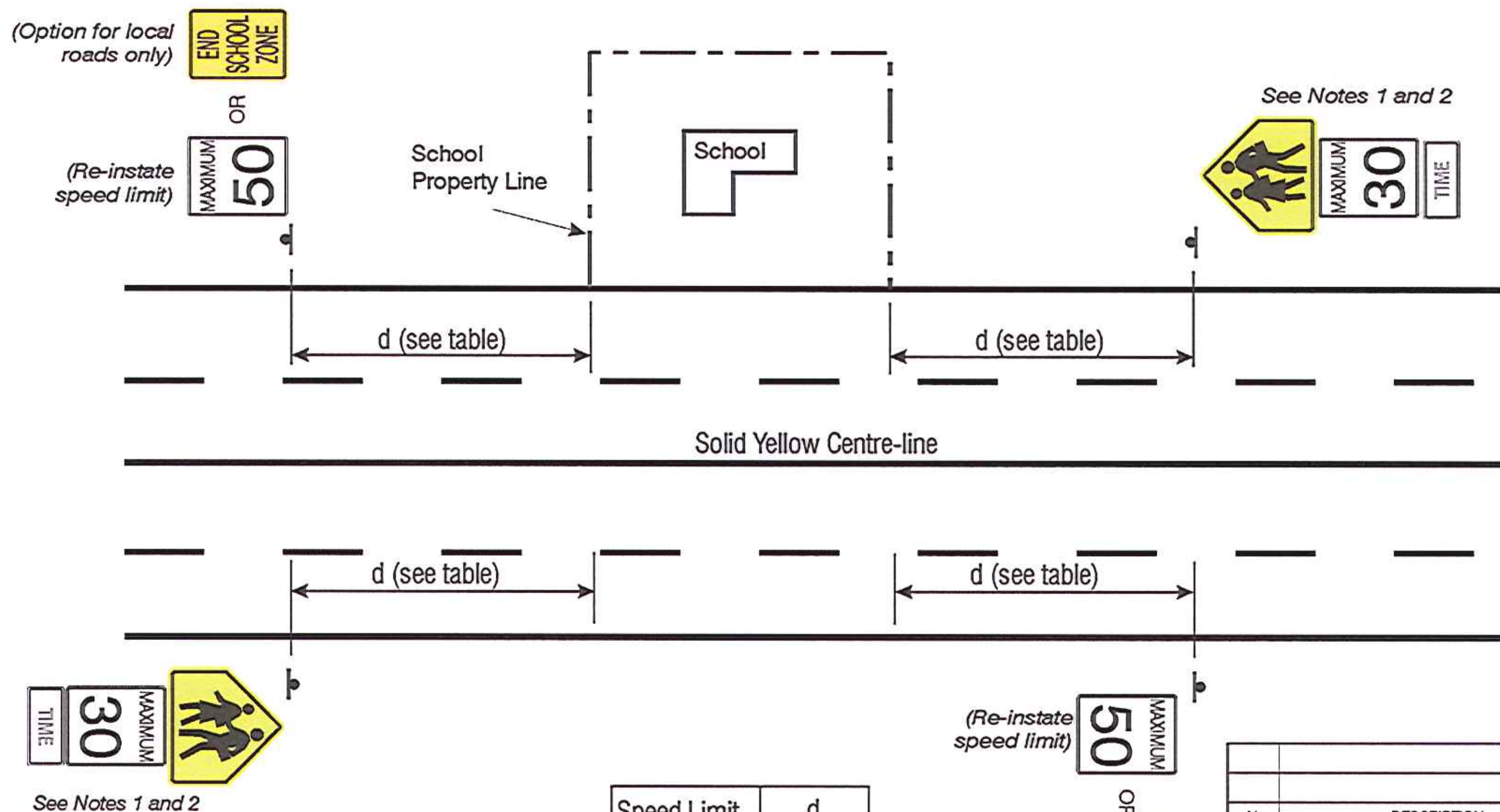
Table 2.3 Playground Zone Input Worksheet

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)	SCORE (MPV * WF)
Playground **T**ype	40	Frontage	Playground Capacity (number of children)			
		≥ 50 m	16 or more	1.00		
			5 to 15	0.75		
			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
Road **C**lassifcation	20	Urban Land Use	Rural Land Use			
		Local		1.00	1.00	
		Minor Collector	Local	0.75		
		Collector	Collector	0.50		
		Major Collector/ Minor Arterial	Arterial	0.25		
		Major Arterial/ Expressway	Freeway	0.00		C= 20
Fencing	20	Fully Traversable		1.00		
		Partially Traversable		0.50		
		Non-Traversable/Indoor Facility		0.10	0.10	F= 2
Property **L**ine Separation	10	Abuts Roadway		1.00	1.00	
		Within 50 metres		0.50		
		Further than 50 metres		0.00		L= 10
Playground **E**ntrance	5	Main Entrance / Multiple Secondary Entrances		1.00		
		Secondary Entrance		0.60	0.60	
		None		0.00		E= 3
Sidewalks	5	None (or Non-Playground Side)		1.00	1.00	
		Playground Side		0.40		
		Both Sides		0.00		S= 5
TOTAL SCORE (sum of T,C,F,L,E and S)						48
						Playground Area

C Appendix C - Signage and Pavement Marking Plans



Speed Limit	d
40 km/h	20 m
50 km/h	30 m
60 km/h	40 m

Note 1: Time SHALL be shown if different from the Act, otherwise it MAY be shown
Note 2: Time can be shown as a tab, or on the RB-1 sign itself

No.	DESCRIPTION	BY	DATE

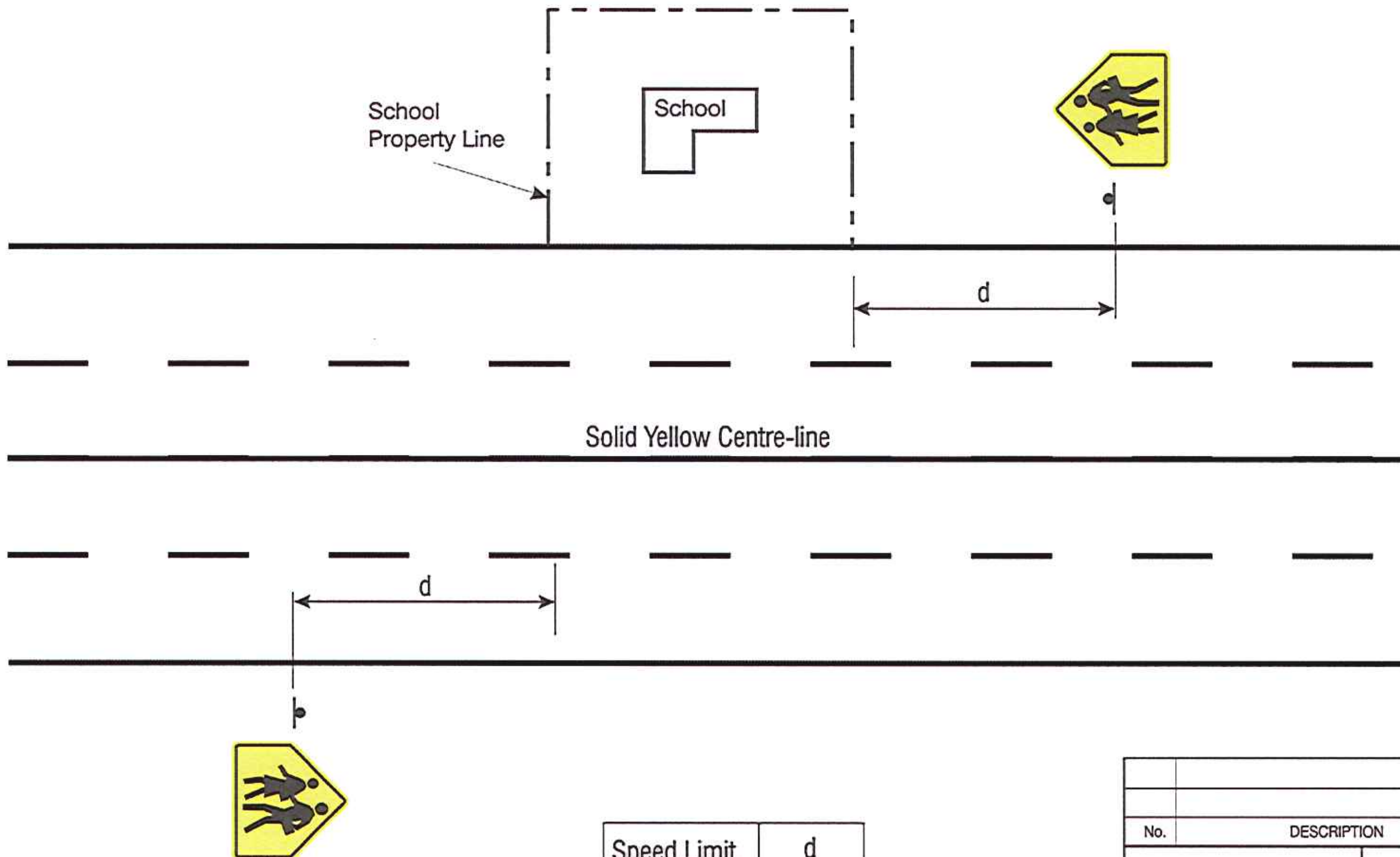
Alberta TRANSPORTATION

DRAWING TCS-D-301

Date: MAY 2004

SCHOOL ZONE ON URBAN ROAD

Prepared By: DP	Checked By: RD	Scale: N.T.S.	SECTION D3



Speed Limit	d
40 km/h	10 m
50 km/h	20 m
60 km/h	30 m
70 km/h	40 m
80 km/h	50 m

No.	DESCRIPTION	BY	DATE

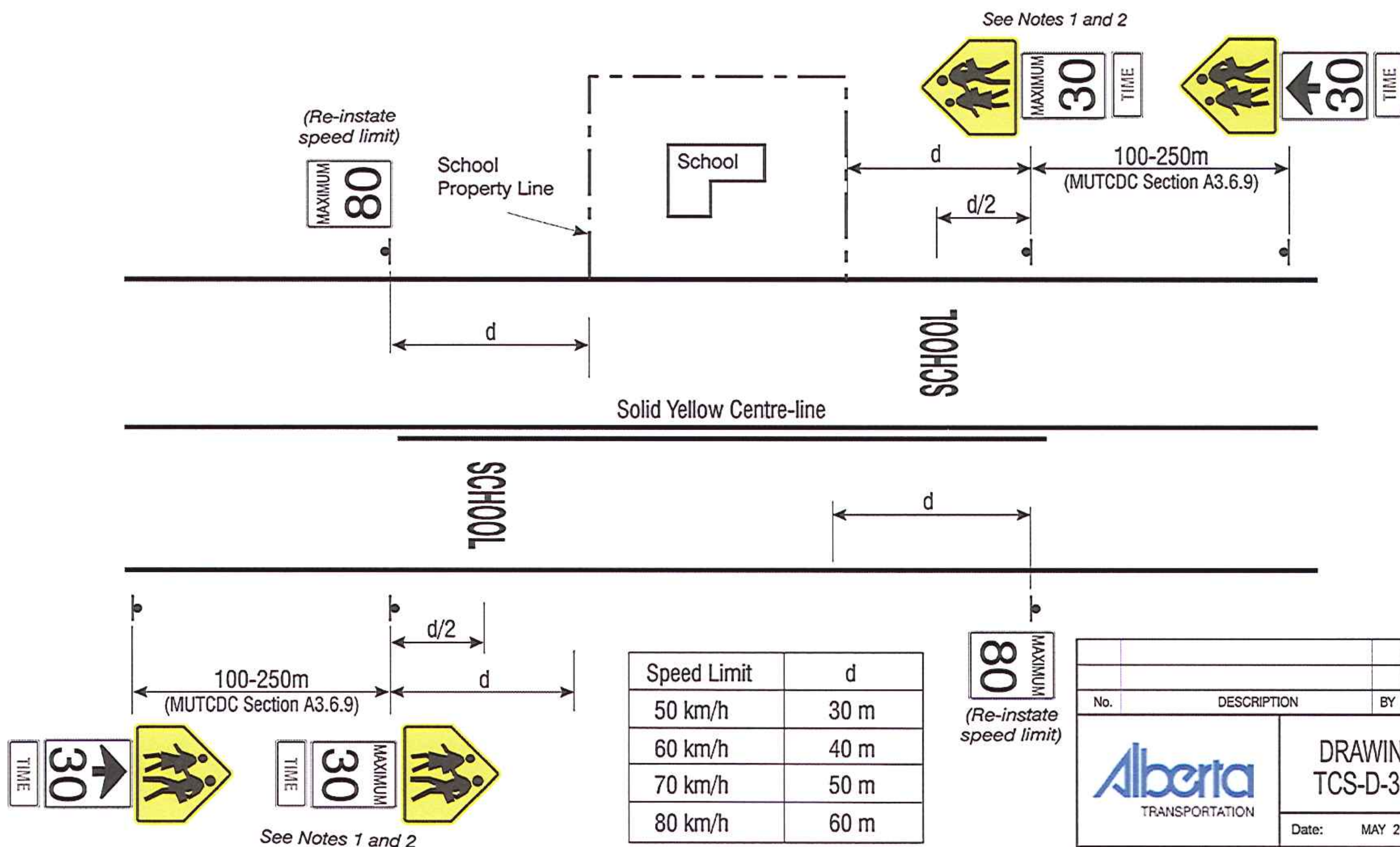
Alberta TRANSPORTATION

DRAWING TCS-D-302

Date: MAY 2004

SCHOOL AREA ON URBAN ROAD

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Speed Limit	d
50 km/h	30 m
60 km/h	40 m
70 km/h	50 m
80 km/h	60 m

Note 1: Time SHALL be shown if different from the Act, otherwise it MAY be shown
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: All signs oversized for speed limits of 70 km/h or more

No.	DESCRIPTION	BY	DATE

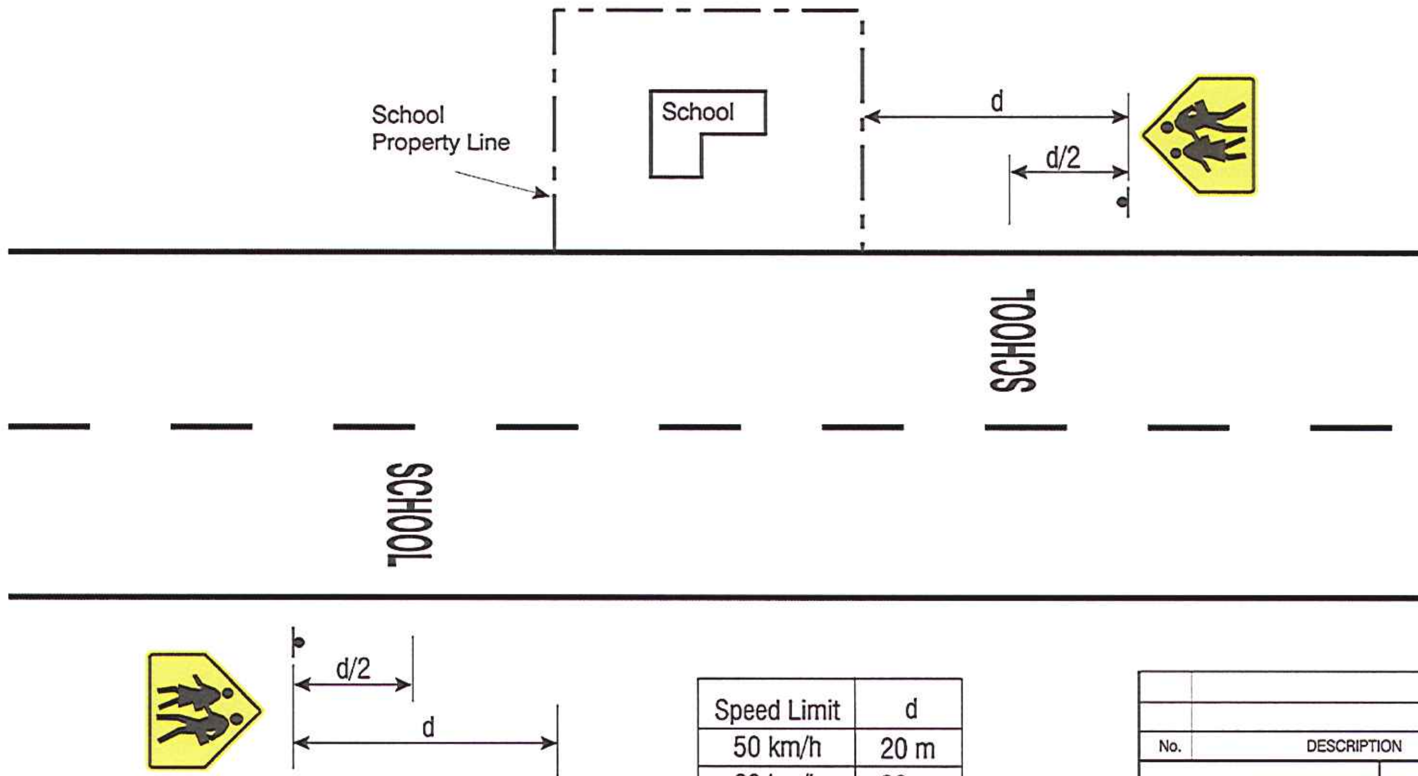
Alberta TRANSPORTATION

DRAWING TCS-D-303

Date: MAY 2004

SCHOOL ZONE ON RURAL ROAD

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Speed Limit	d
50 km/h	20 m
60 km/h	30 m
70 km/h	40 m
80 km/h	50 m
90 km/h	60 m
100 km/h	70 m

Note: All signs oversized for speed limits of 70km/h or more

No.	DESCRIPTION	BY	DATE

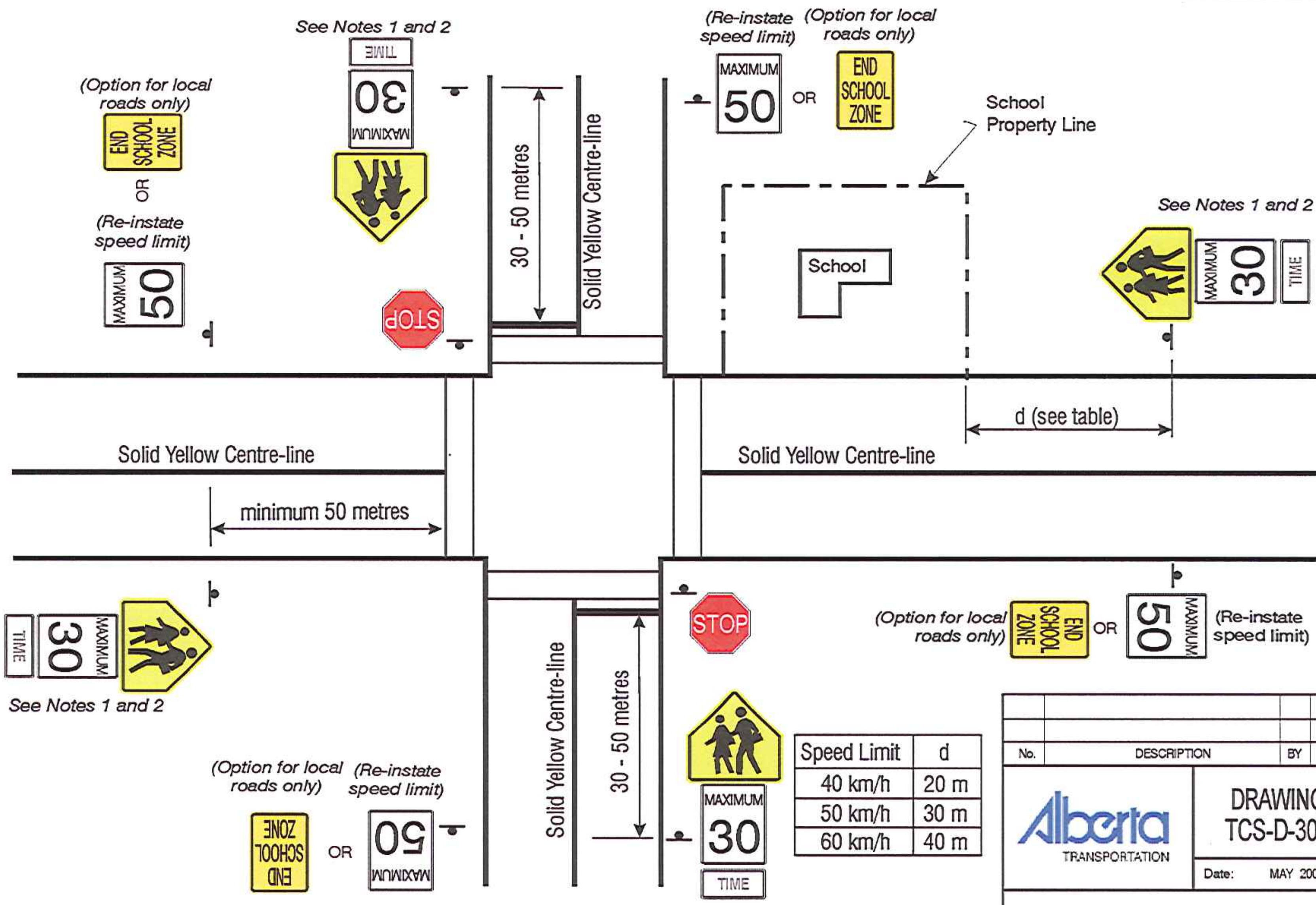
Alberta TRANSPORTATION

DRAWING TCS-D-304

Date: MAY 2004

SCHOOL AREA ON RURAL ROAD

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Speed Limit	d
40 km/h	20 m
50 km/h	30 m
60 km/h	40 m

Note 1: Time SHALL be shown if different from the Act, otherwise it MAY be shown
Note 2: Time can be shown as a tab, or on the RB-1 itself

No.	DESCRIPTION	BY	DATE

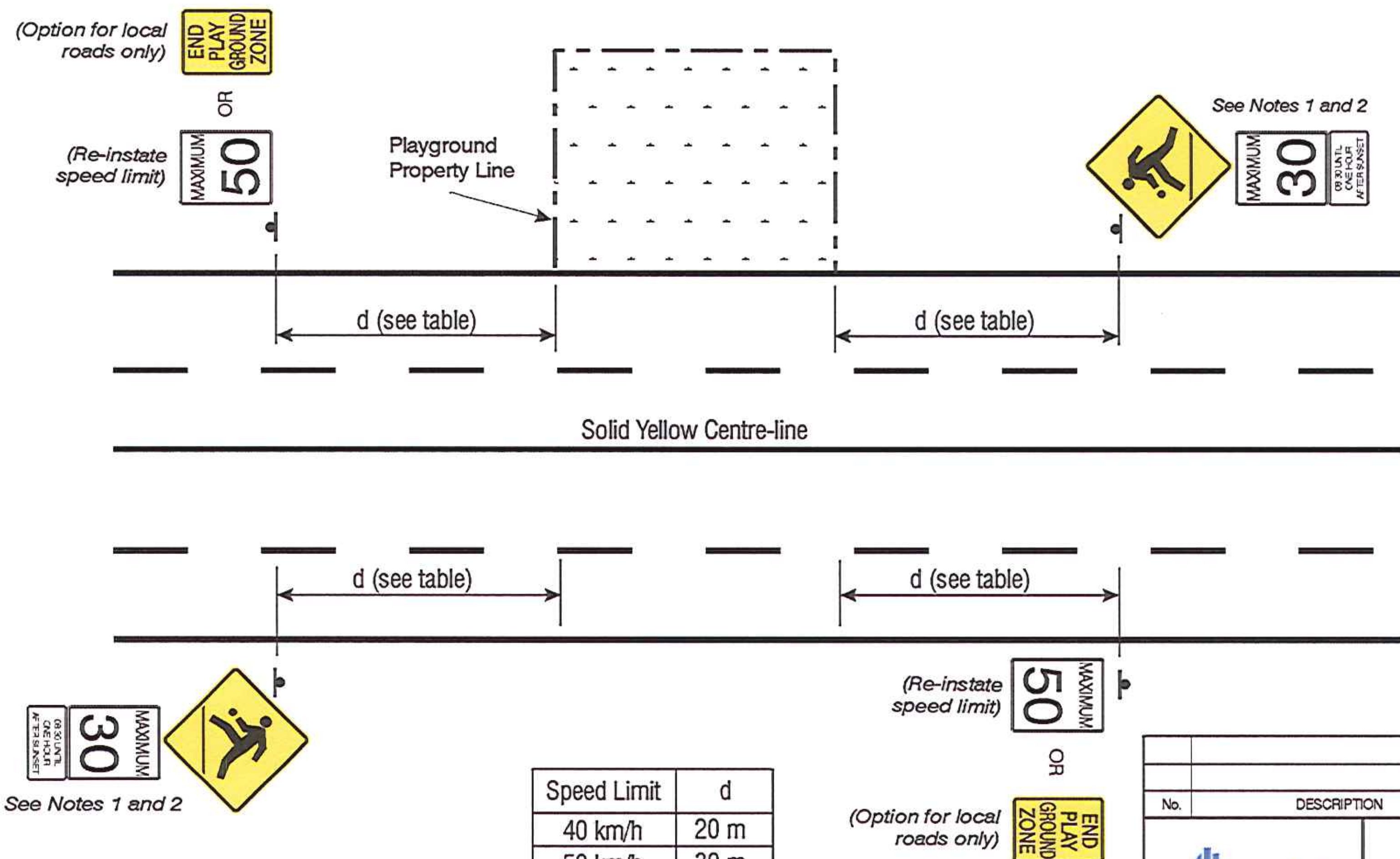
Alberta TRANSPORTATION

DRAWING TCS-D-305

Date: MAY 2004

SCHOOL ZONE THROUGH INTERSECTION

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Speed Limit	d
40 km/h	20 m
50 km/h	30 m
60 km/h	40 m

Note 1: Time MAY be shown
Note 2: Time can be shown as a tab, or on the RB-1 itself

No.	DESCRIPTION	BY	DATE

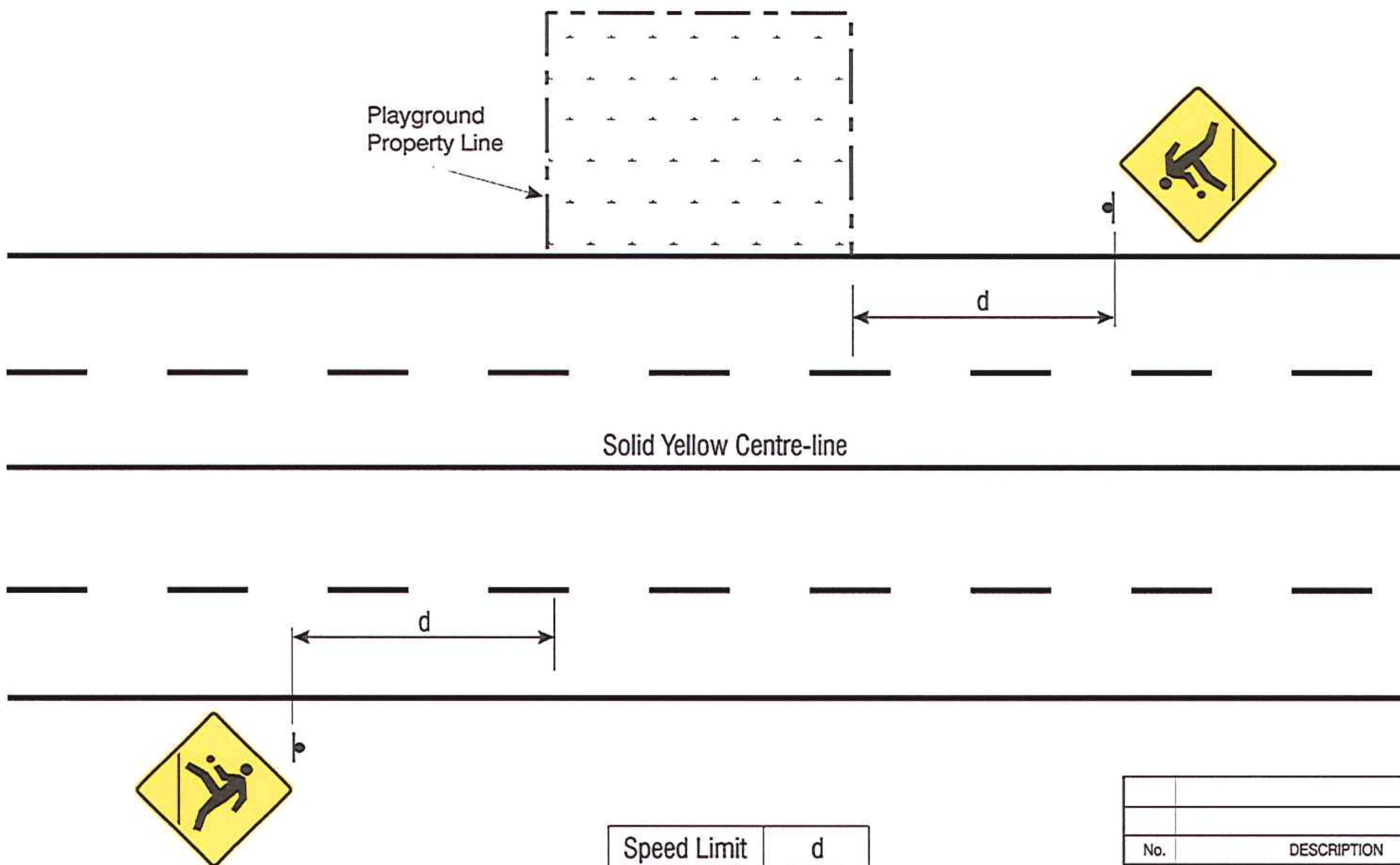
Alberta TRANSPORTATION

DRAWING TCS-D-306

Date: MAY 2004

PLAYGROUND ZONE ON URBAN ROAD

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Speed Limit	d
40 km/h	10 m
50 km/h	20 m
60 km/h	30 m
70 km/h	40 m
80 km/h	50 m

No.	DESCRIPTION	BY	DATE

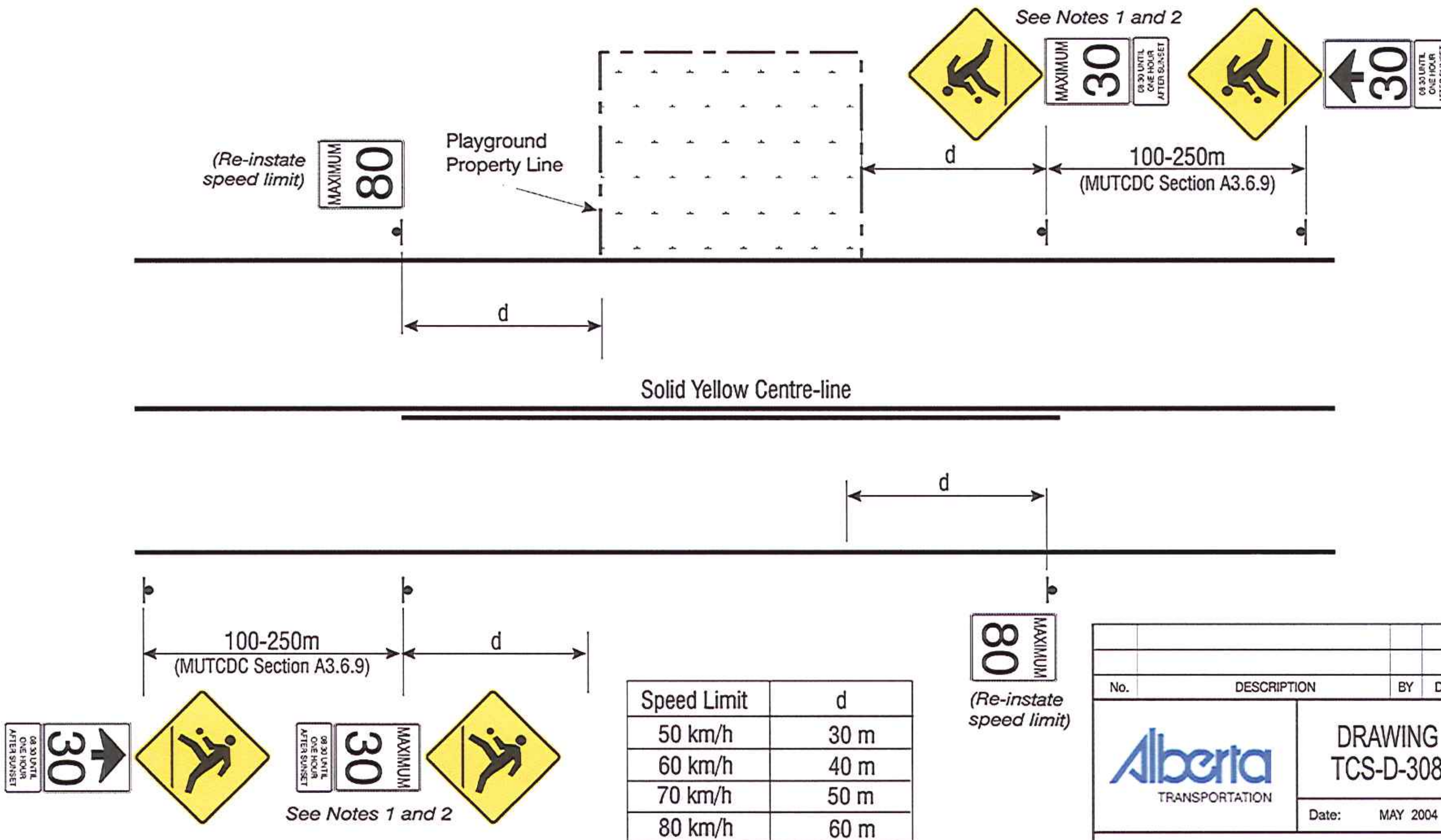
Alberta TRANSPORTATION

DRAWING TCS-D-307

Date: MAY 2004

PLAYGROUND AREA ON URBAN ROAD

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Speed Limit	d
50 km/h	30 m
60 km/h	40 m
70 km/h	50 m
80 km/h	60 m

Note 1: Time MAY be shown
Note 2: Time can be shown as a tab, or on the RB-1 itself
Note 3: All signs oversized for speed limits of 70 km/h or more

No.	DESCRIPTION	BY	DATE

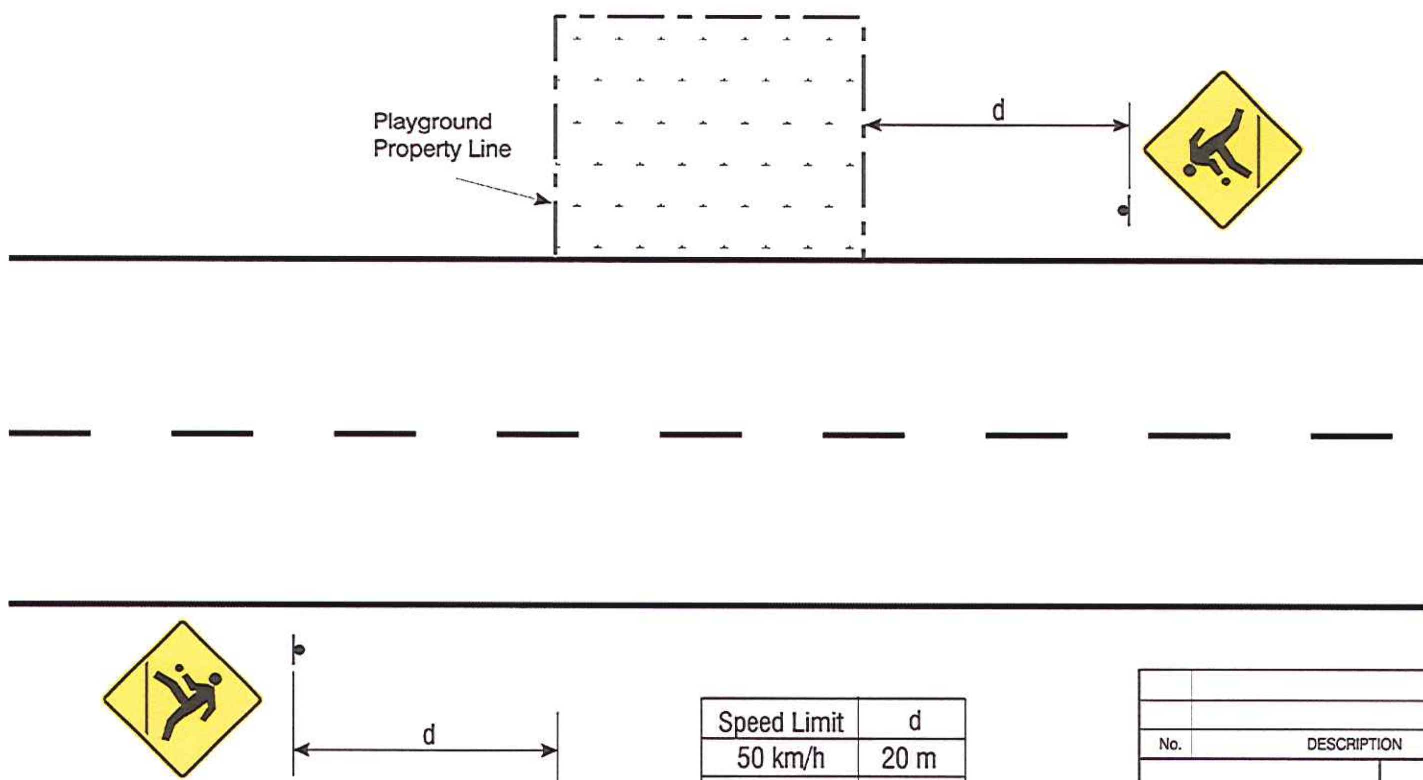
Alberta TRANSPORTATION

DRAWING
TCS-D-308

Date: MAY 2004

PLAYGROUND ZONE
ON RURAL ROAD

Prepared By: DP	Checked By: RD	Scale: N.T.S.	SECTION D3



Speed Limit	d
50 km/h	20 m
60 km/h	30 m
70 km/h	40 m
80 km/h	50 m
90 km/h	60 m
100 km/h	70 m

Note: All signs oversized for speed limits of 70 km/h or more

No.	DESCRIPTION	BY	DATE

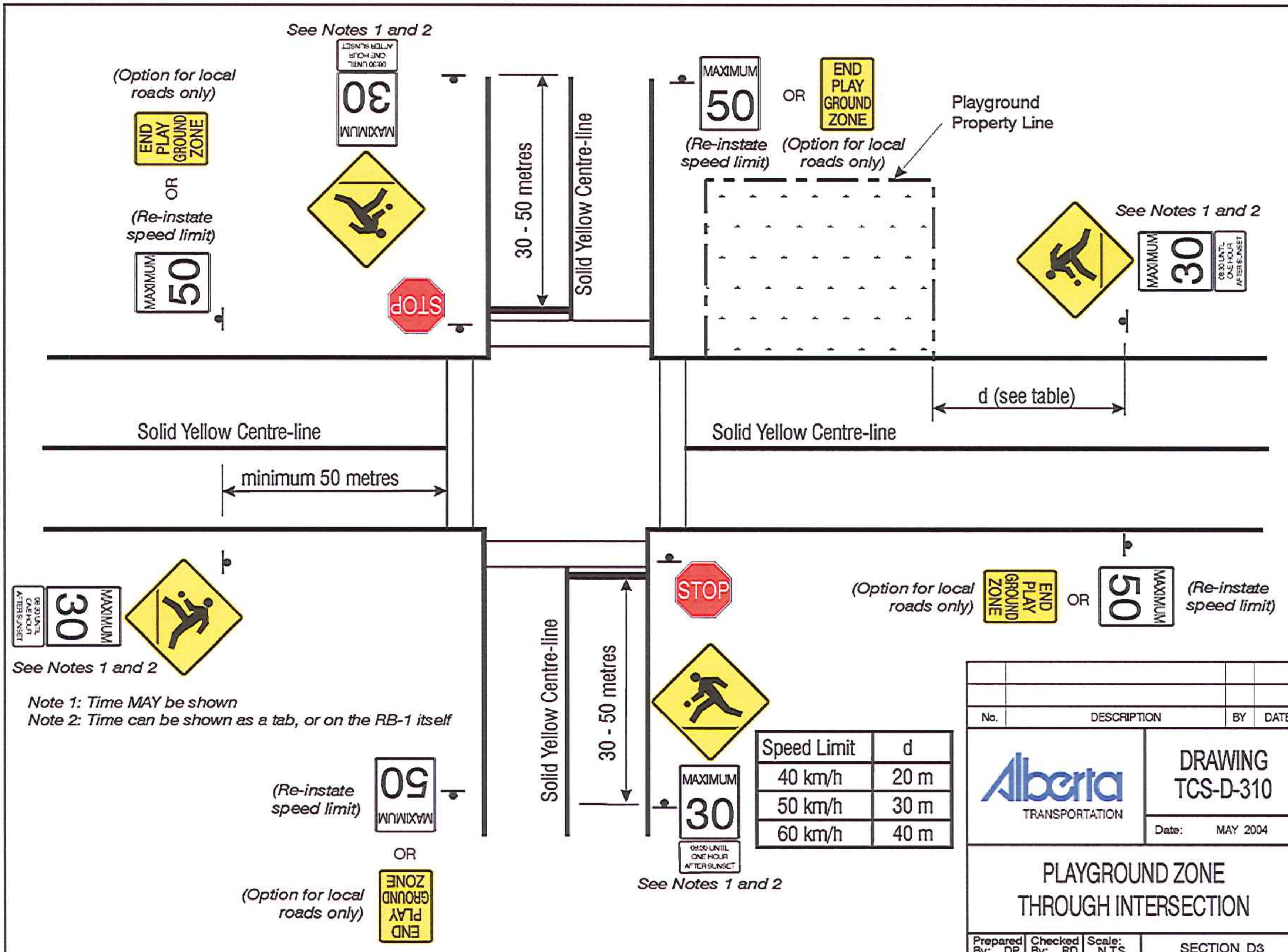
Alberta TRANSPORTATION

DRAWING TCS-D-309

Date: MAY 2004

PLAYGROUND AREA ON RURAL ROAD

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Note 1: Time MAY be shown
Note 2: Time can be shown as a tab, or on the RB-1 itself

Speed Limit	d
40 km/h	20 m
50 km/h	30 m
60 km/h	40 m

No.	DESCRIPTION	BY	DATE

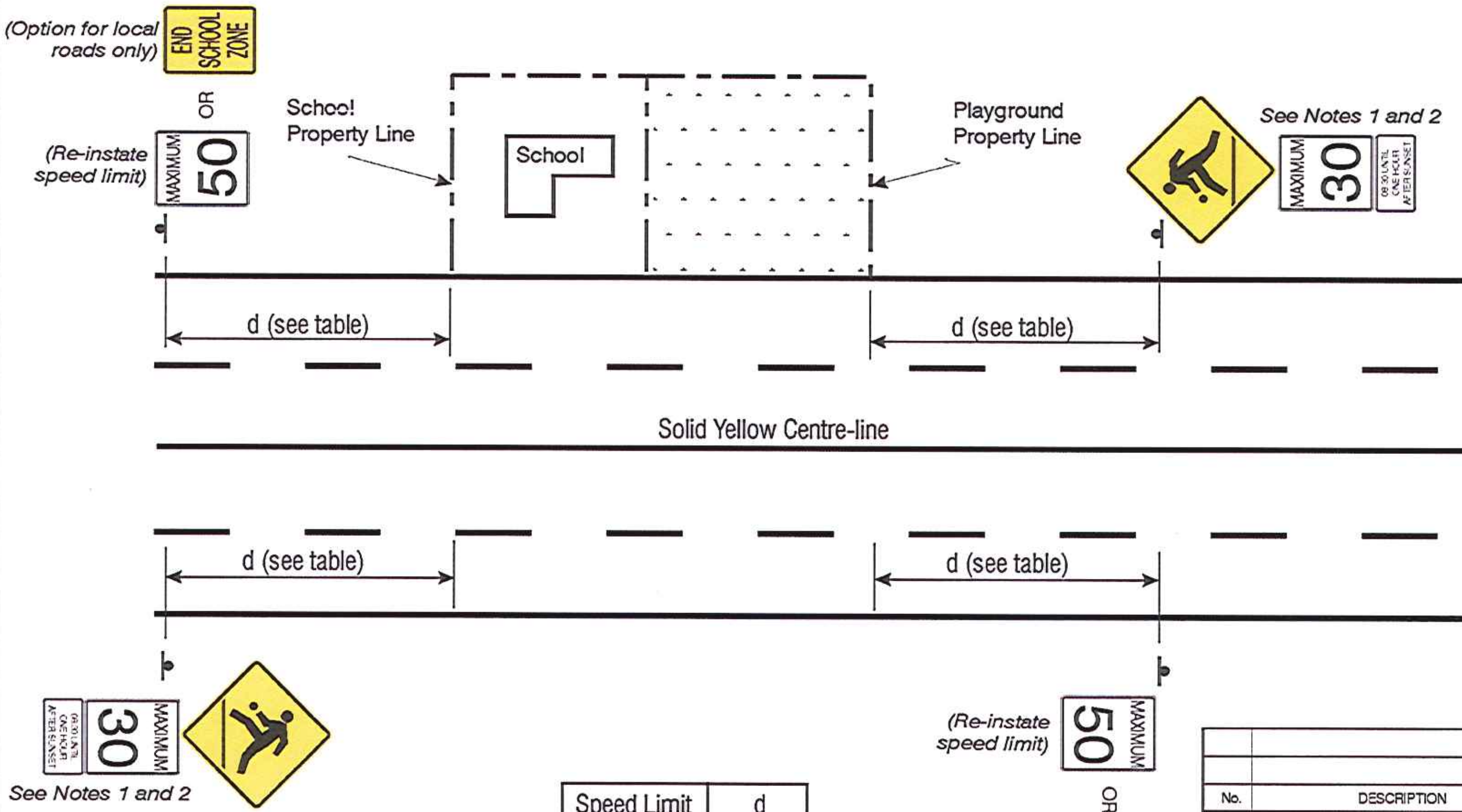
Alberta TRANSPORTATION

DRAWING TCS-D-310

Date: MAY 2004

PLAYGROUND ZONE THROUGH INTERSECTION

Prepared By: DP | Checked By: RD | Scale: N.T.S. | SECTION D3



Speed Limit	d
40 km/h	20 m
50 km/h	30 m
60 km/h	40 m

Note 1: Time MAY be displayed as an option
Note 2: Time can be shown as a tab, or on the RB-1 itself

No.	DESCRIPTION	BY	DATE

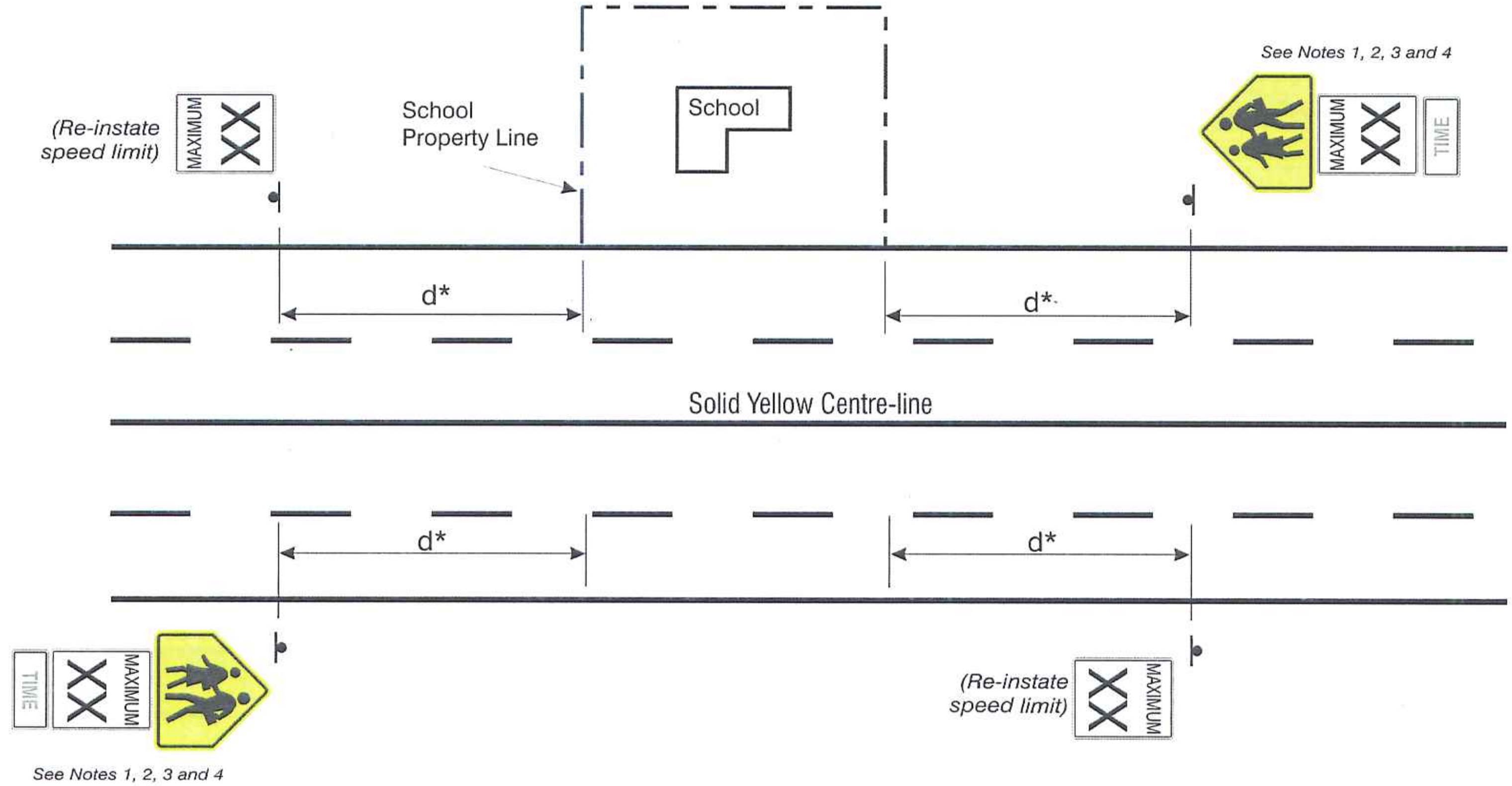
Alberta TRANSPORTATION

DRAWING TCS-D-311

Date: MAY 2004

ADJACENT SCHOOL AND PLAYGROUND ZONE

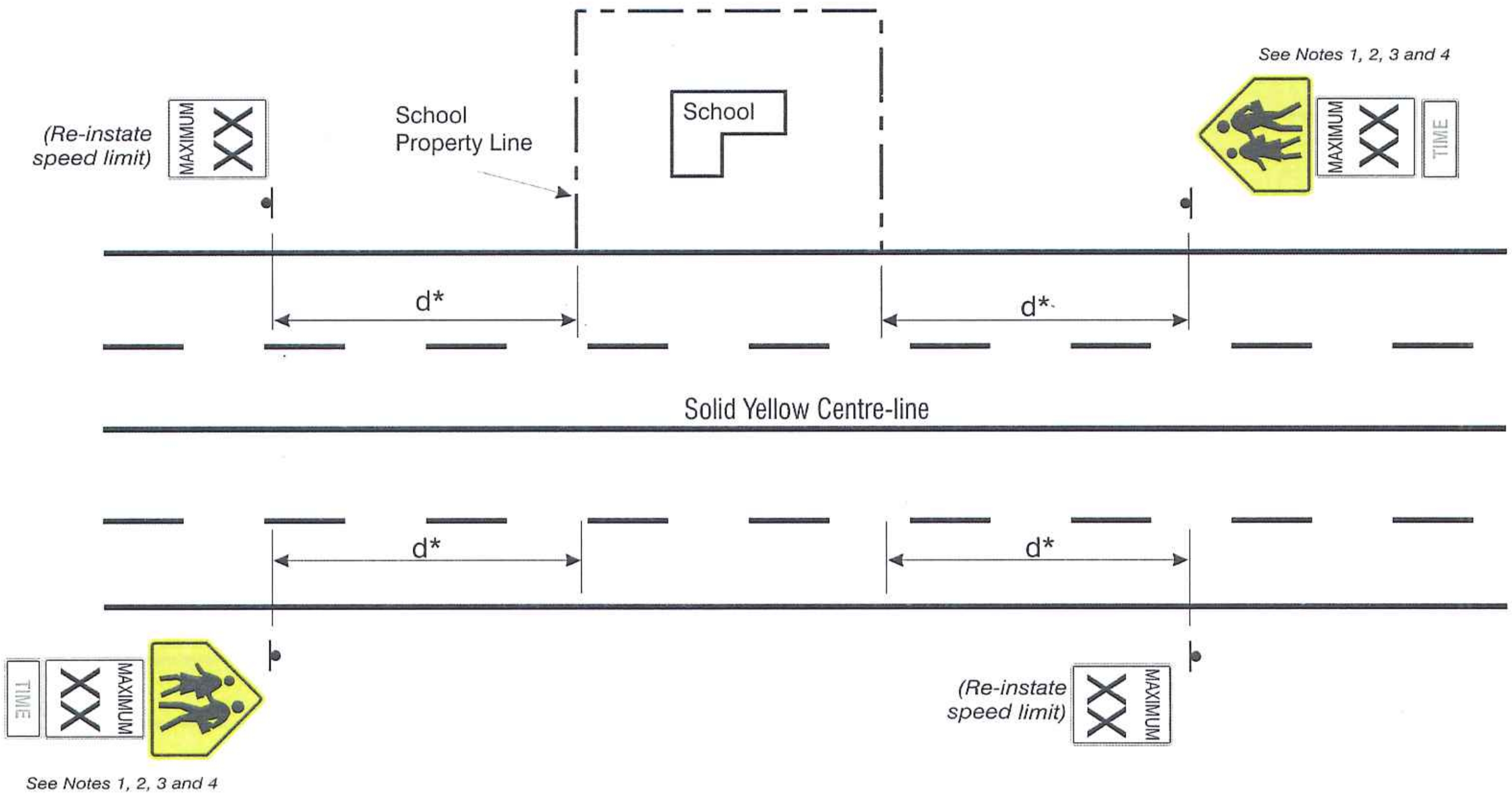
Prepared By: DP	Checked By: RD	Scale: N.T.S.	SECTION D3



Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law
Note 4: Illumination of RB-1 sign or flashing amber beacons may be used in place of a tab to indicate the Effective Times according to local traffic law

* Refer to Section 3.1.1.

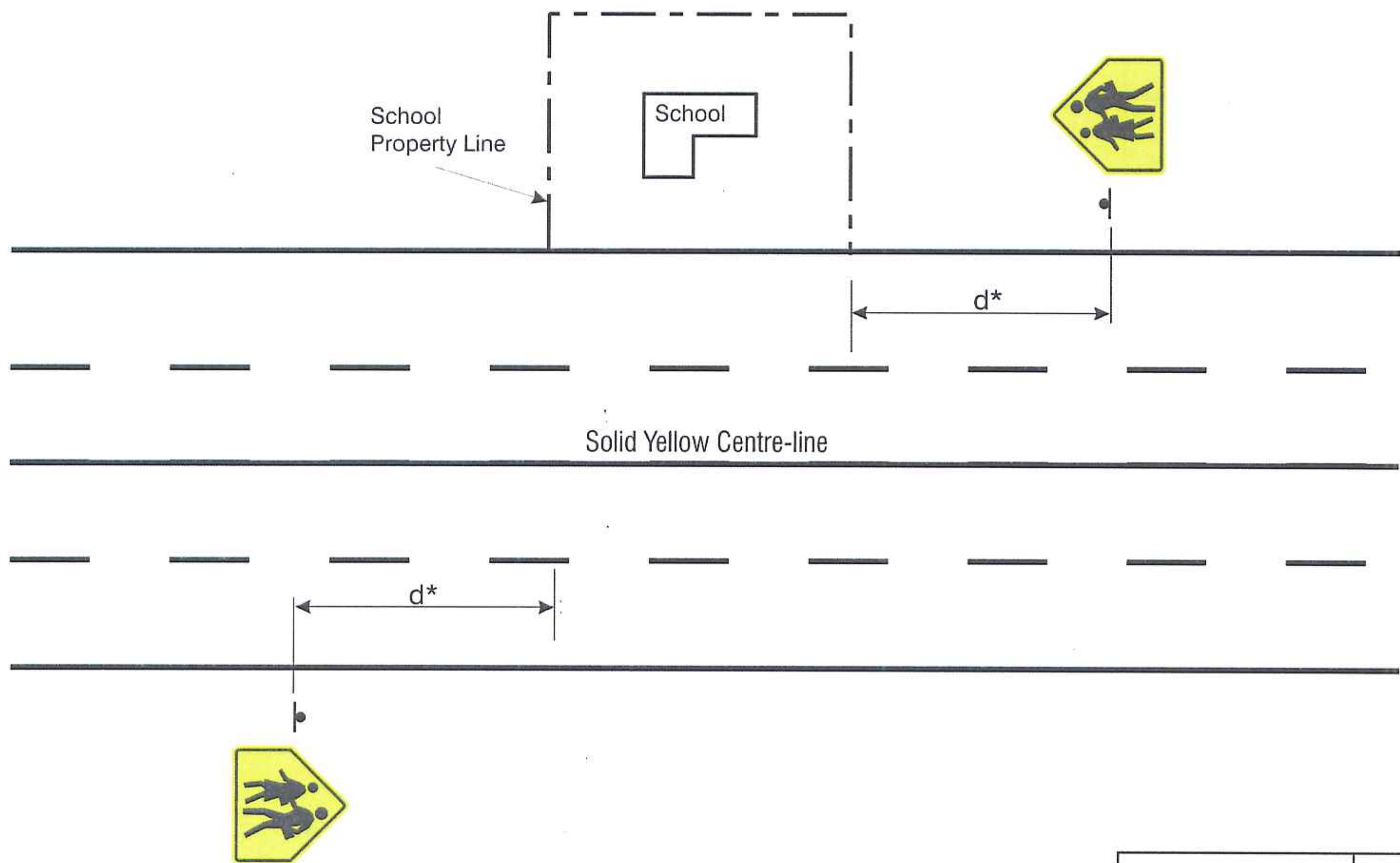
TAC ATC	DRAWING A1
	Date: OCT 2005
SCHOOL ZONE ON URBAN ROAD	



Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law
Note 4: Illumination of RB-1 sign or flashing amber beacons may be used in place of a tab to indicate the Effective Times according to local traffic law

* Refer to Section 3.1.1.

TAC ATC	DRAWING A1
	Date: OCT 2005
SCHOOL ZONE ON URBAN ROAD	

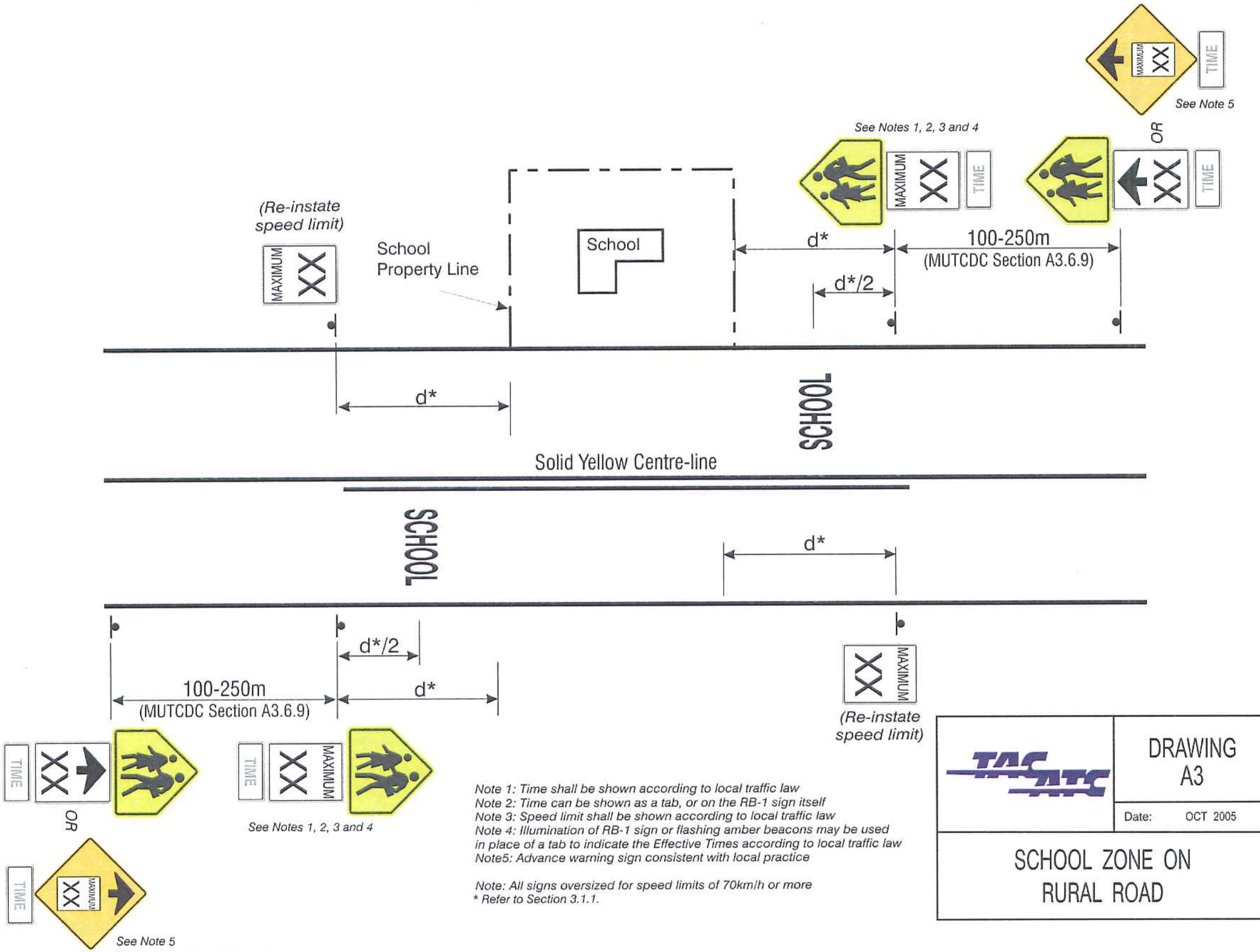


* Refer to Section 3.1.1.

DRAWING
A2

Date: OCT 2005

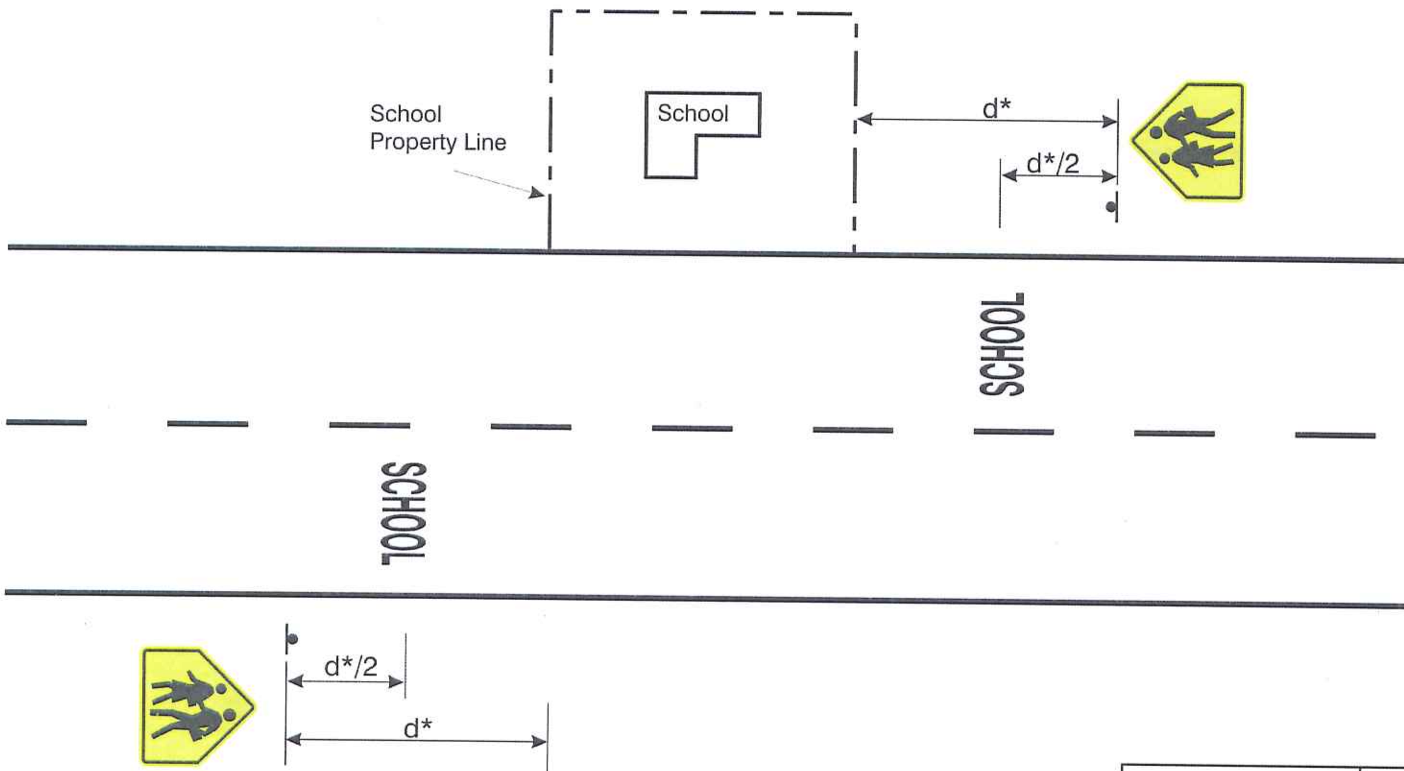
SCHOOL AREA ON
URBAN ROAD



Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law
Note 4: Illumination of RB-1 sign or flashing amber beacons may be used in place of a tab to indicate the Effective Times according to local traffic law
Note5: Advance warning sign consistent with local practice

Note: All signs oversized for speed limits of 70km/h or more
* Refer to Section 3.1.1.

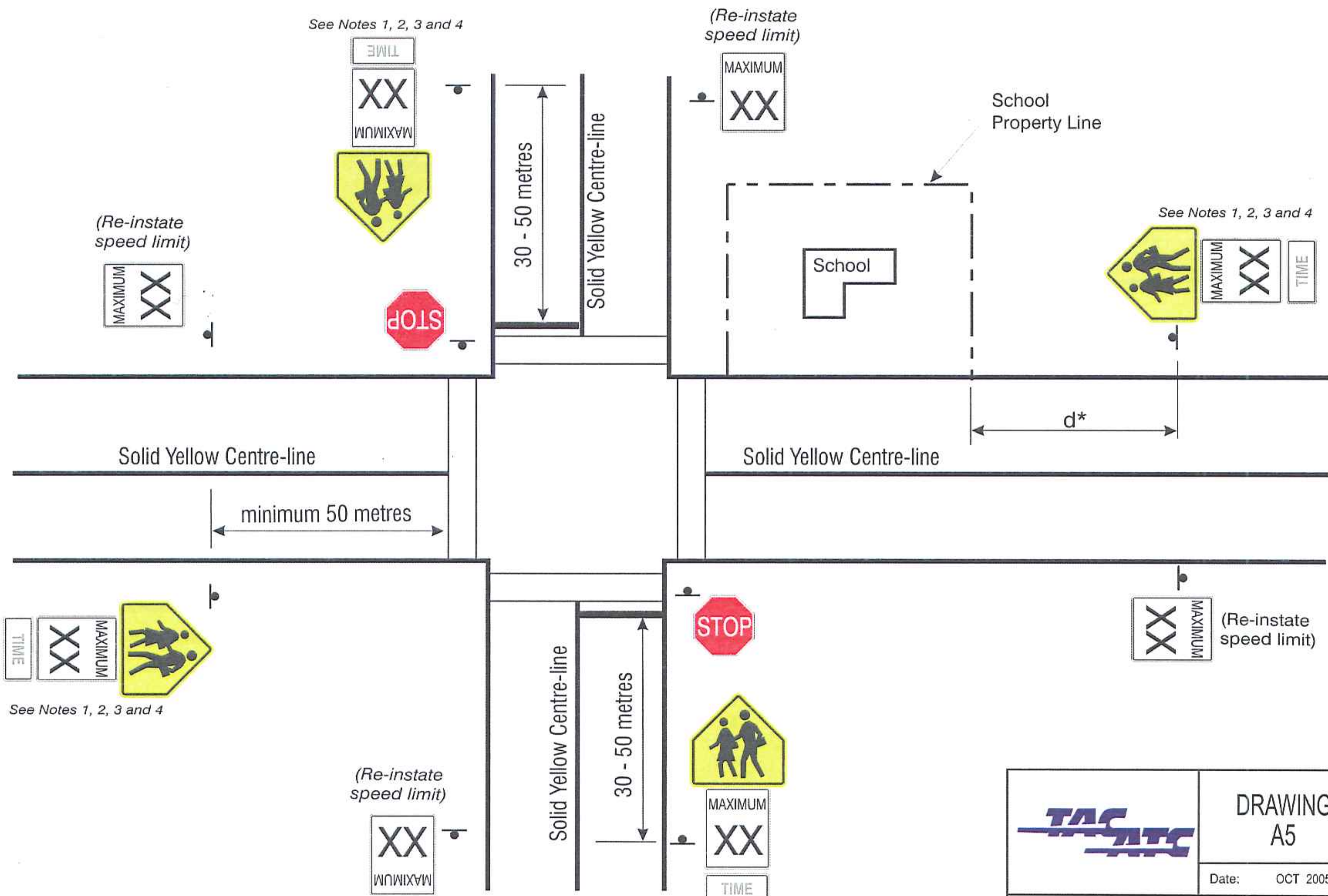
TAC ATC	DRAWING A3
	Date: OCT 2005
SCHOOL ZONE ON RURAL ROAD	



Note: All signs oversized for speed limits of 70km/h or more

* Refer to Section 3.1.1.

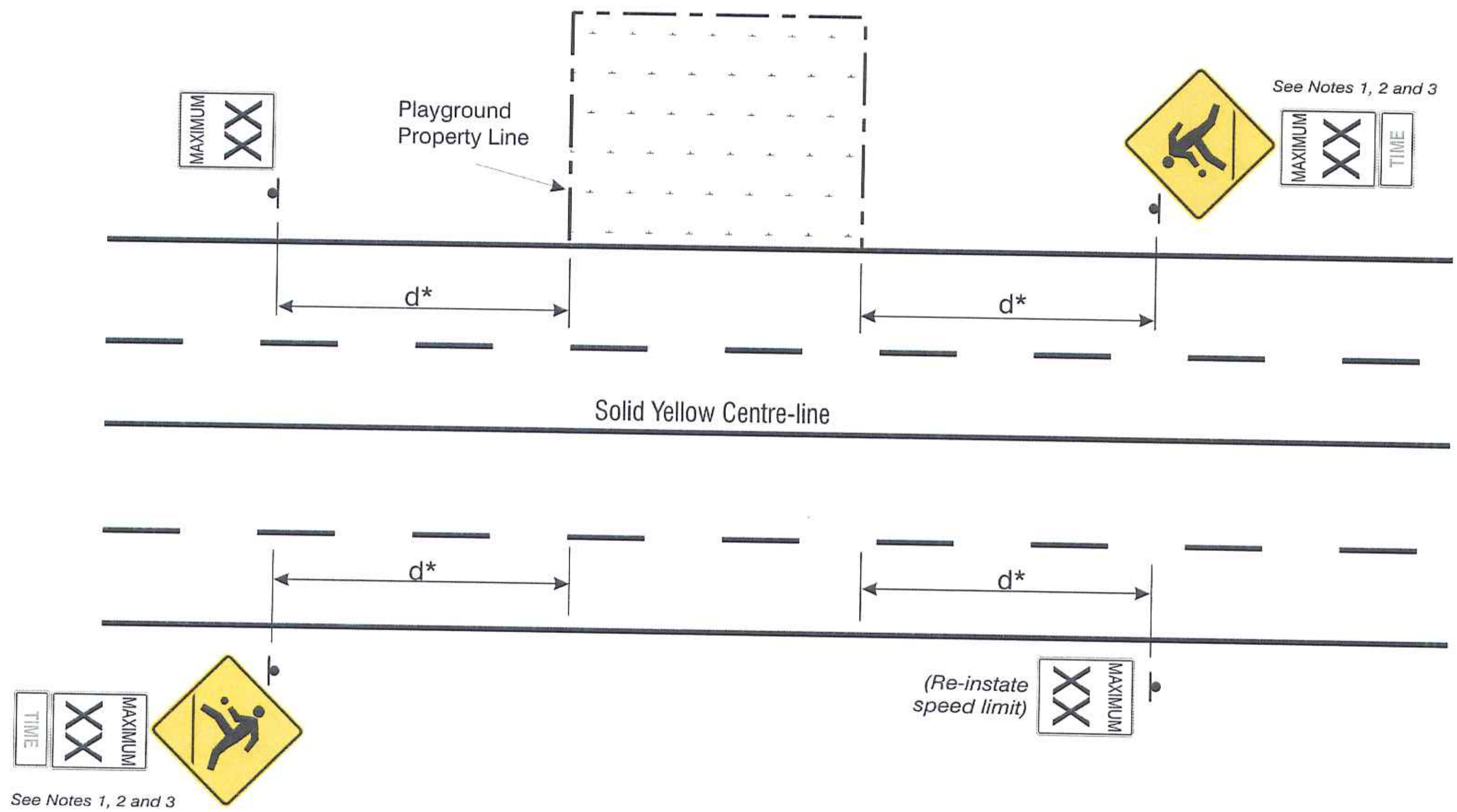
TAC ATC	DRAWING A4
	Date: OCT 2005
SCHOOL AREA ON RURAL ROAD	



Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law
Note 4: Illumination of RB-1 sign or flashing amber beacons may be used in place of a tab to indicate the Effective Times according to local traffic law

* Refer to Section 3.1.1.

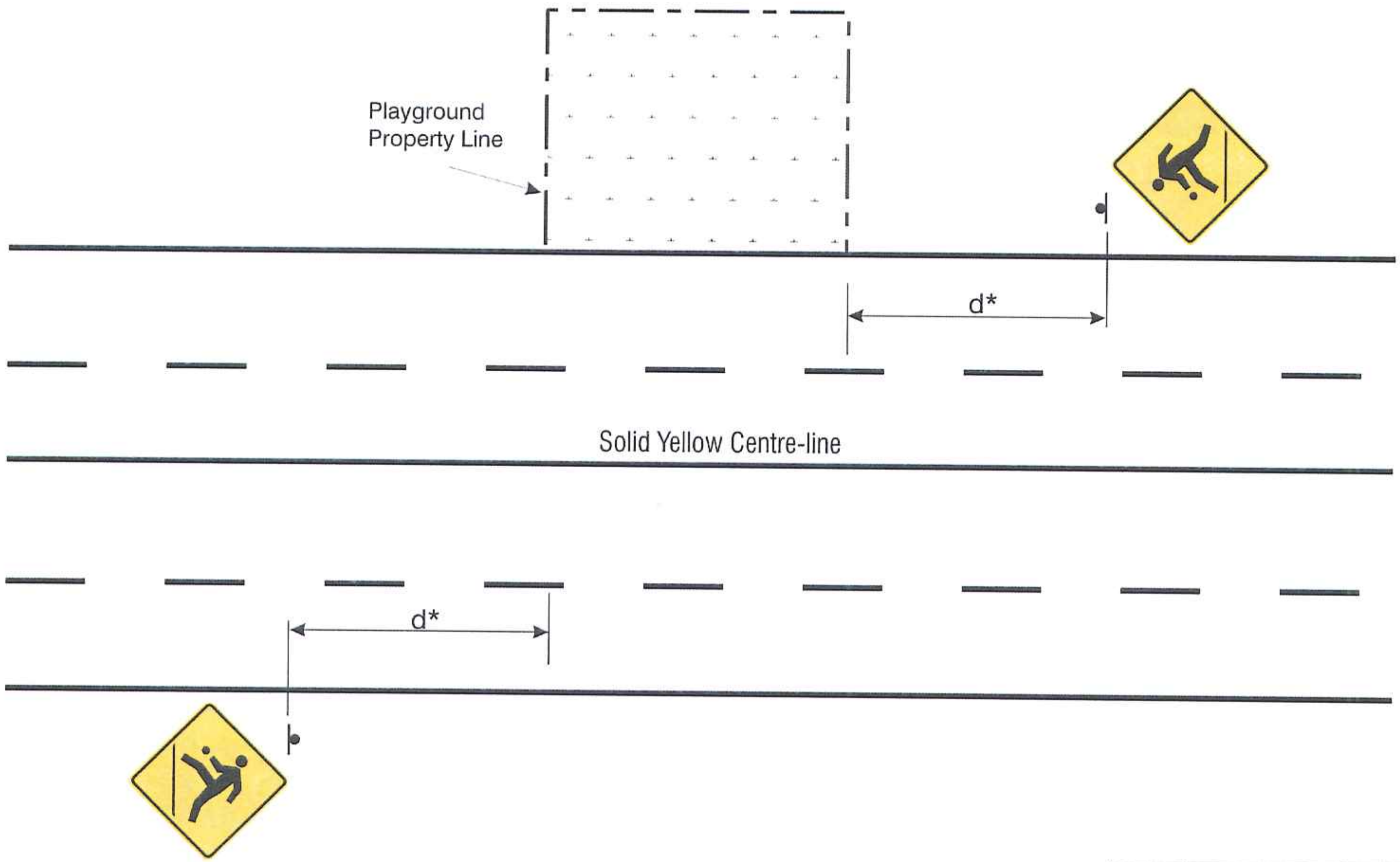
TAC ATC	DRAWING A5
	Date: OCT 2005
SCHOOL ZONE THROUGH INTERSECTION	



Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law

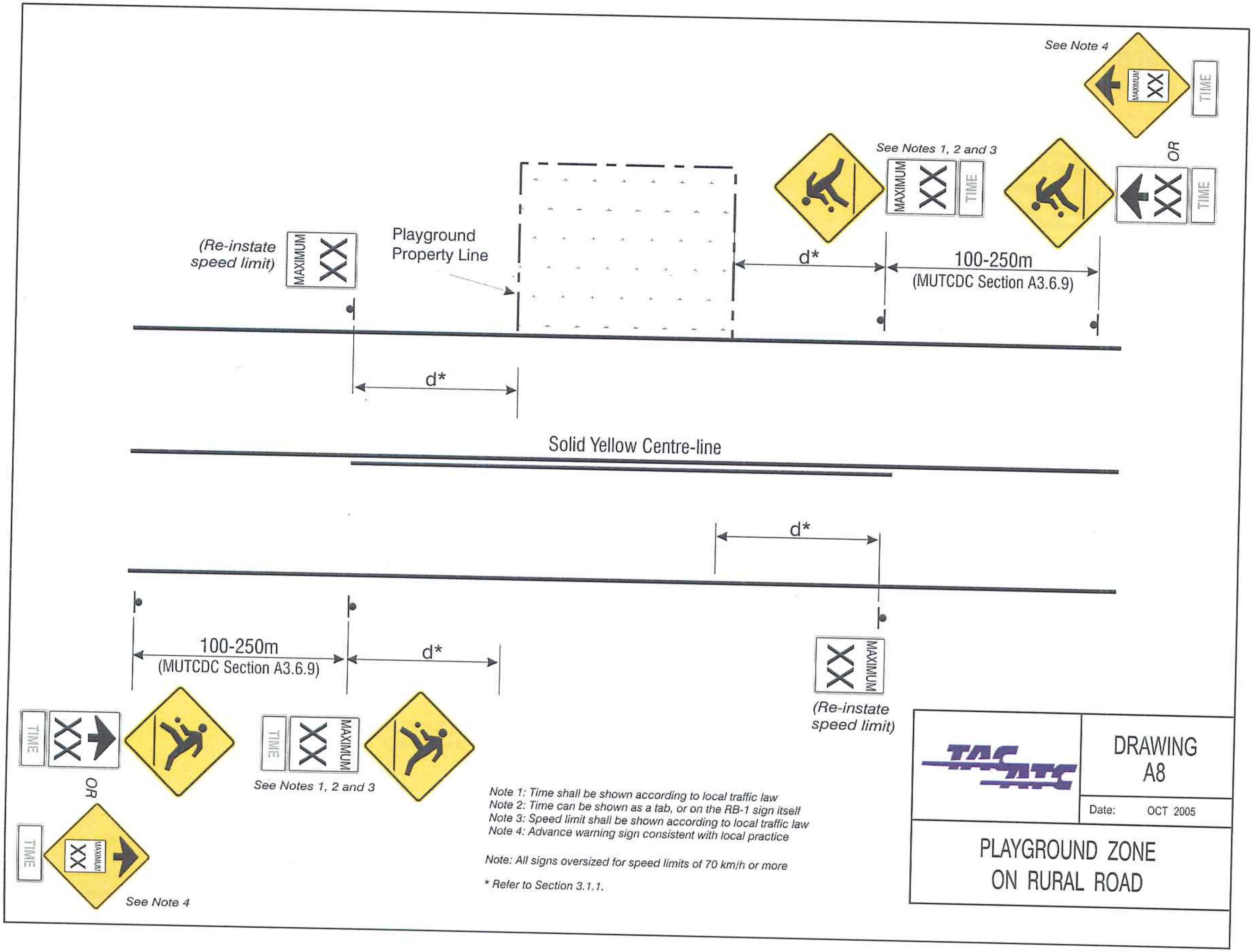
* Refer to Section 3.1.1.

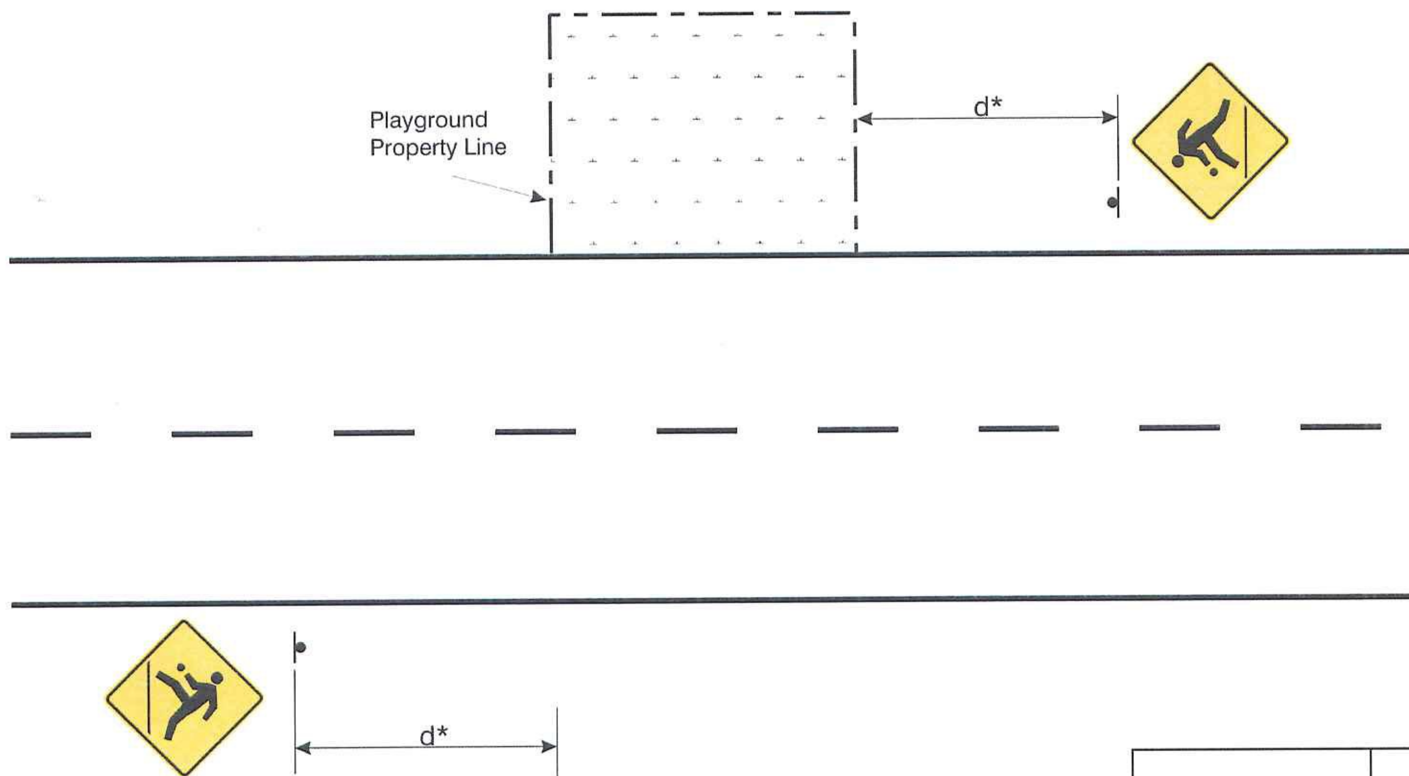
TAC ATC	DRAWING A6
	Date: OCT 2005
PLAYGROUND ZONE ON URBAN ROAD	



* Refer to Section 3.1.1.

TAC ATC	DRAWING A7
	Date: OCT 2005
PLAYGROUND AREA ON URBAN ROAD	

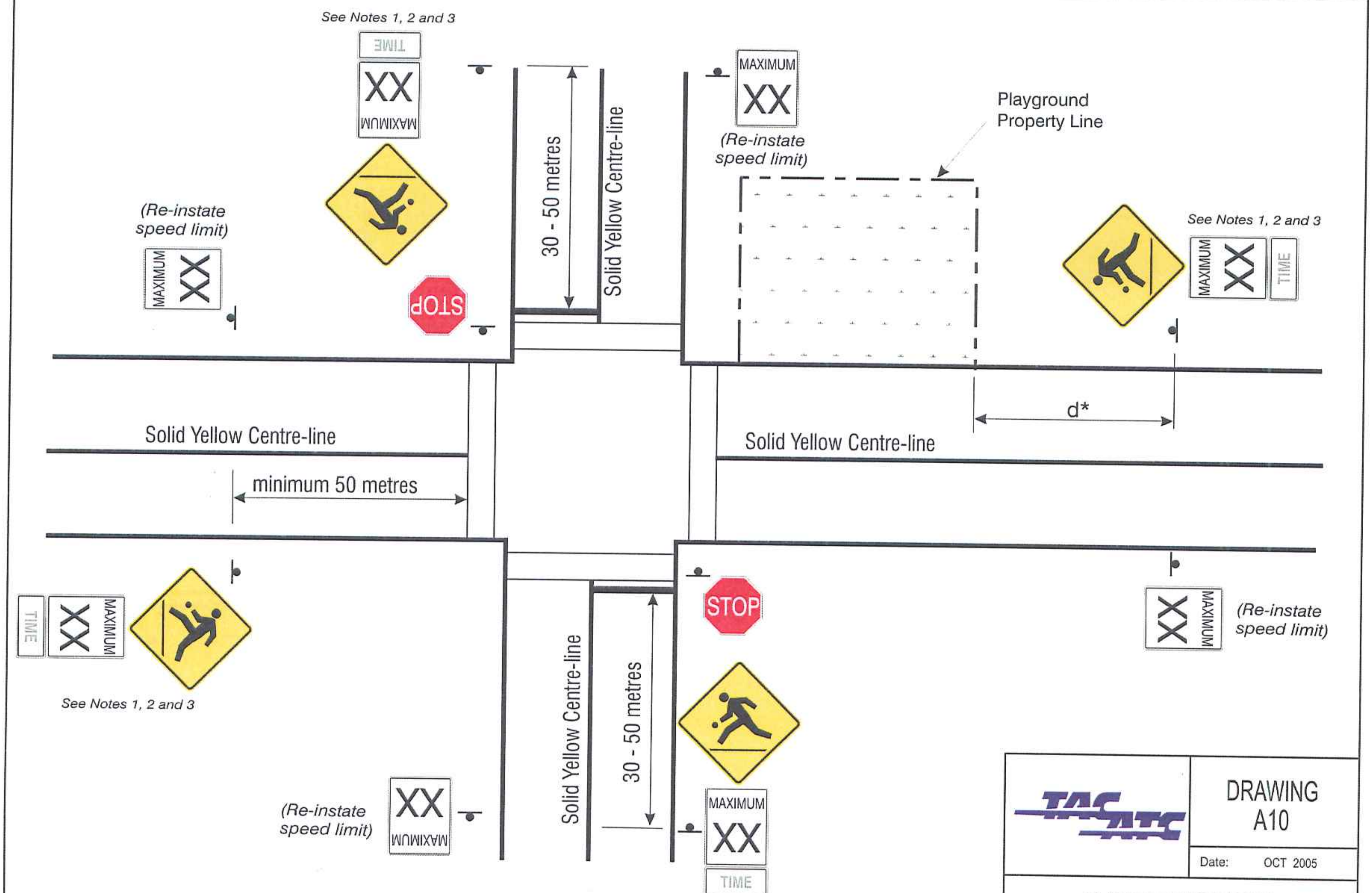

See Note 4
MAXIMUM
XX
TIME
OR
XX
TIME
See Notes 1, 2 and 3
MAXIMUM
XX
TIME
(Re-instate speed limit)
MAXIMUM
XX
Playground Property Line
d*
100-250m
(MUTCDC Section A3.6.9)
d*
Solid Yellow Centre-line
d*
100-250m
(MUTCDC Section A3.6.9)
d*
MAXIMUM
XX
(Re-instate speed limit)
XX
TIME
OR
MAXIMUM
XX
TIME
See Note 4
MAXIMUM
XX
TIME
See Notes 1, 2 and 3
Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law
Note 4: Advance warning sign consistent with local practice
Note: All signs oversized for speed limits of 70 km/h or more
* Refer to Section 3.1.1.
DRAWING A8
Date: OCT 2005
PLAYGROUND ZONE ON RURAL ROAD



Note: *All signs oversized for speed limits of 70 km/h or more*

* *Refer to Section 3.1.1.*

TAC ATC	DRAWING A9
	Date: OCT 2005
PLAYGROUND AREA ON RURAL ROAD	



Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law

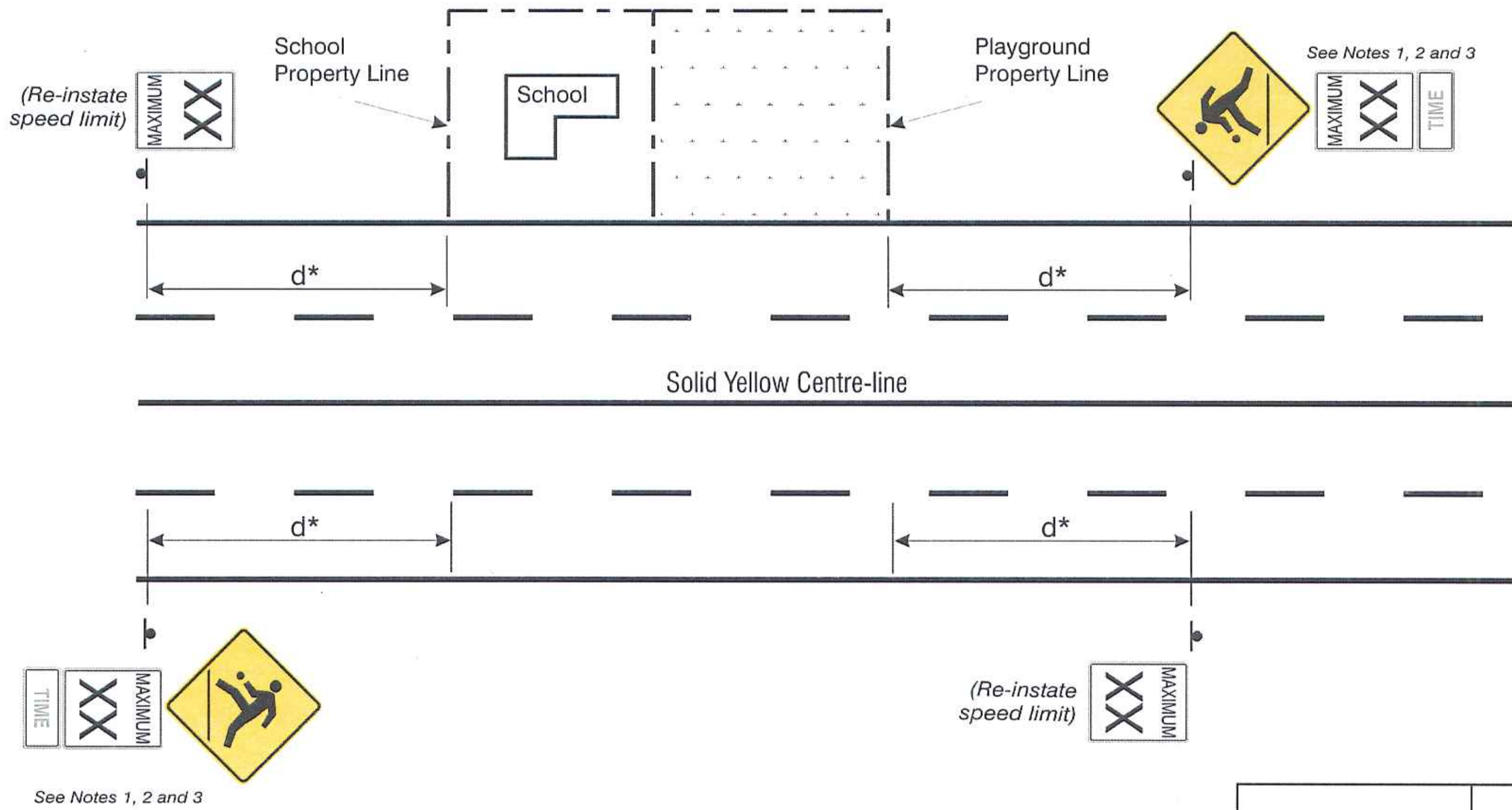
* Refer to Section 3.1.1.

TAC ATC

DRAWING A10

Date: OCT 2005

PLAYGROUND ZONE THROUGH INTERSECTION



TAC ATC

DRAWING A11

Date: OCT 2005

ADJACENT SCHOOL AND PLAYGROUND ZONE

Note 1: Time shall be shown according to local traffic law
Note 2: Time can be shown as a tab, or on the RB-1 sign itself
Note 3: Speed limit shall be shown according to local traffic law

** Refer to Section 3.1.1.*

Appendix I - Unit Rate Development

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

Asphalt (m^3 to Tonne) = 2.60
Granular (m^3 to Tonne) = 2.35
$1m^2$ = 0.0001 ha

Unit Rate Development

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.

Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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 8 Avenue Roadway Upgrade, per metre of Roadway =			$2,131.63			

Various Locations - Install Traffic Signals

Component	Quantity	Unit	Cost
Traffic Signals	1.00	int	$350,000.00
Total Cost of Traffic Signals, per Intersection =			$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

Component	Quantity	Unit	Cost	Unit Prices: 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

Component	Quantity	Unit	Cost	Unit Prices: 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
Project No: 2010-3050
Date: April 14, 2011

Asphalt (m^3 to Tonne) =	2.60	
Granular (m^3 to Tonne) =	2.35	
$1m^2$ =	0.0001	ha

Unit Rate Development

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 Roadway Upgrade, per metre 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 Marking, per On-Street Parallel Parking 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.
Assumed: Same pavement structure as Collector roads. 13.0m solid white lines for each parking 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
Total Cost to Install Parking Control 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
Total Cost of Repaving, per meter of Roadway =			$826.61			

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

Asphalt (m^3 to Tonne) = 2.60
Granular (m^3 to Tonne) = 2.35
$1m^2$ = 0.0001 ha

Unit Rate Development

19 Street Crosswalk - Provide Pavement Marking and Signage

Component	Quantity	Unit	Cost	Unit Prices: 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 Marking and Signage at 19 Street 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).

Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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
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).

Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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
Project No: 2010-3050
Date: April 14, 2011

Asphalt (m^3 to Tonne) = 2.60
Granular (m^3 to Tonne) = 2.35
$1m^2$ = 0.0001 ha

Unit Rate Development

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	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	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 Pavement 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
Project No: 2010-3050
Date: April 14, 2011

Asphalt (m^3 to Tonne) = 2.60
Granular (m^3 to Tonne) = 2.35
1m^2 = 0.0001 ha

Unit Rate Development

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 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).

				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						
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 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 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 Repaving, per meter of Roadway =		$959.12			

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

Asphalt (m^3 to Tonne) = 2.60
Granular (m^3 to Tonne) = 2.35
$1m^2$ = 0.0001 ha

Unit Rate Development

8 Street (16 Avenue to 75 Avenue) - Upgrade Roadway

Build pavement structure to Collector standard.
Assumed: Existing pavement width = 10.0m (from MESS).

Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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	lm
Total Cost for 8 Street Roadway Upgrade, per metre of Roadway =			$1,208.12			

20 Avenue (12 Street to 8 Street) - Build Roadway

Build out as per 20-year Horizon

Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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 =			$965.62			

Lakeshore Drive - Install Parking Control Signs

Component	Quantity	Unit	Cost	Unit Prices: 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
Total Cost to Install Parking Control 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).

Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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			

Lakeshore Drive - Improve Pedestrian Crosswalks

Component	Quantity	Unit	Cost	Unit Prices: 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
Project No: 2010-3050
Date: April 14, 2011

Asphalt (m^3 to Tonne) =	2.60	
Granular (m^3 to Tonne) =	2.35	
$1m^2$ =	0.0001	ha

Unit Rate Development

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 Roadway Upgrade, per metre 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						
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 Avenue 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.

				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 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 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
Project No: 2010-3050
Date: April 14, 2011

Asphalt (m^3 to Tonne) =	2.60	
Granular (m^3 to Tonne) =	2.35	
$1m^2$ =	0.0001	ha

Unit Rate Development

52 Avenue (57 Street to Highway 28) - Roadway Upgrade

Widen to provide 2 lanes in each direction.

Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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 Avenue Roadway Upgrade, per metre of Roadway =			$1,161.39			

51 Avenue (56 Street to Service Road) - Relocate Crosswalk

Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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.

Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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 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.

Pavement Component - 1.0m Section of Roadway	Quantity	Unit	Cost	Unit Prices: 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 Centre Avenue Roadway Upgrade, per metre of Roadway =			$1,258.04			

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

Asphalt (m^3 to Tonne) =	2.60	
Granular (m^3 to Tonne) =	2.35	
$1m^2$ =	0.0001	ha

Unit Rate Development

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 Pavement Marking Lines, per Angle Parking 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 Repaint 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 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	lm	$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 Highway 28 and 43 Avenue Improvements =			$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	lm
Total Cost for 43 Avenue Roadway Upgrade, per meter of Roadway =			$1,898.57			

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

Asphalt (m^3 to Tonne) = 2.60
Granular (m^3 to Tonne) = 2.35
$1m^2$ = 0.0001 ha

Unit Rate Development

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 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		
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	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						
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 Kingsway Roadway Upgrade, per metre of Roadway =			$3,104.14			

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

Asphalt (m^3 to Tonne) =	2.60	
Granular (m^3 to Tonne) =	2.35	
$1m^2$ =	0.0001	ha

Unit Rate Development

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	**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 Glenwood Roadway Upgrade, per metre of Roadway =			$2,214.01			

Technical Memorandum

City of Cold Lake

Cold Lake Transportation Study Traffic Volume Forecast and Analysis

April 2011

Table of Contents

Appendix B - Traffic Demand Forecast Work Plan

Appendix C - Gravity Model (Trip Distribution) Calculations

Appendix D - Capacity Analysis

List of Tables

List of Figures

1 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

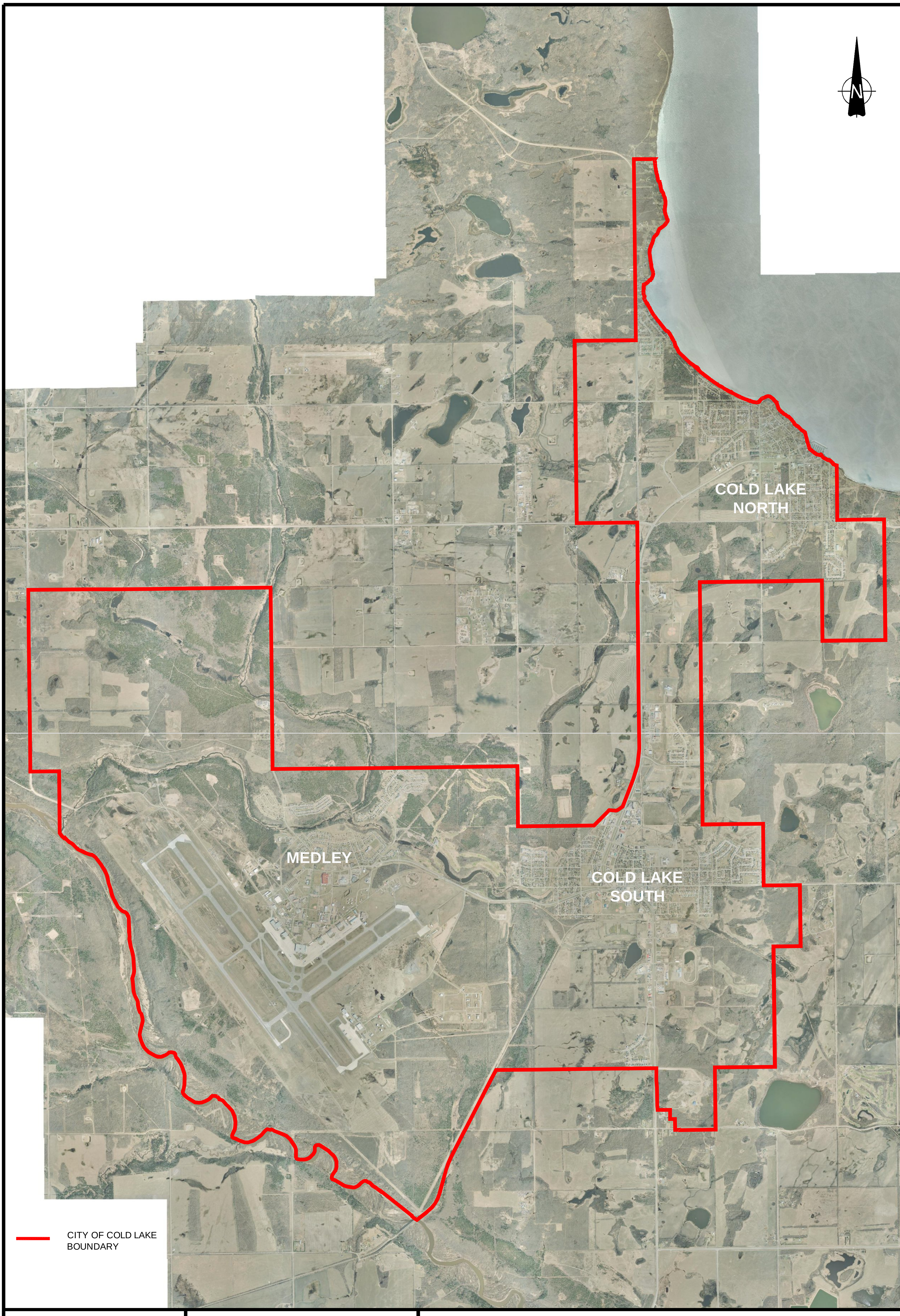
The objectives for the traffic volume forecast and analysis were:

- 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.

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.



Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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

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FIGURE 3.2
5 YEAR (2015) DAILY BACKGROUND TRAFFIC VOLUMES

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DATE: APRIL 2011
APPROVED:
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CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 3.3
10 YEAR (2020) DAILY BACKGROUND TRAFFIC VOLUMES

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DATE: APRIL 2011
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DWG NO:

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FIGURE 3.4
15 YEAR (2025) DAILY BACKGROUND TRAFFIC VOLUMES

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SCALE: NTS
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FIGURE 3.5
20 YEAR (2030) DAILY BACKGROUND TRAFFIC VOLUMES

4 Traffic Forecast: Future Development Traffic Volumes

4.1 FUTURE DEVELOPMENTS

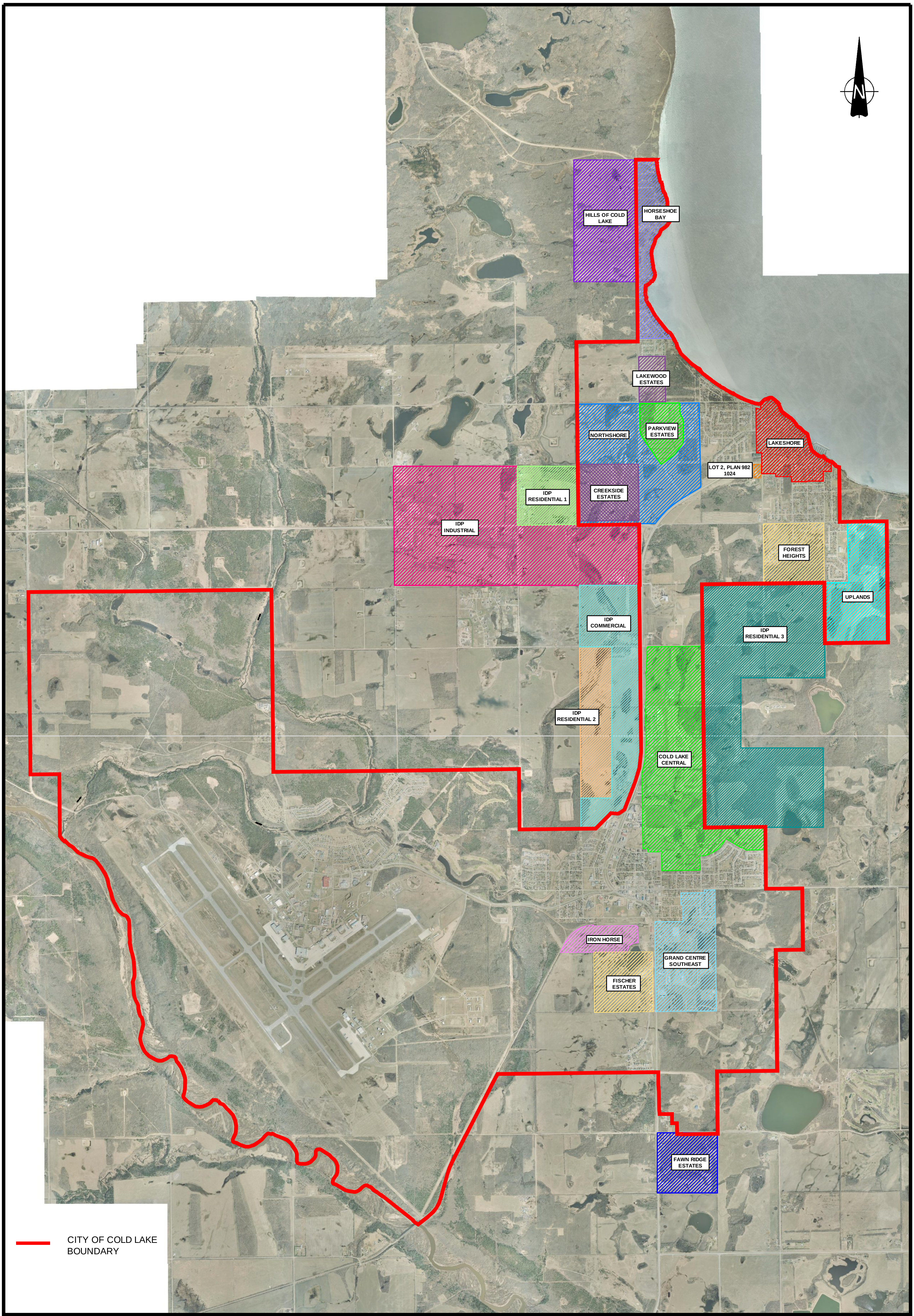
There are 20 development/redevelopment projects identified for the City and surrounding area in the next 20 years; 13 are located within the City and seven are located outside the City, in the MD of Bonnyville. The development/redevelopment projects are shown in Figure 4.1 and are discussed in the following 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 ¼ 22-63-2-4)
- **Parkview Estates**: 36.8 hectares located in Cold Lake North (NW 23-63-2-4).



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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.

Table 4-1
Development Phasing Assumption

Development / Redevelopment	Land Use	5-year (2015) Horizon	10-year (2020) Horizon	15-year (2025) Horizon	20-year (2030) Horizon
Fischer Estates	Residential	0%	0%	25%	50%
	Commercial	0%	0%	25%	50%
Iron Horse	Residential	0%	0%	25%	50%
Cold Lake Central	Residential	25%	50%	75%	100%
	Commercial	50%	100%	100%	100%
Grand Centre Southeast	Residential	25%	50%	75%	100%
	Industrial	25%	50%	75%	100%
Forest Heights	Residential	0%	0%	25%	50%
Northshore	Residential	25%	50%	75%	100%
	Commercial	25%	50%	75%	100%
	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%
Uplands	Residential	25%	50%	75%	100%
	Health Services & Mixed Use	25%	50%	75%	100%
Lakeshore Area Redevelopment	All	25%	50%	75%	100%

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%
Parkview Estates	Residential	25%	50%	75%	100%
	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.

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

1 hectare = 107,639.1 sq.ft.
1 hectare = 2.4711 acre

Table 4.2 Future Developments Trip Generation

Trip Generation - ITE Trip Generation Handbook

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Fischer	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
	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
	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
						Total Dwelling Units	**744**						**Total Trips:**	**884**	**470**	**415**	**992**	**458**	**534**
						Total Commercial/Industrial (1000 sq.ft)	**313**												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Iron Horse	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
	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**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Cold Lake Central Area	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
	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
	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
						Total 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**												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Grand Centre SE	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
	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
						Total Dwelling Units	**431**						**Total Trips:**	**559**	**301**	**258**	**694**	**296**	**398**
						Total Commercial/Industrial (1000 sq.ft)	**380.1**												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Forest 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
	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**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Northshore	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 Use 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
		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
	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
		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
						Total Dwelling Units	**1,716**						**Total Trips:**	**3,516**	**2,229**	**1,286**	**3,394**	**1,305**	**2,089**
						Total Commercial/Instutional (1000 sq.ft)	**1,338.5**												
						School Site (Students)	**1,958**												

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%

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

1 hectare = 107,639.1 sq.ft.
1 hectare = 2.4711 acre

Table 4.2 Future Developments Trip Generation

Trip Generation - ITE Trip Generation Handbook

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	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	23%	77%	23	19	4	27	6	21
						Total Commercial/Industrial (1000 sq.ft)	15.4						**Total Trips:**	**23**	**19**	**4**	**27**	**6**	**21**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	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	63%	37%	39	10	29	49	31	18
						Total Dwelling Units	42						**Total Trips:**	**39**	**10**	**29**	**49**	**31**	**18**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Uplands	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
	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
	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
						Total Dwelling Units	1,384						**Total Trips:**	**926**	**246**	**680**	**1,108**	**689**	**419**
						Total Health Care & Mixed Use (1000 sq.ft)	269.1												

3. Maximum site coverage for Health Care & Mixed Use assumed to be 50%
4. AM directional split for Nursing Home, by 1000 sq. ft., not available. Assume reverse of PM directional split

TO SUBTRACT

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Lakeshore ARP	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	23%	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	23%	77%	6	5	1	7	2	6
	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
	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
	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
						Total Commercial (1000 sq.ft)	27.7						**Total Trips:**	**464**	**246**	**218**	**94**	**33**	**61**
						Total Fire Hall / Community Hall (1000 sq.ft)	18.4												

5. For Fire Hall, assumed same trip rate as future community centre. Trips will remain the same essentially.

TO ADD

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Lakeshore ARP	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	67%	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	58%	42%	4	1	3	6	3	2
	904 10 Street	9	du	**223:** Mid-Rise Apartment	-	Dwelling Units	9	0.3	31%	69%	0.39	58%	42%	3	1	2	4	2	2
	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
	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
	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
	Fire Hall / Community Hall	0.34	hec	**495:** Recreational Community Center [8]	50%	1000 sq.ft	18.4	22.88	50%	50%	10 % of All Day			422	211	211	42	21	21
						Total Dwelling Units	80						**Total Trips:**	**475**	**225**	**251**	**90**	**51**	**38**
						Total City Park (Acres)	3.8												
						Total Fire Hall / Community Hall (1000 sq.ft)	18.4												

6. Average rate used instead of equation since equation results in negative trip values.
7. Trip rate for park is for all-day, weekday. PM trips assumed to be 10% of all-day trips (presented under AM Trips)
8. Trip rate for community centre is for all-day, weekday. PM trips assumed to be 10% of all-day trips (presented under AM Trips). To be used for special events only.

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Lakewood	Low Density Residential	153	du	**210:** Single Family Residential	-	Dwelling Units	153	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	117	29	87	157	99	58
						Total Dwelling Units	153						**Total Trips:**	**117**	**29**	**87**	**157**	**99**	**58**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data						Trips (T)					
								AM Peak			PM Peak			AM Peak			PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
Creekside	Low Density Residential	594	du	**210:** Single Family Residential	-	Dwelling Units	594	T = 0.70X + 9.43	25%	75%	Ln(T) = 0.90Ln(X) + 0.53	63%	37%	425	106	319	533	336	197
	Medium Density Residential	196	du	**230:** Residential Condo/Townhouse	-	Dwelling Units	196	Ln(T) = 0.80Ln(X) + 0.26	17%	83%	Ln(T) = 0.82Ln(X) + 0.32	67%	33%	88	15	73	104	70	34
						Total Dwelling Units	790						**Total Trips:**	**514**	**121**	**392**	**637**	**406**	**232**

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

1 hectare =	107,639.1	sq.ft.
1 hectare =	2.4711	acre

Table 4.2 Future Developments Trip Generation

Trip Generation - ITE Trip Generation Handbook

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						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
	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
						Total Dwelling Units	367						**Total Trips:**	**467**	**236**	**232**	**553**	**265**	**288**
						Total Commercial/Industrial (1000 sq.ft)	141.7												

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% 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
						Total Dwelling Units	300						**Total Trips:**	**219**	**55**	**165**	**288**	**182**	**107**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	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
						Total Dwelling Units	54						**Total Trips:**	**42**	**11**	**31**	**55**	**35**	**20**

9. Information, including dwelling units, trip generation rates and percentage splits, as per 2010 TIA

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% 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
						Total Dwelling Units	519						**Total Trips:**	**310**	**69**	**241**	**395**	**254**	**141**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						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
						Total Dwelling Units	696						**Total Trips:**	**405**	**91**	**314**	**510**	**328**	**183**

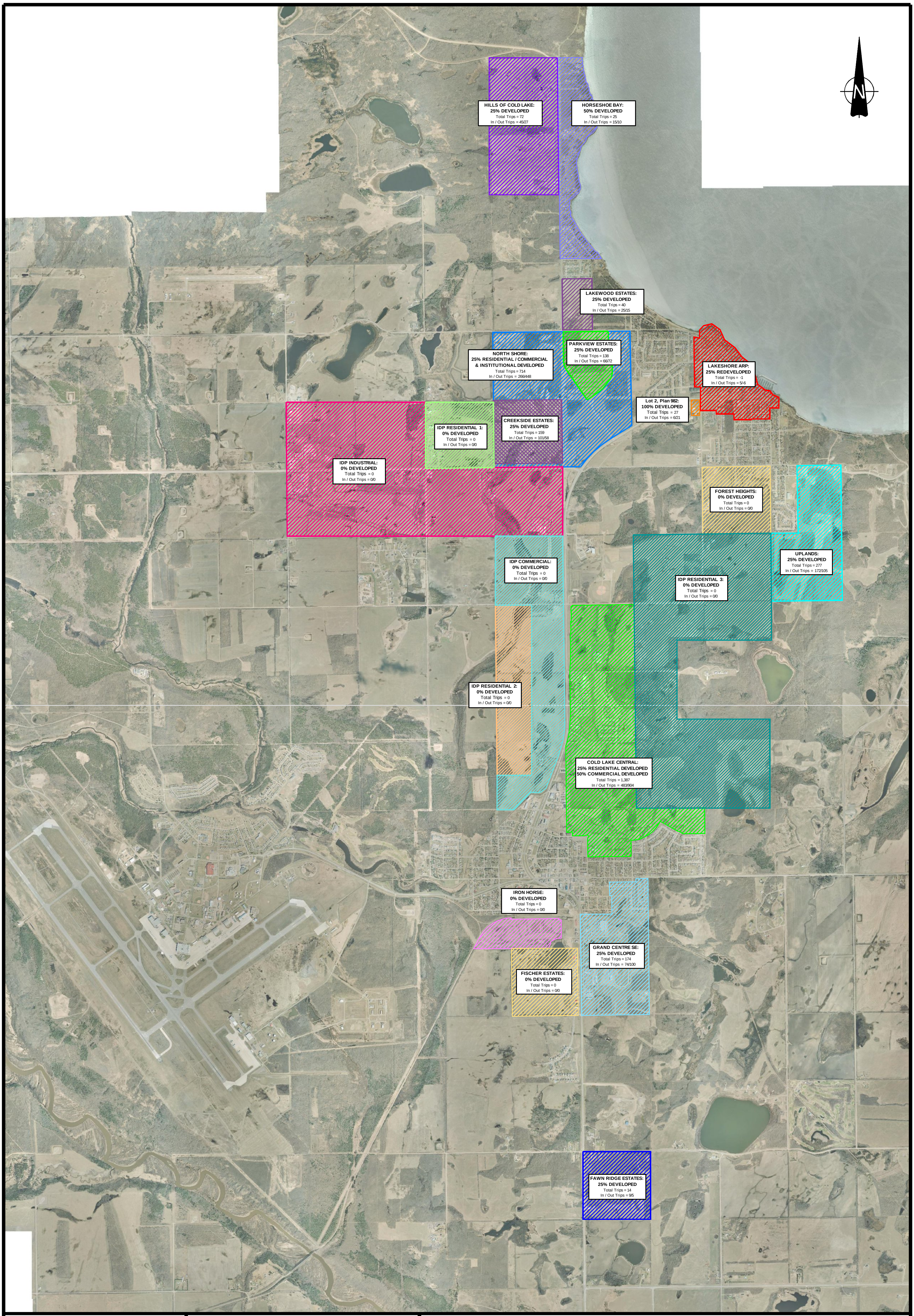
Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						Description	Units (X)	Equation or Average Rate	% Inbound	% Outbound	Equation or Average Rate	% Inbound	% Outbound	Total	In	Out	Total	In	Out
IDP - Residential 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	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
						Total Dwelling Units	3,447						**Total Trips:**	**1,792**	**411**	**1,381**	**2,077**	**1,331**	**746**

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						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
						Total Commercial/Industrial (1000 sq.ft)	2,109						**Total Trips:**	**1,079**	**885**	**194**	**1,666**	**350**	**1,316**

10. Maximum site coverage for IDP - Industial Developments assumed to be 25%

Development	Description	# of	Unit	Land Use Description	Maximum Lot Coverage	Independent Variable		ITE Data: AM Peak			ITE Data: PM Peak			Trips (T): AM Peak			Trips (T): PM Peak		
						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
						Total Commercial/Industrial (1000 sq.ft)	1,271						**Total Trips:**	**1,727**	**1,451**	**276**	**1,565**	**360**	**1,205**

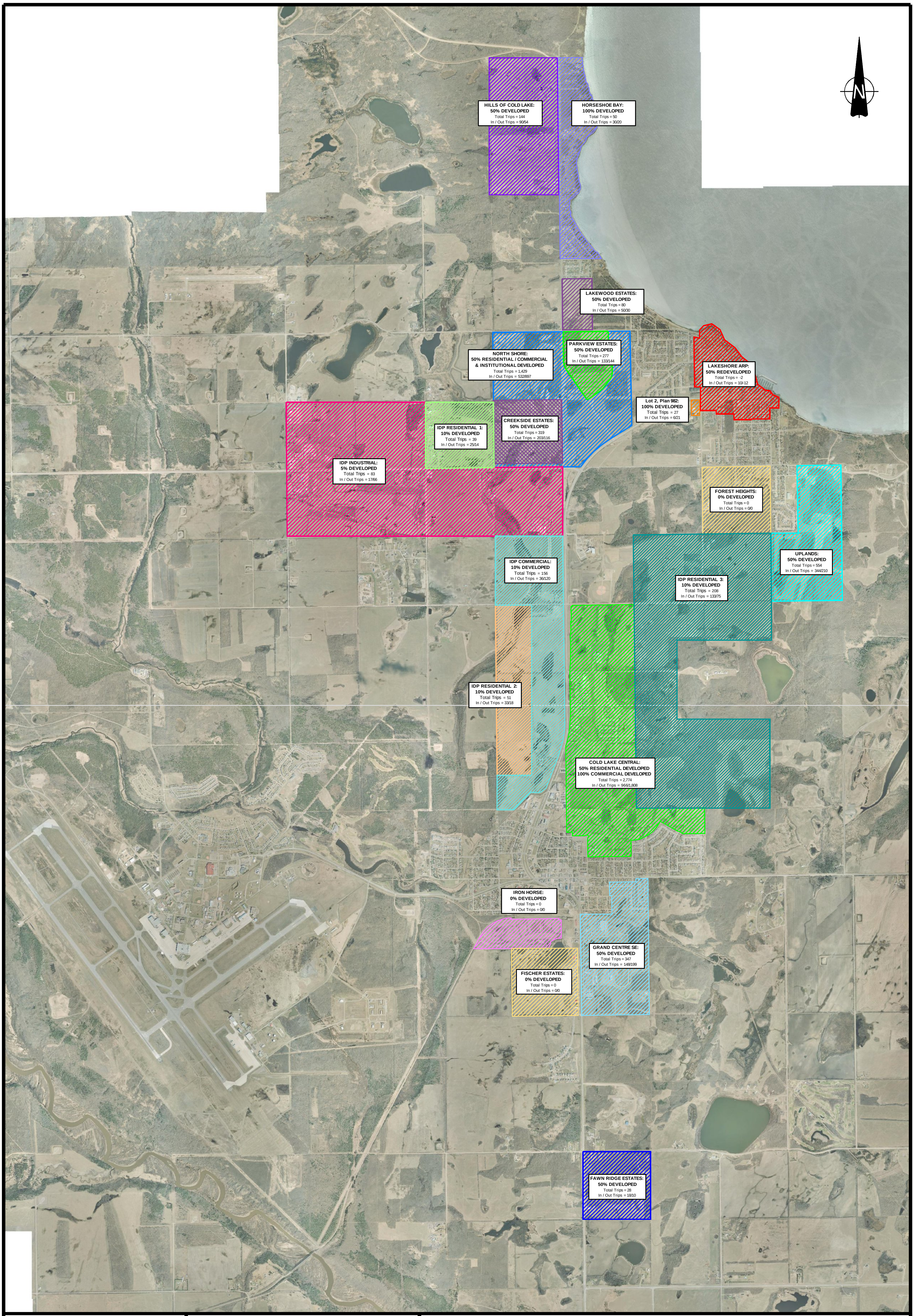
11. Maximum site coverage for IDP - Industial Developments assumed to be 25%



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

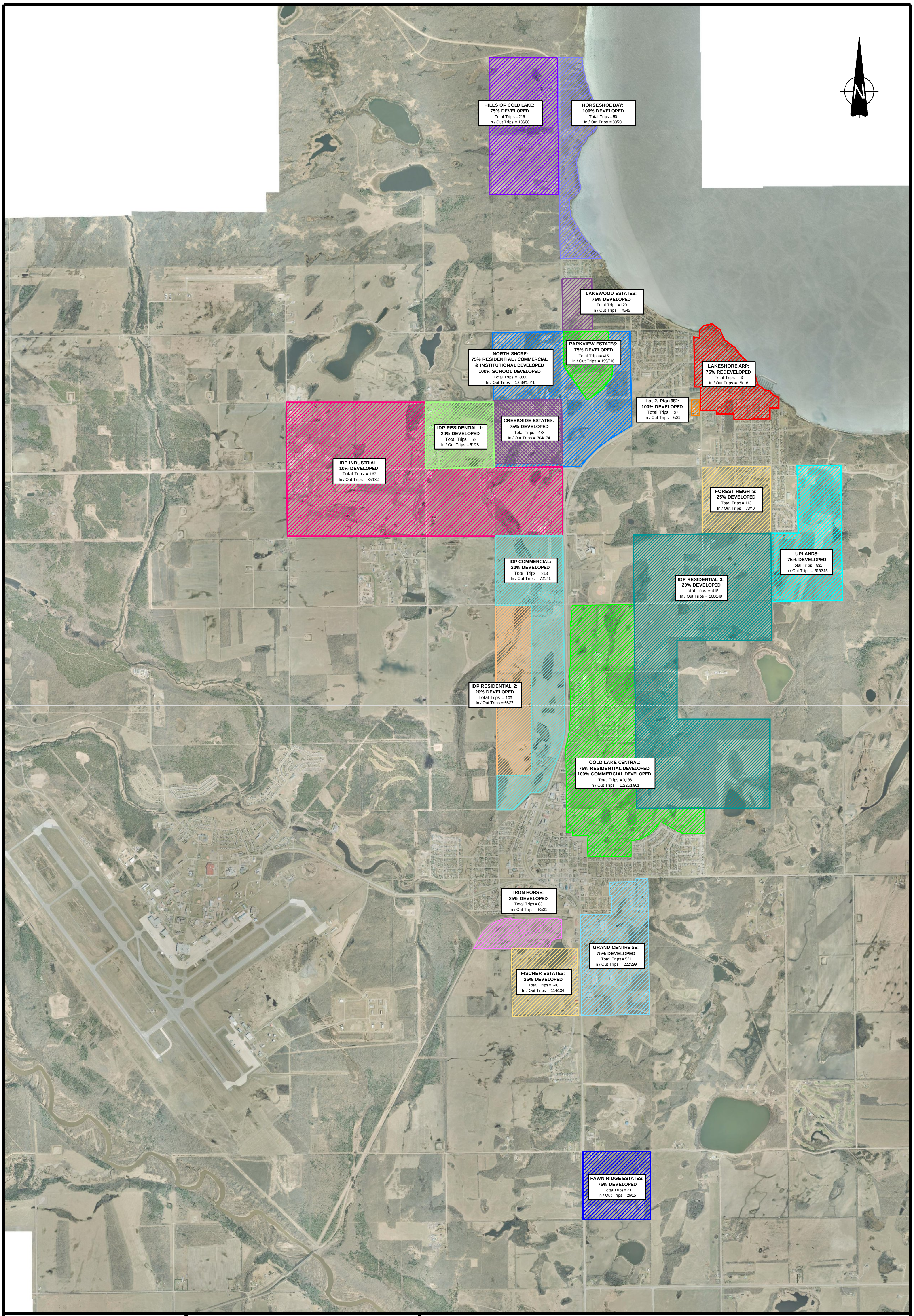
FIGURE 4.2
5 YEAR (2015) TRIP GENERATION FROM PLANNED DEVELOPMENT
PM PEAK



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

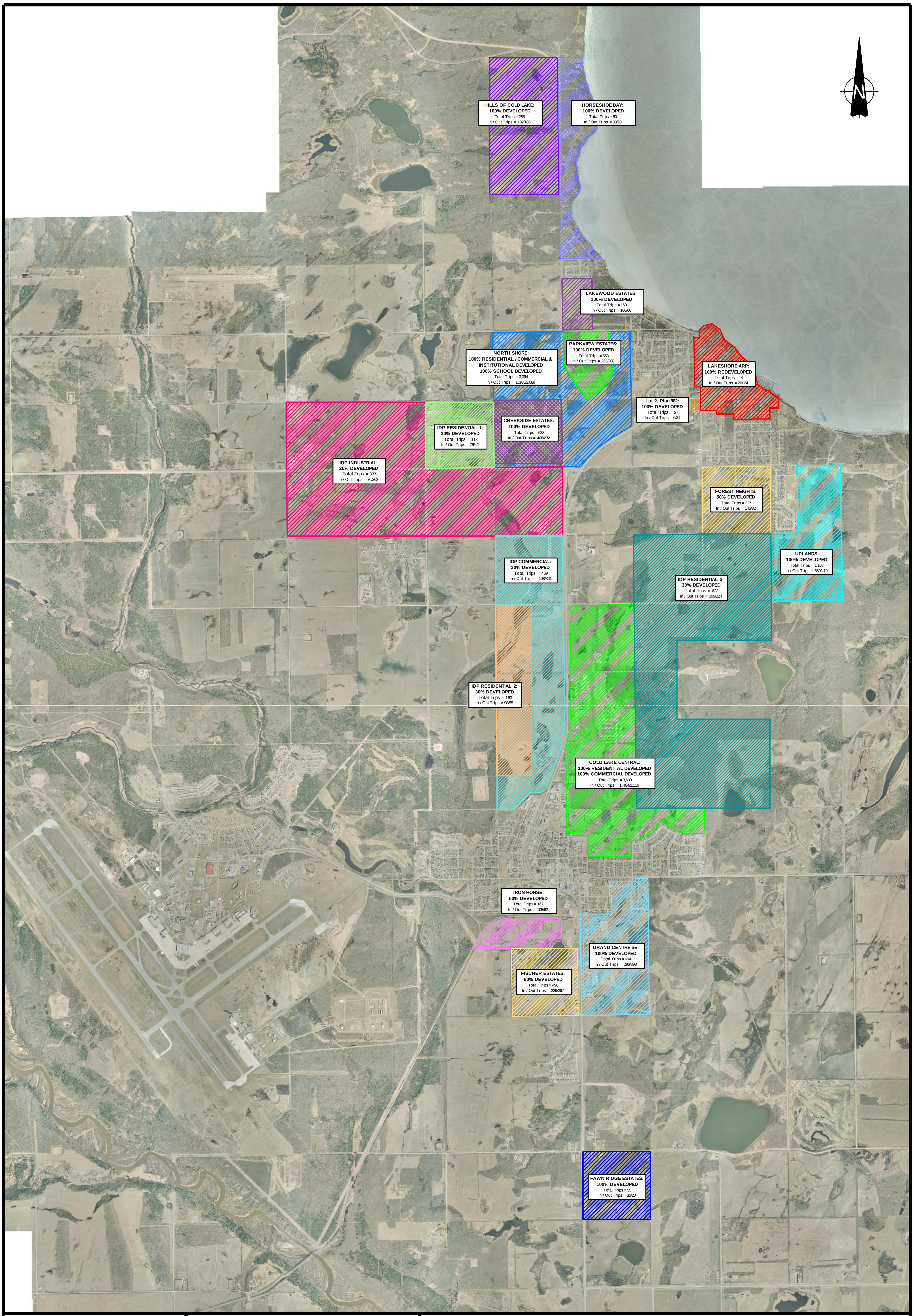
FIGURE 4.3
10 YEAR (2020) TRIP GENERATION FROM PLANNED DEVELOPMENT
PM PEAK



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

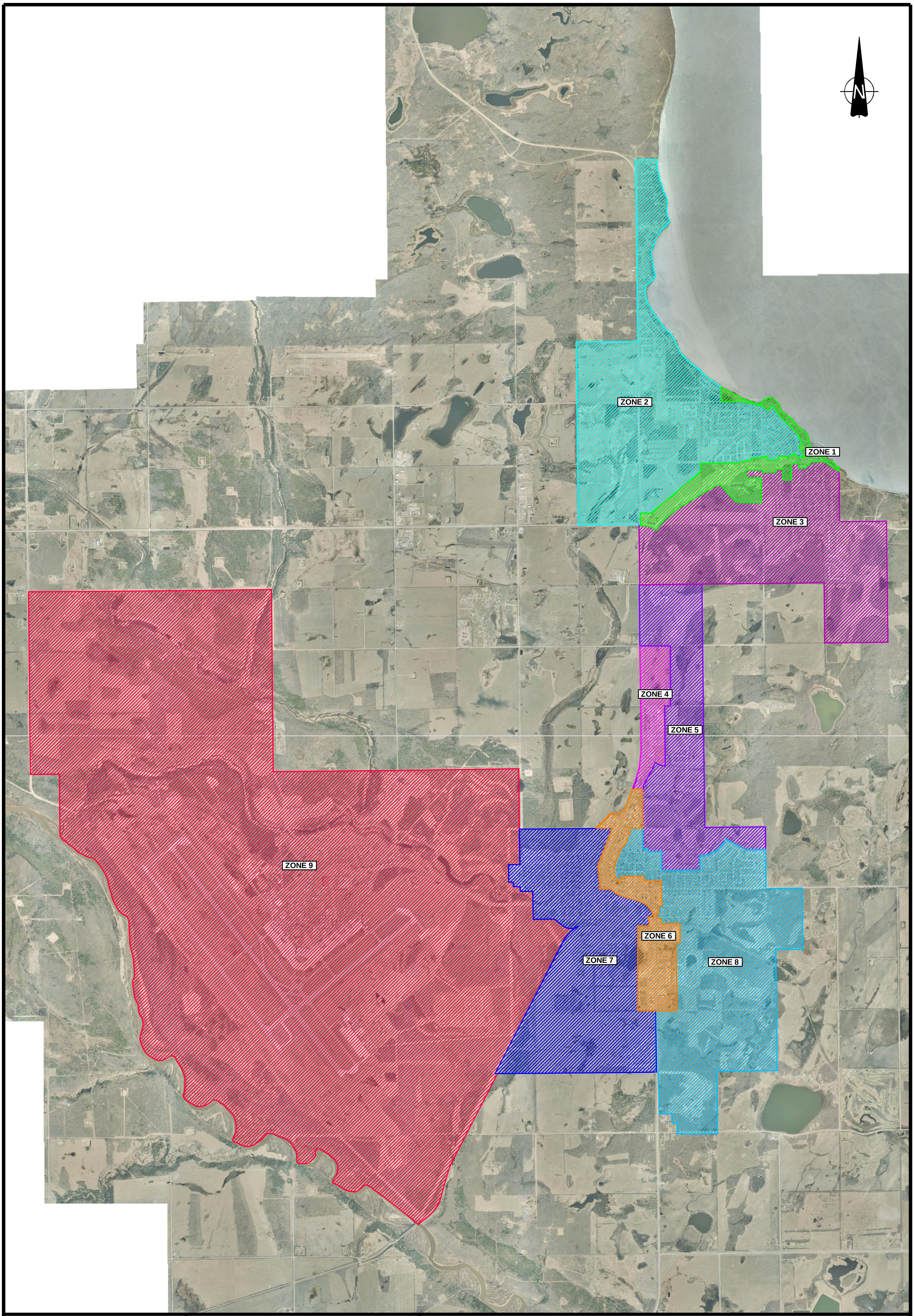
FIGURE 4.4
15 YEAR (2025) TRIP GENERATION FROM PLANNED DEVELOPMENT
PM PEAK



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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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:

CITY OF COLD LAKE
TRANSPORTATION STUDY

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.

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

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 4.4
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**

Table 4.5
15-year (2025) - Trip Generation from Planned Developments by Zone

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 4.6
20-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).

Table 4.7
Trip Distribution Table (Within City Limits)

From	To									SUM
	1	2	3	4	5	6	7	8	9	
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%**	-

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 Lake	20% from Cold Lake North business area 20% from Tri-City Mall area 20% from Cold Lake South business area 20% from the commercial area in the south (near 43 Avenue) 20% from Medley	5% to Cold Lake North business area 25% to Tri-City Mall area 25% to Cold Lake South business area 40% to the commercial area in the south (near 43 Avenue) 5% to Medley
Fawn Ridge Estates	20% from Cold Lake North business area 20% from Tri-City Mall area 20% from Cold Lake South business area 20% from the commercial area in the south (near 43 Avenue) 20% from Medley	5% to Cold Lake North business area 25% to Tri-City Mall area 25% to Cold Lake South business area 40% to the commercial area in the south (near 43 Avenue) 5% to Medley
IDP Residential 1 IDP Residential 2 IDP Residential 3	25% Internal 15% from Cold Lake North business area 15% from Tri-City Mall area 15% from Cold Lake South business area 15% from the commercial area in the south (near 43 Avenue) 15% from Medley	30% Internal 5% to Cold Lake North business area 20% to Tri-City Mall area 20% to Cold Lake South business area 20% to the commercial area in the south (near 43 Avenue) 5% to Medley
IDP Industrial	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 5% Medley	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 5% Medley
IDP Commercial	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 5% Medley	25% Internal 25% Cold Lake North residential 10% Residential behind Tri-City Mall 35% Cold Lake South residential 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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PROJECT NO:	2010-3050
DATE:	APRIL 2011
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SCALE:	NTS
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CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 4.7
5 YEAR (2015) DAILY DEVELOPMENT TRAFFIC VOLUMES

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 4.8
10 YEAR (2020) DAILY DEVELOPMENT TRAFFIC VOLUMES

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 4.9
15 YEAR (2025) DAILY DEVELOPMENT TRAFFIC VOLUMES

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 5.1
5 YEAR (2015) DAILY TOTAL TRAFFIC VOLUMES

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

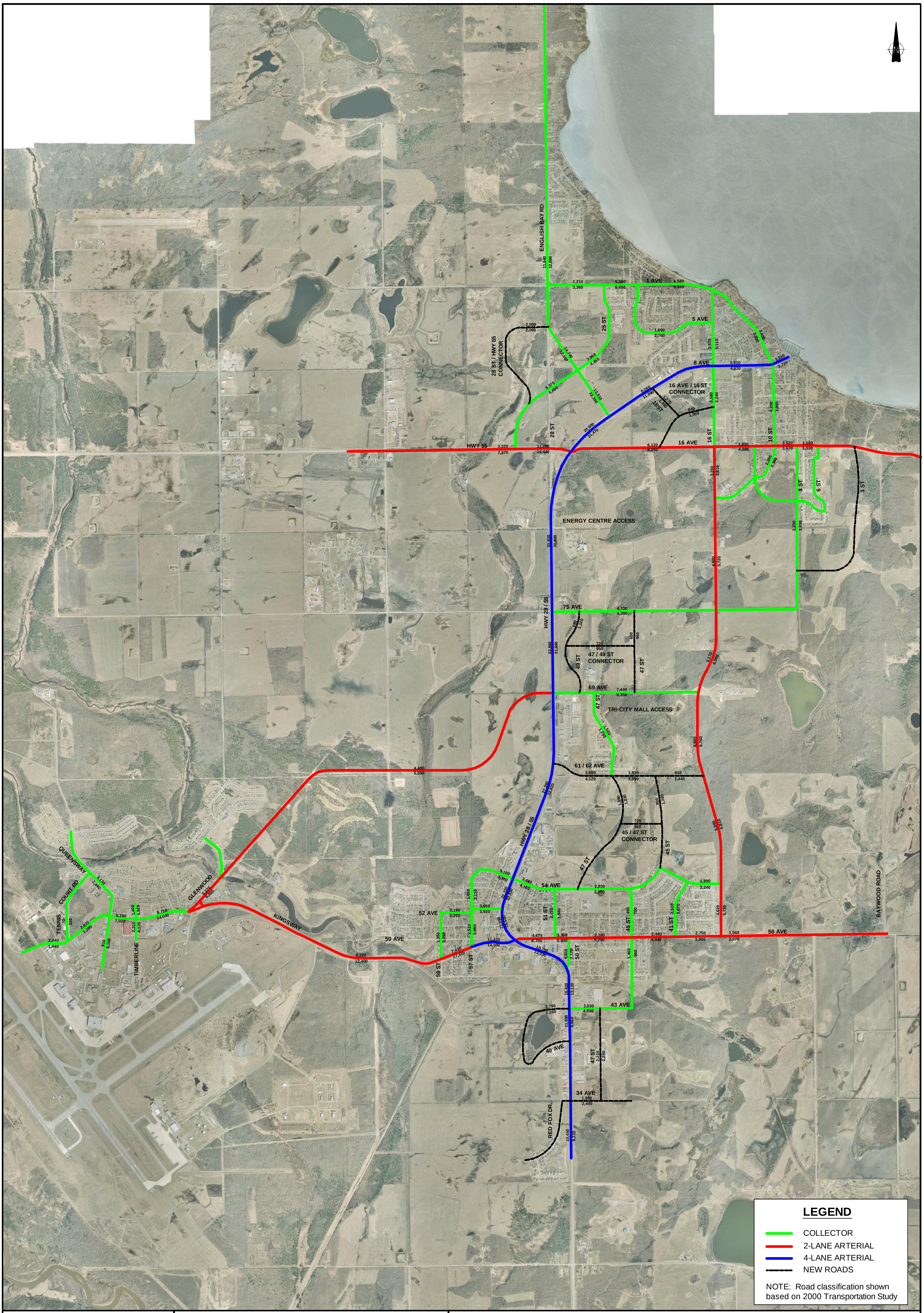
FIGURE 5.2
10 YEAR (2020) DAILY TOTAL TRAFFIC VOLUMES

Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

FIGURE 5.3
15 YEAR (2025) DAILY TOTAL TRAFFIC VOLUMES



Associated Engineering

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

CITY OF COLD LAKE
TRANSPORTATION STUDY

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.

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

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

Table 6-2
Lane Capacity by Road Classification

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

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 20-year (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
DATE:	FEB 2013
APPROVED:	
SCALE:	NTS
DWG NO:	

CITY OF COLD LAKE
TRANSPORTATION STUDY

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

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	3,360	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,210						1
1 Avenue	25 Street	Nelson Street	Eastbound	6,650	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,560						1
1 Avenue	Nelson Street	16 Street	Eastbound	6,240	12,820	Collector	Undivided Arterial	800	8,000	1
			Westbound	6,580						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	21,470	42,370	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	20,900						2
8 Avenue	25 Street	16 Street	Eastbound	11,990	20,050	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,060						1
8 Avenue	16 Street	10 Street	Eastbound	4,630	8,540	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,910						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,720	5,930	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,210						1
Hwy 55	West City Limit	25 Street	Eastbound	7,370	10,690	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	3,320						1
Hwy 55	25 Street	Hwy 28	Eastbound	14,440	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,280						2
16 Avenue	Hwy 28	16 Street	Eastbound	8,250	14,370	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,120						1
16 Avenue[5]	16 Street	10 Street	Eastbound	4,880	8,700	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,820						1
16 Avenue	10 Street	8 Street	Eastbound	3,670	7,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,520						1
16 Avenue	8 Street	East City Limit	Eastbound	1,530	3,190	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,660						1
English Bay Road [6]	North City Limit	Lake Avenue	Northbound	6,430	12,350	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,920						1
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24,700	Collector	Divided Arterial	1,000	10,000	2
			Southbound	11,840						2
English Bay Road	1 Avenue	25 Street	Northbound	14,740	27,120	Collector	Divided Arterial	1,000	10,000	2
			Southbound	12,380						2
English Bay Road	25 Street	Hwy 28	Northbound	13,510	25,810	Collector	Divided Arterial	1,000	10,000	2
			Southbound	12,300						2
25 Street	English Bay Road	Hwy 55	Northbound	6,690	12,060	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,370						1
25 Street[7]	1 Avenue	English Bay Road	Northbound	4,450	8,410	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,960						1
English Bay Road/25 Street Connector	English Bay Road	25 Street	Eastbound	2,500	4,580	-	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,080						1
Nelson Street	1 Avenue	16 Street	Eastbound	2,760	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,600						1
16 Street[8]	1 Avenue	8 Avenue	Northbound	5,110	8,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,570						1
16 Street	8 Avenue	16 Avenue	Northbound	3,240	6,820	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,580						1
16 Street	16 Avenue	75 Avenue	Northbound	3,810	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,200						1
16 Avenue/16 Street Connector	8 Avenue	16 Avenue	Northbound	1,270	2,760	-	Local (Residential or Industrial)	150	1,500	1
			Southbound	1,490						1
16 Avenue/16 Street Connector	16 Avenue	16 Street	Eastbound	1,550	2,390	-	Local (Residential or Industrial)	150	1,500	1
			Westbound	840						1
10 Street	1 Avenue	8 Avenue	Northbound	3,400	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,320						1
10 Street[9]	8 Avenue	16 Avenue	Northbound	3,560	7,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,250						1
10 Street	16 Avenue	16 Street	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
8 Street	16 Avenue	75 Avenue	Northbound	2,550	4,780	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,230						1
6 Street [10]	16 Avenue	21 Avenue	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	30,680	62,490	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	31,810						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	31,690	65,550	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	33,860						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	22,820	50,210	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	27,390						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,390	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,730						2
69 Avenue	Glenwood	Hwy 28/55	Eastbound	5,590	10,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,480						1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,350	15,790	Collector	Undivided Arterial	800	8,000	2
			Westbound	7,440						1
49 Street	75 Avenue	69 Avenue	Northbound	1,120	1,800	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	680						1
47 Street	75 Avenue	69 Avenue	Northbound	960	1,560	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	600						1
47 Street/49 Street Connector	47 Street	49 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1
			Westbound	720						1
47 Street	69 Avenue	61 Avenue/62 Avenue	Northbound	1,520	3,270	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,750						1
47 Street[11]	61 Avenue/62 Avenue	54 Avenue	Northbound	1,030	2,620	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	1,590						1
61 Avenue/62 Avenue[12]	Hwy 28/55	47 Street	Eastbound	4,120	8,000	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,880						1
61 Avenue/62 Avenue	47 Street	45 Street	Eastbound	3,990	5,800	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,810						1
61 Avenue/62 Avenue	45 Street	Future Arterial	Eastbound	1,440	2,350	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	910						1
47 Street/45 Street Connector	47 Street	45 Street	Eastbound	950	1,670	-	Local (Residential or Industrial)	150	1,500	1
			Westbound	720						1
45 Street	61 Avenue/62 Avenue	54 Avenue	Northbound	1,280	2,080	-	Local (Residential or Industrial)	150	1,500	1
			Southbound	800						1
54 Avenue[13]	56 Street	Hwy 28/55	Eastbound	3,380	8,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,190						1
54 Avenue[14]	Hwy 28/55	51 Street	Eastbound	4,160	7,840	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,680						1
54 Avenue	51 Street	45 Street	Eastbound	3,950	6,800	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,850						1
54 Avenue[15]	45 Street	41 Street	Eastbound	3,095	5,515	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,420						1
54 Avenue	41 Street	Future Arterial	Eastbound	2,240	4,230	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,990						1
52 Avenue	59 Street	57 Street	Eastbound	2,270	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,190						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	3,920	7,770	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,850						1
Centre Avenue	59 Street	57 Street	Eastbound	17,310	24,740	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	7,430						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	14,500	25,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,410						2
50 Avenue[16]	Hwy 28/55	51 Street	Eastbound	6,355	10,830	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	4,475						1
50 Avenue[17]	51 Street	50 Street	Eastbound	5,440	8,740	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,300						1
50 Avenue[18]	50 Street	45 Street	Eastbound	5,290	7,470	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,180						1
50 Avenue[19]	45 Street	41 Street	Eastbound	4,940	7,380	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,440						1
50 Avenue	41 Street	Future Arterial	Eastbound	3,900	6,650	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,750						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

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,070	3,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,560						1
43 Avenue[20]	Hwy 28/55	45 Street	Eastbound	4,830	8,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,530						1
59 Street	52 Avenue	Centre Avenue	Northbound	3,050	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,350						1
57 Street	54 Avenue	52 Avenue	Northbound	2,130	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
57 Street	52 Avenue	Centre Avenue	Northbound	3,960	6,470	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	20,930	43,080	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	22,150						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	18,500	40,450	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,950						2
Hwy 28/55	50 Avenue	50 Street	Northbound	10,700	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	13,030						2
Hwy 28/55	50 Street	43 Avenue	Northbound	13,120	29,540	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	16,420						2
Hwy 28/55	43 Avenue	34 Avenue	Northbound	9,960	21,650	4-Lane Arterial	Divided Arterial	1,000	10,000	1
			Southbound	11,690						2
Hwy 28/55	34 Avenue	South City Limit	Northbound	9,220	19,670	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	10,450						2
40 Avenue	43 Avenue	Hwy 28/55	Eastbound	2,260	5,050	-	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,790						1
34 Avenue	Hwy 28/55	47 Street	Eastbound	2,400	4,390	-	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,990						1
47 Street	43 Avenue	34 Avenue	Northbound	2,280	4,490	-	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,210						1
51 Street	54 Avenue	50 Avenue	Northbound	1,980	4,210	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,230						1
50 Street	50 Avenue	Hwy 28/55	Northbound	7,170	13,980	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,810						1
45 Street	54 Avenue	50 Avenue	Northbound	700	1,150	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	450						1
45 Street	50 Avenue	43 Avenue	Northbound	960	2,420	Collector	Local (Residential or Industrial)	150	1,500	1
			Southbound	1,460						1
41 Street	54 Avenue	50 Avenue	Northbound	3,870	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Future Arterial	75 Avenue	69 Avenue	Northbound	6,900	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,170						1
Future Arterial	69 Avenue	61 Avenue/62 Avenue	Northbound	6,760	12,660	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,900						1
Future Arterial	61 Avenue/62 Avenue	54 Avenue	Northbound	6,810	12,800	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,990						1
Future Arterial	54 Avenue	50 Avenue	Northbound	5,730	10,350	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	4,620						1
Kingsway	59 Street	Glenwood	Eastbound	12,400	20,620	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,220						1
Kingsway	Timberline	Glenwood	Eastbound	14,040	22,750	Collector	Divided Arterial	1,000	10,000	2
			Westbound	8,710						1
Kingsway	Queensway	Timberline	Eastbound	7,020	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,190						1
Kingsway	Tennis Court Road	Queensway	Eastbound	1,280	3,300	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,020						1
Kingsway	End of Road	Tennis Court Road	Eastbound	1,440	3,480	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,040						1
Tennis Court Road	Queensway	Kingsway	Northbound	330	400	Collector	Lane	N/A	N/A	N/A
			Southbound	70						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	3,130	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,440						1
Queensway	Kingsway	Hanger Ln	Northbound	4,100	5,010	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	910						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,920	3,320	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
Timberline	Kingsway	Athabasca Road	Northbound	4,170	6,480	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	2,310						1
Glenwood Drive	Glenwood	Kingsway	Northbound	8,460	13,730	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	5,270						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. A 2-lane collector cross section would be appropriate for 16 Avenue between 16 Street and 10 Street as the AADT is less than 9000.
6. Assumed daily traffic for English Bay Road (North City Limit to Lake Avenue) to be half of daily traffic on English Bay Road (Lake Avenue to 1 Avenue)
7. A 2-lane collector cross section would be appropriate 25 Street between 1 Avenue and English Bay Road as the AADT is less than 9000
8. A 2-lane collector cross section would be appropriate for 16 Street between 1 Avenue and 8 Avenue as the AADT is less than 9000
9. A 2-lane collector cross section would be appropriate f0r 10 Street between 8 Avenue and 16 Avenue as the AADT is less than 9000
10. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)
11. A 2-lane collector cross section would be appropriate for 47 Street between 62 Avenue and 54 Avenue as the AADt is less than 9000
12. A 2-lane collector cross section is appropriate for 61 Avenue/62 Avenue between 47 Street and 45 Street as the AADT is less than 9000
13. A 2-lane collector cross section would be appropriate for 54 Avenue between 56 Street and Highway 28 as the AADT is less than 9000
14. A 2-lane collector cross section would be appropriate for 54 Avenue between Highway 28 and 51 Street as the AADT is less than 9000
15. Assumed daily traffic for 54 Avenue (45 Street to 41 Street) to be average of daily traffic on 54 Avenue (51 Street to 45 Street) and 54 Avenue (41 Street to Future Arterial)
16. Although the AADT along 50 Avenue between Hwy 28 and 51 Street is 10,830, a 2-lane collector cross section is aprropriate because of the characteristics of the adjacent land use i.e. Downtown
17. A 2-lane collector cross section is appropriate for 50 Avenue between 51 Street and 50 Street as the AADT is less than 9000
18. A 2-lane collector cross section is appropriate for 50 Avenue between 50 Street and 45 Street as the AADT is less than 9000
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 43 Avenue between 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

Corridor	Intersection		Existing (2010) Road Classification[1]	Existing (2010) Number of Lanes (One Direction)	Recommended 20-Year (2030) Road Classification	Recommended 20-Year (2030) Number of Lanes (One Direction)	Improvements Required
	From	To					
8 Avenue	10 Street	Lakeshore Drive	Undivided Arterial	1 1	Divided Arterial	2 2	Widen to provide centre median and 2 travel lanes in each direction
8 Avenue	25 Street	10 Street	Divided Arterial	2 2	Divided Arterial	2 2	-
Hwy 28/55	Hwy 55/16 Avenue	53 Avenue	Divided Arterial	2 2	Expressway	2 2	-
Hwy 28/55	53 Avenue	52 Avenue	Undivided Arterial	2 2	Expressway	2 2	Widen to provide centre median
Hwy 28/55	52 Avenue	50 Avenue	Divided Arterial	2 2	Expressway	2 2	-
Hwy 28/55	50 Avenue	52 Street	Divided Arterial	2 2	Divided Arterial	2 2	-
Hwy 28/55	52 Street	47 Avenue	Undivided Arterial	2 2	Divided Arterial	2 2	Widen to provide centre median
Hwy 28/55	47 Avenue	40 Avenue	Divided Arterial	2 2	Divided Arterial	2 2	-
Hwy 28/55	40 Avenue	South City Limit	Undivided Arterial	1 1	Undivided Arterial	1 1	-
1 Avenue	28 Street	1 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Hwy 55[2]	West City Limit	28 Street	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
Hwy 55	28 Street	Hwy 28	Collector (Residential or Industrial)	1 1	Divided Arterial	2 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)	1 1	Undivided Arterial	2 2	Build pavement structure to Arterial standard (2 travel lanes in each direction)
16 Avenue	16 Street	8 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	2 2	Widen to provide 2 travel lanes in each direction
16 Avenue	8 Street	East City Limit	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
English Bay Road	North City Limit	Lake Avenue	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
English Bay Road	Lake Avenue	Hwy 28	Collector (Residential or Industrial)	1 1	Divided Arterial	2 2	Build pavement structure to Arterial standard (centre median and 2 travel lanes in each direction)
28 Street	English Bay Road	Hwy 55	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	Realign 28 Street and build pavement structure to Arterial standard
25 Street	1 Avenue	English Bay Road	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
Nelson Street	1 Avenue	16 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
16 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
16 Street	16 Avenue	75 Avenue	Local	1 1	Undivided Arterial	1 1	Build pavement structure to Arterial standard
Future Arterial	75 Avenue	50 Avenue	Non-existant	- -	Undivided Arterial	1 1	Build out as per 20-year horizon
10 Street	1 Avenue	16 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
10 Street	16 Avenue	16 Street	Local	1 1	Collector (Residential or Industrial)	1 1	-
8 Street	16 Avenue	75 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	Build pavement structure to Collector standard
6 Street	16 Avenue	21 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
20 Avenue	12 Street	8 Street	Non-existant	- -	Collector (Residential or Industrial)	1 1	Build out as per 20-year horizon
75 Avenue	Hwy 28/55	Future Arterial	Local	1 1	Collector (Residential or Industrial)	2 2	Build pavement structure to Collector standard (2 travel lanes in each direction)
69 Avenue	Glenwood	Hwy 28/55	Non-existant	- -	Undivided Arterial	1 1	Build out as per 20-year horizon
69 Avenue	Hwy 28/55	Future Arterial	Local	1 1	Undivided Arterial	1 1	-
47 Street	69 Avenue	61/62 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
54 Avenue	56 Street	49 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	2 2	Widen to provide 2 travel lanes in each direction
54 Avenue	49 Street	Future Arterial	Non-existant	- -	Collector (Residential or Industrial)	2 2	Build out as per 20-year horizon
52 Avenue	59 Street	57 Street	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
52 Avenue	57 Street	Hwy 28/55	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	2 2	Widen to provide 2 travel lanes in each direction
Centre Avenue	59 Street	57 Street	Undivided Arterial	1 1	Divided Arterial	2 2	Widen to provide centre median and 2 travel lanes in each direction
Centre Avenue	57 Street	Hwy 28/55	Undivided Arterial	2 2	Divided Arterial	2 2	Widen to provide centre median
50 Avenue	Hwy 28/55	Future Arterial	Undivided Arterial	1 1	Undivided Arterial	1 1	-
50 Avenue	Future Arterial	Baywood Road	Undivided Arterial	1 1	Collector (Residential or Industrial)	1 1	-
43 Avenue	Hwy 28/55	45 Street	Local	1 1	Collector (Residential or Industrial)	2 2	Build pavement structure to Collector standard (2 travel lanes in each direction)
59 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
57 Street	54 Avenue	52 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
57 Street	52 Avenue	Centre Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
51 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
50 Street	50 Avenue	Hwy 28/55	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
45 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
45 Street	50 Avenue	43 Avenue	Local	1 1	Collector (Residential or Industrial)	1 1	-
41 Street	54 Avenue	50 Avenue	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Kingsway	59 Street	Glenwood	Undivided Arterial	1 1	Divided Arterial	2 2	Widen to provide centre median and 2 travel lanes in each direction
Kingsway	Timberline	Glenwood	Collector (Residential or Industrial)	1 1	Divided Arterial	2 2	Build pavement structure to Arterial standard (centre median and 2 travel lanes in each direction)
Kingsway	Queensway	Timberline	Collector (Residential or Industrial)	1 1	Undivided Arterial	1 1	-
Kingsway	Queensway	End of Road	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Queensway	Tennis Court Road	Hanger Ln	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Timberline	Juniper Avenue	Athabasca Road	Collector (Residential or Industrial)	1 1	Collector (Residential or Industrial)	1 1	-
Glenwood Drive	Glenwood	Kingsway	Collector (Residential or Industrial)	1 1	Undivided Arterial	2 2	Build pavement structure to Arterial standard (2 travel lanes in each direction)

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

7 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 right-of-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.

A Appendix A - ASP, ARP and Outline Plan Information

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

FISCHER ESTATES - LAND USE INFORMATION

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

Land Use Type	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

IRON HORSE - LAND USE INFORMATION

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

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

COLD LAKE CENTRAL - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

GRAND CENTRE SE - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

FOREST HEIGHTS - LAND USE INFORMATION

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

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

NORTHSHORE - LAND USE INFORMATION

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

TOTAL AREA

Land Use	Total Area[1] (ha)	Creekside ASP [2] (ha)	Parkview ASP [3] (ha)	Remaining Area (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

Land Use	Total Area (ha)	Creekside ASP (ha)	Parkview ASP (ha)	Remaining Area (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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

NORTHSHORE - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

2010 HORIZON - DEVELOPED

Land Use	Total Area (ha)	Creekside ASP (ha)	Parkview ASP (ha)	Remaining Area (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

Land Use	Total Area (ha)	Creekside ASP (ha)	Parkview ASP (ha)	Remaining Area (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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

NORTHSHORE - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

TOTAL DEVELOPABLE - SCHOOL/RESIDENTIAL

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

Land Use	Total Area		Creekside ASP	Parkview ASP	Remaining Area
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

LOT 2, PLAN 982 1024 - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

HORSESHOE BAY - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

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**

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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

UPLANDS - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable		Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

LAKEWOOD ESTATES - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable			Developed in 2010		Undeveloped in 2010	
	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**

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

CREEKSIDE ESTATES - LAND USE INFORMATION

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

Land Use	Total Developable				Developed in 2010		Undeveloped in 2010	
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

PARKVIEW ESTATES - LAND USE INFORMATION
* Land uses highlighted in yellow will be used to generate development traffic volumes *

Land Use	Total Developable				2010 Developed		2010 Undeveloped	
	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

City of Cold Lake Transportation Study
Traffic Volume Forecast
Project No: 2010-3050
Date: January 28, 2011

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

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

Time Period	Trip Generation Rate (Trips per Dwelling Units)	Generated Trips	Direction Distribution (%)		Direction Distribution (%)	
			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

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
Residential Development 1	75% - Single Family Residential	14	283
	25% - Multi Family Residential	5	236
	Total	**19**	**519**
Residential Development 2	75% - Single Family Residential	19	379
	25% - Multi Family Residential	6	316
	Total	**25**	**696**
Residential Development 3	75% - Single Family Residential	94	1,880
	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

Land Use	Developable Area (m^2)	Developable Area (Hec)	Developed Area 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 (m^2)	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

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Date:	February 25, 2011	**File:**	20103050.00.01.10
To:	Bob Kitchen		
From:	Rohit Vij		
Project:	City of Cold Lake Transportation Study		
Subject:	Traffic Demand Forecast Work Plan		

MEMO

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

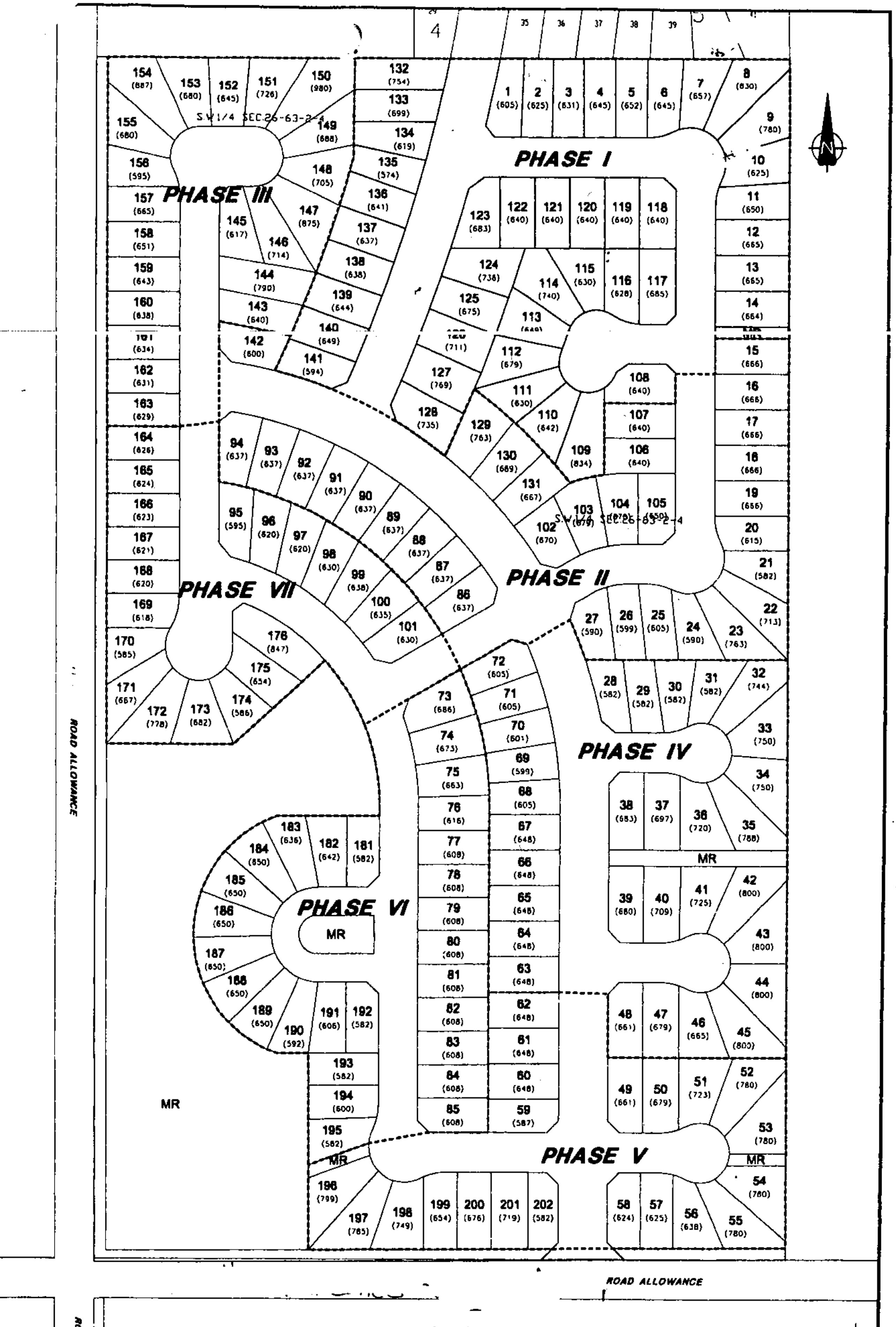
2.2 AREA REDEVELOPMENT PLAN (ARP)

- 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**.



SCALE 1:1750	PROJECT No. 29-05-01
DESIGNED BY SBE	DRAWN BY SBE
CHECKED BY	DATE

SE DESIGN AND CONSULTING
SUITE 203, 4801 - 51 STREET COLD LAKE, ALBERTA T9M 1P4 PH (780) 201-5380

LAKEWOOD DEVELOPMENTS
LAKEWOOD ESTATES SUBDIVISION
PROPOSED RESIDENTIAL SUBDIVISION
OVERALL DEVELOPMENT CONCEPT

Figure 1

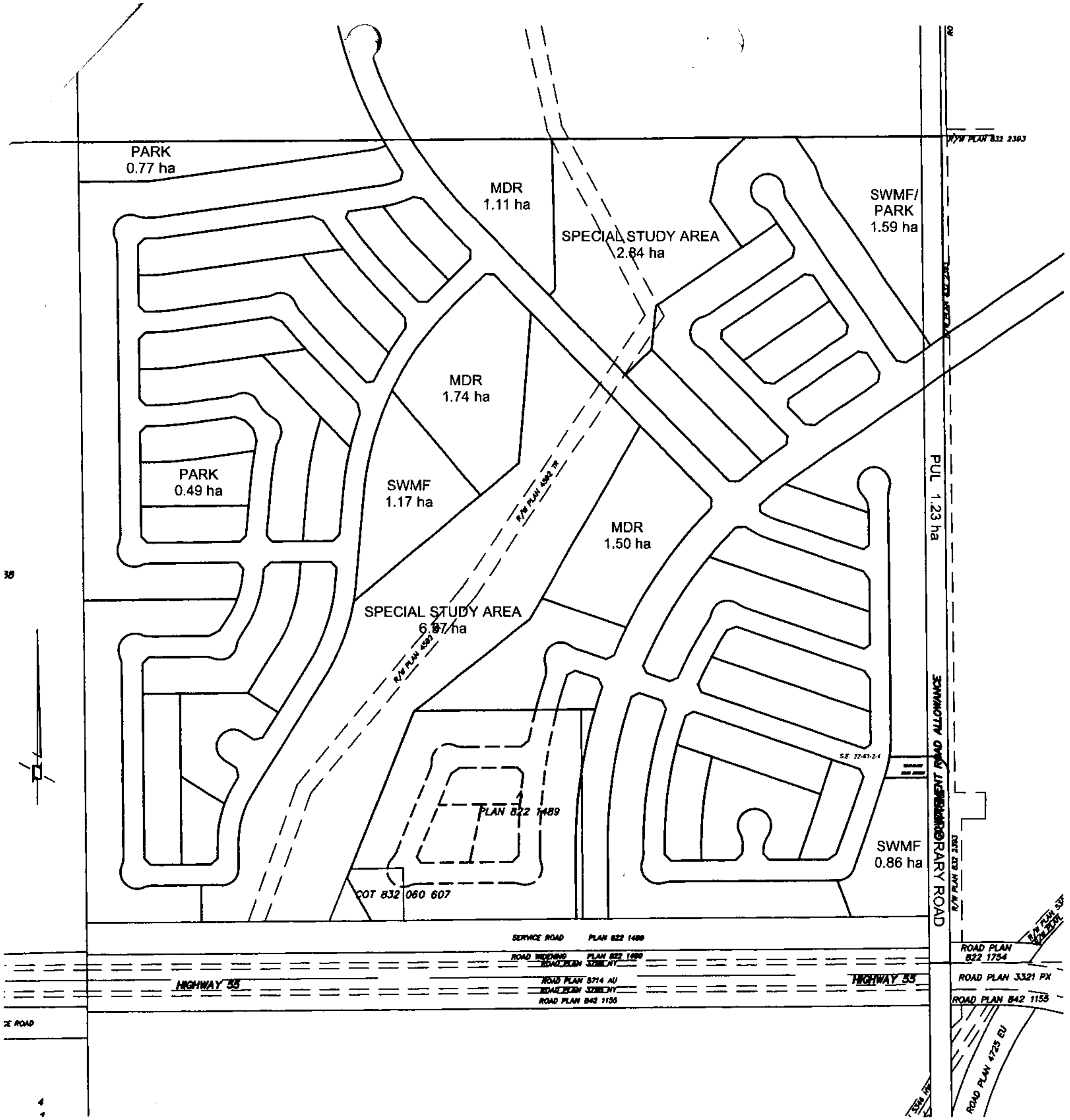


Figure 2

CREEKSIDE

OVERALL DESIGN CONCEPT

FOCUS

N:\102255\Planning\102255-12\102255-12-TLP-1.dwg\Overall

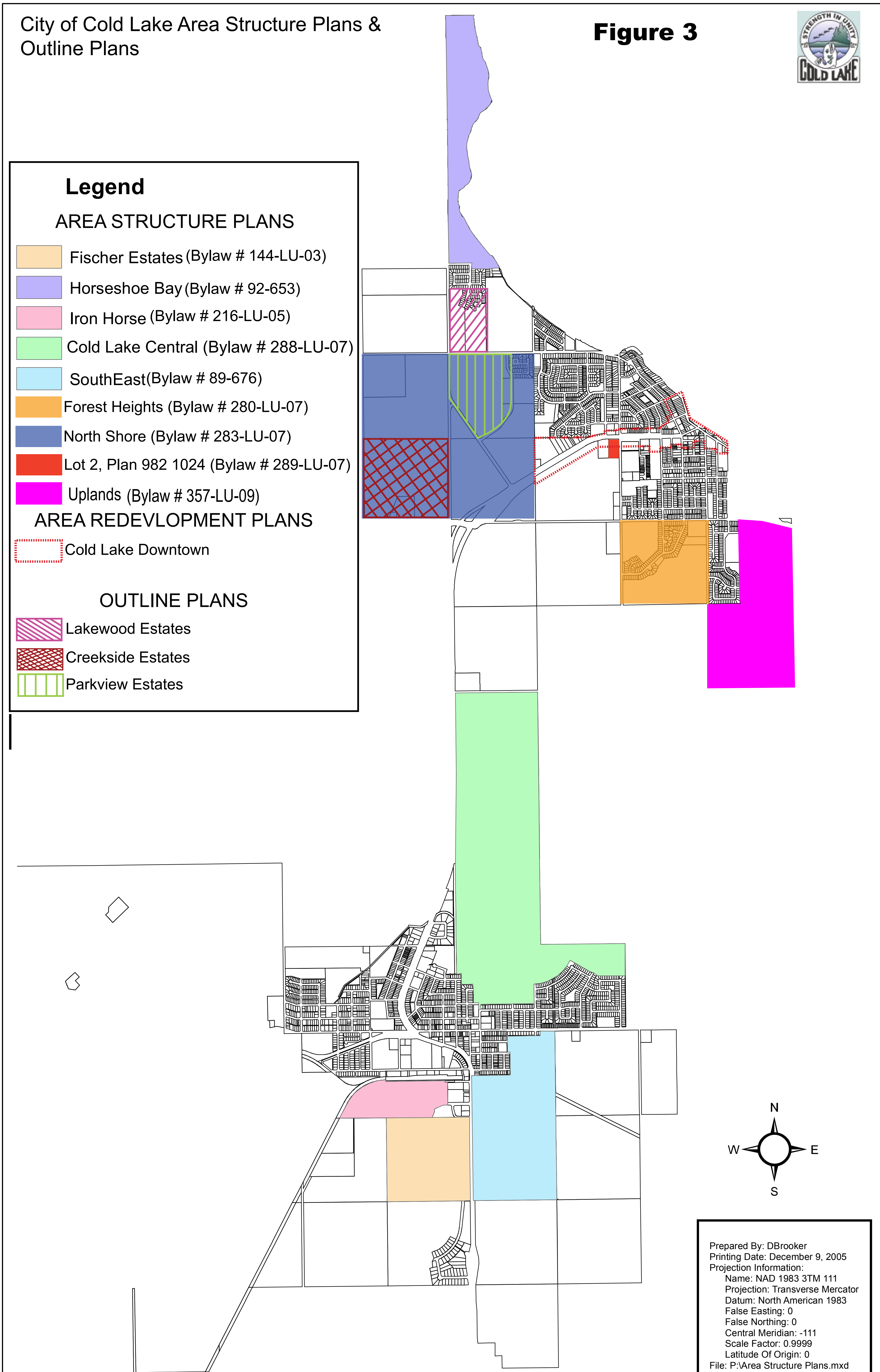

City of Cold Lake Area Structure Plans & Outline Plans
Figure 3
STRENGTH IN UNITY
COLD LAKE
Legend
AREA STRUCTURE PLANS
Fischer Estates (Bylaw # 144-LU-03)
Horseshoe Bay (Bylaw # 92-653)
Iron Horse (Bylaw # 216-LU-05)
Cold Lake Central (Bylaw # 288-LU-07)
SouthEast (Bylaw # 89-676)
Forest Heights (Bylaw # 280-LU-07)
North Shore (Bylaw # 283-LU-07)
Lot 2, Plan 982 1024 (Bylaw # 289-LU-07)
Uplands (Bylaw # 357-LU-09)
AREA REDEVLOPMENT PLANS
Cold Lake Downtown
OUTLINE PLANS
Lakewood Estates
Creekside Estates
Parkview Estates
N
W
E
S
Prepared By: DBrooker
Printing Date: December 9, 2005
Projection Information:
Name: NAD 1983 3TM 111
Projection: Transverse Mercator
Datum: North American 1983
False Easting: 0
False Northing: 0
Central Meridian: -111
Scale Factor: 0.9999
Latitude Of Origin: 0
File: P:\Area Structure Plans.mxd

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.

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

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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	-	-

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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%	-	-	-

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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 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 MD of Bonnyville Land Use 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

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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 Development Authority			

Land Use District	Maximum Lot Coverage	Minimum Floor Area (m^2)	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.**

- Calculate the area of each zone (A_1, A_2, 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.

Existing Traffic Volumes (2010 Horizon)

Intersection		Zone 1			Zone 2		…	Zone 9	
		$I_{1,1}$	$I_{1,2}$	$I_{1,x}$	$I_{2,1}$	$I_{2,2}$	$I_{i,x}$	$I_{9,1}$	$I_{9,x}$
NB	Left	5	9	15					
	Through	85	211	150					
	Right	3	15	7					
SB	Left								
	Through								
	Right								
EB	Left								
	Through								
	Right								
WB	Left								
	Through								
	Right								

Where $\mathbf{I}_{i,x}$ denotes intersection number x in Zone i.

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)

Intersection		Zone 1			Zone 2		…	Zone 9	
		$I_{1,1}$	$I_{1,2}$	$I_{1,x}$	$I_{2,1}$	$I_{2,2}$	$I_{i,x}$	$I_{9,1}$	$I_{9,x}$
NB	Left	6 = 5+(5x5x 0.02)	10 = 9+(9x5x 0.02)	17 =15+(15 x5x0.02)					
	Through	94	232	165					
	Right	3	17	8					
SB	Left								
	Through								
	Right								
EB	Left								
	Through								
	Right								
WB	Left								
	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:**

Assumed Development Staging by Study Horizon

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 Lake Central	Residential	25%	25%	25%	25%	100%
	Commercial	50%	50%	0%	0%	100%
Grand Centre Southeast	Residential	25%	25%	25%	25%	100%
	Industrial	25%	25%	25%	25%	100%
Forest Heights	Residential	0%	0%	25%	25%	50%
Northshore	Residential	25%	25%	25%	25%	100%
	Commercial	25%	25%	25%	25%	100%
	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%
Uplands	Residential	25%	25%	25%	25%	100%
	Health Services & Mixed Use	25%	25%	25%	25%	100%

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%
Parkview Estates	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.

Trip Production (Pi) - Horizon

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

7	
8	
9	
Total (∑Pi)	

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	$A_1/(d_{11})^2$	$[A_1/(d_{11})^2] / \sum_1$	$P_1 \times [A_1/(d_{11})^2] / \sum_1$
Zone 1 to Zone 2	$A_1/(d_{12})^2$	$[A_1/(d_{12})^2] / \sum_1$	$P_1 \times [A_1/(d_{12})^2] / \sum_1$
Zone 1 to Zone 3	$A_1/(d_{13})^2$	$[A_1/(d_{13})^2] / \sum_1$	$P_1 \times [A_1/(d_{13})^2] / \sum_1$
Zone 1 to Zone 4	$A_1/(d_{14})^2$	$[A_1/(d_{14})^2] / \sum_1$	$P_1 \times [A_1/(d_{14})^2] / \sum_1$
Zone 1 to Zone 5	$A_1/(d_{15})^2$	$[A_1/(d_{15})^2] / \sum_1$	$P_1 \times [A_1/(d_{15})^2] / \sum_1$
Zone 1 to Zone 6	$A_1/(d_{16})^2$	$[A_1/(d_{16})^2] / \sum_1$	$P_1 \times [A_1/(d_{16})^2] / \sum_1$
Zone 1 to Zone 7	$A_1/(d_{17})^2$	$[A_1/(d_{17})^2] / \sum_1$	$P_1 \times [A_1/(d_{17})^2] / \sum_1$
Zone 1 to Zone 8	$A_1/(d_{18})^2$	$[A_1/(d_{18})^2] / \sum_1$	$P_1 \times [A_1/(d_{18})^2] / \sum_1$
Zone 1 to Zone 9	$A_1/(d_{19})^2$	$[A_1/(d_{19})^2] / \sum_1$	$P_1 \times [A_1/(d_{19})^2] / \sum_1$

Total	$\sum_1$	100%	P_1

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

- 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

- 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

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

Traffic Demand Model: Zones & Intersections

Zone	Description	Intersection with Counts	
		Node #	Intersection
1	Cold Lake North - Commercial/Recreational	104	1 Avenue & 16 Street
		105	1 Avenue / 2 Avenue & 10 Street
		106	8 Avenue & Lakeshore Drive
		107	8 Avenue & 10 Street
		108	8 Avenue & 16 Street
		109	Highway 28 & 25 Street
		111	Highway 55/ 16 Avenue & Highway 28
2	Cold Lake North - Residential (North of Hwy 28)	101	1 Avenue & 28 Street / English Bay Road
		102	1 Avenue & 25 Street
		103	1 Avenue & Nelson Street
		110	Highway 55 & 28 Street / English Bay Road
3	Cold Lake North - Residential (South of Hwy 28)	112	16 Avenue & 16 Street
		113	16 Avenue & 10 Street
4	Cold Lake Central - Commercial	202	Highway 28 / 55 & 75 Avenue
		203	Highway 28 / 55 & 69 Avenue / Museum Road
		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
6	Cold Lake South - CBD/Commercial	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
		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
7	Cold Lake South - Residential (West of Hwy 28)	309	57 Street & 52 Avenue (North)
		310	57 Street & 52 Avenue (South)
		311	50 Avenue & 59 Street
		312	50 Avenue & 57 Street
		313	Centre Avenue & 59 Street
		314	Centre Avenue & 57 Street
8	Cold Lake South - Residential (East of Hwy 28)	315	54 Avenue & 51 Street
		321	50 Avenue & 45 Street
		322	50 Avenue & 41 Street
		323	50 Avenue / Twp Rd 630 & Baywood Road / RR 20
9	Medley	401	Kingsway & Medley Road
		402	Kingsway & Glenwood Drive (West)
		403	Kingsway & Glenwood Drive (East)
		404	Kingsway & Timberline Drive
		405	Kingsway & Queensway
		406	Kingsway & Tennis Court Road
		407	Queensway & Tennis Court Road

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

Traffic Demand Model: Zones & Areas

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**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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 - Distances^2

	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

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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	1	0.17	3.0%	11
	2	1.89	33.8%	117
	3	2.48	44.1%	153
	4	0.04	0.8%	3
	5	0.17	3.0%	10
	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**
2	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
	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**
3	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	0.25	8.3%	23
	6	0.04	1.4%	4
	7	0.14	4.7%	13
	8	0.20	6.7%	19
	9	0.59	20.0%	55
	SUM	**2.96**	**100.0%**	**277**
4	1	0.06	0.5%	5
	2	0.32	2.9%	28
	3	0.43	3.8%	38
	4	0.48	4.3%	42
	5	6.44	58.2%	567
	6	0.20	1.8%	17
	7	0.68	6.2%	60
	8	0.73	6.6%	65
	9	1.73	15.6%	152
	SUM	**11.06**	**100.0%**	**974**
5	1	0.05	0.8%	3
	2	0.26	3.9%	16
	3	0.41	6.3%	26
	4	1.48	22.6%	93
	5	0.56	8.6%	36
	6	0.28	4.2%	17
	7	0.79	12.1%	50
	8	1.14	17.5%	72
	9	1.56	23.9%	99
	SUM	**6.53**	**100.0%**	**412**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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
6	1	0.02	0.1%	0
	2	0.13	0.7%	1
	3	0.16	0.8%	1
	4	0.10	0.5%	0
	5	0.64	3.4%	3
	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**
7	1	0.02	0.2%	0
	2	0.12	1.4%	0
	3	0.14	1.6%	0
	4	0.09	1.1%	0
	5	0.47	5.4%	0
	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**
8	1	0.02	0.3%	0
	2	0.12	1.7%	2
	3	0.17	2.4%	2
	4	0.09	1.2%	1
	5	0.58	8.4%	8
	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**
9	1	0.01	0.6%	0
	2	0.10	4.2%	0
	3	0.08	3.3%	0
	4	0.03	1.3%	0
	5	0.12	5.2%	0
	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**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

Traffic Demand Model, 5 Year Horizon: Future Production

	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**	

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.

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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%**

City of Cold Lake Transportation Study
Project No: 2010-3050
Date: February 28, 2011

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%**	

D Appendix D - Capacity Analysis

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

CAPACITY ANALYSIS - EXISTING (2010) HORIZON

Corridor	Intersection From	Intersection To	Direction	Forecasted Volumes: Daily Traffic - Directional	Forecasted Volumes: Daily Traffic - Two Way	Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	960	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	850						1
1 Avenue	25 Street	Nelson Street	Eastbound	1,640	3,110	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,470						1
1 Avenue	Nelson Street	16 Street	Eastbound	1,290	2,650	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,360						2
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	5,410	9,650	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,240						2
8 Avenue	25 Street	16 Street	Eastbound	5,260	7,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,600						1
8 Avenue	16 Street	10 Street	Eastbound	1,880	2,980	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,100						2
8 Avenue	10 Street	Lakeshore Drive	Eastbound	950	1,720	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	1
			Westbound	770						1
Hwy 55	West City Limit	28 Street	Eastbound	3,360	4,930	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,570						1
Hwy 55	28 Street	Hwy 28	Eastbound	3,250	4,980	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,730						1
16 Avenue	Hwy 28	16 Street	Eastbound	1,820	3,210	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,390						1
16 Avenue	16 Street	10 Street	Eastbound	1,270	2,050	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	780						1
16 Avenue	10 Street	8 Street	Eastbound	1,320	2,430	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,110						2
English Bay Road	North City Limit	1 Avenue	Northbound	1,450	2,540	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,090						2
English Bay Road	1 Avenue	25 Street	Northbound	1,150	1,930	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	780						1
English Bay Road	25 Street	Hwy 28	Northbound	1,490	3,100	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,610						1
28 Street	English Bay Road	Hwy 55	Northbound	660	1,050	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	390						1
25 Street	1 Avenue	English Bay Road	Northbound	840	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	770						1
Nelson Street	1 Avenue	16 Street	Eastbound	570	900	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	330						1
16 Street	1 Avenue	8 Avenue	Northbound	2,070	2,840	Collector	Local (Residential or Industrial)	100	1,000	3
			Southbound	770						1
16 Street	8 Avenue	16 Avenue	Northbound	420	870	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	450						1
10 Street	1 Avenue	8 Avenue	Northbound	780	1,610	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	830						1
10 Street	8 Avenue	16 Avenue	Northbound	900	1,810	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	910						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	6,810	12,980	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,170						1
Hwy 28/55	75 Avenue	69 Avenue	Northbound	7,480	15,160	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	7,680						1
Hwy 28/55	69 Avenue	54 Avenue	Northbound	7,500	14,650	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	7,150						1
54 Avenue	56 Street	Hwy 28/55	Eastbound	1,330	2,860	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,530						2
54 Avenue	Hwy 28/55	51 Street	Eastbound	2,320	4,600	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,280						1
54 Avenue	51 Street	45 Street	Eastbound	1,440	2,610	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,170						2
52 Avenue	57 Street	Hwy 28/55	Eastbound	810	1,990	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,180						2
50 Avenue	62 Street	59 Street	Eastbound	220	590	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	370						1
50 Avenue	59 Street	57 Street	Eastbound	420	950	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	530						1
50 Avenue	57 Street	55 Street	Eastbound	180	520	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	340						1
Centre Avenue	59 Street	57 Street	Eastbound	8,340	12,040	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	3,700						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	8,500	12,800	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	4,300						1
50 Avenue	Hwy 28/55	51 Street	Eastbound	3,280	5,890	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,610						1
50 Avenue	51 Street	50 Street	Eastbound	3,080	5,050	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,970						1
50 Avenue	50 Street	45 Street	Eastbound	3,210	5,100	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,890						1
50 Avenue	45 Street	41 Street	Eastbound	2,620	4,130	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,510						1
50 Avenue	41 Street	Future Arterial	Eastbound	1,820	2,960	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,140						2
50 Avenue	Future Arterial	Baywood Road	Eastbound	1,510	2,470	2-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	960						1
59 Street	50 Avenue	Centre Avenue	Northbound	630	910	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	280						1
57 Street	52 Avenue	50 Avenue	Northbound	770	1,240	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	470						1
57 Street	50 Avenue	Centre Avenue	Northbound	820	1,340	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	520						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	6,970	13,840	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,870						1
Hwy 28/55	52 Avenue	50 Avenue	Northbound	7,640	13,340	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,700						1
Hwy 28/55	50 Avenue	50 Street	Northbound	5,280	10,730	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,450						1
Hwy 28/55	50 Street	43 Avenue	Northbound	5,930	12,600	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,670						1
Hwy 28/55	43 Avenue	South City Limit	Northbound	5,500	11,730	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,230						1
51 Street	54 Avenue	50 Avenue	Northbound	870	1,770	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	900						1
50 Street	50 Avenue	Hwy 28/55	Northbound	2,980	5,880	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,900						1
45 Street	54 Avenue	50 Avenue	Northbound	410	690	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	280						1
41 Street	54 Avenue	50 Avenue	Northbound	800	1,320	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	520						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 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
Kingsway	59 Street	Glenwood	Eastbound	7,290	10,510	2-Lane Arterial	Undivided Arterial	800	8,000	1
			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

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic

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

CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	1,600	2,800	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,200						2
1 Avenue	25 Street	Nelson Street	Eastbound	2,490	4,630	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,140						1
1 Avenue	Nelson Street	16 Street	Eastbound	2,680	5,500	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,820						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	9,600	17,840	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	8,240						2
8 Avenue	25 Street	16 Street	Eastbound	6,870	10,890	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,020						1
8 Avenue	16 Street	10 Street	Eastbound	2,470	4,210	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,740						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	1,300	2,610	4-Lane Arterial	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,310						2
Hwy 55	West City Limit	28 Street	Eastbound	3,700	5,430	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,730						1
Hwy 55	28 Street	Hwy 28	Eastbound	5,130	9,040	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,910						1
16 Avenue	Hwy 28	16 Street	Eastbound	3,720	6,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,770						1
16 Avenue	16 Street	10 Street	Eastbound	2,490	4,010	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,520						1
16 Avenue	10 Street	8 Street	Eastbound	2,450	4,240	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,790						1
English Bay Road	North City Limit	1 Avenue	Northbound	4,740	8,600	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,860						1
English Bay Road	1 Avenue	25 Street	Northbound	5,580	9,710	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,130						2
English Bay Road	25 Street	Hwy 28	Northbound	4,730	8,950	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,220						2
28 Street	English Bay Road	Hwy 55	Northbound	2,650	4,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,810						1
25 Street	1 Avenue	English Bay Road	Northbound	1,620	3,020	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
Nelson Street	1 Avenue	16 Street	Eastbound	1,180	1,860	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	680						1
16 Street	1 Avenue	8 Avenue	Northbound	4,840	6,600	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	1,760						1
16 Street	8 Avenue	16 Avenue	Northbound	970	2,060	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	1,090						2
16 Street	16 Avenue	10 Street	Northbound	1,030	1,780	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	750						1
10 Street	1 Avenue	8 Avenue	Northbound	1,340	2,610	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,270						2
10 Street	8 Avenue	16 Avenue	Northbound	1,580	3,290	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,710						1
10 Street	16 Avenue	16 Street	Northbound	1,040	2,020	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	980						1
6 Street [5]	16 Avenue	21 Avenue	Northbound	1,040	2,020	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	980						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	13,050	25,070	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,020						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	13,970	27,830	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	13,860						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	13,310	28,860	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	15,550						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	1,750	4,830	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,080						1
54 Avenue	56 Street	Hwy 28/55	Eastbound	1,820	4,110	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,290						1
54 Avenue	Hwy 28/55	51 Street	Eastbound	3,800	7,350	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,550						1
54 Avenue	51 Street	45 Street	Eastbound	2,990	5,420	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,430						1
52 Avenue	59 Street	57 Street	Eastbound	980	2,350	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,370						2
52 Avenue	57 Street	Hwy 28/55	Eastbound	1,680	4,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,450						1
Centre Avenue	59 Street	57 Street	Eastbound	12,290	17,560	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	5,270						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	11,020	18,420	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	7,400						1
50 Avenue	Hwy 28/55	51 Street	Eastbound	5,080	8,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,640						1
50 Avenue	51 Street	50 Street	Eastbound	4,080	6,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,640						1
50 Avenue	50 Street	45 Street	Eastbound	4,310	6,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,320						1
50 Avenue	45 Street	41 Street	Eastbound	3,660	5,720	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,060						1
50 Avenue	41 Street	Future Arterial	Eastbound	2,840	4,620	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,780						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,360	3,860	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,500						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	3,410	6,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,100						1
59 Street	52 Avenue	Centre Avenue	Northbound	1,310	1,890	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	580						1
57 Street	54 Avenue	52 Avenue	Northbound	910	1,510	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	600						1
57 Street	52 Avenue	Centre Avenue	Northbound	1,700	2,780	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,080						2
Hwy 28/55	54 Avenue	52 Avenue	Northbound	11,440	24,400	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,960						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	11,980	23,440	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	11,460						2
Hwy 28/55	50 Avenue	50 Street	Northbound	5,180	11,660	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	6,480						1
Hwy 28/55	50 Street	43 Avenue	Northbound	8,070	17,510	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	9,440						2
Hwy 28/55	43 Avenue	South City Limit	Northbound	6,520	13,880	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	7,360						1
51 Street	54 Avenue	50 Avenue	Northbound	1,320	2,800	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,480						2
50 Street	50 Avenue	Hwy 28/55	Northbound	4,770	9,300	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,530						2
45 Street	54 Avenue	50 Avenue	Northbound	520	860	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	340						1
45 Street	50 Avenue	43 Avenue	Northbound	370	950	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	580						1
41 Street	54 Avenue	50 Avenue	Northbound	1,660	2,740	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,080						2

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

CAPACITY ANALYSIS - 5 YEAR (2015) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
Kingsway	59 Street	Glenwood	Eastbound	9,530	15,530	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,000						1
Kingsway	Timberline	Glenwood	Eastbound	7,950	12,240	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,290						1
Kingsway	Queensway	Timberline	Eastbound	3,770	6,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,590						1
Kingsway	Tennis Court Road	Queensway	Eastbound	770	1,770	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,000						1
Kingsway	End of Road	Tennis Court Road	Eastbound	900	2,020	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,120						2
Tennis Court Road	Queensway	Kingsway	Northbound	250	310	Collector	Lane	N/A	N/A	N/A
			Southbound	60						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	1,790	3,110	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,320						1
Queensway	Kingsway	Hanger Ln	Northbound	2,370	2,860	Collector	Local (Residential or Industrial)	100	1,000	3
			Southbound	490						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,050	1,830	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	780						1
Timberline	Kingsway	Athabasca Road	Northbound	2,270	3,470	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,200						1
Glenwood Drive	Glenwood	Kingsway	Northbound	3,430	5,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,700						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)

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

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	2,190	3,690	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,500						1
1 Avenue	25 Street	Nelson Street	Eastbound	4,250	7,630	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,380						1
1 Avenue	Nelson Street	16 Street	Eastbound	4,120	8,470	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,350						2
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	14,280	26,760	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,480						2
8 Avenue	25 Street	16 Street	Eastbound	9,030	14,780	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	5,750						1
8 Avenue	16 Street	10 Street	Eastbound	3,250	5,750	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,500						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	1,780	3,700	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,920						1
Hwy 55	West City Limit	28 Street	Eastbound	4,640	6,850	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,210						1
Hwy 55	28 Street	Hwy 28	Eastbound	7,690	14,100	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	6,410						1
16 Avenue	Hwy 28	16 Street	Eastbound	5,720	9,850	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,130						2
16 Avenue	16 Street	10 Street	Eastbound	3,810	6,130	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,320						1
16 Avenue	10 Street	8 Street	Eastbound	3,590	6,060	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,470						1
English Bay Road	North City Limit	1 Avenue	Northbound	7,390	13,480	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,090						1
English Bay Road	1 Avenue	25 Street	Northbound	9,100	15,900	Collector	Undivided Arterial	800	8,000	2
			Southbound	6,800						1
English Bay Road	25 Street	Hwy 28	Northbound	7,980	14,720	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,740						1
28 Street	English Bay Road	Hwy 55	Northbound	4,620	7,920	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,300						1
25 Street	1 Avenue	English Bay Road	Northbound	3,310	6,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,700						1
Nelson Street	1 Avenue	16 Street	Eastbound	1,820	2,870	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,050						2
16 Street	1 Avenue	8 Avenue	Northbound	6,230	8,760	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	2,530						1
16 Street	8 Avenue	16 Avenue	Northbound	1,540	3,490	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,950						1
16 Street	16 Avenue	10 Street	Northbound	1,740	3,250	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,510						1
10 Street	1 Avenue	8 Avenue	Northbound	1,950	3,820	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,870						1
10 Street	8 Avenue	16 Avenue	Northbound	2,280	4,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,530						1
10 Street	16 Avenue	16 Street	Northbound	1,820	3,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
6 Street [5]	16 Avenue	21 Avenue	Northbound	1,820	3,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	20,290	38,580	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	18,290						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	21,650	42,820	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,170						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	17,000	37,270	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	20,270						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	3,710	9,240	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,530						2
69 Avenue	Glenwood	Hwy 28/55	Eastbound	3,080	5,530	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,450						1
54 Avenue	56 Street	Hwy 28/55	Eastbound	2,350	5,560	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,210						1
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,130	9,410	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,280						2
54 Avenue	51 Street	45 Street	Eastbound	4,600	8,340	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,740						1
52 Avenue	59 Street	57 Street	Eastbound	1,500	3,610	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,110						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	2,590	6,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,770						1
Centre Avenue	59 Street	57 Street	Eastbound	12,560	17,950	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	5,390						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	11,140	19,350	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	8,210						2
50 Avenue	Hwy 28/55	51 Street	Eastbound	6,560	11,410	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,850						1
50 Avenue	51 Street	50 Street	Eastbound	5,190	8,690	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,500						1
50 Avenue	50 Street	45 Street	Eastbound	5,420	8,510	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,090						1
50 Avenue	45 Street	41 Street	Eastbound	4,560	7,270	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,710						1
50 Avenue	41 Street	Future Arterial	Eastbound	3,950	6,420	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,470						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	3,270	5,350	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,080						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	4,710	8,640	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,930						1
59 Street	52 Avenue	Centre Avenue	Northbound	2,010	2,990	Collector	Local (Residential or Industrial)	100	1,000	3
			Southbound	980						1
57 Street	54 Avenue	52 Avenue	Northbound	1,410	2,340	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	930						1
57 Street	52 Avenue	Centre Avenue	Northbound	2,620	4,280	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,660						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	14,270	32,000	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	17,730						1
Hwy 28/55	52 Avenue	50 Avenue	Northbound	14,590	30,460	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	15,870						1
Hwy 28/55	50 Avenue	50 Street	Northbound	7,220	16,490	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	9,270						2
Hwy 28/55	50 Street	43 Avenue	Northbound	10,360	22,910	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	12,550						2
Hwy 28/55	43 Avenue	South City Limit	Northbound	7,700	16,310	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	8,610						2
51 Street	54 Avenue	50 Avenue	Northbound	1,550	3,240	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
50 Street	50 Avenue	Hwy 28/55	Northbound	5,520	10,760	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,240						1
45 Street	54 Avenue	50 Avenue	Northbound	640	1,060	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	420						1
45 Street	50 Avenue	43 Avenue	Northbound	450	1,160	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	710						1
41 Street	54 Avenue	50 Avenue	Northbound	2,560	4,220	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,660						1

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

CAPACITY ANALYSIS - 10 YEAR (2020) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
Kingsway	59 Street	Glenwood	Eastbound	9,220	15,440	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,220						1
Kingsway	Timberline	Glenwood	Eastbound	9,960	15,970	Collector	Undivided Arterial	800	8,000	2
			Westbound	6,010						1
Kingsway	Queensway	Timberline	Eastbound	4,840	8,440	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,600						1
Kingsway	Tennis Court Road	Queensway	Eastbound	890	2,290	Collector	Local (Residential or Industrial)	100	1,000	1
			Westbound	1,400						2
Kingsway	End of Road	Tennis Court Road	Eastbound	1,080	2,550	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,470						2
Tennis Court Road	Queensway	Kingsway	Northbound	270	330	Collector	Lane	N/A	N/A	N/A
			Southbound	60						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	2,300	3,990	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,690						1
Queensway	Kingsway	Hanger Ln	Northbound	2,940	3,590	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	650						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,390	2,370	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	980						1
Timberline	Kingsway	Athabasca Road	Northbound	2,890	4,520	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,630						1
Glenwood Drive	Glenwood	Kingsway	Northbound	6,290	9,880	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,590						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)

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

CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
1 Avenue	28 Street	25 Street	Eastbound	2,870	4,780	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,910						1
1 Avenue	25 Street	Nelson Street	Eastbound	5,660	10,340	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,680						1
1 Avenue	Nelson Street	16 Street	Eastbound	5,680	11,670	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,990						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	18,790	36,170	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	17,380						1
8 Avenue	25 Street	16 Street	Eastbound	11,040	18,360	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	7,320						1
8 Avenue	16 Street	10 Street	Eastbound	3,930	7,150	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,220						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,250	4,850	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,600						1
Hwy 55	West City Limit	28 Street	Eastbound	5,560	8,270	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,710						1
Hwy 55	28 Street	Hwy 28	Eastbound	11,050	20,440	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	9,390						1
16 Avenue	Hwy 28	16 Street	Eastbound	7,360	12,910	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	5,550						1
16 Avenue	16 Street	10 Street	Eastbound	4,850	7,960	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,110						1
16 Avenue	10 Street	8 Street	Eastbound	4,640	7,830	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,190						1
English Bay Road	North City Limit	1 Avenue	Northbound	10,550	20,090	Collector	Divided Arterial	1,000	10,000	2
			Southbound	9,540						1
English Bay road	1 Avenue	25 Street	Northbound	13,350	24,350	Collector	Divided Arterial	1,000	10,000	2
			Southbound	11,000						2
English Bay road	25 Street	Hwy 28	Northbound	11,090	21,150	Collector	Divided Arterial	1,000	10,000	2
			Southbound	10,060						2
28 Street	English Bay Road	Hwy 55	Northbound	7,100	12,690	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,590						1
25 Street	1 Avenue	English Bay Road	Northbound	4,640	8,710	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,070						2
Nelson Street	1 Avenue	16 Street	Eastbound	2,510	3,960	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,450						1
16 Street	1 Avenue	8 Avenue	Northbound	7,870	11,530	Collector	Undivided Arterial	800	8,000	1
			Southbound	3,660						1
16 Street	8 Avenue	16 Avenue	Northbound	2,180	5,090	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,910						1
16 Street	16 Avenue	10 Street	Northbound	2,550	4,880	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,330						1
10 Street	1 Avenue	8 Avenue	Northbound	2,800	5,510	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,710						1
10 Street	8 Avenue	16 Avenue	Northbound	3,020	6,500	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,480						1
10 Street	16 Avenue	16 Street	Northbound	2,440	4,590	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,150						1
6 Street [5]	16 Avenue	75 Avenue	Northbound	2,440	4,590	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,150						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	27,060	52,890	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	25,830						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	28,420	56,990	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	28,570						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	21,360	46,290	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	24,930						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,950	11,560	Collector	Undivided Arterial	800	8,000	1
			Westbound	6,610						1
69 Avenue	Glenwood	Hwy 28/55	Eastbound	4,320	8,000	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,680						1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,130	16,970	Collector	Undivided Arterial	800	8,000	2
			Westbound	8,840						2
47 Street [6]	69 Avenue	61/62 Avenue	Northbound	4,420	8,485	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	4,065						2
54 Avenue	56 Street	Hwy 28/55	Eastbound	3,160	7,520	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	4,360						2
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,310	9,910	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,600						2
54 Avenue	51 Street	45 Street	Eastbound	6,340	11,490	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,150						1
54 Avenue [7]	45 Street	41 Street	Eastbound	3,795	7,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,335						1
54 Avenue	41 Street	Future Arterial	Eastbound	1,250	2,770	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,520						2
52 Avenue	59 Street	57 Street	Eastbound	2,070	4,980	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,910						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	3,570	8,770	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,200						2
Centre Avenue	59 Street	57 Street	Eastbound	15,000	21,440	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	6,440						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	13,460	23,590	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	10,130						2
50 Avenue	Hwy 28/55	51 Street	Eastbound	7,440	12,700	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	5,260						1
50 Avenue	51 Street	50 Street	Eastbound	6,140	9,750	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,610						1
50 Avenue	50 Street	45 Street	Eastbound	5,990	8,430	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,440						1
50 Avenue	45 Street	41 Street	Eastbound	5,110	7,290	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,180						1
50 Avenue	41 Street	Future Arterial	Eastbound	2,980	4,640	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,660						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,630	4,450	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,820						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	5,430	9,940	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,510						2
59 Street	52 Avenue	Centre Avenue	Northbound	2,780	4,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,230						1
57 Street	54 Avenue	52 Avenue	Northbound	1,940	3,220	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,280						1
57 Street	52 Avenue	Centre Avenue	Northbound	3,610	5,900	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,290						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	18,090	39,620	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,530						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	18,190	37,600	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	19,410						2
Hwy 28/55	50 Avenue	50 Street	Northbound	9,090	20,390	4-Lane Arterial	Divided Arterial	1,000	10,000	1
			Southbound	11,300						2
Hwy 28/55	50 Street	43 Avenue	Northbound	12,470	27,470	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	15,000						2
Hwy 28/55	43 Avenue	South City Limit	Northbound	9,020	18,910	4-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	9,890						2
51 Street	54 Avenue	50 Avenue	Northbound	1,760	3,700	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,940						1
50 Street	50 Avenue	Hwy 28/55	Northbound	6,300	12,290	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,990						1
45 Street	54 Avenue	50 Avenue	Northbound	690	1,130	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	440						1

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

CAPACITY ANALYSIS - 15 YEAR (2025) HORIZON

Corridor	Intersection		Direction	Forecasted Volumes		Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
45 Street	50 Avenue	43 Avenue	Northbound	510	1,380	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	870						1
41 Street	54 Avenue	50 Avenue	Northbound	3,520	5,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,290						1
Future Arterial	69 Avenue	54 Avenue	Northbound	2,320	4,490	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,170						1
Future Arterial	54 Avenue	50 Avenue	Northbound	1,880	3,300	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,420						1
Kingsway	59 Street	Glenwood	Eastbound	10,870	18,070	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	7,200						1
Kingsway	Timberline	Glenwood	Eastbound	12,120	19,630	Collector	Undivided Arterial	800	8,000	2
			Westbound	7,510						1
Kingsway	Queensway	Timberline	Eastbound	5,990	10,470	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,480						1
Kingsway	Tennis Court Road	Queensway	Eastbound	1,090	2,840	Collector	Local (Residential or Industrial)	100	1,000	2
			Westbound	1,750						2
Kingsway	End of Road	Tennis Court Road	Eastbound	1,270	3,050	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,780						1
Tennis Court Road	Queensway	Kingsway	Northbound	300	370	Collector	Lane	N/A	N/A	N/A
			Southbound	70						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	2,760	4,840	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,080						1
Queensway	Kingsway	Hanger Ln	Northbound	3,550	4,340	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	790						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,680	2,880	Collector	Local (Residential or Industrial)	100	1,000	2
			Southbound	1,200						2
Timberline	Kingsway	Athabasca Road	Northbound	3,570	5,580	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,010						1
Glenwood Drive	Glenwood	Kingsway	Northbound	7,310	11,860	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	4,550						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)
6. Assumed daily traffic for 47 Street to be half of daily traffic on 69 Avenue, east of Highway 28/55
7. Assumed daily traffic for 54 Avenue (45 Street to 41 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

Corridor	Intersection From	Intersection To	Direction	Forecasted Volumes: Daily Traffic - Directional	Forecasted Volumes: Daily Traffic - Two Way	Road Classification 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
1 Avenue	28 Street	25 Street	Eastbound	3,360	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,210						1
1 Avenue	25 Street	Nelson Street	Eastbound	6,650	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,560						1
1 Avenue	Nelson Street	16 Street	Eastbound	6,240	12,820	Collector	Undivided Arterial	800	8,000	1
			Westbound	6,580						1
Hwy 28	Hwy 55/16 Avenue	25 Street	Northbound	21,470	42,370	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	20,900						2
8 Avenue	25 Street	16 Street	Eastbound	11,990	20,570	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,580						1
8 Avenue	16 Street	10 Street	Eastbound	4,630	8,540	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,910						1
8 Avenue	10 Street	Lakeshore Drive	Eastbound	2,720	5,930	4-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,210						1
Hwy 55	West City Limit	28 Street	Eastbound	7,370	10,690	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	3,320						1
Hwy 55	28 Street	Hwy 28	Eastbound	14,440	25,720	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,280						2
16 Avenue	Hwy 28	16 Street	Eastbound	8,660	15,310	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Westbound	6,650						1
16 Avenue	16 Street	10 Street	Eastbound	5,820	9,640	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,820						1
16 Avenue	10 Street	8 Street	Eastbound	4,510	8,030	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,520						1
16 Avenue	8 Street	East City Limit	Eastbound	2,370	4,030	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,660						1
English Bay Road [5]	North City Limit	Lake Avenue	Northbound	6,430	12,350	Collector	Undivided Arterial	800	8,000	1
			Southbound	5,920						1
English Bay Road	Lake Avenue	1 Avenue	Northbound	12,860	24,700	Collector	Divided Arterial	1,000	10,000	2
			Southbound	11,840						2
English Bay Road	1 Avenue	25 Street	Northbound	16,370	30,130	Collector	Expressway	1,800	18,000	1
			Southbound	13,760						1
English Bay Road	25 Street	Hwy 28	Northbound	13,510	25,810	Collector	Divided Arterial	1,000	10,000	2
			Southbound	12,300						2
28 Street	English Bay Road	Hwy 55	Northbound	8,640	15,680	Collector	Undivided Arterial	800	8,000	2
			Southbound	7,040						1
25 Street	1 Avenue	English Bay Road	Northbound	5,560	10,510	Collector	Undivided Arterial	800	8,000	1
			Southbound	4,950						1
Nelson Street	1 Avenue	16 Street	Eastbound	2,760	4,360	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,600						1
16 Street	1 Avenue	8 Avenue	Northbound	9,290	13,820	Collector	Undivided Arterial	800	8,000	2
			Southbound	4,530						1
16 Street	8 Avenue	16 Avenue	Northbound	3,850	8,130	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,280						2
16 Street	16 Avenue	10 Street	Northbound	3,810	7,010	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,200						1
16 Street	10 Street	75 Avenue	Northbound	5,720	10,320	Collector	Undivided Arterial	800	8,000	1
			Southbound	4,600						1
10 Street	1 Avenue	8 Avenue	Northbound	3,400	6,720	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	3,320						1
10 Street	8 Avenue	16 Avenue	Northbound	3,560	7,810	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,250						2
10 Street	16 Avenue	16 Street	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
8 Street	16 Avenue	75 Avenue	Northbound	2,840	5,320	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,480						1
6 Street [6]	16 Avenue	21 Avenue	Northbound	2,380	4,680	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,300						1
Hwy 28/55	Hwy 55/16 Avenue	75 Avenue	Northbound	30,680	62,490	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	31,810						2
Hwy 28/55	75 Avenue	69 Avenue	Northbound	31,690	65,550	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	33,860						2
Hwy 28/55	69 Avenue	54 Avenue	Northbound	24,020	52,940	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	28,920						2
75 Avenue	Hwy 28/55	Future Arterial	Eastbound	4,390	9,120	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	4,730						2
69 Avenue	Glenwood	Hwy 28/55	Eastbound	5,590	10,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,480						1
69 Avenue	Hwy 28/55	Future Arterial	Eastbound	8,350	15,790	Collector	Undivided Arterial	800	8,000	2
			Westbound	7,440						1
47 Street [7]	69 Avenue	61/62 Avenue	Northbound	3,720	7,895	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	4,175						2
54 Avenue	56 Street	Hwy 28/55	Eastbound	3,850	9,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,610						2
54 Avenue	Hwy 28/55	51 Street	Eastbound	5,850	10,560	Collector	Undivided Arterial	800	8,000	1
			Westbound	4,710						1
54 Avenue	51 Street	45 Street	Eastbound	6,960	12,620	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,660						1
54 Avenue [8]	45 Street	41 Street	Eastbound	4,600	8,425	Collector	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,825						1
54 Avenue	41 Street	Future Arterial	Eastbound	2,240	4,230	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,990						1
52 Avenue	59 Street	57 Street	Eastbound	2,270	5,460	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	3,190						1
52 Avenue	57 Street	Hwy 28/55	Eastbound	3,920	9,630	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	5,710						2
Centre Avenue	59 Street	57 Street	Eastbound	17,310	24,740	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	7,430						1
Centre Avenue	57 Street	Hwy 28/55	Eastbound	15,540	27,490	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	11,950						2
50 Avenue	Hwy 28/55	51 Street	Eastbound	7,940	13,510	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	5,570						1
50 Avenue	51 Street	50 Street	Eastbound	6,800	10,920	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Westbound	4,120						1
50 Avenue	50 Street	45 Street	Eastbound	6,610	9,340	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	2,730						1
50 Avenue	45 Street	41 Street	Eastbound	6,170	9,220	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,050						1
50 Avenue	41 Street	Future Arterial	Eastbound	4,880	8,320	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Westbound	3,440						1
50 Avenue	Future Arterial	Baywood Road	Eastbound	2,070	3,630	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	1
			Westbound	1,560						1
43 Avenue	Hwy 28/55	45 Street	Eastbound	6,220	11,240	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,020						1
59 Street	52 Avenue	Centre Avenue	Northbound	3,050	4,400	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,350						1
57 Street	54 Avenue	52 Avenue	Northbound	2,130	3,530	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
57 Street	52 Avenue	Centre Avenue	Northbound	3,960	6,470	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Hwy 28/55	54 Avenue	52 Avenue	Northbound	20,930	45,540	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	24,610						2
Hwy 28/55	52 Avenue	50 Avenue	Northbound	20,540	42,490	4-Lane Arterial	Expressway	1,800	18,000	2
			Southbound	21,950						2
Hwy 28/55	50 Avenue	50 Street	Northbound	10,700	23,730	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	13,030						2
Hwy 28/55	50 Street	43 Avenue	Northbound	14,520	32,070	4-Lane Arterial	Expressway	1,800	18,000	1
			Southbound	17,550						1
Hwy 28/55	43 Avenue	40 Avenue	Northbound	10,330	21,420	4-Lane Arterial	Divided Arterial	1,000	10,000	2
			Southbound	11,090						2
Hwy 28/55 [9]	40 Avenue	South City Limit	Northbound	5,165	10,710	4-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,545						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 2000 TPS [1]	Road Classification City of Cold Lake [2]	Lane Capacity for Road Classification (veh/hour/lane) [3]	Lane Capacity for Road Classification (veh/day/lane) [4]	Number of Lanes Required (One Direction)
	From	To		Daily Traffic - Directional	Daily Traffic - Two Way					
51 Street	54 Avenue	50 Avenue	Northbound	1,980	4,210	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,230						1
50 Street	50 Avenue	Hwy 28/55	Northbound	7,170	13,980	Collector	Undivided Arterial	800	8,000	1
			Southbound	6,810						1
45 Street	54 Avenue	50 Avenue	Northbound	700	1,150	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	450						1
45 Street	50 Avenue	43 Avenue	Northbound	960	2,420	Collector	Local (Residential or Industrial)	100	1,000	1
			Southbound	1,460						2
41 Street	54 Avenue	50 Avenue	Northbound	3,870	6,380	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,510						1
Future Arterial	75 Avenue	69 Avenue	Northbound	6,900	12,070	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,170						1
Future Arterial	69 Avenue	54 Avenue	Northbound	6,510	12,080	2-Lane Arterial	Undivided Arterial	800	8,000	1
			Southbound	5,570						1
Future Arterial	54 Avenue	50 Avenue	Northbound	4,730	8,570	2-Lane Arterial	Collector (Residential or Industrial)	400	4,000	2
			Southbound	3,840						1
Kingsway	59 Street	Glenwood	Eastbound	12,400	20,620	2-Lane Arterial	Divided Arterial	1,000	10,000	2
			Westbound	8,220						1
Kingsway	Timberline	Glenwood	Eastbound	14,040	22,750	Collector	Divided Arterial	1,000	10,000	2
			Westbound	8,710						1
Kingsway	Queensway	Timberline	Eastbound	7,020	12,210	Collector	Undivided Arterial	800	8,000	1
			Westbound	5,190						1
Kingsway	Tennis Court Road	Queensway	Eastbound	1,280	3,300	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,020						1
Kingsway	End of Road	Tennis Court Road	Eastbound	1,440	3,480	Collector	Collector (Residential or Industrial)	400	4,000	1
			Westbound	2,040						1
Tennis Court Road	Queensway	Kingsway	Northbound	330	400	Collector	Lane	N/A	N/A	N/A
			Southbound	70						N/A
Queensway	Tennis Court Road	Kingsway	Northbound	3,130	5,570	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	2,440						1
Queensway	Kingsway	Hanger Ln	Northbound	4,100	5,010	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	910						1
Timberline	Juniper Avenue	Kingsway	Northbound	1,920	3,320	Collector	Collector (Residential or Industrial)	400	4,000	1
			Southbound	1,400						1
Timberline	Kingsway	Athabasca Road	Northbound	4,170	6,480	Collector	Collector (Residential or Industrial)	400	4,000	2
			Southbound	2,310						1
Glenwood Drive	Glenwood	Kingsway	Northbound	8,460	13,730	2-Lane Arterial	Undivided Arterial	800	8,000	2
			Southbound	5,270						1

1. Road classification based on 2000 Transportation Study
2. Road classification based on Daily 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 (attached). Using road classification according to City's standards.
4. Based on assumption that PM peak hour traffic is 10% of the daily traffic
5. Assumed daily traffic for English Bay Road (North City Limit to Lake Avenue) to be half of daily traffic on English Bay Road (Lake Avenue to 1 Avenue)
6. Assumed daily traffic for 6 Street to be similar to 10 Street (16 Avenue and 16 Street)
7. Assumed daily traffic for 47 Street to be half of daily traffic on 69 Avenue, east of Highway 28/55
8. Assumed daily traffic for 54 Avenue (45 Street to 41 Street) to be average of daily traffic on 54 Avenue (51 Street to 45 Street) and 54 Avenue (41 Street to Future Arterial)
9. Assumed daily traffic for Highway 28 (40 Avenue to South City Limit) to be half of daily traffic on Highway 28 (43 Avenue to 40 Avenue)