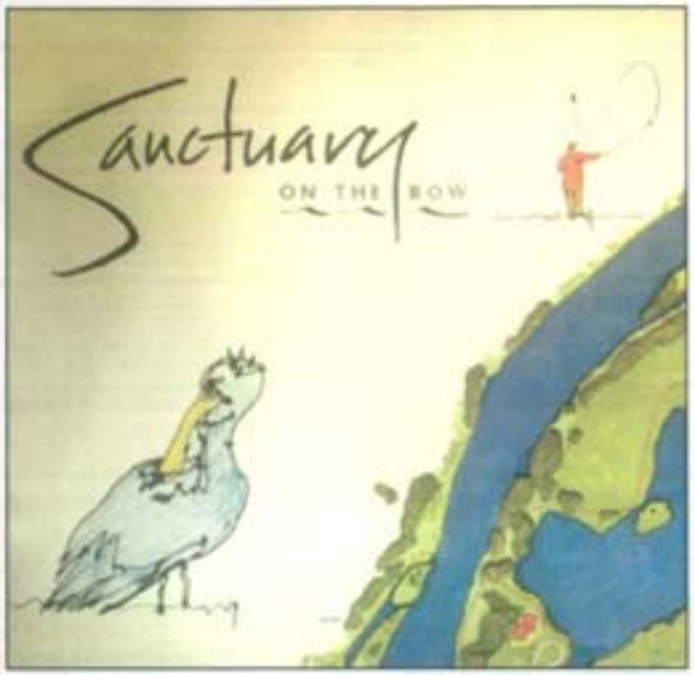

The Sanctuary on the Bow
Area Structure Plan

ADOPTED

Submitted to: The Municipal District of Foothills No. 31

Prepared by: Sherbrooke Investments Limited
& Dillon Consulting Limited

October 2006

Sanctuary on the Bow

Area Structure Plan

October 2006

Prepared by

Sherbrooke Investments Limited

And

DILLON
CONSULTING

On behalf of

The Municipal District of Foothills No. 31

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1.0 INTRODUCTION

Sanctuary on the Bow is a unique residential community situated along the Bow River in the Municipal District of Foothills No. 31. It was designed and will be developed to exist in harmony with nature and the surrounding area. It has been intentionally scrutinized from every angle, using conservation planning and Best Management Practices in all aspects of its form. Located in the Municipal District of Foothills No. 31, this one hundred and seventy three (173) unit housing development has been conceived with conservation in mind. Best Management Practices established in the BRBC's (Bow River Basin Council) document entitled "*Protecting Riparian Areas: Creative Approaches to Subdivision and Development in the Bow River Basin*", May 2002 are used as guidelines. This property has been privately held by Sherbrooke Investments Limited since 1967. *Sanctuary on the Bow* is to become a conservation community creating a coexistence of habitat for people, fish, birds, vegetation, and animals. Incorporation of formal planning and conservation tools will promote perpetual stewardship of archaeological and natural resources.

1.1 Purpose of the Plan

The *Sanctuary on the Bow Area Structure Plan* (ASP), here after known as The Plan, has been prepared pursuant to provincial legislation in order to provide for the orderly development of a residential and recreational community. The Plan is more detailed than the M.D. of Foothills Municipal Development Plan, and is intended to provide a framework for continued subdivision and development within the Plan Area.

In accordance with Part 17 of the Municipal Government Act (MGA), the Council of a Municipality may, by by-law, adopt the Plan as a statutory document.

The *Sanctuary on the Bow ASP* has been prepared in accordance with provincial requirements outlined in s.633 (1) of the *Municipal Government Act* (MGA) *(Statutes of Alberta, 1994, Chapter M-26.1).*

> *633(1) For the purpose of providing a framework for subsequent subdivision and development of an area of land, a council may, by bylaw, adopt an area structure plan.*
>
> *(2) An area structure plan*
>
> *(a) must describe*
>
> *(i) the sequence of development proposed for the area,*
> *(ii) the land uses proposed for the area, either generally or with respect to specific parts of the area,*
> *(iii) the density of population proposed for the area either generally or with respect to specific parts of the area, and*
> *(iv) the general location of major transportation routes and public utilities,*
>
> *and*
>
> *(b) may contain any other matters the council considers necessary.*

The ASP was prepared in accordance with the Municipal District of Foothills Municipal Development Plan and Land Use Bylaw and complies with the Municipal "Guideline for the Preparation of Area Structure Plans." Technical information required to complete this Plan was obtained in consultation with the Municipal District of Foothills Staff.

Direction for the Plan was provided by the Municipal Development Plan, and examines and addresses the following issues:

a) The proposed land use;
b) The sequence of development;
c) The location of proposed and existing roads and public utilities ,
d) The location of reserves;
e) Water supply and public sewage provisions;
f) The developability of the land;
g) The method of stormwater management and implementation of "Best Management Practices"; and
h) Impact, if any, on surrounding land uses.

1.2 Objectives of the ASP

The objectives of the Plan are as follows;

A. To ensure that the review of any subdivision and/or development proposal is conducted on the basis of approved policies and guidelines for the Plan Area.
B. To define a land use strategy that is in conformity with the overall principles of the Municipal Development Plan.
C. To conform to the provisions of the Municipal Government Act, and applicable provincial standards and regulations.

1.3 The Approval Process

The Municipal District of Foothills No. 31 requires the preparation of an Area Structure Plan to provide a framework for subsequent subdivision and development within the Plan Area. The ASP establishes the framework for the subsequent land use, subdivision and development of the subject property.

The landowner/developer, in conjunction with municipal planning staff, sought community and municipal input at various stages in the planning process. This has resulted in refinement and improvement of the overall development concept for the subject lands.

A public consultation program was undertaken by the landowner/developer prior to the formal submission of the Plan for approval. Nine hundred (900) invitations were sent to landowners in the Dunbow Road/Davisburg areas advising them of an open house at the DeWinton Hall on the evening of 7 April 2005. There were 92 attendees signed in at that open house.

A second Open House was held on May 19, 2005 to answer questions and provide further clarification of issues raised at the first open house. Nine hundred and sixty (960) invitations were mailed to landowners in the same vicinity, and an ad was placed in the Okotoks Western Wheel. There were 50 signed-in attendees at that open house.

Following circulation and subsequent review, a statutory Public Hearing was held on January 26, 2006.

On February 2, 2006 Council tabled its decision regarding the application for the Sanctuary on the Bow Area Structure Plan and accompanying redesignation application in N.1/2 3-22-29 W4 and S.E. 10-22-29 W4 in order to allow the developers an opportunity to provide information regarding the potential of the lands to flood and a written response from Alberta Environment with respect to that information.

First reading of the adopting Bylaw 131/2006 was given September 5, 2006.

Second and third reading was obtained _____, 2006 and Bylaw 131/2006 was adopted.

The *Sanctuary on the Bow Area Structure Plan* does not supersede, repeal, replace or regulate or otherwise diminish any Statutory Plan in effect in the Plan Area.

1.4 Plan Implementation, Review, and Amendment

The Sanctuary on the Bow Area Structure Plan, adopted by Bylaw ___/05 in accordance with Part 17 of the Municipal Government Act, is a statutory document of the Municipal District of Foothills No. 31. The ASP does not supersede, repeal, replace, or regulate or otherwise diminish the Intermunicipal Development Plan, or other statutory plans in effect in the Plan Area.

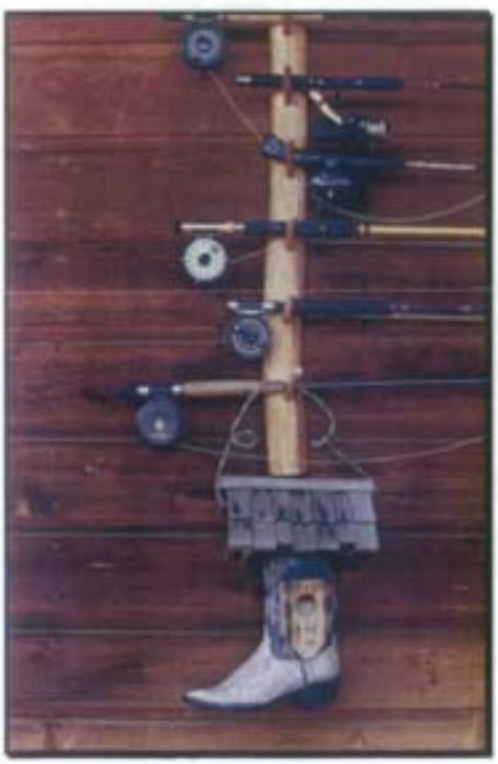
The ASP is designed to establish long-term planning strategies and guidelines for the Plan Area. Because of its long-term nature, changing considerations such as environmental, social or economic factors may require periodic review and occasional amendment of the Plan. Council through monitoring of subdivision and development approvals may initiate amendment of the ASP in accordance with part 17 of the MGA. In addition, the landowner(s) or their agent(s) may request by application to amend the ASP in accordance with the requirements and procedures of the same Section.

1.4.1 Periodic review and occasional amendment of the *Sanctuary on the Bow Area Structure Plan* may be required in accordance with the *Municipal Government Act*.

1.5 Interpretation

In this Plan:

a) "**Concept Plan**" means a land use concept prepared for the Plan Area.
b) "**Council**" means the Council of the Municipal District of Foothills No. 31.
c) "**Developer**" means Sherbrooke Investments Ltd.
d) "**Plan**" means The *Sanctuary on the Bow Area Structure Plan.*
e) "**Subdivision Approving Authority**" means the Council of the Municipal District of Foothills No. 31.
f) "**Plan of Subdivision**" means a detailed proposal for development of the land and forms the basis for an application for subdivision.
g) "**Residual Lands**" means all lands within the Plan Area, which are not identified for residential, recreational, reserve, amenity, roadway, or utility uses by the Plan.



2.0 THE PLAN AREA

2.1 Regional/Municipal Location (see Figure 1)

The Plan Area is located within the Municipal District of Foothills No. 31 directly contiguous to the south of the Bow River, and approximately one-quarter mile north of Dunbow Road. Access from the parcel is via 40th Street East, Dunbow Road, and Highway 2 (Deerfoot Trail), which is approximately two kilometres west of the site.

2.2 Definition of the Plan Area

Boundaries of the Plan Area (see Figure 2).

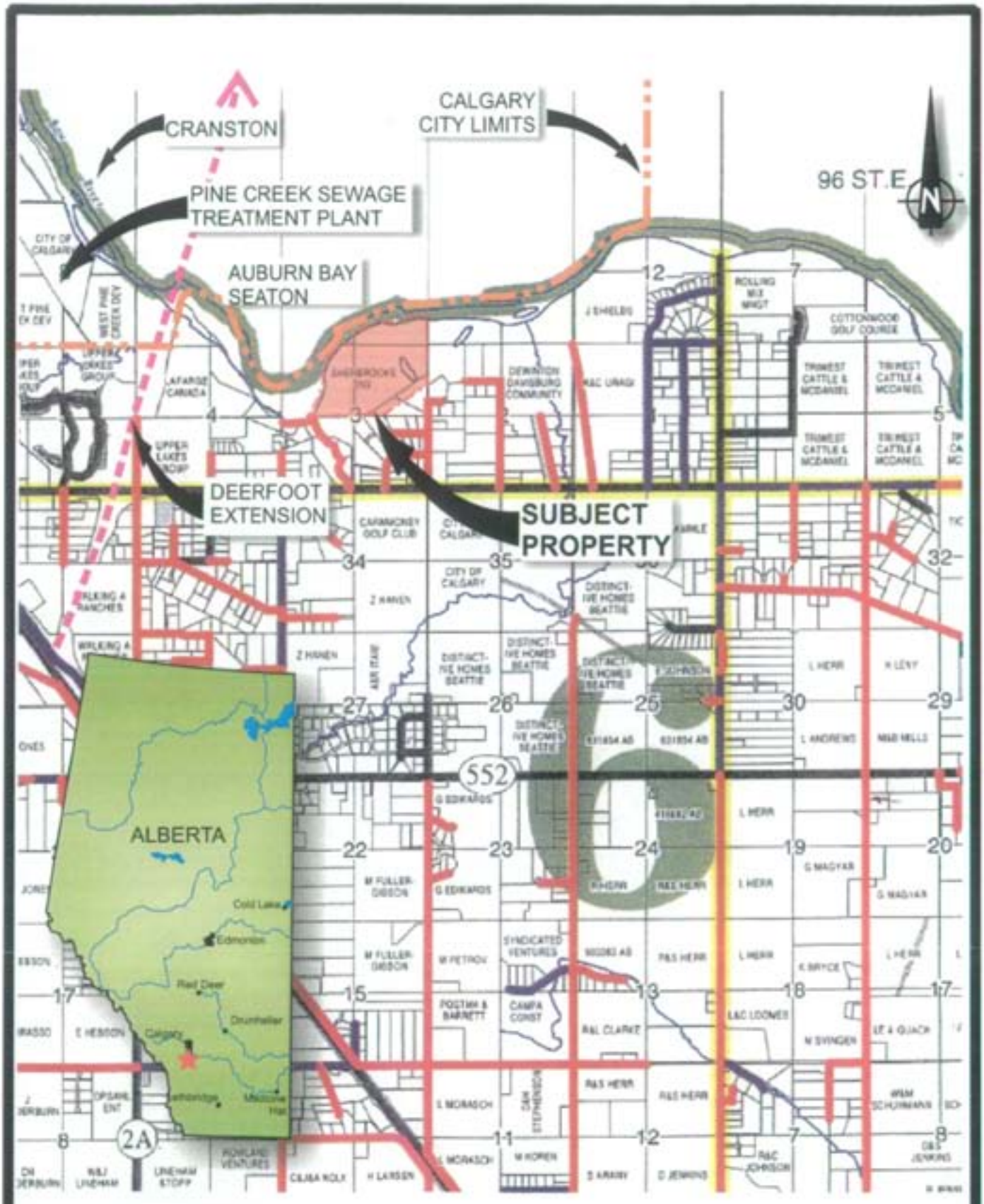
The Plan Area is described as those portions of Section 03 and Section 10; Township 22; Range 29; West of the 4th south of the Bow River with acreage amounts as follows:

Quarter Section	Acres	Ha
NW ¼ 3	85.8	34.72
SE ¼ 10	41.20	16.67
NE ¼ 3	159.73	64.64
TOTAL	286.73	116.03

2.3 General Physical Description and Area Land Uses

The Plan Area borders the Bow River to the north and the river valley escarpment on the south. A mix of residential and country residential development exists above the escarpment, and the general area contains a mix of minor and major home occupations, particularly along Dunbow Road. The majority of the Plan Area is flat with only minor topographic undulations to the east and south. The vegetation is characteristic of the foothills fescue natural sub region containing a mixture of poplar, willow, trembling aspen, wolf willow, and kinnikinnick.

Natural drainage traverses the property generally in a north-west to south-east direction.



DILLON CONSULTING

DESIGN	RCB
CHECKED	KJB
APPROVED	
DATE	2005.08.24
SCALE	NTS

SANCTUARY ON THE BOW

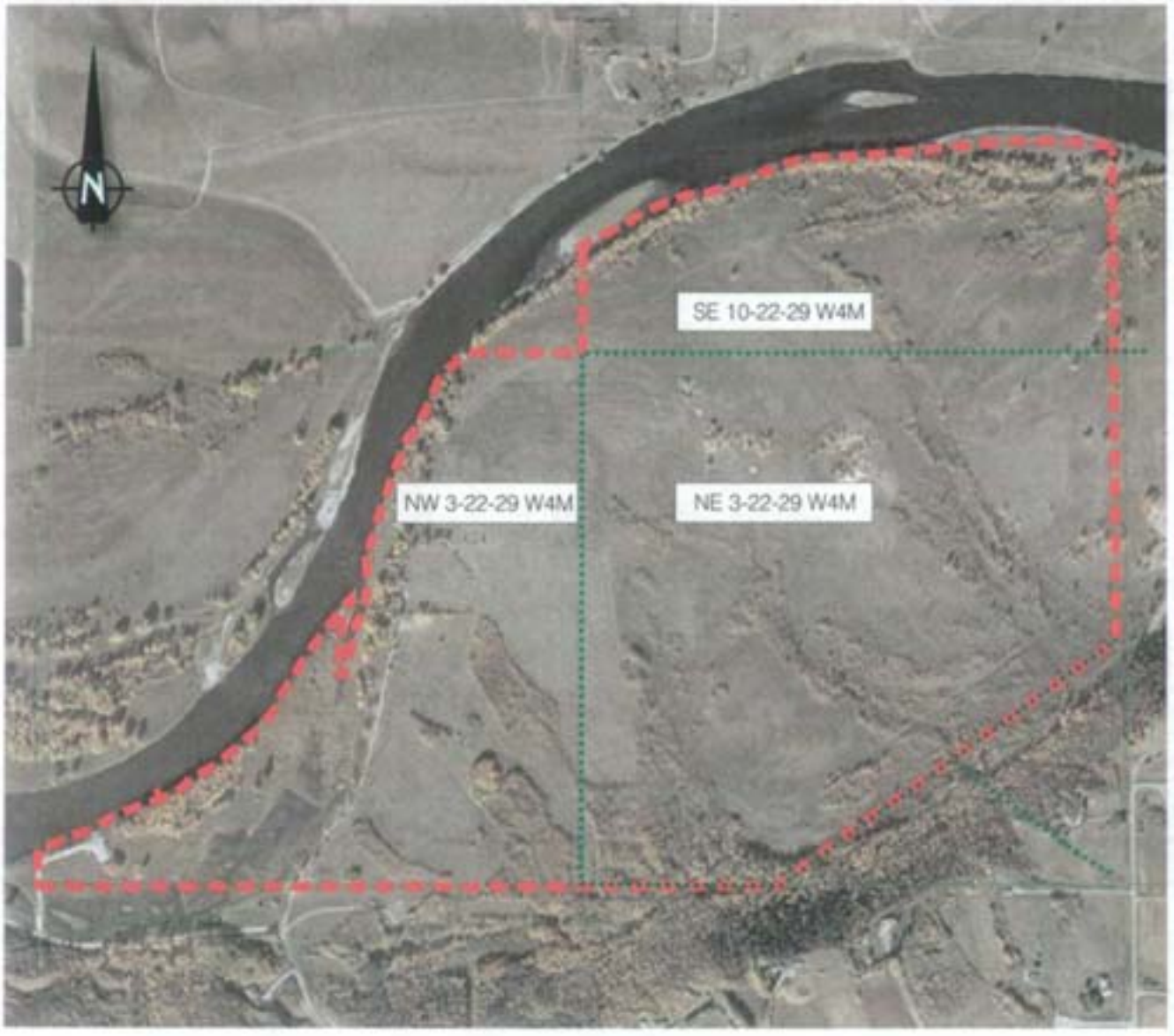
LAND USE CONCEPT PLAN

PNT. SEC 3 & 10 TWP RGE 29 W4M

055079

SITE LOCATION PLAN

FIG 1



Quarter Section	Area
NW Sec. 3	34.72 Ha (85.8ac)
SE Sec. 10	16.67 Ha (41.20ac)
NE Sec. 3	64.64Ha (159.7ac)
Total	287.7ac

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LAND USE CONCEPT PLAN
PNT. SEC 3 & 10 TWP 22 RGE 29 W4M

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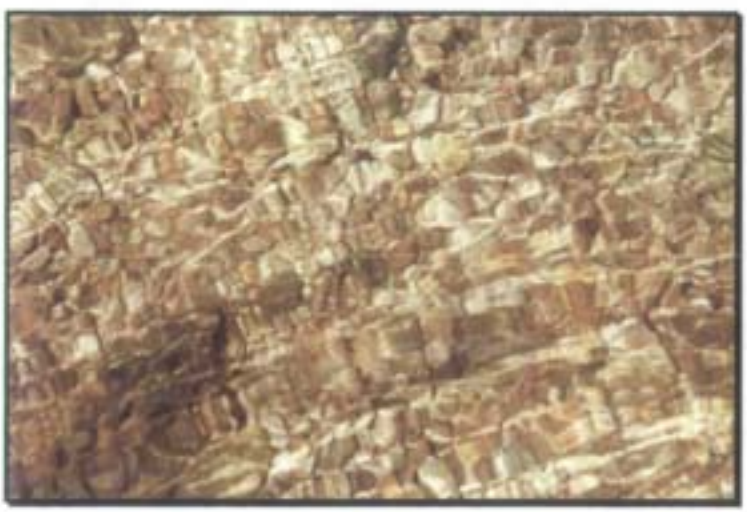
PLAN AREA BOUNDARY

FIG 2

2.4 Best Management Practices

It is recognized that The Plan Area is located within a landscape that contains features such as wildlife and plant diversity, and it is also, located adjacent to one of the most significant waterbodies in Canada, the Bow River. As the long term landowner, the Developer wants to ensure that the integrity of the landscape is maintained. Therefore, The Plan will include Best Management Practices (BMPs) for stormwater management.

Best Management Practices offer an alternative to traditional stormwater management. BMPs utilize existing natural features as well as integrate landscaping features and "water wise" designs within development to reduce runoff rates and to encourage water re-use. Ultimately, BMPs are designed to achieve pre-development runoff rates. This is accomplished through the reduction of impervious surfaces and an increase in water infiltration on the building envelope. A low impact development approach will prevent degradation to the Bow River, its riparian corridor, and downstream areas. In fact, BMPs contain and/or contribute to the biological and chemical complexities found in natural environments. For example, the design and construction of wetlands and bioretention areas strive towards mimicking natural functions such as water detention, water treatment, and infiltration. To safeguard the design and long term implementation and maintenance of BMPs they are included in the design guidelines for the development.



3.0 PLAN GOALS AND OBJECTIVES

3.1 Goals and Objectives of the Plan

- To plan a residential development achieving a high standard of design, aesthetic appeal and environmental stewardship in conformance with existing provincial, regional and municipal policy documents.

- To act as a guide under which the Municipal District can review and evaluate specific development proposals.

- To establish policies which will direct proposed land use, open space, population density, location of transportation routes, location and methods of utility servicing, phasing of development, as well as site specific issues such as river engineering and development setbacks and such other matters as Council deems necessary.

3.2 Principles of Development

The major objectives of development are as follows:

a. To ensure all development is in accordance with current statutory policy, provincial, and municipal standards.
b. To provide for residential land use in a manner which is sensitive to the rural surroundings and natural environment.
c. To create design guidelines that safeguard environmental features and archaeological resources.
d. To provide a high quality of design and development for the project including residential and recreational uses and method of servicing.
e. To incorporate Best Management Practices at a building envelope and regional level to prevent impact on the Bow River.
f. To encourage recreational development that is compatible with the surrounding area and takes advantage of natural physical features.
g. To provide, where appropriate, recreational and residential uses within the Plan Area.
h. To acknowledge the existing topography, sensitive vegetation, and riparian zones.
i. To address any significant historic sites in the Plan Area.
j. To ensure the provision of municipal reserve.
k. To establish a future road network that will provide for the safe and efficient movement of traffic in accordance with the long term goals of the Municipal District of Foothills, No. 31.
l. To provide a high standard of utility services which will not detrimentally affect adjacent and downstream communities.
m. To develop an efficient internal roadway system.

n. To phase development in a logical and efficient manner and in a consistent manner with market demand.

o. To ensure that environmental reserve dedication is provided on lands that qualify at the discretion of the Municipal District of Foothills No. 31.

p. To allow the utilization of such environmental areas for public and private outdoor recreational activities such as walking, hiking, fishing, and wildlife viewing.

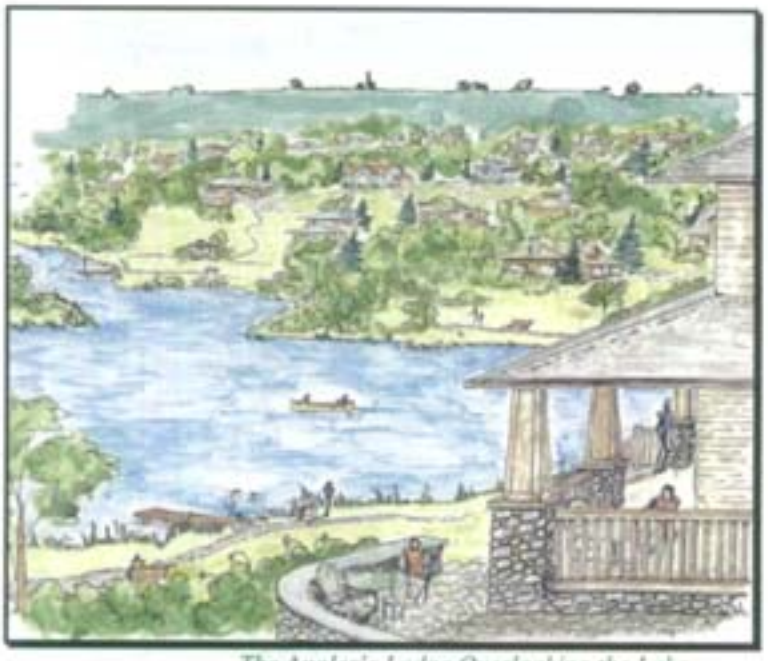
Mandatory Porch front with architectural detailing

4.0 PLAN POLICIES

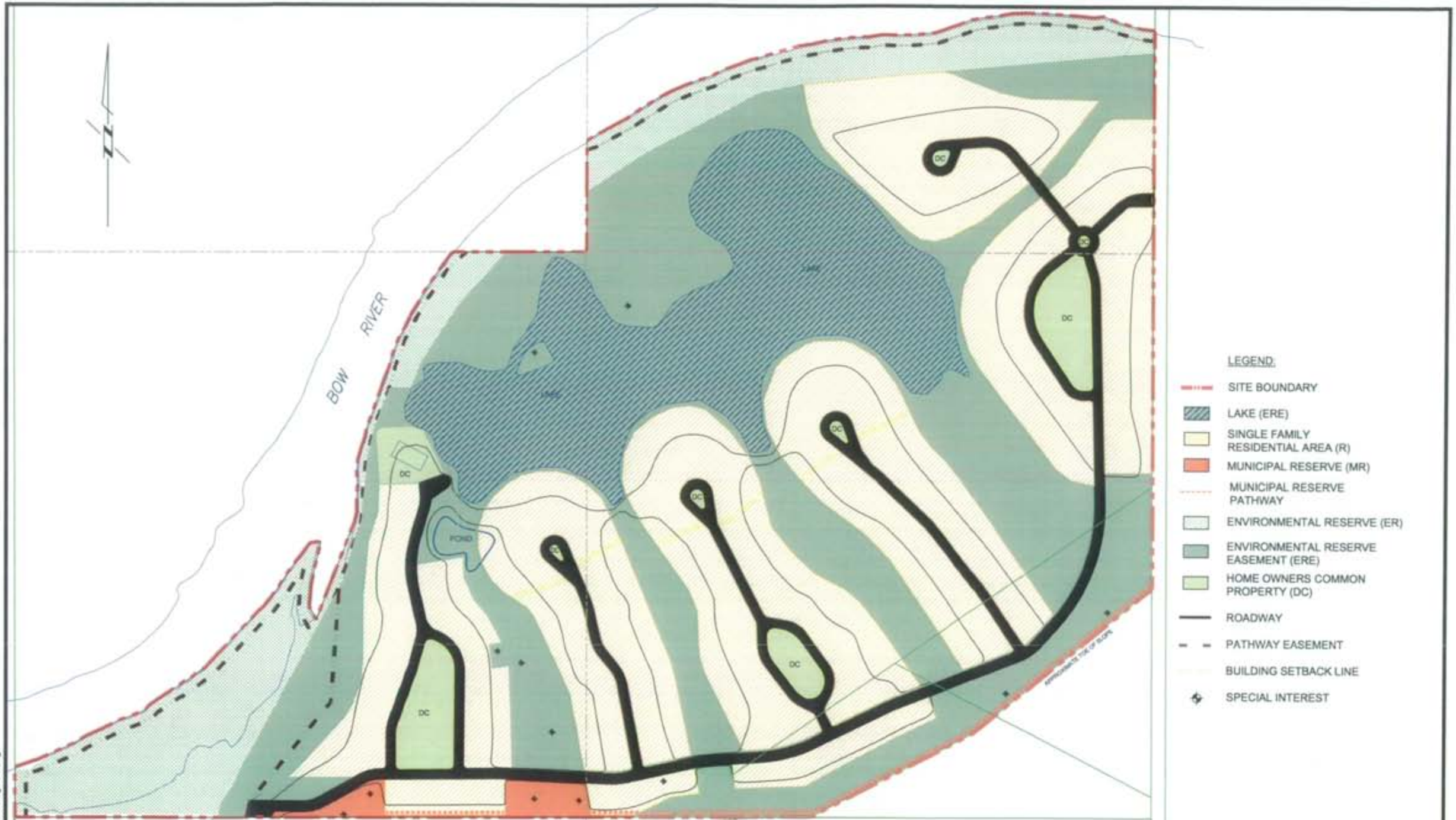
4.1 The Plan Concept (see Figure 3)

This section discusses the implementation of the Area Structure Plan objectives and principles of development identified in Section 3.0 as applied to the *Sanctuary on the Bow* Plan Area and reflected in the Land Use Concept Plan (***Figure 3***). *Sanctuary on the Bow* is proposed to contain one hundred seventy three (173) residential lots to be subdivided and developed in phases as market forces dictate. The proposed housing density to be contained within the two hundred and eighty six (286.73) acre Plan Area boundary translates into 0.60 units per gross acre or 1.65 gross acres in title for every unit developed.

It is anticipated that all of the one hundred and seventy three (173) units will be single-family residential housing types on various lot sizes and widths. The Plan Area will be centrally serviced with piped water and wastewater servicing. The Plan Area includes passive recreational use (fish habitat and bird sanctuary), proposes the dedication of both Municipal and Environmental Reserve parcels, and contains an extensive pathway system. The project shall incorporate educational interpretive sites describing known historic and/or archaeological resources, and seasonal Bow River inhabitants (aquatic, wildlife and bird species). The property will be developed as a fee-simple project, with some site-specific variations to development standards, to better accommodate the non-intrusive vision of development for this site.



The Angler's Lodge Overlooking the Lake



DILLON CONSULTING

DESIGN KJKB
DRAWN
APPROVED
DATE 2006.10.23
SCALE 1:5000

SANCTUARY ON THE BOW

LAND USE CONCEPT PLAN
PNT. OF SEC 3 & 10 TWP. 22 RGE 29 W4M

PROPOSED LOT LAYOUT

SCALE 1:5000 0 100 200m

DILLON PLS NO. 050079

FIG 3

g:\cad\050079\dwg\ updated oct\dwg\figure 3.dwg

4.2 Land Use Concept Goals:

To comprehensively plan a residential and recreational development achieving a high standard of design, aesthetic appeal and environmental stewardship in a setting that promotes and enhances the natural environment.

The *Sanctuary on the Bow Area Structure Plan* provides the Municipal District of Foothills with a planned development consisting of residential land use, passive recreational development, in the form of a fish habitat and bird sanctuary, an extensive pathway system, and related utility systems to service the development.

The ASP provides the Municipal District of Foothills with a framework on which to evaluate future redesignation and subdivision applications within the Plan Area. It allows for, but is not limited to:

i. The provision of full scale utility systems in terms of water and sewer;
ii. Integration of Best Management Practices for stormwater;
iii. The provision of a passive recreation area in the form of a fish estuary, bird sanctuary and extensive pathway system;
iv. The provision of a community meeting facility, with associated community space;
v. Economic viability of the amenities and infrastructure both in terms of utility servicing and recreation uses; by comprehensively planning and developing the entire area, and;
vi. The review and resolution of external transportation issues prior to development.

Principle: *To ensure all development is in accordance with current statutory policy and municipal standards.*

Figure 3 conceptually illustrates a proposed land use plan for the Plan Area. **Appendix A** contains the conceptual lot layout proposed for the site. **Appendix B** is an artists conceptual rendering of the site in context. The Plan provides for recreational use, along with residential uses, a community use facility and municipal reserve (MR), environmental reserve (ER) and Environmental Reserve Easement (ERE) provisions.

The key land use elements are the recreational development; which provides a community focus and environmental stewardship and awareness; and the residential lands, with the required utility systems, and a "The Angler's Lodge" a community facility.

The proposed development layout is aimed at maximizing the site potential, topography, and natural features, while minimizing any impact on adjacent lands, the Bow River or the existing Policeman's Flats recreational area.

The overall theme of the concept provides a comprehensively designed recreational and residential development in a park like setting, which is in keeping with the current legislation and is in harmony with the natural features of the site.

4.3 The Land Use Concept

Sanctuary on the Bow is planned with openness to its design, embracing the natural landscape and topography, and creating a sense of community. There are a number of features that will contribute to this objective including:

Lot Structure: *Sanctuary on the Bow* will not have a typical lot structure; the fenceless design promotes connections within the community between neighbours and within nature.

Best Management Practices: The Design Guidelines require Best Management Practices to sustain surrounding natural features and the unique approach to development.

Dwelling Design: A diverse range of housing types and sizes unified by a consistent architectural standard is proposed. Each home and neighbourhood can be distinctive, yet the community as a whole will be cohesive, and each neighbourhood will compliment and uphold the other. Innovative lot sizing will allow for a blend and variety of home designs attracting residents with different family sizes and spatial needs.

Front Porches: The Design Guidelines (***Appendix C***) require that all homes incorporate a front porch to provide a consistent, inviting, and traditional design to the front façade.

Pathways: *Sanctuary on the Bow* incorporates pathway systems for public use and access to the Bow River. Traditionally this access has been used for horseback or foot traffic.

4.4 Residential Land Use

Principle:

To provide for residential land use in a manner which maximizes the retention of natural features and is sensitive to the rural surroundings, the environment and existing development in the area.

The 173 single family residential sites can be accommodated under Section 14.0.0 "Residential District" in the MD of Foothills current Land Use Bylaw.

Single Family Dwelling – no dominant front garage

Policies:

4.4.1 The residential development shall conform to provisions of the Foothills Land Use Bylaw including the general and specific setback requirements from highways, property lines and internal roads.

4.4.2 The residential development shall contain a maximum of one hundred and seventy three (173) residential units. The residential units shall not exceed 0.60 units per acre (or 1.65 acres for every unit developed) and shall be a variety of sizes to a maximum of 1.045 ha (2.58 acres).

4.4.3 All subdivision and development shall be in conformity with the provisions of the Municipal Government Act, The Municipal District of Foothills Land Use Bylaw, and *The Sanctuary on the Bow Design Guidelines* (**Appendix C**).

4.4.4 Development Approval shall be conditional upon a signed Development Agreement between the Municipal District of Foothills and the Developer.

4.4.5 Internal subdivision roads shall be constructed to municipal standards at the sole cost of the Developer. The Municipality shall assume maintenance of the internal roads upon issuance of a Final Acceptance Certificate.

4.4.6 In accordance with Municipal Stormwater policies, the internal road design shall address stormwater management and ensure that existing drainage patterns are retained. Post-development flows shall not exceed pre-development flows. A Master Drainage Plan shall be submitted at the land use redesignation stage.

4.4.7 The development will be fully serviced with piped utilities for water and sanitary sewer, while stormwater management will be based on Best Management Practices. The Developers may supply the amenity site with potable water and/or wastewater and/or tie-ins to adjacent properties at the discretion of the Municipality and with approval of provincial agencies.

4.4.8 The Developer shall be responsible for the creation and maintenance of the lake until such time as the Homeowner's Association is established. Once established the lake, lake amenity (Angler's Lodge), and common property (i.e. ERE areas) will then be transferred to the *Sanctuary on the Bow* Homeowner's Association for ongoing operation and maintenance.

4.5 Sanctuary on the Bow Homeowner's Association

4.5.1 Upon reaching a predetermined number of occupants, the Developer will assign ownership, operation and maintenance of common property and Environmental Reserve Easement areas to the *Sanctuary on the Bow* Homeowner's Association which will be a legally incorporated body under the Societies Act c.S-14 of Alberta. The Homeowner's Association will also be responsible for enforcement of the Design Guidelines, contracting of communal garbage collection, and operation of the lake and lake amenity (Angler's Lodge).

4.6 Private Community Amenity

The Developer is providing a private community amenities in the form of a large private lake and an Angler's Lodge within the Plan Area located on land that shall be assigned to the Homeowner's Association. The Lake will be developed, operated and maintained by the Developer until such time as the title can be legally transferred to the Homeowners Association. It is critical to the success of the project that the lake be controlled and maintained to the highest standard. The Angler's Lodge will be available to the Homeowner's Association for both private and public functions. This amenity will be characterized as a private facility for the benefit of the Homeowner's Association. It is anticipated that the Angler's Lodge will have a kitchen and lounge. The development of the Angler's Lodge will be subject to permits required by the Municipality and/or applicable Provincial agencies. The Angler's Lodge may support a part-time caretaker's residence, but is not to be utilized as a full time residential dwelling unit.

4.6.1 The Developer shall operate and maintain the private amenity spaces until such time as they can be assigned to the *Sanctuary on the Bow Homeowner's Association* for continued operation and maintenance.

4.6.2 The Angler's Lodge is for the sole private use of the *Sanctuary on the Bow Homeowner's Association*, they may choose to support public functions at this location at their discretion.

4.6.3 The Angler's Lodge may support a part-time caretaker's residence but shall not be utilized for full time residential occupancy.

4.6.4 The Municipality shall not assume operation or maintenance of the Lake or lake amenity.

4.7 Environmental Considerations

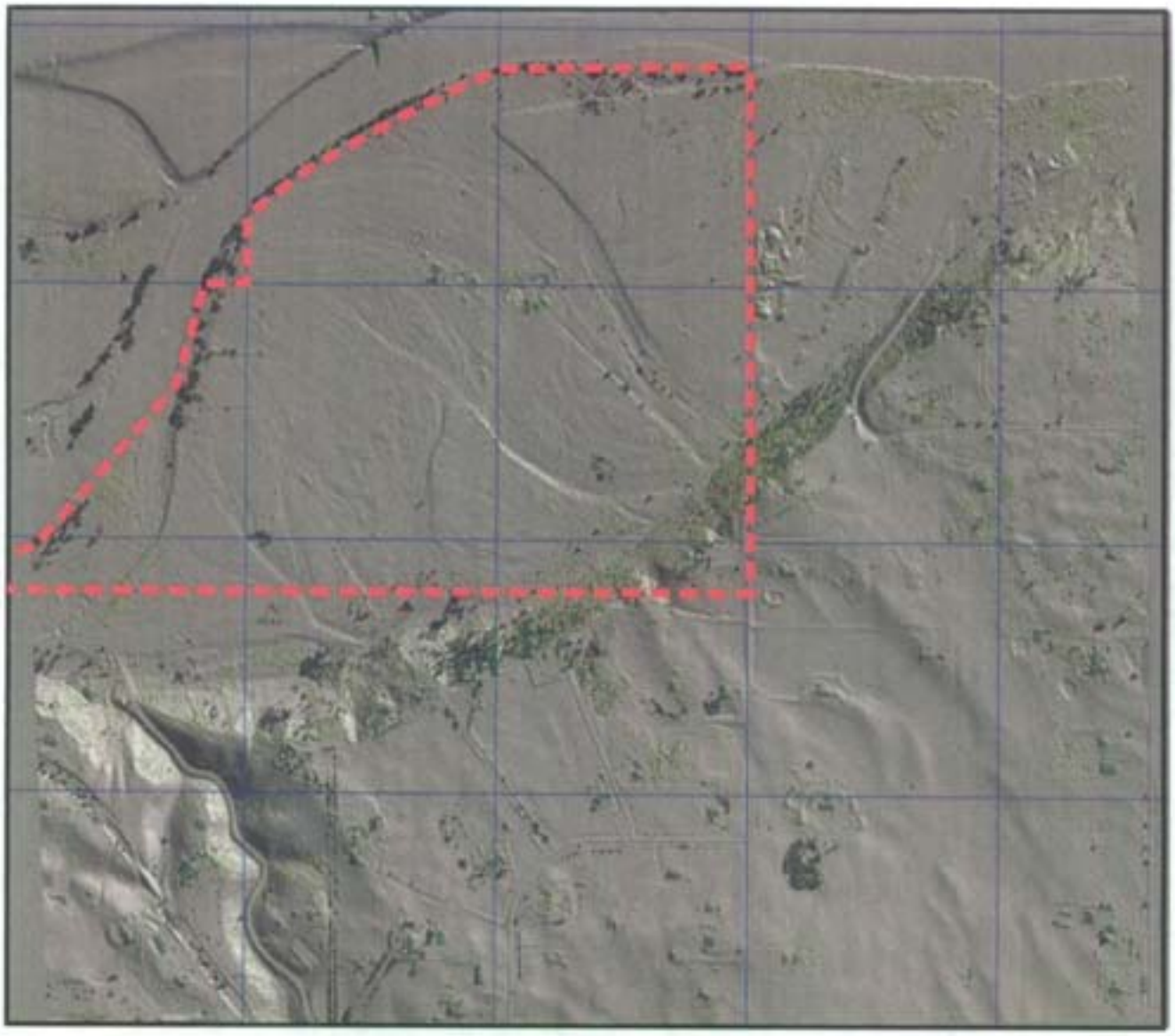
A key component to the *Sanctuary on the Bow* Plan is consideration of the retention of natural habitat and the extent impacts of development on the landscape can be mitigated. Therefore, the Developer has included specific strategies to reduce the impact of development in this area including:

- Incorporating a high degree of permeable surfaces within the development area.
- Prohibiting the use of chemicals, fertilizers, de-icing products and salts.
- Retaining over 50% of natural habitat areas.
- Developing an integrated stormwater management plan based on Best Management Practices and water conservation practices.
- Incorporating Cluster-style development with a high degree of retention of open space and tree cover.
- Utilizing central water and sewer servicing to promote sustainability.
- Retention of primary and secondary wildlife corridors.
- Increasing the amount of landscaping within disturbed areas post construction.
- Discouraging fencing of any kind.
- Replicating the seed mix of native grasses and re-planting of that mix on all disturbed areas.
- Respecting setbacks and buffering from riparian areas.
- Incorporating habitat areas in the landscape and the lake.
- Provision of recreational pathways that are well defined and can be closed during seasonal breeding periods.
- Provide for a bird sanctuary along the Bow River.

4.7.1 Environmental Policies

An Environmental Overview was prepared by MSES for this site and is included in **Appendix D**. A detailed topographic assessment of the site was undertaken using light imaging data retrieval and is included in **Figure 4**. The overview assesses the baseline habitat pre-development, the percentage of habitat disturbed, mitigation strategies to reduce loss of habitat, and percentage of new habitat resulting from development.

The following policies are based upon information gathered from a reconnaissance survey of the site, discussions with development managers and Alberta Sustainable Resources Development staff, and the judgment of trained professional biologists.



PLAN AREA BOUNDARY

+- 500m²

REDUCED FROM ORIGINAL OF 1:7500 m

DILLON CONSULTING

RCB

KJB

2008.08.24

NTS

SANCTUARY ON THE BOW

LAND USE CONCEPT PLAN

PNT. SEC 3 & 10 TWP RGE 29 W4M

055079

LIDAR TOPO IMAGE

FIG 4

4.7.1.1 Vegetation

Retention, and duplication, of the native grasses and retention of trees present within the Plan Area are of critical importance to the Developer. The Developer will replicate the existing seed mix and require, by way of the Design Guidelines, that it be planted to re-establish disturbed areas. The Design Guidelines also require that a building envelope is identified that protects existing trees and that planting of new trees are of compatible species to those already existing. In order to protect and maintain existing vegetation the following polices apply:

a. The Developer shall conduct vegetation surveys within various plant communities that is inclusive of:
   i. Conduct a rare plant survey;
   ii. Identification of appropriate native plants for landscaping and reclamation; and
   iii. Provide a baseline for comparing vegetation post development.

b. The Developer shall provide mitigations against introduction of exotic and weedy species.
   i. During construction; and
   ii. During landscaping.

c. The Developer shall maintain native trees and shrubs where feasible, and research the feasibility of transplanting native trees and shrubs within a predetermined development footprint.

d. The Developer shall provide native seeds for landscaping.

4.7.1.2 Wildlife

There are a series of game trails used primarily by ungulates (mule deer, white-tailed deer and possibly moose) but also used by grazing cattle and local residents riding horses. Integration of these corridors has been a goal of the development and is accommodated in the design of the community (i.e. lots, roads, inundation of land, etc). The project development plan will not severely disrupt primary movement corridors that run along the riverbank and toe of slope.

a. The Developer shall determine movement corridors of ungulate and any furbearers on site via a winter tracking survey; information can be cross-referenced with planned roadways and building lots. Mitigation options and Best Management Practices for wildlife crossing roadways (i.e., ungulates, amphibians), between and across lots should be determined.

b. The Developer shall determine the likelihood of various animals becoming established in the newly-constructed habitats and compare with current baseline information gathered through wildlife surveys.

c. The Developer shall utilize due diligence monitoring during construction activities.

4.7.1.3 Migratory Birds

The primary focus of the development plan is a centrally located lake and wetland. The primary goal of this development is to establish a bird sanctuary that provides resting, perching, watering and, possibly, nesting habitat for migratory birds. The proximity of the development to the Bow River will facilitate the success of this plan by encouraging the use of available resources by birds during spring and fall migrations.

a. The developer shall determine current conditions (distribution and abundance) via a breeding bird survey in early spring to assist with planning for desired species attraction and to compare with post-development bird species.

b. The Developer shall utilize due diligence monitoring during construction activities.

4.7.1.4 Geotechnical and Environmental Testing

a. The Municipality may require that the Developer, in support of a proposal for redesignation, subdivision or development, and at their sole expense, prepare and submit the following in a form and content satisfactory to the Municipality, and in accordance with all pertinent Alberta Environmental Protection guidelines or requirements of the appropriate Provincial or Municipal Departments:

i. A Geotechnical report pursuant to the provisions of the *Municipal Development Plan*;

ii. Any additional environmental testing or study deemed necessary by the Municipality (i.e. slope stability testing, percolation testing, high water table testing).

b. The site is flat to rolling in nature (**Figure 4**) and drainage to the Bow River occurs naturally. Any subdivision and development plan shall recognize drainage areas and ensure that natural drainage courses are protected.

4.7.1.5 Flooding, Wildlife, and Additional Environmental Policy

Many more stringent environmental and site design considerations are listed in the Design Guidelines (**Appendix C**) which have been crafted to achieve the Developer's vision in conservation planning and design. The land has been the subject of intense scrutiny given its proximity to the Bow River. Detailed hydraulic analysis and topographical mapping was undertaken to understand the movement and flows of flood waters in various flood events. **Figure 5** outlines the post-development flood conditions in a 1:100 year flood event. Significant evidence was provided to the Municipality between February 2006 and September 2006 regarding the potential for flooding of the property, the proposed steps that will be taken to protect residences from water damage, and the commitment of the Developer to hold the M.D. harmless. The Developer utilized standards for the development of these lands that exceeds those of the City of Calgary for similar developments. In addition to the specific polices regarding wildlife, migratory birds, and vegetation, the Developer shall adhere to the following in accordance with the Design Guidelines:

a. In conjunction with the above recommended vegetation and wildlife surveys, the Developer shall investigate the likelihood of encountering any plant or animal species listed under the current federal Species At Risk Act (SARA) to ensure that this legislation is not unknowingly violated during construction activities.

b. The Developer shall ensure that all residents are aware of the Municipal District of Foothills No. 31's Dog Bylaw and any breeches of that bylaw will be reported by the Homeowner's Association.

c. The Developer shall review and analyze current public access practices in ecologically significant areas in Calgary and the MD of Foothills. A synthesis should provide recommendations for access management in the development area including the proposed bird sanctuary.

d. The Developer and the Municipality shall protect the shoreline as Environmental Reserve and maintain a 30 metre development setback from the Bow River. Shoreline vegetation shall be retained to minimize the visual impact of development.

e. The Developer and the Municipality shall determine specialized road standards, in an attempt to eliminate the need for significant vegetation removal within road rights-of-way.

N

Elevation Range
- 986 - 1034.79
- 985 - 986
- 984 - 985
- 983 - 984
- 982 - 983
- 981 - 982
- 980 - 981
- 979 - 980
- 978 - 979
- 977 - 978
- 976 - 977
- 975 - 976
- 974 - 975
- 973 - 974
- 972 - 973
- 970 - 972

Floodway Post-Development

Floodway 1983 (Alberta Environment)

100 0 100 200 300 Meters

1:7500

SHERBROOKE INVESTMENTS LTD.

Westhoff Engineering Resources, Inc.
Land & Water Resources Management Consultants

Sanctuary on the Bow

POST DEVELOPMENT

Date	Job No.	File	Figure No.	Rev.
10/06	WER 105-23		5	

f. The Developer shall install and/or tie-in to a piped water and central sewage treatment and disposal system, thereby ensuring a sustainable servicing strategy.

g. The Developer shall preparing an integrated Master Drainage Plan and stormwater management plan in accordance with Best Management Practices. The Master Drainage Plan shall be submitted at the land use redesignation stage.

h. The Developer shall pre-determine building site locations on each proposed lot to minimize areas of building disturbance. These predetermined building sites will be clearly identified and strictly enforced by Restrictive Covenant on title in order to maximize retention of existing vegetation and reduce, or eliminate, potential for flood damage. Any residential home construction that may be proposed outside of the identified building envelope requires the written permission of the Developers and/or Design Committee and must adhere to all required testing and approvals that the Municipality may require at the Building Permit stage.

i. The Developer shall ensure that all residential homes are sighted and designed in accordance with the *Sanctuary on the Bow Design Guidelines* attached in Appendix C.

j. The Developer and/or the Homeowner's Association shall constantly retain a liability insurance policy that indemnifies, or holds harmless, the Municipal District of Foothills No. 31 from any liability should the land flood or be inundated with flood waters.

k. The Developer shall register Restrictive Covenant on Title advising that the Municipal District of Foothills No. 31 shall not be held liable for any flood damage that may occur within the Plan Area and that the Developer and/or Homeowner's Association must always carry liability insurance regarding flooding or potential inundation of the land.

l. The Developer shall implement a Construction Management Plan and environmental construction operation and erosion and sediment control plans to manage construction activity during development of the project.

m. The Developer shall undertake a post-construction monitoring and reporting program to the satisfaction of the Municipal District of Foothills No. 31.

n. The Developer shall utilize specialized construction techniques to preserve natural areas.

o. The Developer shall formulating an environmental handbook for each unit purchaser to promote environmental stewardship. These will provide on-going/future guidelines for the preservation and enhancement of the natural environment of the Bow River, the fish estuary and island.

p. The Developer shall prohibit the use of chemicals, fertilizers, de-icing products and salts.

4.8 Historical Resources Impact Assessment (Appendix E)

Bison Historical Services Ltd. has completed a Historical Resources Impact Assessment (HRIA) of all terrain within the proposed project. **Appendix E** contains a figure identifying the location of the sites in relation to the project area. The fieldwork component consisted of ground surface survey augmented significantly by judgmental shovel and backhoe testing. In total, eleven heritage resource sites were examined within the proposed development area. The identified sites include sites that were previously recorded during the past forty years, as well as heritage resources initially identified during the current HRIA. Nine of the eleven sites identified are deemed to have moderate heritage resource significance, the Developer has accommodated for avoidance of most sites. Sites impacted by development will be mitigated in accordance with the direction of the Province of Alberta. It is an objective of the Developer to interpret the historical resources of the area and provide opportunities for on site display of archeological materials recovered.

1. A Historical Resources Impact Assessment has been undertaken within the Plan Area and specific recommendations are detailed within the report. Work in and around these sites is subject to the approval of Alberta Community Development.

4.9 Lake Design and Viability

As part of the *Sanctuary on the Bow*, the Developer is proposing to construct a Lake that would return water to the Bow River. To this end, an engineered design was prepared that would enable development of an aesthetically pleasing waterbody. The basic lake (and stream) design incorporates a channel acting in conjunction with a gently sloping basin and irregular lake shoreline with a number of lakeside residences built on higher ground, comprised in part of excavated channel material.

The dimensions of the channel and stream were first and foremost designed to convey flows associated with the 1:100 year flood through the subject property in a manner that would reduce the potential for property inundation while mitigating upstream impacts. The creation of the lake allows for a parcel of land to be retained as riparian habitat north of the lake and south of the Bow River. It is anticipated that the island will become a bird sanctuary with access though the area controlled during seasonal breeding periods. The Developer has undertaken significant consultation with regulatory agencies and stakeholder groups to ensure the viability to the lake and island as future habitat areas that enhance the quality of the Bow River basin. The Developer has undertaken an extensive river engineering study that focuses on the management of flood conveyance and the measures of flood proofing.

The lake design will consider several elements:

Hydrology - Water Supply

The favoured option is to "daylight" groundwater as opposed to a direct connection to the Bow River to divert flow; therefore, eliminating the need for altering a section of the bank and riparian area. This system will ensure that it meets the requirements of Fisheries and Oceans Canada to prevent any disturbance to fish habitat and fish species. However, if the use of groundwater is not achievable due to other design elements then an inlet system on the west bank will be required.

Hydrology – Flood Conveyance:

During major flood events, routing of flood flows spilling over the river banks will be managed by diversion through the lake. In essence, the lake system and its outlet will be designed as a flood relief system and an emergency escape route for these overland flows. A floodplain and floodway delineation study has been completed by Westhoff Engineering Resources, Inc. It focuses on the management of flood conveyance and measures of flood proofing to ensure that the environment is not negatively impacted while safeguarding private property and municipal infrastructure components. Approval of the study report by the Municipal District of Foothills No. 31, Federal Department of fisheries and Oceans, and the Coast guard is to be facilitated.

Stormwater:

It is emphasized that stormwater will be treated before entering the lake so that it meets or exceeds Alberta Environment's regulations in terms of quantity and quality. Stormwater from the development parcels will be treated and mostly conserved on the lots.

Operation and Maintenance (O&M):

The lake system will be designed to require minimal ongoing operation and maintenance. Maintenance will be limited to inspection of the shoreline and clean up of debris that may be carried in from the river during flood events. It is anticipated that the Developer will be responsible for on-going operation and maintenance of the lake until such time as the Homeowner's Association is established and ownership of the lake is transferred.

Other Items:

Items such as lake contouring, flow, depth, vegetation, wind, and wave action will be considered to ensure a sustainable lake system is achieved.

4.9.1 The Developer shall be responsible for obtaining all appropriate authorizations and approvals required by The Municipal District of Foothills no. 31, Alberta Environment, and the Department of Fisheries and Oceans Canada, and Transport Canada for the final design, construction, operation and maintenance of the lake. All fisheries and aquatic aspects of Sanctuary on the Bow would be designed and constructed to meet or exceed all applicable federal, provincial and municipal legislation and standards.

4.9.2 The Developer shall be responsible for the ongoing operation and maintenance of the lake until such time as it can be legally transferred to the Homeowners Association.

5.0 Reserve Lands

5.1 Environmental Reserve / Environmental Reserve Easement

Principle:
To ensure that lands qualifying for dedication are protected through the provision of Environmental Reserve or Environmental Reserve Easement.

Where there are significam habitat areas, native vegetation (i.e. tree stands) or drainage courses identified on the site, these lands shall be protected from development through the dedication of Environmental Reserve or Environmental Reserve Easement, and/or identification outside the building envelope via Restrictive Covenant where appropriate and at the discretion of the Municipality. Additionally, the Developer is the owner of a portion of Policeman's Flats south of the Bow River and located within the NE ¼ 3-22-29 W4M that shall be formally dedicated as Environmental Reserve as part of the planning process.

Policies:

5.1.1 The dedication of Environmental Reserve (ER) and/or Environmental Reserve Easement (ERE) in the Plan Area shall be considered by the Municipal District at the time of subdivision approval.

5.1.2 The Land Use Concept, Figure 3, identifies a pathway easement across the Environmental Reserve Area. The necessity, form and construction of any pathway upon the identified easement area shall be sole discretion of the Municipality and may be operated and maintained by the Sanctuary on the Bow Homeowner's Association.

5.1.3 Areas dedicated as ERE are intended to remain under the common ownership of the Homeowner's Association with the Municipal District of Foothills being a party to the easement.

5.2 Municipal Reserve

Principle:
To ensure the dedication of public land consisting largely of Municipal Reserve (MR) or Environmental Reserve (ER) land that has been dedicated to the Municipality upon development approval.

5.2.1 Dedication of Municipal Reserve, either by cash-in-lieu of land, deferred reserve caveat, or by physical dedication of land, or combination of same, in the Plan Area shall be determined by the Municipality in accordance with the policies in this Plan.

5.2.2 The Developer has provided for a MR pathway in the land use concept on Figure 3. The Municipality may, at their discretion, retain the pathway in its natural state and/or develop and maintain the pathway. It is anticipated that this pathway dedication is provided over and above actual Municipal Reserve owing and is to me a minimum 6.0 meters in width.

5.2.3 Lands dedicated for Municipal Reserve should be of similar quality as lands being utilized for development.

The Land Use Concept Plan (**Figure 3**) identifies proposed Municipal Reserve, Municipal Reserve Pathway, Environmental Reserve, pathway easement, and Environmental Reserve Easement areas within the Plan Area.

6.0 Transportation

The Developer has undertaken the preparation of a Traffic Impact Assessment (TIA) to addresses the impacts of *Sanctuary on the Bow* and the associated traffic on the immediately adjacent and downstream roadway network. The TIA examined issues and possible impacts caused by traffic conflicts, traffic behaviour (volume and capacity) and cumulative impacts, and site access. The TIA is attached to this Document as **Appendix F**.

The main roadways of interest in this Plan are 40th Street East, Dunbow Road, Highway 2 and Highway 2A.

Highway 2 is a paved, multi-lane, divided provincial highway. It is classified as a major expressway and is a link within the North-South Trade Corridor or "CANAMEX" Trade Corridor. Highway 2 between Highway 22X and the Dewinton Interchange was completed and open for travel in November of 2003.

Highway 2A is a paved, multi-lane, divided provincial highway. Located east of Highway 2, it is a north-south expressway that becomes an arterial roadway north of Highway 22X within the City of Calgary.

Dunbow Road is a paved, two-lane, arterial roadway. It is an east-west roadway that provides access to several residential, country residential and farmstead developments located south of the City of Calgary. It also provides access to Heritage Pointe, Cammoney and Cottonwood Golf Courses. Dunbow Road is located approximately 7 km south of Highway 22X and south of the City of Calgary city limits.

40th Street East is a dead-end gravel road that provides access to properties located south of the Bow River and north of Dunbow Road. It also provides access to Policeman Flats, a local recreational area. The intersection of 40th Street East and Dunbow Road is located approximately 2.5 km east of Highway 2.

Based on the TIA, the potential traffic volumes to be generated by *Sanctuary on the Bow*, require improvement to 40th Street East; however, the character of the roadway will be maintained. Additionally, improvements to the intersection of 40th Street East and Dunbow Road are likely required due to existing deficiencies, existing traffic volumes on Dunbow Road and future growth.

Preliminary recommendations of the TIA include the following:

- Redevelopment of 40th Street East as a 40 km/h local roadway that provides the necessary level of safety and operational capacity while still maintaining the character of the corridor; and
- Upgrade of the intersection at 40th Street East and Dunbow Road to accommodate future traffic volumes due to growth and the proposed development.

Consultation with the MD of Foothills is required to confirm the acceptance of a 40 km/h local roadway and to confirm the accepted typical intersection treatment for similar developments along Dunbow Road. According to Municipal District of Foothills Resolution of Council adopted January 9, 2003, the Developer may be subject to a financial contribution, which shall be specifically used to improve the offsite roads as determined by Council.

Policies:

6.1 Vehicular access to the Plan Area shall be from internal roads to the Plan Area and 40th Street E.

6.2 Internal access and internal roads required to service the development area shall be designed in accordance with municipal standards, modified for the purposes of this development in consultation with the Municipality, and constructed at the Developers expense.

6.3 The Municipality, upon issuance of a Final Acceptance Certificate, shall maintain internal roads.

6.4 The Developer shall upgrade 40th Street to the satisfaction of the Municipality at the sole expense of the Developer.

6.5 The Developer shall upgrade the intersection of Dunbow Road and 40th Street to the satisfaction of Council at the sole expense of the Developer.

6.6 The Developer shall prepare and submit an Emergency Preparedness Plan outlining emergency evacuation procedures and routes to the satisfaction of the Municipality.

7.0 Phasing and Density

Sanctuary on the Bow has been designed as a comprehensively planned community. Because of this, a single application for land use redesignation of the site, in its entirety, shall be made. However, the subdivision of the site shall occur in phases which consider such factors as servicing, access capacity, and potential market absorption.

7.1 The Developer shall redesignate the land in its entirety. The site will be subdivided as market absorption requires to the satisfaction of the Municipal District of Foothills No. 31.

8.0 Servicing (Appendix G)

The Plan Area is to have quality development standards in all areas including, the communal water and sewer systems, roadways, landscaping, signage and design guidelines, aimed a creating a quality recreational and residential environment. The preliminary alignments for the location of water and wastewater systems in the Plan Area are identified in **Appendix G.**

Principle:
To provide a high level of central services that does not rely on groundwater resources or negatively impact upon subsurface conditions.

8.1 Water Supply & Wastewater Treatment

Of primary importance in a development of this nature is the development of a long-term water supply capable of meeting the average and peak daily needs of the development without negatively impacting the existing water supplies in the immediate area. Sanctuary on the Bow will be serviced by an existing central utility capable of meeting peak demands.

All utilities will be developed in keeping with municipal and provincial standards in accordance with the following policies.

8.2 Water Supply (Appendix G)

The purpose of these policies is to provide for a suitably designed water distribution system to serve the Sanctuary on the Bow area. Water supply will be from the existing facilities of a central utility system provider based at the Hamlet of Heritage Pointe. The proposed alignment for the extension of the water supply services is along Dunbow Road and 48th Street. Horizontal drilling will be used at the escarpment to avoid disturbance of existing vegetation, which would otherwise be damaged if open cut trenching were utilized.

8.2.1 The water supply and distribution system shall be constructed by the Developers at their sole cost and designed to the standards of Alberta Environment and the Municipal District of Foothills No. 31. The Developer will enter into a standard Development Agreement to undertake this work.

8.2.2 A water reservoir and reservoir fill line may potentially be required to provide the volumes, pressure and level of service to accommodate development in the Plan Area and to provide fire protection.

8.2.3 The design, operation and maintenance of the water supply system shall comply with Municipal District of Foothills No. 31 and Alberta Environment standards, guidelines, and regulations.

8.2.4 Continuous operation and maintenance of the water supply and distribution system shall be undertaken by the central utility service provider. The Developer shall enter into a service agreement with the utility provider.

8.2.5 All capital costs associated with the provision of the facilities will be the sole responsibility of the Developer and/or central utility provider.

8.3 Sanitary Sewer Treatment and Disposal

The purpose of these policies is to provide for a suitably designed sanitary system to serve the Sanctuary on the Bow area. As shown in Appendix G, a lift station will be required to convey these flows to the existing wastewater treatment plant (WWTP) system at the Hamlet of Heritage Pointe where the sanitary service is provided by a central utility systems operator. The current system includes a mechanical plant and a sewage lagoon that, in time, will be decommissioned. In the interim, the tie-in from the Sanctuary on the Bow development is proposed at the lagoon site where peak loadings can be attenuated. Once the WWTP has been upgraded for capacity and the lagoon is decommissioned, the existing pipeline to the WWTP can be utilized to convey wastewater from the Sanctuary on the Bow directly to the WWTP. Treated effluent from this WWTP system is discharged to the Bow River in accordance to Provincial approvals and licenses. It is understood that the servicing area of the central utility system operator and future upgrades include the Sanctuary on the Bow development area. It is also recognized that the City of Calgary Pine Creek WWTP is being constructed and that this plant may become a regional system that ultimately will serve Heritage Pointe and Sanctuary on the Bow development areas. The proposed sanitary sewer alignment follows Dunbow Road to the east and 48th Street to the north. As noted for the water supply line, the portion across the escarpment will be constructed using horizontal drilling techniques to safeguard the existing vegetation. The developer shall be responsible for the construction of all on-site facilities to accommodate the development of the plan area and enter into a service agreement with the central utility operator.

8.3.1 The design, operation and maintenance of the proposed sanitary sewer collection and waste water treatment system shall comply with Alberta Environment standards, guidelines, and regulations.

8.3.2 Continuous operation and maintenance of the wastewater treatment plant and collection facilities shall be undertaken by a central utility operator. The Developer shall enter into a service agreement with the utility operator.

8.3.3 All capital costs associated with the provision of the waste water facilities will be the sole responsibility of the Developer and/or central utility operator.

8.4 Storm Water Management

The purpose of this policy is to provide for the development of a suitable and effective stormwater management system to serve the Sanctuary on the Bow area. The system will be not only address the current guidelines on water quantity management, i.e. releases to receiving water bodies at pre-development rates, but perhaps more importantly, integrate Best Management Practices (BMPs) to improve water quality of runoff from non-permeable features such as roads and roof tops. Existing natural drainage courses will be integrated and protected as much as possible by drainage easements. A comprehensive Master Drainage Plan will be prepared at the land use redesignation approval stage and will describe the BMPs for stormwater management. The BMPs will include source control measures (e.g., lot controls, including rainharvesting and landscaping controls) and end-of pipe measures such as water quality polishing prior to release into receiving water bodies.

8.4.1 The developer shall submit a Storm Water Management Plan, prepared by a Professional Engineer licensed to practice in the Province of Alberta, to the satisfaction of the Municipal District of Foothills No. 31.

8.5 Shallow Utilities

Shallow utilities include gas, power, cable, and telephone connections.

8.5.1 Extension of shallow utilities shall be the responsibility of the Developer. The right-of-way and final servicing requirements for electrical, natural gas and telephone shall be determined at the plan of subdivision preparation stage.

9.0 Community Services

Police Service

9.1 Police service to the Plan Area will be provided by the RCMP detachments at Okotoks and the Special Constables of the Municipal District of Foothills No. 31.

Fire Services

9.2 The Plan Area is in an area of the Municipal District which is serviced by joint agreement with the City of Calgary.

9.2.1 This development shall provide fire hydrants on site with adequate pressures and fire flows.

APPENDIX A – CONCEPTUAL LOT LAYOUT

DILLON CONSULTING

DESIGN	
DRAWN	KJKB
CHECKED	
APPROVED	
DATE	2006.10.23
SCALE	1:5000

SANCTUARY ON THE BOW

LAND USE CONCEPT PLAN

PNT. OF SEC 3 & 10 TWP. 22 RGE 29 W4M

CONCEPTUAL LOT LAYOUT

SCALE

SCALE 1:5000 0 100 200m

NOTES

DILLON PROJ NO. 055079

DRAWING NO. APP A

g:\cal\055079\dwg updated october\appendix a & e.dwg

APPENDIX B – CONCEPTUAL RENDERING OF SITE


Sanctuary
ON THE BOW
design by BRECO DEVELOPMENT CORP
STURGESSarchitecture

APPENDIX C – SANCTUARY ON THE BOW DESIGN GUIDELINES

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1.0 Overall Vision and Concept

1.1 Uniquely

The Bow River: Pure Waters, River of Life

Flowing elegantly from the Canadian Rockies in Banff National Park, winding through the Bow Valley, emerging on the Alberta prairies through the City of Calgary (Calgary) is one of Canada's most magnificent rivers — the Bow River. World-renowned for its trout fly fishing, breathtaking scenery, and nature untamed, the Bow River draws outdoor enthusiasts to its beautiful waters.

The First Nations travelled along its shores for many years setting up summer camps, finding shelter along its escarpments. Using reeds from the river to make their bows, it was the Peigan tribe that named the mighty Bow River — "Makhabn" — meaning "river where bow reeds grow."

Today, the shores of the Bow River attract thousands of nature-lovers each year from around the world. Its banks are dotted with fly fishers, casting their lines, seeking brown and rainbow trout. Over 40 Bow River guiding and outfitting operations rely on the river to serve 3,000 fly fishers a year. Canoeists and guide boats float along its currents, marvelling at the sheer number of species of birds — pelicans, eagles, ducks, geese, and shorebirds — that inhabit its many miles of tree-lined shores.

"Eventually, all things merge into one, and a river runs through it." – Norman Maclean

Calgary: Right Across the River, Everything is Closer

Nearing 1,000,000 residents, Calgary is one of the fastest growing cities in North America. Home to the highest concentration of corporate offices, the city is set to continue its economic growth. The result is extensive residential development in Calgary and the surrounding Municipal Districts.

As the city stretches further beyond its boundaries, residents seek communities with a less urbanized lifestyle. They long for the beauty of the prairies out their backdoors, with unfettered views to the towering Rocky Mountains and surrounded by Alberta nature unspoiled by the growing city development.

The Municipal District of Foothills No. 31

Sanctuary on the Bow is situated within the jurisdiction of The Municipal District of Foothills No. 31 (M.D.), a rural municipality located adjacent to and immediately south of Calgary. The M.D. covers an area of approximately 1,400 square miles (3,600 square kilometres) in the foothills of sunny southern Alberta. It surrounds the Towns of Okotoks,

High River, Turner Valley, and Black Diamond, the Village of Longview, and the Eden Valley Indian Reserve. The M.D. celebrated its 50th Anniversary in 2004. The results of the 2003 Census indicated that 17,682 people live in the M.D.

Sanctuary on the Bow: Find Your Solitude

Just off Dunbow Road and winding down 40 Street will be a community embracing the ultimate in riverfront living in the M.D. There will be 173 homes nestled serenely within the natural landscape, surrounded by a sense of calm that only mother earth could create.

As you turn into this gentle property, you'll know that you've arrived in nature: the magic of the Bow River greets you as you meander past beautiful homes. As you travel the semi-circular road of the community, you'll weave through fingers of wildlife corridors, past nature pathways that lead deeper into the trees or down to the water's edge, and alongside unique areas of discovery where adventure can be found.

Of the community's seven distinct neighbourhoods, one has been set aside for the longest term residents of the area — the birds of the Bow River. White Pelican Island will only be accessible by wing or by walkway, inhabited by those who've flown the banks of the Bow River long before today. A pedestrian path will open up this fascinating bird sanctuary to those whose curiosity of our feathered friends will take flight, with quiet observation points and an interpretive educational sites set amongst this special park.

Find a Natural World, Away from The Unnatural...

The word "sanctuary" denotes a place where birds and wild animals are protected. A place of refuge. A place where history is interpreted.

Developing a Community with Nature as Our Guide

Sanctuary on the Bow has been designed for people with passions and appreciation for the outdoors. In every aspect of the Master Plan, Sanctuary on the Bow is committed to work with nature and preserve the natural integrity of this special place.

A River Runs Through It

The location is situated in a valley that sits on the floor of the Bow River, hugged between two escarpments.

Crafting a course through which the existing ground water will travel through Sanctuary on the Bow, this new waterbody will enable tranquil areas for residents to sit alongside the river and enjoy all the sights it has to offer. This lake will be in an ideal secluded area for canoeing and fishing in the summer, and skating and cross-country skiing in the winter.

Creation of this lake honours Sanctuary's vision - offering the natural appreciation its owners will desire while enhancing the unique character and natural beauty of its extraordinary riverside setting.

> "*A river seems a magic thing. A magic, moving, living part of the very earth itself—for it is from the soil, both from its depth and from its surface, that a river has its beginning.*" – Laura Gilpin

Amenities and Programs to Complement Nature's Perfection

Sanctuary on the Bow's amenities cater to the active lifestyles of the residents, for whom fishing, birding, and generally taking part in nature's "gentler" pastimes are local points.

Dedicated to fly fishing, bird watching, and family-focused experiences, an elegant facility called The Angler's Community Lodge will be created for owners and guests. Serving as the community's central gathering spot, The Angler's Community Lodge is a warm and welcoming place to mingle with other owners, spend time with family, and share stories of the day's adventures.

Numerous other recreational opportunities include a pathway system that extends into the community's expansive nature preserves with interpretation and rest points for group gathering. In the winter, the lake will serve as an old-fashioned skating and hockey rink.

> "*Nature never wears a mean appearance. Neither does the wisest man extort her secret, and lose his curiosity by finding out all her perfection. Nature never became a toy to a wise spirit.*" – Ralph Waldo Emerson

Connecting Pathways, Connecting People.

Throughout Sanctuary, picnic areas, parks with docks, benches looking out upon vista views, and similar gathering spots speak to the importance we place on fellowship and community.

Sanctuary's extensive network of pathways also promotes education, meetings, and interaction. To encourage usage, the pathways are posted generously with signs that provide interpretive information about indigenous flora and fauna, and signs that help you find your way home.

A Unique Country Community — Neighbourhoods that Elevate Expectations

Sanctuary on the Bow is planned with openness, where homes are not restricted by fencing or barriers. Open spaces are shared between homes. Architectural guidelines require a particular feature: all homes must have a porch. This breakdown of the traditional lot structure will promote connections within the community that create a family atmosphere, where neighbours are your friends, and respect for the surroundings is utmost in terms of the Bow River, fish, birds, and animals. This is where a balance is created between nature and neighbours.

Like all extraordinary residential communities, Sanctuary offers a diversity of footprint sizes and home styles that are unified by well-considered standards of architectural integrity. While each home and each neighbourhood is distinctive, the community as a whole is cohesive, and each neighbourhood complements and upholds the value of the others. There will be a variety of single family home designs, attracting residents with different family sizes and spatial needs.

The neighbourhoods of Sanctuary on the Bow will consist of;

Heron's Landing
As you arrive at Sanctuary on the Bow, Heron's Landing will be the first neighbourhood that you happen upon. To your left will be the Angler's Community Lodge, near the original rustic Stier homestead. As you follow the road right, you'll be greeted by your first views of the water and the first collection of Sanctuary homes.

Canoe Terrace
Moving deeper into the beauty of Sanctuary, you'll find the first of many areas of discovery leading down to the water's edge. A community dock, tethering the silent canoes that paddle lazily along still ponds, or swiftly down exciting river currents. A small island sits just offshore, connecting to the next bay of homes.

Bucktail Crossing
In the heart of the community lies Bucktail Crossing, where homes hide deep within the woods near the escarpment, encircle the next innovative area of discovery, or sit around a point looking across the water to the bird sanctuary of White Pelican Island. Residents here spend many a lazy day contemplating the beauty of nature viewed in all directions.

Piper's Inlet
Moving eastward along the road the homes of Piper's Inlet form a protective ring around its central meeting place. Neighbours here savour the quiet times of Sanctuary, but make motion a friendly wave each time they meet along the pathways that travel throughout the community.

The Narrows
Here, the area of discovery pays homage to the adjacent waters as they lead back out into the main flow of the Bow River. Homes are surrounded by towering trees frequented by the area's feathered population. When residents are searching for a sanctuary within Sanctuary, they come to The Narrows.

Kingpost Island
Crossing a covered bridge will land you on this special place where folks covet their neighbourhood. Kingpost island backs onto the Bow River and the lake and represents the completion of Sanctuary on the Bow.

Land Purchased on a Hope and a Prayer...

Sanctuary on the Bow will grow from a dignified history of ownership. Ottawa originally granted the land to the CPR in 1891, in 1947 Ernest Stier and his wife Marilee bought the land, building their home in about 1954. In 1967, Martin Cohos of Sherbrooke Investments purchased the land from the Stier family and has retained ownership since.

The goal for Sanctuary on the Bow is simple: to respect the land as a natural park where people will want to live with nature and their neighbours. This will be a beautiful habitat for many living things.

1.2 Naturally

Landform and Natural Features

The largest of the North American Grasslands is the Great Plains Grasslands. The Great Plains stretches from the Gulf of Mexico through the middle of the continent to the northern tip in Southern Alberta. This tip is known as the Alberta Plain and occupies Southern Alberta, Western Saskatchewan, Northern Montana, and parts of North and South Dakota.

This site is situated in the Alberta Plain and holds many of its characteristics. The uniqueness of this site is its proximity to the Bow River. It is situated along the south bank of the Bow River in a valley surrounded by Escarpments to the north and south. Views are down the river valleys east and west. The northeastern portion of the site beholds views of the mountains to the west. It is a sanctuary within the prairies and the urban areas that are above the escarpments.

An arcing escarpment cups the south of the property. The escarpment is fairly heavily treed. Along the toe of this escarpment and still in the trees, is the remains of an intermittent drainage course. Moving north out of the trees towards the Bow, distinct low gullies and plateaus exist. These radiate out from the toe of slope area. The gullies, being more vegetated, provide movement corridors for wildlife to the more open grassland of the north/central portion of the site. This area tends to flatten out for about 400 meters. The lands then drop quickly in most places by a meter or two to the riverbank. The northeast portion of the bank is more gradual. The river frontage is approximately 2,000 meters. The eastern third of the site is a flat plateau that sits about two meters over the rest of the site.

Vegetation

Native grasses are the heart and soul of the prairie, the living link between the physical resources of the Great Plains – sunshine, rain, and soil – and almost every other aspect of the ecosystem.

Climate

With the exception of the seasonal drainage course at the south of the property, the area is a semiarid zone – better watered than deserts, but less humid than forests. Winter is a relatively arid season across most of the plains not only because cold air cannot hold much moisture, but also because of the strong seasonal influence of dry air from the north and west. As a rule, less than one-third of the year's precipitation falls between October and March, when these air masses exert their strongest influence. The other roughly 70 percent of the year's moisture is received during the April-to-September growing season. The Great Plains are subject to drought partly because they lie in the lee of the western mountains with the Coastal Ranges, the Cascades, the Sierras, and the Rockies all standing in the their path, the Pacific westerlies are forced to rise, cool, and drop their moisture as they pass. By the time the winds flow down over the plains, they are almost devoid of rain. An estimated 400 to 600 millimetres falls on the area per year.

Thunderstorms are a large component to the moisture delivered in the growing season. Storms typically develop locally or in the Rocky Mountains to the west and tend to move eastward as they grow. It usually takes a mass of warm, moist air and something to send that air spiralling up through the atmosphere. This lift-energy usually comes from the summer sun, which blazes down through cloudless skies to heat the ground. Heat then radiates out of the soil, into the surface air, causing it to rise, rotate, and mount upwards to form a rain-filled thunder-head. In the dry western plains, one third of the year's precipitation can fall in a single hour from one of these spectacular cloudbursts.

Prevailing winds in the area are from the west and north. Arctic air dominates in the winter. In the spring, the balance of power is reversed, as the gulf air mass gains strength and surges north, sometimes carrying tropical heat and humidity to the local area. These are sometimes called upslope systems and usually bring rain up the leeward side of the mountains, doing the reverse of the Pacific westerlies. The rained-out Pacific westerlies, with their meagre stock of moisture, make themselves felt throughout the year, especially during the dry months of fall and winter.

The area lies in the lee of the western mountains. In the winter months when the Pacific westerlies are dumping their moisture on the windward slopes of the mountains as they rise and cool, they do the opposite on the way down the leeward side. The winds warm up and draw moisture back. This is called a Chinook. Local temperatures in the areas influenced by the Chinook can rise quickly and snow melt and evaporation also happens quickly. Temperatures have been known to rise as much as 20 to 25 degrees in hours. The first nations people first named these winds Chinook, which translated means "The Snow Eater".

Like most of the world's great grasslands, the Great Plains of North America lie squarely in the middle of a large continental land mass. As a result, the region is isolated from the influence of all four oceans...without the moderating influence of water, the plains are subject to violent oscillations of temperature. In the northern prairies, in particular, the temperature can span 80 degrees Celsius in the course of a year, from brittle –40 in midwinter to a stifling +40 in summer.

Local conditions follow roughly the following statistics:

Temperature (°C)	J	F	M	A	M	J	J	A	S	O	N	D
Maximum	-3	0	3	11	16	21	23	23	17	13	3	-1
Minimum	-15	-11	-7	-1	3	7	10	9	4	0	-8	-13
Mean	-9	-5	-2	4	10	14	16	16	11	6	-2	-7

Precipitation	J	F	M	A	M	J	J	A	S	O	N	D
Rain (mm)	0	0	2	9	44	77	70	49	43	6	1	0
Snow (cm)	18	15	19	20	10	0	0	0	6	12	16	19
Total (mm)	12	10	15	25	53	77	70	49	48	16	12	13
Snow Cover (cm)	7	5	1	1	0	0	0	0	0	1	4	6

Weather Info	J	F	M	A	M	J	J	A	S	O	N	D
Sunshine (h)	114	137	174	215	256	286	320	285	202	179	125	103
Rel.Humidity (%)	65	65	66	58	56	57	60	61	62	58	65	65
Wind Speed (km/h)	16	15	16	17	18	17	15	14	15	15	15	16
Wind Direction	W	S	S	N	NW	NW	NW	NW	S	S	S	W

Sun

The following is a summary of the amount of sunlight, sun angles, sunset and sunrise times for the area. All are based on the Equinox and Solstice. Solstice is the longest and shortest days of the year. These also represent the start of Summer and Winter. Equinox is the two days at which day and night is equal and represent the start of Fall and Spring. As we are 36 minutes east of the meridian or time zone the sun is at its highest point 30 to 40 minutes after the hour. The Equinox in September and the Solstice in June fall into daylight savings and thus the suns highest point is not until 1 after noon. Combined with the 30 to 40 minute offset from the meridian, the sun reaches its highest point at about 1:30 during the day light savings period.

Date	Season	Rise	Set	Midpoint	Light	Highest point
March 21	Spring Equinox	6:37	6:51	12:44	12.23	39.0 degrees
June 21	Summer Solstice	4:21+1	8:55+1	12:38+1	16.56	62.3 degrees
September 23	Fall Equinox	6:24+1	6:33+1	12:29+1	12.15	38.9 degrees
December 22	Winter Solstice	8:38	4:32	12:35	7.90	15.5 degrees

At December 22, the Winter Solstice, the sun raises approximately 50 degrees east of south and sets approximately 50 degrees west of south. On the longest day, the Summer Solstice on June 21, the sun rises approximately 130 degrees east of south (or 50 degrees east of north) and sets approximately 130 degrees west of south (or 50 degrees west of north). At the Equinox the sun rises and sets due east and west.

Orientation

The Property is orientated squarely on a north/south and east/west axis. With the developable area running in an arch from the southwestern corner to the northeastern corner. With the arc convexing to the southeast. The Bow river flows and arcs from the southwest corner back to the northeast corner convexing to the northeast.

1.3 Historically

The end of the last great Ice Age marks the first arrival of humans into North America. They came to the continent in small hunting groups at least 12,000 years ago. Much of what we know of these first peoples and the long histories of their later descendants comes from the tools and other remains of daily life that they left behind. Some of those material traces have been found at Sanctuary n The Bow, and these are helping us to understand the ancient lives of the First Nations people who lived in Alberta prior to the arrival of European settlers.

The first inhabitants of North America were primarily big-game hunters, and it is known from very early archaeological sites in the United States and Canada that they hunted and trapped mammoth and other large game using spears in coordinated group efforts. These were nomadic people who moved with the seasonal migrations of the animals they hunted. While settled communities appeared during later times in other parts of North and South America, this pattern of seasonal nomadism was very well suited to life on the northern plains, and remained largely unchanged during the millennia prior to the arrival of European settlers.

Technological advances throughout the 12,000 years of human history in Alberta served to improve the lives and cultures of the First Nations people. Early technologies involving stone-tipped spears were gradually replaced, first by the use of the atlatl (a spear throwing tool), and later by the invention of the bow and arrow. Approximately 2000 years ago, the bow and arrow had largely replaced other hunting weapons. Pottery making (which was invented far to the south of Alberta and was gradually traded northward) became a widespread part of daily domestic life about 2000 years ago in the northern plains.

Since their first arrival in this continent, First Nations communities hunted the abundant bison of the great plains, at first in small groups, and later using highly coordinated community efforts at large bison jumps. The UNESCO world heritage site of Head-Smashed-In buffalo jump is a remarkable testament to the success and sustainability of this cultural practice over a period covering several thousand years. A good deal of activity revolved around the harvesting, processing, and preservation of meat from these bison kills. Archaeological sites in close proximity to kill sites provide evidence for butchering, meat preparation, boiling of bones for marrow, stone tool making, and camping, and are scattered across the northern plains. The heritage resources found at Sanctuary on The Bow reflect these complex activities, and provide a window into the society of the First Nations people that lived here in ancient times.

2.0 Design Considerations

2.1 Neighbourhoods

Sanctuary on the Bow is defined by its community of neighbourhoods rather than by individual buildings. "Neighbourhood" implies cooperation, understanding, and a desire to share in something greater than the expression of individual buildings. Homes, although different, should respect its neighbours.

Grouping/Connections/Views

The first step in the design process must be a thorough assessment of the site and context. This includes documenting landscape elements to be maintained and/or modified and views to be preserved and/or enhanced, whether of the water, meadows, or distant trees and ridges. It also includes considering the various possibilities of organizing the building elements (homes, garages, guest homes, and landscape planting) in ways that enhance their use as well as contribute to the neighbourhood continuity.

Location, Orientation and Design

A successful home at Sanctuary on the Bow transcends the emphasis on the individual building to consider design issues in terms of the neighbourhood and the larger community. Among these issues are the size and form of the building, its location on the site, the building's relation to existing landscape features, both in the immediate and distant environment, the form, scale, materials, and color of building elements, the building's relationship to adjacent and nearby buildings, and the selection and massing of landscape elements. While all of these are normal components of individual building design, they become even more important when considered in relationship to Sanctuary on the Bow as a whole.

Character of the Neighbourhood

It is important to assess the scale, apparent size and location of nearby homes and landscape; document materials and colors; understand how the neighbourhood functions by locating neighbours' entrances, outdoor use spaces and service areas; and determine how to preserve views, sunlight, and privacy of existing and future neighbours. Consider how a home on the site will affect the views from other homes, from the roads and trails, and how it will contribute to the evolving landscape. The Site Analysis must include a photographic documentation of the site and its context, including adjacent homes.

3.0 Site Analysis

Sensory Awareness

Exploring the sensory perception of a site is the first step in understanding the character of the place. This consists of documenting experiences that affect personal impressions as well as factual information: the influences of the wind, rain, and sun; the close and distant views of meadows, trees and water, the sounds; the shape of the land; and the activity of wildlife. It helps to develop a narrative statement as to the most important aspects of the place, both positive and negative. This documentation is most useful if it results from observations made at different times of the day and night, in different seasons, and in different weather conditions.

Existing Conditions

An accurate topographic map of the site, prepared by a licensed surveyor, is the starting point for an analysis of the site and its context. The analysis will include an assessment of the visual character of the area, including the land forms, vegetation types and patterns, both on the site and in the adjacent area; an accurate analysis of the drainage patterns on the site, adjacent roadways, and offsite drainage patterns including swales and watersheds; and the types of solid and soil conditions such as rocky, wet, erosive, or expansive.

In treed areas, the site should be assessed in terms of the potential building locations that will have the least impact on existing vegetation, as well as the trees that may have to be removed because of disease or the potential for windthrow danger. This evaluation will guide the placement of buildings, driveways, and the location of drainage fields. The objectives are to minimize site disturbance and avoid future site-related difficulties.

4.0 Design Relationships

The Sanctuary on the Bow design philosophy is based on the ideas that building forms should evolve from an understanding of the three-dimensional relationship of the building to its specific site. This goes beyond a two-dimensional plan view to consider all the senses that provide our experience of the environment. Successful homes at The Sanctuary on the Bow have developed from an understating of the vocabulary of indigenous rural structures, the particular characteristics of the landform and the plant materials, and from a detailed architectural and landscape program identifying the need and desires of the users. This section identifies the principles that have guided the form and sighting of buildings at Sanctuary on the Bow.

4.1 Relationship to Views

Every site on Sanctuary on the Bow has a view, but not every site has a water view. While water views can be dramatic, views of meadows, hedgerows, forests, and distant ridges can be equally rewarding. The organization of a home for a close-up landscape view may be different than for a distant view and will affect the

form of the spaces and the placement of windows. Views that are present today may be affected by new home construction and by natural growth of trees and shrubs. Each owner has a responsibility to consider negative impacts their project may have on the views of current and future neighbours.

4.2 Relationship to the Sun and the Wind

On cool winter days, sunny and wind-protected places within and adjacent to the home provide opportunities for more complete enjoyment of the site. Interior spaces that provide a sunny place for breakfast or a shaded place to read in the afternoon will enhance potential enjoyment, just as the form and orientation of the building can create sunny outdoor courtyards and terraces, protected from wind, for year-round use. Materials and colours used on the interior also contribute significantly to the efficiency of a home (i.e. – heating in the evening). Solutions that integrate active and passive solar energy techniques are highly encouraged.

While the sun provides great benefits, potential heat gain on south and west building elevations, particularly in summer, must also be considered. Understanding the cyclical patterns of the sun, wind, and rain will aid in determining the shape of the home, the location of interior and exterior functions, and the size and locations of openings. Respect for the solar access of neighbours is important.

4.3 Relationship to the Land

A home should respond to its specific location. Each site is unique and building forms must develop from a thorough understanding of the particular place. A successful design can reduce the impact of the building on the site and create a harmonious relationship with the neighbourhood. Grading and vegetation removal should be minimized and existing natural features and topographic patterns should be preserved. Building forms should relate to the existing terrain and follow the natural slope of the ground. Stepping the floor levels to conform to the natural grade helps ground the building and creates a more appropriate relationship between the building and the site.

5.0 The Design Review Process

This section of the Sanctuary on the Bow Design Guidelines establishes a process of design review to maintain the continuity design values of Sanctuary on the Bow and to help property owners explore the unique potential of each site. The review process involves the owner who must obtain Design Committee approval to construct, reconstruct, refinish, alter, demolish, modify or modify the exterior of any improvement (as defined in the Guidelines) upon, under, or above any private area, or to change, alter or modify the natural drainage, or, subject to section 6.0 hereof, to remove any tree, landscape or vegetation.

The term "improvement" shall include buildings, outbuildings, roads, driveways, parking areas, lighting, screens, retaining walls, stairs, decks, hedges, landscaping, windbreaks,

poles, signs, and any structure of any kind. Separate applications for specific improvements; for example, new construction, additions, modifications, extensions, demolitions, tree removing, landscape, roofing, and finishes are to be made.

Design review is not a static process but is based on balancing the feel of the land. This process benefits from the experience and observation of planning and design professionals, as well as from the experience of the Sanctuary on the Bow Design Committee.

5.1 Design Committee

A Design Committee directs the design review process. The Design Committee is comprised of three members: one of whom is the designated architect member, one of whom is a Developer representative, and one representative from the Sanctuary on The Bow Homeowner's Association. The Homeowner's Association member will not be appointed until such time as there is a critical mass of ownership within the project, in the meantime the Design Committee may consist of alternate members. The vote or written consent of any two [2] members shall constitute an act by the Design Committee unless unanimous decision of its members is required.

To construct, reconstruct, refinish, alter, or maintain any improvement, or change the natural drainage, or change the natural landscape or vegetation on any private area, an owner must first file an application and then obtain approval from the Design Committee. The permit requirement does not apply to building interiors or routine work to sustain the integrity of the structure, or site if such work is consistent with the existing approved plans. It is the goal of the Design Committee to avoid harsh contrasts in the landscape and to encourage and foster design that is appropriate to the vision of Sanctuary on the Bow so that there is harmony between homes and the landscape setting and between groups of homes in neighbourhoods.

5.2 Design Review Process

For new construction and major additions, the design review process generally consists of a pre-design site visit (the "Preliminary Site Visit") and two design review submittals for Design Committee consideration and action: the Conceptual; Design Review submittal and the Final Design Review submittal. The Design Committee will schedule the submittal for review following the time schedule below in accordance with the Design Committee rules.

5.3 Design Committee Actions

The Design Committee shall approve a submittal if the plans, drawings, and specifications submitted to it satisfy the requirements set forth in the Design Committee Submittal Checklist, and the Design Committee finds that the plans and specifications conform to the Design Guidelines. If the Design Committee denies a submittal or approves a submittal with conditions, the notification shall be in writing and set forth the reasons for such disapproval or conditions.

5.4 *Time Schedule – Review*

Specific time schedule guidelines for design review submittals are set forth in the Design Committee document, *Design Committee Review Procedures*. The Design Committee generally meets on the first and third Friday of each month. If a submittal is received no later than 12:00 noon on the Thursday one week prior the next Design Committee meeting date for Preliminary Reviews, the next Design Committee meeting date for Conceptual and Final Reviews, then the submittal shall be first considered at such meeting. For each submittal required by this Design Guideline of the two required submittals, unless time is waived by the owner or the owner's representative, the Design Committee will act on and notify the owner or the owner's representative in writing within seven [7] days of the date that the submittal is reviewed by the Design Committee. If the Design Committee denies a submittal or approves a submittal with conditions, the written notification shall be in writing and set forth the reasons for such disapproval or conditional approval and specify that the owner has a right to request reconsideration by the Design Committee. In the case of denial, the Design Committee notification must advise the owner.

5.5 *Submittal Checklist*

All submittals shall be accompanied by and prepared in accordance with the Design Committee Submittal Checklist ("Checklist"). The Submittal Checklist is available from the Design Committee. The Design Committee may modify the Checklist from time to time to facilitate design review.

5.6 *Preliminary Site Visit*

Prior to any submittal to the Design Committee, a lot owner and the owner's architect or designer shall meet on the site with a member of the Design Committee to discuss the specific characteristics and constraints of the site and the possibilities for developing a project that provides the most appropriate fit between the needs and desires of the owner and the vision and rules of the Sanctuary on the Bow, the lot sheet for the site, and as set forth in the Design Guideline. It **is strongly advised that this meeting be scheduled before proceeding with any design work on the project.** It is also advised that if there are any questions or concerns about the Sanctuary on the Bow Design Guideline that the project developer be contacted for clarification. Owners and/or their designers should meet with the Design Committee before submitting materials for formal review.

6.0 *Conceptual Design Review*

The conceptual design review submittal provides the opportunity for the owner and the owner's architect/designer to obtain feedback from the Design Committee at the early stages of the design process. The submittal must include the signed application form and the Checklist and shall clearly articulate the overall concept through written statements, diagrams, drawings, photographs, and in model form if appropriate. The submittal shall be in duplicate and must include the following information:

1) A survey of the lot, prepared by a licensed surveyor that shows major topographic and vegetation features and all setbacks and easements, if any.
2) A copy of the Lot Sheet.
3) A site development concept, which should indicate how the planned project will respond to the conditions delineated in the site analysis.
4) A building design concept, including sketch plans, sections, elevations, and a drawing and/or model that shows the three-dimensional relationship between the building and the site.
5) Photographs of the site and adjacent lots to help explain the relationship of the proposed building to its environment. The Design Committee will inspect the building site during the conceptual design review.

The Design Committee may require that the owner and the owner's architect or designer meet with the Design Committee as part of the conceptual review.

7.0 *Final Design Review*

After receiving approval of the conceptual design review submittal from the Design Committee, the owner may present the final documents including the signed Checklist, three (3) copies of the building plans (including all information regarding details, finishes, screens, site work, and landscaping) and any additional information specified by the Design Committee. The plans and specifications presented shall be the exact construction documents that the owner will submit to the M.D. of Foothills for a building permit. These documents must also fully address any conditions that the Design Committee imposed in the Committee's conceptual design review approval.

The final plans must include:

1) A site plan that depicts the existing topography and vegetation, proposed grading, drainage, vegetation, and location of all existing and/or proposed improvements, buildings, and adjacent improvements or buildings.
2) Floor plan(s), sections, and elevations that completely and fully describe the form of the building, the individual building elements, and the relation of the building to the site.
3) A depiction of major building details, materials, and finishes.
4) A simple model or three-dimensional drawings that explain the relationship of the building to the site and to adjacent neighbouring buildings.
5) A neighbourhood map depicting developed and undeveloped lots.

6) A landscape plan to demonstrate the integration of the building elements with the site development and landscape planting, for the protection of the landscape during site preparation and construction, and restoring the landscape after construction.

7.1 Stake-Out Requirements

Prior to the Final design review submittal, the owners or their representatives may be required to "flag" the corners of the lot; stake the corners of all proposed construction including the home, garage, and decks; ribbon the building perimeter; and stake and ribbon all screens and the centerline of the driveway (plastic ribbon is required). The Design Committee will inspect the building stakeout, if required, during the final design review. The Design Committee may require story poles to indicate the height of the structure. The preliminary design review submittal must contain an affirmation that the stake-out and story poles, if required, are in place.

7.2 Construction / Building Permit

The Design Committee provide the architectural review for projects on the Sanctuary on the Bow, and plans submitted to the M.D. of Foothills Building Department must conform to the Design Committee's final review approval. The Design Committee approval must be secured prior to applying for a M.D. of Foothills Building Permit. After obtaining the required permit(s) from the M.D. of Foothills, and submitting evidence of same to the Design Committee, a Construction Permit will be issued by the Sanctuary on the Bow Design Committee which must be posted where visible at site. All exterior construction and site work must be completed within one year from the time of issuance of the M.D. of Foothills Building Permit, except in the event of conditions beyond the owner's control, such as strikes, fires, or natural calamities.

7.3 Construction Changes or Additions

Any proposed changes and/or additions to the approved construction documents made prior to, or during, or after construction must be approved prior to initiating the changes or additions. Subject to review by the Design Committee may act on minor changes and additions to previously approved plans.

7.4 Required Compliance Inspections

During construction, the project may be monitored by the Design Committee.

If it finds that the improvement was not completed in accordance with the approved plans, it shall notify the owner or the owner's representative of the violation and may require the removal and/or correction of the unapproved construction, specifying a reasonable time to correct the violation.
The Design Committee may also require the submittal of as-built plans to reflect approved modifications and changes to the approved final submittal. Failure to complete all exterior construction, including restoration of the site in accordance

with the approved plans, and conditions or standards set forth by the Design Committee, may result in the forfeiture of part or all of the deposit.

7.5 Fees

The Design Committee shall require the payment of fees to cover services such as, but not limited to, the review of projects, construction observations, inspections, and approval extensions. These charges are set forth in the Sanctuary on the Bow fee schedule to cover the cost of services and may change from time to time. Owners may obtain a copy of the fee schedule from the Design Committee.

7.6 Owner's Responsibilities

Receipt of the M.D. of Foothills building permit is more than a license to carry out construction; it carries with it an obligation on the owner's part to observe the Design Guidelines that affect all improvements and ownerships at the Sanctuary on the Bow and to complete the project in compliance with the approved plans. Prior to making any changes, additions, or revisions to the approved plans, the owner or the owner's representative must submit such proposed changes, additions or revisions to the Design Committee for review. Property owners who contemplate building, remodelling, additions, maintenance, refinishing or reconstruction should consult this guideline.

7.7 Design Committee Reconsideration

An owner or owner's representative may request the Design Committee to reconsider a denial or conditional approval. The Design Committee shall act on such request in writing within thirty [30] days of receipt by the Design Committee and notify the owner or owner's representative in writing within five [5] business days of such action.

If the Design Committee denies a request for reconsideration of conditional approval, it will be deemed a denial.

7.8 Violations

It is a violation of this Design Guideline to construct, reconstruct, refinish, alter, demolish, modify or modify any improvement, or alter or modify the natural drainage, landscape, or vegetation on any private area of Sanctuary on the Bow without first obtaining approval from the Design Committee or fail to complete all exterior work within a twelve-month period after the issuance of a M.D. of Foothills building permit. The Design Committee will report violations to the Sanctuary on the Bow Homeowners Association for enforcement action.

The Design Committee will not process new applications for lots that are in violation of the Design Guideline provided however, the Design Committee may waive the prohibition in the interest of the health, safety, and welfare of the

Sanctuary on the Bow Homeowners Association or its owners; and provided further that an owner may apply for approval for any work which is performed without Design Committee approval, or which is at variance with the approved plans, or is in violation of the Design Guideline. Provided that any such application must be made in accordance with the requirements of this Design Guideline and must be accompanied by plans that describe with specificity the improvements or other alterations that constitute the violation and for which approval is sought. The Design Committee will act on the application in accordance with the requirements of the Design Guideline. If the Design Committee denies the application, it will require removal of the improvements constituting the violation(s).

7.9 Design Standards

The design standards establish the requirements for building on Sanctuary on the Bow to maintain the character of the existing environment and preserve that character for present and future owners. The standards are concerned with all aspects of building development, from architectural and site design to the processes that take place during construction and remodelling and maintenance. The design standards are derived from the Design Guideline and reflect the objective of maintaining the traditions and spirit of the Sanctuary on the Bow founders. The Design Guideline states that nothing shall be done which may be or become a nuisance, or cause unreasonable embarrassment, disturbance or annoyance to other owners.

7.10 Precedent

The Design Committee recognizes that each site is unique and will interpret and adapt these Design Guidelines to take the specific characteristics of each site into account and will consider and act on submittals based on the specific site context and characteristics. Because of the uniqueness of each site, its context, and the owners specific building program, Design Committee decisions are not precedent setting.

7.11 Variances

The Design Committee may grant variances to these standards or require more restrictive solutions than the standards indicate if, in its judgment, the design solution or site circumstances warrant such action. Variances will be considered, weighing the requests of the individual homeowner and the impact on and concerns of affected neighbours and the larger Sanctuary on the Bow community.

8.0 Guiding Design Principals and Architectural Elements

8.1 Physical Form

The various elements of the project – structures, landscaping, and screening – should be seen as an integrated whole. The roof forms, whether single or multiple elements, should be used to simplify and organize the structure and not just look like a "hat" sitting on walls. The building should be shaped to deflect the predominant wind flow, to create sheltered places.

8.2 Built Landscape Elements

The built landscape includes screens, walls, and minor structures as well as exterior lighting and vegetation. They should be considered at the time of the development of the design concept and integrated into the overall site plan. Property boundaries should be de-emphasized.

Planted elements – trees and shrubs – grow. Therefore, consideration must be given to their potential for blocking views and their need for pruning in the future. The spaces adjacent to the building should flow from site to the Commons, minimizing the sense of separation. The existing landscape of most of Sanctuary on the Bow already provides a "natural park" setting. Planting can help connect the building to the site, but should not materially change the character of the setting. Plant materials must be selected from the Sanctuary on the Bow approved plant list, except within enclosed courtyards where non-native plants are allowed, provided that they are, and remain, screened from public view.

8.3 Home Size

It is necessary to consider both the actual size and the apparent size of the homes to properly integrate the building with its environment, making it subordinate to the landscape and in harmony with the neighbourhood. The actual and apparent size of homes must be considered in relation to the character of the site and the neighbourhood context. This does not say that all homes must be of the style. All architectural styles will be considered. If a building appears to overpower its surroundings and lacks cohesiveness with its neighbourhood, a comparative bulk study will be required. Buildings should blend with and not overwhelm their immediate surroundings.

The minimum required square footage for a dwelling is 2000 ft^2 developed and not including the garage.

Among the elements that often contribute to a visual appearance of excessive size are:

- Exaggerated and over-scaled details and entries
- Buildings that appear "top-heavy" and unrelated to the ground
- Large, unbroken expanses of high or long wall surfaces
- Continuous, unbroken roof forms
- Inefficient circulation and layout

8.4 *Site Planning*

Site grading and management of site drainage is a major development concept. As the amount of runoff as a result of development increases, the downstream erosion and habitat protection becomes more critical. Watersheds deepen and erode, bluffs are subject to damage by the increased volumes of surface and sub-surface water and the character of the Commons is altered. There is a need for all owners to accept their roles in the overall protection of the Sanctuary on the Bow environment.

Critical principles of site planning include:

- Preservation of the existing landforms, and vegetation, and drainage patterns,
- Integration of the building and site improvements into the natural setting
- Take best advantage of views and sunlight
- Achieve proper balance of visibility and privacy
- Create sheltered, comfortable outdoor areas, useable through extended seasons by the use of landforms buildings and plants
- Positive drainage from buildings and respect of existing drainage patterns, while encouraging water conservation by rainwater harvesting and use for irrigation or lawns and gardens (i.e. – implementation of lot level Best Management Practices), and
- Utilize Best Management Practices to reduce run-off rates and to prevent deterioration of receiving water bodies.

The general requirements for grading and drainage control are listed below. Upon review, due to the uniqueness of each site, the Design Committee may grant variances to the standards or require more restrictive solutions if, in its judgement, the design solution or site circumstances of a particular project warrant such changes.

8.5 *Best Management Practices*

It is recognized that Sanctuary on the Bow is located within a landscape that contains features such as wildlife and plant diversity but is also located adjacent to one of the most significant waterbodies in Canada, the Bow River. Best Management Practices (BMPs) offer an alternative to traditional stormwater management. BMPs utilize existing natural features as well as integrate landscaping features and "water wise" designs within development to reduce runoff rates and to encourage water re-use. Ultimately, BMPs are designed to achieve at minimum pre-development runoff rates and perhaps more importantly improve water quality of water run-off. This is accomplished through the reduction of impervious surfaces and an increase in water infiltration on the building envelope. A low impact development approach will minimize the impact of degradation to the Bow River, its riparian corridor, and downstream areas. BMPs may contain and/or contribute to the biological and chemical complexities found in natural environments. For example, the design and construction of wetlands and

bioretention areas strive towards mimicking natural functions such as water detention, water treatment, and infiltration.

8.6 *Grading and Drainage*

The design of each home will be tailored to the site, not the site to the home. Excessive lot grading is discouraged and usually not allowed. However, since generalized solutions may not be appropriate to all site conditions at Sanctuary on the Bow, unique solutions may be allowed in specific cases.

Appropriate grading within the approved building envelope on each lot will:

- Minimize site disturbance
- Retain the maximum amount of undisturbed topsoil
- Avoid major excavation
- Avoid significant engineered cut or fill slopes
- Avoid creation of depressed floor areas or low areas of poor drainage that will negatively impact existing vegetation, impede growth of new planting, or create future drainage problems.

No grading or disturbance shall occur outside of the designated building envelope.

A site Grading and Drainage Plan at a scale of 1:100 m, based on a topographic map as supplied by the developer, will be required as part of the preliminary design review submittal. This plan shall indicate existing and proposed contours at 0.5 m, location of all proposed and existing improvements, location of all existing trees with a height of over six feet and a calliper of over 3 inches, and prominent shrubs. Trees to be removed and the location of proposed utility installations will be indicted.

The Grading and Drainage Plan shall be in compliance with the Master Drainage Plan and shall also include the anticipated zone of site disturbance, the line of tops and bases of all cuts and fills, pitch direction of graded parking and yard areas, and direction of drainage swales. Collected storm water runoff may not be directed onto neighbouring property or Commons. Runoff should be conveyed to subsurface leach trenches, laid parallel to the contours, and covered with soil and planted with indigenous materials.

The Grading and Drainage Plan shall be reviewed by the Design Committee to ensure that BMP's are incorporated and that these measures integrate with the overall drainage system envisions and developed by the Master Drainage Plan. The Grading and Drainage Plan shall include measures during construction, including but not limited to: erosion and sedimentation controls, run-off management, and a schedule of maintenance of these on-site measures. As-Built surveys will be required to ensure compliance.

8.7 Finished Grade

The Grading and Drainage Plan shall demonstrate that finished contours blend naturally with the existing adjacent topography. On steep sites and where soils are stable, 1:1 or greater slopes may be permitted where they are hidden and will minimize damage to existing vegetation, subject to approval by the Design Committee.

8.8 Grading on Commons and Restricted Areas

On the Commons or Restricted Private Areas, no excavation, fill, or change in natural or existing drainage is permitted.

8.9 Erosion Control

Erosion control features and materials must be described on an Erosion Control Plan for the construction period and for the completed project, if required by the Design Committee. An Environmental Construction Operations Plan may, at the discretion of the Design Committee, also be required should the site be considered as adjacent to sensitive areas or within proximity to the Bow River.

8.10 Soil Management

During construction, soil disturbance shall be managed as follows:

- Topsoil removed from building footprint and areas to be paved should be stored on site for reuse.
- Subsoils lacking humus should not be used to cover topsoil.
- If soil removal is necessary, subsoil should removed first. Retain the best quality soil for reuse on site.
- Where soil is to be stored on site for reuse, the placement area must be prescarified, rototilled, or otherwise softened to ensure downward soaking of rainwater to undisturbed soil levels.
- Soil should not be spread over existing vegetation to avoid soil removal.
- Sedimentation and Erosion Control measures must be in place and maintained during the construction period.

8.11 Site Protection During Construction

Any grading within the drip line of any tree outside of the defined building envelope with a calliper of four [4] inches or larger is prohibited without prior approval of the Design Committee. A construction fence must be installed at the drip line. Storage of materials, parking of vehicles or equipment or any other construction-related activities within the fenced area is prohibited. Major shrubs or shrub masses are to be retained and will require protection to avoid construction impacts. Repeated parking or driving vehicles and other construction equipment outside the planned driveway, parking court, and building footprint is prohibited. The Design Committee may wave this rule depending on specific site conditions and the proximity of the building site to a road.

8.12 Re-grading

Re-graded areas and berms must be sloped in a gradual fashion to reduce the apparent height of walls and buildings and to create the appearance that the re-graded areas are a natural extension of adjacent undisturbed grades.

8.13 Re-planting (Native Grass Mix)

All re-graded and disturbed areas shall be replanted with Sanctuary on the Bow approved grasses, the native grass mix, and/or shrubs and trees to blend in with the adjacent landscape.

8.14 Construction Site Control

No fill, construction debris, or building materials are to be located on adjacent properties, rights-of-way, Commons or roadways. The building site must be kept clean and orderly and blowing dust and sand must be controlled throughout the period of construction.

8.15 Temporary Construction Buildings

No temporary buildings shall be placed on a lot prior to the construction of the main residence unless such a building is used only as a temporary construction shelter. A temporary construction shelter must have a neutral, non-reflective finish with no advertising.

8.16 Portable Toilet

A portable chemical toilet of the type approved by the M.D. of Foothills shall be specified in the building plans and located on the building site during the course of construction. It shall be a muted color and be located so as to be unobtrusive.

9.0 Vegetation Management

9.1 Vegetation and/or Tree Removal or Destruction

An owner must submit an application to the Design Committee and obtain approval to remove or destroy any of the following vegetation from the owner's private area:

1) Any tree, living or dead, having a height of six [6] feet or more and a trunk diameter at ground level of three [3] inches or more in any direction, or shrub measuring over six [6] feet in height or spread in any direction. As used herein, an owner destroys a tree or shrub by significantly damaging the root system or other parts by any means, or by removing more than 1/3 of the live wood or substantially altering the natural form of the tree or shrub.

2) Any tree or shrub planted pursuant to a Design Committee approved plan. As part of an application to remove or destroy vegetation, the Design Committee may require that the owner at their cost provide a certified Arborist's (Arborist) report that evaluates whether the removal or destruction will have an adverse impact on the health or stability of any other trees or vegetation and whether the proposed removal is consistent with maintaining the general health of the landscape.

9.2 Pruning

Removal of more than 1/3 of the live wood or substantial alteration of the natural form or topping of a tree without prior approval of the Design Committee is prohibited.

9.3 Wildfire Hazard Assessment and Management

Wildfire hazard assessment and management is a critical consideration for fire safety at Sanctuary on the Bow. Vegetation removal and trimming to maintain a private area in a fire safe condition is not subject to Design Committee review and approval. Owners are encouraged to choose building sites and materials that are in conformance with Alberta Sustainable Development's FireSmart Homeowner's Manual.

9.4 Protecting the Commons

An owner is prohibited from removing, destroying , or altering any vegetation in the Common Area, or Restricted Private Area. These are areas identified as under the common ownership of the Homeowner's Association or subject to an Environmental Reserve Easement. The Design Committee may approve the removal of vegetation from any such area only upon receipt of a written application. An owner may request the Design Committee to initiate such an application for the removal or destruction of vegetation from the Common Area or Restricted Private Area in accordance with The Sanctuary on the Bow Homeowner's Association and FireSmart Guidelines.

9.5 Maintaining Existing Vegetation During Construction

As part of an application for new construction or for a major addition, the Design Committee may require a plan to protect vegetation on the site during construction or to restore the site vegetation after construction. To protect the site during construction, the Design Committee may restrict construction to a reasonable portion of the lot so that maximum amount of natural vegetation can be retained, and may require the installation of temporary fencing for the protection of designated trees, shrubs, and/or areas of the site that should remain undisturbed.

10. Driveways

10.1 Location

Driveways should be located with consideration for safety of access to and from main roads, ease of grade, minimal destruction of vegetation, and minimal disturbance of the site. Where possible, driveways are to be no wider than 4 metres (13 feet) and include pervious materials.

10.2 Shared Driveways

Wherever possible, driveways should serve more than one home, typically along a shared property line.

10.3 Surface Material

Washed gravel, crushed limestone, dust controlled materials (i.e. crushed rundle) or other approved porous driveway surfaces are required.

10.4 Approaches

Approaches are considered a municipally approved width and should not be adjusted. The driveway and driveway taper are not to exceed ten [10] feet in width.

11.0 Architectural Elements

When viewed in the context of an individual building, many elements, such as the height of screens, the scale of entryways or the color of window sashes are seemingly minor design issues, but when viewed as part of the larger context, they are important in establishing and maintaining the character and sense of place. Buildings must respond to Sanctuary on the Bow community at large as well as to their specific sites. The impact of wind, rain, and sun over many years takes its toll on the materials and finishes of buildings. The Design Committee is aware of the changing availability and the declining quality of traditional building materials and encourages the exploration of new, alternate and sustainable building materials and energy-efficient building systems. Because of the uniqueness of each site, the Design Committee may allow variations or require more restrictive solutions than those listed below.

11.1 Building Height and Profile

7.0 m (23 ft) 2 storey – maximum to the eaves measured from the grade on all sides of the home. Also, maximum roof peak height is 10.00 m (32.8 ft), measured as the average of heights form all elevations.

In a two story home on a walk-out lot , the upper floor is to be incorporated into the roof. Simple roof elements that are a coherent part of the building form, avoid the look of a "hat" placed on the top of solid wall.

11.2 Roof Slope

Roof slopes are a product of the type of roof and the building width. A 4-in-12 or greater roof pitch is appropriate for a gable roof; whereas a single pitch (shed roof) may be the same or lower; metal roofs create less reflection at a lower pitch; and sod roofs require an even lower pitch.

11.3 Exterior Walls

Materials

Must be natural materials only; wood and stone. Other Materials like metal will be considered on an individual bases based on the compatibility with the visual vocabulary of the Sanctuary on the Bow and adherence to finish, color, and reflective requirements. Stucco will be considered as an architectural feature, but not an extensive wall material.

Trim

The size and amount of trim around door and window openings and the use will be reviewed in relation to the form and finish of the building.

Foundation Walls

Siding shall be designed to come within six [6] inches of and be parallel to the finished grade. Exposed concrete stepped foundations as part of an integrated design will be considered on an individual basis in terms of appropriateness of the relationship of the overall design of the structure to the landscape.

Decks

First story decks and decks in exposed locations shall have siding matching the home and extending to within six [6] inches of and be parallel to the finished grade. The Design Committee may consider alternative deck configurations depending on site conditions.

Meter Boxes

Meter Boxes and switch boxes shall be recessed into the wall of the structure, unless otherwise approved by the Design Committee. The access door shall be flush and constructed of the same material as the adjacent material.

11.4 Windows

Windows are an important element in determining the character and liveability of a home. Window openings should be considered as part of the three-dimensional development of the interior spaces responding to the building program. The scale (apparent size) of the building will be affected by the size and arrangement of windows and how the windows fit into the wall.

Shape

Window shapes should result from their function – to focus views, to extend spatial relationships, to bring in light – not just as elements on the exterior walls. They should relate to the character of the building and be integrated with it.

Glass

Mirrored glass is prohibited; clear glass is preferred. Some high efficiency, lightly tinted glass materials may be acceptable, but samples must be submitted for review along with the appropriate specifications and drawings.

11.5 Skylights

Skylights provide an ideal source of natural light as well as views into treetops in wooded locations.

Materials and Shape

Skylights should be flat, clear glass or polycarbonate (or similar), panels, placed parallel to the roof plane. "Dome" or other three-dimensional shaped skylights or skylights with white or other coloured glazing materials add unnecessary complexity to the building form may create light-fall problems for neighbours and are not permitted.

11.6 Solar Collectors

The use of active and passive solar design systems is encouraged.

Location

Solar collectors and attendant attachments (fasteners, pipes, power lines, and so on) must be thoroughly integrated with the building and/or site design. Screening from nearby properties and roads may be required.

Materials

Materials that minimize reflectivity are preferred. The collectors and related materials must be properly integrated with the overall building and roof forms.

11.7 Fencing

No fencing is permitted at Sanctuary on the Bow.

11.8 Setbacks

Sideyard setbacks and staggering of homes on adjacent lots can provide for privacy, separation and an improved streetscape. Side yard setbacks at minimum should be 6.0 m (20 feet) and will be pre-determined for every lot by identified building envelope..

11.9 Garbage Storage

Garbage must be kept in an enclosure integrated within the form of the house. It may not be placed on the street or stored outside, except 12 hours before pick up. All containers must be wildlife proof.

11.10 Outdoor Lighting

Exterior lighting should be subtle, providing illumination for safety and highlighting architectural elements or landscape elements. Exterior fixtures must not have light sources directly visible from the street or neighbouring properties. No light shall be allowed to shine or be directed upward with no excessive glare. Floodlights and uplighting trees is not consistent with the natural character of Sanctuary on the Bow and will not be allowed.

11.11 Satellite Dishes & Antennas

Small dishes may be permitted provided they are integrated into the design of the home. Multiple satellite dishes on a residence are discouraged.

Design Committee review is required for dishes and antennas, subject to applicable regulations of the CRTC if any.

Visibility

Antennas, including satellite dishes, shall be installed so that they do not project above the ridgeline of the roof of the structure. Installation shall minimize the visibility from neighbouring properties, pedestrian trails, and roads. The color of satellite dishes should match the color, as closely as possible, of that part of the structure on which they are mounted.

11.12 Screens

Use of Screens

Parking areas and all above grade service facilities, including trash and garbage containers, maintenance and service equipment and clothes lines must be

screened or a combination of screens and plant materials. Trash and garbage enclosures must be animal proof and placed to allow for convenient pick-up from the road. Screens may also be used to define and screen private courtyards and gardens from public view. Gates used to close off parking areas require approval from the Design Committee.

Fences may not be used to define the perimeter of a lot or large portions thereof. The use of screens to define areas for private use should be limited. Privacy screening by the use of a combination of screens and vegetation is preferred.

Height

The height of screening shall not exceed five [5] feet, subject to the review of the Design Committee. On some sites, the apparent height of screening can be reduced by the use of landscape elements or by the use of gently sloped berms extending to the top of a retaining wall and then topped by a low screen.
Visual Impact

The scale and placement of screens are important to the visual composition of the total building complex. When screens are used as integrated extensions of buildings to define entrances and courts they should be constructed of the same materials as the buildings. The extent and visual impact of screening should be minimized.

Location

While screening and planting may be appropriate at the street side of the property to establish the edges of private spaces, to provide screening, privacy, and to soften the visual impact of the buildings, the spaces on the Commons side of buildings should visually flow into the Commons without screens or planted barriers to maintain the open character of the larger landscape.

11.13 Deck Railings

- At the ground level, when in close proximity to neighbouring properties or trails, decks shall have constructed edges, seating, or railings at least eighteen [18] inches above the deck surface to visually screen the deck surface. In specific cases this rule may be waived by the Design Committee to provide a more subtle demarcation between the structure and the Commons. When required, these railings shall be solid, with the same surface material of the adjacent structure, and extend downward to within six [6] inches of the finished grade. A combination of wood railings, earth berms, and landscape planting may be approved by the Design Committee. Decks at an upper floor level may have solid or open railings appropriate to the character of the building.

11.14 Hot Tubs

Hot tubs and spas must be located and screened from view in such a way that their use provides no intrusion on neighbouring property, Commons, or public use areas. Heights of the screening enclosure must conform to applicable public safety requirements and must be a minimum of six (6) inches above the top of the hot tub or spa enclosure. Additional screening may be required by the Design Committee.

12.0 Landscape Elements

The Sanctuary on the Bow landscape includes a rich diversity of indigenous plant types as the terrain extends from the escarpments to the Bow River. The mixture is varied, and the success of each plant type is a result of its suitability to the terrain, soil conditions, available moisture, and wind. The common pattern is random, a mix of grassy meadows intertwining with forest trees and riparian corridors. The goal of Sanctuary on the Bow planning is to maintain, restore, and reinforce the native landscape. The vegetation and landforms to and between buildings is an important part of that concept. Personalized gardens incorporating non-indigenous plant materials may only be developed within enclosed courtyards.

Generally, non-indigenous plants in Sanctuary on the Bow landscape are ill suited to the character of Sanctuary on the Bow and are not allowed outside of screened courtyards. Non-native plant materials or plants arranged in a formalistic pattern are not consistent with the overall concept of supporting the existing natural setting of Sanctuary on the Bow, in terms of plant association and imagery.
The constructed elements of the landscape must also be compatible with Sanctuary on the Bow image. Walls, steps, and graded slopes are important parts of site development and must be designed as part of the overall plan for the project. Such constructed elements shall use materials and building techniques that blend with the existing landscape. The Design Committee may require landscape solutions other than those listed below depending on the characteristics of the specific site.

12.1 Walls and Steps

Design and Materials

Landscape walls and walls relating to stairs adjacent to a building shall be sheathed in the same materials as the building. Step railings, where required, shall conform to safety requirements but should be simple and visually unobtrusive rather than becoming a dominant design feature.

Local Materials

Walls of local stone may be appropriate for the construction of retaining walls in areas where these materials occur naturally. In the forest setting, walls constructed of horizontal or vertical logs blend well with the natural setting but may need special treatment to be resistant to decay.

12.2 Pavement

The design of paved areas and the paving materials must be porous and must reinforce and blend in with the natural character of the site and de-emphasize an urban or suburban appearance.

Drainage

Porous pavements, so loose stone, are required rather than poured concrete or asphalt based materials. Porous pavements permit rain-water to be absorbed into the soil, decreasing the quantity of runoff and consequent downgrade problems.

Materials

Materials such as paved surfaces of decomposed granite, rundle, etc., compacted drain rock or gravel, fir bark mulch, and stepping-stones of wood or stone are suitable materials for landscape walks and terrace areas. Unit pavement materials placed over base materials of drain rock and sand may be suitable substitutes for concrete. Some types of precast pavers may be suitable for use at Sanctuary on the Bow, but most are urban in character. Permission from the Design Committee must be given to use certain precast pavers.

12.3 Lot Line Definition

Delineation of lot lines with fencing or planting is not allowed. Lot boundaries serve a legal purpose, but they are visually unimportant in an open landscape at Sanctuary on the Bow. A lot line made visible by rigid planting patterns, clearing or mowing to the edge, establishes a suburban look as precisely as a fence and denies the open-space philosophy underlying Sanctuary on the Bow development.

12.4 Landscape Design

Any landscape improvements or modifications to the existing landscape require the approval of the Design Committee. Landscape designs should be simple rather than complex, natural in appearance, and free of artificial appearing geometric patterns, for example, evenly spaced, straight rows of trees or shrubs along driveways or property lines. A detailed landscape plan identifying plant materials and locations of both new and existing vegetation must be submitted for review and approval.

Plant Selection

Variety in plant selection and size can maintain the visual diversity present in the natural landscape. A diverse pattern rather than a monoculture pattern leads to a healthier more successful landscape design.

Plant Materials

Preservation of the landscape

Native vegetation should be salvaged and restored to the extent possible in areas damaged during construction. The Landscape Plan must indicate areas to be protected as well as any new planting. Plant species selected should be those that deter wildlife from browsing or attract wildlife to the home site.

Plant types

Excessive areas of a single plant type in a geometric pattern which by the dominance of foliage or flowers detract from the natural surroundings should be avoided. Placement of large shrubs and trees should be made judiciously. They must be considered as elements of the total composition along with the mass of the building and related components, and will require maintenance. An approved plant list is available from the Design Committee.

Non-Indigenous Planting

Plants completely within enclosed courtyards, not visible from any neighbouring properties, roads, or pedestrian trails, may deviate from the approved plant list. However, they must remain screened from public view. Plants selected should be appropriate to the prairie environments. Invasive non-native plants capable of spreading by seed, root growth, or runners are prohibited and must be replaced by the homeowner. (See Design Committee list of plant material not allowed on Sanctuary on the Bow) Plant material considered incompatible with Sanctuary on the Bow landscape is subject to removal at the expense of the property owner, if requested by Sanctuary on the Bow Homeowner's Association or the Design Committee.

Meadow Grass

Management of meadow grass is required for fire protection. Care must be given to the way that grasses are mowed. Cutting grasses too short simulates a suburban lawn-like appearance, allows invasive plants to become established, and is detrimental to the regeneration of native bunch grasses. The shape of the mowed area should be random. Mowing strictly along the property line or in a rectilinear pattern emphasizes the shape of the parcel and negates the visual continuity of the meadow.

13.0 Dogs

Dog control on the property shall be in accordance with the Municipal District of Foothills Land Use Bylaw as it relates to Dog Control within municipal Hamlets.

APPENDIX D – ENVIRONMENTAL OVERVIEW (MSES)

Sanctuary On The Bow Environmental Overview : Wildlife, Vegetation and Migratory Birds

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June 2005

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Sanctuary On The Bow Environmental Overview : Vegetation, Wildlife and Migratory Birds

Introduction

Breco Development Corporation is proposing an Area Structure Plan for a residential housing development and wetland bird/wildlife sanctuary adjacent to Policeman's Flats and the Bow River (Sanctuary On The Bow). The main objective associated with the proposed development is to retain, as much as possible, existing ecological integrity in the form of wildlife habitat use and to create wetland habitat for migratory birds in a balanced and integrated fashion with residential use. The overview of information gathered to date surrounding wildlife and vegetation communities will enable Breco to assess the feasibility of these objectives by evaluating the constraints and opportunities associated with any such development.

Information pertaining to the sensitive species of the subject land was requested from the Biodiversity/Species Observation Database (BSOD) maintained by Alberta Sustainable Resource Development (ASRD) and the species tracking list maintained by the Alberta Natural Heritage Information Centre (ANHIC). No site-specific vegetation or wildlife information was available in either database, although this is not necessarily indicative of the lands' relative importance to plant and animal species. ASRD stressed the relative importance of the treed escarpment surrounding the subject lands to wildlife movement, especially ungulates. This escarpment also contributes to the regional diversity of habitats and species. Policeman's Flats and the associated constructed wetland/channel complex were also pointed out by ASRD as being important areas to maintain for both public access to the Bow River and wetland stewardship, respectively.

A reconnaissance-level vegetation community and wildlife survey of the subject lands was carried out on 14 June 2005 by MSES personnel to gain a better understanding of the potential constraints and opportunities associated with any integrated development plan.

Vegetation

The local flora is generally characteristic of the Foothills Parkland Subregion of Alberta, although the study area is within the mapped boundary of the Foothills Fescue Grassland Subregion (Kershaw et al. 2001). General descriptions of vegetation communities are outlined below. Species composition information gathered during a reconnaissance survey on 14 June 2005 is presented in Table 1.

The forests along the raised escarpment at the southern end of the study area have a predominant tree cover of trembling aspen and balsam poplar, with an occasional white spruce. Woody and herbaceous understorey species are outlined in Table 1. The uplands below the escarpment include open forest, low shrub and herbaceous communities.

The low shrub communities appear to be succeeding from previously cleared and grazed meadows to open, trembling aspen forests. The woody components of the low shrub communities are outlined in **Table 1**.

Predominately, grasses comprise the herbaceous communities. Woody species and other herbaceous species were usually also present (Table 1). Evidence of cattle grazing suggests that some of the herbaceous communities may be the result of clearing.

Adjacent to the Bow River, riparian communities include old balsam popular forest, mature balsam poplar forest, tall willow shrub, and shoreline herbaceous. The understorey of the old balsam poplar stand mainly consists of grass. In contrast, the understorey of mature balsam popular stands includes red osier-dogwood and willow. At the waters edge in the northeast corner of the study area, tall stands of sandbar willow grow, bordered by shrubby cinquefoil further inland. The river flows over and pools in depressed areas near shoreline allowing grass and sedge growth. In other places, vegetation along the rocky shoreline includes silverberry, Canada anemone, and star-flowered Solomen's seal.

Disturbed areas include excavation sites, pasture lands, and horse trails. A large population of leafy spurge (*Euphorbia esula*) was noted in a presumed former pasture at the north-western end of the study area. Leafy spurge is a serious introduced weed of pastures, difficult to eradicate, and poisonous to most livestock, except sheep. Other introduced species noted in the study area were Canada thistle and common Caragena.

Off site, a constructed wetland near Policeman's Flat provides wildlife habitat and emergent vegetation, such as sedges, rush and cattail.

Vegetation Species of Special Management Concern

There are at least 33 potential rare plant species known to occur in similar habitats as found within the study area (Kershaw et al. 2002). Spring and summer plant surveys would be required to assess the actual presence of plants considered endangered, threatened, of special concern, and rare within the study area.

Reconnaissance Survey

During the reconnaissance level survey the following sites were noted, described and inventoried for plant species constituents (Table 1). This information may be used to assist in the establishment of the subject land seed base that is to be used for building envelopes. GPS coordinates for sites are available upon request.

Table 1. Reconnaissance survey plant observations.

Site	Description	Plant species
1	Grassy meadow on edge of study area	*Amelanchier alnifolia* (saskatoon) *Rosa aciculans* (rose) *Potentilla fruticosa* (shrubby cinquefoil) *Onosmodium molle* (western false gromwell) *Linum perenne* (wild blue flax) *Hackelia floribunda* (stickseed) *Lithospermun incisum* (yellow stoneseed)
2	Deer trail up/down treed escarpment	*Prunus virginiana* (chokecherry) *Amelanchier alnifolia* (saskatoon) *Rosa acicularis* (rose) *Populus tremuloides* (trembling aspen) *Populus balsamifera* (balsam poplar) *Thalictrum* sp. (meadow rue) *Anemone canadensis* (Canada anemone) *Ribes sp* (gooseberry)
3	Open trembling aspen	*Populus tremuloides* (trembling aspen) *Salix* (old) (willow) *Symphoricarpos albus* (buck brush) *P. balsamifera* (balsam poplar juveniles) *Elaeagnus commutata* (silverberry) *Equisetum arvense* (horsetail) *Rosa acicularis* (rose) *Betula occidentalis* (water birch) Grass
4	Grassy meadow, silverberry at edge	*Elaeagnus commutata* (silverberry) *Symphoricarpos albus* (buck brush) *Antennaria* sp. (pussytoes) *Populus tremuloides* (trembling aspen juveniles) *Tragopogon dubius* (goatsbeard) *Fragaria* sp. (strawberry) *Potentilla fruticosa* (sparse shrubby cinquefoil) *Linum perenne* (wild blue flax) *Onosmodium molle* (western false gromwell) *Cirsium arvense* (Canada thistle)
5	Open trembling aspen	*Populus tremuloides* (trembling aspen) *Elaeagnus commutata* (many silverberry) *Amelanchier alnifolia* (Saskatoon) *Rosa acicularis* (rose) *Galium boreale* (bedstraw) *Symphoricarpos albus* (buck brush) *Thalictrum* sp. (meadow rue) *Juniperus communis* (patch)

		Betula occidentalis (water birch) *Shephardia canadensis* (infrequent buffaloberry) *Picea glauca* (occasional white spruce) *Lonicera dioica* (twining honeysuckle)
6	Open stand of young trembling aspen	*Populus tremuloides* (trembling aspen) *Potentilla fructicosa* (shrubby cinquefoil) *Antennaria* sp. (pussytoes) *Symphoricarpos albus* (buck brush) *Picea glauca* (occasional white spruce) *Juniperus communis* (patch) *Amelanchier alnifolia* (saskatoon) *Shephardia canadensis* (buffaloberry) *Cornus stolonifera* (red-osier dogwood) *Arctostaphylos uva-ursi* (bearberry) *Betula occidentalis* (water birch) *Populus balsamifera* (occasional balsam poplar) *Ribes* sp (gooseberry) grass
7	Low shrub	*Elaeagnus commutata* (silverberry) *Potentilla fructicosa* (shrubby cinquefoil) *Antennaria* sp. (pussytoes) *Comandra umbellata* (toadflax) *Populus tremuloides* (juvenile trembling aspen) *Sisyrinchium montanum* (blue-eyed grass) *Cerastium arvense* (chickweed) *Symphoricarpos albus* (buck brush) *Geum triflorum* (old man's whiskers) *Vicia americanum (wild vetch)* *Lithospermun incisum* (yellow stoneseed) *Senecio canus* (prairie groundsel) grass moss
8	Mature trembling aspen	*Populus tremuloides* (trembling aspen) *Elaeagnus commutata* (silverberry) *Amelanchier alnifolia* (saskatoon) *Potentilla fructicosa* (shrubby cinquefoil) *Galium boreale* (bedstraw) *Rosa aciculoris* (rose) *Symphoricarpos albus* (buck brush) *Picea glauca* (occasional white spruce) *Thalictrum* sp. (meadow rue) *Shephardia canadensis* (buffaloberry) *Prunus virginiana* (chokecherry)

9	Mature balsam poplar	*Populus balsamifera* Grass
10	River shore willow	*Salix exigua* (sandbar willow) *Potentilla fruticosa* (shrubby cinquefoil) at inland margin of willow
11	River shore flooded	Grass *Elaeagnus commutata* (silverberry) *Anemone canadensis* (Canada anemone) *Smilacina stellata* (star-flowered Solomon's seal)
12	Herbaceous/low shrub	*Euphorbia esula* (large population of leafy spurge)

Wildlife and Wildlife Habitat

As indicated in an earlier wildlife reconnaissance study, there are a series of game trails used primarily by ungulates (mule deer, white-tailed deer and possibly moose) (EBA, 2005). Although there are several heavily-used primary trails (EBA, 2005), most probably also used by grazing cattle and local residents riding horses, the subject lands were virtually criss-crossed with innumerable mule deer and white-tailed deer trails, moving somewhat parallel to the nearby Bow River but also moving perpendicular to the Bow River, across the lands and up/down the nearby treed escarpment. Integration of the development with these and other wildlife movements can be facilitated via appropriate design that will be explored in conjunction with other aspects of project development (i.e., lots, roads, inundation of land, etc.). Underpasses or conduits for large and small mammals and amphibians are commonly used in association with vegetation plantings to direct wildlife movements safely across roadways (Forman et al. 2003).

The reconnaissance-level survey also yielded the following wildlife information (locations identified via GPS are available upon request):

Table 2. Reconnaissance survey wildlife observations.

Observation	Wildlife species / sign description
1	Female mule deer (*Odocoileus hemionus*) in open meadow
2	3 Male White-tailed Deer (*Odocoileus virginianus*) crossing meadow between poplar stands
3	3-4 Boreal Chorus Frogs (*Pseudacris maculata*)calling near intermittent stream at base of escarpment
4	Possible Coyote (*Canis latrans*) den on top of small ridge
5	Possible Coyote Den and Deer Scat near old aggregate mining operation
6	2 Wood Frogs (*Rana sylvatica*) and a single Chorus Frog observed in shallow side channel near Bow

	River

Migratory Birds

The primary focus of the conceptualized development plan is a centrally-located constructed lake and wetland. The primary goal of this development strategy is to establish a sanctuary that potentially provides resting, perching, watering and possibly nesting habitat for migratory birds. The proximity of the development to the Bow River will facilitate the success of this plan by encouraging the use of available resources by birds during spring and fall migrations as well as summer and winter resident bird species. This would provide an opportunity to enhance habitat in support of migratory birds and other wildlife associated with lakes and wetlands. The provision of interpretive opportunities of this habitat also exists and could be incorporated into any finalized design documents. A trail or walking path through part of the sanctuary could be made accessible to individuals using the Bow River.

Part of the existing habitat and vegetation communities will be inundated with water. Where feasible, shorelines are to be developed in association with indigenous vegetation species and wildlife and bird habitat requirements. Although some existing wildlife habitat will be lost or altered, wetland and lake habitat could offset wildlife habitat losses. Bird community species composition could change, but it is likely that species diversity and bird abundance will increase in response to a mindfully designed wetland complex. There are examples of constructed wetlands in the City of Calgary that successfully increased bird abundance. The nearby constructed wetland on Policeman's Flats might also serve as a successful example, albeit on a smaller scale. The migratory birds observed and heard calling at this latter wetland prior to the reconnaissance survey conducted on the subject lands included red-winged blackbirds (*Agelaius phoeniceus*), yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), and several species of ducks and their young. An unidentified nest in a small tree immediately adjacent to the wetland was also observed. Other bird species observed during the reconnaissance survey are listed below in Table 3. This information, combined with the results from a breeding bird survey, would assist in the planning of migratory bird habitats associated with the constructed lake/wetland.

Table 3. Reconnaissance survey bird observations.

Observation	Bird species / sign description
1	10 American White Pelicans (*Pelecanus erythrorhynchos*) circling over subject lands (observed from escarpment)
2	Four European Starlings (*Sturnus vulgaris*) near meadow edge
3	Northern Flicker (*Colaptes auratus*) on the edge of a meadow
4	2 American Robins (*Turdus migratorius*) and 2 tree swallows (*Tachycineta bicolor*) in mixed-wood area
5	2 Red-tailed Hawks (*Buteo jamaicensis*) circling and calling near the treed escarpment
6	Male Ring-Necked Pheasant

	(*Phrosionus colchicus*) calling near Bow River
7	4 Cedar Waxwings (*Bombycilla cedrorum*) near edge of Bow River in large poplar trees
8	Eastern Kingbird (*Tyrannus tyrannus*) near edge of Bow River in large poplar trees
9	Yellow-bellied Sapsucker (*Sphyrapicus varius*) in poplar grove along Bow River
10	Swainson's Hawk (*Buteo swainsoni*) circling over subject lands
11	2 Canada Geese (*Branta Canadensis*) on Bow River / subject land
12	4 Common mergansers (*Mergus merganser*) on Bow River near subject lands

Summary

Based upon our reconnaissance-level survey, the area appears to have a relatively high level of species and ecosystem diversity. There were a large number of habitat types, plant species, terrestrial wildlife species and bird species present during the time of the survey. Amphibians were also observed and heard calling. Although no detailed wildlife or amphibian surveys have been completed to date, the above information will allow for the preliminary assessment of constraints and opportunities associated with generating an ecologically integrated development by balancing development with the existing wildlife and vegetation communities. Low impact development strategies shall be researched and multiple options shall be scrutinized prior to making any final planning decisions. Additional systematic surveys for rare plants, species listed under the federal Species At Risk Act (SARA), and species of special management consideration under provincial legislation and guidelines (i.e., amphibians) will assist in the effort to effectively integrate the development with the existing natural setting and reduce the likelihood of unknowingly violating any pertinent legislation. If properly planned in conjunction with potential issues surrounding land access management, the development could set a new standard for low impact, integrated ecosystem and housing development planning.

Recommendations and Considerations

The following recommendations and considerations are based upon information gathered from a reconnaissance survey of the site, conversations with development managers and ASRD staff, past experience with regulatory applications and submissions, and the judgment of trained professional biologists. Pending approval of an ASP and land use re-designation, representatives of regulatory agencies and stakeholder groups may have very specific information requests that could only be answered by completing the following tasks and considering the constraints and opportunities associated with the overall integrated development plan.

Vegetation

1. Vegetation surveys within various plant communities
    a. Conduct in combination with rare plant surveys (see below)
    b. Identify appropriate native plants for landscaping and reclamation

c. Provide baseline for comparing vegetation post development

2. Conduct rare plant surveys. Two seasons are recommended in order to capture plants with different times of flowering.
   a. Spring (early June)
   b. Summer (mid August)
   c. Due diligence (avoidance, replanting, etc.) for Species of Special Management Concern

3. Provide mitigations against introduction of exotic and weedy species
   a. During construction
   b. During landscaping

4. Maintain native trees and shrubs where feasible. Research feasibility of transplanting native trees and shrubs within development footprint.

5. Provide native seeds for landscaping
   a. Research feasibility of harvesting local seeds or having seed companies rear seed from native stocks
   b. Contact native plant seed companies for seed availability

Wildlife

1. Determine movement corridors of ungulate and any furbearers on site via a winter tracking survey; information can be cross-referenced with planned roadways and building lots. Mitigation options and best management practices for wildlife crossing roadways (i.e., ungulates, amphibians), between and across lots should be determined.

2. Determine the likelihood of various animals becoming established in the newly-constructed habitats and compare with current baseline information gathered through wildlife surveys.

3. Due diligence monitoring during construction activities.

Migratory Birds

1. Determine current conditions (distribution and abundance) via a breeding bird survey in early spring to assist with planning for desired species attraction and to compare with post-development bird species.

2. Due diligence monitoring during construction activities.

Other

1. In conjunction with the above recommended vegetation and wildlife surveys, investigate the likelihood of encountering any plant or animal species listed under the current federal Species At Risk Act (SARA) to ensure that this legislation is not unknowingly violated during construction activities.

2. No domestic animals (i.e., dogs and cats) should be allowed to roam freely about the development. Dogs and cats are known to disturb wildlife species and nesting birds and significantly increase local wildlife and bird mortality. The continued riding of horses on site could further introduce non-native species of plants and invertebrates (earthworms, nematodes) that could negatively impact the development site.

3. Review and analyze current public access practices in ecologically significant areas in Calgary and the MD of Foothills. A synthesis should provide recommendations for access management in the development area including the proposed sanctuary.

Literature Cited

EBA Engineering Consultants Ltd. 2005. Wildlife Habitat Assessment For The Sherbrooke Lands Residential Development. Prepared for Sherbrooke Investments Ltd.

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Kershaw, L., J. Gould, D. Johnson, and J. Lanchaster (Editors). 2001. Rare vascular plants of Alberta. University of Alberta Press and the Canadian Forest Service. Edmonton, AB.

APPENDIX E – HISTORIC RESOURCES IMPACT ASSESSMENT – LOCATION OF IDENTIFIED SITES

DILLON CONSULTING

DRAWN	KJKB
DATE	2008.10.23
SCALE	1:5000

SANCTUARY ON THE BOW
LAND USE CONCEPT PLAN
PNT. OF SEC 3 & 10 TWP. 22 RGE 29 W4M

HISTORIC RESOURCES IMPACT ASSESSMENT

SCALE 1:5000 — 0 100 200m

DILLON FILE NO. 055079

APP E

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APPENDIX F – TRAFFIC IMPACT ASESSMENT

DUNBOW ROAD & 40th STREET EAST
TRAFFIC IMPACT ASSESSMENT
PROPOSED DEVELOPMENT OF SHERBROOKE LANDS
SOUTHEAST OF CALGARY

Prepared by:

EBA ENGINEERING CONSULTANTS LTD.
CALGARY, ALBERTA

Project No. 9600213-002

Final - August 2005

EXECUTIVE SUMMARY

This report addresses the impacts of the proposed residential development located north of Dunbow Road and east of 40 Street East, southeast of the City of Calgary, and the associated traffic on the immediately adjacent and downstream roadway network.

The objectives of the study are:

- Identify the areas of traffic impact and expected changes in traffic volumes, composition and type, (i.e., passenger vehicles, trucks, etc.) within that area;
- Identify possible deficiencies in the existing transportation infrastructure immediately adjacent to and in the immediate vicinity of the site; and
- Identify, review and evaluate access management plans to prevent, minimize or mitigate adverse transportation effects and maintain acceptable levels of service.

The site for the proposed development of the Sherbrooke Lands is located in the MD of Foothills along the south shore of the Bow River. Access to the site is via 40th Street East, north of Dunbow Road and east of Highway 2. The location of the proposed development is shown in the Location Plan. The existing land is generally undeveloped. The surrounding land use south of the site for the proposed development is agricultural or country residential.

Based on this assessment of the potential traffic volumes to be generated by the proposed development, it can be concluded that improvements are required on 40th Street East; however, the character of the roadway can still be maintained. Improvements to the intersection of 40th Street East and Dunbow Road are likely required due to existing deficiencies, existing traffic volumes on Dunbow Road and future growth.

Recommendations include the following:

- Redevelopment of 40th Street East as a 40 km/h local roadway that provides the necessary level of safety and operational capacity while still maintaining the character of the corridor; and
- Upgrade of the intersection at 40th Street East and Dunbow Road to accommodate future traffic volumes due to growth and the proposed development.

The criteria to support the recommendations are provided in the following table:

Preliminary Development Criteria

Network Component	Preliminary Development Criteria
Intersection of 40th Street East and Entrance to Proposed Development	- Intersecting driveways and roadways should be ad 90 degrees - Minimum 8 m wide entrance road width (i.e., driving surface) - Be located preferably on a horizontal tangent section of 40th Street East where a minimum stopping sight distance for a passenger vehicle of 65 m is available for vehicles approaching the intersection, (anticipating a posted speed limit of 40 km/h on 40th Street East) - Meets the MD of Foothills Approach Standards for sideslope, construction materials and grade - The entrance to 40th Street East should be controlled by a STOP Sign
40th Street East from the Entrance to the Proposed Development to Dunbow Road	- Posted speed limit of 40 km/h (Design speed of 50 km/h) - Minimum road width of 8 m (i.e., driving surface) - Paved surface - Maximum gradient of 10 to 14% - Minimum stopping sight distance on approach to driveways or other roads of 65 m - Minimum curve radius of 80 m - Provision of guide rail where sideslope rations are steeper than 3:1 or where embankment height is greater than 4.5 m
Intersection of 40th Street East and Dunbow Road	- Modified Type II intersection treatment with an exclusive left turn lane in the eastbound direction that has sufficient storage length for evening peaks - Realignment of the private driveway on east side, just north of Dunbow Road such that it intersects with 40th Street East at 90 degrees and is outside of the intersection treatment

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1.0 INTRODUCTION

This report addresses the impacts of the proposed residential development located north of Dunbow Road and east of 40 Street East, southeast of the City of Calgary, and the associated traffic on the immediately adjacent and downstream roadway network.

2.0 OBJECTIVE

The objectives of the study are:

- Identify the areas of traffic impact and expected changes in traffic volumes, composition and type, (i.e., passenger vehicles, trucks, etc.) within that area;
- Identify possible deficiencies in the existing transportation infrastructure immediately adjacent to and in the immediate vicinity of the site; and
- Identify, review and evaluate access management plans to prevent, minimize or mitigate adverse transportation effects and maintain acceptable levels of service.

3.0 METHODOLOGY

The assessment was undertaken through the completion of two tasks.

Task 1 – Site Investigation and Data Compilation

This task included travel to the site, visual observations, minor on-site measurements and collection of traffic, geometric, and collision data that is available from published sources.

Task 2- Analysis

This task included the analysis of the additional traffic (volume and composition) to the existing traffic on Dunbow Road, 40 Street East, Highway 2 (Deerfoot Trail), and Highway 2A (McLeod Trail), with respect to safety and operation. Intersection and roadway analysis was completed with respect to the Alberta Infrastructure and Transportation Highway Geometric Design Guide and other guidelines from the

Transportation Association of Canada and the MD of Foothills Road Construction Standards were referred to.

4.0 EXISTING CONDITIONS

4.1 Site Location

The site for the proposed development of the Sherbrooke Lands is located in the MD of Foothills along the south shore of the Bow River. Access to the site is via 40th Street East, north of Dunbow Road and east of Highway 2. The location of the proposed development is shown in Figure 1, Location Plan. The existing land is generally undeveloped. The surrounding land use south of the site for the proposed development is agricultural or country residential.

4.2 Adjacent Road Network

The main roadways of interest in this study are 40th Street East, Dunbow Road, Highway 2 and Highway 2A. Photographs illustrating the adjacent road network are included in Appendix A.

Highway 2 is a paved, multi-lane, divided provincial highway. It is classified as a major expressway and is a link within the North-South Trade Corridor or "CANAMEX" Trade Corridor. Highway 2 between Highway 22X and the Dewinton Interchange was completed and open for travel in November of 2003. The airphoto depicted in Figure 1 – Location Plan, although the most recent airphoto, was taken prior to the completion of this portion of Highway 2.

Highway 2A is a paved, multi-lane, divided provincial highway. Located east of Highway 2, it is a north-south expressway that becomes an arterial roadway north of Highway 22X within the City of Calgary. This section of Highway 2A ends at Highway 2A at the Dewinton interchange.

Dunbow Road is a paved, two-lane, arterial roadway. It is an east-west roadway that provides access to several country residential and farmstead developments located south of the City of Calgary. It also provides access to Cammoney and Cottonwood Golf

Courses. Dunbow Road is located approximately 7 km south of Highway 22X and south of the City of Calgary city limits.

40th Street East is a dead-end gravel road that provides access to farmsteads located south of the Bow River and north of Dunbow Road. It also provides access to Policeman Flats, a local recreational area. The intersection of 40th Street East and Dunbow Road is located approximately 2.5 km east of Highway 2.

4.3 Traffic Control and Geometry

The existing traffic control and geometry is summarized in the following table. The main roadways or "links" and the intersections, interchanges or "nodes" on the transportation network are described in order starting from near the site.

Table 1 – Description of Transportation Network

Roadway or Intersection	Description
40th Street East, west of proposed development	- 3.5 to 5.0 m wide gravel road - Vertical profile is flat - Entrance to Policeman Flats is on a large radius horizontal curve - Two horizontal curves west of Policeman Flats - Three driveway entrances to farmsteads and residences - No posted speed limit, by statute it would be 80 km/h - Road geometry is such that operating speed was observed to be 40 km/h.
Intersection of 40th Street East at the driveway at the southwest corner of the proposed development	- The southwest corner of the proposed development is located just west of a "north to west" horizontal curve on 40th Street East. At this location there is an existing driveway access and a field entrance.
40th Street East, south of proposed development	- 5.0 m wide gravel road with oil treatment - Vertical profile is generally downhill from Dunbow Road with changes in rate of grade. Grades are estimated based on visual observations between 2% and 10% - Alignment follows an existing ravine and is cut into the embankment on the east side. - There are seven small radius horizontal curves between

	Dunbow Road and the proposed development. The embankment backslope on the east side causes obstruction to sight distance around these curves. - There are some locations where the west sideslope is quite steep, and are not protected by guide rail or other barriers. - There is a power/telephone line on the east side. - The road allowance limit is not obvious - There is fencing along both sides of the roadway at selected locations - No posted speed limit, by statute it would be 80 km/h - Road geometry is such that operating speed was observed to be 30 km/h to 40 km/h. - Signing includes warning signs that read "SLOW", Winding Road Signs (WA-6) with 30 km/h Advisory Speed Tab Signs (WA-7S).
Intersection of Dunbow Road and 40th Street East	- 3 legged, "T" intersection - 40th Street East approaches Dunbow Road at an angle of approximately 75 degrees but turns to intersect Dunbow Road at 90 degrees within the last 20 m. - No formal intersection treatment - Dunbow Road is the through road - Access to Dunbow Road from 40th Street East is controlled by a STOP Sign - Driveway access to local acreage is located approx 20 m north from the edge of pavement of Dunbow Road. This driveway runs approximately parallel to 40th Street East and tapers into the east side of the roadway just prior to the intersection with Dunbow Road. - WA-8B Checkerboard Sign facing southbound traffic stopped at intersection - Intersection sight distance considered from a passenger vehicle is unrestricted to the west and approximately 400 m to the east.
Dunbow Road, between 40th Street East and Highway 2 (Deerfoot Trail)	- 10 to 11 m wide paved road, two lanes with paved shoulders - Slight vertical sag and crest curves west of 40th Street East - Straight - Posted speed limit of 80 km/h - Operating speed observed to be between 80 and 90 km/h - Intersection sight distance from 40th Street East unrestricted to the west.
Dunbow Road, east of 40th Street East.	- 10 to 11 m wide paved road, two lanes with paved shoulders - Vertical crest curve east of 40th Street East - Straight

	- Posted speed limit of 80 km/h - Operating speed observed to be between 80 and 90 km/h - Intersection sight distance from 40th Street East in excess of 400 m to the east.
Interchange at Highway 2 (Deerfoot Trail) and Dunbow Road	- Modified diamond interchange - The southbound to eastbound ramp is controlled by a STOP Sign at Dunbow Road, southbound to westbound is a yield condition - The northbound to westbound ramp is controlled by a STOP Sign at Dunbow Road, northbound to eastbound is a yield condition. - The interchange is illuminated.
Dunbow Road, between Highway 2 (Deerfoot Trail) and Highway 2A (McLeod Trail)	- Varying width from 11 m to 8 m, two-lane, paved roadway. - Straight, with minor undulations - Posted speed limit of 80 km/h - Operating speed observed to be at or near posted speed limit
Highway 2 (Deerfoot Trail), north and south of Dunbow Road	- Multi-lane divided highway - 14.5 m wide paved road in northbound direction - 17.6 m wide paved road in southbound direction - Generally flat vertical profile in vicinity of Dunbow Road - Large radius horizontal curves - Posted speed limit of 110 km/h - Operating speed observed to be at or near posted speed limit
Intersection of Highway 2A (McLeod Trail) and Dunbow Road	- At grade intersection - Left-hand-forward skew intersection, angle of intersection approx. 55 degrees - Highway 2A is the through road - Dunbow Road is controlled by STOP Signs on the east and west approach - Intersection sight distance is unrestricted in both north and south directions - Fully illuminated
Highway 2A (McLeod Trail), north and south of Dunbow Road	- Multi-lane divided highway - 16.2 m wide paved road in northbound direction - 16.2 m wide paved road in southbound direction - Rolling terrain in vicinity of Dunbow Road - Large radius horizontal curves - Posted speed limit of 110 km/h - Operating speed observed to be at or near posted speed limit

4.4 Traffic

Traffic counts were conducted to determine existing volumes at the intersection of 40th Street East and Dunbow Road, as well as throughout the surrounding network. 12-hour traffic counts were completed at the following intersections:

- Dunbow Road and Heritage Pointe Lake Development Access;
- Dunbow Road and Heritage Pointe Golf Course Access;
- Dunbow Road and 40th Street East; and
- McLeod Trail and North service road Access to Heritage Pointe Lake.

The following detailed information for each of the traffic counts is included in Appendix B:

- Directional traffic count summary (in 15-minute intervals);
- Observed 12-hour (7:00 AM to 7:00 PM) traffic movements;
- Estimated 2005 Average Annual Daily Traffic (AADT) and Average Summer Daily Traffic (ASDT) volumes;
- Estimated 2005 AM 100th highest hour volumes; and
- Estimated 2005 PM 100th highest hour volumes.

Estimates are based on traffic counts conducted on a weekday in April 2005 and factors from matching permanent traffic counters, calculated according to Alberta Infrastructure and Transportation Guidelines.

The following observations are made from the traffic data:

At the Intersection of 40th Street East and Dunbow Road

- The estimated traffic volume (AADT) on 40th Street East is 90 vehicles per day, and approximately 89% of those vehicles are passenger vehicles.
- Throughout the day and during the morning and evening peak periods, most of those vehicles are making either right turn movements onto westbound Dunbow Road, or left turn movements from eastbound Dunbow Road.
- The estimated traffic volume (AADT) on Dunbow Road in the vicinity of 40th Street East is 2050 vehicles per day, and approximately 90% of those vehicles are passenger vehicles.

At the intersection of Heritage Pointe Golf Course Access and Dunbow Road

- The estimated traffic volume (AADT) on the Heritage Pointe Golf Course Access Road is 1220 vehicles per day, and approximately 96% are passenger vehicles.
- The estimated traffic volume (AADT) on Dunbow Road in the vicinity of the access to the golf course is 3360 vehicles per day, and approximately 92% of those vehicles are passenger vehicles.
- Traffic entering and leaving the golf course is generally split between the east and west directions on Dunbow Road.

At the intersection of Dunbow Road and Heritage Pointe Lake Development Access

- The estimated traffic volume (AADT) on the Heritage Pointe Lake Access road is 1730 vehicle per day, and approximately 90% are passenger vehicles.
- The estimated traffic volume (AADT) on Dunbow Road in the vicinity of the access to the residential development is between 2800 and 3400 vehicle per day, and approximately 93% of these are passenger vehicles.
- Traffic primarily enters and exits the development to the east.

At the intersection of McLeod Trail and North Service Road Access to Heritage Pointe Lake Development

- The estimated traffic volume (AADT) on the North Service Road Access is 1050 vehicles per day and approximately 92% of these are passenger vehicles.
- Through traffic volumes on McLeod Trail were not counted but are known to be very high.
- Most traffic is destined or originates from McLeod Trail, north of the intersection.

Estimates of Annual Average Daily Traffic (AADT) based on 2004 traffic counts have been provided by Alberta Infrastructure and Transportation for the intersection of Dunbow Road and Highway 2A, and at the Dunbow Road Interchange on Highway 2. This information is included in Appendix B and summarized in the following tables.

Table 2 – Traffic Estimates for Dunbow Road Interchange on Highway 2

Interchange Leg	2004 AADT (Preliminary Estimate in Vehicles per Day – vpd)	Proportion of Commercial Vehicle Traffic
Northbound Hwy 2, North of Interchange	8917 vpd	14.0 %
Northbound Highway 2, South of Interchange	7512 vpd	15.1 %
Southbound Hwy 2, North of Interchange	9235 vpd	13.1 %
Southbound Hwy 2, South of Interchange	7711 vpd	13.8 %
Dunbow Road (both directions), East of Interchange	3355 vpd	9.6 %
Dunbow Road (both directions), West of Interchange	3122 vpd	8.6 %

Traffic movements of interest at the Dunbow Road Interchange on Highway 2:

- Over 50% of the westbound traffic on Dunbow Road turns north onto Highway 2;
- Approximately 42% of the westbound traffic on Dunbow Road continues westbound over the interchange;
- Over 80% of the southbound traffic continues south on Highway 2; and
- Over 97% of the northbound traffic continues north on Highway 2.

Historical growth rates on Highway 2 are not available. Considering the rate of development in the Calgary, Okotoks, and High River Area, predicted growth rates on Highway 2 are likely to be higher than the overall provincial average of 2 % per year.

Table 3 – Traffic Estimates for Intersection of Dunbow Road and Highway 2A

Interchange Leg	2004 AADT (Preliminary Estimate in Vehicles per Day – vpd)	Proportion of Commercial Vehicle Traffic
Northbound Hwy 2A, North of Intersection	10096 vpd	1.4 %
Northbound Hwy 2A, South of Intersection	9090 vpd	2.5 %
Southbound Hwy 2A, North of Intersection	9534 vpd	3.2 %
Southbound Hwy 2A, South of Intersection	8160 vpd	3.1 %
Dunbow Road (Both Directions), East of Hwy 2A	3022 vpd	5.7 %
Dunbow Road (Both Directions), West of Hwy 2A	408 vpd	6.8 %

Traffic movements of interest include:

- Approximately 85 % of the westbound traffic turns north onto Highway 2A;
- Approximately 98 % of the northbound traffic continues north on Highway 2A;
- Approximately 85 % of the southbound traffic continues south on Highway 2A; and
- Approximately 15% of the southbound traffic turns east onto Dunbow Road.

Based on available traffic data and prior to the opening of the Highway 2 (Deerfoot Trail Extension) in November 2003, the historical growth rate on Highway 2A, north and south of Dunbow Road was 4.1 % per year and 6.3 % per year respectively. This is based on AADT information available for the 1999 to 2003 period. Between 2003 and 2004, given that much of the Highway 2A traffic now travels on Highway 2, the traffic volumes on Highway 2A, were observed to decline by 32 % north of Dunbow Road and approximately 50% south of Dunbow Road. This decline is not anticipated to continue. Considering the rate of development in the Calgary, Okotoks, and High River Area, predicted growth rates on Highway 2 are likely to be higher than the overall provincial average of 2 % per year.

4.5 Safety Performance

Collision information for Dunbow Road has been received from Alberta Infrastructure and Transportation for the period of 1998 to 2003. This data includes collisions that are reported as on Dunbow Road and/or at an intersection with Dunbow Road. There is a total of 98 collisions reported over the six year period. The location of many of the collisions as reported is unclear and a collision rate over a specific length of Dunbow Road cannot be determined. Approximately 40% of the collisions are reported as animal/vehicle collisions and this is not unusually in this type of rural area.

The collision data can be confidently reviewed for collisions reported at the intersection of Dunbow Road and 40th Street E. There are two collisions reported specifically at the intersection in the six year period, and both are reported as animal/vehicle collisions with low severity. There are five collisions reported within 500 m either east or west of the intersection in the six year period, and all five of these are reported as animal/vehicle collisions with low severity. From this it can be concluded that the intersection is performing well with respect to safety.

5.0 PROPOSED DEVELOPMENT

The proposed development is anticipated to include 173 homes, and internal road network and an access point to 40th Street East at the southwest corner of the property, east of the access to Policeman Flats. Occupancy of the homes is anticipated to start in 2009.

6.0 TRAFFIC IMPACT ASSESSMENT

6.1 Traffic Generation Rates and Direction of Travel

Within this study, traffic counts have been conducted at access points to adjacent developments. This local data can be used to determine a traffic generation rate for the new development. Considering the traffic counts for the intersection of Dunbow Road and Heritage Pointe Golf Course access, we are using a traffic generation rate for the new development of between three and four round trips per home. A round trip may include a commuting to work and back or a trip to the store and back.

For the purposes of this study, it is estimated that all additional traffic from the proposed development will turn west on to Dunbow Road.

6.2 Impact on Roadway Network due to Growth

Traffic volumes on the adjacent roadway network are likely to increase over time due to other developments throughout the local area and the province. Although full occupancy is not likely to be achieved until 2014, traffic growth projections for existing roadways beyond the eight to ten year timeframe are not likely reliable. For the purposes of this assessment, the traffic growth projection for Dunbow Road is considered at the provincial average rate of 2%, for four years with year zero being 2005.

6.3 Traffic Projections

The traffic projections due to growth and the proposed development are summarized in the following table. The values are represented as vehicles per day.

Table 4 – Projected Traffic

Movement	2005 AADT	Growth	Development	Total Estimated AADT*
NB 40th Street E, north of the intersection	50	0	731	781
SB 40th Street E, north of the intersection	40	0	731	771
SB Right Turn – 40th Street E	30	0	731	761
SB Left Turn – 40th Street E	10	0	0	10
EB Dunbow Road, east of the intersection	1060	85	0	1145
WB Dunbow Road, east of the intersection	970	78	0	1048
WB Right Turn – Dunbow Road	10	0	0	10
WB Through – Dunbow road	960	78	0	1038
EB Dunbow Road, west of the intersection	1090	88	731	1909
WB Dunbow Road, west of the intersection	990	80	731	1801
EB Left Turn – Dunbow Road	40	0	731	771
EB Through – Dunbow Road	1050	88	0	1138

*Total Estimated AADT = 2005 AADT + Growth + Development

7.0 BASIC IMPROVEMENT REQUIREMENTS

7.1 Improvement Criteria

The criteria for improvement is based on operational requirements provided in published and applicable guidelines. The requirement for surfacing or pavement is prescribed by the MD of Foothills, Municipal Development Plan wherein, Section 6.3.8 indicates:

"6.3.8 Residential Parcels and roads should be designed and developed such that;
c. dwellings have direct legal access to an internal paved road system;
d. the internal road system connects to a surfaced Municipal road."

Entrance and roadway standards for 40th Street East are prescribed in the MD of Foothills Road Construction Standards (July 2003). Although Dunbow Road is not a provincial highway, the geometry and operation is similar to a rural provincial highway and therefore, the intersection treatment considerations along this 80 km/h roadway are based on Alberta Infrastructure and Transportation's Highway Geometric Design Guidelines.

7.2 Required Improvements – Existing Traffic Volumes + Growth

The estimated traffic volumes in 2009 considering growth only and not including the impact of the proposed development have been reviewed in consideration of improvement requirements. A linear growth rate of 2.0% per year has been considered for all roadways other than 40th Street East. Growth in traffic volumes on 40th Street East is not expected to occur at average annual rates, but is dependent on specific development along the roadway. The improvement requirements are summarized as follows.

7.2.1 40th Street East

Improvements to the road width and alignment are desirable; however, the low traffic volume, low operating speed and the anticipated satisfactory safety performance are likely to indicate that these improvements are not urgent.

7.2.2 Intersection of 40th Street East and Dunbow Road

The merging of the private driveway and 40th Street East on the east side of 40th Street East just at the intersection with Dunbow Road is a safety concern due to the left merge requirement and southbound vehicles from the driveway being in

the northbound travel lane when approaching the intersection with Dunbow Road. The driveway should be realigned such that it intersects with 40th Street East at 90 degrees at a distance away from Dunbow Road such that it is outside of the intersection treatment.

Entering Figure D-7.4 of the Alberta Infrastructure and Transportation Highway Geometric Design Guide (included in Appendix C), with the estimated traffic volumes, the required intersection treatment indicated is a Type II. Although this figure is generally used for design speeds of 100 km/h or greater (posted speed limit of 90 km/h) it is also applicable to rural arterial roadways with posted speeds of 80 km/h that may operate as rural highways.

Figure D-7c, which illustrates a Type IIa intersection treatment are included in Appendix C. The driveway to the east of 40th Street East, just north of the intersection would intersect the street just north of the end of the taper in the northbound lane.

The available intersection sight distance is unrestricted to the west and approximately 400 m to the east, when a passenger vehicle is considered. Based required sight distances for left turns onto the roadway (Figure D-4.2.2.2 of the Highway Geometric Design Guide, included in Appendix C), and considering a design speed of 90 km/h, the required intersection sight distance for a passenger vehicle is 175 m, for a single unit truck is 265 m, and for WB-15 or 17 vehicles or a double recreational vehicle, the required intersection sight distance is 350 m. The available intersection sight distance at this location is adequate.

7.2.3 Dunbow Road; 40th Street to Highway 2

Dunbow Road operates similarly to a Class 2 or Class 3 Provincial Highway. The current road width is approximately 10 to 11 m. The estimated traffic volume on this section of Dunbow Road are likely higher than 2000 vehicles per day. Considering the suggested minimum roadway width in Alberta, and entering Figure G-1.1 of the Highway Geometric Design Guide with the estimated traffic volumes the suggested minimum roadway width is 10 m. The existing roadway is adequate for these estimated traffic volumes.

7.2.4 Dunbow Road Interchange at Highway 2

Ultimate stage design traffic volumes are not available for this interchange. However, based on information provided in the Deerfoot Trail (Hwy 2X) Extension Functional Planning Study Technical Report (Prepared by Stanley Consulting Group Ltd. for Alberta Transportation and Utilitties, May 1998), the ultimate stage design traffic volumes for this interchange and for Highway 2 – Deerfoot Trail are based on a population scenario in the Calgary area of 1.5 million. Although detailed analysis has not been completed, estimated traffic volumes are considered well within the capacity of the interchange and the highway. Level of Service C or greater is expected to be maintained for some time.

7.2.5 Dunbow Road; Highway 2 to Highway 2A

This section of Dunbow Road operates as a collector roadway and the traffic volumes are greater than 3000 vehicles per day. The MD of Foothills Road Construction Standards provides for paved road allowances or paved industrial/commercial roads with pavement widths of 8.0 m. The existing roadway meets this requirement.

7.2.6 Intersection of Dunbow Road and Highway 2A

Intersection plans are plans are not available for this location and a detailed intersection analysis has not been undertaken in this study. Given the traffic volumes on Highway 2A, it is likely that the intersection is already limited in capacity and it is likely difficult for drivers to find sufficient gaps to cross or turn left to enter the highway. Driver's turning right are likely to find it difficult to judge the speed of approaching vehicles given the visibility limitations created by the intersection being on a skew; however, adequate intersection sight distance seems to be available. This situation is typical for at-grade intersections on multi-lane divided highways approaching urban centres throughout the province. Analysis of improvements to this intersection is no within the scope of this study.

7.3 Required Improvements – Due to the Proposed Development

The improvement requirements are summarized as follows:

7.3.1 40th Street East, West of Entrance to Proposed Development

The proposed development does not impact this section of 40th Street East. The traffic volume is expected to be maintained at existing low levels, and given the low operating speed and anticipated satisfactory safety performance improvements are not required at this time.

7.3.2 Intersection of 40th Street East and Entrance to Proposed Development

The entrance to the proposed development should be constructed to meet the following criteria:

- Intersecting driveways and roadways should be at 90 degrees;
- Minimum 8 m wide entrance road width (i.e., driving surface);
- Be located preferably on a horizontal tangent section of 40th Street East where a minimum stopping sight distance for a passenger vehicle of 65 m is available for vehicle approaching the intersection, (anticipating a posted speed limit of 40 km/h on 40th Street East);
- Meets the MD of Foothills Approach Standards for sideslope, construction materials and grade, etc.; and
- The entrance to 40th Street East should be controlled by a STOP Sign.

7.3.3 40th Street East; From Entrance to Proposed Development to Dunbow Road

The current road will require some level of reconstruction. The geometry is not adequate for the traffic volumes that are anticipated to be generated by the proposed development. Although not confirmed through field survey, the radii of existing horizontal curves on the roadway range from 50 to 100 m.

A geotechnical evaluation was completed by McIntosh Lalani Engineering Ltd. in November 2004. Based on six boreholes extending an average depth of 1.3 m, the general subsurface stratigraphy is described as consisting of the surficial road structure atop either fine grained fill soils or directly atop silty clay glacial till. The report provides recommendations for construction approach and a pavement structure based on the City of Calgary 2004 Road Specifications. The pavement

structure described is to a higher standard than that specified in the MD of Foothills Road Construction Standards; however, the City of Calgary Standard is likely more appropriate given the anticipated traffic volume.

Reconstruction of the roadway will not necessarily result in significant changes to the character of the existing road. Aspects of the quiet local road, winding its way down the ravine to the edge of the Bow River can still be maintained and balanced with a thoughtful approach to road safety.

Reconstruction of the roadway should consider the following requirements:

- Posted Speed Limit of 40 km/h (Design Speed of 50 km/h);
- Minimum road width of 8 m (i.e., driving surface);
- Paved surface;
- Maximum gradient of 10 to 14 % (maximum grade on existing roadway is approximately 7.6%);
- Minimum stopping sight distance on approach to driveways or other roads of 65 m;
- Minimum curve radius of 80 m;
- Provision of guide rail where sideslope ratios are steeper than 3:1 or where embankment height is greater than 4.5 m; and
- Intersecting roadways and driveways should be at 90 degrees.

Typical W-Beam guide rail is not likely to be desired in an effort to maintain the character of the roadway. Other forms of guide rail that are more decorative and/or suitable to the rural environment are available and are discussed later in this report.

7.3.4 Intersection of 40th Street East and Dunbow Road

Entering Figure D-7.4 of the Alberta Infrastructure and Transportation Highway Geometric Design Guide with the estimated traffic volumes, it is confirmed that a detailed intersection analysis is required. A detailed intersection analysis has been completed based on the Highway Geometric Design Guide and the resulting requirement is a Type IV intersection treatment with an exclusive left turn lane in the eastbound direction and an exclusive right turn lane in the southbound direction.

This treatment is of a considerably high standard and is warranted based on the projected traffic volumes and turning movements, if Dunbow Road is considered to operate similarly to a highway. It is not unusual to consider major roadways within rural municipalities to operate similarly to highways; however, this type of intersection treatment is not typical along Dunbow Road, particularly at the entrance to the Cannoney golf course entrance, which would be considered high volume. Intersection treatments are not fully described in the MD of Foothills Road Construction Standards. A minimum of a Type II intersection treatment, perhaps modified to include an exclusive left turn lane in the eastbound direction with sufficient storage for evening peaks is recommended.

7.3.5 Roadway Network East and West of 40th Street East.

There are no additional improvements required on the roadway network east and west of 40th Street East, due to the proposed development.

8.0 OTHER ROAD CONSTRUCTION MATERIALS

The recommendations above describe a paved road surface on 40th Street East. Although typical road construction standards would provide for a paved surfacing using asphalt concrete pavement, other road surfacing materials may be considered. For example, a chip seal surface combined with a typical asphalt concrete pavement structure may provide a visual impact that meets the desired character of the roadway, while still maintaining the required pavement structure.

The proposed reconstruction is likely to require some form of guide rail installation to minimize disturbance to the surrounding topography. Typical W-beam guide rail is not likely desirable. In the United States, particularly within national parks and at national historic sites, other materials are being tested for guide rail installations. These include galvanized steel beams in shapes other than W-beam, rough sawn timber and logs. These applications are likely suitable for this low speed environment and further information will be provided in the final report.

9.0 CONCLUSIONS

Based on this assessment of the potential traffic volumes to be generated by the proposed development, it can be concluded that improvements are required on 40th Street East;

however, the character of the roadway can still be maintained. Improvements to the intersection of 40th Street East and Dunbow Road are likely required due to existing deficiencies, existing traffic volumes on Dunbow Road and future growth.

10.0 RECOMMENDATIONS

Recommendations include the following:

- Redevelopment of 40th Street East as a 40 km/h local roadway that provides the necessary level of safety and operational capacity while still maintaining the character of the corridor; and
- Upgrade of the intersection at 40th Street East and Dunbow Road to accommodate future traffic volumes due to growth and the proposed development.

Based on the analysis, the criteria to support the recommendations are provided in the following table:

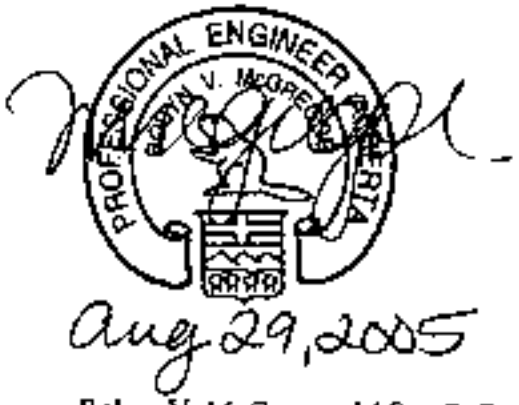
Table 5 – Preliminary Development Criteria

Network Component	Preliminary Development Criteria
Intersection of 40th Street East and Entrance to Proposed Development	- Intersecting driveways and roadways should be ad 90 degrees - Minimum 8 m wide entrance road width (i.e., driving surface) - Be located preferably on a horizontal tangent section of 40th Street East where a minimum stopping sight distance for a passenger vehicle of 65 m is available for vehicles approaching the intersection, (anticipating a posted speed limit of 40 km/h on 40th Street East) - Meets the MD of Foothills Approach Standards for sideslope, construction materials and grade - The entrance to 40th Street East should be controlled by a STOP Sign
40th Street East from the Entrance to the Proposed Development to Dunbow Road	- Posted speed limit of 40 km/h (Design speed of 50 km/h) - Minimum road width of 8 m (i.e., driving surface) - Paved surface - Maximum gradient of 10 to 14% - Minimum stopping sight distance on approach to driveways or other roads of 65 m - Minimum curve radius of 80 m - Provision of guide rail where sideslope rations are steeper than 3:1 or where embankment height is greater than 4.5 m
Intersection of 40th Street East and Dunbow Road	- Modified Type II intersection treatment* with an exclusive left turn lane in the eastbound direction that has sufficient storage length for evening peaks - Realignment of the private driveway on east side, just north of Dunbow Road such that it intersects with 40th Street East at 90 degrees and is outside of the intersection treatment

11.0 CLOSURE

This report has been prepared within the quality management requirements of EBA Engineering Consultants Ltd. Use of the information and analysis presented in this report is limited to the specific project application.

Respectfully submitted,
EBA Engineering Consultants Ltd.



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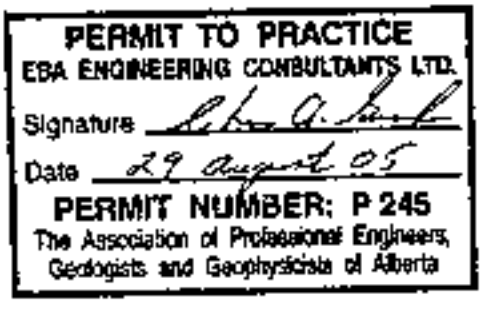

FIGURES

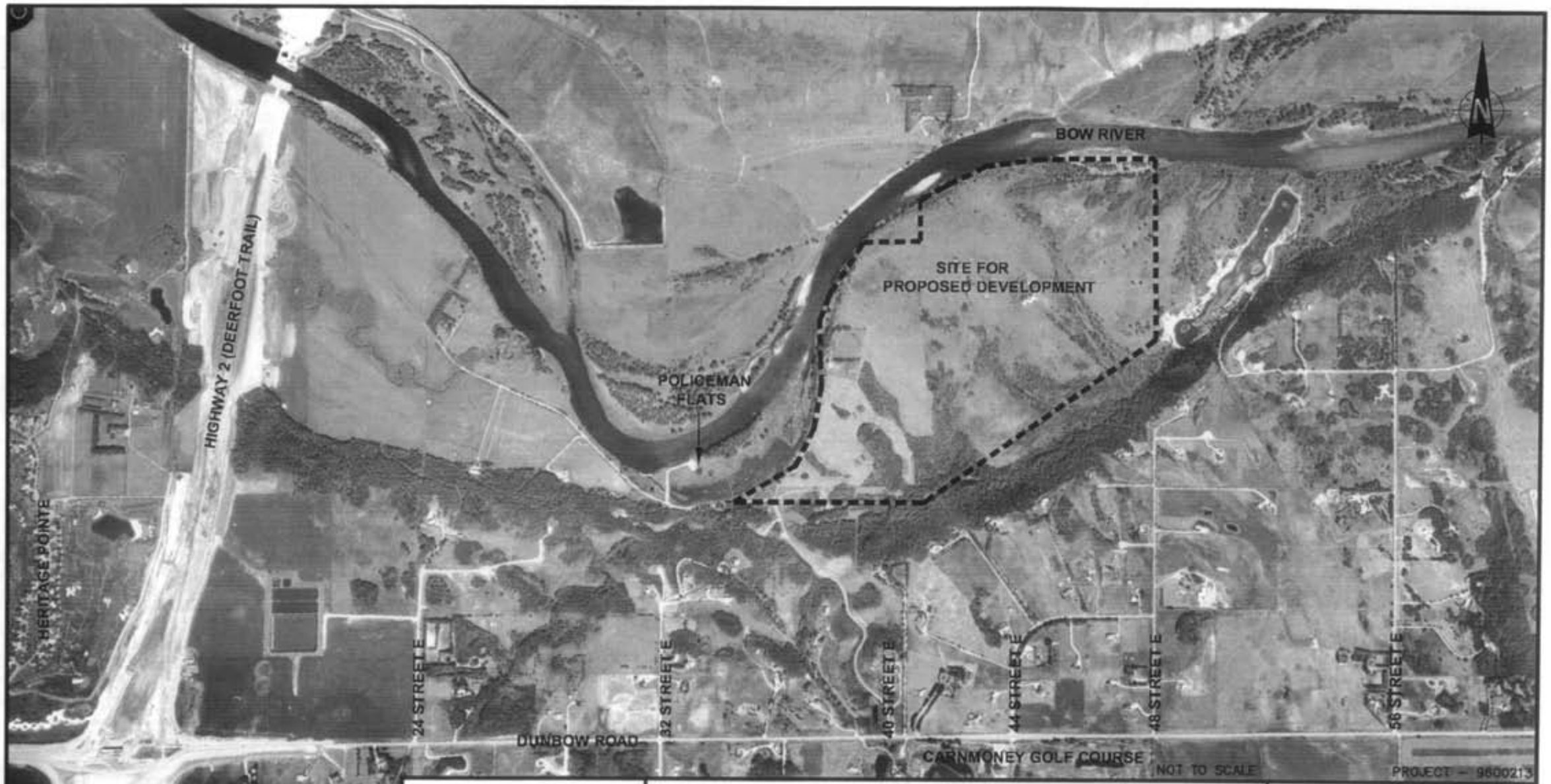

	FIGURE 1 – LOCATION PLAN	DATE	DWG
	DUNBOW ROAD & 40 STREET E	MARCH 2005	9600213–002AIR
	EBA Engineering Consultants Ltd.	Dwn.By:	Chk By:
		MS	RM

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APPENDIX A

Photo 1
Looking west along 40th Street East from access to Policeman Flats.

Photo 2
Looking north at access to Policeman Flats.

Photo 3
Looking east along 40th Street East from access to Policeman Flats.

Photo 4
Looking west along 40th Street East from southwest corner of proposed development.

Photo 5
Looking south along 40th Street East from southwest corner of proposed development.

Photo 6
Looking south along 40th Street East from southwest corner of proposed development.

Photo 7
Looking north along 40th Street East from 100 m south of southwest corner of proposed development.

Photo 8
Looking north along 40th Street East from approximately 550 m north of Dunbow Road.

Photo 9
Looking south along 40th Street East from approximately 550 m north of Dunbow Road.

Photo 10
Looking north along 40th Street East from approximately 225 m north of Dunbow Road.

Photo 11
Looking north along 40th Street East from approximately 100 m north of Dunbow Road.

Photo 12
Looking north along 40th Street East from approximately 50 m north of Dunbow Road.

Photo 13
Looking south along 40th Street East from approximately 50 m north of Dunbow Road.

Photo 14
Looking west along Dunbow Road from stopping position on 40th Street East.

Photo 15
Looking east along Dunbow Road from stopping position on 40th Street East.

Photo 16
Looking north along 40th Street East from south side of Dunbow Road.

Photo 17
Looking west along Dunbow Road from east of the Highway 2 interchange.

Photo 18
Looking north along Highway 2 from Dunbow Road overpass.

Photo 19
Looking west along Dunbow Road from west of Highway 2 Interchange.

Photo 20
Looking west at intersection of Dunbow Road and Highway 2A from east leg of intersection.

APPENDIX C

McElhanney

Consulting Services Ltd

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (2nd AVE) & 40 STREET EAST

2005 AADT & ASDT ESTIMATES

NORTH ON	40 ST E.	
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	40	80.00
B: RECREATION VEHICLES	4	4.44
C: BUSES	5	5.56
D: SINGLE UNIT TRUCKS	1	1.11
E: TRACTOR TRAILER COMB.	0	0.00
ASDT 30	AADT	30

WEST ON	DUNBOW RD	
	VOL.	%
A: PASSENGER VEHICLES	1863	89.57
B: RECREATION VEHICLES	13	0.62
C: BUSES	28	1.35
D: SINGLE UNIT TRUCKS	80	3.85
E: TRACTOR TRAILER COMB.	94	4.52
ASDT 2080	AADT	2080

EAST ON	DUNBOW RD	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	1811	89.21
B: RECREATION VEHICLES	19	0.94
C: BUSES	27	1.33
D: SINGLE UNIT TRUCKS	75	3.69
E: TRACTOR TRAILER COMB	94	4.63
ASDT 2110	AADT	2030

SOUTH ON		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	0	0.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
ASDT 0	AADT	0

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

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TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & 40 STREET EAST

2005 AM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NORTH ON	40 ST E	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	2	50.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	2	50.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
TOTAL	4	

WEST ON	DUNBOW RD	
	VOL	%
A: PASSENGER VEHICLES	174	87.00
B: RECREATION VEHICLES	2	1.00
C: BUSES	9	4.50
D: SINGLE UNIT TRUCKS	8	4.00
E: TRACTOR TRAILER COMB.	7	3.50
TOTAL	200	

EAST ON	DUNBOW RD	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	177	86.87
B: RECREATION VEHICLES	2	1.01
C: BUSES	9	4.55
D: SINGLE UNIT TRUCKS	8	4.04
E: TRACTOR TRAILER COMB	7	3.54
TOTAL	198	

SOUTH ON		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	0	0.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL	0	

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT

NT : TRAFFIC FROM NORTH PROCEEDING THROUGH

NR : TRAFFIC FROM NORTH TURNING RIGHT

SL : TRAFFIC FROM SOUTH TURNING LEFT

ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH

SR : TRAFFIC FROM SOUTH TURNING RIGHT

EL : TRAFFIC FROM EAST TURNING LEFT

ET : TRAFFIC FROM EAST PROCEEDING THROUGH

ER : TRAFFIC FROM EAST TURNING RIGHT

WL : TRAFFIC FROM WEST TURNING LEFT

WT : TRAFFIC FROM WEST PROCEEDING THROUGH

WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney

Consulting Services Ltd.

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & 40 STREET EAST

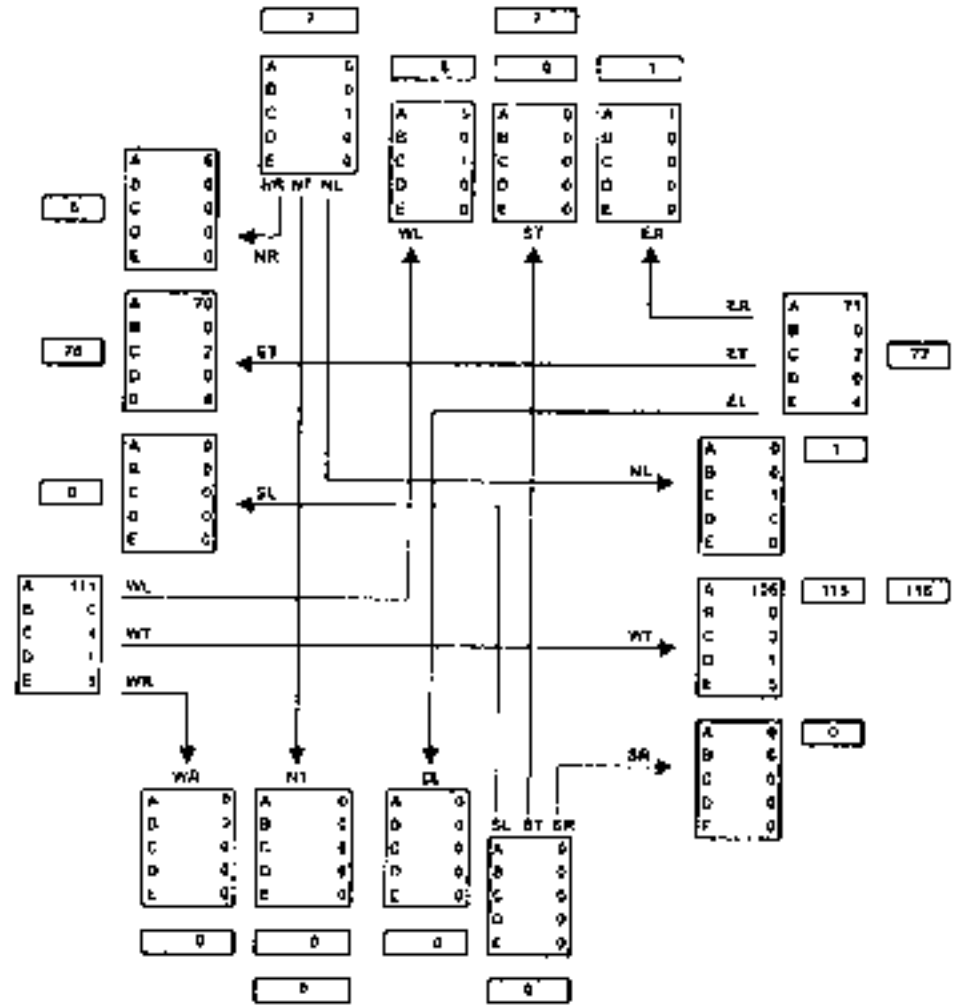
2006 PM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NORTH ON	40 ST E.	
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	72	85.71
B: RECREATION VEHICLES	0	0.00
C: BUSES	2	14.29
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
TOTAL	14	

WEST ON	DUNBOW RD	
	VOL.	%
A: PASSENGER VEHICLES	187	92.57
B: RECREATION VEHICLES	0	0.00
C: BUSES	6	2.96
D: SINGLE UNIT TRUCKS	1	0.49
E: TRACTOR TRAILER COMB.	8	3.45
TOTAL	203	

EAST ON	DUNBOW RD	
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	177	91.71
B: RECREATION VEHICLES	0	0.00
C: BUSES	6	3.11
D: SINGLE UNIT TRUCKS	1	0.52
E: TRACTOR TRAILER COMB	9	4.66
TOTAL	193	

SOUTH ON		
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	0	0.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL	0	



TURNING MOVEMENT ABBREVIATIONS

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ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney

Page 1

DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 242 AVE REFERENCE NO.: INTERSECTION OF: DUNBOW RD (242 AVE) & 40 STREET EAST

LATITUDE (degrees): LONGITUDE (degrees): LEGAL DESCRIPTION:

DAY & DATE OF COUNT: MONDAY, APRIL 18, 2005 COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

	APPROACHING INTERSECTION																											
	FROM THE EAST ON DUNBOW RD														FROM THE WEST ON DUNBOW RD												
	LEFT					THROUGH					RIGHT					LEFT					THROUGH					RIGHT				
INTERVAL																													TOTALS
7:00-7:15 am						30			1												6			1							38
7:15 - 7:30						27	1														9										37
7:30 - 7:45						26		3	1	1				1							16			2	1						51
7:45 - 8:00						21	1	3	1												22		3	1	1						58
8:00 - 8:15						29		1	1	1											14				1						43
8:15 - 8:30						22		1	2	1											16	1									41
8:30 - 8:45						24				1											8			1							32
8:45 - 9:00						7															6		1		2						16
9:00 - 9:15						22			2	1	1										9				2						39
9:15 - 9:30						12	1			1											13			2							30
9:30 - 9:45						8			1												7		1		2						17
9:45 - 10:00						11				1											6			1	1						21
10:00 - 10:15						14			1	1										2	9			1	1						33
10:15 - 10:30						12			2	1											7			1							23
10:30 - 10:45						15	1		2												3			1	1						23
10:45 - 11:00						15				1										1	9				1						27
11:00 - 11:15						18		1	1	1										1	10				2						37
11:15 - 11:30						12	1														9			2	1						25
11:30 - 11:45						16			1											4	4										25
11:45 12:00 pm						11			1	1											8			1	1						23
12:00 - 12:15						14			1	1	1									1	11			1	1						31
12:15 - 12:30						12														1	16			1	1						30
12:30 - 12:45						8			4	3	1										7			2	1						25
12:45 - 1:00						7			1												14			2							24
1:00 - 1:15						8			1	1	1									1	14			2	1						28
1:15 - 1:30						8			1	1											7			1	1						24
1:30 - 1:45						9			1											5	12	1		1	1						30
1:45 - 2:00						10			1	1										1	11			4	1						28
2:00 - 2:15						5				1										1	11	1		4	1						24
2:15 - 2:30						10			1												15	1		3							29
2:30 - 2:45						9		1	1	1										1	10			1	1						30
2:45 - 3:00						17			1	1										1	11			3							33
3:00 - 3:15						12			1	2										1	13				1						31
3:15 - 3:30						15	1			1											29			1	1						48
3:30 - 3:45						12															29				2						43
3:45 - 4:00						8				1	1										34		2		2						47
4:00 - 4:15						12				2										1	20		1	2							35
4:15 - 4:30						14		1		1									1		28		2								46
4:30 - 4:45						34		1			1									3	21				2						62
4:45 - 5:00						15														2	36			1	2						56
5:00 - 5:15						14				1	1										30				1						46
5:15 - 5:30						11			2	1										1	34										48
5:30 - 5:45						10			1			1								1	33										46
5:45 - 6:00						9														1	35										45
6:00 - 6:15						22	1														28										49
6:15 - 6:30						14			1											1	27										43
6:30 - 6:45						17	2													1	34										54
6:45-7:00 pm						15														1	29										45
VEHICLE	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
TOTALS	0	0	0	0	0	702	9	11	34	40	6	1	1	0	0	29	1	1	0	0	805	4	9	17	36	0	0	0	0	0	1724
	EL					ET					ER					WL					WT					WR					

LOCATION DIAGRAM ENCLOSED (Y/N): YES

WEATHER CONDITIONS: OVERCAST LIGHT SNOW, RAIN

RECORDER(S): A. AUBOS

COMMENTS:

VEHICLE CLASSES

A: PASSENGER VEHICLES B: RECREATION VEHICLES C: BUSES

D: SINGLE UNIT TRUCKS E: TRACTOR TRAILER COMBINATIONS

DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 242 AVE REFERENCE NO: INTERSECTION OF: DUNBOW RD (242 AVE) & 40 STREET EAST

LATITUDE (degrees): LONGITUDE (degrees): LEGAL DESCRIPTION:

DAY & DATE OF COUNT: MONDAY, APRIL 18, 2005 COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

	APPROACHING INTERSECTION																																	
	FROM THE NORTH ON 40 ST E															FROM THE SOUTH ON																		
	LEFT					THROUGH					RIGHT					LEFT					THROUGH					RIGHT					TOTALS	GRAND TOTALS
INTERVAL																																		
7:00-7:15 am																																0	28
7:15 - 7:30																																0	32
7:30 - 7:45															L																	1	52
7:45 - 8:00																																0	56
8:00 - 8:15																																0	43
8:15 - 8:30											2																					2	43
8:30 - 8:45											1																					1	33
8:45 - 9:00																																0	46
9:00 - 9:15											1																					1	38
9:15 - 9:30	1																															1	31
9:30 - 9:45																																0	37
9:45 - 10:00											1																					1	22
10:00 - 10:15																																0	35
10:15 - 10:30											1																					1	24
10:30 - 10:45											1																					1	24
10:45 - 11:00																																0	27
11:00 - 11:15											1																					1	38
11:15 - 11:30														1																		1	37
11:30 - 11:45											1																					1	28
11:45-12:00 pm											2																					2	25
12:00 - 12:15																																0	31
12:15 - 12:30																																0	30
12:30 - 12:45	1																															1	28
12:45 - 1:00											1							1														1	23
1:00 - 1:15	1																															1	36
1:15 - 1:30											1																					1	25
1:30 - 1:45																																0	26
1:45 - 2:00											1																					1	27
2:00 - 2:15																																0	24
2:15 - 2:30											2							1														3	30
2:30 - 2:45																		1														0	30
2:45 - 3:00																		1														0	32
3:00 - 3:15																																0	31
3:15 - 3:30											1							1														1	49
3:30 - 3:45																																0	39
3:45 - 4:00																																0	49
4:00 - 4:15	1																															1	33
4:15 - 4:30			1								1																					2	50
4:30 - 4:45											1																					1	43
4:45 - 5:00											3																					3	40
5:00 - 5:15											3																					3	51
5:15 - 5:30																																0	49
5:30 - 5:45																																0	48
5:45 - 6:00		1																														1	30
6:00 - 6:15																																0	48
6:15 - 6:30																																0	43
6:30 - 6:45																																0	34
6:45-7:00 pm											1																					1	46
VEH CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E		
TOTALS	4	1	1	0	0	0	0	0	0	0	25	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	1757
	NL					NO					NR					3A					3T					3AT						

LOCATION DIAGRAM ENCLOSED (Y/N): YES

WEATHER CONDITIONS: OVERCAST, LIGHT SNOW RAIN

RECORDER(S): A. KUPOS

COMMENTS:

VEHICLE CLASSES

A. PASSENGER VEHICLES B. RECREATION VEHICLES C. BUSES

D. SINGLE UNIT TRUCKS E. TRACTOR TRAILER COMBINATIONS

McElhanney

Consulting Services Ltd.

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & 40 STREET EAST

DAY & DATE OF COUNT: MONDAY, APRIL 16, 2009

COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

OBSERVED 12 HOURS TRAFFIC VOLUMES

NORTH ON 40 ST E.		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	64	88.89
B: RECREATION VEHICLES	3	4.17
C: BUSES	4	5.56
D: SINGLE UNIT TRUCKS	1	1.39
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL		72

WEST ON DUNBOW RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	1561	89.56
B: RECREATION VEHICLES	14	0.80
C: BUSES	22	1.26
D: SINGLE UNIT TRUCKS	67	3.84
E: TRACTOR TRAILER COMB.	79	4.53
TOTAL		1743

EAST ON DUNBOW RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	1517	89.29
B: RECREATION VEHICLES	15	0.88
C: BUSES	22	1.29
D: SINGLE UNIT TRUCKS	66	3.88
E: TRACTOR TRAILER COMB.	79	4.65
TOTAL		1699

SOUTH ON		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	0	0.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL		0

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT

NT : TRAFFIC FROM NORTH PROCEEDING THROUGH

NR : TRAFFIC FROM NORTH TURNING RIGHT

SL : TRAFFIC FROM SOUTH TURNING LEFT

ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH

SR : TRAFFIC FROM SOUTH TURNING RIGHT

EL : TRAFFIC FROM EAST TURNING LEFT

ET : TRAFFIC FROM EAST PROCEEDING THROUGH

ER : TRAFFIC FROM EAST TURNING RIGHT

WL : TRAFFIC FROM WEST TURNING LEFT

WT : TRAFFIC FROM WEST PROCEEDING THROUGH

WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney
Consulting Services Ltd

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE LK ACC

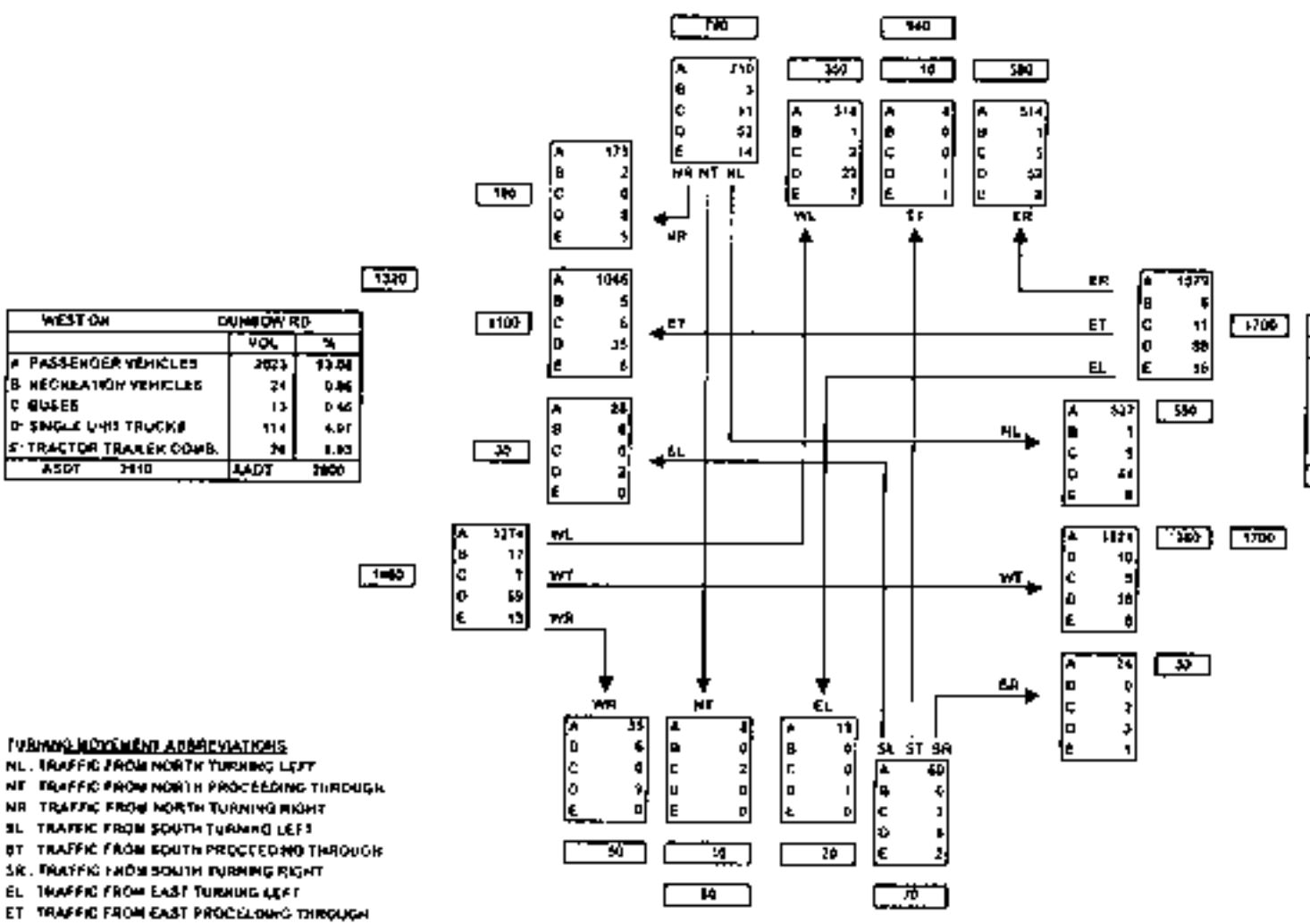
2005 AADT & ASDT ESTIMATES

NORTH ON HERITAGE		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	3556	88.40
B: RECREATION VEHICLES	5	0.29
C: BUSES	18	1.04
D: SINGLE UNIT TRUCKS	123	7.34
E: TRACTOR TRAILER COMB.	30	1.73
ASDT 1800	AADT	1730

WEST ON DUNBOW RD		
	VOL	%
A: PASSENGER VEHICLES	2623	93.04
B: RECREATION VEHICLES	24	0.86
C: BUSES	13	0.46
D: SINGLE UNIT TRUCKS	114	4.07
E: TRACTOR TRAILER COMB.	24	0.83
ASDT 2810	AADT	2800

EAST ON DUNBOW RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	3151	92.68
B: RECREATION VEHICLES	17	0.50
C: BUSES	27	0.79
D: SINGLE UNIT TRUCKS	173	5.09
E: TRACTOR TRAILER COMB.	32	0.94
ASDT 3540	AADT	3400

SOUTH ON 2 STE		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	122	81.33
B: RECREATION VEHICLES	6	4.00
C: BUSES	4	2.67
D: SINGLE UNIT TRUCKS	16	10.67
E: TRACTOR TRAILER COMB.	2	1.33
ASDT 160	AADT	150



TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT TRAFFIC FROM NORTH PROCEEDING THROUGH
NR TRAFFIC FROM NORTH TURNING RIGHT
SL TRAFFIC FROM SOUTH TURNING LEFT
ST TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL TRAFFIC FROM EAST TURNING LEFT
ET TRAFFIC FROM EAST PROCEEDING THROUGH
ER TRAFFIC FROM EAST TURNING RIGHT
WL TRAFFIC FROM WEST TURNING LEFT
WT TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney

Consulting Services Ltd.

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE LK ACC

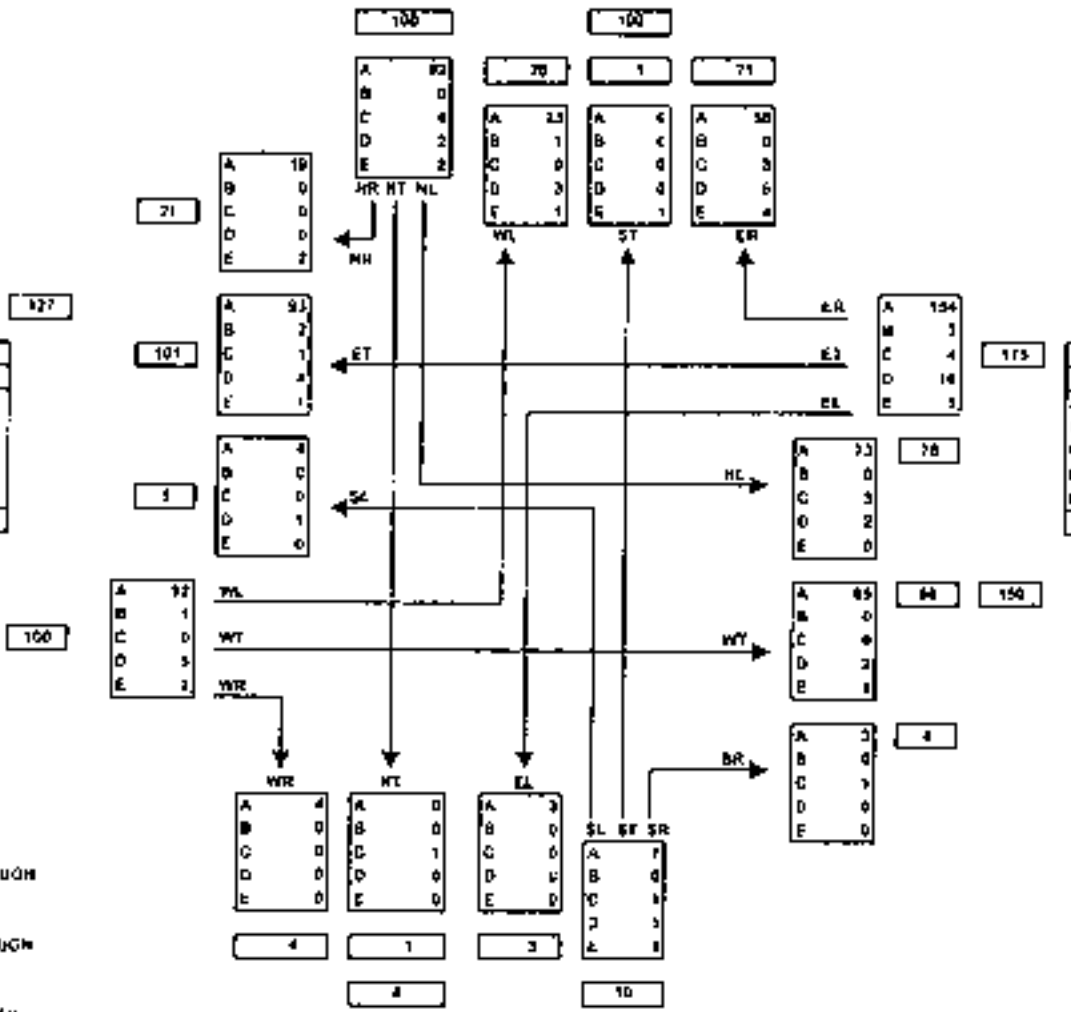
2005 AM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NORTH ON	HERITAGE ACC	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	173	86.50
B: RECREATION VEHICLES	1	0.50
C: BUSES	7	3.50
D: SINGLE UNIT TRUCKS	11	5.50
E: TRACTOR TRAILER COMB.	8	4.00
TOTAL	200	

WEST ON	DUNBOW RD	
	VOL	%
A: PASSENGER VEHICLES	204	91.83
B: RECREATION VEHICLES	3	1.32
C: BUSES	1	0.44
D: SINGLE UNIT TRUCKS	10	4.41
E: TRACTOR TRAILER COMB	5	2.20
TOTAL	227	

EAST ON	DUNBOW RD	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	293	90.77
B: RECREATION VEHICLES	2	0.62
C: BUSES	8	2.48
D: SINGLE UNIT TRUCKS	14	4.31
E: TRACTOR TRAILER COMB.	6	1.85
TOTAL	325	

SOUTH ON	7 ST E	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	14	77.78
B: RECREATION VEHICLES	0	0.00
C: BUSES	2	11.11
D: SINGLE UNIT TRUCKS	1	5.56
E: TRACTOR TRAILER COMB.	1	5.56
TOTAL	18	



TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney

Consulting Services Ltd

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE LK ACC

2005 PM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NORTH ON: HP LK ACC		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	163	94.81
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	7	4.19
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL	167	

WEST ON: DUNBOW RD		
	VOL	%
A: PASSENGER VEHICLES	260	94.55
B: RECREATION VEHICLES	7	2.55
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	6	2.18
E: TRACTOR TRAILER COMB.	2	0.73
TOTAL	275	

EAST ON: DUNBOW RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	313	95.99
B: RECREATION VEHICLES	2	0.61
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	5	1.53
E: TRACTOR TRAILER COMB.	3	0.91
TOTAL	328	

SOUTH ON: 2 S1 F		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	12	66.67
B: RECREATION VEHICLES	5	27.78
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	1	5.56
TOTAL	18	

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

McElhenney

Page 1

DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 242 AVE REFERENCE NO.: INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE LK ACC

LATITUDE (degrees): LONGITUDE (degrees): LEGAL DESCRIPTION:

DAY & DATE OF COUNT: TUESDAY, APRIL 19, 2005 COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

	APPROACHING INTERSECTION																															
	FROM THE EAST ON DUNBOW RD															FROM THE WEST ON DUNBOW RD															
	LEFT					THROUGH					RIGHT					LEFT					THROUGH					RIGHT						
INTERVAL																																TOTALS
7:00-7:15 am						43					8			1		3					13					2						41
7:15 - 7:30						21	1		1		6					4	1			1	11				1	3						54
7:30 - 7:45	3					21	1				12			2		2					20											61
7:45 - 8:00						29				1	16		3	2	4	5			2		36			4								82
8:00 - 8:15						13		1	3		16			1		5			1		31			4		1						53
8:15 - 8:30						23			1		13				1	1			1		8			4	1							52
8:30 - 8:45						28			1		9					6					9			2								54
8:45 - 9:00						19			1		8			1		7					21	1	1									59
9:00 - 9:15						13				3	7			1		2					20		1									49
9:15 - 9:30	1					16					8				1	1					17											44
9:30 - 9:45						11			1		8					4					8	1				1						32
9:45 - 10:00						23			1		8			3		3			1		13					3						56
10:00 - 10:15	1					14					9			1		2					10											37
10:15 - 10:30						20					5					6			1		9	1		4		2						48
10:30 - 10:45						23			1		8			1		4					11			1		3						61
10:45 - 11:00						19			1		7			2	1	2			1		12			2								49
11:00 - 11:15						16		1	2		10					6			1		24					1						55
11:15 - 11:30						18			1		4					3					14			2		3						43
11:30 - 11:45						12			4		5					2			1		9			1								41
11:45-12:00 pm						13			4		3					5					16			1					1			42
12:00 - 12:15	1					16					7					6			1		16			2					1			54
12:15 - 12:30						13	1		3		5					2			1		14	1		2								40
12:30 - 12:45						17					10			4		6			1		16					1						54
12:45 - 1:00						15		1	2	1	7			1		6					17			2								54
1:00 - 1:15	1					15			3		8			1		6			1		17			2								54
1:15 - 1:30						16		1			7			3		7					18			1		3						55
1:30 - 1:45						18			1		7			2		7					10	1		1					1			54
1:45 - 2:00	1					21					5			2		7			1		17			1								55
2:00 - 2:15						25					5	1		1		7			1		17											57
2:15 - 2:30	1					21			1		8			5		8					16			1					1			53
2:30 - 2:45						9		1			9			1		4					30	1		1	1							47
2:45 - 3:00	1					29				1	7			3		9					14											31
3:00 - 3:15	1					24			2	1	3			1		2					25			1					2			66
3:15 - 3:30	1			1		8			1		11			1		8					18	1							1			48
3:30 - 3:45						14	1				6					8			1	1	28					1						58
3:45 - 4:00				1		23					15			2		11			1		34	1										87
4:00 - 4:15						12					10		1	1		10		2			19		1									56
4:15 - 4:30	1					22			1		10					5				1	44		1			1						86
4:30 - 4:45	1					31			1		8			2		4					26		1		1	1						75
4:45 - 5:00						33					22					10			1		23		1			1						90
5:00 - 5:15				1		27					7					2			1		26		1		1							65
5:15 - 5:30	1					33				1	5					5				1	24					5						77
5:30 - 5:45						30					22					12					36	1				2						83
5:45 - 6:00						23					20					7			1		29	1		2		1						84
6:00 - 6:15						17					18					10			1		31					2						77
6:15 - 6:30	1					16			1		6			1		7					28											60
6:30 - 6:45						18					14					5					29					1						70
6:45-7:00 pm						14					7					3					4											50
VEHICLE CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E		
TOTALS	16	0	0	1	0	906	4	3	30	3	441	1	4	15	7	272	1	2	10	0	881	9	4	33	5	28	5	0	7	0	3740	
	EL					ET					ER					YEL					YT					YR						

LOCATION DIAGRAM ENCLOSED (Y/N): YES

WEATHER CONDITIONS: SUNNY

RECORDER(S): J. HURDS

COMMENTS:

VEHICLE CLASSES

A: PASSENGER VEHICLES B: RECREATION VEHICLES C: BUSES

D: SINGLE UNIT TRUCKS E: TRACTOR TRAILER COMBINATIONS

McElhanney
Consulting Services Ltd.

DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 242 AVE REFERENCE NO.: INTERSECTION OF: SUNBOW RD (242 AVE) & HERITAGE POINTE LK ACC

LATITUDE (degrees): LONGITUDE (degrees): LEGAL DESCRIPTION:

DAY & DATE OF COUNT: TUESDAY, APRIL 19, 2005 COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

INTERVAL	APPROACHING INTERSECTION																														TOTALS	GRAND TOTALS
	FROM THE NORTH ON H P LK ACC															FROM THE SOUTH ON 2 ST E																
	LEFT					THROUGH					RIGHT					LEFT					THROUGH					RIGHT						
7:00-7:15 am	12			1							3				1																17	38
7:15-7:30	16										3				1																22	78
7:30-7:45	15							1			4				1	1									1	2		1			27	99
7:45-8:00	9		2								3					1															15	97
8:00-8:15	22		1	2							5					2			1							1					33	86
8:15-8:30	11										2																				14	65
8:30-8:45	9				1						7			1												3					21	75
8:45-9:00	4				1						7				1	1													1		10	69
9:00-9:15	9			1							1																				11	37
9:15-9:30	13										1																				14	58
9:30-9:45	11			1	2						5					1			1		1										22	54
9:45-10:00	3																									1					4	60
10:00-10:15	7										1																				8	45
10:15-10:30	3			1							3					2										3					11	59
10:30-10:45	8										5			1		1										2			1		18	69
10:45-11:00	7										7															1					15	84
11:00-11:15	4	1		1							3																				9	67
11:15-11:30	8			2							1					1															12	57
11:30-11:45	7										4					1										1					13	54
11:45-12:00 pm	3				1						4					1															9	51
12:00-12:15	14			1	1						3																		1		20	74
12:15-12:30	8			3							1																				12	53
12:30-12:45	7										2										1										10	54
12:45-1:00	9			1							3																				13	63
1:00-1:15	9			2							3																				14	68
1:15-1:30	9										3										1										13	64
1:30-1:45	7			1	1						3																				12	64
1:45-2:00	6			2							3															1					12	67
2:00-2:15	5				1						3																				9	64
2:15-2:30	7										4																				11	73
2:30-2:45	10			7							2															2					21	64
2:45-3:00	13			2							3																				18	65
3:00-3:15	9			1		1					5					1					1					1					18	69
3:15-3:30	8					1					2					1					1			1							14	62
3:30-3:45	3			2		1					8	1				1															12	70
3:45-4:00	11			1							1																				13	150
4:00-4:15	10		1	1				1			7			2		2										1					21	77
4:15-4:30	5		3								1																	1			9	55
4:30-4:45	17		1			2					1																				21	96
4:45-5:00	16		1			3					3										1					1					25	105
5:00-5:15	7			2		1					1					1															12	77
5:15-5:30	7										3			1		1					1					2				1	15	92
5:30-5:45	8					1					6															1					16	99
5:45-6:00	12			2							4			1																	19	103
6:00-6:15	18			1							1																				20	97
6:15-6:30	10										9			1		3															23	83
6:30-6:45	12										4																				16	88
6:45-7:00 pm	8										3	1														1					13	43
VEH CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E		
TOTALS	451	3	8	38	8	10	0	2	0	0	150	2	0	7	4	23	0	0	2	0	7	0	0	1	1	23	0	3	3	1	744	3484
	NL					NT					NR					SL					ST					SR						

LOCATION DIAGRAM ENCLOSED (Y/N): YES
WEATHER CONDITIONS: SUNNY
RECORDER(S): J. RUNGS
COMMENTS:

VEHICLE CLASSES
A: PASSENGER VEHICLES B: RECREATION VEHICLES C: BUSES
D: SINGLE UNIT TRUCKS E: TRACTOR TRAILER COMBINATIONS

McElhanney

Consulting Services Ltd

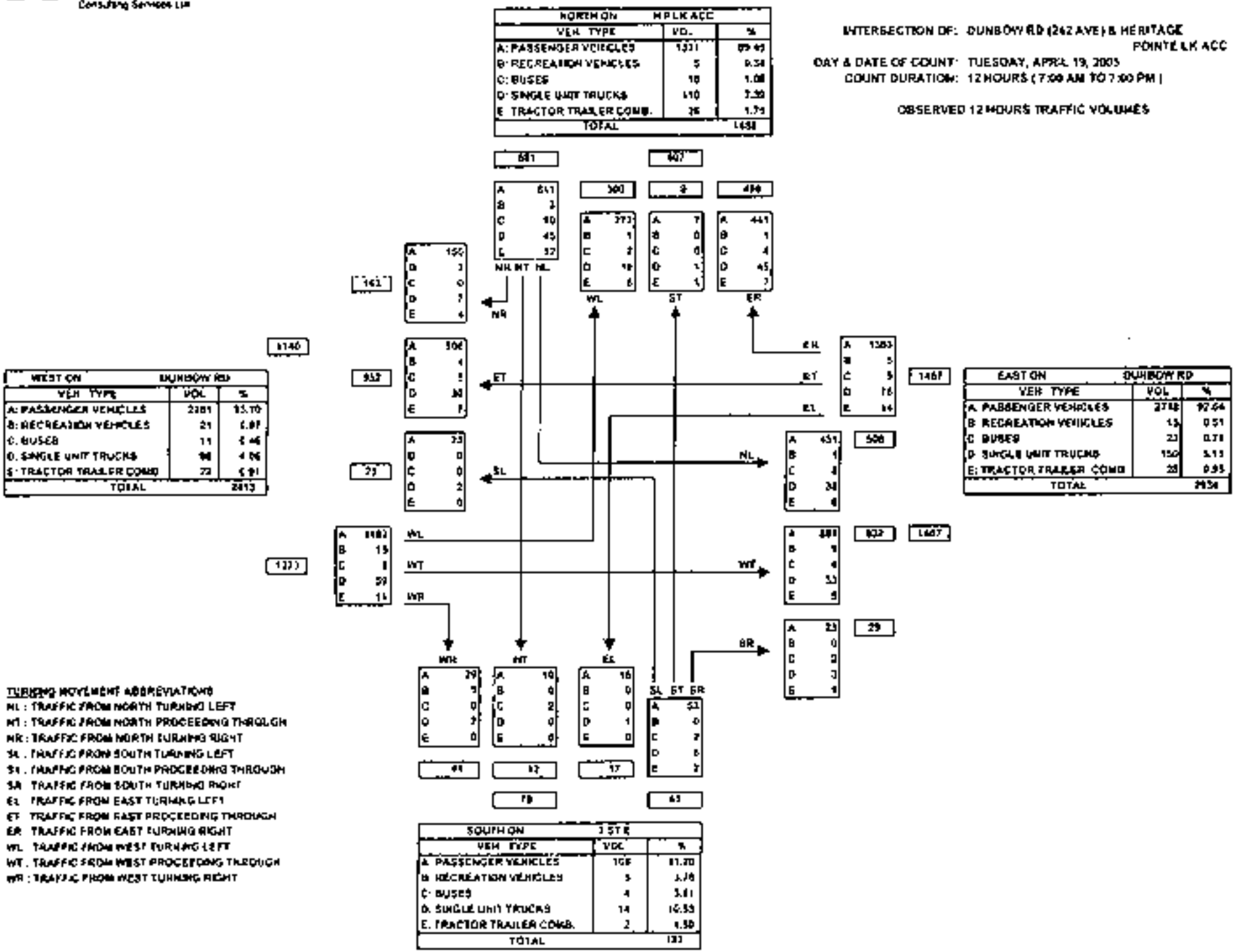
TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE LK ACC

DAY & DATE OF COUNT: TUESDAY, APRIL 19, 2005

COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

OBSERVED 12 HOURS TRAFFIC VOLUMES



McElhanney

Consulting Services Ltd

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: McLEOD TR & PINE CRK RD (226 AVE)
(NORTH SERV RD ACC TO HERITAGE PT LK)

2005 AADT & ASDT ESTIMATES

NOTE
Only traffic turning on to and off Pine Creek Rd monitored

NORTH ON	McLEOD TR	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	877	92.32
B: RECREATION VEHICLES	1	0.11
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	70	7.37
E: TRACTOR TRAILER COMB	2	0.21
ASDT PED	AADT	950

WEST ON	226 AVE	
	VOL	%
A: PASSENGER VEHICLES	37	92.50
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	2	5.13
E: TRACTOR TRAILER COMB.	1	1.67
ASDT 60	AADT	60

EAST ON	PINE CRK RD	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	966	97.08
B: RECREATION VEHICLES	1	0.10
C: BUSES	1	0.10
D: SINGLE UNIT TRUCKS	25	2.43
E: TRACTOR TRAILER COMB	4	0.39
ASDT 1990	AADT	1030

SOUTH ON	McLEOD TR	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	52	86.67
B: RECREATION VEHICLES	0	0.00
C: BUSES	1	1.67
D: SINGLE UNIT TRUCKS	6	10.00
E: TRACTOR TRAILER COMB.	1	1.67
ASDT 60	AADT	60

TURNING MOVEMENT ABBREVIATIONS
NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney

Surveying Services Ltd

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: McLEOD TR & PINE CRK RD (226 AVE)
(NORTH SERV RD ACC TO HERITAGE PT LK)

2003 AM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NOTE:
Only traffic turning on to and off Pine Creek Rd monitored

NORTH ON: MCLEOD TR		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	95	97.94
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	1	1.03
E: TRACTOR TRAILER COMBI	1	1.03
TOTAL	97	

WEST ON: 226 AVE		
	VOL	%
A: PASSENGER VEHICLES	3	100.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
TOTAL	3	

EAST ON: PINE CRK RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	97	97.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	1	1.00
D: SINGLE UNIT TRUCKS	1	1.00
E: TRACTOR TRAILER COMBI	1	1.00
TOTAL	100	

SOUTH ON: MCLEOD TR		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	2	66.67
B: RECREATION VEHICLES	0	0.00
C: BUSES	1	33.33
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL	3	

TURNING MOVEMENT ABBREVIATIONS:
NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney

Consulting Services Ltd

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: MCLEOD TR & PINE CRK RD (226 AVE)
(NORTH SERV RD ACC TO HERITAGE PT 1K)

2005 PM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NOTE:
Only traffic turning on to and off Pine Creek Rd monitored

NORTH ON	MCLEOD TR	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	98	100.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
TOTAL	98	

WEST ON	226 AVE	
	VOL	%
A: PASSENGER VEHICLES	3	100.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
TOTAL	3	

EAST ON	PINE CRK RD	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	101	100.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
TOTAL	101	

SOUTH ON	MCLEOD TR	
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	2	100.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB	0	0.00
TOTAL	2	

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

McElhanney
Consulting Services Ltd

DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 2A REFERENCE NO.: INTERSECTION OF: MCLEOD TR & PINE CRK RD (226 AVE)

LATITUDE (degrees): LONGITUDE (degrees): (NORTH SERV RD ACC TO HERITAGE PT LK)

DAY & DATE OF COUNT: THURSDAY, APRIL 21, 2005 COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

INTERVAL	APPROACHING INTERSECTION																															TOTALS
	FROM THE EAST ON PINE CRK RD																FROM THE WEST ON 226 AVE															
	LEFT					THROUGH					RIGHT						LEFT					THROUGH					RIGHT					
7:00 7:15 am			1								14											1										14
7:15 - 7:30			2								18																1					19
7:30 - 7:45											12																					12
7:45 - 8:00			1								12				1							11										14
8:00 - 8:15			1								12																					12
8:15 - 8:30	1		1								11											8										33
8:30 - 8:45			1	1		1					8																					10
8:45 - 9:00						1					10											1										42
9:00 - 9:15						1					7			1																		9
9:15 - 9:30										1	5																					6
9:30 - 9:45											8			1																		9
9:45 - 10:00											12			2								1										15
10:00 - 10:15											10			2																		12
10:15 - 10:30						1					12											2										15
10:30 - 10:45											10			1								1										12
10:45 - 11:00											3																					3
11:00 - 11:15											8											1										9
11:15 - 11:30	1										10			2								2										15
11:30 - 11:45											5			1																		6
11:45 12:00 pm								1			6			1																		8
12:00 - 12:15											10			2								1										13
12:15 - 12:30	2										11			3																		16
12:30 - 12:45				1							5			1																		7
12:45 - 1:00											9			1																		9
1:00 - 1:15	1							1			9			1																		11
1:15 - 1:30											9			1								1										11
1:30 - 1:45						1					9			1																		11
1:45 - 2:00						1					8			2								1										12
2:00 - 2:15			1			1					9			2																		12
2:15 - 2:30			1			1					7											1										9
2:30 - 2:45			1			1					3			2								1										7
2:45 - 3:00											6			1								1										8
3:00 - 3:15											8																					8
3:15 - 3:30	1					1					4			2								1										9
3:30 - 3:45	2										5											1										8
3:45 - 4:00	1										7																					8
4:00 - 4:15						1					12											2			1							16
4:15 - 4:30											10			1																		11
4:30 - 4:45											5			1																		6
4:45 - 5:00											7			1								1										9
5:00 - 5:15						1					11											2										13
5:15 - 5:30											12																					12
5:30 - 5:45											16																					16
5:45 - 6:00											14																					14
6:00 6:15						2					12											1										15
6:15 - 6:30	1					2					10											1										15
6:30 - 6:45						1					6											1										8
6:45 7:00 pm											3			1								1										5
VEH CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E		
TOTALS	9	0	0	2	0	17	0	0	1	1	428	0	0	33	1	0	0	0	0	0	20	0	0	1	0	1	0	0	0	0	521
	EL					ET					ER					WL					WT					WR						

LOCATION DIAGRAM ACCOMPANIES (Y/N): YES

WEATHER CONDITIONS: OVERCAST

RECORDER(S): A. MUNRO

COMMENTS: MCLEOD BRAE TRAFFIC - ONLY VEHICLES TURNING ON TO PINE CREEK RD (SERVICE RD ENTRANCE TO HERITAGE POINTE LN DEVELOPMENT) MONITORED

VEHICLE CLASSES

A. PASSENGER VEHICLES B. RECREATION VEHICLES C. BUSES
D. SINGLE UNIT TRUCKS E. TRACTOR TRAILER COMBINATIONS

McElhanney

DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 2A | REFERENCE #0: | INTERSECTION OF: MCLEOD TR & PINE CRK RD (226 AVE)

LATITUDE (degrees): | LONGITUDE (degrees): | (NORTH SERV RD ACC TO HERITAGE PT I,K)

DAY & DATE OF COUNT: THURSDAY, APRIL 21, 2005 | COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

	APPROACHING INTERSECTION																											
	FROM THE NORTH ON MCLEOD TR													FROM THE SOUTH ON MCLEOD TR														
	LEFT					THROUGH					RIGHT					LEFT					THROUGH					RIGHT					TOTALS	GRAND TOTALS
INTERVAL																															
7:00-7:15 am	5																													5	19
7:15 - 7:30	6			1																					1			1		9	28
7:30 - 7:45	1																													1	13
7:45 - 8:00	8																													8	22
8:00 - 8:15	8																													8	18
8:15 - 8:30	1																											1		3	13
8:30 - 8:45	2																													2	12
8:45 - 9:00	8			1																								1		10	22
9:00 - 9:15	6																								2					8	17
9:15 - 9:30	7			1																										8	14
9:30 - 9:45	7			2																										9	18
9:45 - 10:00	2																													2	17
10:00 - 10:15	6																								1					7	19
10:15 - 10:30	4			1																					1					6	21
10:30 - 10:45	2			4																					1					7	19
10:45 - 11:00	4			2																					2					8	11
11:00 - 11:15	4																													4	13
11:15 - 11:30	5																								1					6	21
11:30 - 11:45	3			1																										4	16
11:45-12:00 pm	10			2																					1					13	21
12:00 - 12:15	3			1																					1					5	19
12:15 - 12:30	6			2																										10	24
12:30 - 12:45	1																								1					2	9
12:45 - 1:00	6																													6	15
1:00 - 1:15	5			1																					1					7	18
1:15 - 1:30	5			1																										6	17
1:30 - 1:45	4																													4	15
1:45 - 2:00	4			1																					1					6	16
2:00 - 2:15	3																								1					4	16
2:15 - 2:30	8																											1		9	19
2:30 - 2:45	4			1																					1					6	23
2:45 - 3:00	3			1																										4	13
3:00 - 3:15	3			1																										4	12
3:15 - 3:30	5																								1					6	15
3:30 - 3:45	11																								1					12	25
3:45 - 4:00	8			1																					1					9	17
4:00 - 4:15	11																											1		12	28
4:15 - 4:30	13																													13	23
4:30 - 4:45	9																													9	32
4:45 - 5:00	6																								2					8	33
5:00 - 5:15	9																								2					11	24
5:15 - 5:30	13																								1					14	28
5:30 - 5:45	15																								1					16	32
5:45 - 6:00	5																													5	18
6:00 - 6:15	12																													12	27
6:15 - 6:30	6	1		1																					1					5	24
6:30 - 6:45	7				1																									8	16
6:45-7:00 pm	10																								2					12	17
VEHICLE CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E		
TOTALS	296	1	0	25	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	1	3	1	355	878
	NL					NT					NR					SL					ST					SR						

LOCATION DIAGRAM INCLUDED? YES

WEATHER CONDITIONS: OVERCAST

RECORDER(S): A KUROS

COMMENTS: MCLEOD TRAIL TRAFFIC - ONLY VEHICLES TURNING ON TO PINE CREEK RD (SERVICE ADD ENTRANCE TO HERITAGE POINTE LK DEVELOPMENT) MONITORED

VEHICLE CLASSES

A: PASSENGER VEHICLES | B: RECREATION VEHICLES | C: BUSES

D: SINGLE UNIT TRUCKS | E: TRACTOR TRAILER COMBINATIONS

McElhanney

Consulting Services Ltd.

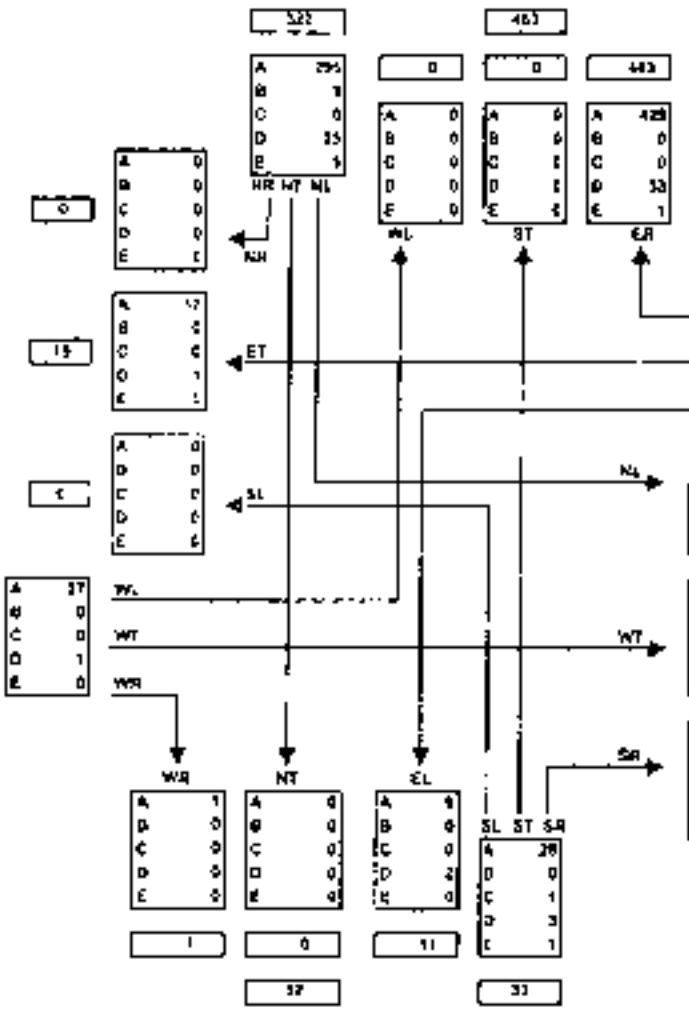
TURNING MOVEMENT SUMMARY DIAGRAM

NORTH ON: MCLEOD TR		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	724	92.23
B: RECREATION VEHICLES	1	0.13
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	58	7.39
E: TRACTOR TRAILER COMB	2	0.25
TOTAL		785

INTERSECTION OF: MCLEOD TR & PINE CRK RD (224 AVE)
(NORTH LEG RD ACC TO HERITAGE PT LN)
DAY & DATE OF COUNT: THURSDAY, APRIL 21, 2005
COUNT DURATION: 12 HOURS (7:00 am TO 7:00 PM)

OBSERVED 12 HOURS TRAFFIC VOLUMES

NOTE:
Only traffic turning on to and off Pine Creek Rd mentioned



WEST ON: 224 AVE		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	44	93.62
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	2	4.26
E: TRACTOR TRAILER COMB	1	2.13
TOTAL		47

EAST ON: PINE CRK RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	864	91.89
B: RECREATION VEHICLES	1	0.11
C: BUSES	1	0.11
D: SINGLE UNIT TRUCKS	65	7.45
E: TRACTOR TRAILER COMB	4	0.46
TOTAL		875

SOUTH ON: MCLEOD TR		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	38	84.44
B: RECREATION VEHICLES	0	0.00
C: BUSES	1	2.22
D: SINGLE UNIT TRUCKS	5	11.11
E: TRACTOR TRAILER COMB	1	2.22
TOTAL		45

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

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TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE GOLF COURSE ACC

2005 AADT & ASDT ESTIMATES

NORTH ON GOLF CS ACC		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	1179	95.84
B: RECREATION VEHICLES	0	0.00
C: BUSES	12	0.98
D: SINGLE UNIT TRUCKS	31	1.72
E: TRACTOR TRAILER COMB.	16	1.33
ASDT 1270	AADT	1226

WEST ON DUNBOW RD		
	VOL	%
A: PASSENGER VEHICLES	3147	87.66
B: RECREATION VEHICLES	38	1.12
C: BUSES	23	0.68
D: SINGLE UNIT TRUCKS	122	3.59
E: TRACTOR TRAILER COMB	70	2.06
ASDT 3540	AADT	3400

EAST ON DUNBOW RD		
VEH TYPE	VOL	%
A. PASSENGER VEHICLES	3046	91.75
B. RECREATION VEHICLES	37	1.11
C. BUSES	28	0.84
D. SINGLE UNIT TRUCKS	120	3.68
E: TRACTOR TRAILER COMB	80	2.41
ASDT 3450	AADT	3320

SOUTH ON EAST E.		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	108	90.00
B: RECREATION VEHICLES	1	0.83
C: BUSES	7	5.83
D: SINGLE UNIT TRUCKS	2	1.67
E: TRACTOR TRAILER COMB.	2	1.67
ASDT 120	AADT	120

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

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TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE GOLF COURSE ACC

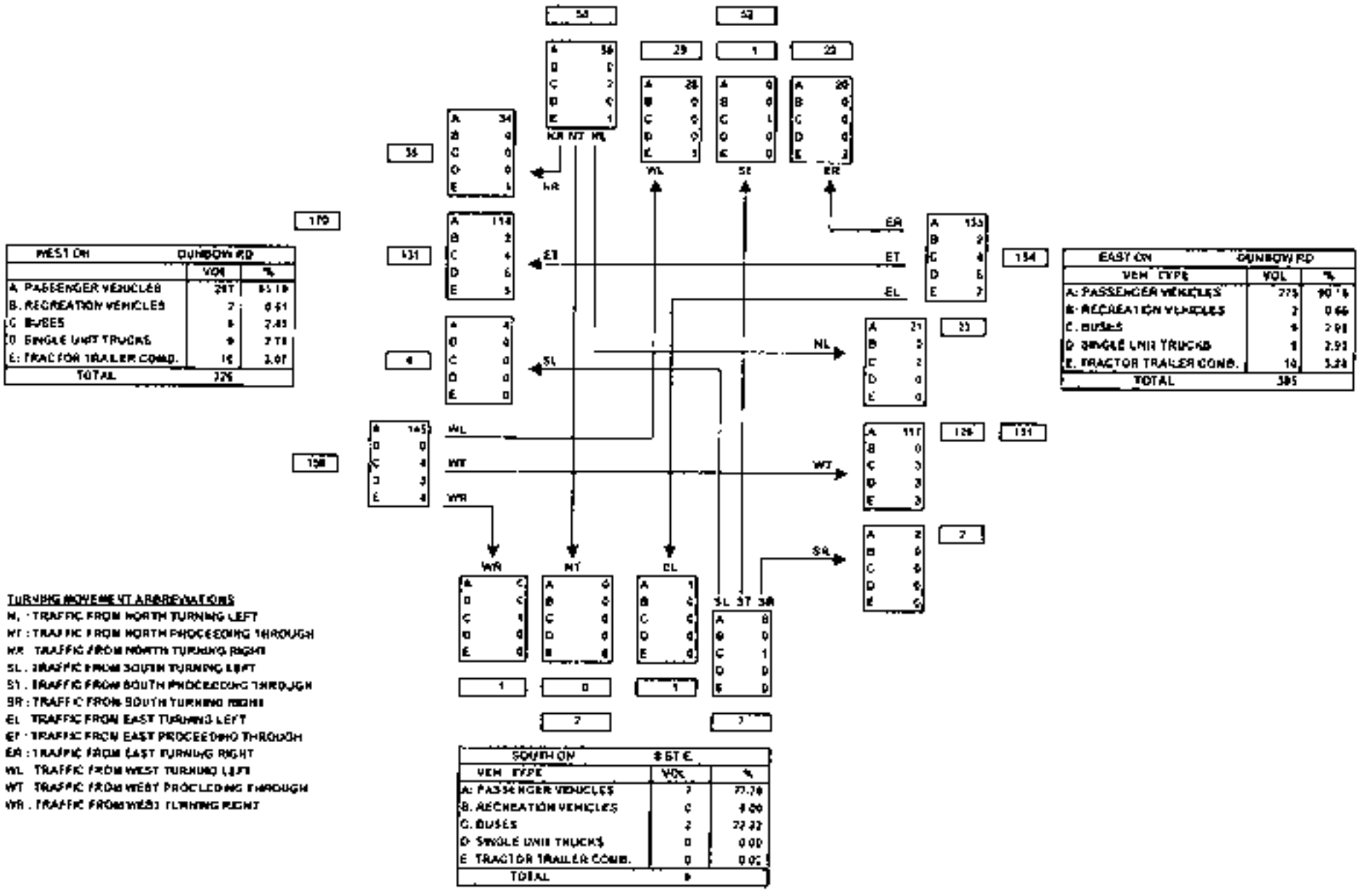
2045 AM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NORTH ON GOLF CS ACC		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	103	93.64
B: RECREATION VEHICLES	1	0.00
C: BUSES	3	2.73
D: SINGLE UNIT TRUCKS	4	0.00
E: TRACTOR TRAILER COMB.	4	3.64
TOTAL	110	

WEST ON DUNBOW RD		
	VOL	%
A: PASSENGER VEHICLES	297	91.10
B: RECREATION VEHICLES	2	0.61
C: BUSES	8	2.45
D: SINGLE UNIT TRUCKS	9	2.76
E: TRACTOR TRAILER COMB.	10	3.07
TOTAL	326	

EAST ON DUNBOW RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	275	90.16
B: RECREATION VEHICLES	2	0.66
C: BUSES	9	2.95
D: SINGLE UNIT TRUCKS	9	2.95
E: TRACTOR TRAILER COMB.	10	3.28
TOTAL	305	

SOUTH ON GOLF CS ACC		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	7	77.78
B: RECREATION VEHICLES	0	0.00
C: BUSES	2	22.22
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL	9	



TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

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TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE GOLF COURSE ACC

2005 PM 100TH HIGHEST HOUR TRAFFIC VOLUMES

NORTH ON: GOLF CS ACC		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	113	100.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL	113	

WEST ON: DUNBOW RD		
	VOL	%
A: PASSENGER VEHICLES	316	96.34
B: RECREATION VEHICLES	3	0.91
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	7	2.13
E: TRACTOR TRAILER COMB.	3	0.91
TOTAL	328	

EAST ON: DUNBOW RD		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	316	96.34
B: RECREATION VEHICLES	3	0.91
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	7	2.13
E: TRACTOR TRAILER COMB.	3	0.91
TOTAL	328	

SOUTH ON: 8 ST E		
VEH TYPE	VOL	%
A: PASSENGER VEHICLES	7	100.00
B: RECREATION VEHICLES	0	0.00
C: BUSES	0	0.00
D: SINGLE UNIT TRUCKS	0	0.00
E: TRACTOR TRAILER COMB.	0	0.00
TOTAL	7	

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT
NT : TRAFFIC FROM NORTH PROCEEDING THROUGH
NR : TRAFFIC FROM NORTH TURNING RIGHT
SL : TRAFFIC FROM SOUTH TURNING LEFT
ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH
SR : TRAFFIC FROM SOUTH TURNING RIGHT
EL : TRAFFIC FROM EAST TURNING LEFT
ET : TRAFFIC FROM EAST PROCEEDING THROUGH
ER : TRAFFIC FROM EAST TURNING RIGHT
WL : TRAFFIC FROM WEST TURNING LEFT
WT : TRAFFIC FROM WEST PROCEEDING THROUGH
WR : TRAFFIC FROM WEST TURNING RIGHT

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DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 242 AVE REFERENCE NO.: INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE PT GLF CS ACC

LATITUDE (degrees): LONGITUDE (degrees): LEGAL DESCRIPTION:

DAY & DATE OF COUNT: MONDAY, APRIL 18, 2005 COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

APPROACHING INTERSECTION

INTERVAL	FROM THE EAST ON DUNBOW RD – LEFT					THROUGH					RIGHT					FROM THE WEST ON DUNBOW RD – LEFT					THROUGH					RIGHT					TOTALS
VEH CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
7:00-7:15 am						24	1		1		2					5					22			1							55
7:15-7:30						22			1	1	5					3					35										67
7:30-7:45	1					20	2	1	2		4		1			3					27			1	3						66
7:45-8:00						30	1	3	3	3	7					11					32		1		1			1			92
8:00-8:15						19		3	1		5					5				1	23		2		1						64
8:15-8:30						23			2	2	4				1	7					16			2							61
8:30-8:45	1					30	1		1		2				1	3					36			1	1						74
8:45-9:00						15	1		1	2	5					2					20		1	1							48
9:00-9:15						25			3	1	3					7					20			1		1					54
9:15-9:30	1					16	1			4	1					1				1	16			1							44
9:30-9:45						17			1		5			1		2					13	1		2							42
9:45-10:00	1					15			1		6										13	1		2	4	1					44
10:00-10:15						14			1	1	2					3					16	1									34
10:15-10:30					1	10	1				3					3					11	1			2						34
10:30-10:45						17	2		2		1				1	4					15										43
10:45-11:00						15					2					4					11			1							33
11:00-11:15						16		1	2	2	6					5					16				1	1					50
11:15-11:30						12					2					3					12					1					36
11:30-11:45						14	2		1		1					6					15			2	1						42
11:45-12:00 pm	1					24	1		2		4			7		3					14	1		3							55
12:00-12:15						22			2		7					7					10					1					44
12:15-12:30	1					13			4		4					7					19				1						40
12:30-12:45						15			1	2						8					15			3		1			1		49
12:45-1:00						14	2		2		2					5					23			3		1					52
1:00-1:15	1					15	1		1	1	2					5					15			2		1					45
1:15-1:30						15			1		5					4					17			2		1					44
1:30-1:45						17	1		3	1	3					4					15	1		2		1					45
1:45-2:00	1					17			1	1	4			1	1	3			1		13			3		1					48
2:00-2:15	1					17	1			1	8			1		1					17	1		2	1						48
2:15-2:30	1					16				2	5				1	2					17			5	1						50
2:30-2:45						11		1			1			1		3			1		11			2		2					53
2:45-3:00						18			1	1	4					8			1		23				1	4					59
3:00-3:15	1					19				1	7					10					16				1						51
3:15-3:30						17			5	1	4					7					35										60
3:30-3:45	1					19					2					6					17			3		2					44
3:45-4:00	1					21				1	5					5					35										68
4:00-4:15	1					23		1			10		1			14					20		3	2	1	1		1			77
4:15-4:30						25					5					5					35		2			1					73
4:30-4:45						33			1		6					9					36	1		1	1	2					85
4:45-5:00						41			1		5					5					37			1		1					91
5:00-5:15	1					45	1		2		3					8					36										92
5:15-5:30						27			2	7	7					10					31					3					82
5:30-5:45						23					11					8					30	1		1	1						85
5:45-6:00	1					30					14					6					38				5	2					90
6:00-6:15						24	1			5	6					8					22	1									98
6:15-6:30						28					5					5					35			1							88
6:30-6:45	1					26	1				6					7					34					2					78
6:45-7:00 pm						18					1					6					25										50
VEH CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
TOTALS	16	0	0	0	1	987	21	8	44	31	215	0	2	6	5	243	0	3	3	7	1044	10	9	50	22	33	0	2	2	0	3797
	EL					ET					ER					WL					WT					WR					

LOCATION DIAGRAM ENCLOSED (Y/N) YES

WEATHER CONDITIONS OVERCAST LIGHT SNOW

RECORDER(S) 2 KUROS

COMMENTS

VEHICLE CLASSES

A. PASSENGER VEHICLES B. RECREATION VEHICLES C. BUSES

D. SINGLE UNIT TRUCKS E. TRACTOR TRAILER COMBINATIONS

McElhanney
Consulting Services Ltd.

DIRECTIONAL TRAFFIC COUNT SUMMARY

HIGHWAY: 242 AVE REFERENCE NO.: INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE PT GLF CS ACC

LATITUDE (degrees): LONGITUDE (degrees): LEGAL DESCRIPTION:

DAY & DATE OF COUNT: MONDAY, APRIL 18, 2005 COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

	APPROACHING INTERSECTION																															
	FROM THE NORTH ON GOLF CS ACC															FROM THE SOUTH ON 8 ST E																GRAND
INTERVAL	LEFT					THROUGH					RIGHT					LEFT					THROUGH					RIGHT					TOTALS	TOTALS
7:00-7:15 am	16										6																				19	74
7:15-7:30	10										7					2										3					21	68
7:30-7:45	11										7																				18	83
7:45-8:00	7		2								9												1								19	111
8:00-8:15	1										2					1										1					5	69
8:15-8:30	4										8				1	1										1					15	74
8:30-8:45	8										13					2															23	98
8:45-9:00	6										9																				15	63
9:00-9:15	6										8					2															14	70
9:15-9:30	5										2															1					8	58
9:30-9:45	4										3			1																	8	50
9:45-10:00	5										9																				14	58
10:00-10:15	3										4																				7	45
10:15-10:30	7										6				1	1										1				1	14	48
10:30-10:45	2				1						2					1															6	49
10:45-11:00	3										10															1					14	47
11:00-11:15	6										7															2					15	66
11:15-11:30	6				1						8					1										1					15	65
11:30-11:45	1										3															1					5	47
11:45-12:00 pm	4										8															1					13	64
12:00-12:15	5										4															1					10	54
12:15-12:30	5			1							7					1															14	64
12:30-12:45	2															1															3	49
12:45-1:00	2										6																				8	60
1:00-1:15	3			1							5					1															10	56
1:15-1:30	4										5					1															10	54
1:30-1:45	5										4					1															10	58
1:45-2:00	6			1	1						6					1															15	61
2:00-2:15	8										10																				18	64
2:15-2:30	7			1	1						3					1															13	63
2:30-2:45	3										4					1	1														9	42
2:45-3:00	3			1							6					1															11	79
3:00-3:15	6				1						3			1																	11	64
3:15-3:30	4										5																				9	60
3:30-3:45	8										4																				12	56
3:45-4:00	2			2							2					1										1					8	76
4:00-4:15	6										9										1										16	83
4:15-4:30	8		2								3																				12	85
4:30-4:45	3										2															1					6	91
4:45-5:00	5										7										1										13	104
5:00-5:15	8										5																				13	105
5:15-5:30	9										8																				17	99
5:30-5:45											6															1					7	97
5:45-6:00	3										7															3					13	103
6:00-6:15	4										7																				11	77
6:15-6:30	3										4																				7	75
6:30-6:45	1										7																				8	66
6:45-7:00 pm	1										6																				7	57
VEH CLASS	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E		
TOTALS	234	0	4	7	5	0	0	0	0	0	269	0	0	2	2	21	1	0	0	0	2	0	2	0	0	19	0	0	0	1	549	3208
	NL					NT					NR					SL					ST					SR						

LOCATION DIAGRAM ENCLOSED (Y/N): YES

WEATHER CONDITIONS: OVERCAST, LIGHT SNOW

RECORDER(S): J. KUROS

COMMENTS:

VEHICLE CLASSES

A: PASSENGER VEHICLES B: RECREATION VEHICLES C: BUSES
D: SINGLE UNIT TRUCKS E: TRACTOR TRAILER COMBINATIONS

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Consulting Services Ltd.

TURNING MOVEMENT SUMMARY DIAGRAM

INTERSECTION OF: DUNBOW RD (242 AVE) & HERITAGE POINTE GOLF COURSE ACC

DAY & DATE OF COUNT: MONDAY, APRIL 18, 2005

COUNT DURATION: 12 HOURS (7:00 AM TO 7:00 PM)

OBSERVED 12 HOURS TRAFFIC VOLUMES

NORTH ON GOLF CS ACC		
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	563	56.01
B: RECREATION VEHICLES	6	0.60
C: BUSES	8	0.80
D: SINGLE UNIT TRUCKS	18	1.79
E: TRACTOR TRAILER COMB.	14	1.40
TOTAL		1005

WEST ON DUNBOW RD		
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	2557	93.52
B: RECREATION VEHICLES	32	1.19
C: BUSES	19	0.69
D: SINGLE UNIT TRUCKS	101	3.69
E: TRACTOR TRAILER COMB.	58	2.07
TOTAL		2687

EAST ON DUNBOW RD		
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	2515	91.72
B: RECREATION VEHICLES	31	1.13
C: BUSES	23	0.84
D: SINGLE UNIT TRUCKS	107	3.90
E: TRACTOR TRAILER COMB.	66	2.41
TOTAL		2743

SOUTH ON & ST E.		
VEH TYPE	VOL.	%
A: PASSENGER VEHICLES	91	91.00
B: RECREATION VEHICLES	1	1.00
C: BUSES	4	4.00
D: SINGLE UNIT TRUCKS	2	2.00
E: TRACTOR TRAILER COMB.	2	2.00
TOTAL		100

TURNING MOVEMENT ABBREVIATIONS

NL : TRAFFIC FROM NORTH TURNING LEFT

NT : TRAFFIC FROM NORTH PROCEEDING THROUGH

NR : TRAFFIC FROM NORTH TURNING RIGHT

SL : TRAFFIC FROM SOUTH TURNING LEFT

ST : TRAFFIC FROM SOUTH PROCEEDING THROUGH

SR : TRAFFIC FROM SOUTH TURNING RIGHT

EL : TRAFFIC FROM EAST TURNING LEFT

ET : TRAFFIC FROM EAST PROCEEDING THROUGH

ER : TRAFFIC FROM EAST TURNING RIGHT

WL : TRAFFIC FROM WEST TURNING LEFT

WT : TRAFFIC FROM WEST PROCEEDING THROUGH

WR : TRAFFIC FROM WEST TURNING RIGHT

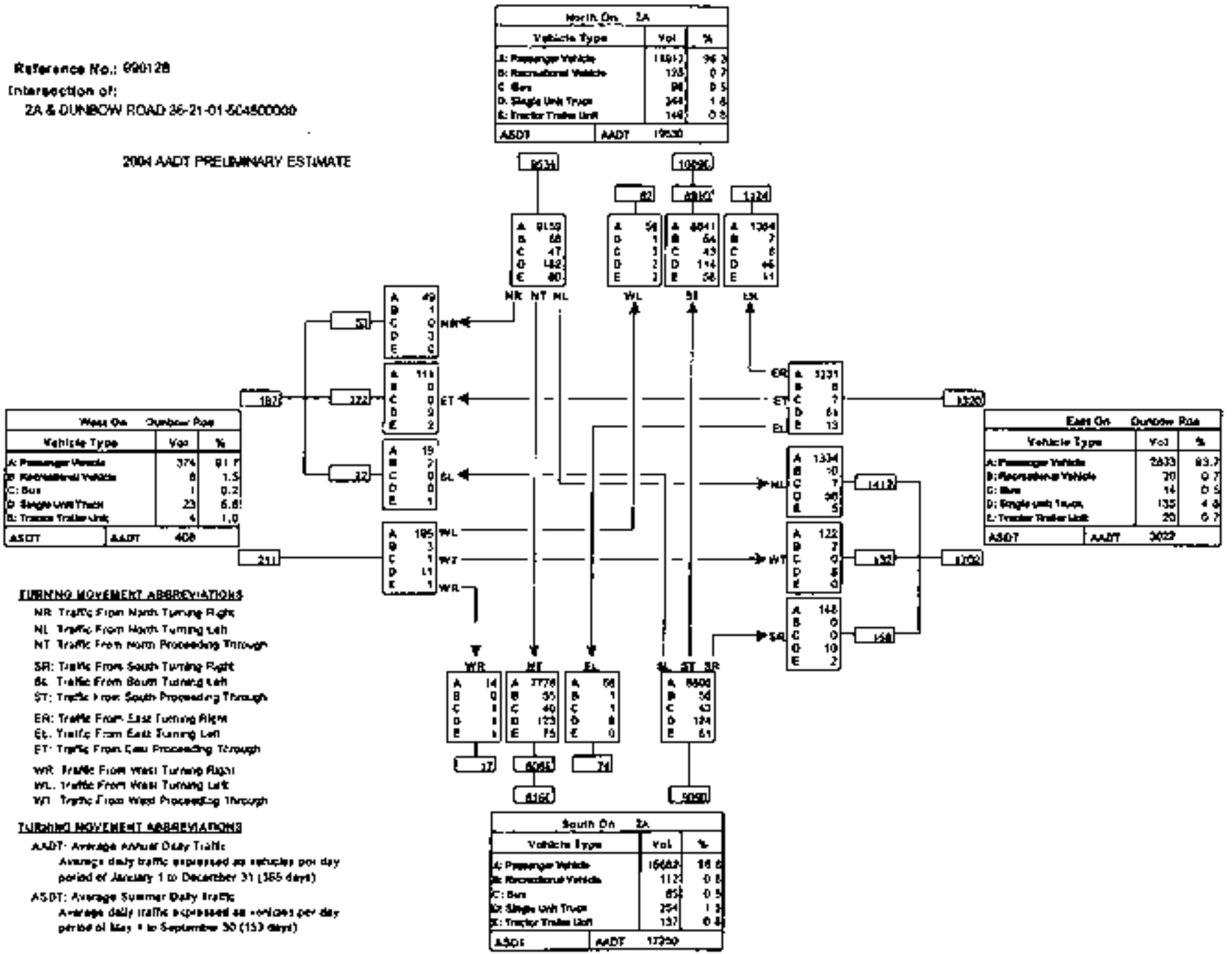
Reference No.: 990128

Intersection of:

2A & DUNBOW ROAD 26-21-01-504500000

2004 AADT PRELIMINARY ESTIMATE

Turning Movement Summary Diagram



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

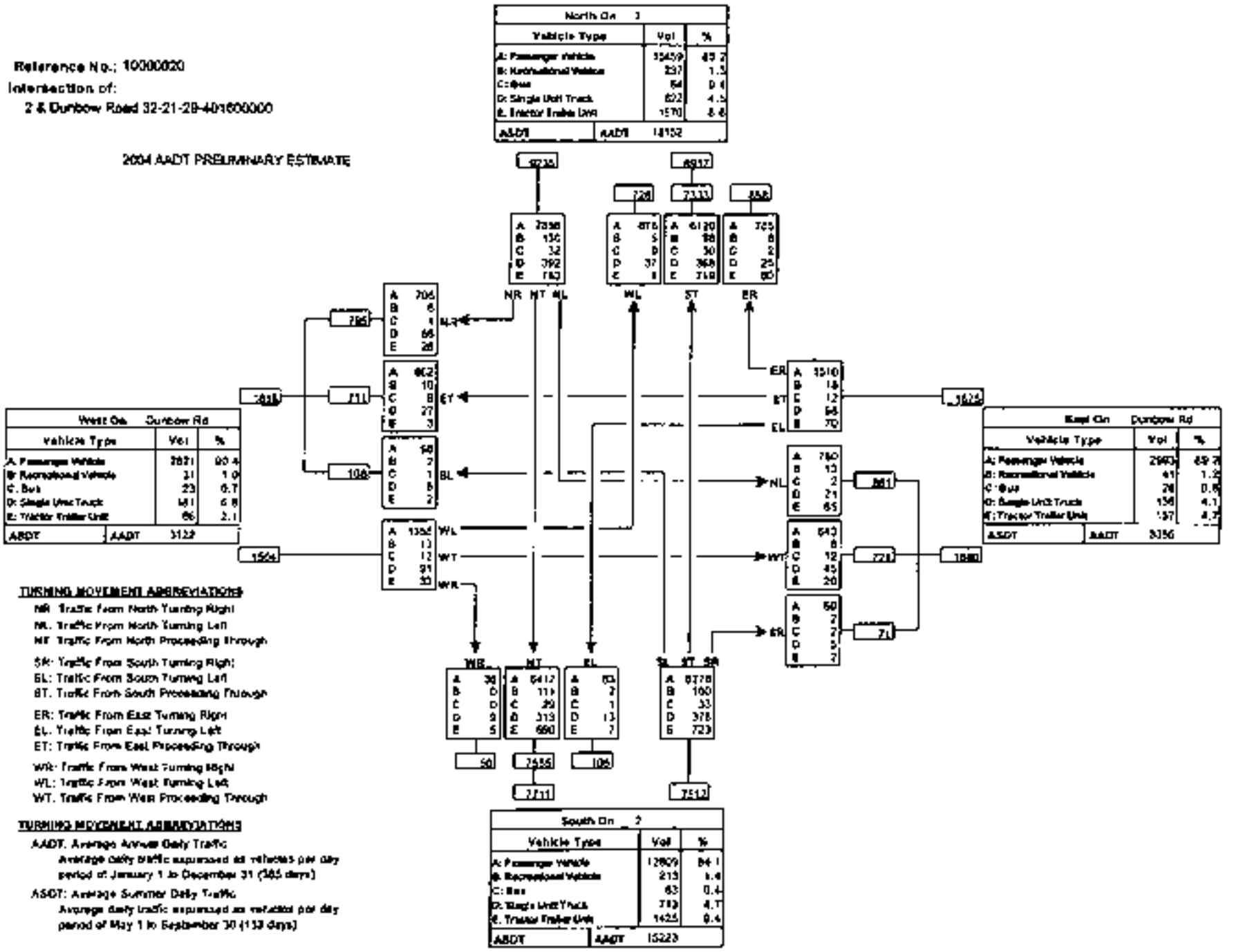
AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day period of May 1 to September 30 (153 days)

Turning Movement Summary Diagram

Reference No.: 10000020
Intersection of:
2 & Dunbow Road 32-21-28-4W6000000

2004 AADT PRELIMINARY ESTIMATE



TURNING MOVEMENT ABBREVIATIONS

NR: Traffic From North Turning Right
NL: Traffic From North Turning Left
NT: Traffic From North Proceeding Through

SR: Traffic From South Turning Right
SL: Traffic From South Turning Left
ST: Traffic From South Proceeding Through

ER: Traffic From East Turning Right
EL: Traffic From East Turning Left
ET: Traffic From East Proceeding Through

WR: Traffic From West Turning Right
WL: Traffic From West Turning Left
WT: Traffic From West Proceeding Through

TURNING MOVEMENT ABBREVIATIONS

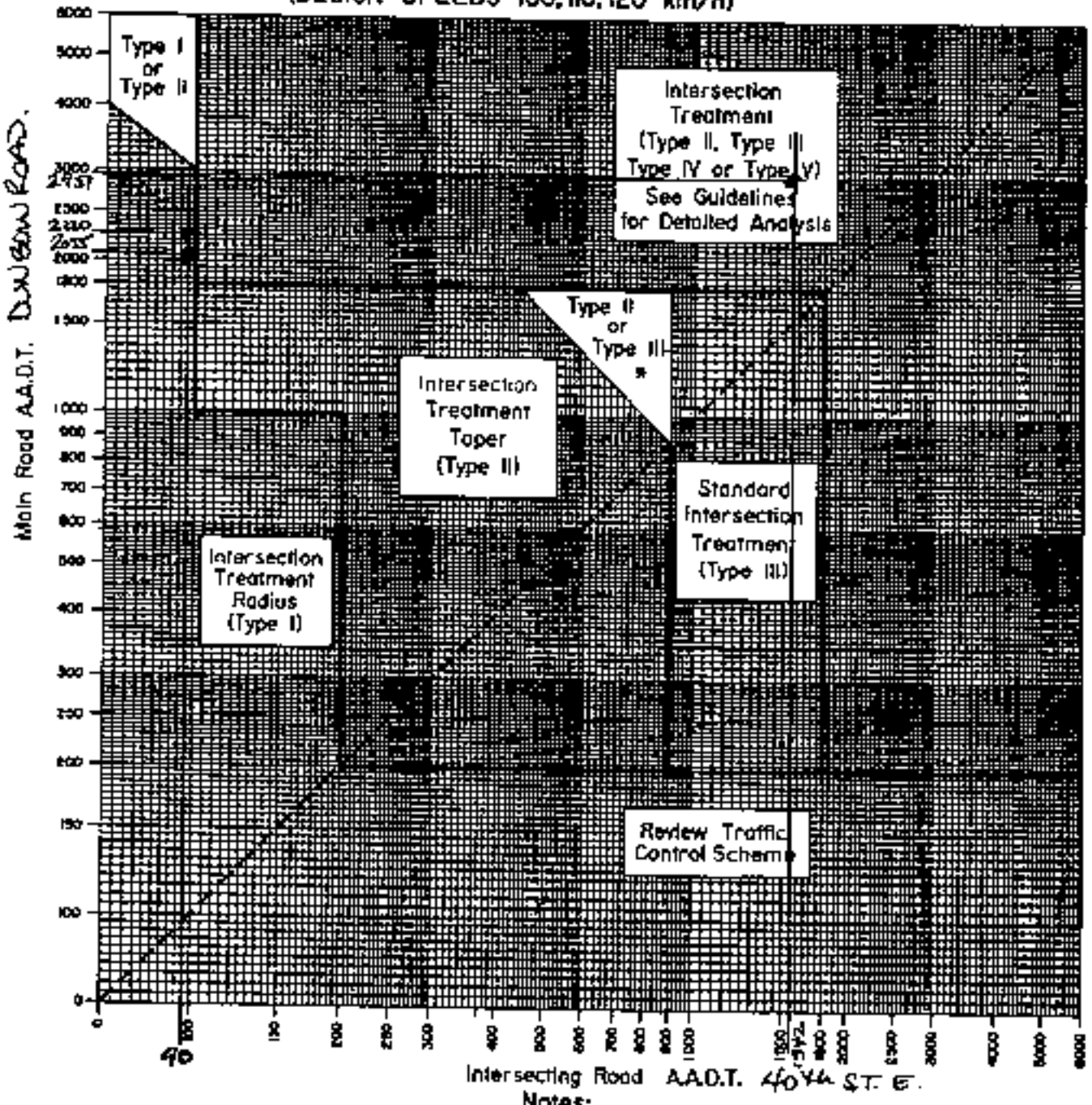
AADT: Average Annual Daily Traffic
Average daily traffic expressed as vehicles per day period of January 1 to December 31 (365 days)

ASDT: Average Summer Daily Traffic
Average daily traffic expressed as vehicles per day period of May 1 to September 30 (153 days)

APPENDIX C

EBA PROJECT No. 9600213-002

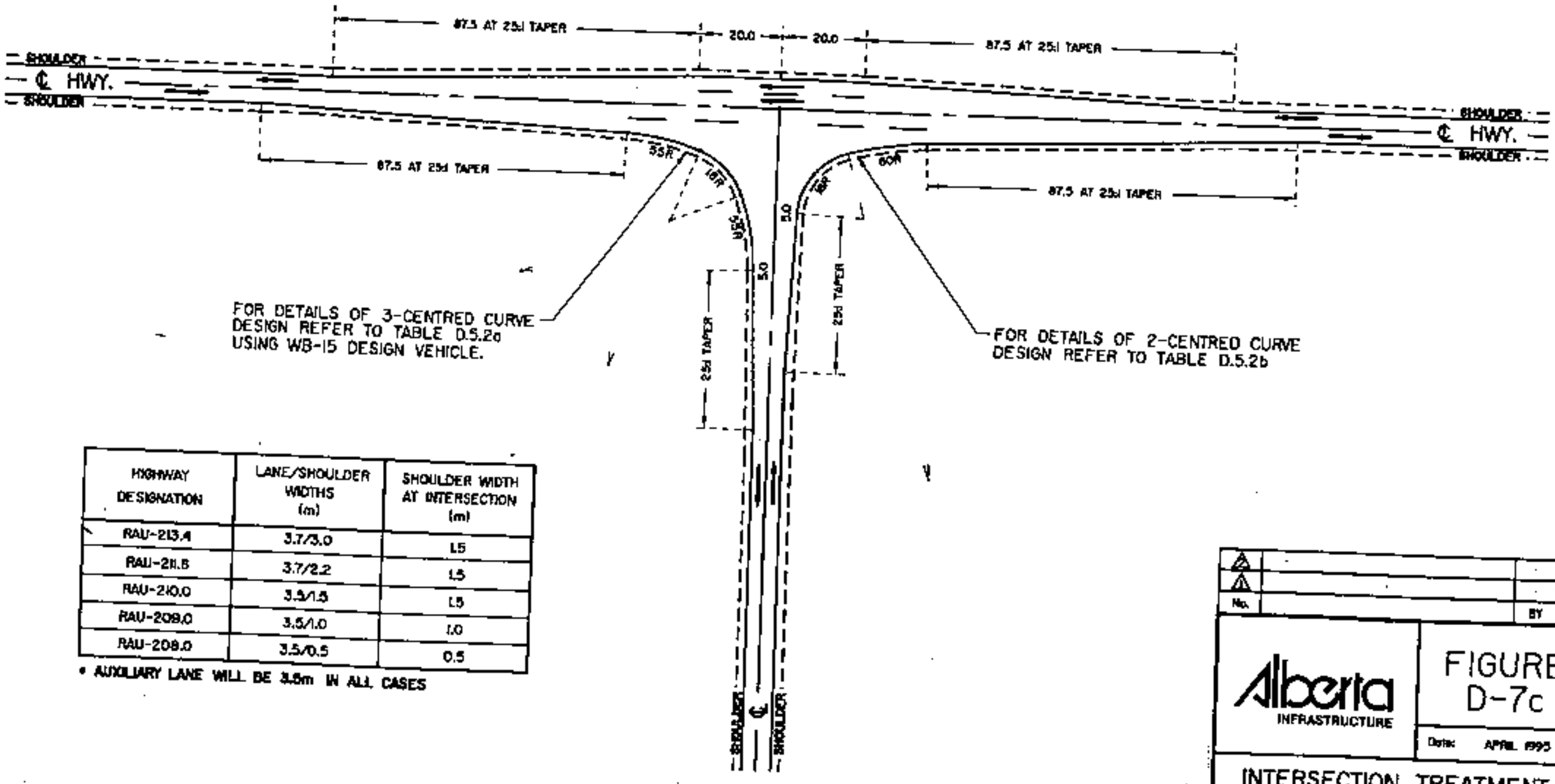
FIGURE D-7.4 TRAFFIC VOLUME WARRANT CHART FOR AT-GRADE INTERSECTION TREATMENT ON TWO-LANE RURAL HIGHWAYS (DESIGN SPEEDS 100, 110, 120 km/h)



Notes:

1. If main road, or intersecting road, is <100 AADT provide Type I Intersection Treatment (15m radius), except as shown for the higher volume main roads on this chart (Type I or II zone) where engineering judgement may be used to select the appropriate treatment.
2. If main road is >4000 AADT Review Access Management
   — — — If Intersecting Road AADT is > Main Road AADT: Review Traffic Control Scheme
3. Use projected traffic volumes for design
   Sloping line is defined by Main Road AADT x Intersecting Road AADT = 800,000

NOTES: DIMENSIONS SHOWN ARE FINISHED SURFACE PAVEMENT WIDTHS. ADDITIONAL SUBGRADE WIDTHS TO BE PROVIDED TO ALLOW FOR DEPTH OF BASE COURSE AND PAVEMENT.



HIGHWAY DESIGNATION	LANE/SHOULDER WIDTHS (m)	SHOULDER WIDTH AT INTERSECTION (m)
RAU-213.4	3.7/3.0	1.5
RAU-211.8	3.7/2.2	1.5
RAU-210.0	3.5/1.5	1.5
RAU-209.0	3.5/1.0	1.0
RAU-208.0	3.5/0.5	0.5

* AUXILIARY LANE WILL BE 3.5m IN ALL CASES

No.		BY	DATE

Alberta INFRASTRUCTURE

FIGURE D-7c

Date: APRIL 1995

INTERSECTION TREATMENT (TYPE IIa) (TWO-LANE HIGHWAY)

Prepared By: R.T.	Checked By: B.K.	Scale: N.T.S.

FIGURE D-34 INTERSECTION SIGHT DISTANCES FOR LEFT TURN FROM MINOR ROAD

* INTERSECTION SIGHT DISTANCE (I.S.D.)

- THE I.S.D.'s SHOWN IN THIS FIGURE ARE BASED ON THE DISTANCE TRAVELLED AT DESIGN SPEED DURING A CRITICAL TIME (SHOWN ON THE FIGURE IN SECONDS). THE CRITICAL TIME INCLUDES THE TIME TAKEN FOR THE MANOEUVRE (LEFT TURN FROM THE MINOR ROAD) PLUS 2 SECONDS FOR PERCEPTION/REACTION TIME.

- THE INTERSECTION SIGHT DISTANCE AVAILABLE IS TO BE DETERMINED USING AN EYE HEIGHT (BASED ON THE DESIGN VEHICLE) LOCATED AT THE JUNCTION AND AN OBJECT HEIGHT OF 1.3m (REPRESENTING THE ROOF OF A PASSENGER VEHICLE) ON THE THROUGH ALIGNMENT. THE EYE HEIGHTS TO BE USED ARE SHOWN IN FIGURE D-5a.

NOTES:

1. To determine the sight distance requirements at an intersection, the designer should select the longest vehicle or vehicle with the greatest I.S.D. need, that uses the intersection on a regular basis. i.e., daily. Because of the various eye heights, the I.S.D. available for several design vehicles may have to be checked.
2. The usefulness of intersection sight distances in excess of 500m has been debated and will be the subject of future research into gap acceptance by large trucks on rural highways in Alberta. Changes to this table may be made based on that research.

* THIS CHART IS BASED ON CRITERIA USED BY AASHTO FOR 'SIGHT DISTANCE' AT STOP LOCATIONS. THE SET OF CRITERIA IS DESCRIBED AS CASE B1B IN THE AASHTO PUBLICATION "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, 1994"

REVISIONS	No.	BY	DATE
	A	BK	AUG/98

D-34

AT-GRADE INTERSECTIONS

DETAILED INTERSECTION ANALYSIS
DUNBOW ROAD AND 40TH STREET EAST

2009 ESTIMATED VOLUMES + PROPOSED DEVELOPMENT

- CONSIDER DESIGN HOURLY VOLUME FACTOR OF 0.15 = K

$V_e = 771(0.15) = 116$ vph

$V_a = 1909(0.15) = 286$ vph

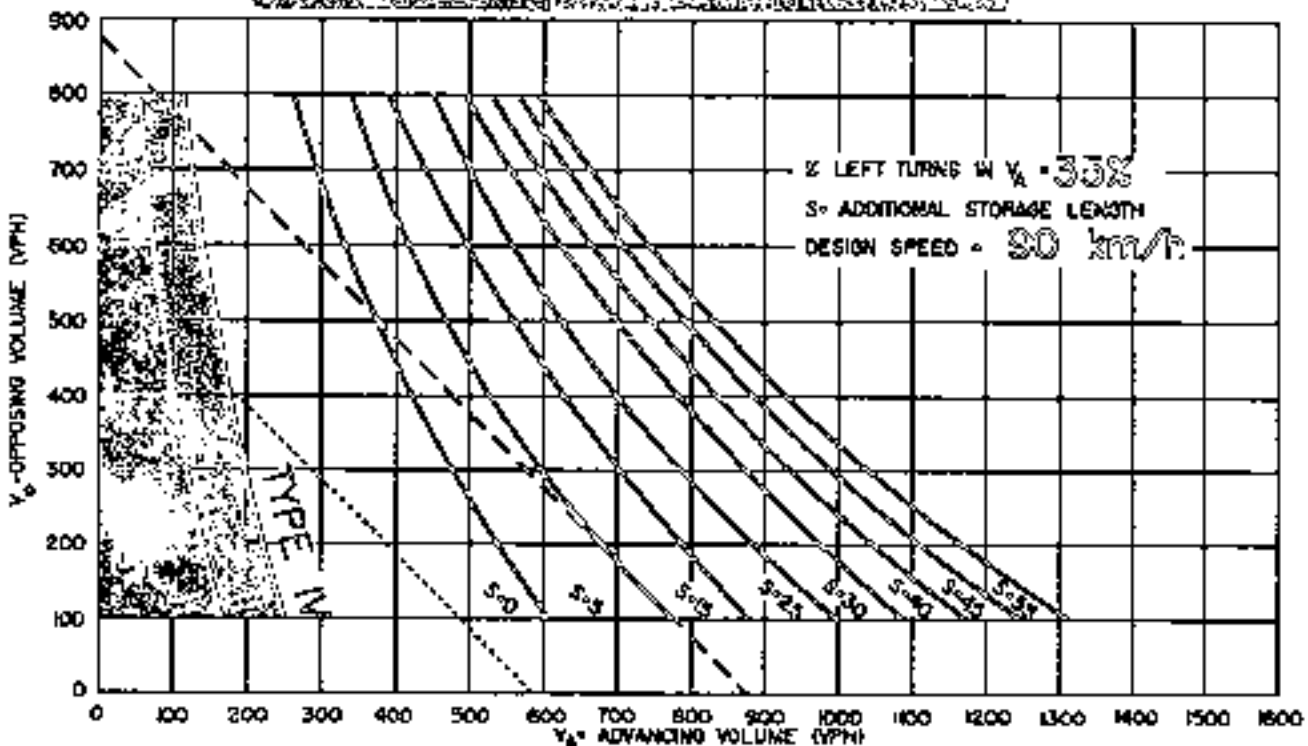
$V_o = 1048(0.15) = 157$ vph

$L = \frac{116}{286} = 40.5\%$

DESIGN SPEED = 90 km/h

ENTERING FIGURE D-7.6-5d

TYPE IV INT TREATMENT IS WARRANTED WITH AN EXCLUSIVE LEFT TURN LANE IN THE EASTBOUND DIRECTION.



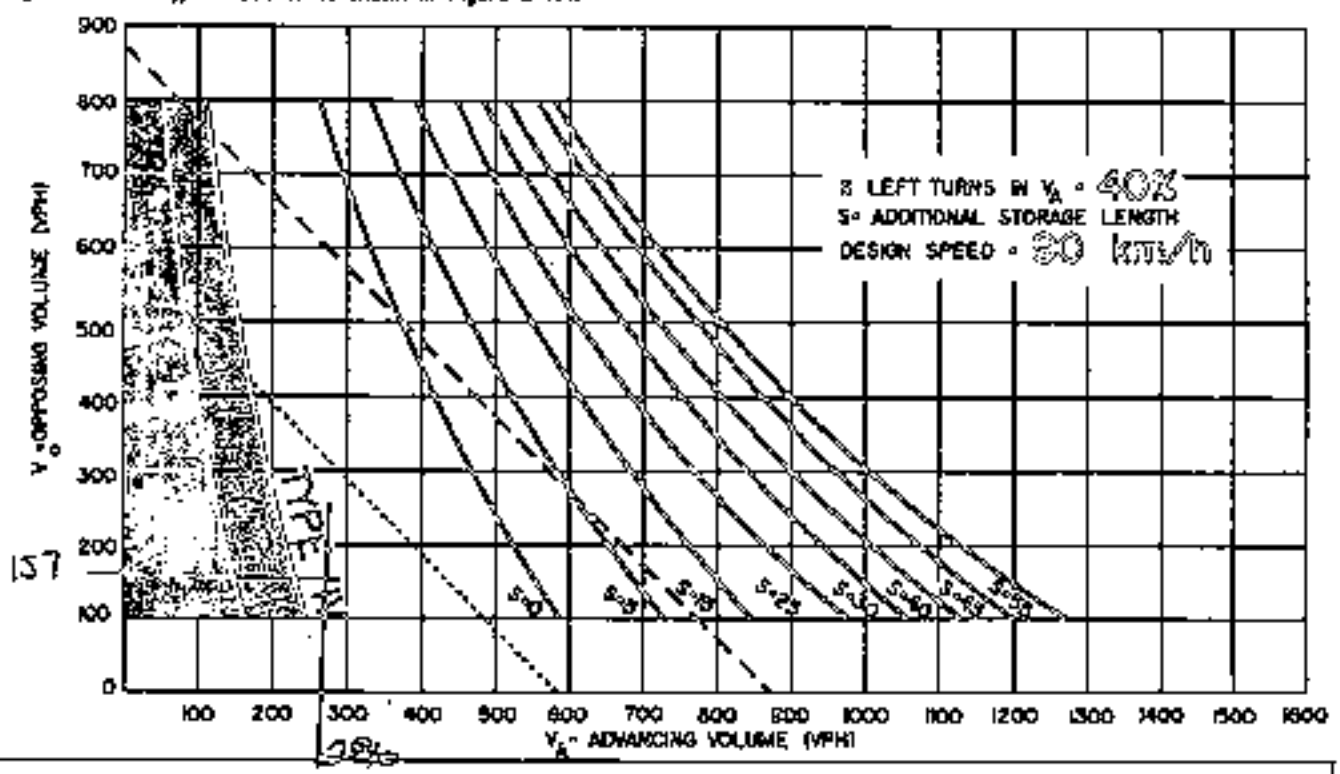
S = Additional storage length required, that is, in addition to what is shown on the appropriate Type IV standard drawing. Designers should check additional storage requirements for trucks, also see Table D.7.6a.

..... Traffic signals may be warranted in rural areas, or urban areas, with restricted flow.

— — — Traffic signals may be warranted in "free flow" urban areas.

Notes:

1. The traffic signal warrant lines are provided for reference only. For detailed analysis of the requirements for signals, contact Roadway Engineering Branch.
2. Warrant for Type II treatment is shown in Figure D-7.4.



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APPENDIX G – PRELIMINARY SERVICE ALIGNMENT
Westhoff Engineering Resources Ltd.

NTS

Client: SHERBROOKE INVESTMENTS LTD.

Westhoff Engineering Resources, Inc.
Land & Water Resources Management Consultants

Project: SANCTUARY ON THE BOW

Title: SERVICING STRATEGY

Date:	Job No.:	Cad File:	Appendix No.:	Rev.
July, 5, 2005	WER105-23	Appendix G.dwg	G	A