Country Meadows

AREA STRUCTURE PLAN

September 2009

Approved by City Council
Bylaw 5629 - February 8/10

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

TABLE OF CONTENTS

APPENDICES

FIGURES

DOCUMENTS ENCLOSED

Letter, to: Michael A. Kitchen – Martin Geomatic Consultants Ltd., from: Neil Mirau – Arrow Archaeology Ltd., re: Portions of 33 and 34-8-22 W4M as indicated in Country Meadows Area Structure Plan Map, dated April, 2009, dated: 7 July 2009

Letter, to: Michael A. Kitchen – Martin Geomatic Consultants Ltd., from: Gary Burke – Lethbridge and Northern Irrigation District, re: Water Conveyance Agreement – Type 3, City of Lethbridge – Section 33-08-22-4, dated: 7 August 2009.

EBA Engineering Ltd. (July 2009), *Geotechnical Evaluation – Desktop Study, Proposed Country Meadows Development, Lethbridge, Alberta*

iTRANS Consulting Inc. (August 2009), *Country Meadows Residential Development Traffic Impact Assessment*

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of the Country Meadows Area Structure Plan (ASP) is to provide a comprehensive planning framework for development of the lands contained within the Plan Area. The Plan Area, located within the City of Lethbridge, contains approximately +/- 121.8 hectares (+/- 301.0 acres) of land within the northwest area of West Lethbridge, as illustrated in **Figure 1.0 – General Location Plan**. Prepared in conformity with the Section 633 the Municipal Government Act, the ASP provides a land use, transportation, and servicing strategy to facilitate the creation of a complete and vibrant new community in West Lethbridge. The ASP has been developed to ensure this future community will be complementary and integrated with both adjacent established communities and planned future communities. The ASP is submitted to the Council of the City of Lethbridge for their consideration to be adopted by Bylaw. The ASP is to provide a guide for the review of future land use redesignation and subdivision applications within the Plan area.

1.2 HISTORY AND VISION

The City of Lethbridge is a dynamic community, which boasts a range of housing choice and business opportunities, as well as an array of community amenities. The ASP seeks to reflect a similar dynamic, where a sensitive mix of residential, commercial, institutional and recreational land uses serve to enhance the greater community by attracting new residents and providing economic benefit. The City and greater region have experienced abundant physical, economic, and social change, the ASP must be responsive and flexible to change. Accommodating population growth, demographic and socio-economic changes, and preservation of resources are important considerations in new community planning.

The ASP strives to be more sensitive to the present needs of The City. It seeks to include a greater range of housing choice, inclusive of a range of Medium-density homes providing for the needs of individuals of all ages and family-types. It also places the recreational and community amenity opportunities at its forefront, by

providing enhanced open space and water feature amenities. By way of pathway or tot-lot, active or passive recreational space, a fully integrated open space network is proposed to connect local residents to the greater community. All these elements are realized through the implementation of high-quality urban planning and design principles, which ultimately seek to further enhance the aesthetic and vitality of The City of Lethbridge.

1.3 ORGANIZATION OF PLAN DOCUMENT

The Country Meadows Area Structure Plan is organized in six (6) major sections:

1.0 Introduction

Highlights the ASP's purpose and outlines its structure, as well provides an overview of the Plan Area's history and vision.

2.0 Planning Process

Provides an overview of the planning system and policy context in which this policy document fits, in particular the provincial and municipal legislative framework.

3.0 Site Analysis

Describes broadly the ASP area's location, landownership, land use context, and natural and historical characteristics.

4.0 Land Use Concept

Outlines generally the Plan Area's land use strategy, as well as highlights its development phasing plan.

5.0 Servicing and Management

Outlines generally the Plan Area's servicing, transportation, and management strategy.

6.0 Implementation and Review

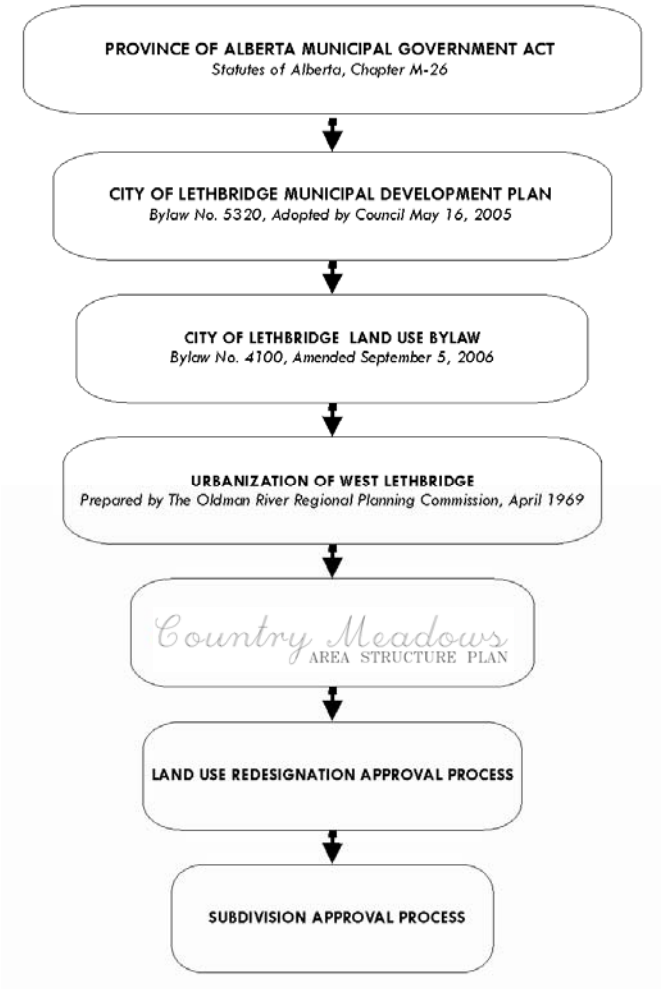
Outlines the procedures and processes associated with the implementation of the ASP and future review of Outline Plan, Land Use Redesignation, and Subdivision proposed within the Plan Area.

2.0 THE PLANNING PROCESS

2.1 PLANNING CONTEXT

The Country Meadows Area Structure Plan was prepared to address City of Lethbridge policy that finds ad hoc development without comprehensive planning as detrimental to any one greater area within The City. The ASP was developed in the context of The City's planning process. The ASP respects the policy context and hierarchy of statutory policy documents to which it must conform, which includes the City of Lethbridge Municipal Development Plan (MDP).

The *MDP* describes a City which continues to experience strong population growth into the future, particularly in the West Lethbridge area. It outlines broad goals in directing future growth, particularly residential development, where planning must seek to create balanced and complete communities. New residential developments must create effective connections and open space areas both internally and with established communities, as well as contain a good mix of housing types and essential services.



The *Land Use Bylaw (LUB)* designates the lands within the Plan Area as Urban Reserve District and Direct Control District. These designations restrict development in rural or undeveloped areas until such time as an appropriate and logical urban development

transition may occur. The stated *LUB* purpose of an Urban Reserve District is, "For the control of subdivision and development until the required municipal services are available, area structure or area redevelopment plans are approved, and more appropriate districts are applied."

This ASP also reflects the policy language contained within *The City of Lethbridge Urbanization of West Lethbridge (1969),* although not a statutory document, it has played a significant role in past planning decisions. The document reflects much of the same vision and goals contained within the *MDP,* and it echoes the *MDP*'s emphasis on planning for balanced and complete communities through policy language related to the "Village" concept.

Additionally, Area Structure Plans from neighboring existing or planned communities were also consulted to ensure compatibility and integration. These included:

The West Highlands Area Structure Plan (2004); and,
The West Lethbridge Phase II Area Structure Plan (2006).

This ASP provides a general planning framework for the Plan Area, which is anchored in the policy objectives as well as forecasted needs and trends contained within the above-mentioned policy documents. The purpose of the ASP is to define a planning and development framework to guide future growth in the Plan Area by establishing a range of appropriate and compatible land uses, and planning for comprehensive servicing and transportation infrastructure.

Beyond a policy review, the ASP takes into consideration existing and developed land uses within the Plan Area, surrounding development, potential future adjacent

2.2 LEGISLATIVE CONTEXT

The Country Meadows Area Structure Plan has been prepared in accordance with the provincial requirements outlined in s.633 of the Municipal Government Act (MGA) (RSA 2000, Chapter M-26), which state:

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 an 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.

2.3 PUBLIC CONSULTATION

A meeting for land owners within the Country Meadows Area Structure Plan boundary was held on April 9, 2009 at Martin Geomatic Consultants Ltd. A neighborhood meeting was held on November 9, 2009 at Father Leonard Van Tighem School, 25 Stoney Crescent West, Lethbridge for adjacent property owners affected by the Country Meadows Area Structure Plan.

3.0 SITE ANALYSIS

3.1 GENERAL LOCATION

The Plan Area is located within the City of Lethbridge (City) municipal boundaries – the northwest corner of the West Lethbridge area, as illustrated in **Figures 1.0 – General Location Plan**. The Plan Area is approximately +/- 121.8 hectares (+/- 301.0 acres) in size and is bound to the north by the existing roadway Walsh Drive West, and the proposed future roadways of Métis Trail West to the east, Garry Drive West to the south, and Chinook Trail to the west, as illustrated in **2.0 – Plan Area.**

3.2 EXISTING OWNERSHIP

The ownership of land within the Plan Area is comprised of the whole or a portion of six (6) parcels registered to six (6) separate landowners or landowner groups, including the City of Lethbridge, and one open Road Allowance (30 Street West). The six (6) parcels range in size from +/- 2.1 hectares (+/- 5.2 acres) to +/- 34.7 hectares (+/- 85.7 acres) comprising a total +/- 121.8 hectares (+/-301.0 acres), as illustrated in **Figure 3.0 – Land Ownership**. The table below summaries the Plan Area's existing landownership by registered land title certificate information (land title certificates included in **Appendix A – Land Title Certificates**).

LAND OWNERSHIP TABLE

Legal Description	Land Owner(s)	Gross Area	Percentage of Total Gross Area
Portion of NW 34-8-22 W4M (C of T 051 287 372)	College Farms Ltd.	+/- 34.7 hectares (+/-85.7 acres)	28.5%
Portion of S of ½ of NE 33-8-22 W4M (C of T 051 183 050)	Mervyn P. Hiebert Professional Corporation (undivided 1/2 interest) Duncan S. MacKey Professional Corporation (undivided 1/2 interest)	+/- 29.1 hectares (+/- 71.9 acres)	23.9%
Portion of N ½ of NE 33-8-22 W4M (C of T 741 052 929)	Marleen M Brown Clifford R Brown	+/- 27.4 hectares (+/- 67.7 acres)	22.5%
Portion of SE 33-9-22 W4M (C of T 061 218 951)	Debra L Dudley-Olafson	+/- 23.2 hectares (+/- 57.3 acres)	19.0%
Portion of SW 34-8-22 W4M (C of T 081 328 014)	Mavis McKay (undivided 25% interest) Marion Moore (undivided 25% interest) Sharon Marshall (undivided 25% interest) Kenneth D McKay (undivided 25% interest)	+/- 3.1 hectares (+/-7.6 acres)	2.5%
Lot 1, Block 1, Plan 0814008 (C of T 081 328 015)	City of Lethbridge	+/- 2.1 hectares (+/-5.2 acres)	1.7%
Existing Open Road Allowance (30 Street West)		+/- 2.3 ha (+/- 5.7 acres)	1.9%
Total Gross Area		**+/-121.9 hectares (+/- 301.1 acres)**	**100.0 %**

3.3 LAND USE CONTEXT

All the land within the Plan Area is currently designated as either Urban Reserve (UR) District or Direct Control (DC) District, according to The City *LUB*, as illustrated in **Figure 4.0 – Existing Land Use Designation**. It contains two (2) farmsteads and the majority of land is being used for minor agricultural pursuits (i.e., hayed pasture). A single developed road allowance (30 Street West) runs north-south through the Plan Area. The Plan Area is directly adjacent (to the east and southeast) to existing and planned urban-standard development, and provides opportunity for a logical extension of the existing City transportation network and utility services, as Illustrated in **Figure 1.0 – General Location Plan**.

To the immediate east of the Plan Area is the predominately residential community of West Highlands. The established residential community of Indian Battle Heights is directly south and east (kitty-corner) of the Plan Area. Directly south of the Plan Area is undeveloped land, primarily agricultural, which are included within the *West Lethbridge Phase II Area Structure Plan (Adopted by Council March 2005)*. According to this policy document, approximately 698 hectares (1,725 acres) in size, shall contain predominately residential land uses of mixed type and be divided into two (2) major "Village" areas. Both "Village" residential areas will be integrated with a central "Commercial Core" containing a mix of retail, institutional, and service uses. To the north and west of the Plan Area is a mix of undeveloped agricultural areas and farmsteads.

3.4 PHYSICAL ENVIRONMENT ANALYSIS

There are a number of natural and man-made features within the Plan Area that need to be considered in future planning and development. An analysis of the physical environment is provided below. A geotechnical analysis by EBA Engineering Ltd. is appended.

3.4.1 Terrain

The lands within the Plan Area consist of undulating terrain – gradually sloping with the highest elevations in the southwest corner. The land is comprised of completely deforested pasture, which is hayed seasonally, as illustrated in **Figure 2.0 – Plan Area**.

As requested, a "desk-top" geotechnical study was completed by EBA Engineering for Country Meadows. The purpose of this study was to determine, in general, if any subsurface conditions would affect development in the plan area. The major findings include:

- Coal mining was conducted in the area prior to the 1950s
- General risk of mine subsidence in the area is low for "relatively small, lightly loaded developments at surface level"
- Larger structures (e.g. greater than four storeys) will require review of foundation design to ensure they can accommodate potential strain due to any residual mine subsidence
- For a small area in the northeast corner of the site, residual surface strains must be considered for all foundations (similar to recommendations for West Highlands)

The report is enclosed under separate cover.

3.4.2 Drainage

According to the City of Lethbridge 2005 Topographic Mapping, the site is undulating, with various small hills and low areas. The high point of the site is located near the southwest corner of the site at approximate elevation 942.5 m. A plateau exists throughout the middle-west portion of the site. This area is mostly above elevation 940.0 m. The overall low point of the site is located near the east boundary (adjacent future Métis Trail) at elevation 929.5 m. This is a trapped low area which spills eastward above elevation 930.0 m. Another depression exists at the extreme southwest corner of the site at elevation 930.0 m. Above elevation 932.0 m, this depression will flow westward into the County of Lethbridge. Another depression exists along the west boundary and toward the northwest corner of the site. This area is

the beginning of a coulee draw which flows westward into the County of Lethbridge and the Oldman River (which is located approximately 1.5 km west). This is illustrated as illustrated in **Figure 2.0 – Plan Area**.

Presently, the subject area is surface drained – there are no existing direct connections to the City of Lethbridge's storm sewers. However, the 1800-mm diameter West Highlands trunk storm sewer was extended to future Métis Trail. This allows extension of the storm sewers westward. Presently, the West Highlands trunk sewer drains the neighborhoods of West Highlands, Heritage Heights and Ridgewood before discharging into the Oldman River north of Whoop-Up Drive. According to the City of Lethbridge, capacity constraints downstream from West Highlands limit discharge into this trunk to off-peak only (i.e. no discharge from new areas' detention facilities until there is adequate conveyance capacity downstream; the City often refers to this situation as "zero" discharge).

3.4.3 Viewshed

The Plan Area contains existing viewsheds of the City of Lethbridge to the east and southeast, as well as some viewshed opportunities of the Rocky Mountains to the west and southwest, as illustrated in **Figure 2.0 – Plan Area**.

3.4.4 Natural Gas Pipeline Right-of-Ways

ATCO Pipelines maintains two (2) high-pressure natural gas transmission pipelines which bisect and intersect within the Plan Area; one pipeline is aligned north-south adjacent to the 30 Street West right-of-way and the other runs east-west along the southern boundaries of Northwest and Northeast Quarters of Section 34, Township 8, Range 22, West of the 4th Meridian, as illustrated in **Figure 2.0 – Plan Area**. The transmission pipelines feed into a regulating station at the intersection of Garry Drive West and Métis Trail West right-of-ways.

The Alberta Energy and Utilities Board recommends permanent structures, such as residential dwellings, be set back a minimum of fifteen (15) metres from an existing natural gas transmission pipeline right-of-way. Wherever possible, the high-pressure gas lines will be contained in proposed road rights-of-way or within parks and open space areas.

3.5 HISTORICAL AND ARCHAEOLOGICAL ANALYSIS

It was determined by the Cultural Facilities and Historical Resources Division (CFHRD) of Alberta Community Development that a Historical Resources Impact Assessment was not required. A letter from Arrow Archaeology Ltd. attesting to this is appended.

4.0 LAND USE CONCEPT

The land use strategy envisions future development within the Plan Area as comprehensively planned; reflective of City policy and development standards and purposefully integrated and complementary to the adjacent established and planned communities. The land use strategy is defined by: site characteristics; development growth patterns and population forecasts; available general area land supply; logical extension of transportation and infrastructure servicing; and, a balance, cost effective, and well integrated land use regime. The land use strategy respects established area development densities and variety of land uses. The land use strategy is built on the outlined vision and core principles of this ASP and it is founded on a desire to organize development. The strategy allows for the orderly, efficient, and affordable development of infrastructure and services.

4.1 VISION STATEMENT

The Country Meadows Area Structure Plan envisions a new community in West Lethbridge, which is balanced, vibrant and reflective of high-quality planning and urban design principles. It is a complete community which provides its residents a mix of housing choices, convenient access to essential services and amenities, and sets a new benchmark for integrated open space network design, where residents throughout the community have convenient access to a green pathway network, as well as nodes of active and passive green spaces.

4.2 CORE PRINCIPLES

The Country Meadows Area Structure Plan's six (6) core principles are as follows:

Create a mixed-use community, which is primarily residential in nature but includes the essential community services and amenities needed to create a complete neighborhood;

Establish a range of residential housing choices for various family types and for individuals of a range of ages and incomes, including single-family dwellings,

Medium-density dwellings, and senior-aged oriented dwellings and assisted-living facilities.

Create variety in both residential built form and lot type to enhance choice and foster diversity and visual interest;

Provide a neighborhood commercial area and a school site serving local residents via both pedestrian and vehicular connections;

Develop an integrated open space network, which creates a walkable and accessible environment, passive and active recreational amenities, and a highly aesthetic community through thematic design which focuses on natural green and water-oriented amenities; and,

Establish a land use strategy that is practical effective and cost efficient to facilitate development through strategic land use location and logical extension of servicing infrastructure.

4.3 LAND USE STRATEGY

The lands within Plan Area are regulated – land uses and development defined – by Municipal Statutes which are contained within the *City of Lethbridge Land Use Bylaw (Bylaw No. 4100)*. All lands within the Plan Area are currently designated as Urban Reserve or Direct Control districts. This ASP proposes a series of new land uses to be designated in accordance with the Bylaw. The various land use districts included in the entire Plan Area have be organized within general land use categories for the purposes of this ASP and illustrated in **Figure 5.0 – Land Use Concept**. The proposed general land use categories include:

- Low-density Residential
- Medium-density Residential (including senior-aged residential and assisted living)
- Local Commercial
- Institutional – School Site
- Park and Open Space Network
- Stormwater Detention Facilities
- Public Utility Areas

The following provides a brief description of each land use category, as well as a broad vision of the intended use, and form and character of existing and planned development. A land use and population statistics summary is provided in Appendix B – this is provided for information and does not form part of the Area Structure Plan Bylaw.

4.3.1 Low-density Residential

Low-density residential land use shall be the most predominate of all land uses proposed, comprising approximately 61.0 hectares (150.7 acres) of the gross developable area. Low-density residential land uses shall be wholly comprised of high-quality architecturally controlled single-detached and two-unit dwellings. A variety of lot sizes shall be incorporated. The location of various lot sizes shall be determined by proximity to roadway type, natural or manmade amenities provided through open space, and amenities. Low-density residential uses may be strategically located in proximity to or back on to open spaces. Where appropriate, lanes shall be provided to facilitate access.

4.3.2 Medium-density Residential

Medium-density residential land uses, comprising approximately 11.2 hectares (27.7 acres) of the gross developable area, shall be located in clusters throughout Plan Area. Such land uses may include a wide range of high-quality architecturally controlled semi-attached dwelling forms including duplex, semi detached, townhouse, and staked townhouses and here appropriate lanes shall be provided to facilitate access. Medium-density sites shall be strategically located to provide access to minor and major collector roadways.

A medium-density residential site in the southeast corner of Plan Area may include a senior-aged residential and assisted living facility. This site shall provide the opportunity to for non-traditional housing, organized in a lifestyle campus setting, oriented toward adult and senior-aged individuals

and families. These uses provide the opportunity for individuals already living in the greater Lethbridge area to 'age-in-place' or transition to housing more suitable to changing housing needs and lifestyle while remaining within the community. There shall be a range of high-quality architecturally controlled housing types which may include both independent living medium-density dwellings in the form of villa-style, apartment-style, and townhouses, as well as assisted-living facilities.

4.3.3 Local Commercial

Local commercial/institutional development, comprising approximately 3.0 hectares (7.4 acres) of the gross developable area is proposed. The local commercial shall be located in the southeast portion of the site. A wide variety of local commercial uses are appropriate for this location, which shall be of high-quality architecturally controlled design.

4.3.4 Institutional - School Site

A future school site approximately 6.5 hectares (16.1 acres) in size has been allocated for a school as required by the public and/or separate school boards. The site is strategically located in the center of the Plan Area to enhance general accessibility and integration opportunities to the open space network. The school site shall also provide multi-purpose sports fields that shall be made available for use by residents of the community.
An estimate of the school-aged population in Country Meadows is provided in Appendix C.

4.3.5 Park and Open Space Network

A network of parks and open spaces comprising approximately 7.8 hectares (19.3 acres) is proposed, as shown in **Figure 6.0-Open Space Network Concept**. The network shall provide a well-integrated system of green pathways and open space nodes. The network seeks to create an enhanced walkable environment for all residents of the community. The provision of

open space, both with active and passive programming, shall include pocket, neighborhood, and community core park nodes. The park nodes shall be integrated with stormwater management facilities, both dry and wet ponds, creating water amenities. The park nodes are to be connected through a system of linear parks and pathways. Park nodes and pathways shall respect The City development guidelines and standards.

4.3.6 Stormwater Detention Facilities

Approximately 9.1 hectares (22.5 acres) is required for detention of stormwater. These facilities will be integrated, both spatially and aesthetically, with the parks and open spaces. It must be noted that the large proportion of area dedicated for stormwater management is due, in large part, to constraints in offsite storm trunk sewer capacity (see Section 5.4 – Stormwater Management).

4.3.7 Public Utility Area

A new water reservoir facility, comprising approximately 2.3 hectares (5.6 acres) of the gross developable area, is proposed within the Plan Area.

4.4 PHASING STRATEGY

Country Meadows will be a phased development as illustrated on **Figure 7.0 – Conceptual Phasing Strategy**. Phasing will be contingent on several factors, including:

- access to land,
- drainage and storm water management,
- development of offsite utilities (e.g. Garry Drive sanitary trunk sewer, City water reservoir),
- development and final location of the school site and
- other factors.

A more-detailed phasing plan will be developed at the Outline Plan stage.

5.0 SERVICING AND INFRASTRUCTURE MANAGEMENT

The design and quality of servicing and infrastructure is a fundamental part of the well-being of any community; integrally linked to its ability to maintain itself and growth over time. The City's development guidelines and standards have been adhered to in the creation of a comprehensive strategy for transportation, potable water, wastewater, shallow utilities infrastructure, and waste, emergency and protective services management.

5.1 TRANSPORTATION NETWORK

5.1.1 External Roadway Network

The Plan Area will be bound by four arterial roadways – to the north by the existing roadway Walsh Drive West, and the proposed future roadways of Métis Trail West to the east, Garry Drive West to the south, and Chinook Trail West to the west, as illustrated in **Figure 8.0 – Transportation Network Concept**. Métis Trail West, Garry Drive West and Chinook Trail extension are planned undeveloped right-of-ways, which shall be developed at the discretion of The City based on phasing and build-out of the Plan Area. Walsh Drive West is an existing developed right-of-way, which shall be upgraded at the discretion of The City based on phasing and build-out of the Plan Area.

Four (4) points of ingress and egress are proposed from the surrounding external road network – one (1) on the north edge of the Plan Area via Walsh Drive West, one (1) on the east edge of the Plan Area via Métis Trail West, two (2) on the south edge via Garry Drive West and one (1) on the west edge via Chinook Trail. The design of the all external roadways and points of access and intersections providing connection to the Plan Area shall be based on City design and development standards.

Vehicular traffic noise associated with the bordering external road network shall be mitigated through noise attenuation fencing, berming, and

landscaping as required when adjacent to residential land uses. The super collector road right-of-ways provide sufficient area for noise mitigation measures to be implemented. A detailed strategy shall be included at the Outline Plan stage.

From discussions with the City of Lethbridge, it is understood that land will be sold to the City for the following external roads:

- Walsh Drive W. from existing 30 Street W. to future Chinook Trail W., 22.0 m south of the existing property line,
- Garry Drive W. at Métis Trail W. for proposed intersection.

5.1.2 Internal Roadway Network

The Plan Area internal roadway network shall be comprised of a hierarchy of internal road types, including: super collectors, community entrance roads, major collectors, minor collectors, local roads, and lanes. The internal road network is illustrated in **Figure 8.0 – Transportation Network Concept**. The network design intent is to provide efficient and effective access to all areas of the Plan Area, and shall be developed based on City design and development standards.

5.1.3 Transit

As per City design standards, Lethbridge Area Transit buses will be routed along the arterial and collector roadway system. The subdivision will be designed to ensure walking distances to transit stops are within 400 m or 5 minutes for residents, 200 m for major seniors housing and activity centres and 250 m for multi-family housing projects.

5.1.4 Transportation Impact Analysis

A transportation impact analysis (TIA) has been completed for the Plan Area by iTrans. Functional classifications of internal roads are based on this document. This document is enclosed under separate cover.

5.2 POTABLE WATER SUPPLY AND DISTRIBUTION SYSTEM

The City of Lethbridge is proposing the construction of a new potable water reservoir in a south and central location within the Plan Area. The proposed reservoir will improve the overall level of service to the existing communities and provide adequate potable water and fire supply for future development, including that proposed within the Plan Area. Due to present constraints and over-allocation of the water supply network in West Lethbridge, the City has stated that development of Country Meadows cannot proceed until such time as the new reservoir is constructed.

The proposed water distribution system within the plan area will connect to a proposed 600-mm diameter distribution loop which will be constructed around the entire perimeter of the plan area – in the road allowances of Chinook Trail, Walsh Drive, Métis Trail and Garry Drive. Required additional capacity in the northerly part of West Lethbridge will be provided by the proposed water reservoir which will be fed by a 750-mm diameter connection from Bridge Drive. This is illustrated in **Figure 9.0 – Potable Water Supply and Distribution System Concept**.

5.2.1 Low-density Residential Use

The proposed system will be sized to provide a minimum pressure of 310 kPa (45 psi) during peak hour conditions and will not be more than 620 kPa (90 psi) during minimum demand. A minimum of one hydrant fire flow of 75 L/s for residential under maximum day demand condition will be provided at a residual pressure of 140 kPa.

5.2.2 Local Commercial/Medium-density Residential/ Institutional - School Site Land Uses

The proposed system will be sized to provide a minimum pressure of 340 kPa (50 psi) during peak hour conditions and will not be more than 620 kPa (90 psi) during minimum demand. A minimum two (2) hydrant fire flow of 75 L/s each for local commercial uses under maximum day demand condition and a residual pressure of

340 kPa (50 psi) will be provided. Requirements for institutional, school and Medium-density residential uses will be dependent on the concentration of the development and may require up to a four (4) hydrant flow of 75 L/s each at 340 kPa (50 psi).

The final sizing and layout of the potable water distribution mains will be determined as part of the Master Servicing Plan included at the Outline Plan stage.

5.3 WASTEWATER COLLECTION SYSTEM

The City has stated that, due to the existing conveyance from West Lethbridge being over-allocated, development in the Country Meadows area cannot proceed until such time as the proposed sanitary trunk sewer and river crossing in the Bridge Drive utility corridor is in service. Tributary to the Bridge Drive utility corridor a system of trunk sanitary sewers is proposed. These will be constructed within the City's arterial road allowances. Surrounding the plan area, the City has proposed the following trunk sanitary sewers:

- A 1200-mm diameter main in Métis Trail,
- A 900-mm diameter main in Walsh Drive,
- A 750-mm diameter main in Chinook Trail and
- A 450-mm diameter main in Garry Drive.

At the junction of Garry Drive and Métis Trail the 1200-mm diameter main will turn and continue eastward in Garry Drive toward the Bridge Drive utility corridor. The proposed wastewater collection system serving the plan area is illustrated on **Figure 10.0 - Wastewater Collection System Concept**.

The total estimated peak wet weather flow that will be generated by the proposed development is approximately 137 L/s. This flow is based on the total estimated population of 6,120 people.

5.4 STORMWATER MANAGEMENT

Stormwater management within the Plan Area will be designed in accordance with relevant City and Provincial standards and guidelines. The conceptual location of the major stormwater management facilities, as well as the proposed tie-in point to existing City servicing infrastructure is illustrated in **Figure 11.0 – Stormwater Management Plan**.

5.4.1 General Catchment Area and Sub-Catchment Areas

The stormwater catchment area boundaries, divided into sub-catchment areas is illustrated in **Figure 11.0 – Stormwater Management Plan**. Except for 37.5 m of adjacent arterial road allowances, all other offsite runoff is to be directed elsewhere (i.e. handled within the adjacent developments).

As stated previously, there is a drainage boundary within the subject area. Existing surface runoff from east of this boundary flows east into the existing developed areas of Lethbridge. According to the City of Lethbridge, downstream constraints limit discharge from the subject area to into the adjacent West Highlands trunk storm sewer to times when adequate discharge capacity exists to convey storm water to the existing Oldman River outfall north of Whoop-up Drive. However, notwithstanding downstream capacity constraints, the City's existing trunk sewer and outfall will accept this area's drainage. West of the divide, surface runoff will flow westward into the County of Lethbridge, where it follows existing natural channels and coulees westward to the Oldman River. The City has a long-term plan to route drainage from this area to a new river outfall, the location of which is to be determined. If development proceeds in the west areas of Country Meadows, the City suggests the following general interim servicing schemes:

- If Chinook Trail and its proposed storm drainage system is constructed, detention facilities should be connected to this system,
- If the Chinook Trail system is not constructed, storm drainage should be connected to the West Highlands trunk storm sewer. The City understands that this may require a storm water lift station and force main.

Based on existing topography and the proposed street and block layout, three (3) general drainage sub-catchments are proposed. Runoff from each of these sub-catchment areas will be routed through a dual drainage system to three (3) storm water detention facilities (Facilities 1, 2, and 3) as described in Section 5.4.2:

- Sub-Catchment Area 1: 84 hectares draining directly into Facility 1.
- Sub-Catchment Area 2: 31 hectares draining into Facility 2.
- Sub-Catchment Area 3: 26 hectare as draining into Facility 3.

As prescribed by the City of Lethbridge, initial sizing of storm water facilities assumed the following:

- Zero discharge during event – given this rule and assuming greater than 90% of the rainfall from the 110-mm, 100-year return, 24-hour duration design storm generates runoff, a detention facility would require approximately 1000 m^3 of active storage per hectare of gross upstream catchment area.
- There will be adequate overland conveyance within the development to ensure peak flow rates in local roads do not exceed 2.2 m^3/s during the 100-year return period storm. This will be confirmed during the outline plan stage; however, generally this would limit the drainage catchment area tributary to any section of local road to not more than 20 ha. Continuous overland flow routes will be provided to ensure runoff for storms with return periods of up to 100 years is routed safely to detention facilities without inundating private property.
- The minor system will be designed to convey in excess of 90 L/s per hectare of upstream drainage catchment area. Again, this will be confirmed during the outline plan process.

It must be noted that, due to site grading and the relative elevations of the proposed facilities, one or more of the above facilities may require a storm water lift station and force main for off-peak discharge – at least for the interim case. Requirements for any pumping systems, lift stations and force mains will be confirmed during detail design. It is assumed that for all the

facilities, pond overflows resulting from catastrophic events (i.e. runoff which causes pond levels to exceed pond freeboard) or the discharge system not operating (e.g. due to power failure, blockage or downstream flooding) will be routed over floodways in such a way that homes and private property are not inundated.

5.4.2 Stormwater Detention Facilities

Based on the existing topography, three (3) areas were identified for storm water detention storage facilities, as illustrated in **Figure 11.0 – Stormwater Management Plan**:

- Facility 1: A wet pond is proposed to be located near an existing low area in the south easterly portion of the Plan Area. It is assumed to have an active storage depth of 2.0 meters. In addition, some storage is assumed within the adjacent multifamily residential area. The estimated total active storage volume for this facility is 84,000 m^3. It is assumed to discharge to the West Highlands trunk when adequate capacity is available.

- Facility 2: A dry pond is proposed to be located in a low area in the southwest corner of the Plan Area. It is assumed to have an active depth of 1.5 meters. The estimated active storage volume for this facility is 31,000 m^3. As stated, this facility is, ultimately, planned to discharge into a new river outfall. However, interim off-peak discharge to Chinook Trail or the West Highlands trunk are options should the area develop prior to construction of the ultimate outfall.

- Facility 3: A dry pond is proposed to be located in the northwest corner of the Plan Area. It is assumed to have an active depth of 1.5 m. The estimated active storage volume for this facility is 26,000 m^3. As stated, this facility is, ultimately, planned to discharge into a new river outfall. However, as with Facility 2, interim off-peak discharge to

Chinook Trail or the West Highlands trunks are options should the area develop prior to construction of the ultimate outfall.

The volumes noted will be confirmed during the Outline Plan and detailed design stages.

5.4.3 Provision of Make-up Water

All stormwater retention facilities (i.e. those with permanent pools) will require the provision of make-up water to maintain water levels and (in particularly severe droughts) to prevent stagnation. In other West Lethbridge facilities, this make-up water is provided by a Lethbridge and Northern Irrigation District (LNID) lateral canal and pipeline.

The volume of make-up water necessary is determined by numerous factors which often change drastically year-to-year, including:

- Volume of runoff into facility which is dependent on amount and timing of precipitation, climate (temperature, hours of sun, amount and speed of wind, etc…), upstream area draining into the facility, land use, and other factors versus the volume and surface area of the permanent pool
    - To prevent stagnation, current best practices recommend that the annual flow through the pond be more than twice the volume of the permanent pool (i.e. turnover twice per year)
    - Larger water surface areas will evaporate water faster, requiring more annual runoff to maintain levels
- Permanent pool level to be maintained (this is often allowed to vary by 0.3 m or more to facilitate establishment and maintenance of wetland vegetation)
- Use of water for irrigation

The above factors make predicting demands for make-up water difficult – especially given the level of detail in an area structure plan as they require detailed knowledge of the design and catchment areas of the stormwater facilities.

From discussions with the City, an initial estimate of the make-up water necessary would be a volume equal to 25 mm per hectare of upstream catchment (the assumed minimum size of the permanent pool). For Pond 1, the 84-ha upstream catchment gives a volume of 21,000 m^3 (approximately 17 acre·feet). A letter indicating LNID's ability to deliver this volume of water for this purpose is enclosed.

Make-up water for stormwater facilities in Country Meadows may be provided by a single-service raw water pipeline from the existing LNID canal pipeline crossing Garry Drive or (preferably) as part of a "regional" raw water distribution system serving multiple new developments in West Lethbridge. This will be determined during the outline plan process.

5.5 SOLID WASTE MANAGEMENT

Garbage pick-up is provided by the City of Lethbridge.

5.6 SHALLOW UTILITIES SERVICING

Natural gas distribution, electrical and telecommunications servicing to the Plan Area shall be provided by existing public utilities or private corporations though extensions, upgrades, and connections to existing distribution systems where appropriate.

5.6.1 Natural Gas

The City of Lethbridge is provided natural gas distribution servicing by ATCO Gas. Details regarding servicing will be provided at the Outline Plan stage.

5.6.2 Electrical Servicing

The City of Lethbridge infrastructure services electrical department provides electrical servicing to the West Lethbridge area. A detailed servicing strategy will be included at the Outline Plan stage.

5.6.3 Telecommunications

The Plan Area shall be serviced through extensions and connection the existing telephone system (Telus Communications Inc.) and cable television and internet system (Shaw Cable). A detailed servicing strategy will be included at the Outline Plan stage.

5.7 PROTECTIVE AND EMERGENCY SERVICES

The Plan Area shall be serviced by a fire and emergency services facility located at Whoop-Up Drive and Jerry Potts Boulevard West. As stated in the *West Lethbridge Phase II ASP*, the Lethbridge Police Service does not have plans for a substation in the proposed Community Core. However, such an installation could be easily incorporated in the future.

6.0 IMPLEMENTATION AND REVIEW

6.1 PLAN IMPLEMENTATION

The ASP falls within a hierarchy of applicable plans as outlined in Section 2.0 of this ASP. The City of Lethbridge Municipal Development Plan (MDP) is the guiding document for all development within the Municipality. The City's Land Use Bylaw (LUB) establishes the land use rules and regulations. The ASP presents a greater level of planning detail within the specific Plan Area and must be consistent with both the MDP and LUB. Development within the Plan Area should be acceptable to community and consistent with policy contained within the ASP. The ASP does not supersede, repeal, replace or otherwise diminish any other statutory plan in effect in the Plan Area.

Subsequent to approval of this ASP, The City planning process requires that an Outline Plan be submitted to provide further detail regarding the land use, transportation, servicing, and phasing strategy. The Outline Plan shall reflect all applicable policy and development standards.

6.2 PLAN REVIEW

As this ASP is a Bylaw of the City of Lethbridge, a formal process as outlined in the Municipal Government Act is required to amend the ASP.

The future land use and development outlined in the ASP is intended to address a long-term time horizon. Periodic review and occasional amendment of the ASP may be required.

APPENDIX A

Land Use and Statistics Country Meadows Area Structure Plan

	Area		Portion of GDA
	ha	acres	
Gross Developable Area	**121.9**	**301.2**	**100.0%**
Non-residential Uses	**49.7**	**122.8**	**40.8%**
Circulation (Collector and Local Roads)	21.0	51.9	17.2%
Stormwater Detention	9.1	22.5	7.5%
Public Utility (Reservoir)	2.3	5.6	1.9%
Parks/School/Open Space			
Neighborhood Parks	7.8	19.3	6.4%
School Site	6.5	16.1	5.3%
Commercial	3.0	7.4	2.5%
Residential Uses	**72.2**	**178.4**	**59.2%**
Single-family	61.0	150.7	50.0%
Multi-family (includes senior assisted living)	11.2	27.7	9.2%

Residential Land Use Analysis

	Area ha	Density units/ha	**Units**	Persons/ Unit	**Population**
Single-family	**61.0**	20	**1220**	3	**3660**
Multi-family (includes senior assisted living)	**11.2**	75	**840**	1.9	**1596**
TOTAL	**72.2**		**2061**		**5256**

APPENDIX B

The following table details the predicted school-age population at various grade levels (elementary, middle, high school) for both public and separate school boards.

School Generation
Country Meadows Area Structure Plan

Number of dwelling units assumed **2060**

School Type	Estimated no. of students per dwelling unit	**Estimated no. of students**
Public Elementary (ECS to Grade 5)	0.170	**350**
Public Middle (Grades 6 to 8)	0.085	**175**
Public Senior High (Grades 9 to 12)	0.113	**233**
Holy Spirit Elementary (K to Grade 9)	0.125	**258**
Holy Spirit Senior High (Grades 10 to 12)	0.040	**82**

APPENDIX C

The following figures are referenced in the Country Meadows Area Structure Plan.

LEGEND:

COUNTRY MEADOWS ASP BOUNDARY

LETHBRIDGE CITY LIMIT

ARTERIAL ROAD

Walsh Drive W.

Future Garry Drive W.

Future Chinook Trail W.

Future Métis Trail W.

Area Structure Plan boundary encompasses 121.9 ha (301.1 ac.)

1:10,000

WEST HIGHLANDS

Location of Area Structure Plan

North Lethbridge

West Lethbridge

South Lethbridge

Oldman River

1: 250,000

NOTE: ALL LOCATIONS ARE APPROXIMATE

Country Meadows
AREA STRUCTURE PLAN

GENERAL LOCATION PLAN

Figure 1.0
SCALE AS NOTED
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

LIMITS OF EXISTING FARMSTEAD

EXISTING BUILDINGS

EXISTING POND

Coulee draw

Views of Mountains

EXISTING POND

EXISTING BUILDINGS

"Plateau" Elev.>940 m

Existing Road Allowance (30 Street W.)

Views of City

FUTURE METIS TRAIL WEST

WALSH DR W

ABERDEEN CRES W

AB PL

WEST HIGHLANDS

Low area Elev. 929.6 m

High point Elev. 942.5 m

LIMITS OF EXISTING FARMSTEAD

EXISTING BUILDINGS

EXISTING POND

Low area Elev. 932 m

NOTE: ALL LOCATIONS ARE APPROXIMATE

LEGEND:

COUNTRY MEADOWS ASP BOUNDARY

LETHBRIDGE CITY LIMIT

VIEWS

DIRECTION OF DRAINAGE

EXISTING ATCOGAS HIGH-PRESSURE GAS LINE (15 m SETBACK REQUIRED)

INDICATES EXISTING STRUCTURE

INDICATES EXISTING POND

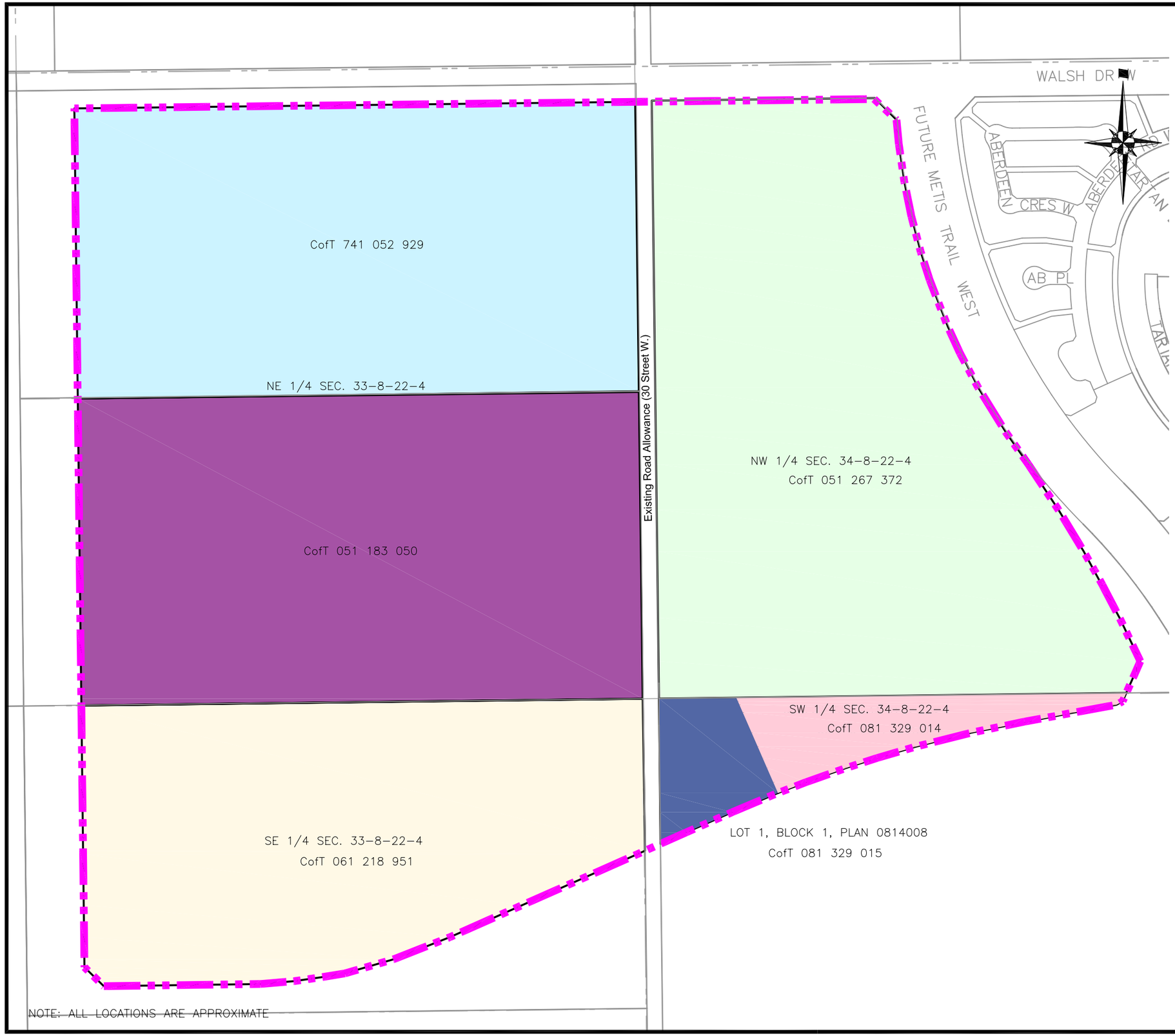
Country Meadows
AREA STRUCTURE PLAN

PLAN AREA

Figure 2.0
SCALE: 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design



LEGEND:

COUNTRY MEADOWS ASP BOUNDARY

LETHBRIDGE CITY LIMIT

- CofT 741 052 929 – ± 27.4 ha (67.7 ac.)
- CofT 051 183 050 – ± 29.1 ha (71.9 ac.)
- CofT 061 218 951 – ± 23.2 ha (57.3 ac.)
- CofT 051 267 372 – ± 34.7 ha (85.7 ac.)
- CofT 081 328 014) – ± 3.1 ha (7.6 ac.)
- CofT 081 329 015 – ± 2.1 ha (5.2 ac.)

ROAD ALLOWANCE (30 ST. W.) – ± 2.3 ha (5.7 ac.)

TOTAL ASP AREA – ± 121.9 ha (301.1 ac.)

Country Meadows
AREA STRUCTURE PLAN

LAND OWNERSHIP

Figure 3.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

LEGEND:

- COUNTRY MEADOWS ASP BOUNDARY
- LETHBRIDGE CITY LIMIT
- URBAN RESERVE (UR) – ± 98.4 ha (243.2 ac.)
- DIRECT CONTROL (DC) – ± 23.5 ha (57.9 ac.)
- INDICATES EXISTING STRUCTURE
- INDICATES EXISTING POND

Country Meadows
AREA STRUCTURE PLAN

EXISTING LAND USE DESIGNATION

Figure 4.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

Walsh Drive W.

WALSH L

ABERDEEN CRES W

ABERDE

AB PL

Future Métis Trail W.

Future Chinook Trail W.

Future Garry Drive W.

LEGEND:

- COUNTRY MEADOWS ASP BOUNDARY
- LETHBRIDGE CITY LIMIT
- PARKLAND
- SCHOOL SITE
- COMMERCIAL SITE
- MEDIUM DENSITY RESIDENTIAL
- LOW–DENSITY RESIDENTIAL
- PUBLIC UTILITY (WATER RESERVOIR)
- WET POND
- DRY POND
- CONCEPTUAL PATHWAY NETWORK
- CONCEPTUAL ARTERIAL ROAD / PATHWAY CROSSING LOCATION
- COMMUNITY ENTRANCE
- ARTERIAL ROAD
- COMMUNITY ENTRANCE ROAD
- MAJOR COLLECTOR
- MINOR COLLECTOR

Country Meadows
AREA STRUCTURE PLAN

LAND USE CONCEPT

Figure 5.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

NOTE: ALL LOCATIONS ARE APPROXIMATE

Walsh Drive W.

WALSH

ABERDEEN CRES W

ABERDEEN

AB PL

Future Métis Trail W.

Future Chinook Trail W.

Future Garry Drive W.

LEGEND:

- COUNTRY MEADOWS ASP BOUNDARY
- LETHBRIDGE CITY LIMIT
- PARKLAND
- SCHOOL SITE
- WET POND
- DRY POND
- CONCEPTUAL PATHWAY NETWORK
- CONCEPTUAL ARTERIAL ROAD / PATHWAY CROSSING LOCATION
- COMMUNITY ENTRANCE
- ARTERIAL ROAD
- COMMUNITY ENTRANCE ROAD
- MAJOR COLLECTOR
- MINOR COLLECTOR

Country Meadows
AREA STRUCTURE PLAN

OPEN SPACE NETWORK CONCEPT

Figure 6.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

NOTE: ALL LOCATIONS ARE APPROXIMATE

Walsh Drive W.

WALSH

Future Métis Trail W.

Future Chinook Trail W.

Future Garry Drive W.

ABERDEEN CRES W

ABERD

AB PL

LANDING

EDINB

PHASE 1

PHASE 2

PHASE 3

PHASE 4

PHASE 5

PHASE 6

PHASE 7

PHASE 8

PHASE 9

LEGEND:

- COUNTRY MEADOWS ASP BOUNDARY
- LETHBRIDGE CITY LIMIT
- ARTERIAL ROAD
- PHASE BOUNDARY
- PARKLAND
- SCHOOL SITE
- COMMERCIAL SITE
- MEDIUM DENSITY RESIDENTIAL
- LOW–DENSITY RESIDENTIAL
- PUBLIC UTILITY (WATER RESERVOIR)
- WET POND
- DRY POND

Country Meadows
AREA STRUCTURE PLAN

PHASING STRATEGY

Figure 7.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

NOTE: ALL LOCATIONS ARE APPROXIMATE

Walsh Drive W.

Future Chinook Trail W.

Future Metis Trail W.

Future Garry Drive W.

ABERDEEN CRES W

AB PL

LEGEND:

- COUNTRY MEADOWS ASP BOUNDARY
- LETHBRIDGE CITY LIMIT
- ARTERIAL ROAD
- COMMUNITY ENTRANCE ROAD
- MAJOR COLLECTOR
- MINOR COLLECTOR
- CONCEPTUAL PATHWAY NETWORK
- CONCEPTUAL ARTERIAL ROAD / PATHWAY CROSSING LOCATION
- COMMUNITY ENTRANCE
- WET POND
- DRY POND
- PARKLAND
- SCHOOL SITE

Country Meadows
AREA STRUCTURE PLAN

TRANSPORTATION NETWORK CONCEPT

Figure 8.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

NOTE: ALL LOCATIONS ARE APPROXIMATE

Walsh Drive W.

Connection for future loop to north

Future Chinook Trail W.

Future Métis Trail W.

Future Garry Drive W.

Proposed City Reservoir c/w dedicated fill line from water treatment plant

Proposed City Distribution Loop (600Ø)

WALSH

ABERDEEN CRES W

ABER

AB PL

LEGEND:

- COUNTRY MEADOWS ASP BOUNDARY
- LETHBRIDGE CITY LIMIT
- 600mm CITY DISTRIBUTION LOOP WATERMAIN
- 300mm/400mm INDUSTRIAL DISTIBUTION WATERMAINS
- 750mm CITY FEEDERMAIN
- PROPOSED CITY WATER RESERVOIR

Country Meadows
AREA STRUCTURE PLAN

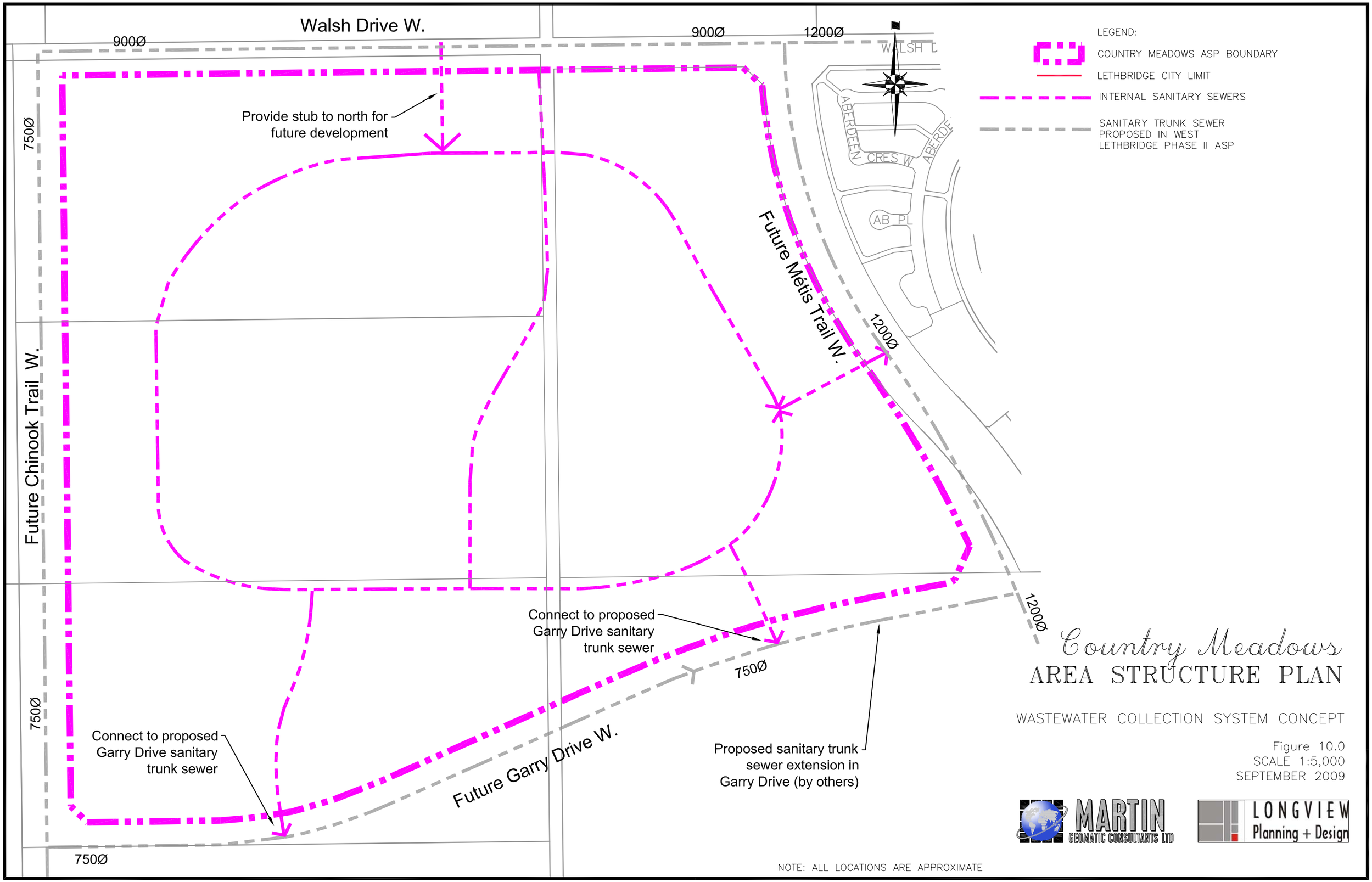
POTABLE WATER SUPPLY & DISTRIBUTION SYSTEM CONCEPT

Figure 9.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

NOTE: ALL LOCATIONS ARE APPROXIMATE



Country Meadows
AREA STRUCTURE PLAN

WASTEWATER COLLECTION SYSTEM CONCEPT

Figure 10.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

NOTE: ALL LOCATIONS ARE APPROXIMATE

Walsh Drive W.

Ultimate discharge
to new outfall (by others)

Subcatchment #1
Area=84 ha

Facility #3
Active Vol. (100-yr)=26,000 m³
Max. Active Depth=1.5 m

Outflow from Facility#3
Possible interim off-peak
discharge

Possible interim
off-peak discharge to
Chinook Trail

Facility #1
Active Vol. (100-yr)=84,000 m³
Max. Active Depth=2.0 m
(Includes storage in multi-family area)

Subcatchment #3
Area=26 ha

Outflow from Facility#2
Possible interim off-peak
discharge

Future Chinook Trail W.

Ultimate discharge
to new outfall (by others)

Subcatchment #2
Area=31 ha

Facility #2
Active Vol. (100-yr)=31,000 m³
Max. Active Depth=1.5 m

Future Garry Drive W.

Possible interim
off-peak discharge to
Chinook Trail

Future Métis Trail W.

WALSH D

ABERDEEN CRES W

ABER

AB PL

TARTAN Cir

TAR

EDINBU

Connect to ex.1800-mm dia.
trunk sewer in Tartan Blvd. W.
Off-peak discharge

LEGEND:

COUNTRY MEADOWS ASP BOUNDARY

LETHBRIDGE CITY LIMIT

DRAINAGE SUBCATCHMENT MODELED

CONCEPTUAL ROUTING OF
CONTROLLED OUTFLOW FROM
SWM FACILTY

WET POND

DRY POND

Country Meadows
AREA STRUCTURE PLAN

STORMWATER MANAGEMENT CONCEPT

Figure 11.0
SCALE 1:5,000
SEPTEMBER 2009

MARTIN GEOMATIC CONSULTANTS LTD

LONGVIEW Planning + Design

NOTE: ALL LOCATIONS ARE APPROXIMATE

APPENDIX D

The following certificates of title pertain to lands within the Country Meadows Area Structure Plan.

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0019 856 798	4;22;8;33;NE	051 183 050

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 33
THE SOUTH HALF OF THE NORTH EAST QUARTER
CONTAINING 32.4 HECTARES (80 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 981 099 589

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
051 183 050	27/05/2005	TRANSFER OF LAND	$800,000	$800,000

OWNERS

MERVYN P. HIEBERT PROFESSIONAL CORPORATION.
OF 23 SANDSTONE WAY
LETHBRIDGE
ALBERTA T1K 7X8
AS TO AN UNDIVIDED 1/2 INTEREST

DUNCAN S. MACKEY PROFESSIONAL CORPORATION.
OF 1518-11 AVE S
LETHBRIDGE
ALBERTA T1K 0J7
AS TO AN UNDIVIDED 1/2 INTEREST

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
751 003 319	14/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "DISCHARGED EXCEPT AS TO PORTION DESCRIBED BY 761072087"
051 183 051	27/05/2005	MORTGAGE MORTGAGEE - ROYAL BANK OF CANADA. 614-4 AVE S LETHBRIDGE ALBERTA T1J3C8 ORIGINAL PRINCIPAL AMOUNT: $540,000

TOTAL INSTRUMENTS: 003

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 17 DAY OF APRIL, 2009 AT 04:42 P.M.

ORDER NUMBER:13722399

CUSTOMER FILE NUMBER: 070944CE

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0031 175 871	4;22;8;34;NW	051 267 372 +1

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 34
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES(160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

		HECTARES	(ACRES) MORE OR LESS
A) PLAN 0211389	SUBDIVISION	2.588	6.39
B) PLAN 0414578	SUBDIVISION	6.155	15.21
C) PLAN 0510515	ROAD	8.933	22.07
D) PLAN 0512653	SUBDIVISION	11.051	27.31

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

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 051 050 009

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
051 267 372	26/07/2005	SUBDIVISION PLAN		

OWNERS

COLLEGE FARMS LTD.
OF R 9,SITE 2,COMP 6
LETHBRIDGE
ALBERTA T1J 4R9

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
891 210 688	16/10/1989	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "PARTIAL DISCHARGE EXCEPT PTN 8911794 BY 901058685, 05 03 1990 (RE-ENTERED 22/12/04 BY 041482893)"
911 068 943	08/04/1991	UTILITY RIGHT OF WAY GRANTEE - ALBERTA GOVERNMENT TELEPHONES. AS TO PORTION OR PLAN:9110217 "TAKES PRIORITY OF CAVEAT 891193049, REG'D 25 09 1989 (RE-ENTERED 22/12/04 BY 041482893)"
971 107 756	21/04/1997	CAVEAT RE : SURFACE LEASE CAVEATOR - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. 909-11 AVE SW CALGARY ALBERTA T2R1L7
981 066 287	04/03/1998	CAVEAT RE : RIGHT OF WAY AGREEMENT CAVEATOR - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. 909 - 11 AVENUE,S.W. CALGARY ALBERTA T2R1L8 (DATA UPDATED BY: TRANSFER OF CAVEAT 981078399)
021 135 987	23/04/2002	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. CITY HALL 910 4 AVENUE SOUTH LETHBRIDGE ALBERTA AGENT - P GEORGE KUHL
071 169 545	10/04/2007	CAVEAT RE : PURCHASERS INTEREST CAVEATOR - 262602 ALBERTA LTD..

(CONTINUED)

NUMBER	DATE (D/M/Y)	PARTICULARS

C/O DIMNIK & COMPANY
334- 12 ST S
LETHBRIDGE
ALBERTA T1J2R1
AGENT - KIRK A BELER

TOTAL INSTRUMENTS: 007

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 17 DAY OF APRIL, 2009 AT 04:42 P.M.

ORDER NUMBER:13722399

CUSTOMER FILE NUMBER: 070944CE

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0022 087 977	4;22;8;33;NE	741 052 929

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 33
THE NORTH HALF OF THE NORTH EAST QUARTER
CONTAINING 32.4 HECTARES (80 ACRES) MORE OR LESS
EXCEPTING 1.03 ACRES FOR ROADWAY AS SHOWN ON PLAN 1618LK
EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

ESTATE: FEE SIMPLE

MUNICIPALITY: COUNTY OF LETHBRIDGE

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
741 052 929	03/06/1974		$28,000	

OWNERS

MARLENE M BROWN (HOUSEWIFE)

AND
CLIFFORD R BROWN (FIREFIGHTER)
BOTH OF:
1308-13 AVE SOUTH
LETHBRIDGE
ALBERTA
AS JOINT TENANTS

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 052 928	03/06/1974	CAVEAT CAVEATOR - THE OLDMAN RIVER REGIONAL PLANNING COMMISSION.
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
751 003 057	14/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "DISCHARGED AS TO 20' STRIPS IN NE 1/4 BY INST 761072085"
861 031 205	24/02/1986	EASEMENT "SUBJECT TO: IN FAVOUR OF N 1/2 OF SE 1/4 4-9-22-W4TH"

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 17 DAY OF APRIL, 2009 AT 04:42 P.M.

ORDER NUMBER:13722399

CUSTOMER FILE NUMBER: 070944CE

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0033 454 852	0814008;1;1	081 329 015

LEGAL DESCRIPTION
PLAN 0814008
BLOCK 1
LOT 1
EXCEPTING THEREOUT ALL MINES AND MINERALS
AREA: 2.06 HECTARES (5.09 ACRES) MORE OR LESS

ESTATE: FEE SIMPLE
ATS REFERENCE: 4;22;8;34;SW

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 081 329 014

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
081 329 015	03/09/2008	TRANSFER OF LAND	$167,805	$167,805

OWNERS

THE CITY OF LETHBRIDGE.
OF 910 - 4TH AVE. SOUTH, LETHBRIDGE
ALBERTA

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
081 329 013	03/09/2008	CAVEAT

(CONTINUED)

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
		RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. CITY HALL 910 4 AVENUE SOUTH LETHBRIDGE ALBERTA AGENT - GARY WEIKUM.

TOTAL INSTRUMENTS: 002

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 17 DAY OF APRIL, 2009 AT 04:42 P.M.

ORDER NUMBER:13722399

CUSTOMER FILE NUMBER: 070944CE

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0025 602 905	4;22;8;33;SE	061 218 951

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
THE NORTH HALF OF THE SOUTH EAST
QUARTER OF SECTION 33
CONTAINING 32.4 HECTARES (80 ACRES) MORE OR LESS
EXCEPTING THEREOUT ALL MINES AND MINERALS

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 061 138 871

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
061 218 951	02/06/2006	TRANSFER OF LAND	$480,000	SEE INSTRUMENT

OWNERS

DEBRA L DUDLEY-OLAFSON
OF BOX 511
LETHBRIDGE
ALBERTA T1J 3Z4

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT

(CONTINUED)

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
751 006 966	27/01/1975	UTILITY RIGHT OF WAY GRANTEE - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. "20 FOOT STRIP. BY 761072088"
981 066 289	04/03/1998	CAVEAT RE : RIGHT OF WAY AGREEMENT CAVEATOR - CANADIAN WESTERN NATURAL GAS COMPANY LIMITED. 909 - 11 AVENUE,S.W. CALGARY ALBERTA T2R1L8 (DATA UPDATED BY: TRANSFER OF CAVEAT 981078661)

TOTAL INSTRUMENTS: 003

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 17 DAY OF APRIL, 2009 AT 04:42 P.M.

ORDER NUMBER:13722399

CUSTOMER FILE NUMBER: 070944CE

END OF CERTIFICATE

LAND TITLE CERTIFICATE

S

LINC	SHORT LEGAL	TITLE NUMBER
0033 454 844	4;22;8;34;SW	081 329 014 +1

LEGAL DESCRIPTION

MERIDIAN 4 RANGE 22 TOWNSHIP 8
SECTION 34
QUARTER SOUTH WEST
CONTAINING 64.7 HECTARES(160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

	HECTARES	(ACRES) MORE OR LESS
A) PLAN 0814008 SUBDIVISION	2.06	5.09

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

ESTATE: FEE SIMPLE

MUNICIPALITY: CITY OF LETHBRIDGE

REFERENCE NUMBER: 041 410 431

REGISTERED OWNER(S)

REGISTRATION	DATE(DMY)	DOCUMENT TYPE	VALUE	CONSIDERATION
081 329 014	03/09/2008	SUBDIVISION PLAN		

OWNERS

MAVIS MCKAY
OF 26 DOUGLAS WOODS PARK SE
CALGARY
ALBERTA T2Z 2K6
AS TO AN UNDIVIDED 25% INTEREST

MARION MOORE
OF 1068 MCKENZIE DR SE
CALGARY
ALBERTA T2Z 1S2
AS TO AN UNDIVIDED 25% INTEREST

SHARON MARSHALL

(CONTINUED)

OF 35 BROOKPARK CRESC SW
CALGARY
ALBERTA T2W 2W6
AS TO AN UNDIVIDED 25% INTEREST

KENNETH D MCKAY
OF 219 LAKE BONAVISTA DR SE
CALGARY
ALBERTA T2J 3M3
AS TO AN UNDIVIDED 25% INTEREST

ENCUMBRANCES, LIENS & INTERESTS

REGISTRATION NUMBER	DATE (D/M/Y)	PARTICULARS
741 091 031	27/09/1974	IRRIGATION ORDER/NOTICE THIS PROPERTY IS INCLUDED IN THE LETHBRIDGE NORTHERN IRRIGATION DISTRICT
071 107 911	05/03/2007	CAVEAT RE : AGREEMENT FOR SALE CAVEATOR - MELCOR DEVELOPMENTS LTD.. 3200, 10180 101 ST EDMONTON ALBERTA T5J3W8 AGENT - VICTOR L LIRETTE
071 551 524	08/11/2007	CAVEAT RE : AMENDING AGREEMENT CAVEATOR - CANADIAN IMPERIAL BANK OF COMMERCE. 595 BAY ST,SUITE 500 TORONTO ONTARIO M5G2C2 AGENT - WAYNE R WHITLOCK
081 329 013	03/09/2008	CAVEAT RE : DEFERRED RESERVE CAVEATOR - THE CITY OF LETHBRIDGE. CITY HALL 910 4 AVENUE SOUTH LETHBRIDGE

(CONTINUED)

NUMBER	DATE (D/M/Y)	PARTICULARS

ALBERTA
AGENT - GARY WEIKUM.

TOTAL INSTRUMENTS: 004

THE REGISTRAR OF TITLES CERTIFIES THIS TO BE AN ACCURATE REPRODUCTION OF THE CERTIFICATE OF TITLE REPRESENTED HEREIN THIS 17 DAY OF APRIL, 2009 AT 04:42 P.M.

ORDER NUMBER:13722399

CUSTOMER FILE NUMBER: 070944CE

END OF CERTIFICATE

APPENDIX E

The following documents are referenced within the Country Meadows Area Structure Plan.

Arrow Archaeology Limited

2315 - 20 Street, Coaldale, Alberta, T1M 1G5
Phone: 403 345 2812 Fax: 403 345 2817
Cell: 403 330 8376 arrowarchaeology.com
Email: neil@arrowarchaeology.com

July 7, 2009

Mike Kitchen
Martin Geomatic Consultants Ltd.
255 – 31 Street N
Lethbridge, Alberta
T1H 3Z4

Dear Mr. Kitchen:

Re: Portions of 33 and 34-8-22 W4M as indicated in Country Meadows Area Structure Plan Map, dated April, 2009

We have searched the March, 2009 edition of Alberta Culture and Community Spirit's *Listing of Significant Historical Sites and Areas* (Public and Restricted versions) and examined Alberta Historical Resources Management's site inventory data files and we can confirm that above-noted parcel does not have an assigned Historical Resource Value and that there are no recorded historical resources in the parcel or its immediately surrounding area. The general area has been under cultivation for many decades and it is unlikely that there is any shallowly buried fossiliferous bedrock within the proposed subdivision.

A pre-development Historical Resources Impact Assessment is therefore not required.

Historical resources can, however, occur in unexpected locations and according to Section 31 of the *Historical Resources Act*, if a development inadvertently or accidentally impacts a historical resource during development or land modification activity, it must be reported. If any historical resources or suspected historical resources, such as artifacts or fossils, are observed during development activities in the area, please contact us or Alberta Historical Resources Management in Edmonton.

Thank you for your enquiry regarding historical resources in this area and on behalf of Arrow Archaeology Limited and Alberta Culture and Community Spirit's Historical Resources Management Branch, thank you for your continued cooperation in the endeavour to conserve Alberta's past.

Please let me know if you need any further information or have any questions.

Yours truly,

Neil Mirau
Senior Archaeologist, Arrow Archaeology Limited

LETHBRIDGE NORTHERN IRRIGATION DISTRICT

334 - 13TH STREET NORTH, LETHBRIDGE, AB T1H 2R8

PHONE: (403) 327-3302 FAX: (403) 320-2457

August 7, 2009

Michael Kitchen, P.Eng.
Project Manager
Martin Geomatic Consultants Ltd.
255 – 31 Street North
LETHBRIDGE, AB T1H 3Z4

RECEIVED
AUG 1 1 2009

Dear Sir:

RE: WATER CONVEYANCE AGREEMENT – TYPE 3
CITY OF LETHBRIDGE – SECTION 33-08-22-4

The Lethbridge Northern Irrigation District (LNID) is willing to supply water to the City of Lethbridge for use in "Country Meadows Area Structure Plan" a subdivision in West Lethbridge.

Based on calculations by Martin Geomatic Consultants Ltd., "Country Meadows" will require approximately 17 acre-feet of water annually. A one time lump sump payment of an access fee to the LNID water licence at a rate of $1,100/acre-foot of water, will be due and payable at the time of signing of the agreement.

The City of Lethbridge will be invoiced for the agreement annually. The current rate is $350.00, plus GST, for the first three (3) acre-feet and then $22.00/acre-foot over three (3) acre-feet.

Yours truly

Gary Burke
Classification/Network Technician
GB/jcp

Martin Geomatics Consultants Ltd.

ISSUED FOR USE

GEOTECHNICAL EVALUATION – DESKTOP STUDY
PROPOSED COUNTRY MEADOWS DEVELOPMENT
LETHBRIDGE, ALBERTA

L12101592

July 2009

EBA Engineering Consultants Ltd.
p. 403.329.9009 • f. 403.328.8817
442 - 10 Street N • Lethbridge, Alberta T1H 2C7 • CANADA

TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS

PAGE

FIGURES

APPENDICES

1.0 INTRODUCTION

This report presents the results of a geotechnical evaluation, comprising a desktop study, conducted by EBA Engineering Consultants Ltd. (EBA) for the proposed Country Meadows Subdivision, to be located in West Lethbridge, Alberta.

The scope of work for the geotechnical evaluation was described in a proposal issued to Mr. Michael Kitchen, P.Eng., of Martin Geomatics Consultants Ltd. (Martin Geomatics) on June 17, 2009. The objective of this evaluation was to determine the general subsurface conditions in the area of the proposed development (from a desktop study of existing data) and to provide general recommendations for the geotechnical aspects of design and construction for the residential subdivision development, in support of the Outline Plan to be submitted to the City of Lethbridge.

Authorization to proceed with the evaluation was provided by Mr. Kitchen of Martin Geomatics, on behalf of Mr. Joe Meszaros.

2.0 PROJECT DETAILS AND SCOPE OF WORK

The subject property is located within the west area of Lethbridge, Alberta, as shown on Figure 1. It is understood that the development will include residential and commercial lots, a school, utility and street infrastructure, as well as a storm water management facility comprising two separate dry ponds and one wet pond. The foundation system for the housing will likely be shallow spread footings and a grade supported lower level floor slab, typical of other residential developments in the area. Foundation recommendations for larger structures, such as schools or commercial developments, will require a more detailed geotechnical evaluation than that conducted for this evaluation.

It is understood that the proposed street structures will be designed and constructed to City of Lethbridge Infrastructure Services Engineering Standards. The majority of the roadways may consist of designated 'local' pavement structures, with some arterial or collector pavement structures in heavier loaded traffic areas. A detailed pavement design for the respective street sections has not been requested as part of this evaluation, but may be completed at a later date.

Previous geotechnical evaluations completed by EBA in the vicinity of the project site in 2005 and 2006 include the "Lands West of Benton Drive Project" (EBA File No.: 0404-4400840), as well as the "West Lethbridge Combined High Schools and Library Project" (EBA File No.: 0404-4401045).

The agreed work scope for this evaluation consisted of a desktop study of existing geotechnical information and the provision of general geotechnical recommendations for the proposed development.

3.0 SUBSURFACE CONDITIONS

3.1 SURFACE FEATURES

The land to be developed is bounded on the east by the future Benton Drive West right-of-way, to the west by the future Chinook Trail West right-of-way, to the north by Walsh Drive West, and extends south to the future Garry Drive West extension.

The land was noted to be largely undeveloped at the time of this evaluation. The exception includes three farmsteads located in the central area of the land, accessed via 30 Street which runs north/south approximately through the middle of the site. The farmstead properties include farmhouses, barns and other small outbuildings, as well as a water dugout for each farmstead. A livestock pen is located at the northern farmstead. The farmsteads are assumed to include septic tanks and/or septic disposal fields. The land west of 30 Street consists of uncultivated pasture land covered with prairie grasses, with occasional trees near the farmsteads. The land east of 30 Street is surfaced with wheat and canola crops.

The ground surface was noted to be undulating. Site drainage is generally towards the low-lying areas, with marginal off-site drainage noted, resulting in seasonal surface water ponding in some areas. Seasonal wet areas are suspected due to thicker vegetation growth near the center of the SE ¼ of Section 34, and near the center of the SE ¼ of Section 33, although ponded surface water was not noted at the time of this evaluation.

3.2 HISTORICAL AERIAL PHOTOGRAPHIC REVIEW

Based on EBA's understanding of the property's history, including an aerial photograph review from the 1950s to the present day, the properties have been utilized generally for agricultural purposes.

As part of the aerial photograph review, seasonal wet areas were noted in Sections 33 and 34. The location and existence of the wet areas were noted to vary over time, with some wet areas being present in the 1950's but not present in later years. Most recently, wet areas noted on the 2007 air photo were located in the center of the SE ¼ of Section 34, and near the center of the SE ¼ of Section 33.

3.3 GENERAL SOIL CONDITIONS

The subsurface stratigraphy for the proposed development site is expected to be somewhat variable for the surficial soils, however, relatively consistent at lower depths (below ±2 m). The site in general likely consists of a surficial layer of topsoil, underlain by native lacustrine clay and silt, with predominantly glacial clay till deposits at underlying depths below ground surface elevation.

The topsoil thickness should be expected to be variable, between 100 mm to 300 mm in thickness, in part due to the undulating surface topography. It is important to note that based on the proposed stripping methodology (i.e. equipment usage) the required thickness of stripping may vary. The method of stripping should therefore be taken into account

when determining stripping volumes. Variable thickness of topsoil and clay fill should be expected due to deposition and/or erosional forces (wind, water).

Based on the borehole information reviewed as part of this study in this area (from previous evaluations), layer(s) of native lacustrine clay are expected underlying the topsoil layer, with typical layer thicknesses varying between 1 m and 3 m.

The native lacustrine clay is typically silty, with some sand to sandy, varying between damp to very moist, low to medium plastic with some high plastic inclusions, varying between firm to very stiff in consistency and light brown coloured. The clay soil moisture content typically varies between dry to wet of its optimum moisture content (OMC). The lacustrine layer also often grades into native lacustrine silt, which is typically sandy with a trace of clay, damp to moist, low plastic, stiff to very stiff in consistency, and light brown coloured with occasional thin sand lenses and grey mottling. Moisture contents within the near surface lacustrine soils typically vary between approximately 10% and 22%. Low lying areas are expected to have wetter surficial soil conditions.

Underlying the lacustrine deposits, the soil will consist of glacial deposits. The upper deposits will consist of clay till. The clay till is typically silty, with some sand to sandy, a trace of gravel, moist, medium plastic and varying between stiff to hard in consistency. The clay till also typically contains traces of fine coal fragments, zones of higher plastic inclusions, as well as occasional thin sand and silt lenses. Moisture contents within the clay till typically vary between 15% and 20%.

Based on previous experience in this area, Standard Proctor maximum dry density values within the clay till typically range between approximately 1750 to 1850 kg/m^3, at optimum moisture contents of 15% to 18%. In addition, the results of laboratory hydraulic conductivity testing have resulted in measured state permeability (K) values in the order of approximately 2.0E-08 cm/sec.

The groundwater levels in this area as reviewed from previous reports typically vary between 2 m to 7 m below ground surface. Based on the groundwater data obtained from previous evaluations, significant groundwater problems are not expected for the majority of excavations expected for this development. The above noted groundwater levels are considered to be localized water, which is perched or trapped within zones of sandy material within the clay till soil, and or perched above the relatively denser glacial deposit.

3.4 MINING ACTIVITY

Research was conducted to review the possible existence of mine workings within the boundary of the proposed development area (Section 33-8-22 W4M and the west half of 34-8-22 W4M), specifically near the eastern edge of the site boundary as shown on Figure 1. The study was performed using a publication by ERCB (Coal Mine Atlas, 1988) and various documents contained in EBA's library regarding the coal mining industry in the Lethbridge area.

The literature indicates that Mine 1464 (commonly referred to as Galt No. 8), operated on the subject property between 1934 and 1957. The relatively extensive mine underlies the west side of the river valley, including the northeastern edge of the subject property and the surrounding areas (specifically the West Highlands subdivision to the east). This was an underground coal mine operated by Lethbridge Collieries Ltd., a division of Canadian Pacific Railway Company. The depth of mine workings in this area was approximately 110 m to 120 m below prairie level.

The mine used a room and pillar mining arrangement. Figure 1 presents an overlay of the mine map on the subject site. EBA understands that a large portion of the coal pillars were removed during mine working, prior to mine closure. It is uncertain what percentage of supporting coal pillars would have been left in place. Areas of the mine shown as shaded on Figure 1 are understood to have had the coal extracted.

The scope of work for this geotechnical evaluation also included a general assessment of the risk of ground surface subsidence due to the existence of coal mine workings located beneath the property. Specifically, this included a review of a mine subsidence evaluation carried out by JWAL for the lands east of the project site (West Highlands), as well as a review of EBA's local experience with similar developments over coal mine workings, including mine subsidence studies in other areas of Lethbridge.

Of note is that since this was one of the last mines to close in the Lethbridge area, it was studied closely in the 1950's, including monitoring of ground surface subsidence with time after the coal had been extracted. The results of this study (referenced by JWAL) indicated that coal mine collapse and ground surface subsidence occurred within three years after the coal was extracted (in this case, regardless of whether the supporting pillars had been removed). Ground surface subsidence in the order of 300 mm on average was recorded at prairie level. Negligible additional surface subsidence was recorded thereafter.

In general terms, the findings of the JWAL report were consistent with local experience and other published reports, including those by EBA. The JWAL report indicated that the risk of land development due to coal mine workings is generally negligible, as the mine subsidence should have already occurred in the late 1950's and early 1960's.

However, for this specific development, two recommendations in the JWAL report and of EBA's mine subsidence studies, which are normally provided for similar local developments over coal mines, will be restated herein. First, all footing excavations should be observed by a geotechnical engineer. Due to coal mine subsidence, there may be localized tension cracks across this property which may require special attention if encountered below the bearing surfaces. This should not adversely affect the foundation load capacity of the site soils. However, it is recommended that any cracks encountered should be over-excavated to remove any softened infill soil materials and backfilled with compacted general engineered fill.

In addition, the JWAL report included values for approximate ground surface strain that could theoretically be experienced in a worst case scenario, should an old mine roadway

collapse in the future. The range of strain approached 0.001 in the worst case areas along the perimeter of mined areas and overlying mine roadways. There are also cautions presented for buildings higher than four storeys in height. It is recommended that the issue of potential mine subsidence should be reviewed by the project structural engineer to verify that the type of structures proposed can structurally accommodate these ranges of strain.

Based on EBA's review of these mining subsidence studies, given the depth of the coal mine workings, it is considered that relatively small, lightly loaded surface developments at prairie level would likely not be adversely affected by the presence of the mine workings. However, the weight of larger structures must be considered in order to limit the risk of additional residual subsidence of the mine workings, induced by structure loading. In addition, the possibility of additional mine subsidence, and any residual surface strains must be considered for all foundations within the area noted to be above the mine on Figure 1.

4.0 GENERAL CONSIDERATIONS

4.1 GENERAL SUBDIVISION DEVELOPMENT

Based on EBA's understanding that a detailed geotechnical evaluation will be completed for this development to verify the geotechnical recommendations contained in this report, the following construction recommendations are provided for consideration. These recommendations are based on the assumption that an adequate level of monitoring will be provided during construction and that all construction will be carried out by a suitably qualified Contractor, experienced in earthworks construction. An adequate level of monitoring for earthworks construction is considered to be full-time monitoring, compaction testing and complimentary laboratory materials analyses.

The initial topsoil stripping depth should be considered as being of particular importance. In this area, the surficial topsoil (A Horizon) layer is somewhat variable in thickness and can be attributed to cultivation of the land surface. However, for such a development, the majority of any underlying B Horizon layer (organic stained, but inorganic) can likely remain in place during site stripping and incorporated into the fill mass during general site grading. Full-time monitoring by experienced personnel is recommended where stripping quantities and the subgrade support characteristics are required by contract.

Subgrade preparation is required in all subdivision development areas, including lot grading as well as all paved areas to City of Lethbridge Standards. This includes stripping of topsoil and deleterious soil, debris, or fill materials, scarification and moisture conditioning and compaction to engineered fill standards. The native medium plastic clay and clay till soils should be acceptable for site grading purposes. Moisture conditioning (both wetting and drying) is anticipated to be required to reduce the swelling potential of the clay soils and to achieve the compaction standards recommended. Higher soil moisture contents in low lying wet areas should be expected. Proof-rolling within roadways to detect soft areas is also recommended.

Low lying wet areas will be encountered. These areas commonly have increased vegetation growth accompanied by a deeper root zone as well as soft subgrade conditions. Special review of wet organic areas will be required and all organic topsoil must be removed from these areas. All organic soil layers, wet and/or soft soils and any deleterious soils must be removed from these areas during site grading. These areas should then be infilled with general engineered fill.

Isolated areas of deleterious debris should be expected within the farmstead properties. It is assumed that any buildings will be demolished and all site features will be removed. All debris must be removed from the site and properly disposed of.

The clay till soils should be suitable for compacted clay liner materials, as discussed in subsequent sections of this report. The clay soils may also be suitable, pending laboratory analysis of this soil type, however, lacustrine soils, particularly very silty clay or silt are generally not suitable as general engineered fill materials where low permeability is a requirement for design purposes.

The construction methodology for installation of the utility services is anticipated to be open trench excavation. As excavation proceeds, following stripping, the excavated soil will generally be comprised of a mixture of clay, silt, and clay till soils. Generally, a variable soil moisture profile for the site soils to be encountered should be expected in all areas.

Materials separation and treatment for approved engineered fill soils are discussed in the subsequent sections of this report. Moisture conditioning of all soil materials to closer to optimum moisture content should be expected by the contractor. Waste or unusable materials should be wasted off site, dried to more suitable moisture, or replaced with better quality engineered backfill materials.

4.2 LOT GRADING

In general terms, the lot grading should be designed and carried out to the current City of Lethbridge Infrastructure Services Engineering Standards. All lots should be initially graded for drainage at a minimum gradient of 2.0%. The existing surficial site soils comprising medium plastic clay and clay till are suitable for use as 'landscape fill' materials or for use as 'general engineered fill' materials for lot grading.

Deleterious materials encountered should be removed from the site. These materials are not suitable for use as general engineered fill for this development. As noted, any organics, soft and wet soils or deleterious materials must be removed to expose the underlying native clay soils. The excavated areas should be backfilled with general engineered fill to satisfy grading requirements.

The moisture content of the site soil materials at surface is expected to be above or below the anticipated optimum moisture content for these soils in most areas. It is anticipated therefore, that moisture conditioning consisting of both wetting and drying will be required at the site for proper compaction. The earthwork contractor should, however, make his

own estimate of the requirements and should consider such factors as weather and construction procedures.

General engineered fill materials for lot grading should be moisture conditioned to within a range of –1% of optimum to +2% of the optimum moisture content prior to compaction and compacted to a minimum of 98% of SPD.

4.3 STREET SUBGRADE PREPARATION

Subgrade preparation should be undertaken prior to pavement construction. The recommended standard for subgrade preparation is a minimum of 98% of Standard Proctor Density (SPD). Clay soils should be compacted with moisture content –1% to +2% of the Optimum Moisture Content (OMC). For cohesionless soil types, the moisture content should be ±2% of the OMC. A minimum depth of subgrade preparation of 300 mm is recommended for previously constructed embankments and areas within the utility trench backfill footprint. A minimum 600 mm subgrade preparation depth is recommended for disturbed areas (i.e. fill areas).

In areas where clay fill soils of unknown origin or quality standards are encountered, these should be removed, moisture conditioned, and replaced to design subgrade elevation as general engineered fill materials to the recommended compaction standards set out in this report.

Although the conditions expected from experience in this area, specifically in terms of groundwater levels, are generally not expected to be significantly adverse, it would be prudent to include a contingency for geotextile, should localized areas of subgrade instability be encountered. Use of geotextile should not be considered as an alternate for subgrade preparation as recommended, but an alternative should subgrade instability exist after subgrade preparation.

Based on EBA's local experience, the contractor should be made aware that subgrade difficulties often arise at moisture contents of 3% over optimum, as noted in the current City of Lethbridge Standards, where siltier soils are encountered. Therefore, in practice, the moisture content within proposed paved areas should be limited to no more than 2% over optimum for acceptable subgrade support conditions.

Backfill to raise these areas to subgrade level should be general engineered cohesive fill materials, as defined in this report, moisture conditioned and compacted as noted previously. The subgrade should be prepared and graded to allow drainage into catchbasins. Proof-rolling of the prepared surface is recommended to identify localized soft areas and for an indication of overall subgrade support characteristics.

It is imperative that positive surface drainage be provided to prevent ponding of water within the roadway structure and subsequent softening and loss of strength of the subgrade materials. Surrounding landscaping should be such that runoff water is prevented from ponding beside paved areas in order to avoid softening and premature failure of the pavement surface.

The pavement design should include provisions for subsurface drainage of the pavement granular layers. For urban sections it is considered appropriate to provide subsurface drainage in the form of longitudinal subdrains along the edge of the pavement structure. Subdrains will provide a means of evacuating water that infiltrates the pavement structure, either through cracks and vertical details (e.g. face of gutter), or from peripheral surface runoff. The subdrain should consist of a perforated flexible plastic drainpipe (100 mm diameter), complete with filter sock. The drain should be placed along the edge of the pavement section in a recessed area of the prepared subgrade. Positive outfall of the drains should be provided at catchbasin locations or other stormwater outfalls.

4.4 CONSTRUCTION EXCAVATIONS

Excavations should be carried out in accordance with the Alberta Occupational Health and Safety Regulations. For this project, based on our understanding of the project requirements, the depth for the trench excavations may vary between 2 m and 9 m below existing ground surface. The following recommendations notwithstanding, the responsibility of trench and all excavation cut slopes resides with the Contractor and should take into consideration site specific conditions concerning soil stratigraphy and groundwater. All excavations should be reviewed by a geotechnical engineer prior to personnel working within the base of the excavation.

As excavation proceeds, consideration should be given to separation of the varying soil materials encountered as far as practical and where economically viable. For example, clay soils with moisture contents of close to the optimum moisture content for the materials should be stockpiled separately from wetter clay soils, which will require mixing or drying.

Excavations within stiff clay soils which are to be deeper than 1.5 m should have the sides shored and braced or the slopes should be cut back no steeper than 1.0 horizontal to 1.5 vertical. Flatter sideslopes may be required in areas where groundwater is encountered within sand/silt seams, which may cause local sloughing and instability of the excavation sidewalls. In these instances, the excavation configuration design should be reviewed by a geotechnical engineer as required, prior to allowing personnel to enter the base of the excavation. Some widening of the trench slope (1.0H:1.0V) should be expected near the existing ground surface if wetter surficial soils will be encountered. Thin wedges of soil should not be left in place between separate trenches (i.e. between alignment of water lines versus sanitary lines) unless approved by qualified personnel (professional engineer).

Vertical trench cuts utilizing trench box wall support is not recommended due to the inherent difficulty in compacting the backfill materials to an engineered standard, as well as the potential of cave-ins of the excavation sidewalls against the utility box.

Any encountered groundwater seepage should be directed towards sumps for removal from the excavation. Conventional construction sump pumps should be capable of accommodating groundwater control.

The maximum allowable sideslopes for utility trenches may not be governed by OH&S regulations, but by construction methodology for ensuring appropriate transition lengths from backfill soils to native soils. As an example, an appropriate transition of 1H:1V is normally recommended to avoid abrupt changes in subgrade stiffness and subsequent consolidation/cracking of the pavement structure. However, areas of multiple trenches, varying trench depth, and position of trenches (parallel or perpendicular to roadway alignments) need to be considered. EBA would be pleased to provide further specific recommendations, once final roadway/utility configurations are known.

The composition and consistencies of the soils encountered along the utility alignment are such that conventional hydraulic excavators should be able to remove these materials. It should be noted that the risk of encountering boulders is considered to be low.

Temporary surcharge loads, such as spill piles, should not be allowed within a distance equal to the depth of the excavation from an unsupported excavation face while mobile equipment should be kept back at least 3.0 m. All excavation should be checked regularly for signs of sloughing, especially after rainfall periods. Small earth falls from the sideslopes are a potential source of danger to workmen and must be guarded against.

4.5 TRENCH BACKFILL AND COMPACTION

All utility pipes should be properly embedded within manufacturer approved granular bedding materials (pipe zone). The granular bedding should extend to a minimum of 100 mm and 300 mm below and above the utility pipe respectively, or to greater thicknesses if recommended by the utility pipe manufacturer. The granular bedding material should conform to the requirements and gradation of the pipe manufacturer or to the standards set by City of Lethbridge.

The anticipated site soils comprising clay, silt, or clay till, are considered adequate for use as 'general engineered fill' within the trenches above the bedding zone.

The moisture content of the clay, silt, and clay till soils are estimated to be variable with respect to their Standard Proctor optimum moisture content (OMC). As such, moisture conditioning should be anticipated for this project. The earthwork contractor should, however, make his own estimate of the requirements and should consider such factors as weather and construction procedures.

The level of compaction of the backfill must be suitable to limit post construction trench settlement both for the road embankment as well as to maintain the design surface drainage (stormwater control) profile of the right-of-ways. Therefore, a minimum compaction level of 95% of Standard Proctor maximum dry density (SPD) is recommended for backfill within the pipe zone of the trench (to 300 mm above the top of pipe). For the remainder of the trench backfill, a minimum compaction standard of 98% of SPD should be utilized in all areas. The compacted thickness of each lift of backfill shall not exceed 250 mm. Moisture conditioning to –1% of optimum and +2% over optimum moisture content of the soils should be specified for general trench backfill. During placement of the backfill

materials it is recommended that 'notching' of the excavation sidewalls (1H:1V) every 1 m in height occur to develop a bond between the native soils and backfill materials, resulting in less potential for long-term settlement or consolidation.

Localized sand and/or silt pockets which may be encountered within the clay till should be 'wasted' or incorporated into the approved backfill materials, as specified by qualified personnel, ensuring the design intent of the backfill work is maintained.

It should be noted that the ultimate performance of the trench backfill is directly related to the uniformity of the backfill compaction. In order to achieve the uniformity, the lift thickness and compaction criteria should be strictly enforced.

4.6 CONCRETE ISSUES

4.6.1 Concrete Type

For this development, based on EBA's experience and CSA A23.1-04, the recommended concrete exposure classification for general usage is anticipated to be Class S-2 (CSA A23.1-04, Table 3). For this exposure classification, alternatives include the usage of Type HS (Sulphate Resistant) Portland cement, or blends of cement and supplementary cementing materials, conforming to Type MSb and/or Type HSb cements (CSA A3001-03).

For all concrete exposed to soil and/or groundwater (i.e., including all building foundation concrete, all below grade concrete, and surface works concrete), a maximum water/cementing materials (W/CM) ratio of 0.45 is recommended. Based on EBA's experience with Alberta aggregates, a W/CM ratio of 0.45 normally corresponds to a 28-day compressive strength of 28 MPa or greater (32 MPa at 56-days).

Air entrainment of 4% to 6% by volume is recommended for all concrete exposed to freezing temperatures, native soils and/or groundwater. This should be increased to 5% to 7% for exterior flatwork.

4.6.2 Concrete Surface Works

With respect to surface works concrete (i.e., specifically concrete curbs and sidewalks), the recommendations provided in this report for subgrade preparation, including moisture conditioning and compaction, are intended to provide relative uniformity in the subgrade. The intention of uniformity, with respect to material type and moisture content, is to reduce the risk of differential concrete movements due to soil volume changes as a result of fluctuating moisture content. For these types of developments, a gradual increase in moisture content is common, resulting from precipitation, reduced evaporation, and irrigation. However, some differential movement and subsequent cracking of concrete surface works should be anticipated, typical for the Lethbridge area.

With respect to providing a layer of granular material beneath surface works concrete, there are both positive and negative consequences. In the positive sense, it must be assumed that the subgrade will be uniformly graded properly such that any moisture gaining access beneath the concrete within the granular layer would be drained away quickly to an area

designed to accommodate excess moisture (i.e., roadway weeping tile tied into the storm system). If well drained, the provision of granular material also serves to reduce some differential distortions, when washed materials are used, and has been documented as helping to reduce longitudinal cracking.

On the negative side, if free drainage of the granular layer is not designed, constructed, and maintained, granular materials provide easy access for excess moisture to pond below the concrete, causing swelling of the medium plastic subgrade soils and/or consolidation of fill soils. There is also a risk of softening of the adjacent roadway pavement edges.

The risk of differential movement of the subgrade soils and the economic consequence for either option should be given due consideration by the municipal engineer.

4.7 STORMWATER POND DEVELOPMENT

4.7.1 General

It is understood that the development will include a stormwater containment pond.

It is understood that the containment facility will include areas considered as a wet pond, in addition to areas considered as dry ponds, as defined by Alberta Environment. The stormwater facility will provide overland stormwater drainage for this area in accordance with municipal regulations.

Based on similar developments in the City, it is anticipated that the proposed sideslopes for the pond below normal operating level will be no steeper than 3 horizontal to 1 vertical. Above normal water level, the sideslopes are recommended to be no steeper than approximately 5 horizontal to 1 vertical.

In the preparation of the recommendations provided for the geotechnical aspects of design and construction of the containment facility for other developments, EBA reviewed pertinent sections of the "Stormwater Management Guidelines for the Province of Alberta", dated January 1999 as prepared by the Municipal Program Development Branch of Alberta Environmental Protection (known now as Alberta Environment (AENV)). The following subsections provide the general recommendations for the stormwater facility anticipated as part of this development. The specific subsections have been taken from previous geotechnical evaluations, conducted for projects with similar subsurface stratigraphy.

4.7.2 General Pond Base Preparation

Following stripping of any organic material from the pond, the containment basin areas should be over-excavated beneath the proposed invert elevation in order to allow sufficient thickness of compacted clay base liner. The clay till soil within the base of the excavation should then be scarified to a minimum depth of 300 mm, moisture conditioned to between –1% and +2% of optimum moisture content, and recompacted to a minimum of 98% of SPD. The intent is to improve the base conditions and to provide a low permeable pond base, effectively increasing the clay liner thickness by 300 mm.

The basin sidewalls in the cut areas (up to high water level) should also be over-excavated a sufficient amount to allow the construction of a compacted clay liner with the exposed subgrade scarified, moisture conditioned, and compacted as noted above.

Monitoring of excavated soils within the pond footprint is recommended so that unsuitable materials, such as low plastic silts or cohesionless sands are wasted or incorporated only in general landscape areas (above high water level), where low permeability is not a requirement.

4.7.3 Remoulded Clay Liner

The following recommendations for the design and construction of remoulded clay liners are based on compliance with Alberta Environment's publication, "Stormwater Management Guidelines for the Province of Alberta", dated January 1999. This publication does not specifically provide permeability recommendations for wet ponds, however, it does provide a guideline in Figure 6.10, Wet Detention Pond Plan Sections, for "suitable subgrade to prevent infiltration below permanent depth (Max = 1.2 m/Min = 0.6 m).

Based on previous experience, the clay till soils are most likely suitable for use as a compacted clay liner, in conformance with the guidelines. For preliminary consideration, it is recommended that the thickness of remoulded clay liner be 0.6 m along the base of the wet pond and 1.0 m along the sidewalls up to normal water elevation. The sidewall liner thickness may be reduced to 0.6 m from normal water level to high water level and in other areas which will normally not be below the water level. These thicknesses account of the potential of desiccation of the upper 0.2 m during the initial periods when the wet pond is empty. They also account for potential disturbance (primarily of the sidewalls) during storm events or during periods of shore maintenance. The 0.3 m initial subgrade preparation depth may be included as part of the total liner thickness, provided base preparation is completed in accordance with the recommendations of this report.

The plan dimensions of the excavation should exceed the final "toe to toe" interior basin dimensions to provide an overlap between the pond floor liner and berm or sideslope liner. The subgrade should be relatively level and proof-rolled to provide a good base for compacting the first liner lift to the specified density. Soft pockets that would prevent sufficient compaction of the liner must be overexcavated and replaced with compacted cohesive clay fill materials. In lieu of satisfying the compaction requirements, a geotextile fabric (such as Armtec 200) may be required on or about the elevation of any encountered soft subgrade, although this is not anticipated for the current site conditions.

Careful site observation and testing will be required to avoid incorporating low or non-plastic materials into the liner. It is recommended that materials with a liquid limit of less than 30% not be incorporated into the liner. However, low plastic clays, silt or sands not meeting liner requirements, may be used in the top area of the embankment above HWL or outside the liner zone for berms.

Soil moisture contents for the clay till are generally variable with respect to the optimum moisture content. Moisture conditioning will be required during liner construction for the pond. Appropriate methods of moisture conditioning should be reviewed with qualified construction personnel prior to final design of the liner system.

Subsequent to the preparation of the pond floor (to 0.3 m depth), the excavated clay soils (liner borrow material) should be moisture conditioned to between –1% of the optimum and +3% over the optimum moisture content as determined by the Standard Proctor Test. Each lift should then be compacted to a minimum of 98% of SPD in lifts of maximum 150 mm compacted thickness to a total placed liner thickness of 0.6 m for the base, as recommended above.

A maximum "clod" size of 100 mm during moisture conditioning (prior to compaction) will produce a relatively uniform moisture content throughout the soil matrix and a relatively homogenous compacted soil structure. The size of the "clods" can be controlled with agricultural equipment such as a disk. As far as practical, the liner should be built up in a uniform fashion over the containment basin area, in order to avoid sections of "butted fill" where seepage paths may develop. Compaction should be carried out utilizing "kneading" type compaction equipment such as vibratory padfoot or sheepsfoot type compactors. Completed liner areas should have the surface smoothed by a vibratory smooth drum roller.

Sideslope liners in "cut" areas should have a minimum thickness (perpendicular to the slope face) of 1.0 m, as noted. The cohesive materials for the sideslope liners should be moisture conditioned and compacted as indicated above for the pond bottom.

If a lift of liner soil is allowed to become dry and desiccated prior to the placement of the next lift, the exposed surface should be scarified, re-moisture conditioned, and recompacted. Prior to lake filling and during maintenance periods when the pond is empty, the pond bottom should be prevented from drying out beyond 0.2 m as accounted for in the design liner thickness.

4.8 PAVEMENT CONSIDERATIONS

For the purposes of the desktop geotechnical evaluation, the City of Lethbridge standard pavement structure sections should be used for preliminary design and budgeting of the pavement surface requirements. Traffic loading requirements should be taken into consideration.

5.0 FOUNDATIONS

5.1 SHALLOW FOUNDATIONS

Shallow foundations, if considered, should be constructed approximately 1.4 m below the final design exterior ground surface (frost protection requirement). At this depth the foundation subgrade soil generally consists of firm to very stiff, damp to very moist, medium plastic, silty clay or clay till.

The net allowable static bearing pressure for the design of strip and spread footings for residential construction at this depth and in this area is normally taken as 75 kPa, on native, undisturbed clay soils. This net allowable bearing pressure is a preliminary estimate based on EBA's own experience with soils in the area and should be confirmed prior to footing placement. This assumes a factor of safety from ultimate bearing capacity of 3.0. Footing dimensions should be in accordance with the minimum requirements of the Alberta Building Code 1997 (Section 9.15.3 Footings).

It is recommended to use a smooth edge-trimming bucket or Grade-All for final excavation to the foundation subgrade elevation to minimize disturbance of the founding soils. The foundation concrete should be placed immediately following excavation to ensure the bearing clay soil does not dry out to below the plastic limit.

The anticipated foundation clay soils may be prone to volume changes (both heave and consolidation) with varying moisture content. Therefore, a permanent weeping tile system is typically recommended around the outside perimeter of the structure at the foundation elevation to maintain a consistent moisture profile of the founding soils. This will reduce the potential of differential movement (heave or consolidation) of the foundations.

Settlement of footings designed and constructed in accordance with the above recommendations should be well within the normally tolerated values of 25 mm total and 20 mm differential.

Recommendations for minimum depth of cover for footings are presented under the heading 'Frost Protection' below.

5.2 BASEMENT CONSTRUCTION

5.2.1 Basement Floor Slabs

Slab-on-grade construction for basements is typical feasible for the subgrade soils anticipated to be encountered on this project, providing certain precautions are undertaken. All excavation should be carried out remotely using a smooth-mouth bucket or Grade-All at final grade in order to minimize disturbance of the base. Basement floor slabs should be supported by a minimum of 150 mm compacted, clean, free-draining granular material.

In areas where floor slabs bear on a clay subgrade soils, the clay may swell following completion of the floor slabs (dependent on plasticity). Therefore, some movement should be anticipated. Any light columns in the basement designed to support the main floor should be of the adjustable "telepost" type.

The slab subgrade should be sloped to provide positive drainage to the edge of the slab. A minimum drainage gradient of 0.5% is recommended.

Slabs-on-grade should be separated from bearing members to allow some differential movement. If differential movement is unacceptable, a structurally supported floor system or crawlspace may be considered.

5.2.2 Basement Walls

Basement walls should be designed to resist lateral earth pressures in an "at-rest" condition. This condition assumes a triangular pressure distribution and may be calculated using the following:

$$P_o = K_o (\gamma H + q)$$

where:

P_o	=	lateral earth pressure "at-rest" condition (no wall movement occurs at a given depth)
K_o	=	co-efficient of earth pressure "at-rest" condition (use 0.5 for silt or clay backfill and 0.45 for sand and gravel backfill)
γ	=	bulk unit weight of backfill soil (use 19 or 21 kN/m³ for clay or granular backfill, respectively)
H	=	depth below final grade (m)
q	=	surcharge pressure at ground level (kPa)

It is assumed that drainage is provided for all basement walls through the installation of weeping tile and hydrostatic pressures will not be a factor in design.

5.3 FOUNDATION PERIMETER DRAINAGE REQUIREMENTS

As part of this evaluation, a review included a document entitled, "A Consolidation of a By-Law of the City of Lethbridge Respecting a Sewerage Service Charge and Regulating the Disposal of Sewage and the Discharge of Liquids and Waste into the Lethbridge Sewerage System".

It is understood that all residential weeping tiles will be tied into the City storm sewer system. An acceptable weeping tile system should consist of a perforated weeping tile wrapped in a geosock or geotextile fabric, in turn surrounded with a minimum of 150 mm thick blanket of washed rock (maximum size 20 mm). The weeping tile should have a minimum 0.5% slope leading to a sump to then discharge as noted above.

5.4 FROST PROTECTION

For protection against frost action, perimeter footings in heated structures should be extended to such depths as to provide a minimum soil cover of 1.4 m. Isolated or exterior footings in unheated structures should have a minimum soil cover of 2.1 m unless provided with equivalent insulation.

5.5 SEISMIC DESIGN

The Site Classification recommended for Seismic Site Response is Classification D, as noted in Table 4.1.8.4.a of the National Building Code of Canada (NBCC) 2005.

6.0 LIMITATIONS

Preliminary recommendations presented herein are based on a review of available geotechnical information in the vicinity of the subject property. The conditions described are anticipated to be reasonably representative of the site. It is understood that a detailed geotechnical evaluation will be conducted for the proposed site development and at that time, the recommendations contained herein reviewed and verified based on an in-situ field geotechnical program.

This report and its contents are intended for the use of Martin Geomatic Consultants Ltd. and the agents of Mr. Joe Meszaros. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Martin Geomatic Consultants Ltd., or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in EBA's Services Agreement and in the General Conditions provided in Appendix A of this report.

7.0 CLOSURE

We trust this report satisfies your present requirements. We would be pleased to provide further information that may be needed during design and to advise on the geotechnical aspects of specifications for inclusion in contract documents. Should you require additional information or monitoring services, please do not hesitate to contact our office.

Respectfully submitted,
EBA Engineering Consultants Ltd.

Prepared by:

Trevor Curtis, E.I.T.
Project Engineer

Reviewed by:

PROFESSIONAL ENGINEER ALBERTA
MARC J. SABOURIN
July 13,09

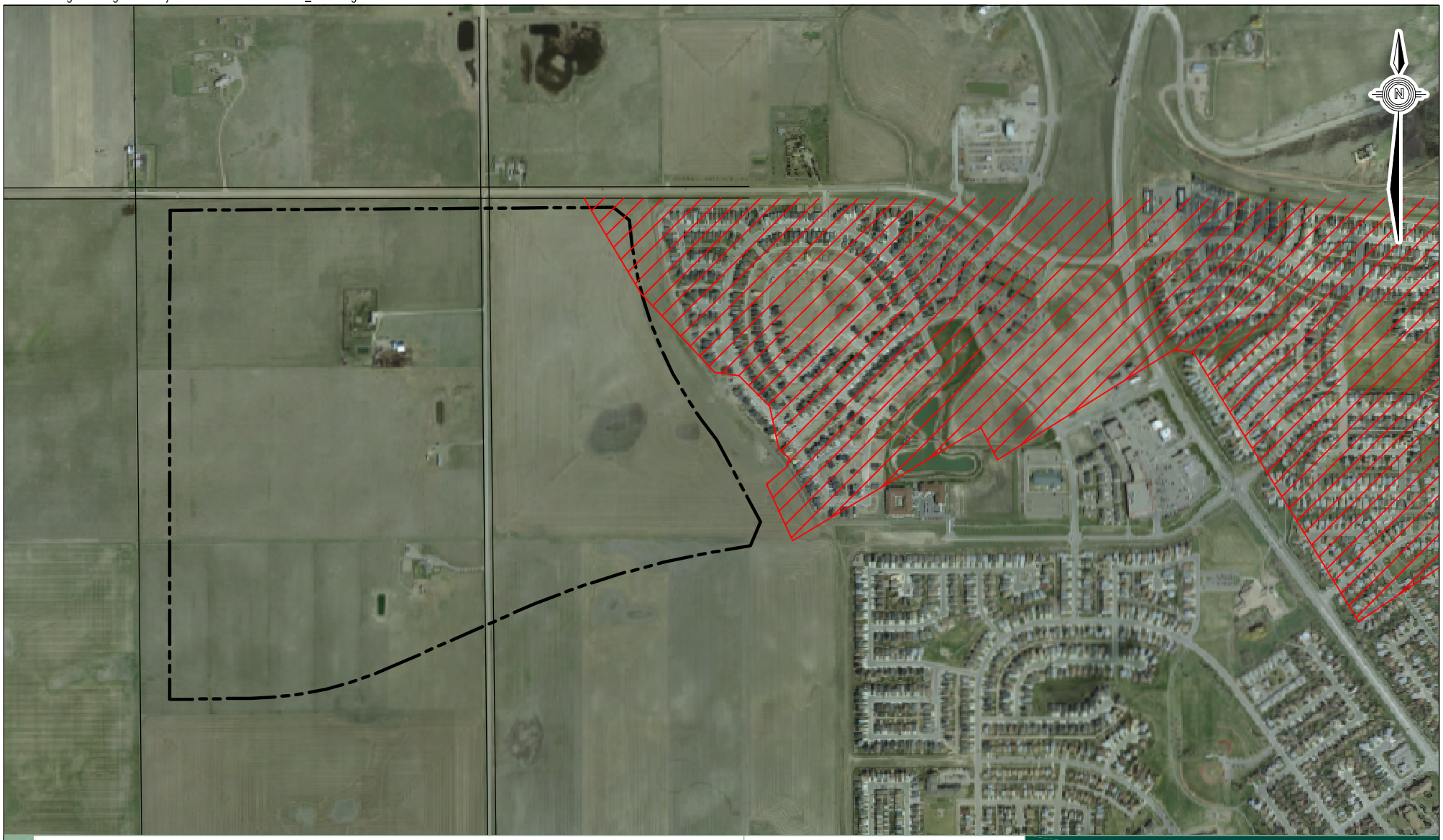
Marc Sabourin, P.Eng.
Senior Project Director

/sdt

PERMIT TO PRACTICE
EBA ENGINEERING CONSULTANTS LTD.
Signature
Date July 13, 09
PERMIT NUMBER: P245
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

FIGURES

\\lethbridge\drafting\L121 Projects\L12101592\L12101592_FIG1.dwg



LEGEND

SITE BOUNDARY

APPROXIMATE LOCATION OF UNDERGROUND MINE

0 200 500m

SCALE 1:12500

CLIENT

Martin Geomatic Consultants Ltd.

COUNTRY MEADOWS - AREA STRUCTURE PLAN

SITE PLAN

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
L12101592	LCH	TC	0

OFFICE: LETH

DATE: July 9, 2009

Figure 1

APPENDIX

APPENDIX A GEOTECHNICAL REPORT – GENERAL CONDITIONS

GEOTECHNICAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA's Client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. EBA's instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

7.0 SURFACE WATER AND GROUNDWATER CONDITIONS

Surface and groundwater conditions mentioned in this report are those observed at the times recorded in the report. These conditions vary with geological detail between observation sites; annual, seasonal and special meteorologic conditions; and with development activity. Interpretation of water conditions from observations and records is judgemental and constitutes an evaluation of circumstances as influenced by geology, meteorology and development activity. Deviations from these observations may occur during the course of development activities.

8.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

9.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

10.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

11.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

12.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

13.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

14.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

Martin Geomatic Consultants Ltd.

Country Meadows Residential Development Traffic Impact Assessment

Lethbridge, Alberta

September 2009

PERMIT TO PRACTICE
ITRANS CONSULTING INC.
Signature _____
Date September 28, 2009
PERMIT NUMBER: P 07086
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

iTRANS Consulting Inc.
4838 Richard Road SW, Suite 140
WestMount Corporate Campus
Calgary, AB T3E 6L1
Tel: (403) 537-0250
Fax: (403) 537-0251
www.itransconsulting.com

Project # 4495

iTRANS Project Team

Project Manager	Megan Fernandes, P. Eng.
Technical Team	Dominic Cheng, E.I.T. Muhammad Amer, M.Eng. Jiajun Li

EXECUTIVE SUMMARY

A. Introduction

Martin Geomatic Consultants Ltd is proposing a residential development, Country Meadows (Site), in west Lethbridge. The development includes:

- 1,300 low density residential
- 841 medium density residential
- 196,000 ft^2 of commercial development
- 500 student elementary school

The site will generate a total of 2,059 trips during the a.m. peak period and 2,910 during the p.m. peak period.

The proposed development will be fully constructed by the 2019 horizon. This analysis also assumed the industrial lands directly north of the Site will be constructed by the 2019 horizon. It was assumed the industrial lands consist of 49 acres of general industrial land use and will generate 371 trips during the a.m. peak period 359 trips during the p.m. peak period.

B. Analysis

The road network was analyzed for the existing, 2019 background and 2019 total horizons for the a.m. and p.m. peak period.

The results from the analysis are summarized in **Table B-1** and show the lowest level of service (LOS) and maximum volume to capacity (v/c) ratio for either the a.m. or p.m. peak period.

Table B-1: Intersection Operation Summary

Intersection	Existing		2019 Background		2019 Total	
	LOS	v/c	LOS	v/c	LOS	v/c
University Drive / Walsh Drive	B	0.71	B	0.82	C	0.90
University Drive / Garry Drive	B	0.84	B	0.80	C	0.95
Metis Trail / Walsh Drive					C	0.69
Metis Trail / Garry Drive					B	0.54
North Access 11 / Walsh Drive					A	0.36
South Access 5 / Garry Drive					B	0.72
South Access 12 / Garry Drive*					A	0.64
Church Street / Garry Drive					A	0.32
West Access 4 / Chinook Trail					A	0.36
East Access / Metis Trail*					B	0.83

*Note: the results summarized for these intersections are for signalized control

Table B-1 shows that all the intersections for the three horizons are able to operate at acceptable levels of service and v/c ratios and the proposed and existing road network is able to support the proposed development.

The access intersections of South Access 2 & Garry Drive and East Access & Metis Trail were found to operate at unacceptable levels as unsignalized intersections. The intersections were analyzed as signalized intersections and were found to operate at acceptable levels.

C. Conclusions

Based on the results of this analysis the following conclusions could be drawn:

- All analyzed intersections are operating at an overall LOS of E and a v/c ratio of 0.91 or lower for the 2019 background and total conditions
- All intersections within the study area are operating at acceptable levels for the existing and 2019 horizons with the improvements to the existing network as listed in **Table C-1** and the ultimate lane configurations and traffic controls illustrated in **Exhibit 7-2**.
- All intersections and site accesses meet City Design Standards in terms of intersection spacing.
- The daily traffic volumes generated by the proposed development (**Exhibit 7-3**) fall within the City road classifications as illustrated in **Exhibit 7-5**.

Table C-1: Intersection Improvement Summary Table

Intersection	Improvements Required for Background Scenario	Improvements Required for Full Build Out Scenario
University Drive & Walsh Drive (signalized)	No improvements required	Additional northbound left turn lane Conversion of eastbound left-through lane to dual eastbound left turn lanes and a single through lane Conversion of westbound left-through lane to single westbound left turn lane and a single through lane
University Drive & Garry Drive (signalized)	No improvements required	Conversion of northbound left turn lane to dual left turn lanes

D. Recommendations

Based on the analysis the following are recommended:

- All proposed Site accesses be constructed to the City Design Standards.
- The intersections within the study area are ultimately expected to be constructed to the lane configurations illustrated in **Exhibit 7-2**.
- All internal roads are expected to be constructed according to road classifications as per **Exhibit 7-5** and the right-of-way widths outlined in the City Design Standards.

TABLE OF CONTENTS

Appendices

I. Initial TIA Sign-off Sheets
II. Existing Traffic Counts
III. Traffic Signal Warrants
IV. Internal Road Network Classification
V. Correspondence with City Staff

Tables

Exhibits

1. INTRODUCTION

iTRANS Consulting Inc. (iTRANS) was retained by Martin Geomatic Consultants Ltd. (Martin) to prepare a Traffic Impact Assessment (TIA) in support of the Country Meadows Residential Development (Site) located in Lethbridge, Alberta.

This TIA follows the *City of Lethbridge Traffic Impact Study Guidelines* document dated March 2008.

Available sign-off sheets have been included in **Appendix I** of this report.

2. PROPOSED SITE AND STUDY AREA

2.1 Development Description

2.1.1 Development Location

The Site will be bound by the Future Chinook Trail to the east, Metis Trail to the west, Walsh Drive to the north, and Garry Drive to the south. The development location and its surrounding area are illustrated in **Exhibit 2-1**.

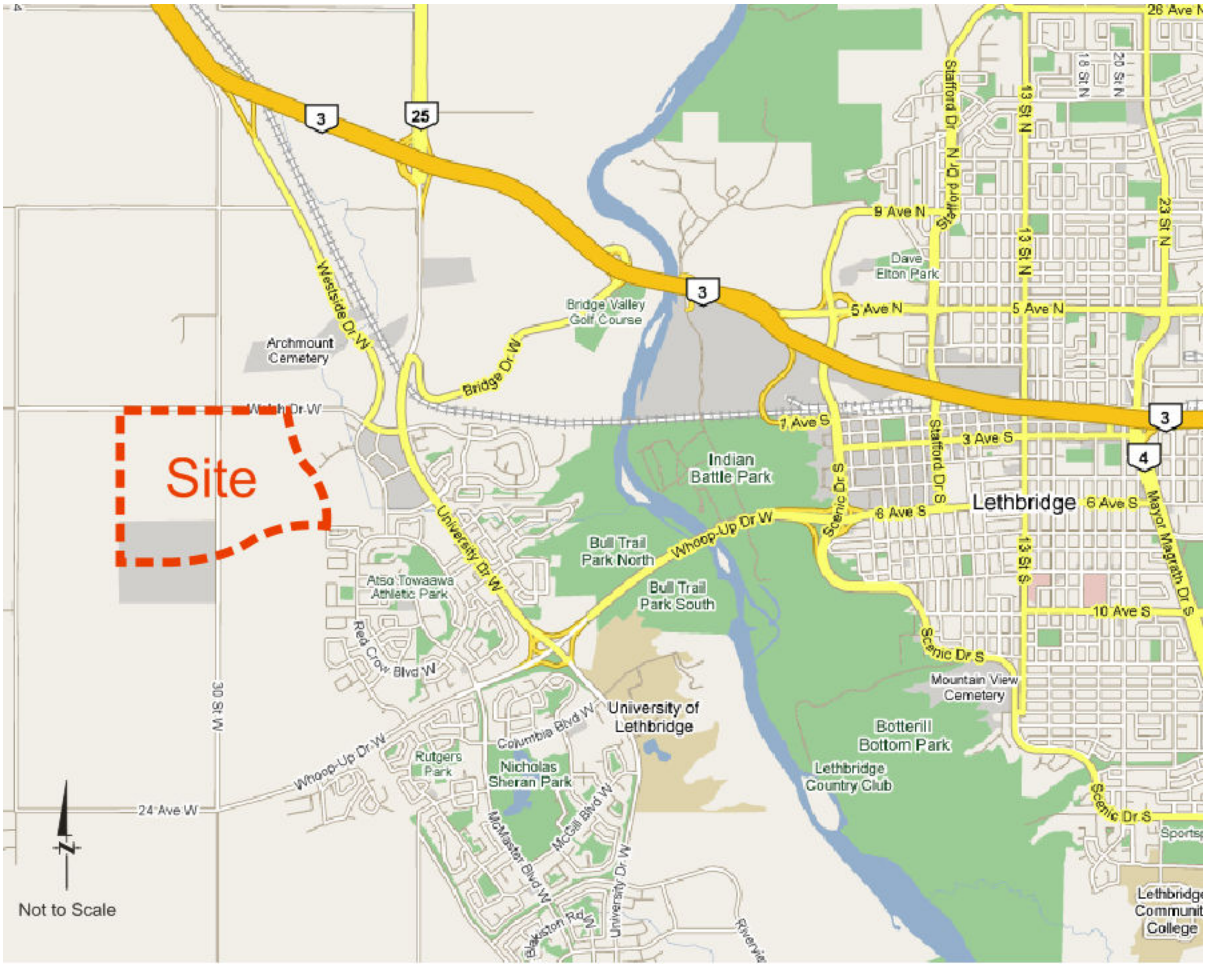


Exhibit 2-1: Site Location

2.1.2 Development Land Use

The proposed site will consist of the following land uses and densities:
- 1,300 low density residential
- 841 medium density residential
- 196,000 ft^2 of commercial development
- 500 student elementary school

The proposed land uses are illustrated in **Exhibit 2-2**.

2.1.3 Development Phasing and Construction

The proposed Site will be completed within a ten year horizon.

2.1.4 Development Transportation Facilities

The proposed Site includes an internal ring road. The Site will also serviced by major routes; Walsh Drive, Metis Trail, Chinook Trail and Garry Drive. The Site will access these main corridors through five all turn accesses.

The proposed Site is currently not serviced directly by transit; however, two routes provide service to communities along University Drive:
- Route 33 – Heritage Heights
- Route 32 – Jerry Potts Boulevard

West Lethbridge includes regional multi-use pathways which service the area along University Drive. There are a few local connections within the West Highlands community, east of the Site.

2.1.5 Study Area

The TIA scope of work was finalized with City of Lethbridge (City) staff through the Initial TIA Sign-off Sheet (**Appendix I**).

The study area is illustrated in **Exhibit 2-3**.

Exhibit 2-2

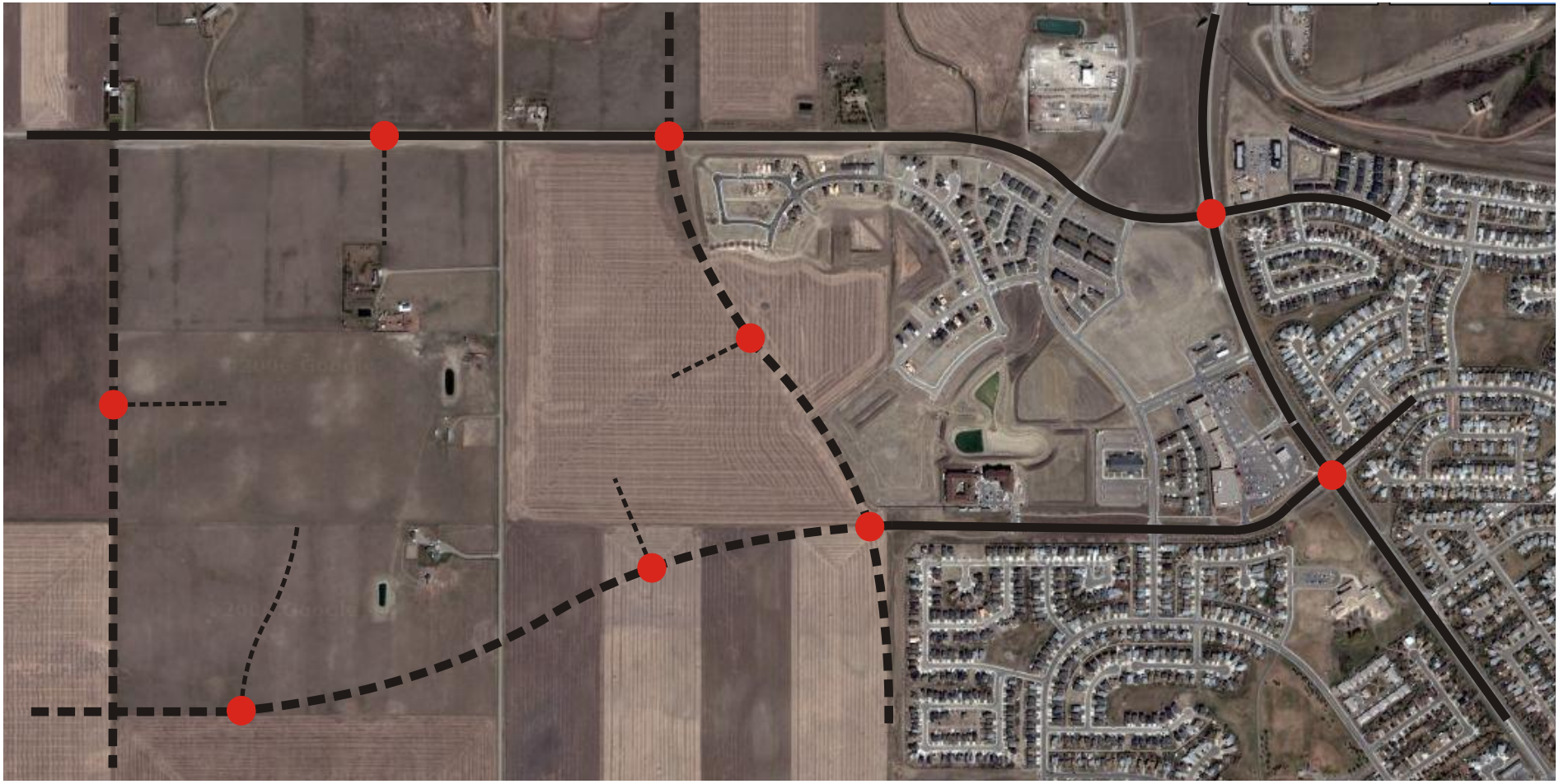
Site Plan

Not to Scale

September 2009

iTRANS

Project # 4495



Legend

- Study Intersection
- Existing Road
- Future Road

Not to Scale

Exhibit 2-3
Study Area

2.1.6 Road Network

The existing road network within the study area is described in more detail in **Table 2-1**. The existing road network is also illustrated in **Exhibit 2-4**.

Table 2-1: Existing Road Network[1]

Road Name	Description
Walsh Drive	Walsh Drive intersections with University Drive and continues west and turns into Township Road 90 at the City boundaries. Walsh Drive is a two-lane cross section road that currently carries approximately 1,600 vehicles per day (vpd) and is classified as a Collector road.
Garry Drive	Garry Drive currently intersects with University Drive and then terminates just west of Highlands Boulevard. The road currently carries approximately 6,500 vpd and has a 2-lane cross section. The road is currently located within a residential development and is currently classified as an Arterial road.
University Drive	University Drive is a north-south 4-lane cross section Arterial road. Daily traffic volumes range from 17,300vpd north of Whoop-Up Drive to 7,200vpd north of Walsh Drive. The speed limit on University Drive is 60km/hr.

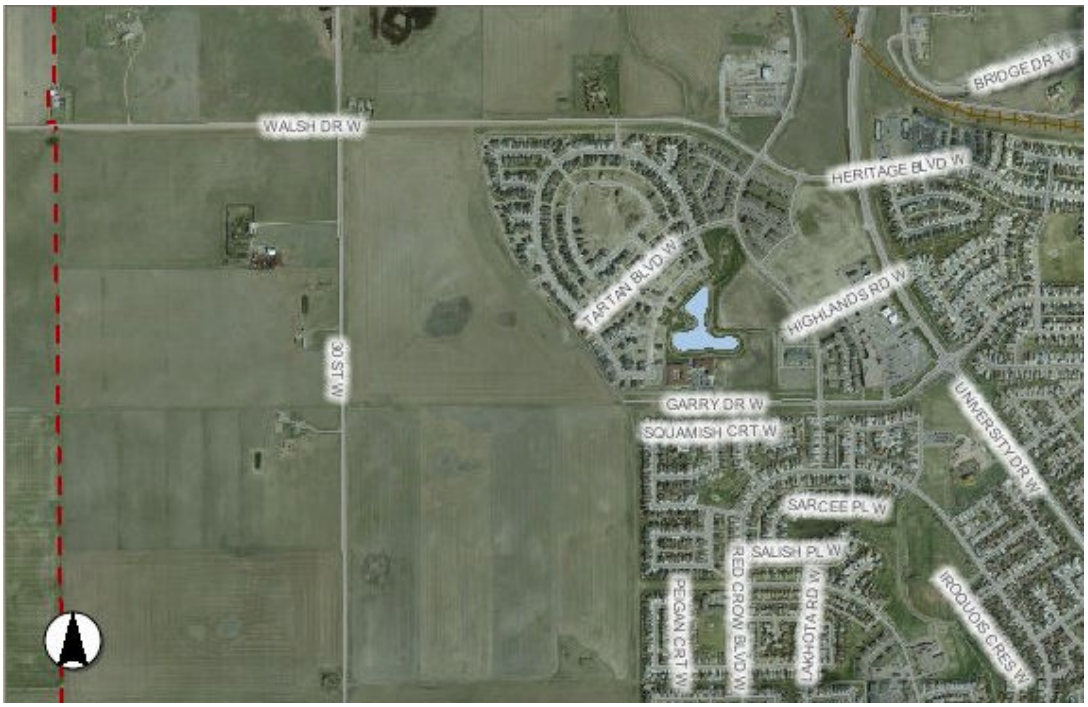


Exhibit 2-4: Existing Road Network[2]

[1] Daily volumes have been obtained from the *City of Lethbridge Infrastructure Services 2007 Traffic Flow Map* unless otherwise stated

[2] City of Lethbridge, Lethbridge Interactive WebMAP, May 2009

2.1.7 Study Area Intersections

The scope of work included analysis of existing conditions for the following intersections:
1. University Drive and Walsh Drive
2. University Drive and Garry Drive

These intersections were included in this analysis to provide the City with operational information to determine if improvements are needed. The location of each intersection is illustrated in **Exhibit 2-5**.

The existing lane configurations are illustrated in **Exhibit 2-6**.

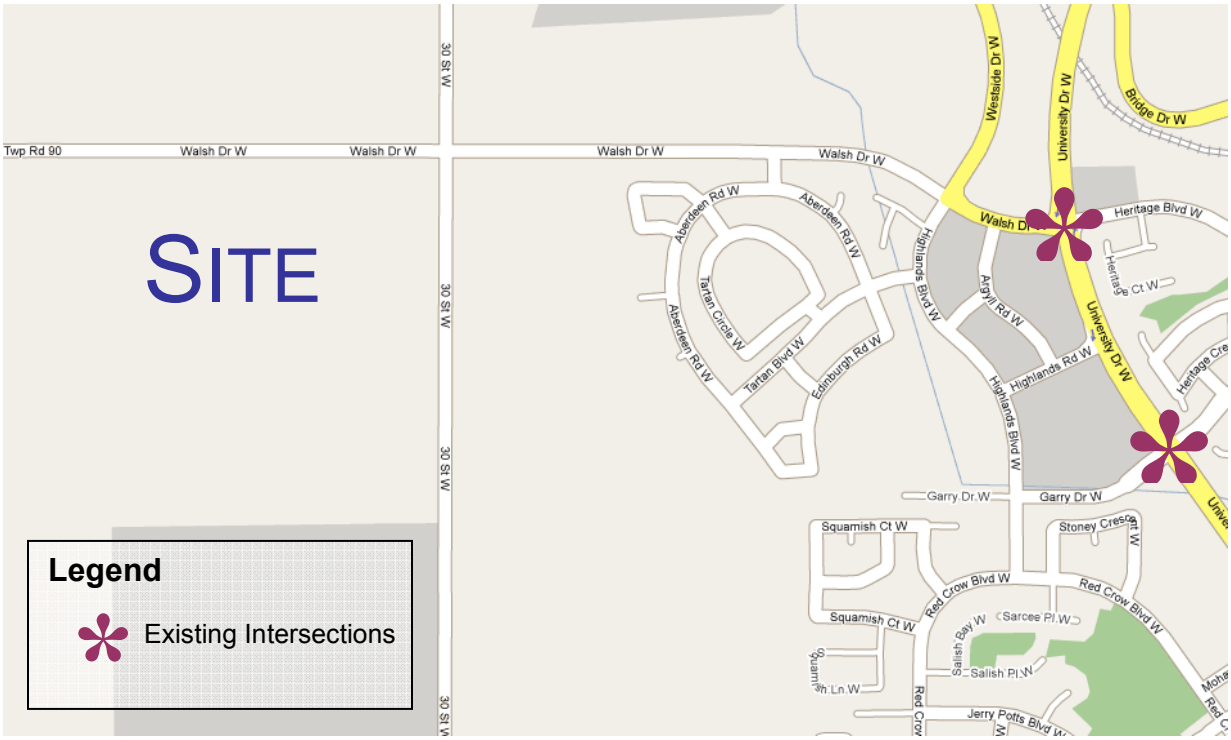


Exhibit 2-5: Existing Intersections

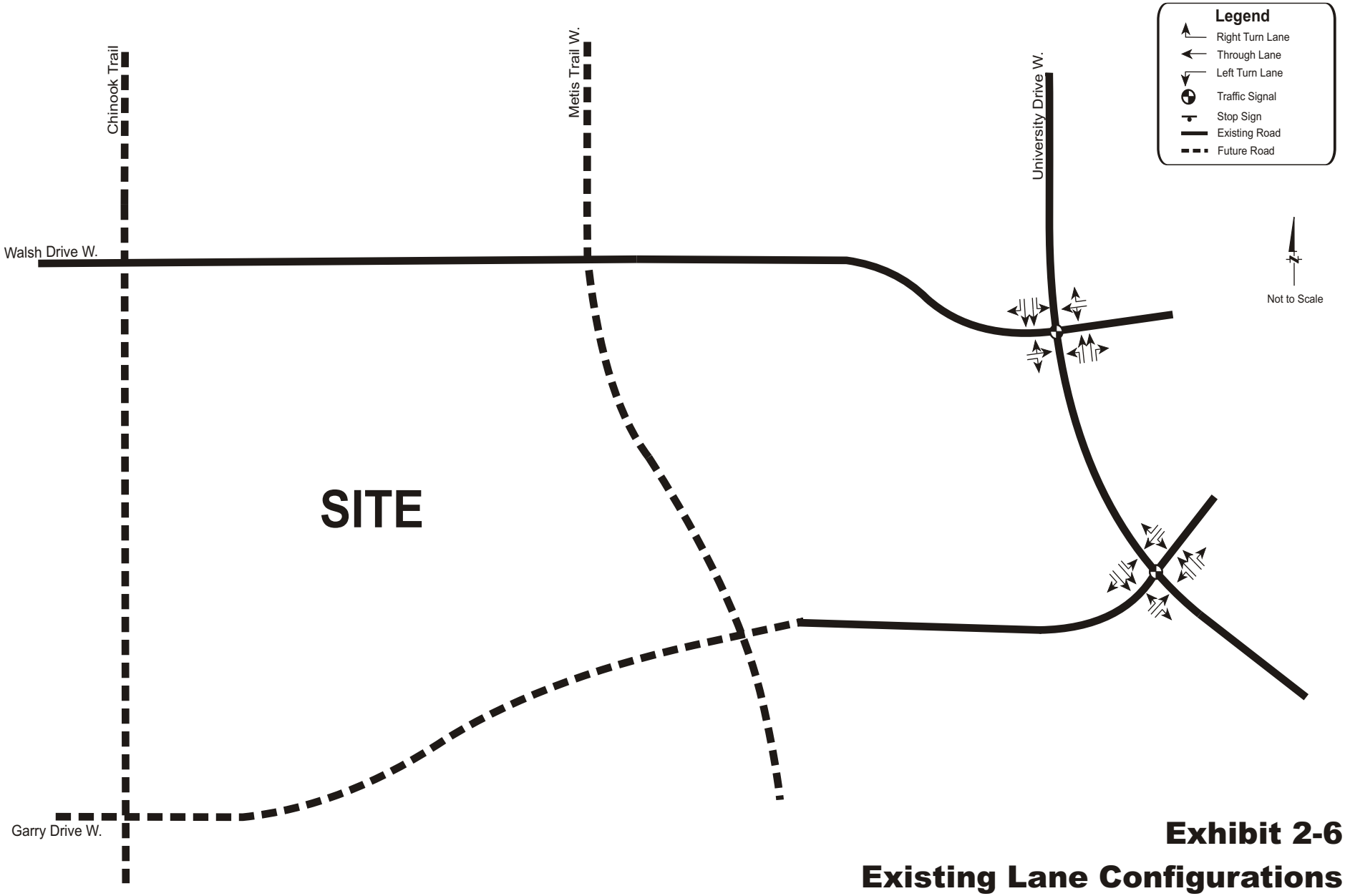


Exhibit 2-6

Existing Lane Configurations

2.1.8 Future Road Improvements

The following are future road improvements planned for West Lethbridge which will impact the study area (**Exhibit 2-7**):

- Metis Trail – a future north-south arterial road that will be the east boundary of the Site
- Chinook Trail – an arterial road located along the west boundary of the City, it will be a north-south road along the west boundary of the Site
- Garry Drive – will be extended further west to intersect with Metis Trail and Chinook Trail

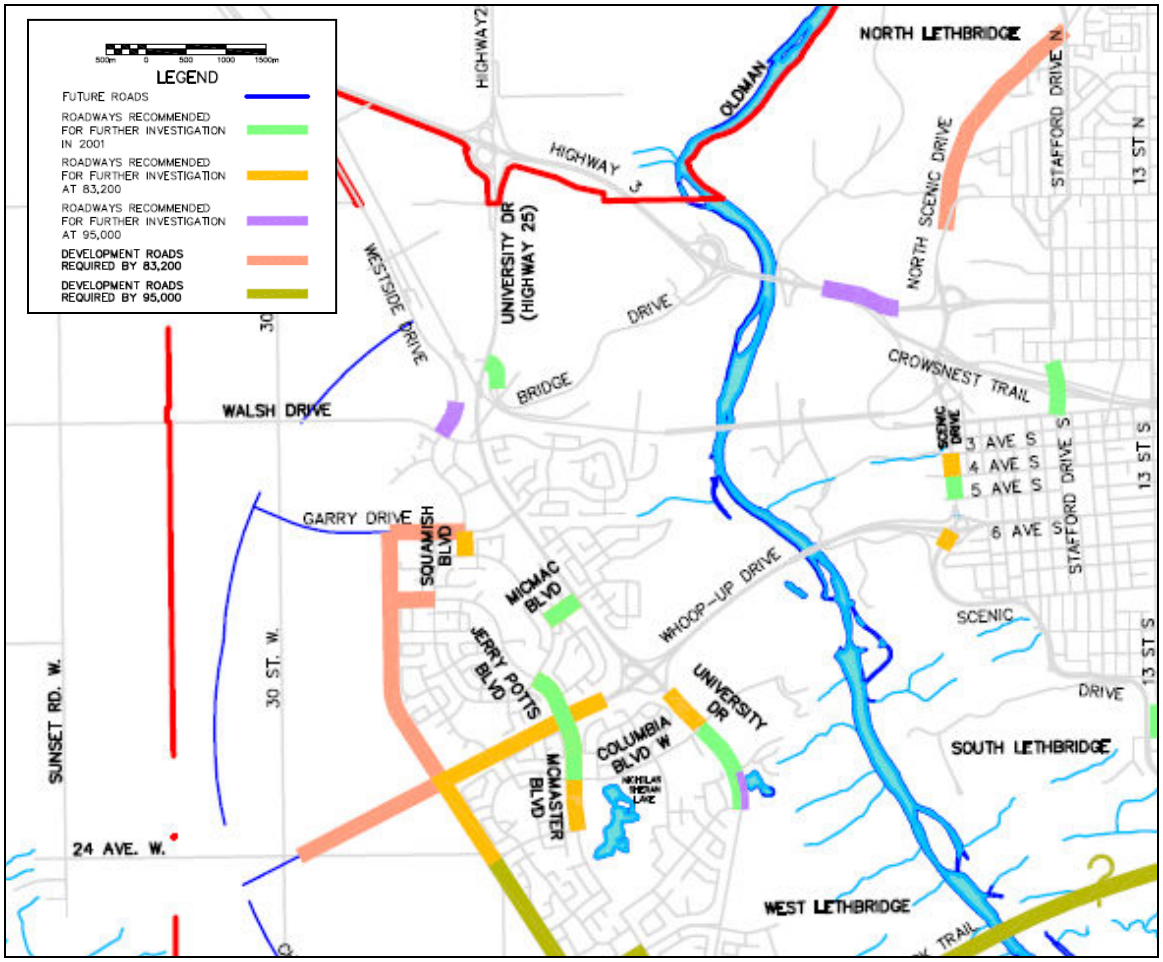


Exhibit 2-7: Future Road Improvements

It has been assumed that all the road improvements summarized above will be constructed by the full build out of the Site.

2.1.9 Study Area Transportation Facilities

The transit routes and regional pathway routes discussed in **Section 2.1.4** also apply to the study area.

The City has designated certain roads for truck and dangerous goods routes. Trucks are able to utilize University Drive and the only dangerous goods route in West Lethbridge is Whoop-Up Drive as illustrated in **Exhibit 2-8**.

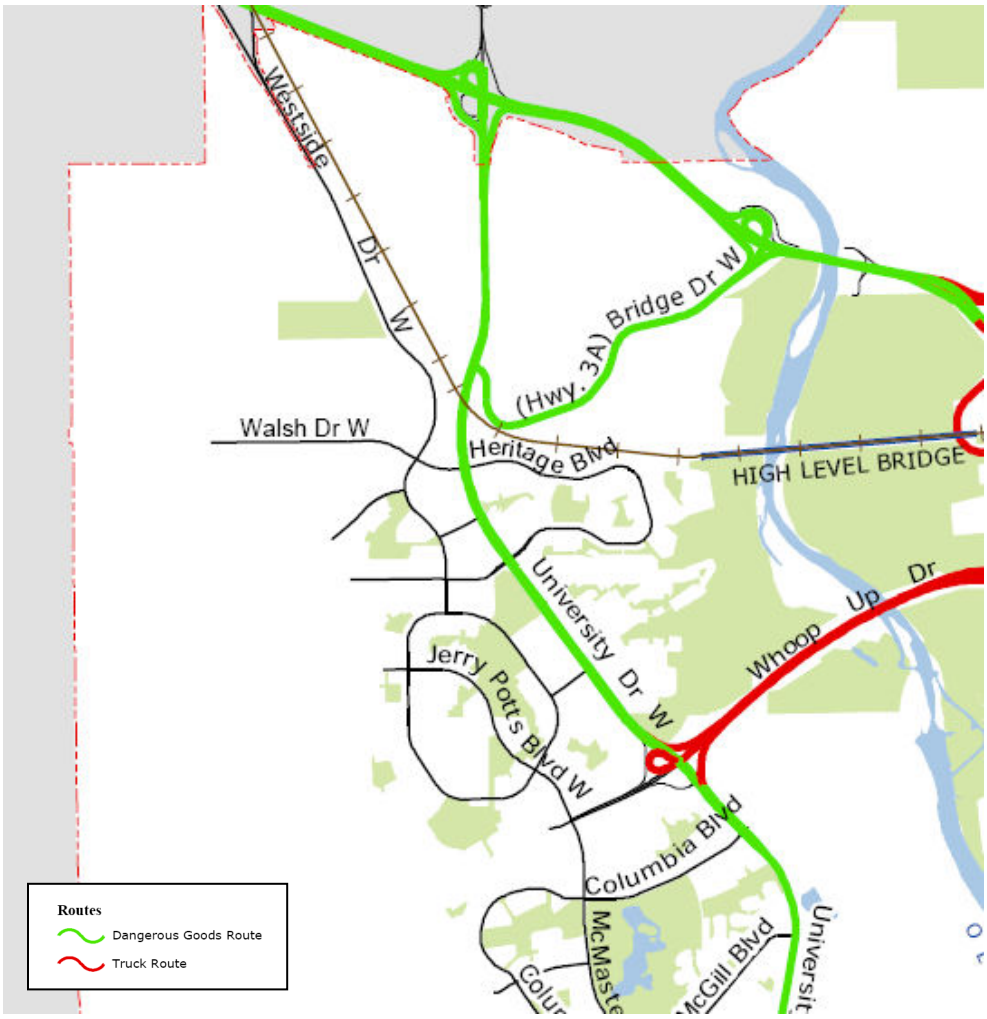


Exhibit 2-8: Truck and Dangerous Good Routes

3. ANALYSIS

3.1 Analysis Horizon

This study looked at existing conditions and the ten year future horizon development volumes which will occur in 2019, which is the assumed full build out of the Site.

3.2 Analysis Peak Hours

The critical time periods investigated for this analysis are the a.m. and p.m. peak hours. The peak hours for existing conditions were determined by the existing traffic counts.

3.3 Analysis Method

Traffic analysis for the future weekday a.m. and p.m. peak hour scenarios were conducted using the methods and procedures of the Highway Capacity Manual (HCM) via Trafficware's Synchro software suite. The typical measures of effectiveness prescribed by the HCM are volume-to-capacity ratio (v/c) and level-of-service (LOS).

For signalized and unsignalized intersections, the LOS is based on the computed delays. LOS A represents minimal delays to minor street traffic movements, and LOS F represents a scenario with an insufficient number of gaps on the major street for minor street motorists to complete their movements without significant delays. For signalized intersections the methodology considers intersection geometry, traffic volumes and composition, the traffic signal/timing plan, and pedestrian volumes. The average delay for each lane group is calculated, as well as the average delay for the overall intersection.

The v/c ratio is also used as an indicator of the extent to which a particular movement's capacity is being utilized. The LOS criteria for both unsignalized and signalized intersections are summarized in **Table 3-1**.

Table 3-1: Level of Service Criteria

Level of Service (LOS)	Average Delay for UNSIGNALIZED Intersections	Average Delay for SIGNALIZED Intersections
A	0 - 10 sec. per vehicle	0 - 10 sec. per vehicle
B	> 10 - 15 sec. per vehicle	> 10 - 20 sec. per vehicle
C	> 15 - 25 sec. per vehicle	> 20 - 35 sec. per vehicle
D	> 25 - 35 sec. per vehicle	> 35 - 55 sec. per vehicle
E	> 35 - 50 sec. per vehicle	> 55 - 80 sec. per vehicle
F	> 50 sec. per vehicle	> 80 sec. per vehicle

3.4 Analysis Improvements

When the desired operational criteria are not met, improvement options are evaluated as follows:

1. Intersection control or optimization
   - Change of intersection control for unsignalized intersections (YIELD controlled to STOP-controlled, etc)
   - Optimization or change of cycle length for signalized signal timings
2. Geometric changes
   - Addition of exclusive lanes, additional lanes, longer storage lengths, etc
3. Signalization
   - Change unsignalized intersections to signalized

4. EXISTING TRAFFIC CONDITIONS

4.1 Traffic Volumes

Existing traffic volumes were obtained from the City of Lethbridge as summarized in **Table 4-1**. As noted in the table, the counts were conducted in 2006 and 2007; therefore an annual growth rate was applied to reflect projected 2009 traffic volumes and illustrated in **Exhibit 4-1**. As discussed later in **Section 5.1**, an annual growth rate of 2% was applied.

Table 4-1: Existing Turning Movement Counts

Intersection	Date	Peak Hours	
		a.m.	p.m.
University Drive & Walsh Drive	November 8, 2006	07:30 – 08:30	16:30 – 17:30
University Drive & Garry Drive	July 12, 2007	07:30 – 08:30	16:15 – 17:15

The existing traffic counts are provided in **Appendix II**.

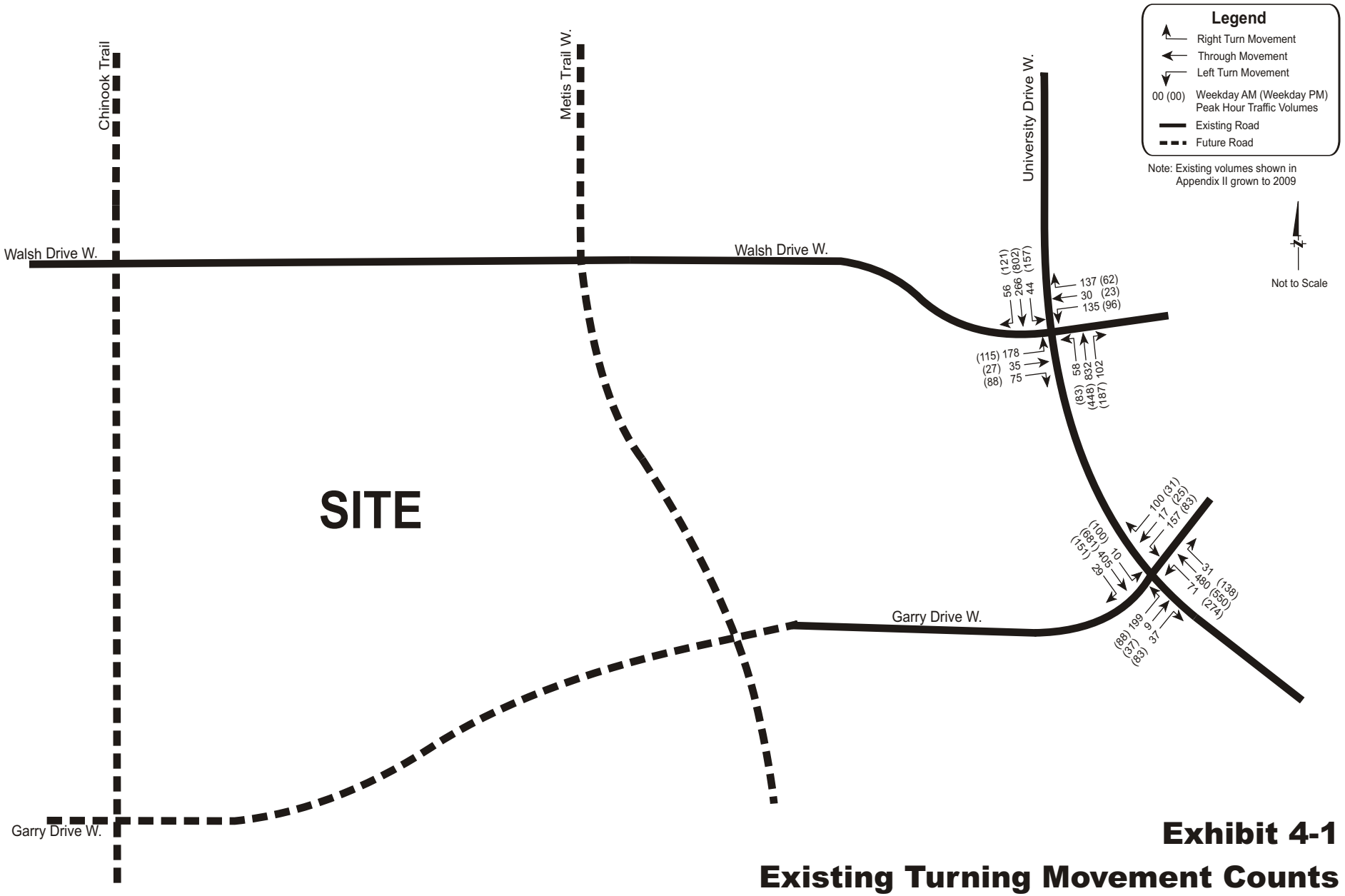


Exhibit 4-1

Existing Turning Movement Counts

4.2 Existing Traffic Conditions

The existing traffic volumes summarized in **Exhibit 4-1** along with the lane configurations illustrated in **Exhibit 2-6**, were analyzed. The results are summarized in **Table 4-2** and **Table 4-3** for the a.m. and p.m. peak, respectively.

Based on the analysis summarized in **Table 4-2** and **Table 4-3**, all intersections are operating at an overall LOS of B and a v/c ratio of 0.84 or lower; therefore, no improvements are required. The corresponding Synchro files for the existing traffic conditions have been included electronically on the attached CD.

Table 4-2: Existing a.m. Peak Hour Results

Intersection/Movement			a.m. Peak hour			
			LOS	delay (s)	v/c ratio	95th queue (m)
University Drive & Walsh Drive (signalized)	EB	Left-Thru	C	24.1	0.71	29.2
		Right	A	3.6	0.17	5.2
	WB	Left-Thru	B	17.9	0.56	22.0
		Right	A	8.4	0.32	13.1
	NB	Left	A	8.3	0.12	8.3
		Thru-Thru	A	9.5	0.51	43.6
		Right	A	2.7	0.13	5.8
	SB	Left	B	12.5	0.24	9.2
		Thru-Thru	A	7.1	0.16	12.8
		Right	A	3.1	0.07	4.3
	Intersection Summary		**B**	**10.7**	**0.71**	-
University Drive & Garry Drive (signalized)	EB	Left	C	22.4	0.65	30.0
		Thru	B	10.8	0.02	2.7
		Right	A	5.0	0.10	4.3
	WB	Left	B	18.0	0.51	23.3
		Thru	B	11.1	0.04	4.0
		Right	A	4.3	0.24	7.0
	NB	Left	A	7.6	0.17	8.7
		Thru-Thru	A	8.5	0.29	31.0
		Right	A	4.7	0.04	4.3
	SB	Left	A	8.0	0.03	2.2
		Thru-Thru	B	10.8	0.28	26.1
		Right	A	5.5	0.04	4.1
	Intersection Summary		**B**	**11.4**	**0.65**	-

LOS – level of service
v/c – volume to capacity ratio

Table 4-3: Existing p.m. Peak Hour Results

Intersection/Movement			p.m. Peak hour			
			LOS	**delay (s)**	**v/c ratio**	**95th queue (m)**
University Drive & Walsh Drive (signalized)	EB	Left-Thru	B	18.4	0.54	18.6
		Right	A	6.5	0.25	8.0
	WB	Left-Thru	B	16.0	0.45	15.7
		Right	A	4.3	0.17	4.9
	NB	Left	B	16.9	0.41	20.4
		Thru-Thru	A	5.9	0.26	18.8
		Right	A	2.0	0.22	7.0
	SB	Left	A	9.8	0.38	21.6
		Thru-Thru	A	7.3	0.46	37.0
		Right	A	2.1	0.15	5.7
	Intersection Summary		**A**	**7.9**	**0.54**	-
University Drive & Garry Drive (signalized)	EB	Left	B	18.1	0.39	30.0
		Thru	B	13.3	0.12	2.7
		Right	A	5.7	0.25	4.3
	WB	Left	B	17.8	0.37	23.3
		Thru	B	12.8	0.08	4.0
		Right	A	6.4	0.11	7.0
	NB	Left	C	34.7	0.84	8.7
		Thru-Thru	A	9.0	0.34	31.0
		Right	A	3.0	0.18	4.3
	SB	Left	A	7.1	0.30	2.2
		Thru-Thru	B	11.3	0.52	26.1
		Right	A	3.1	0.22	4.1
	Intersection Summary		**B**	**12.6**	**0.84**	-

LOS – level of service
v/c – volume to capacity ratio

5. BACKGROUND TRAFFIC

Future background traffic consists of two types of traffic:
- Background Base Traffic
- Background Development Traffic

The addition of the background base traffic and the background development traffic forms the 2019 background traffic.

The background traffic is described in detail in the following sections.

5.1 2019 Background Base Traffic

Background base traffic volumes are the volumes which will exist by the 2019 horizon without the Site being constructed. To obtain the background base traffic volumes for the 2019 horizon, an annual growth rate was applied to the existing traffic volumes shown on **Exhibit 4-1**.

The annual growth rates applied to the existing traffic volumes for this study were based on growth rates from ***The Crossings Traffic Impact Assessment*** iTRANS report dated July 2007 and are:
- 2.0% annual growth rate from existing to 2015
- 1.5% annual growth rate from 2015 onwards

The 2019 background base traffic volumes are shown in **Exhibit 5-1**.

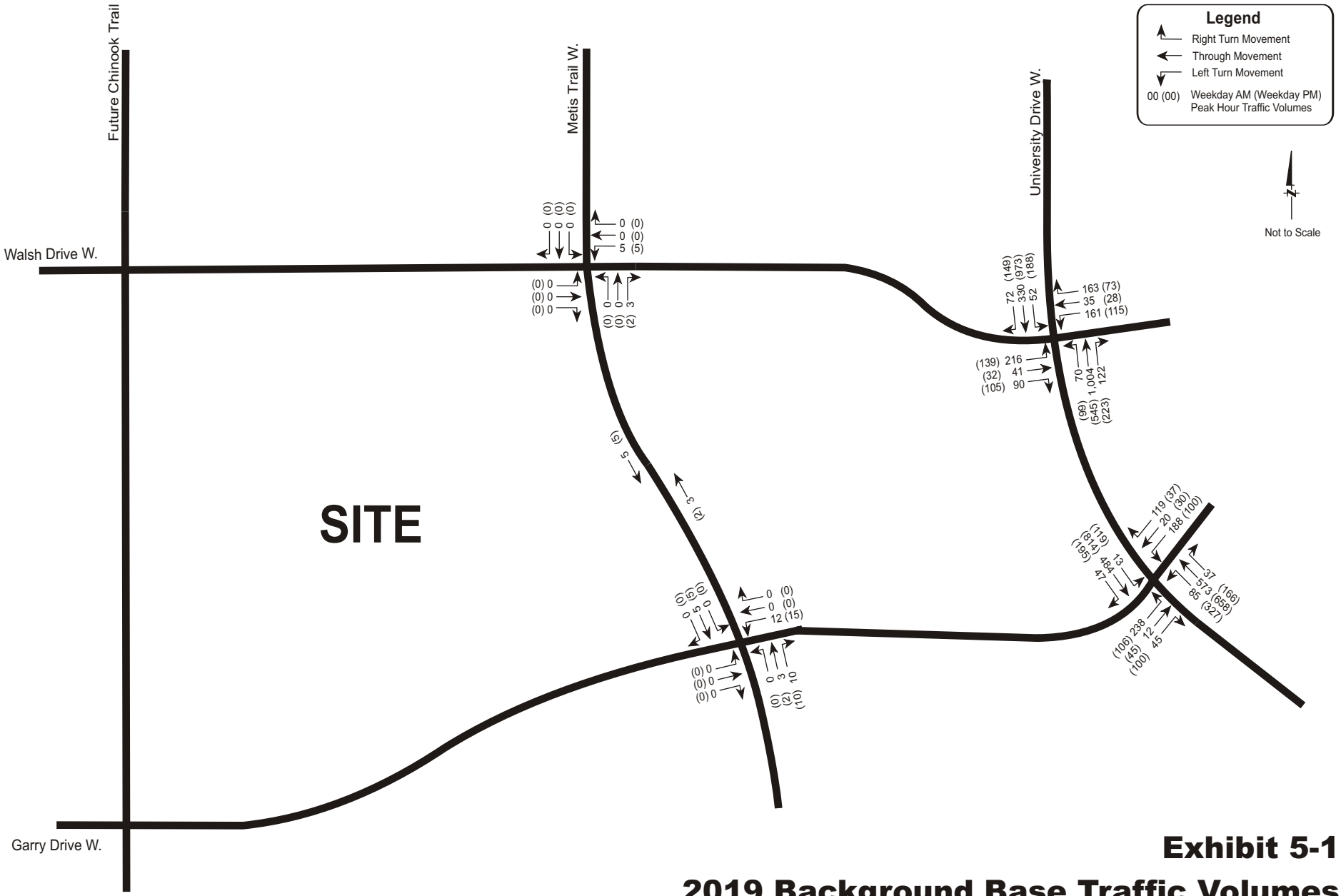


Exhibit 5-1
2019 Background Base Traffic Volumes

5.2 Background Development Traffic

Background developments are future developments, similar to the proposed Site, which are assumed to be constructed by the 2019 horizon.

As requested by City staff, this study assumed land directly north of the Site will be developed with industrial uses. The assumed density and area was provided by City staff. Site details and trip generation is summarized in **Table 5-1**.

Table 5-1: Background Site Characteristics and Trip Generation

Land Use	Area (acres)	a.m.						p.m.					
		Rate	Split (%)		Trips			Rate	Split (%)		Trips		
			in	out	in	out	total		in	out	in	out	total
Industrial Park	49	7.51	83	17	308	63	371	7.26	21	79	75	284	359

The background site traffic was distributed through the road network by applying the trip distribution percentages. The trip distribution is based on those agreed upon with the City for the Site and are summarized in **Table 5-2**.

Table 5-2: Background Site Trip Distribution

Direction	Via	Percentage
North	Chinook Trail W.	0%
	University Drive	25%
	Metis Trail W.	4%
South	Chinook Trail W.	8%
	University Drive	38%
	Metis Trail W.	25%
West	Walsh Drive W.	0%
	Garry Drive W.	0%
East	Walsh Drive W.	0%
	Garry Drive W.	0%
Total		**100%**

The analysis also took into account traffic generated by The Piers Residential development located immediately south of the Site. Traffic will access The Piers via Metis Trail. Volumes for this development at the 2017 horizon year were taken from ***The Piers Traffic Impact Assessment*** completed by iTRANS in December 2007. The Piers study had not assumed Metis Trail would be constructed by the 2017 horizon, so volumes from the intersection of Whoop-Up Drive and Garry Drive were redistributed to reflect possible traffic movements along Metis Trail for the 2019 study horizon for Country Meadows. The background site traffic is summarized in **Exhibit 5-2**.

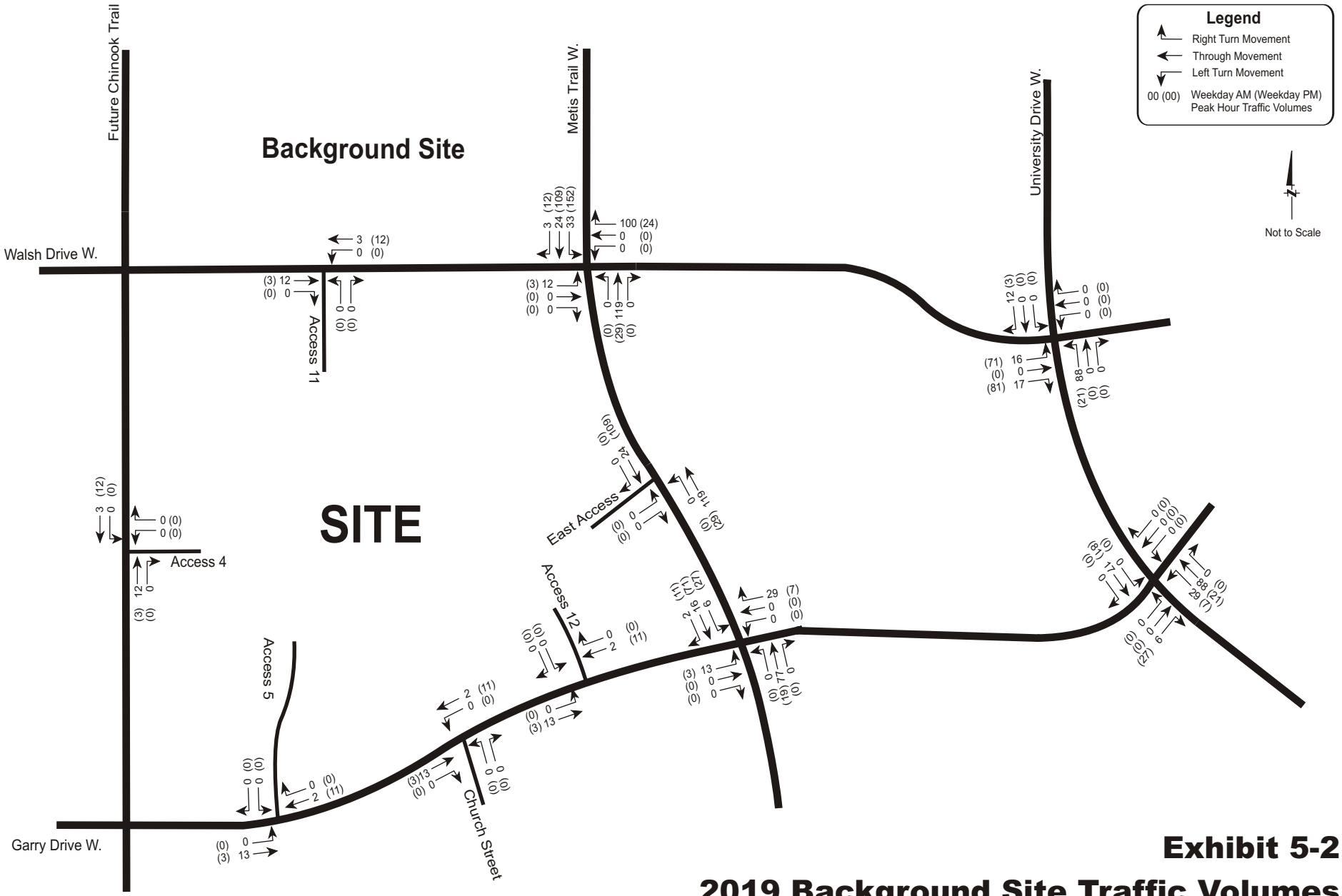


Exhibit 5-2

2019 Background Site Traffic Volumes

5.3 2019 Background Traffic

The 2019 background traffic is a combination of the background base traffic volumes (**Exhibit 5-1**) and the background development site traffic (**Exhibit 5-2**) and is summarized in **Exhibit 5-3**.

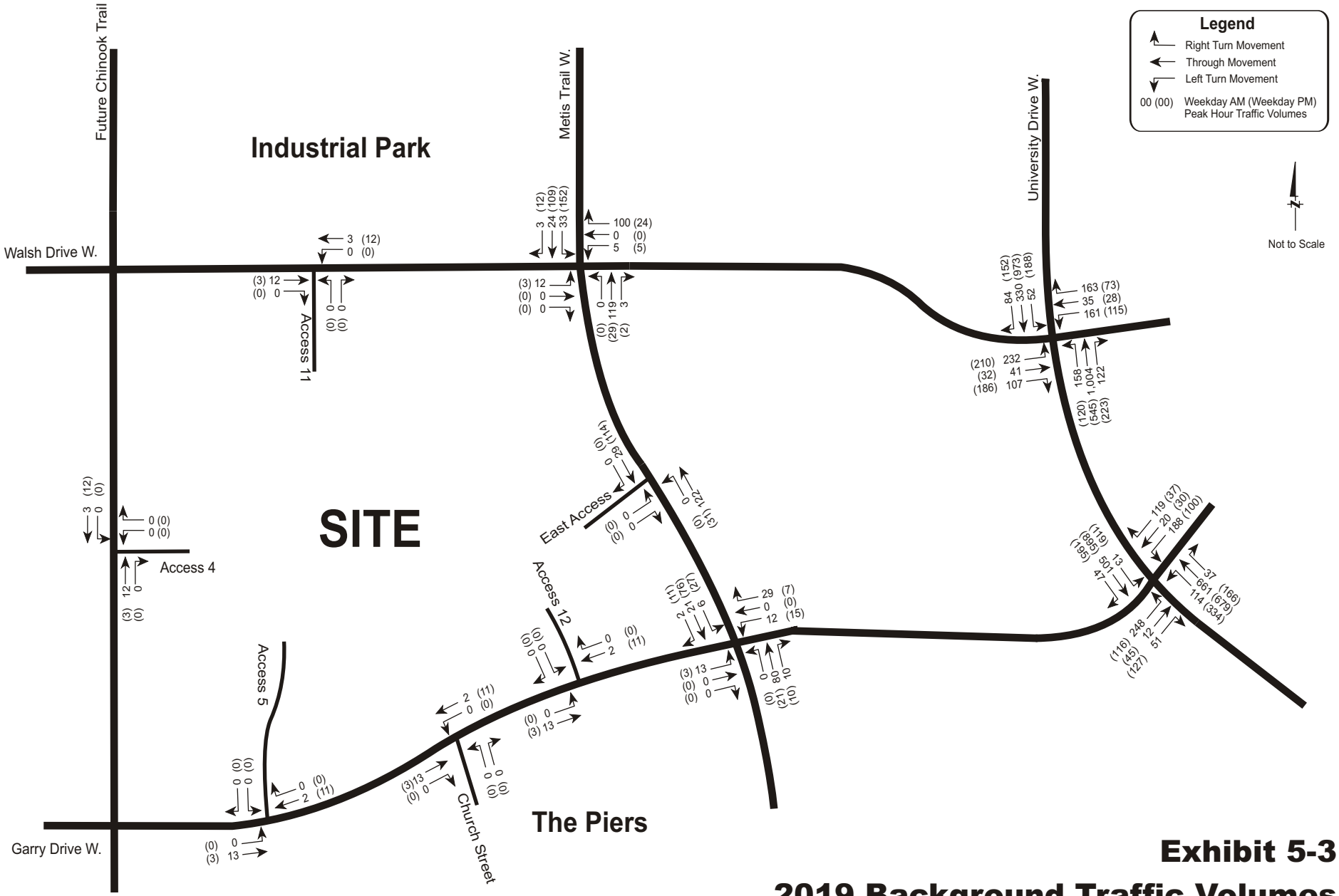


Exhibit 5-3
2019 Background Traffic Volumes

5.4 2019 Background Traffic Analysis

The 2019 background traffic volumes (**Exhibit 5-3**) were analyzed for the a.m. and p.m. peak hour using Synchro and are summarized in **Table 5-3**and **Table 5-4**, respectively.

The 2019 background conditions were analyzed with the lane configurations illustrated in **Exhibit 2-6.**

Table 5-3: 2019 Background a.m. Peak Hour Results with Existing Lane Configurations

Intersection/Movement			a.m. Peak hour			
			LOS	delay (s)	v/c ratio	95th queue (m)
University Drive & Walsh Drive (signalized)	EB	Left-thru	C	32.9	0.82	50.1
		Right	A	3.3	0.20	6.3
	WB	Left-thru	C	23.5	0.69	32.5
		Right	A	10.0	0.34	17.5
	NB	Left	B	13.2	0.42	22.0
		Thru-Thru	B	15.3	0.75	60.6
		Right	A	2.8	0.18	6.3
	SB	Left	B	16.4	0.35	10.9
		Thru-Thru	A	8.5	0.25	15.6
		Right	A	3.0	0.13	5.2
	Intersection Summary		**B**	**15.0**	**0.82**	**-**
University Drive & Garry Drive (signalized)	EB	Left	C	27.0	0.75	38.6
		Thru	B	10.7	0.03	3.3
		Right	A	4.5	0.12	5.0
	WB	Left	B	19.4	0.57	28.3
		Thru	B	10.8	0.05	4.6
		Right	A	4.2	0.26	7.6
	NB	Left	A	9.4	0.31	12.7
		Thru-Thru	A	10.0	0.40	44.5
		Right	A	4.6	0.05	4.6
	SB	Left	A	8.7	0.05	2.7
		Thru-Thru	B	12.9	0.37	32.5
		Right	A	4.9	0.07	5.2
	Intersection Summary		**B**	**13.0**	**0.75**	**-**

LOS – level of service
v/c – volume to capacity ratio

Table 5-4: 2019 Background p.m. Peak Hour Results with Existing Lane Configurations

Intersection/Movement			p.m. Peak hour			
			LOS	delay (s)	v/c ratio	95th queue (m)
University Drive & Walsh Drive (signalized)	EB	Left-thru	C	25.4	0.74	35.5
		Right	B	11.1	0.41	19.8
	WB	Left-thru	B	14.5	0.45	19.1
		Right	A	3.5	0.15	5.2
	NB	Left	D	49.0	0.77	33.6
		Thru-Thru	A	8.9	0.39	26.1
		Right	A	2.7	0.30	8.5
	SB	Left	C	26.8	0.68	41.5
		Thru-Thru	B	13.3	0.69	55.3
		Right	A	2.7	0.22	7.1
	Intersection Summary		**B**	**14.1**	**0.77**	**-**
University Drive & Garry Drive (signalized)	EB	Left	C	32.1	0.57	36.6
		Thru	C	21.1	0.16	3.3
		Right	A	7.3	0.37	5.0
	WB	Left	C	29.6	0.50	28.3
		Thru	C	20.4	0.11	4.6
		Right	A	8.4	0.14	7.6
	NB	Left	C	26.8	0.80	12.7
		Thru-Thru	A	9.9	0.39	44.5
		Right	A	2.4	0.20	4.6
	SB	Left	A	7.7	0.32	2.7
		Thru-Thru	C	10.1	0.70	32.5
		Right	A	3.7	0.29	4.5
	Intersection Summary		**B**	**15.9**	**0.80**	**-**

As illustrated in the **Table 5-3** and **Table 5-4** , all the movements of two reviewed intersections are operating at a LOS B or better and v/c of 0.82 or better in a.m. peak hour and a LOS B or better and v/c of 0.80 or better in p.m. peak hour.

Based on the analysis, no improvements are required for two reviewed intersections.

The corresponding Synchro files for the background traffic conditions have been included electronically on the attached CD.

6. SITE TRAFFIC

6.1 Site Trip Generation

The estimation of the development trip generation was completed using generation rates published in the **Institute of Transportation Engineers Trip Generation** (8th Edition) and from the City of Lethbridge TIA Guidelines dated March 2008.

The proposed site will consist of the following land uses and densities:
- 1,300 low density residential
- 841 medium density residential
- 196,000 ft^2 of commercial development
- 500 student elementary school

Due to the location and the amount of proposed commercial land uses in the South Village located south of the Site, there were no assumptions made for pass-by trips for the commercial uses.

The total traffic generated by the development during the a.m. and p.m. peak periods is summarized in **Table 6-1**.

Table 6-1: Trip Generation Summary

Land Use		a.m. Peak Hour			p.m. Peak Hour		
		In	Out	Total	In	Out	Total
Single-Family Residential (City rates)		No. of Units	1,300				
Gross Trip Generation Rate		0.77		vph/unit	1.02		vph/unit
Gross Vehicle Trips	vph		1,001			1,326	
Directional Splits		26%	74%	100%	64%	36%	100%
Gross Vehicle Trip Splits	vph	260	741	1,001	849	477	1,326
Multi-Family Residential (City rates)		No. of Units	841				
Gross Trip Generation Rate		0.75		vph/unit	0.92		vph/unit
Gross Vehicle Trips	vph		631			774	
Directional Splits		29%	71%	100%	61%	39%	100%
Gross Vehicle Trip Splits	vph	183	448	631	472	302	774
Local Commercial (ITE Trip gen 820)		Area (per 1,000ft^2)	196				
Gross Trip Generation Rate		1.03		vph/1000 ft^2	3.75		vph/1000 ft^2
Gross Vehicle Trips	vph		202			735	
Directional Splits		61%	39%	100%	48%	52%	100%
Gross Vehicle Trip Splits	vph	123	79	202	353	382	735
Elementary School Site (ITE Trip gen 520)		No. of Students	500				
Gross Trip Generation Rate		0.45		vph/student	0.15		vph/student
Gross Vehicle Trips	vph		225			75	
Directional Splits		55%	45%	100%	49%	51%	100%
Gross Vehicle Trip Splits	vph	124	101	225	37	38	75
Net Additional Vehicle Trips	**vph**	**690**	**1,369**	**2,059**	**1,710**	**1,200**	**2,910**

Daily trip generation was also calculated using the ITE informational report and the corresponding rates and trips are summarized in **Table 6-2**.

Table 6-2: Site Daily Trip Generation

Land Use		Daily - Weekday		
		In	Out	Total
Single-Family Residential		No. of Units	1,300	
Gross Trip Generation Rate		9.32		vpd/unit
Gross Vehicle Trips	vpd		12,116	
Directional Splits		50%	50%	100%
Gross Vehicle Trip Splits	vpd	6,058	6,508	12,116
Multi-Family Residential		No. of Units	841	
Gross Trip Generation Rate		9.88		vpd/unit
Gross Vehicle Trips	vpd		8,309	
Directional Splits		50%	50%	100%
Gross Vehicle Trip Splits	vpd	4,155	4,155	8,309
Local Commercial (ITE Trip gen 820)		Area (per 1,000 ft^2)	196	
Gross Trip Generation Rate		42.94		vpd/1000 ft^2
Gross Vehicle Trips	vpd		8,416	
Directional Splits		50%	50%	100%
Gross Vehicle Trip Splits	vpd	4,208	4,208	8,416
Elementary School Site (ITE Trip gen 520)		No. of Students	500	
Gross Trip Generation Rate		1.29		vpd/student
Gross Vehicle Trips	vpd		645	
Directional Splits		50%	50%	100%
Gross Vehicle Trip Splits	vpd	323	323	810
Net Additional Vehicle Trips	**vpd**	**14,743**	**14,743**	**29,486**

6.2 Trip Distribution

The trip distribution percentage for the area was based on The Crossings Traffic Impact Assessment iTRANS report dated July 2007. It was assumed that the distribution for the a.m. and p.m. peak periods would be the same. Based on an assessment of the traffic patterns, the trip distribution pattern for the 2019 horizon year is summarized in **Table 6-3** and illustrated in **Exhibit 6-1**.

Table 6-3: Site Trip Distribution

Direction	Via	Percentage
North	Chinook Trail W.	1%
	University Drive	25%
	Metis Trail W.	3%
South	Chinook Trail W.	8%
	University Drive	36%
	Metis Trail W.	25%
West	Walsh Drive W.	1%
	Garry Drive W.	1%
East	Walsh Drive W.	0%
	Garry Drive W.	0%
Total		**100%**

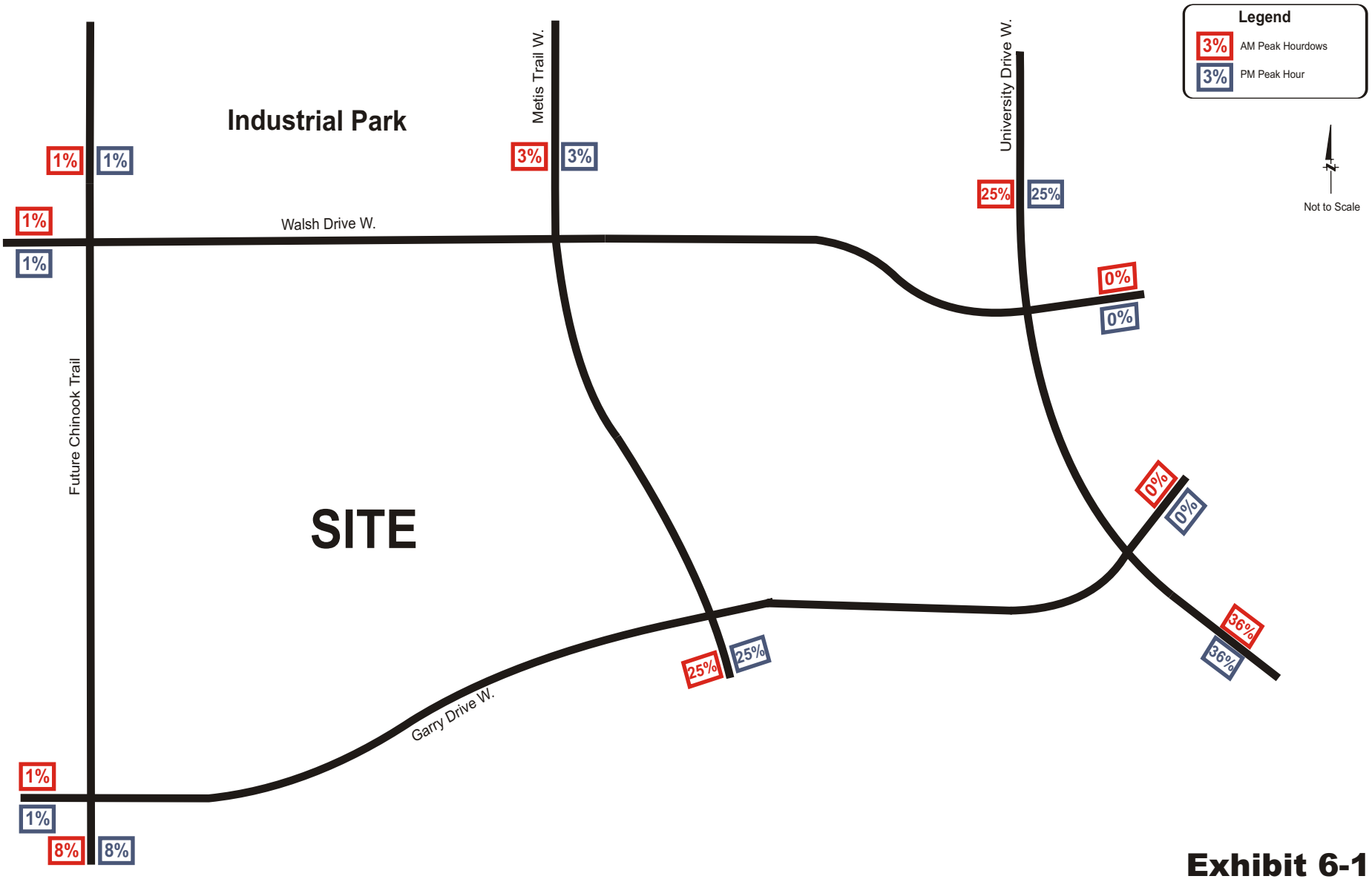


Exhibit 6-1

2019 Trip Distribution

6.3 Trip Assignment

The trips generated by the Site were distributed throughout the road network within the study area by applying the site trip distributions (**Exhibit 6-1**) to obtain the site traffic volumes as illustrated in **Exhibit 6-2**.

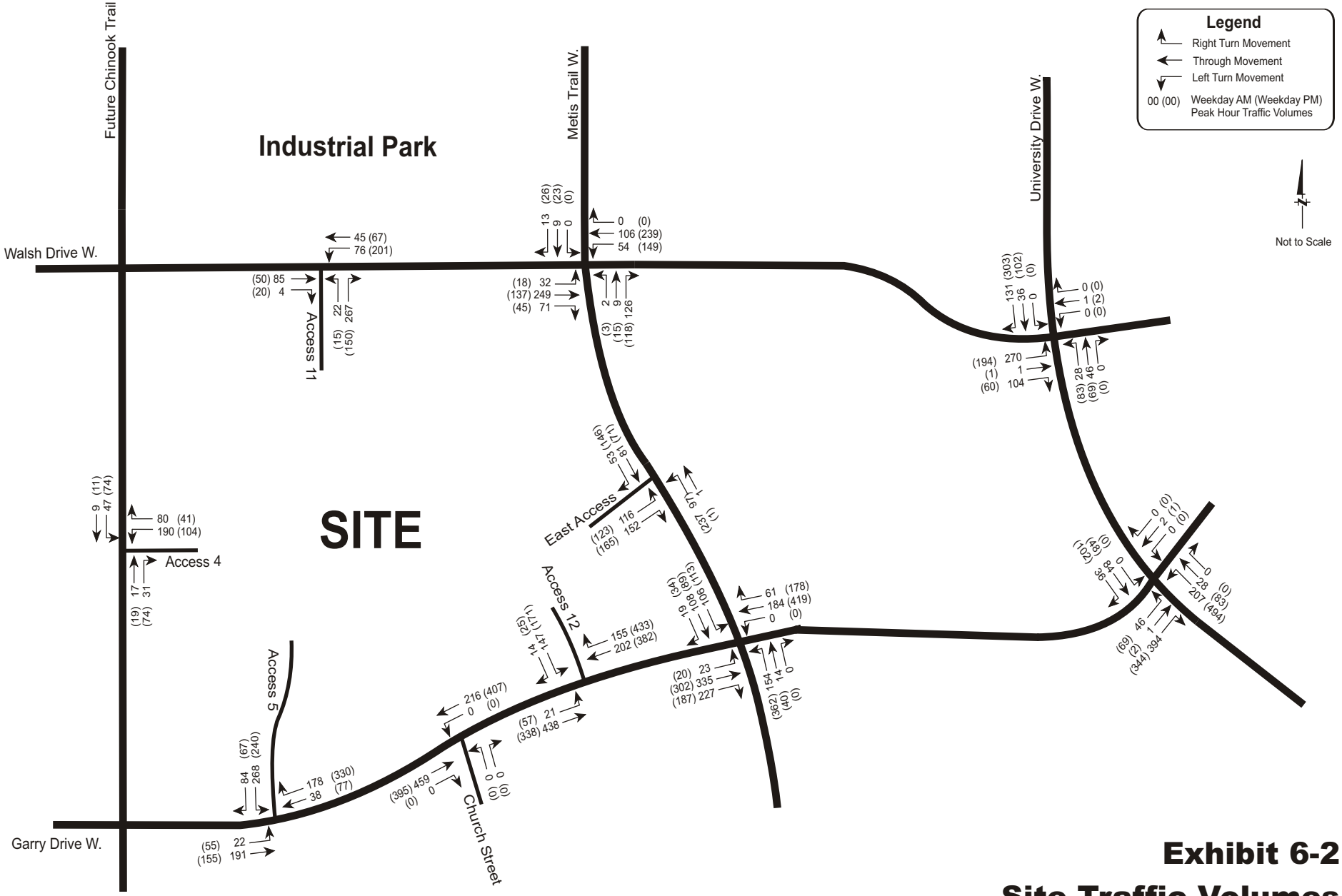


Exhibit 6-2
Site Traffic Volumes

7. 2019 TOTAL TRAFFIC

7.1 2019 Peak Hour Traffic Analysis

The 2019 total traffic volumes are the addition of the 2019 background traffic volumes (**Exhibit 5-3**) and the site traffic volumes (**Exhibit 6-2**) and are illustrated in **Exhibit 7-1**

The intersections of University Drive and Walsh Drive and University Drive and Garry Drive were analyzed with existing lane configurations for the 2019 total traffic volumes for the a.m. and p.m. peak hour and the results are summarized in **Table 7-1** and **Table 7-2,** respectively.

The corresponding Synchro files for the full build-out traffic conditions have been included electronically on the attached CD.

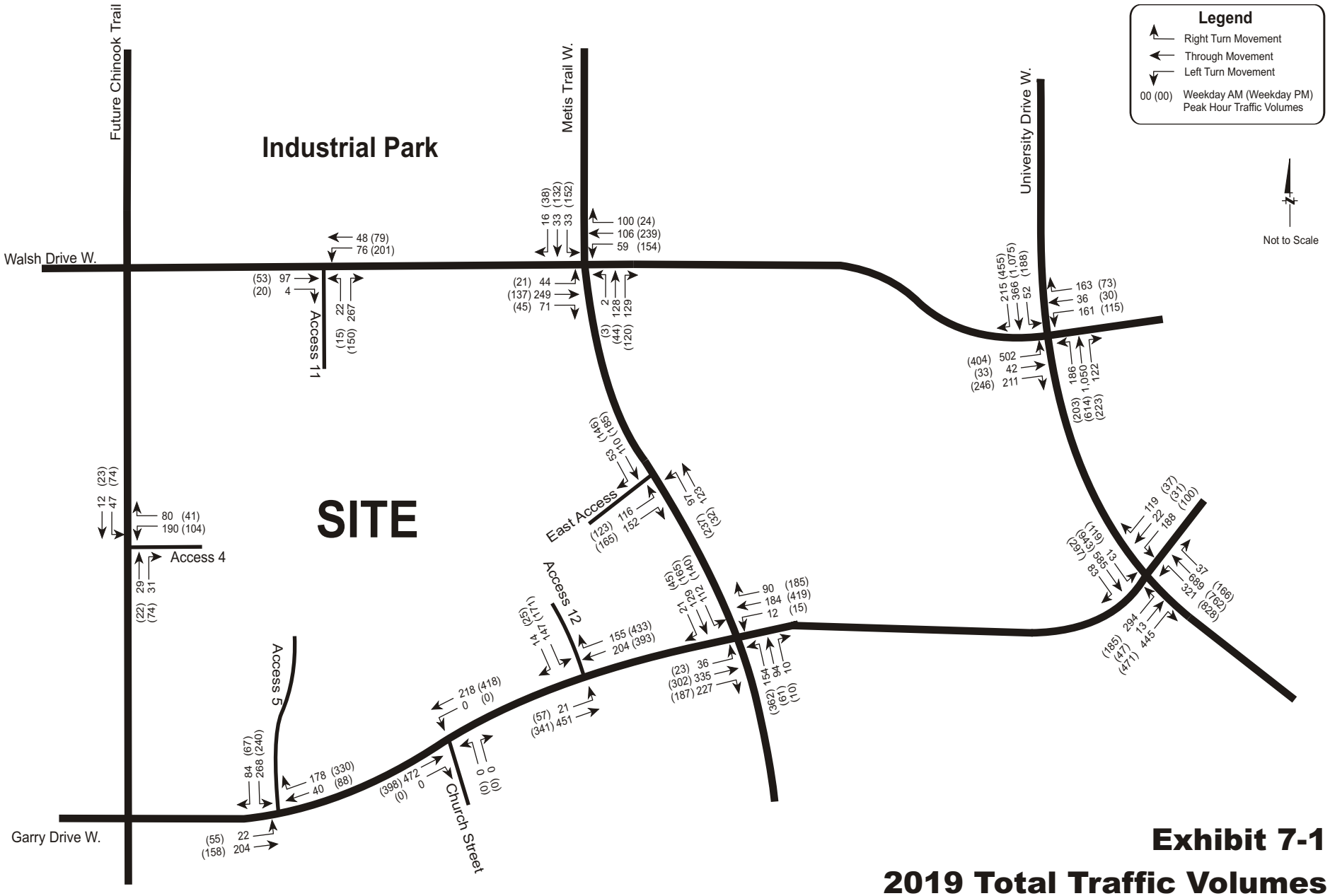


Exhibit 7-1
2019 Total Traffic Volumes

Table 7-1: 2019 Full Build-Out a.m. Operating Conditions With Existing Lane Configurations

Intersection/Movement			a.m. Peak hour			
			LOS	delay (s)	v/c ratio	95th queue (m)
University Drive & Walsh Drive (signalized)	EB	Left-Thru	F	Error*	No Cap	200.5
		Right	A	0.2	0.16	0.0
	WB	Left-Thru	F	Error*	No Cap	89.0
		Right	A	0.2	0.13	0.0
	NB	Left	C	26.5	0.60	36.1
		Thru-Thru	C	29.3	0.90	103.1
		Right	A	5.2	0.21	10.3
	SB	Left	C	25.5	0.27	14.4
		Thru-Thru	B	19.0	0.45	31.2
		Right	A	5.4	0.41	13.1
	Intersection Summary		**F**	**Error***	**No Cap**	**-**
University Drive & Garry Drive (signalized)	EB	Left	D	43.1	0.84	66.9
		Thru	B	14.5	0.03	4.3
		Right	A	6.0	0.64	16.3
	WB	Left	C	23.0	0.55	35.7
		Thru	B	14.6	0.05	6.1
		Right	A	4.8	0.25	9.1
	NB	Left	B	18.8	0.68	56.0
		Thru-Thru	B	10.4	0.44	46.5
		Right	A	3.8	0.05	4.4
	SB	Left	B	19.6	0.07	4.7
		Thru-Thru	C	25.3	0.72	50.4
		Right	A	5.8	0.17	7.8
	Intersection Summary		**B**	**17.6**	**0.84**	**-**

LOS – level of service
v/c – volume to capacity ratio
*: Error indicates very high values

Table 7-2: 2019 Full Build-Out p.m. Operating Conditions With Existing Lane Configurations

Intersection/Movement			p.m. Peak hour			
			LOS	delay (s)	v/c ratio	95th queue (m)
University Drive & Walsh Drive (signalized)	EB	Left-Thru	F	Error*	No Cap	167.4
		Right	A	0.3	0.19	0.0
	WB	Left-Thru	F	Error*	No Cap	70.4
		Right	A	0.1	0.06	0.0
	NB	Left	C	29.2	0.64	39.5
		Thru-Thru	C	22.4	0.68	52.7
		Right	A	4.9	0.40	12.9
	SB	Left	C	29.3	0.62	37.4
		Thru-Thru	F	139.2	1.24	130.1
		Right	B	11.2	0.71	36.5
	Intersection Summary		**F**	**Error***	**No Cap**	**-**
University Drive & Garry Drive (signalized)	EB	Left	C	28.3	0.65	35.5
		Thru	B	15.7	0.12	10.2
		Right	A	7.2	0.69	16.6
	WB	Left	B	19.8	0.36	19.7
		Thru	B	15.2	0.08	7.6
		Right	A	6.2	0.10	5.3
	NB	Left	F	366.3	1.76	212.6
		Thru-Thru	B	13.2	0.54	52.7
		Right	A	3.0	0.23	8.8
	SB	Left	C	31.8	0.56	26.6
		Thru-Thru	F	90.0	1.12	108.4
		Right	A	5.6	0.51	14.9
	Intersection Summary		**F**	**104.4**	**1.76**	**-**

v/c – volume to capacity ratio
*: Error indicates very high values

During both peak periods, the intersections of University Drive and Walsh Drive and University Drive and Garry Drive had movements operating at a LOS above E or v/c ratios exceeding 0.90.

Both intersections were re-analyzed with the following improvements:

- University Drive and Walsh Drive
  - Additional northbound left turn lane
  - Conversion of eastbound left-through lane to dual eastbound left turn lanes and , a single through lane
  - Conversion of westbound left-through lane to single westbound left turn lane and a single through lane

- University Drive and Garry Drive
  - Conversion of northbound left turn lane to dual left turn lanes

All other intersections were analyzed based on the lane configurations required to accommodate the anticipated traffic volumes. The 2019 ultimate lane configurations are illustrated in **Exhibit 7-2**.

The results of the re-analysis of the a.m. and p.m. peaks are summarized in **Table 7-3**and **Table 7-4,** respectively. The corresponding Synchro files for the full build-out traffic conditions, with network improvements, have been included electronically on the attached CD. Traffic signal warrants for Site access intersections that required signals as an improvement are provided in **Appendix III**.

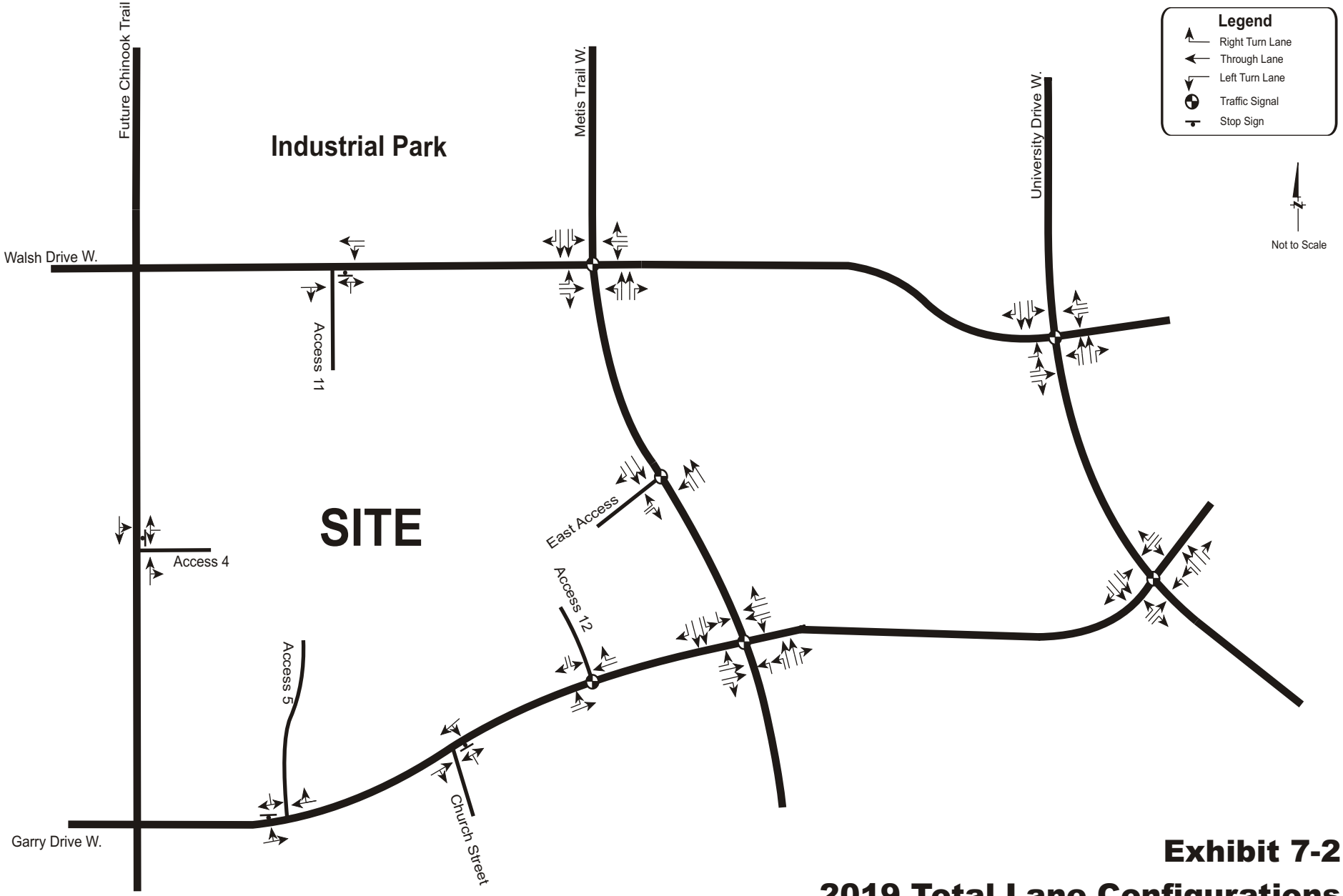


Exhibit 7-2

2019 Total Lane Configurations

Table 7-3: 2019 Full Build Out a.m. Operating Conditions

Intersection/Movement			a.m. Peak hour			
			LOS	delay (s)	v/c ratio	95th queue (m)
University Drive & Walsh Drive (signalized)	EB	Dual Left	E	55.0	0.90	74.9
		Thru	D	42.1	0.30	17.5
		Right	A	0.2	0.16	0.0
	WB	Left	D	41.8	0.59	48.1
		Thru	D	42.7	0.28	15.6
		Right	A	0.2	0.13	0.0
	NB	Dual Left	D	41.1	0.52	26.6
		Thru-Thru	B	18.8	0.66	112.8
		Right	A	4.9	0.16	12.1
	SB	Left	E	73.4	0.64	27.7
		Thru-Thru	B	17.9	0.28	39.4
		Right	A	4.0	0.30	13.9
	Intersection Summary		**C**	**24.8**	**0.90**	**-**
University Drive & Garry Drive (signalized)	EB	Left	D	37.2	0.83	61.7
		Thru	B	12.2	0.03	3.9
		Right	A	6.8	0.68	18.3
	WB	Left	C	20.3	0.53	31.6
		Thru	B	12.4	0.05	5.4
		Right	A	4.3	0.24	8.3
	NB	Dual left	C	33.9	0.74	34.7
		Thru-Thru	B	11.0	0.46	47.3
		Right	A	4.3	0.05	4.6
	SB	Left	C	26.4	0.12	5.8
		Thru-Thru	C	20.2	0.64	44.5
		Right	A	5.1	0.18	7.7
	Intersection Summary		**B**	**17.8**	**0.83**	**-**

LOS – level of service
v/c – volume to capacity ratio

Table 7-3: Continued

Intersection/Movement			a.m. Peak hour			
			LOS	delay (s)	v/c ratio	95th queue (m)
Metis Trail & Walsh Drive (signalized)	EB	Left	B	13.4	0.16	7.6
		Thru	C	21.6	0.62	32.0
		Right	A	4.4	0.18	5.6
	WB	Left	B	16.5	0.29	10.1
		Thru	B	14.5	0.26	14.4
		Right	A	0.1	0.08	0.0
	NB	Left	B	16.5	0.01	1.3
		Thru-Thru	B	11.6	0.09	11.4
		Right	A	4.6	0.19	10.4
	SB	Left	C	20.6	0.18	8.7
		Thru-Thru	B	11.8	0.02	4.6
		Right	A	8.4	0.02	4.1
	Intersection Summary		**B**	**12.5**	**0.62**	**-**
Metis Trail & Garry Drive (signalized)	EB	Left	B	10.6	0.13	5.9
		Thru-Thru	B	10.7	0.36	17.4
		Right	A	3.7	0.40	9.1
	WB	Left	B	14.4	0.06	4.0
		Thru-Thru	B	13.9	0.25	13.8
		Right	A	5.8	0.23	7.9
	NB	Dual Left	B	17.4	0.31	13.4
		Thru-Thru	B	12.8	0.11	8.1
		Right	A	8.7	0.02	2.7
	SB	Dual Left	C	20.1	0.31	10.9
		Thru-Thru	B	15.6	0.21	11.1
		Right	A	8.6	0.07	4.2
	Intersection Summary		**B**	**11.7**	**0.40**	**-**
North Access 11 & Walsh Drive (unsignalized)	EB	Thru-Right	A	0.0	0.07	0.0
	WB	Left	A	7.6	0.06	1.4
		Thru	A	0.0	0.03	0.0
	NB	Left-Right	B	11.2	0.36	12.7
	Intersection Summary		**A**	**7.4**	**0.36**	**-**
South Access 5 & Garry Drive (unsignalized)	EB	Left-Thru	A	0.2	0.02	0.2
	WB	Thru-Right	A	0.0	0.15	0.0
	SB	Left-Right	C	20.3	0.64	34.6
	Intersection Summary		**A**	**9.2**	**0.64**	**-**

LOS – level of service
v/c – volume to capacity ratio

Table 7-3: Continued

Intersection/Movement			a.m. Peak hour			
			LOS	**delay (s)**	**v/c ratio**	**95th queue (m)**
South Access 12 & Garry Drive (signalized)	EB	Left	A	5.1	0.04	3.1
		Thru	A	8.8	0.49	45.0
	WB	Thru	A	6.2	0.22	18.3
		Right	A	1.5	0.18	5.3
	SB	Left-Right	C	20.7	0.41	30.0
	Intersection Summary		**A**	**9.0**	**0.49**	**-**
West Access 4 & Chinook Trail (unsignalized)	WB	Left-Right	B	11.7	0.36	12.6
	NB	Thru-Right	A	0.0	0.04	0.0
	SB	Left-Thru	A	6.0	0.03	0.8
	Intersection Summary		**A**	**9.0**	**0.36**	**-**
East Access & Metis Trail (signalized)	EB	Left	C	25.5	0.47	22.6
		Right	A	7.5	0.44	11.1
	NB	Left	A	8.7	0.29	8.0
		Thru-Thru	A	5.7	0.53	48.5
	SB	Thru-Thru	A	9.9	0.48	49.4
		Right	A	0.1	0.04	0.0
	Intersection Summary		**A**	**8.2**	**0.53**	**-**
Garry Drive & Church Street (unsignalized)	EB	Thru-Right	A	0.0	0.32	0.0
	WB	Left-Thru	A	0.0	0.00	0.0
	NB	Left-Right	-	-	-	-
	Intersection Summary		**A**	**0.0**	**0.32**	**-**

LOS – level of service
v/c – volume to capacity ratio

Table 7-4: 2019 Full Build Out p .m. Operating Conditions

Intersection/Movement			p.m. Peak hour			
			LOS	**delay (s)**	**v/c ratio**	**95th queue (m)**
University Drive & Walsh Drive (signalized)	EB	Dual left	E	55.6	0.87	62.4
		Thru	D	41.5	0.25	14.9
		Right	A	0.3	0.19	0.0
	WB	Left	D	42.4	0.51	37.0
		Thru	D	42.4	0.24	13.9
		Right	A	0.1	0.06	0.0
	NB	Dual Left	D	41.4	0.53	31.8
		Thru-Thru	C	28.7	0.46	68.4
		Right	B	13.0	0.31	26.7
	SB	Left	E	65.2	0.84	70.4
		Thru-Thru	C	25.4	0.76	144.4
		Right	A	7.5	0.56	40.7
	Intersection Summary		**C**	**27.9**	**0.87**	**-**
University Drive & Garry Drive (signalized)	EB	Left	E	76.5	0.91	71.9
		Thru	C	32.2	0.17	17.3
		Right	B	17.4	0.82	55.8
	WB	Left	D	41.2	0.50	33.3
		Thru	C	31.4	0.11	12.6
		Right	B	11.3	0.14	7.9
	NB	Dual left	D	49.9	0.95	114.5
		Thru-Thru	B	14.9	0.50	61.6
		Right	A	2.4	0.22	8.7
	SB	Left	D	40.1	0.53	25.2
		Thru-Thru	D	44.5	0.87	126.7
		Right	B	17.0	0.46	54.3
	Intersection Summary		**C**	**33.7**	**0.95**	**-**

LOS – level of service
v/c – volume to capacity ratio

Table 7-4: Continued

Intersection/Movement			p.m. Peak hour			
			LOS	**delay (s)**	**v/c ratio**	**95th queue (m)**
Metis Trail & Walsh Drive (signalized)	EB	Left	C	21.9	0.14	7.1
		Thru	C	25.5	0.37	28.1
		Right	A	6.3	0.13	6.1
	WB	Left	D	39.6	0.69	35.6
		Thru	C	32.7	0.64	47.8
		Right	A	0.0	0.02	0.0
	NB	Left	C	27.7	0.02	2.2
		Thru-Thru	B	18.9	0.04	7.3
		Right	A	5.5	0.19	12.4
	SB	Left	D	38.3	0.6	38.5
		Thru-Thru	B	12.3	0.08	17.0
		Right	A	6.9	0.05	7.2
	Intersection Summary		**C**	**24.8**	**0.69**	**-**
Metis Trail & Garry Drive (signalized)	EB	Left	B	13.5	0.11	5.8
		Thru-Thru	B	13.3	0.31	22.4
		Right	A	3.7	0.33	9.9
	WB	Left	B	19.0	0.07	6.0
		Thru-Thru	C	20.5	0.54	41.7
		Right	A	9.9	0.42	21.2
	NB	Dual left	C	21.8	0.51	37.7
		Thru-Thru	B	18.2	0.07	8.1
		Right	B	11.5	0.02	3.3
	SB	Dual left	C	26.0	0.34	18.1
		Thru-Thru	C	24.8	0.35	20.5
		Right	B	10.6	0.18	8.0
	Intersection Summary		**B**	**17.3**	**0.54**	**-**
North Access 11 & Walsh Drive (unsignalized)	EB	Thru-Right	A	0.0	0.05	0.0
	WB	Left	A	7.8	0.15	4.0
		Thru	A	0.0	0.05	0.0
	NB	Left-Right	B	10.3	0.23	6.2
	Intersection Summary		**A**	**6.3**	**0.22**	**-**

LOS – level of service
v/c – volume to capacity ratio

Table 7-4: Continued

Intersection/Movement			p.m. Peak hour			
			LOS	**delay (s)**	**v/c ratio**	**95th queue (m)**
South Access 5 & Garry Drive (unsignalized)	EB	Left-Thru	A	0.5	0.06	1.4
	WB	Thru-Right	A	0.0	0.28	0.0
	SB	Left-Right	D	29.1	0.72	43.6
	Intersection Summary		**B**	**10.1**	**0.72**	**-**
South Access 12 & Garry Drive (signalized)	EB	Left	A	8.9	0.18	8.5
		Thru	B	10.5	0.44	37.9
	WB	Thru	B	11.5	0.51	45.1
		Right	A	2.9	0.50	10.3
	SB	Left-Right	B	15.2	0.39	29.0
	Intersection Summary		**A**	**9.0**	**0.51**	**-**
West Access 4 & Chinook Trail (unsignalized)	WB	Left-Right	B	11.1	0.22	6.3
	NB	Thru-Right	A	0.0	0.06	0.0
	SB	Left-Thru	A	0.4	0.06	1.4
	Intersection Summary		**A**	**6.5**	**0.22**	**-**
East Access & Metis Trail (signalized)	EB	Left	D	48.2	0.62	38.6
		Right	B	10.7	0.52	15.9
	NB	Left	D	46.7	0.81	65.7
		Thru-Thru	A	4.2	0.40	37.0
	SB	Thru-Thru	C	21.4	0.83	151.2
		Right	A	0.2	0.11	0.0
	Intersection Summary		**B**	**17.7**	**0.83**	**-**
Garry Drive & Church Street (unsignalized)	EB	Thru-Right	A	0.0	0.27	0.0
	WB	Left-Thru	A	0.0	0.00	0.0
	NB	Left-Right	-	-	-	-
	Intersection Summary		**A**	**0.0**	**0.27**	**-**

LOS – level of service
v/c – volume to capacity ratio

As illustrated in **Table 7-3** and **Table 7-4,** all the intersections are operating with a LOS of E or better and v/c of 0.95 or less.

7.2 2019 Daily Traffic Volumes

Daily traffic volumes were calculated (**Table 6-2**) for the site and background developments using trip generation rates from the ITE informational report. Since the existing traffic was obtained though data collection and not trip generation calculation, a factor was applied to the p.m. peak hour volumes to determine daily volumes. Based on the existing land uses being primarily residential the factor was based on the low density daily rate from ITE which is 9.32. To be conservative a factor of 10 was assumed and applied to the 2019 base background traffic volumes.

The 2019 base background daily traffic volumes were added to the site and background development daily traffic volumes to obtain the total daily traffic volumes as illustrated in **Exhibit 7-3**.

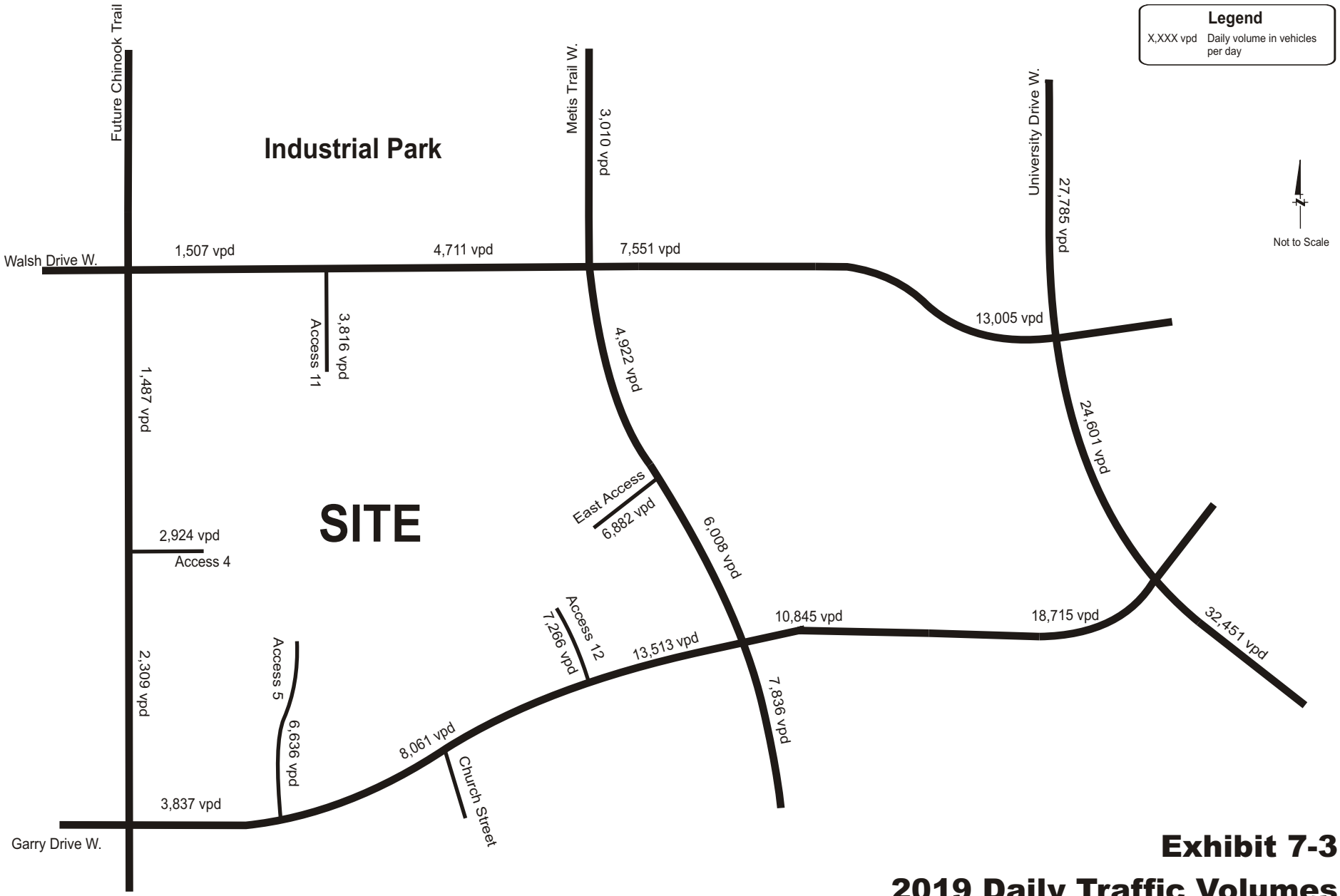


Exhibit 7-3

2019 Daily Traffic Volumes

7.3 Road Classifications

Road classifications are based on Section 6 of the City's Design Standards and are summarized in **Table 7-5**.

Table 7-5: Road Classifications

Road Classification	Volume (vpd)	Intersection Spacing (metres)
Arterial	>15,000	400
Super Collector	2,000 – 15,000	200
Community Entrance Road	2,000 – 8,000	120
Major Collector	2,000 – 8,000	120
Minor Collector	< 4,000	60
Local	< 2,000	30
Lanes	n/a	30

The existing road classifications are based on the existing road network and are illustrated in **Exhibit 7-4**.

The road classifications for the study area are based on long term transportation plans and the daily volumes from **Exhibit 7-3** and are illustrated in **Exhibit 7-5**. The road classifications and intersection spacing for all accesses for the proposed Site meet City requirements.

The road classifications for the internal road network were also identified. These are illustrated in **Appendix IV**.

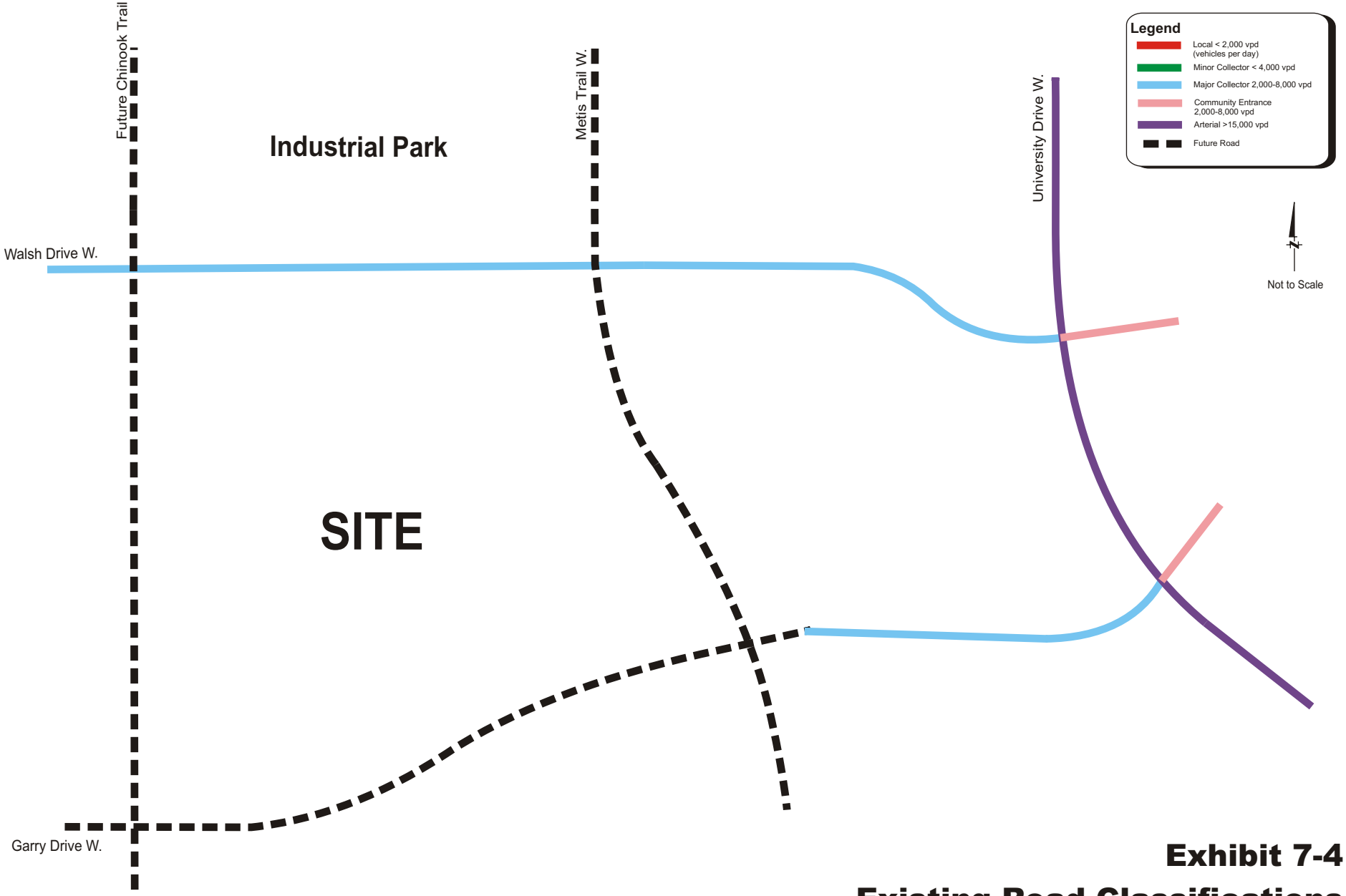


Exhibit 7-4

Existing Road Classifications

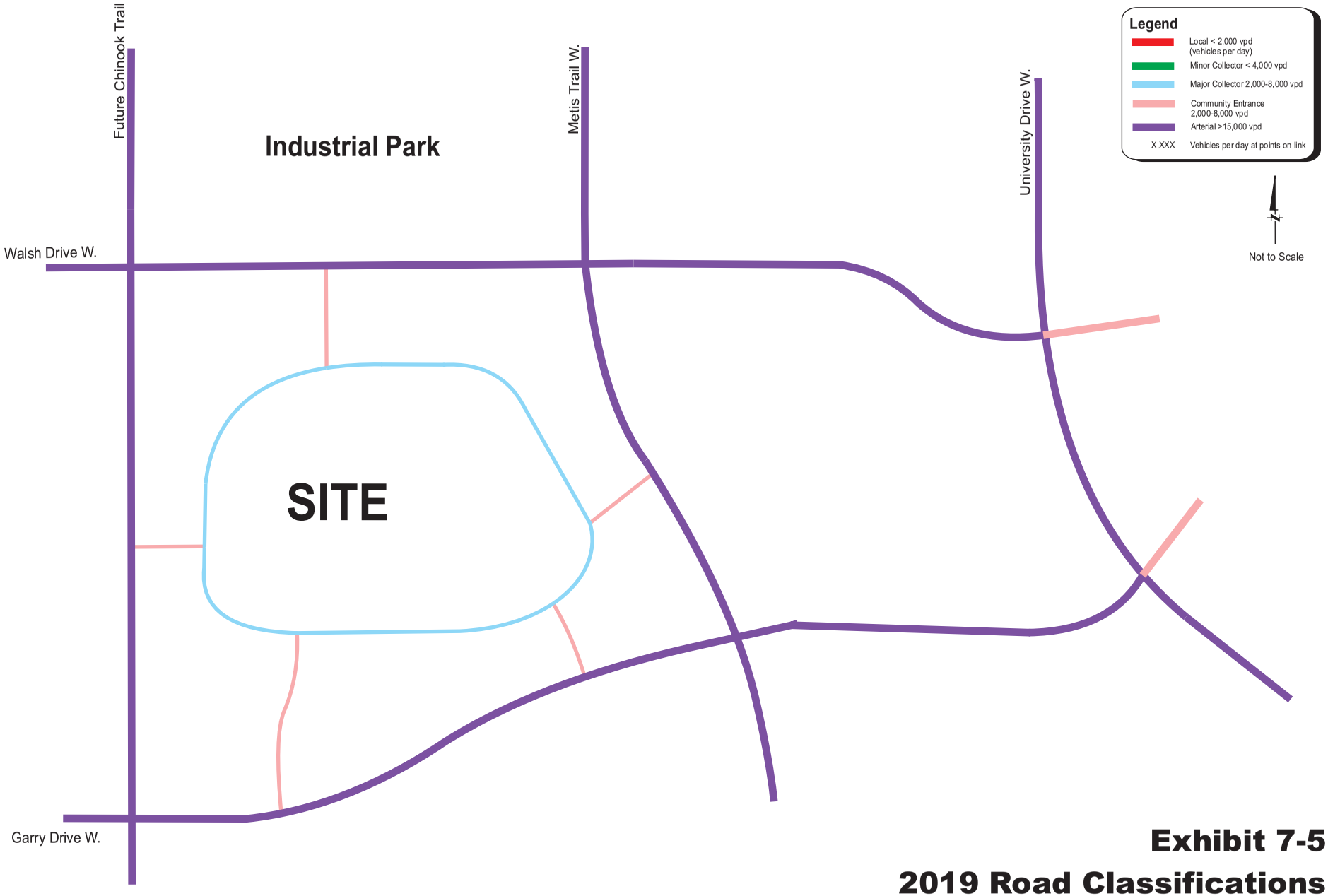


Exhibit 7-5

2019 Road Classifications

8. CONCLUSIONS

Based on the results of this analysis the following conclusions could be drawn:

- All analyzed intersections are operating at an overall LOS of E and a v/c ratio of 0.95 or lower for the 2019 background and total conditions
- All intersections within the study area are operating at acceptable levels for the existing and 2019 horizons with the improvements to the existing network as listed in **Table 8-1** and the ultimate lane configurations and traffic controls illustrated in **Exhibit 7-2**All intersections and site accesses meet City Design Standards in terms of intersection spacing.
- The daily traffic volumes generated by the proposed development (**Exhibit 7-3**) fall within the City road classifications as illustrated in **Exhibit 7-5**.

Table 8-1: Intersection Improvement Summary Table

Intersection	Improvements Required for Background Scenario	Improvements Required for Full Build Out Scenario
University Drive & Walsh Drive (signalized)	No improvements required	Additional northbound left turn lane Conversion of eastbound left-through lane to dual eastbound left turn lanes and a single through lane Conversion of westbound left-through lane to single westbound left turn lane and a single through lane
University Drive & Garry Drive (signalized)	No improvements required	Conversion of northbound left turn lane to dual left turn lanes

9. RECOMMENDATIONS

Based on the analysis the following are recommended:

- All proposed Site accesses be constructed to the City Design Standards.
- The intersections within the study area ultimately expected to be constructed to the lane configurations illustrated in **Exhibit 7-2**.
- All internal roads to be constructed according to road classifications as per **Exhibit 7-5** and the right-of-way widths outlined in the City Design Standards.

City of Lethbridge
Initial Traffic Impact Study Sign-off Sheet

Project Name: Country Meadows Residential Development
Date: February 27, 2009

Consultant: iTRANS Consulting

Project Engineer: Megan Fernandes

	Review Subject	Review Status
1	Site plan, development statistics, phasing and timing:* Please see attached a copy of the proposed site plan. We are assuming the development is scheduled to be completed construction by 2018 with no phasing. The following are the characteristics of the development: ▪ 1,409 Low density units ▪ 945 Medium density units ▪ 196,000 ft^2 of commercial shopping center ▪ 700 student Middle school	OK
2	Traffic impact study area: The proposed site is bounded by the future Chinook Trail W. t the west, Benton Drive W. to the east, Walsh Drive W. to the south, and Garry Drive W to the north.	Include University Dr./Walsh Dr and University Dr./Garry Dr. intersections as well as the Access Road intersections at Benton, Garry, and Walsh Dr.
3	Traffic analysis period(s): The a.m., p.m. peak hour and daily periods will be analyzed.	OK
4	Planning horizons: The 2018 horizon year will be analyzed.	OK
5	Trip generation factors: (review also pass-by, diverted and synergy trip rates):* The trip generation rates were taken from the City of Lethbridge Traffic Impact Assessment Guidelines and the rates which were used are attached. Internal trips were considered, but no pass-by, diverted or synergy trips were considered.	OK

6	Basis for Trip Distribution: The trip distribution was based on The Crossings TIA. A table summarizing the trip distribution is attached.	Please see the Table
7	Source for Future Background Traffic: Future background traffic will be taken from The Crossings TIA report which is located immediately south of the proposed site. Traffic generated by developments east of the proposed site will be researched by referencing the West Highlands Area Structure Plan.	Quarter sections lying north of Walsh Drive shall also be considered, see the attached sketch
8	Assumed Road Improvements: The following was assumed in terms of road network: ▪ construction of the future Chinook Trail W. and future Garry Drive W. ▪ construction of accesses to the site from Chinook Trail W., Walsh Drive W. and Benton Drive W., and two accesses from Garry Drive W. ▪ construction of all internal roads	OK
9	Traffic Analysis Software: The micro-simulation program Synchro 6.0 would be used for all signalized and unsignalized intersections. Any roundabouts would be analyzed using SIDRA Intersection 3.2.	OK

Data Collection

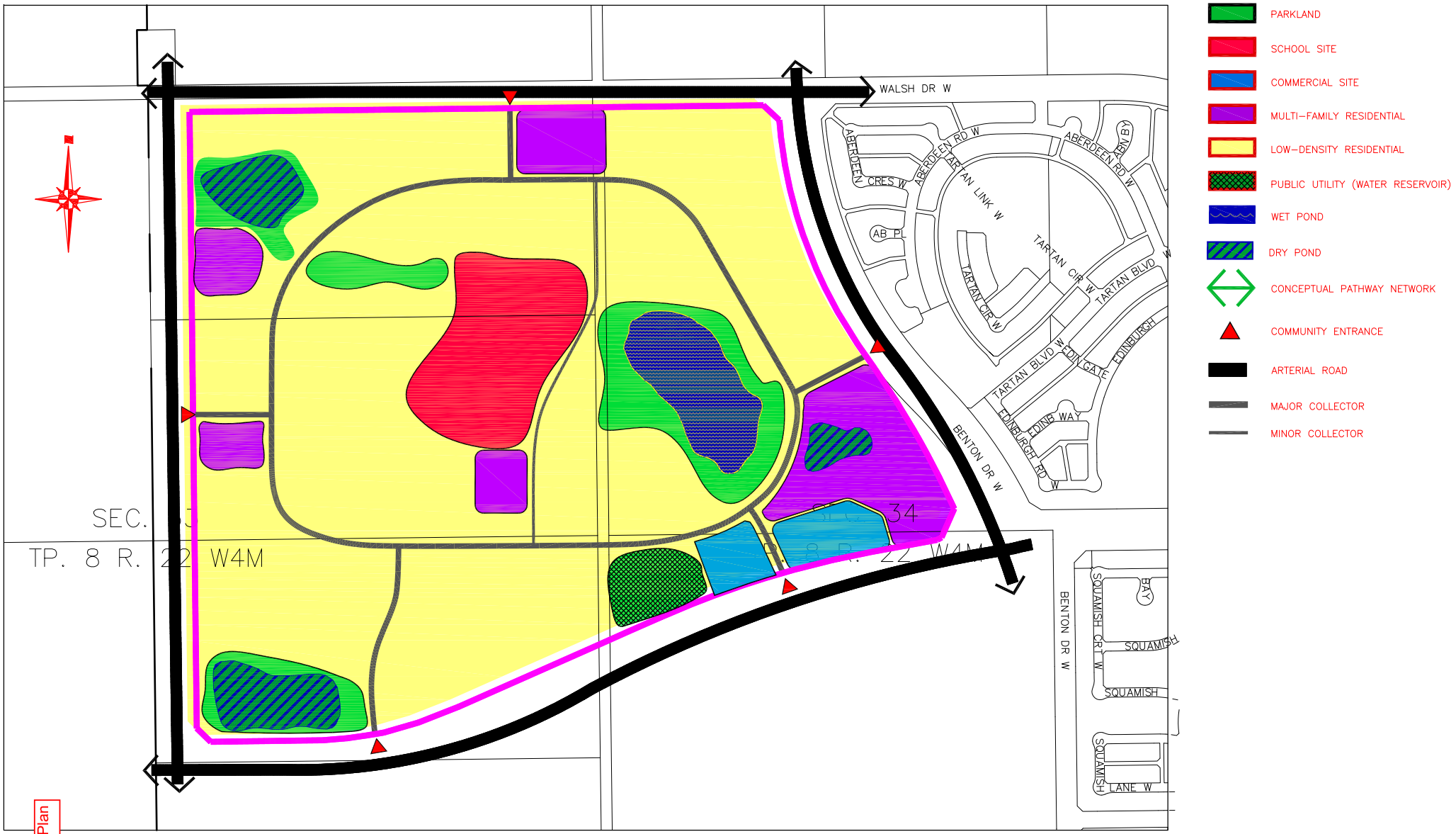
Type of Data		Review Status
1	Existing Traffic Counts: The site is located in an undeveloped area of Lethbridge therefore existing traffic counts would be minimal. Documents such as neighbouring ASP's, and volumes generated by The Crossings will be used to form base traffic counts.	Counts may be required on University Dr./Walsh Dr and University Dr/Garry Dr
2	Signal Timings: The area is currently undeveloped with no signalized intersections. Any intersections requiring signalization at the 2018 horizon will follow the City guidelines with respect to signal timings, pedestrian times, minimum all-red, yellow, advance greens, etc.	Signal timings may be required at University Dr./Walsh Dr and University Dr/Garry Dr

3	Bicycle Route Map: The area is currently undeveloped therefore there are no existing pathways.	Investigate the existing bikeways/ pathways/sidewalk along Garry and Walsh and up to University Dr.
4	Bus Routes and Signs: The area east of the proposed development is serviced by two bus routes (attached): ▪ Route 32 – Jerry Potts Blvd ▪ Route 33 – Heritage Heights	OK
5	Local Parking Issues: The proposed development is in West Lethbridge and is a residential development with existing residential development to the east and undeveloped land to the west, north and south. There are no local parking issues in this area.	OK
6	Local Traffic Issues: The proposed development is located along Walsh Drive W. with undeveloped land to the south; therefore, traffic volumes are minimal.	Investigate any issues on University Dr./ Walsh Dr and University Dr/Garry Dr intersections

Comments: G=Good, C=Items of concern, R=Revision required, OK=Satisfactorily reviewed

Initial Sign-off Engineer:
City:
Date:
Page___of ___

Notes:* Indicates information that the consultant is to prepare in advance and provide to the City prior to the initial meeting



Current Site Plan

Item 5: Trip Generation Rates

Land Use	Document	Splits (in% / out%)			Rates		
		a.m.	p.m.	daily	a.m.	p.m.	daily
Low Density	City of Lethbridge / ITE LU 210 (daily)	26 / 74	64 / 36	50 / 50	0.77	1.02	9.57
Medium Density	City of Lethbridge / ITE LU 222 (daily)	29 / 71	61 / 39	50 / 50	0.75	0.92	6.72
Commercial	ITE LU 820	61 / 39	48 / 52	50 / 50	1.03	3.75	42.94
Middle School	ITE LU 522	55 / 45	52 / 48	50 / 50	0.53	0.15	1.62

OK

Item 6: Trip Distribution

Direction	Via	Percentage
North	Future Chinook Trail W.	1.0%
	Benton Drive W.	3.0%
South	Future Chinook Trail W.	3.0%
	Benton Drive W.	15.0%
West	Walsh Drive W.	1.0%
	Garry Drive W.	1.0%
East	Walsh Drive W.	34.0%
	Garry Drive W.	42.0%

Increase the proportion to south on Chinook and Benton

For background case, please consider lands north of Walsh Dr shown in the attached sketch as general industrial

Route 32 – Jerry Potts Blvd

Route 33 – Heritage Heights

Megan Fernandes

From: Ahmed Ali [aali@lethbridge.ca]
Sent: Wednesday, March 18, 2009 5:13 PM
To: Megan Fernandes
Subject: RE: Initial TIA Form - Country Meadows
Attachments: Shortcut to Initial Traffic Impact Study ... Country Meadows -sign off March 18, 2009.pdf

Megan,
Attached please find the sign-off sheet. I have ok'd most of it with some comments to be considered in the TIA. Please call me if you have any questions.
Thx

Ahmed Ali, P.E., P.Eng., Ph.D.
Transportation Planning Manager
Infrastructure Services
City of *Lethbridge*

City Hall, 910 – 4th Avenue South, Lethbridge, Alberta, Canada T1J 0P6
Phone:403-320-4038, Cell: 403-393-4685, Fax: 403-329-4657
aali@lethbridge.ca, www.lethbridge.ca

From: Megan Fernandes [mailto:mfernandes@itransconsulting.com]
Sent: Friday, February 27, 2009 5:58 PM
To: Stephen Burnell; Ahmed Ali
Cc: Ed Martin; Jiajun Li
Subject: Initial TIA Form - Country Meadows

Hello Stephen and Ahmed,

Please find attached the Initial TIS Sign-off Sheet for the Country Meadows development immediately north of West Lethbridge.

The only thing missing is the most recent site plan; I am unfortunately at home right now and only have a paper copy. I will scan this in and send it over on Monday.

If you have any questions or would like to discuss the form please let me know.

Megan

Megan Fernandes, P.Eng.
Project Manager
iTRANS Consulting Inc.
4838 Richard Road SW, Suite 140
WestMount Corporate Campus
Calgary, AB T3E 6L1
Tel: 403 537-0250 x 5717
Fax: 403 537-0251
www.itransconsulting.com
mfernandes@itransconsulting.com

Please update your records to reflect our new Calgary address

Top 10 for the second year ~ Top 50 Best Workplaces in Canada

Please consider the environment before printing this email.

Appendix II
Existing Traffic Counts

City of Lethbridge: Intersection Summary

Northbound Street:	University Drive West	**RTOR**	Y	**Speed**	60	**Heavy Veh %**	2	**Next Signal**	610	**Median Wth**	1.5	**Bus Route**	Y			
Eastbound Street:	Garry Drive West	**RTOR**	Y	**Speed**	50	**Heavy Veh %**	2	**Next Signal**		**Median Wth**	1.8	**Bus Route**	Y			
Southbound Street:	University Drive West	**RTOR**	Y	**Speed**	60	**Heavy Veh %**	3	**Next Signal**	800	**Median Wth**	1.5	**Bus Route**	Y			
Westbound Street:	Heritage Boulevard West	**RTOR**	Y	**Speed**	50	**Heavy Veh %**		**Next Signal**		**Median Wth**	1.0	**Bus Route**	N			
Weather	Sunny	**Persons Challenged by Mobility Issues:**	N					**Adjacent to Elementary School**	Y			**Pathway for School**	Y			
Date:	Thu, Jul 12, 2007	**Counted By**	MM			**Intersection**	W-620	**Senior Centre or Junior High**	N			**CBD**	N			
Notes:																

AM

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks							
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total	15 Minute Totals	60 Minute Totals	Peak Hour
7:00 - 7:15	11	77	4	2	55	4	27	2	2	9	1	20	1				1	214		
7:15 - 7:30	5	91	8	3	73	8	61	4	14	20	2	12			1		1	301		
7:30 - 7:45	9	117	7		91	4	67	2	7	34	5	27						370		
7:45 - 8:00	20	137	3	3	95	8	60	2	1	46	2	25						402	1287	
8:00 - 8:15	19	105	11	2	103	7	30	1	11	25	3	21	3		3		6	338	1411	
8:15 - 8:30	20	102	9	5	100	9	34	4	17	46	6	23	3	2		1	6	375	1485	7:30-8:30
8:30 - 8:45	20	72	5	4	111	5	29	3	9	26	4	21		2	2	2	6	309	1424	
8:45 - 9:00	23	96	10	4	99	10	28	3	16	22	7	13	4				4	331	1353	
Peak Hour:	*68*	*461*	*30*	*10*	*389*	*28*	*191*	*9*	*36*	*151*	*16*	*96*							*PHF:*	*0.92*
PHF:	*0.85*	*0.84*	*0.68*	*0.50*	*0.94*	*0.78*	*0.71*	*0.56*	*0.53*	*0.82*	*0.67*	*0.89*								

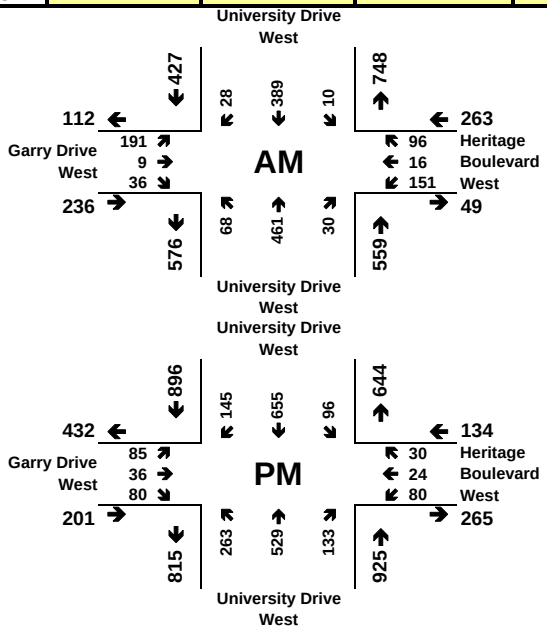
MID

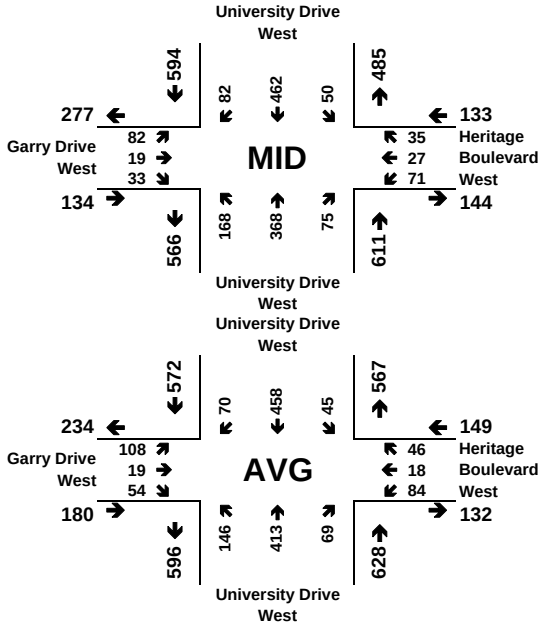
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks							
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total	15 Minute Totals	60 Minute Totals	Peak Hour
11:00 - 11:15	34	87	11	12	103	8	12	4	13	14	3	4	3	2	3	2	10	305		
11:15 - 11:30	39	89	13	7	80	11	20	4	11	13	4	10	2		4	2	8	301		
11:30 - 11:45	34	96	7	13	90	6	19		12	18	3	2	2	2		4	8	300		
11:45 - 12:00	36	96	13	12	102	18	20	4	10	19	6	11	5	1		1	7	347	1253	
12:00 - 12:15	47	101	24	12	112	30	13	3	4	14	9	7		3		1	4	376	1324	
12:15 - 12:30	35	84	21	16	134	20	21	5	12	18	6	9	3	1			4	381	1404	
12:30 - 12:45	50	87	17	10	114	14	28	7	7	20	6	8				2	2	368	1472	11:45-12:45
12:45 - 13:00	33	86	16	6	107	3	23	3	11	27	2	8	7	1		1	9	325	1450	
Peak Hour:	*168*	*368*	*75*	*50*	*462*	*82*	*82*	*19*	*33*	*71*	*27*	*35*							*PHF:*	*0.97*
PHF:	*0.84*	*0.91*	*0.78*	*0.78*	*0.86*	*0.68*	*0.73*	*0.68*	*0.69*	*0.89*	*0.75*	*0.80*								

PM

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks							
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total	15 Minute Totals	60 Minute Totals	Peak Hour
15:00 - 15:15	37	95	14	11	112	14	14		17	21	7	4	3				3	346		
15:15 - 15:30	46	72	16	16	118	21	16	5	18	23	5	7		1	3	1	5	363		
15:30 - 15:45	30	104	25	10	119	26	15	2	17	19	2	7	4	3		1	8	376		
15:45 - 16:00	49	90	18	11	132	19	19	9	24	11	4	8	4				4	394	1479	
16:00 - 16:15	48	108	25	17	133	25	16	5	25	12	4	5	4	2	4	1	11	423	1556	
16:15 - 16:30	68	162	25	20	178	33	16	10	15	13	6	5	2			3	5	551	1744	
16:30 - 16:45	68	107	35	24	140	29	25	5	16	25	5	10		1		1	2	489	1857	
16:45 - 17:00	66	130	36	23	177	37	22	7	24	24	4	6						556	2019	
17:00 - 17:15	61	130	37	29	160	46	22	14	25	18	9	9	1				1	560	2156	16:15-17:15
17:15 - 17:30	53	122	31	23	140	37	18	11	18	13	6	7						479	2084	
Peak Hour:	*263*	*529*	*133*	*96*	*655*	*145*	*85*	*36*	*80*	*80*	*24*	*30*							*PHF:*	*0.96*
PHF:	*0.97*	*0.82*	*0.90*	*0.83*	*0.92*	*0.79*	*0.85*	*0.64*	*0.80*	*0.80*	*0.67*	*0.75*								

6 Hour Average	146	413	69	45	458	70	108	19	54	84	18	46	8	4	3	4
Approach Lanes	1	2	1	1	2	1	1	1	1	1	1	1				
Departure Lanes	2			2			1			1						





City of Lethbridge: Intersection Summary

Northbound Street:	University Drive West	**RTOR**	Y	**Speed**	60	**Heavy Veh %**	4	**Next Signal**	600	**Median Wth**	1.8	**Bus Route**	N
Eastbound Street:	Walsh Drive West	**RTOR**	Y	**Speed**	50	**Heavy Veh %**	5	**Next Signal**		**Median Wth**		**Bus Route**	N
Southbound Street:	University Drive West	**RTOR**	Y	**Speed**	60	**Heavy Veh %**	5	**Next Signal**	600	**Median Wth**	1.8	**Bus Route**	N
Westbound Street:	Heritage Boulevard West	**RTOR**	Y	**Speed**	50	**Heavy Veh %**	3	**Next Signal**		**Median Wth**		**Bus Route**	Y

Weather		**Persons Challenged by Mobility Issues:**	N	**Adjacent to Elementary School**	N	**Pathway for School**	N
Date:	Wed, Nov 8, 2006	**Counted By**	ME2 - J, LP	**Intersection**	W-638	**Senior Centre or Junior High**	N	**CBD**	N

Notes: ME2 pedestrians 'From the East' assigned to South crosswalk.

AM

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks							
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total	15 Minute Totals	60 Minute Totals	Peak Hour
7:00 - 7:15	6	118	32	5	29	14	13	6	4	10	2	25						264		
7:15 - 7:30	4	170	23	13	24	18	26	6	11	14	1	44						354		
7:30 - 7:45	13	268	21	7	50	18	60	9	20	28	5	49						548		
7:45 - 8:00	8	217	22	7	68	11	39	7	17	30	4	26						456	1622	
8:00 - 8:15	20	162	19	8	62	18	37	9	20	45	14	26						440	1798	
8:15 - 8:30	14	137	34	19	71	6	32	8	14	24	5	28						392	1836	**7:30-8:30**
8:30 - 8:45	10	119	42	12	97	11	26	7	29	59	12	12						436	1724	
8:45 - 9:00	7	101	24	7	55	12	19	6	14	16	1	27						289	1557	
Peak Hour:	***55***	***784***	***96***	***41***	***251***	***53***	***168***	***33***	***71***	***127***	***28***	***129***							***PHF:***	***0.84***
PHF:	***0.69***	***0.73***	***0.71***	***0.54***	***0.88***	***0.74***	***0.70***	***0.92***	***0.89***	***0.71***	***0.50***	***0.66***								

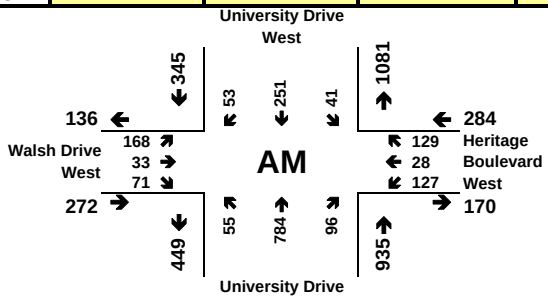
MID

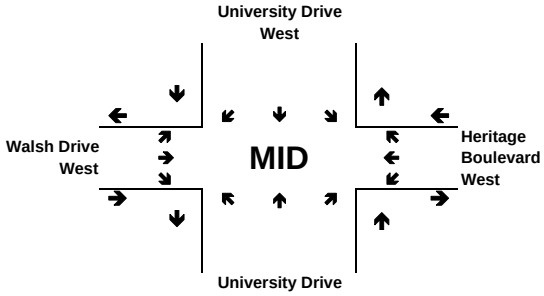
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks							
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total	15 Minute Totals	60 Minute Totals	Peak Hour
11:00 - 11:15																				
11:15 - 11:30																				
11:30 - 11:45																				
11:45 - 12:00																				
12:00 - 12:15																				
12:15 - 12:30																				
12:30 - 12:45																				
12:45 - 13:00																				
Peak Hour:																			***PHF:***	
PHF:																				

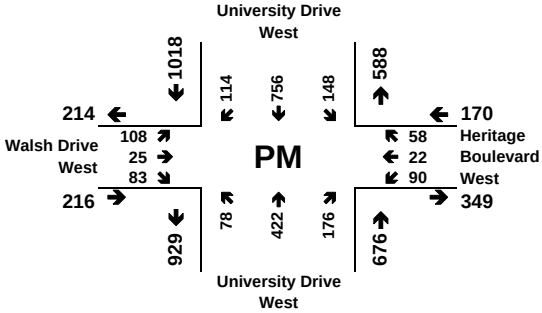
PM

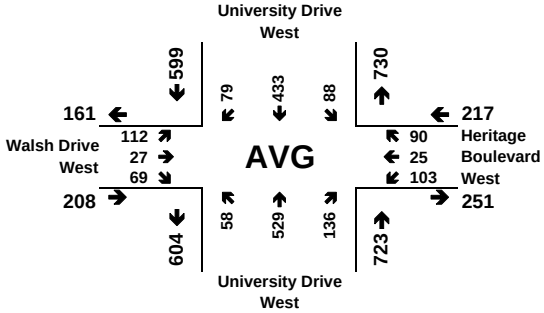
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			Crosswalks							
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	North	South	East	West	Total	15 Minute Totals	60 Minute Totals	Peak Hour
15:00 - 15:15	15	62	37	16	82	14	21	9	8	12	7	26						309		
15:15 - 15:30	24	75	30	14	108	21	11	11	13	16	7	17						347		
15:30 - 15:45	14	93	37	25	124	12	22	10	22	31	12	9						411		
15:45 - 16:00	15	103	39	40	119	33	15	5	12	33	12	14						440	1507	
16:00 - 16:15	23	100	36	28	146	27	25	4	16	22	4	17						448	1646	
16:15 - 16:30	20	104	40	33	129	20	26	4	14	8	5	23						426	1725	
16:30 - 16:45	21	128	49	29	175	26	39	10	27	24	2	15						545	1859	
16:45 - 17:00	19	111	41	37	193	27	20	3	22	36	12	12						533	1952	
17:00 - 17:15	24	83	52	25	191	30	27	5	22	22	5	12						498	2002	
17:15 - 17:30	14	100	34	57	197	31	22	7	12	8	3	19		3			3	504	2080	**16:30-17:30**
Peak Hour:	***78***	***422***	***176***	***148***	***756***	***114***	***108***	***25***	***83***	***90***	***22***	***58***							***PHF:***	***0.95***
PHF:	***0.81***	***0.82***	***0.85***	***0.65***	***0.96***	***0.92***	***0.69***	***0.63***	***0.77***	***0.63***	***0.46***	***0.76***								

4 Hour Average	58	529	136	88	433	79	112	27	69	103	25	90		1		
Approach Lanes	1	2	1	1	2	1	0.5	1	1	0.5	1	0.5				
Departure Lanes	2			2			1			1						









Appendix III
Traffic Signal Warrants

Traffic Signal Warrant Analysis

Main Street (name)	Garry Drive W.	Direction (EW or NS)	EW
Side Street (name)	Access 5	Direction (EW or NS)	NS
Quadrant / Int #		Comments	90.2 Population Future Total Traffic Volumes were used for the analysis

CHECK SHEET

press 'CHECK SHEET' button to calculate results

Road Authority:	
City:	Lethbridge
Analysis Date:	2009 Sep 04, Fri
Count Date:	
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Garry Drive W.	WB	0	0	0	0	1	0	786	1
Garry Drive W.	EB	0	1	0	0	0	0	384	1
Access 5	NB	0	0	0	0	0	0		
Access 5	SB	0	0	0	1	0	0		
							n		

Are the Access 5 SB right turns significantly impeded by through movements? (y/n) n

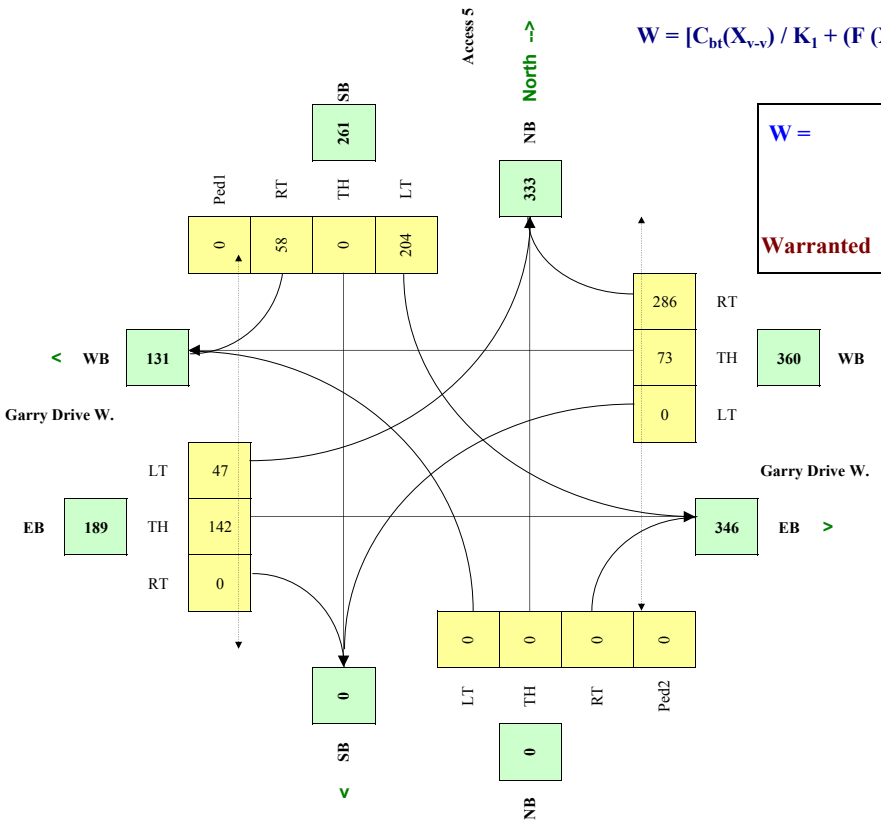
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,235
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Garry Drive W.	EW	50	2.0%	n	0.0
Access 5	NS		2.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	0	0	0	245	0	70	0	88	345	56	171	0	0	0	0	0
	0	0	0	207	0	59	0	74	292	47	145	0	0	0	0	0
	0	0	0	142	0	40	0	51	199	32	99	0	0	0	0	0
	0	0	0	236	0	67	0	85	333	54	165	0	0	0	0	0
	0	0	0	222	0	63	0	80	312	51	155	0	0	0	0	0
	0	0	0	169	0	48	0	61	237	39	118	0	0	0	0	0
Total (6-hour peak)	**0**	**0**	**0**	**1,221**	**0**	**347**	**0**	**439**	**1,718**	**279**	**853**	**0**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**0**	**0**	**0**	**204**	**0**	**58**	**0**	**73**	**286**	**47**	**142**	**0**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

W =

Veh *Ped*

Warranted

RESET SHEET

Traffic Signal Warrant Analysis

Main Street (name)	Metis Trail W.	Direction (EW or NS)	NS
Side Street (name)	East Site Access	Direction (EW or NS)	EW
Quadrant / Int #		Comments	90.2 Population Future Total Traffic Volumes were used for the analysis

press 'CHECK SHEET' button to calculate results

CHECK SHEET

Road Authority:	
City:	Lethbridge
Analysis Date:	2009 Sep 04, Fri
Count Date:	
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Metis Trail W.	NB	1	0	3	0	0	0	475	3
Metis Trail W.	SB	0	0	3	0	0	1	465	3
East Site Access	WB	0	0	0	0	0	0		
East Site Access	EB	1	0	0	0	0	1		
							n		
							n		

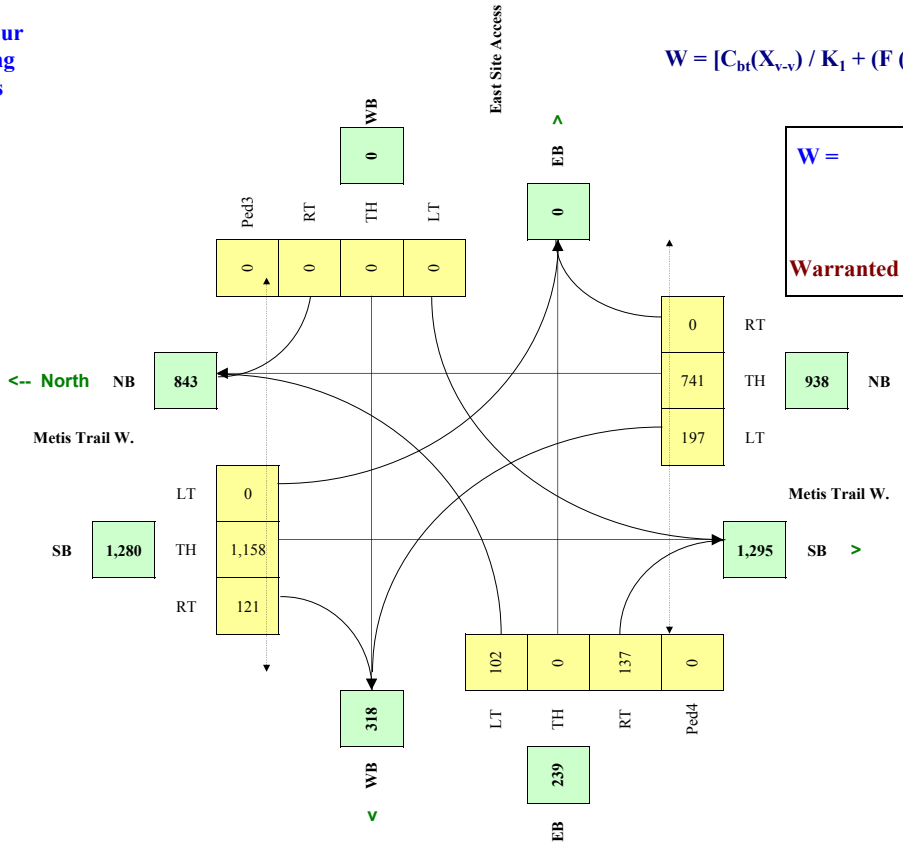
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,235
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Metis Trail W.	NS	50	2.0%	n	0.0
East Site Access	EW		2.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	237	892	0	0	1395	146	0	0	0	123	0	165	0	0	0	0
	201	755	0	0	1181	124	0	0	0	104	0	140	0	0	0	0
	137	515	0	0	806	84	0	0	0	71	0	95	0	0	0	0
	228	860	0	0	1345	141	0	0	0	119	0	159	0	0	0	0
	215	808	0	0	1263	132	0	0	0	111	0	149	0	0	0	0
	163	614	0	0	960	100	0	0	0	85	0	114	0	0	0	0
Total (6-hour peak)	**1,181**	**4,444**	**0**	**0**	**6,950**	**727**	**0**	**0**	**0**	**613**	**0**	**822**	**0**	**0**	**0**	**0**
Average (6-hour peak)	**197**	**741**	**0**	**0**	**1,158**	**121**	**0**	**0**	**0**	**102**	**0**	**137**	**0**	**0**	**0**	**0**

Average 6-hour Peak Turning Movements



$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$

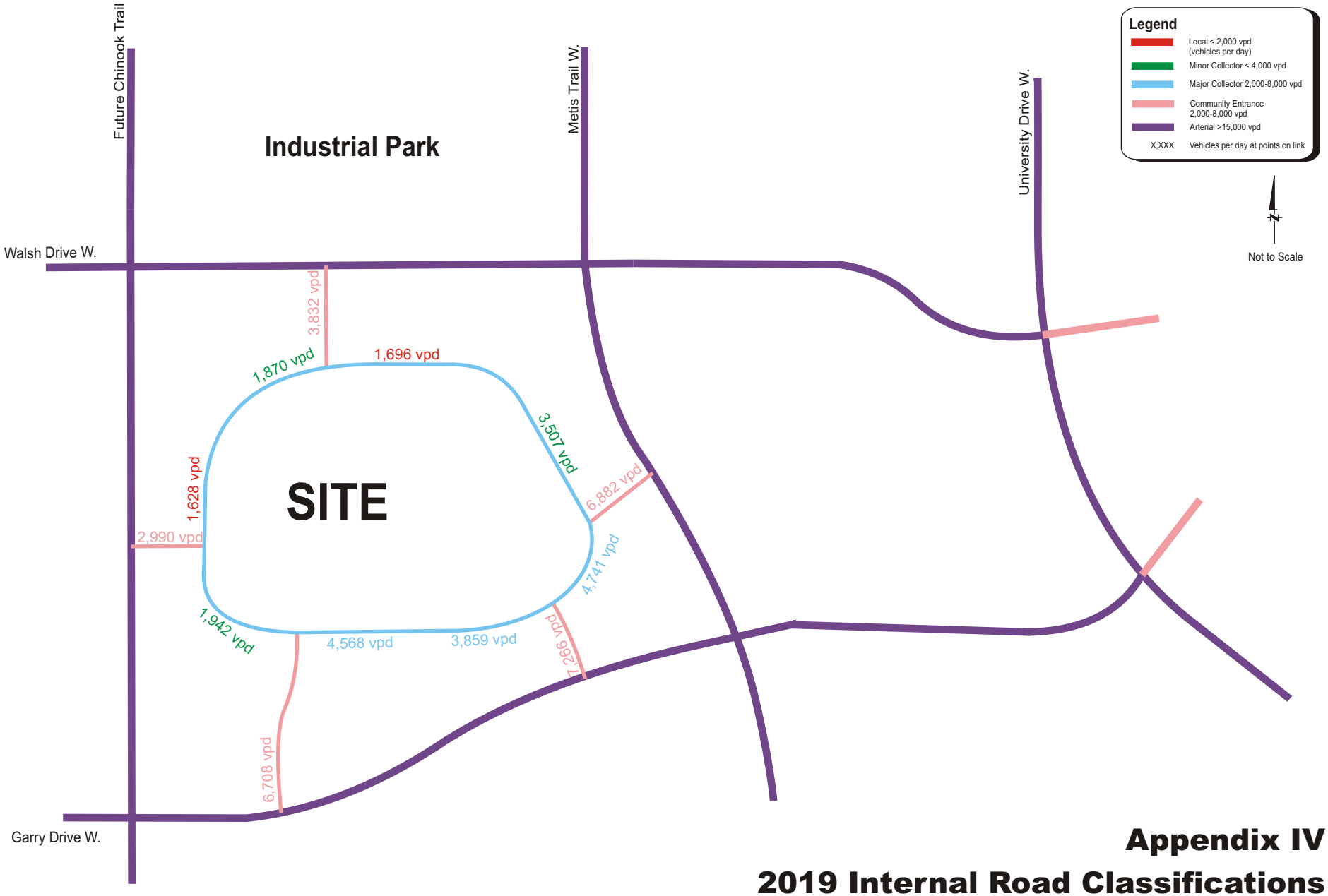
W =

Veh *Ped*

Warranted

RESET SHEET

Appendix IV
Internal Road Network Classification



Appendix IV
2019 Internal Road Classifications

Appendix V
Correspondence with City Staff

iTRANS Consulting Inc.
4838 Richard Road SW, Suite 140
WestMount Corporate Campus
Calgary, AB T3E 6L1
Tel: (403) 537-0250
Fax: (403) 537-0251
www.itransconsulting.com

File: 2.0
Project # 4495

Memorandum

To: Mike Kitchen – Martin Geomatics Consultants Ltd
Cc:
From: Megan Fernandes - iTRANS Consulting Inc.
Date: September 24, 2009
Re: **Country Meadows**
Post Submission Communications

Mike,

Attached are the follow-up email discussions between the City of Lethbridge, Martin Geomatics Consultants Ltd. and iTRANS Consulting Inc. to be appended to the September 9th TIA.

Regards,

Megan Fernandes, P.Eng.
Project Manager

HDR | iTRANS
4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5717 | Fax: 403.537.0251 | Email: mfernandes@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

Att. Country Meadows TIA Response (Sept 17)
Re: Country Meadows Response (Sept 18)
Country Meadows Response (Sept 23)

Dominic Cheng

From: Megan Fernandes
Sent: Thursday, September 17, 2009 4:37 PM
To: 'Ahmed Ali'
Cc: 'Mike Kitchen'; Dominic Cheng
Subject: Country Meadows TIA Response
Attachments: Shortcut to ; Shortcut to ; Shortcut to ; Shortcut to ; Shortcut to ; Shortcut to

Hello Ahmed,

Please find attached our letter response to your comments (the 20090918 file) along with the signal warrants.

I also noted that one of your advisory comments say you did not receive our previous response letter. This was emailed to you but it must not have made it through. I have attached it here for you again (the 20090909 file).

Also are attached is the pm and am files for the analysis.

Megan

Megan Fernandes, P.Eng.
Project Manager

HDR | iTRANS
4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5717 | Fax: 403.537.0251 | Email: mfernandes@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

iTRANS
transportation planning & engineering consultants

September 9, 2009 Project # 4495

Ahmed Ali, P.E., P.Eng., Ph.D.
Transportation Planning Manager
Infrastructure Services
City of Lethbridge
City Hall, 910 – 4th Avenue South
Lethbridge, Alberta T1J 0P6

Dear Sir:

Re: Country Meadows
Comment Responses

The following is in response to the comments received September 4, 2009 via email.

Comment 1
Exhibit 4-1: NB through traffic volume (491 vph) at Garry Drive/University Drive does not match with the actual count (461 vph).

Noted. The 491 was a typo and it has been corrected.

Comment 2
Table 4-2 – It seems the Synchro file in the CD is not the one used for report, please send the correct Synchro file.

The revised Synchro files will be forwarded to you.

Comment 3
I cannot reconcile the numbers shown in Exhibit 5-3 as the sum of traffic volumes on Exhibit 5-1 and 5-2, please check (In the absence of the explanation for the volumes, I am unable to make comments on Metis' Trail intersection configurations).

The volumes have been revised and the graphics updated.

iTRANS Consulting Inc.
4838 Richard Road SW, Suite 140
WestMount Corporate Campus
Calgary, AB, Canada T3E 6L1
Tel: 403.537.0250 Fax: 403.537.0251
www.itransconsulting.com

Comment 4

Page 24- re. the recommendation to improve University Drive/Walsh Drive in background conditions – I feel that no improvement may be necessary as the LOS is B and a v/c of 0.81 is not far from the acceptable 0.80.

Noted. The report has been revised to reflect this.

Comment 5

Exhibit 5-4 may not be required as the network would function satisfactorily in the background conditions.

Noted. This graphic has been removed from the report.

Comment 6

Table 6-1 and Table 6-2 – Trip rates for school use (ITE land-use 520) does not match with ITE rates

Noted. The table has been updated.

Comment 7

Exhibit 6-2 – Site traffic assignment shows some anomalies with the assumed trip distribution.

The analysis was checked and the trips were assigned as per the trip distribution.

Comment 8

Text on page 46 as well as Exhibit 7-2 would need revision as many of the improvements recommended for the University Drive may not be necessary, please see the attached Synchro file.

Noted. The text and exhibit revised.

Comment 9

Section 7.2 – daily volumes seem to have been obtained by using daily trip generation rather than multiplying by the peak hour volumes by 10 as suggested in Section 7.2. The text might require revisions.

In order to obtain the total daily volumes, an assumed factor of 10 was applied to the existing traffic counts since these were assumed to be primarily residential trips; this was done since we are unable to use ITE daily rates to calculate daily volumes for this traffic. The site and background traffic was calculated by applying the ITE daily rates.

Comment 10
Exhibit 7-3 – Daily volumes on Metis' Trail south of Garry Drive seem to be incorrect.

Noted. This is a typo and has been revised.

Comment 11
Page 46. and Exhibit 7-5: Please revise the Exhibit 7-5 to show intersection spacing (as per previously sent comments).

Noted. This graphic has been included in the revised report.

Comment 12
Revise Table C-1.

Noted.

Comment 13
Include signal warrants for the new intersections (Access 5/Garry Drive may not need a traffic light).

Signal warrants have been included.

Comment 14
Executive Summary Page ii. – Revise the conclusions.

Noted.

The revised report has been sent via email and a hard copy will follow via courier. If you have any other questions please do not hesitate to contact me to discuss.

Yours truly,

iTRANS Consulting Inc.

Megan Fernandes, P.Eng.
Project Manager

Encl. Country Meadows Traffic Impact Assessment

cc: Ed Martin – Martin Geomatics
Mike Kitchen – Martin Geomatics

transportation planning & engineering consultants

September 18, 2009 Project # 4495

Ahmed Ali, P.E., P.Eng., Ph.D.
Transportation Planning Manager
Infrastructure Services
City of Lethbridge
City Hall, 910 – 4th Avenue South
Lethbridge, Alberta T1J 0P6

Dear Sir:

Re: Country Meadows
Comment Responses

The following is in response to the comments received September 15, 2009 via email.

Comment 1

Exhibit 5-1 background volumes, could you please let me know the reference for the SB volumes on Metis Trail (1215/724 vph) at Walsh Drive intersection? If you could attach a copy of the reference that will help

The southbound volumes on Metis Trail (1, 215 / 724 vph) at Walsh Drive are carry through volumes from the intersection of Metis Trail / Garry Drive resulting from traffic generated by The Piers development. These volumes were taken from the Piers TIA of December 2007 as submitted by iTRANS. Though the intersection of Metis Trail / Garry Drive was not included in the Piers TIA, the volumes were projected based on assumptions made for that study.

Comment 2

The traffic volumes in the Signal warrant analysis sheets do not match with the forecast volumes for 2019

The signal warrants account for the traffic volumes spread throughout the day, not only during the peak hours. As a result, the volumes analysed in the signal warrant analysis sheets will not necessarily match the forecast volumes for 2019 shown on Exhibit 7-1.

iTRANS Consulting Inc.
4838 Richard Road SW, Suite 140
WestMount Corporate Campus
Calgary, AB, Canada T3E 6L1
Tel: 403.537.0250 Fax: 403.537.0251
www.itransconsulting.com

The a.m. peak hour was assumed at 07:00 – 08:00 and the p.m. peak hour assumed at 16:00 – 17:00. These two time periods will match the projected volumes shown in Exhibit 7-1. The remaining time periods were estimated using a calculated factor based on the volume spread of the existing counts done for the intersection of University Drive / Garry Drive.

Comment 3

Signal warrant analysis is not undertaken for Access 12/Garry Drive

A signal warrant has been completed for the Access 12 / Garry Drive intersection.

Comment 4

The Signal warrant analysis attached for Access 5/Garry Drive shows that a signal is warranted, but Table B-1 shows this intersection as unsignalized

As the intersection analysis in Synchro indicated no signalization was required, the signal warrant analysis was not required. Though the signal warrant analysis may have provided justification of providing signals; operationally, the intersection will operate at accepted LOS and v/c of E and 0.80 as unsignalized. Therefore, it is at the discretion of City staff whether they feel signals are justified.

Comment 5

Please send all the electronic files (Trip gen, distr & assignment and signal warrants)

All electronic files have been attached as requested (Trip Generation, Trip Distribution, Trip Assignment and Signal Warrants)

The revised report has been sent via email and a hard copy will follow via courier. If you have any other questions please do not hesitate to contact me to discuss.

Yours truly,

iTRANS Consulting Inc.

Megan Fernandes, P.Eng.
Project Manager

Encl. Country Meadows Traffic Impact Assessment

cc: Ed Martin – Martin Geomatics
Mike Kitchen – Martin Geomatics

Dominic Cheng

From: Megan Fernandes
Sent: Friday, September 18, 2009 3:21 PM
To: 'Ahmed Ali'
Cc: 'Mike Kitchen'; Dominic Cheng
Subject: RE: Country Meadows TIA Response
Attachments: P M Peak Hour improvements.sy7; AM Peak Hour improvements.sy7; 20090918 Country Meadows Analysis Summary.PDF; Traffic Signal Warrant Metis Trail W. & East Site Access (2019 Total) v9.xls; Traffic Signal Warrant Garry Dr W. & Access 12 (2019 Total) v10.xls

Hello Ahmed,

In response to your questions regarding volumes along Metis Trail:

- The Piers TIA did not evaluate the intersections of Metis Trail at either Walsh or Garry Drive. However, at the time of the study we did distribute volumes outside the boundaries of the study area and those volumes went north along Metis Trail which was the assumption at the time for this traffic. Therefore, we did not alter the Piers traffic in any way for the Country Meadows study; we simply took those volumes and added them in as background volumes. This is shown in Exhibit 5-1 which includes the Piers volumes for north and southbound along Metis. The Piers volumes represent traffic that accessed Garry Drive via Church Street and traffic that accessed Metis Trail via Whoop-Up Drive and North Road. The graphics you have for the Piers TIA do not go into that level of detail since it was not part of the scope of work.
- In our last report submission we updated Exhibit 5-1 (which did not originally show the Metis Trail intersection volumes) to show these volumes as requested. The volumes now balance.

In response to the location of Church Street:

- As stated above we were not required to evaluate Church Street and its intersection with Garry Drive in the Piers TIA and were not aware of its exact location along Garry Drive in relation to Metis Trail at the time of this study. For the Country Meadows study we assumed that it would form a 4-leg intersection with Access 12 at Garry Drive.
- If this assumption is incorrect please see attached the traffic signal warrants for Garry Drive at Access 12 with the new volumes along with the synchro analysis for both the a.m. and p.m. ultimate peak hours.

If you have any further questions please let me know.

Megan

Megan Fernandes, P.Eng.
Project Manager

HDR | iTRANS
4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5717 | Fax: 403.537.0251 | Email: mfernandes@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

From: Ahmed Ali [mailto:Ahmed.Ali@lethbridge.ca]
Sent: Friday, September 18, 2009 10:01 AM
To: Megan Fernandes
Cc: Mike Kitchen; Dominic Cheng
Subject: RE: Country Meadows TIA Response

Good morning Megan
Thanks for the response letters.
I am still unable to reconcile the background flows. I have reviwed the TIAs for West lethbridge ASP, the

Crossings OP and the Piers OP and found nothing that can explain the volumes you have shown on Metis Trail NB and SB at both the Walsh Drive and Garry Drive intersections (see the attached). Please let me know if you can tell otherwise. Also, can you please send me the excel worksheets for the signal warrants?
Thx
Ahmed

From: Megan Fernandes [mailto:mfernandes@itransconsulting.com]
Sent: Thursday, September 17, 2009 4:37 PM
To: Ahmed Ali
Cc: Mike Kitchen; Dominic Cheng
Subject: Country Meadows TIA Response

Hello Ahmed,

Please find attached our letter response to your comments (the 20090918 file) along with the signal warrants.

I also noted that one of your advisory comments say you did not receive our previous response letter. This was emailed to you but it must not have made it through. I have attached it here for you again (the 20090909 file).

Also are attached is the pm and am files for the analysis.

Megan

Megan Fernandes, P.Eng.
Project Manager

HDR | iTRANS
4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5717 | Fax: 403.537.0251 | Email: mfernandes@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

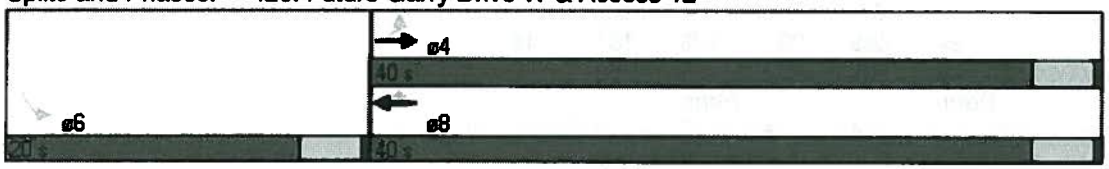
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	60.0			0.0	60.0	0.0
Storage Lanes	1			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (m)	15.2	15.2	15.2	15.2	15.2	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Turning Speed (k/h)	24			14	24	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.850	0.988	
Flt Protected	0.950				0.956	
Satd. Flow (prot)	1648	1735	1735	1475	1639	0
Flt Permitted	0.487				0.956	
Satd. Flow (perm)	845	1735	1735	1475	1639	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				176	8	
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Link Speed (k/h)		50	50		50	
Link Distance (m)		404.2	101.0		174.0	
Travel Time (s)		29.1	7.3		12.5	
Volume (vph)	21	782	349	155	147	14
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	24	889	397	176	167	16
Lane Group Flow (vph)	24	889	397	176	183	0
Turn Type	Perm			Perm		
Protected Phases		4	8			
Permitted Phases	4			8	6	
Detector Phases	4	4	8	8	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	40.0	40.0	40.0	40.0	20.0	0.0
Total Split (%)	66.7%	66.7%	66.7%	66.7%	33.3%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Max	Max	Max	
Act Effct Green (s)	36.0	36.0	36.0	36.0	16.0	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.27	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.05	0.85	0.38	0.18	0.41	
Control Delay	5.3	20.7	7.6	1.5	20.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.3	20.7	7.6	1.5	20.7	
LOS	A	C	A	A	C	
Approach Delay		20.3	5.7		20.7	
Approach LOS		C	A		C	
Queue Length 50th (m)	1.0	69.3	19.6	0.0	15.7	
Queue Length 95th (m)	3.2	#141.2	32.6	5.3	30.0	
Internal Link Dist (m)		380.2	77.0		150.0	
Turn Bay Length (m)	60.0				60.0	
Base Capacity (vph)	507	1041	1041	955	443	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.05	0.85	0.38	0.18	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 61.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 420: Future Garry Drive W & Access 12



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	472	0	145	218	0	331
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	536	0	165	248	0	376
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			536		1114	536
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			536		1114	536
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		100	31
cM capacity (veh/h)			1032		194	544

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	536	412	376
Volume Left	0	165	0
Volume Right	0	0	376
cSH	1700	1032	544
Volume to Capacity	0.32	0.16	0.69
Queue Length 95th (m)	0.0	4.3	40.6
Control Delay (s)	0.0	4.7	25.1
Lane LOS		A	D
Approach Delay (s)	0.0	4.7	25.1
Approach LOS			D

Intersection Summary			
Average Delay	8.6		
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

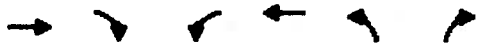
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.7
Grade (%)		0%	0%		0%	
Storage Length (m)	60.0			0.0	60.0	0.0
Storage Lanes	1			1	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (m)	15.2	15.2	15.2	15.2	15.2	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Turning Speed (k/h)	24			14	24	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt				0.850	0.983	
Flt Protected	0.950				0.958	
Satd. Flow (prot)	1648	1735	1735	1475	1634	0
Flt Permitted	0.204				0.958	
Satd. Flow (perm)	354	1735	1735	1475	1634	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				492	12	
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99
Link Speed (k/h)		50	50		50	
Link Distance (m)		380.9	101.0		174.0	
Travel Time (s)		27.4	7.3		12.5	
Volume (vph)	57	532	712	433	171	25
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	65	605	809	492	194	28
Lane Group Flow (vph)	65	605	809	492	222	0
Turn Type	Perm			Perm		
Protected Phases		4	8			
Permitted Phases	4			8	6	
Detector Phases	4	4	8	8	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	40.0	40.0	40.0	40.0	20.0	0.0
Total Split (%)	66.7%	66.7%	66.7%	66.7%	33.3%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max	Max	Max	Max	Max	
Act Effct Green (s)	36.0	36.0	36.0	36.0	16.0	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.27	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.31	0.58	0.78	0.45	0.50	
Control Delay	10.7	10.2	15.9	2.1	22.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	10.7	10.2	15.9	2.1	22.2	
LOS	B	B	B	A	C	
Approach Delay		10.3	10.7		22.2	
Approach LOS		B	B		C	
Queue Length 50th (m)	3.0	35.3	57.6	0.0	19.4	
Queue Length 95th (m)	9.7	57.6	96.7	8.3	36.0	
Internal Link Dist (m)		356.9	77.0		150.0	
Turn Bay Length (m)	60.0				60.0	
Base Capacity (vph)	212	1041	1041	1082	445	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.31	0.58	0.78	0.45	0.50	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2: and 6:SBL, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 11.7 Intersection LOS: B
Intersection Capacity Utilization 66.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 420: Future Garry Drive W & Access 12



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	398	0	319	418	0	191
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	452	0	362	475	0	217
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)				381		
pX, platoon unblocked					0.58	
vC, conflicting volume			452		1652	452
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			452		2132	452
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			67		100	64
cM capacity (veh/h)			1108		21	607

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	452	838	217
Volume Left	0	362	0
Volume Right	0	0	217
cSH	1700	1108	607
Volume to Capacity	0.27	0.33	0.36
Queue Length 95th (m)	0.0	10.9	12.3
Control Delay (s)	0.0	6.8	14.2
Lane LOS		A	B
Approach Delay (s)	0.0	6.8	14.2
Approach LOS			B

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

Traffic Signal Warrant Analysis

Main Street (name)	Garry Drive W
Side Street (name)	Access 12
Quadrant / Int #	
press 'CHECK SHEET' button to calculate results	CHECK SHEET

Direction (EW or NS)	EW
Direction (EW or NS)	NS
Comments	90,235 Population forecast future total traffic volumes were used in this signal warrant analysis

Road Authority:	
City:	Lethbridge
Analysis Date:	2009 Sep 18, Fri
Count Date:	
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Garry Drive W	WB	1	0	1	0	0	1	530	1
Garry Drive W	EB	1	0	0	0	1	0	790	1
Access 12	NB	0	0	0	1	0	0		
Access 12	SB	1	0	0	0	1	0		

Are the Access 12 NB right turns significantly impeded by through movements? (y/n) n

Are the Access 12 SB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,235
Central Business District	(y/n)	n

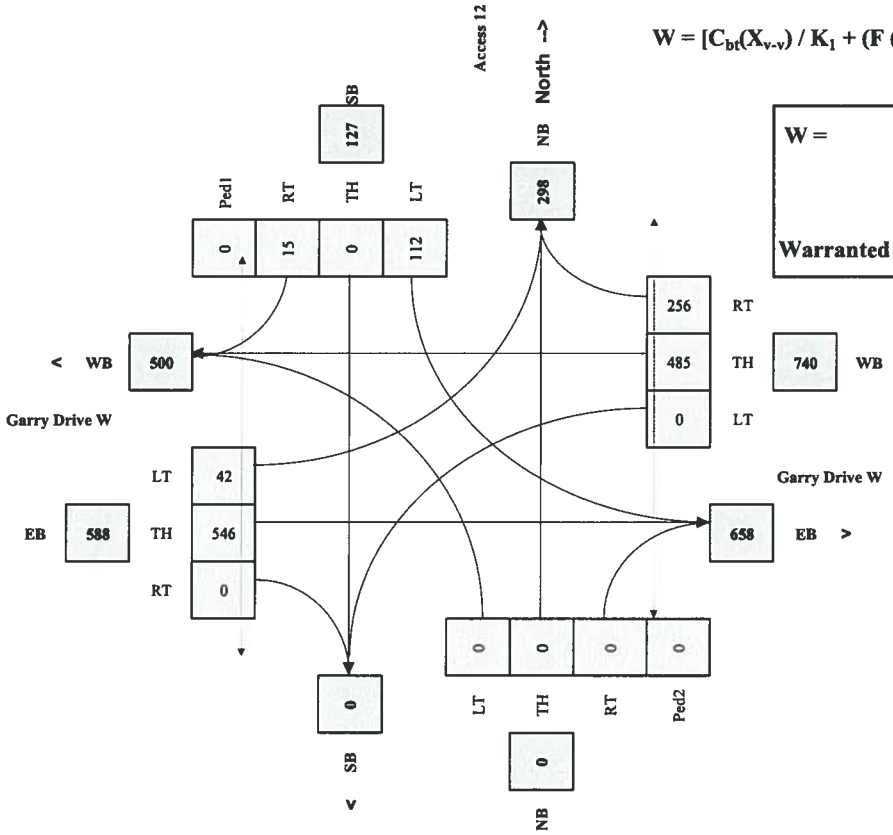
Other Input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Garry Drive W	EW	50	2.0%	n	0.0
Access 12	NS		2.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:00 - 8:00	0	0	0	147	0	14	0	349	155	21	782	0	0	0	0	0
8:00 - 9:00	0	0	0	78	0	11	0	317	70	19	391	0	0	0	0	0
11:30 - 12:30	0	0	0	90	0	9	0	633	281	38	420	0	0	0	0	0
12:30 - 13:30	0	0	0	90	0	14	0	475	184	61	644	0	0	0	0	0
16:00 - 17:00	0	0	0	171	0	25	0	712	433	57	532	0	0	0	0	0
17:00 - 18:00	0	0	0	98	0	16	0	422	411	57	504	0	0	0	0	0
Total (6-hour peak)	0	0	0	674	0	89	0	2,908	1,534	253	3,273	0	0	0	0	0
Average (6-hour peak)	0	0	0	112	0	15	0	485	256	42	546	0	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W =

Veh *Ped*

Warranted

RESET SHEET

Traffic Signal Warrant Analysis

Main Street (name)	Metis Trail W.	Direction (EW or NS)	NS
Side Street (name)	East Site Access	Direction (EW or NS)	EW
Quadrant / Int #		Comments	90,235 Population forecast future total traffic volumes were used in this signal warrant analysis
press 'CHECK SHEET' button to calculate results	CHECKSHEET		

Road Authority:	
City:	Lethbridge
Analysis Date:	2009 Sep 16, Wed
Count Date:	
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Metis Trail W.	NB	1	0	2	0	0	0	470	2
Metis Trail W.	SB	0	0	2	0	0	1	475	2
East Site Access	WB	0	0	0	0	0	0		
East Site Access	EB	1	0	0	0	0	1		

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,235
Central Business District	(y/n)	n

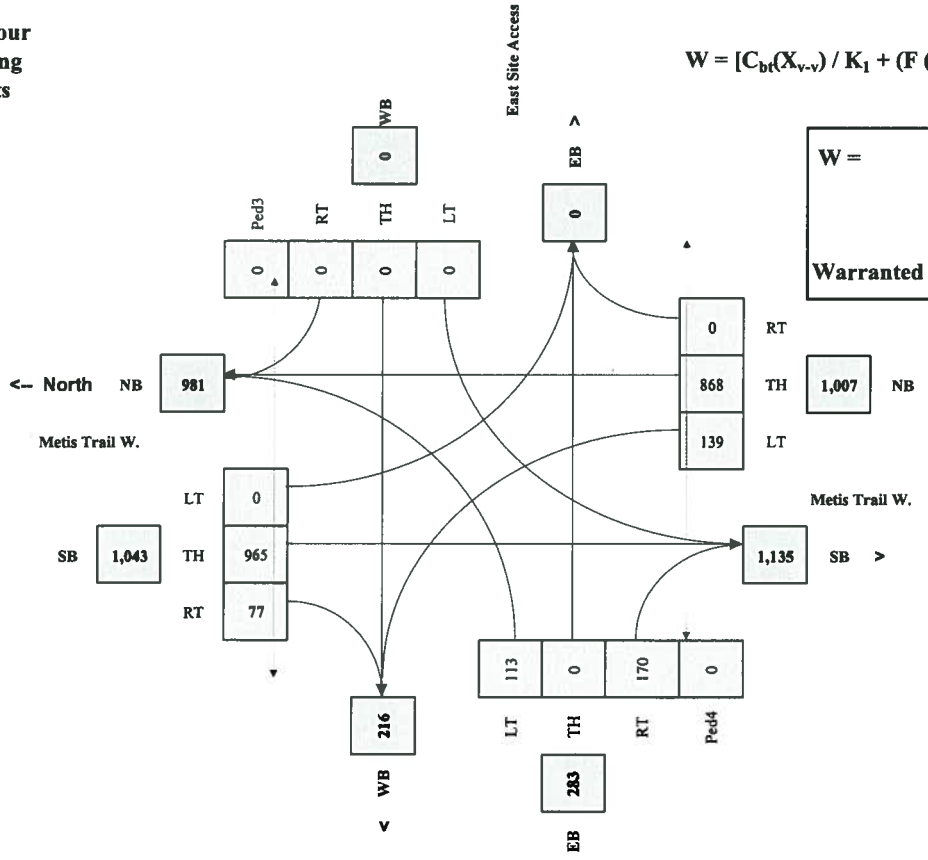
Other Input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Metis Trail W.	NS	50	2.0%	n	0.0
East Site Access	EW		2.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:00 - 8:00	97	1131	0	0	829	53	0	0	0	116	0	152	0	0	0	0
8:00 - 9:00	53	1273	0	0	630	41	0	0	0	106	0	164	0	0	0	0
11:30 - 12:30	136	647	0	0	833	51	0	0	0	81	0	171	0	0	0	0
12:30 - 13:30	156	630	0	0	1037	79	0	0	0	131	0	203	0	0	0	0
16:00 - 17:00	237	892	0	0	1395	146	0	0	0	123	0	165	0	0	0	0
17:00 - 18:00	154	635	0	0	1068	94	0	0	0	123	0	165	0	0	0	0
Total (6-hour peak)	833	5,208	0	0	5,792	464	0	0	0	680	0	1,020	0	0	0	0
Average (6-hour peak)	139	868	0	0	965	77	0	0	0	113	0	170	0	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W =

Veh *Ped*

Warranted

RESET SHEET

Dominic Cheng

From: Dominic Cheng
Sent: Wednesday, September 23, 2009 1:59 PM
To: 'Ahmed.Ali@lethbridge.ca'; 'Mike Kitchen'
Cc: Megan Fernandes
Subject: Country Meadows Response
Attachments: Figure 3-2.pdf; p.m. Piers Volumes on Metis (Benton) Trail.pdf; a.m. Piers Volumes on Metis (Benton) Trail.pdf; Piers Traffic Re-distributed.pdf; P M Peak Hour improvementsv2.sy7; AM Peak Hour improvements v2.sy7

Hello Ahmed,

As discussed on Friday with Megan Fernandes, please our revised analysis for your questions regarding volumes along Metis Trail.

We have double checked the volumes for The Piers study and the volumes that are shown in the Country Meadows report are correct. The Piers study took into account traffic generated from the entire North and South Village; therefore, there is a fair bit of traffic. However, for this study Stephen had us assume that Benton Trail would not be constructed north or south by 2017; therefore, all traffic would be on Whoop-Up Drive. The Full Build out for all studies was based on a distribution for 2031 when Metis Trail was assumed to be in place. The Full Build out volumes were based on traffic from the West Lethbridge Phase II ASP (Bunt in 2005) and The Copperwood TIA (UMA 2005) and are show in Figure 2-2 of The Crossings TIA by iTRANS in 2007. Traffic generated by the North Village was added onto these volumes to form the Full Build out volumes. So even though the distribution was for 2031, the volumes just represent full build out.

To give you some more background information please see the following:

- As discussed the Piers study did not have to evaluate intersections along Metis Trail; however, our spreadsheets did carry volumes outside of the study area as per the trip distribution shown in Figure 3-2 of the Piers study. **<Figure 3-2.pdf>**
- The volumes resulting from this distribution along with all background developments are shown in the attached illustrations. **<a.m. Piers Volumes on Metis (Benton) Trail.pdf> & < p.m. Piers Volumes on Metis (Benton) Trail.pdf >**
- Analysis completed today assumed that Metis Trail would be in place by the 2019 horizon year. As a result, the 2017 traffic volumes from the Piers study were used instead of the 2031 traffic volumes previously used.
- Due to these assumptions being different during the Piers study from what is now being assumed, we revised the analysis which shows this traffic using Garry and Walsh to get to northbound University. We have assumed a 70-30 right turn split for traffic traveling north-south along Metis and a 100% eastbound through from traffic along Garry Drive. This distribution took the eastbound traffic on Whoop-up Drive at Metis Trail and divided it by percentages of distribution for the intersection of Whoop-Up Drive and Metis Trail at the 2031 full buildout horizon. The process is shown in the attached **<Piers Traffic Re-distributed.pdf>**. The 'x' symbols indicate no volume changes were applied.
- Please find attached the updated Synchro files which show the new traffic volumes and analysis. A summary of the analysis are provided in the table below.

Intersection	2019 Total	
	LOS	v/c

University Drive / Walsh Drive	C	0.90
University Drive / Garry Drive	C	0.95
Metis Trail / Walsh Drive	C	0.68
Metis Trail / Garry Drive	B	0.54

If you have any further questions please let me know.

Dominic Cheng, EIT
Transportation Planner

for

Megan Fernandes, P.Eng.
Project Manager

HDR | iTRANS
4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5717 | Fax: 403.537.0251 | Email: mfernandes@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

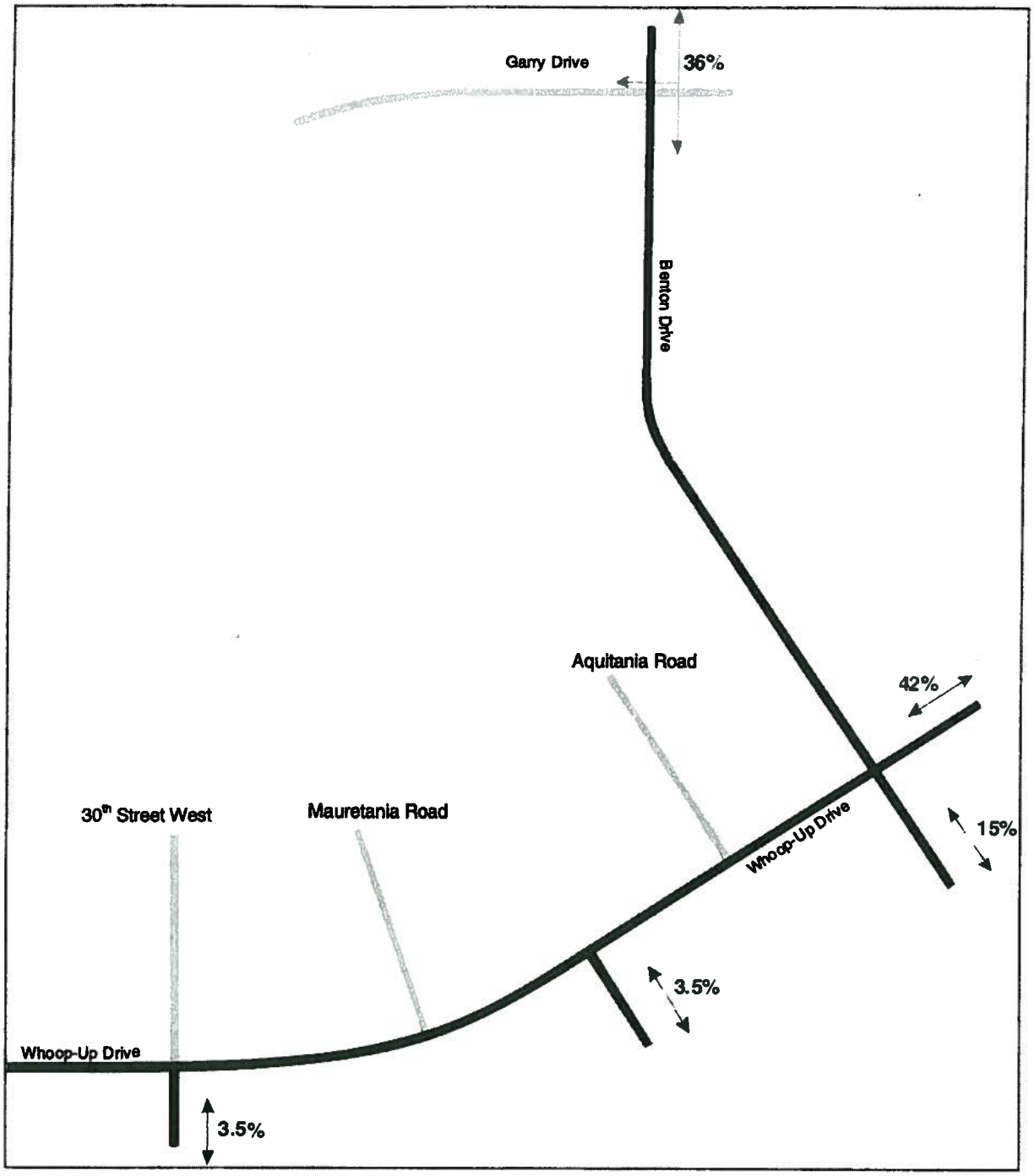
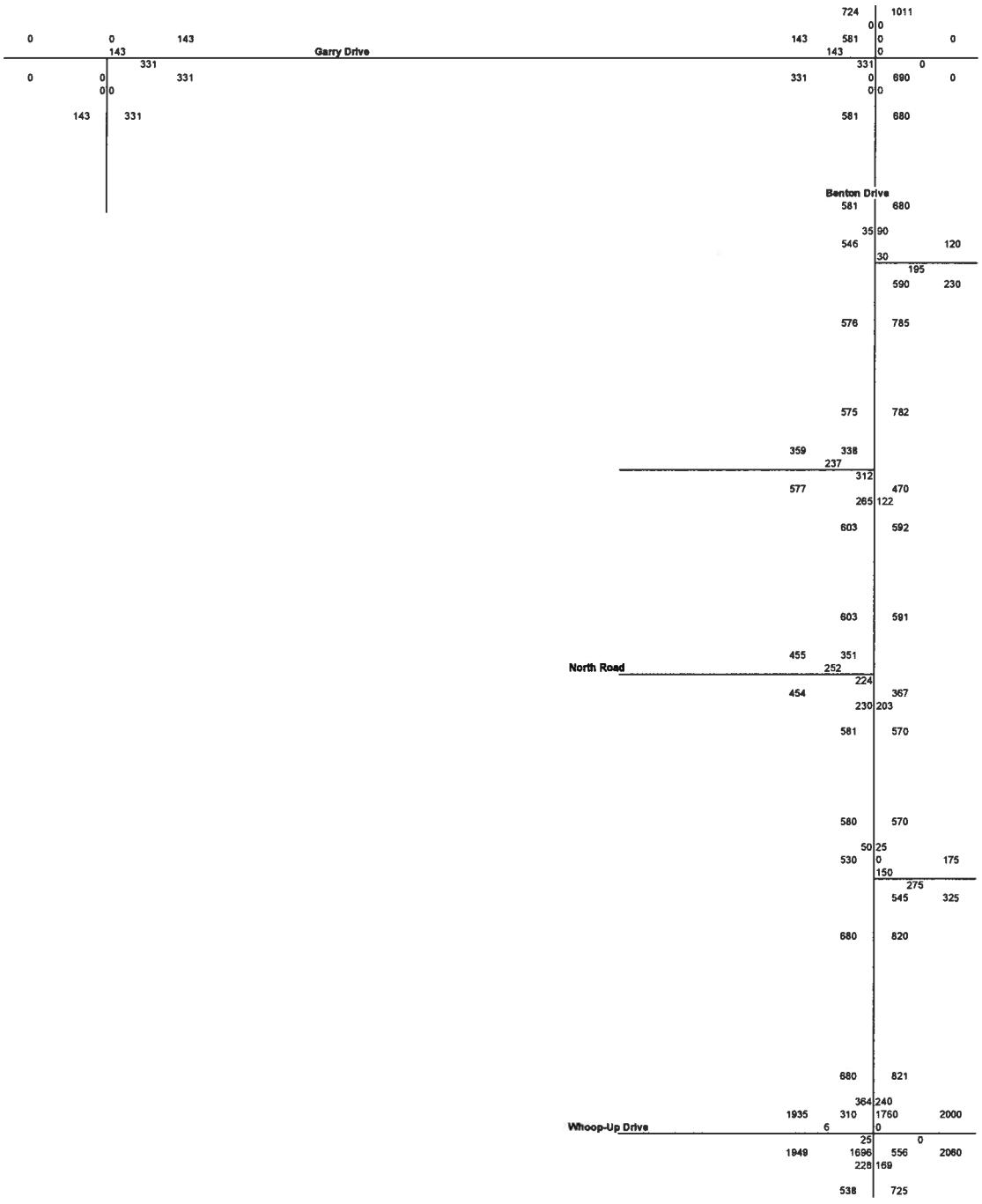
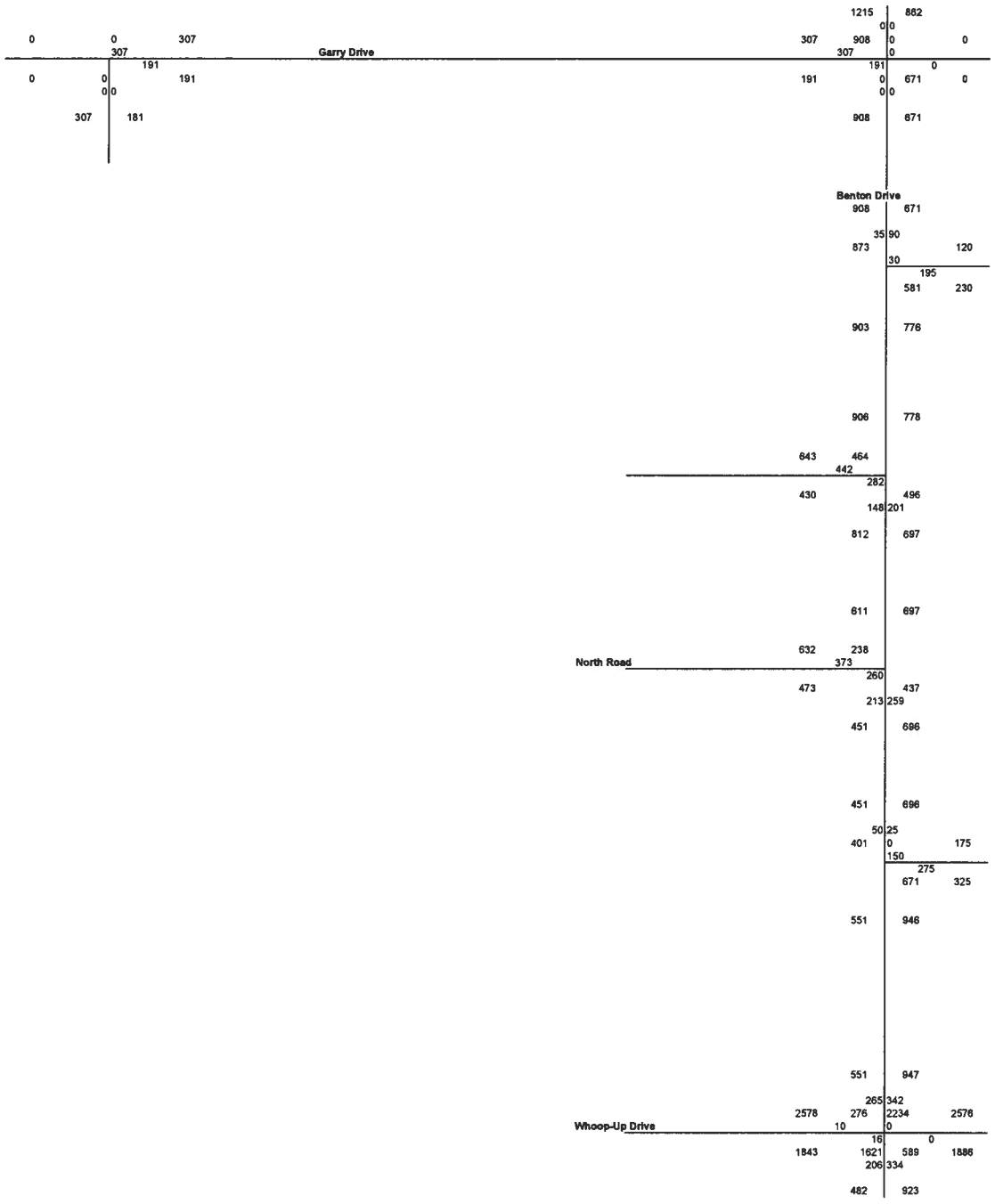


Figure 3-2: Full Build-Out Distribution


Garry Drive
Benton Drive
North Road
Whoop-Up Drive


Garry Drive
Benton Drive
North Road
Whoop-Up Drive

Name of Contact: _____ Distribution: _____

Organization: _____ File: _____

Subject: A.M. DISTRIBUTION Contact Date: _____

Telephone Conversation _____ Meeting ____ Phone: _____

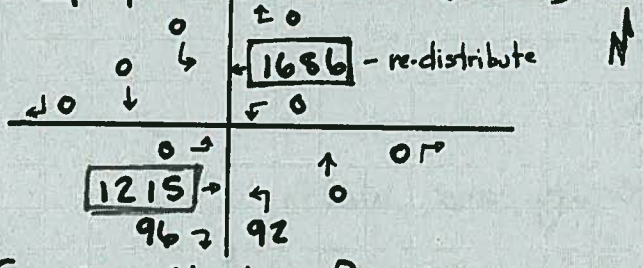
From Piers report:

Full build-out A.M. peak hour - Whoop-up Drive & Benton (Metis)

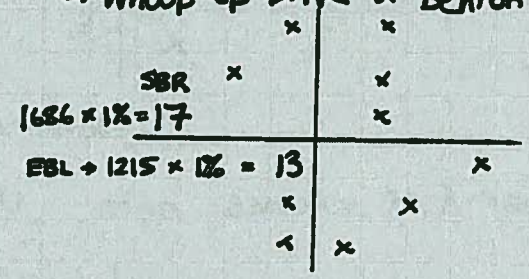
SBR	6	- 1%
NBL	169	- 9%
WBT	1760	- 90%
	1935	

EBL	25	- 1%
EBT	1696	- 87%
EBR	228	- 12%
	1949	

10 year A.M. volumes - original distribution
↳ Whoop-up Drive & Benton (Metis)

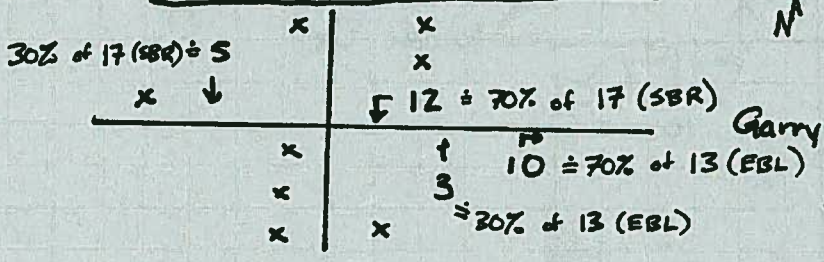


10 year A.M. volumes w/ FBO dist.
↳ Whoop-up Drive & Benton (Metis)

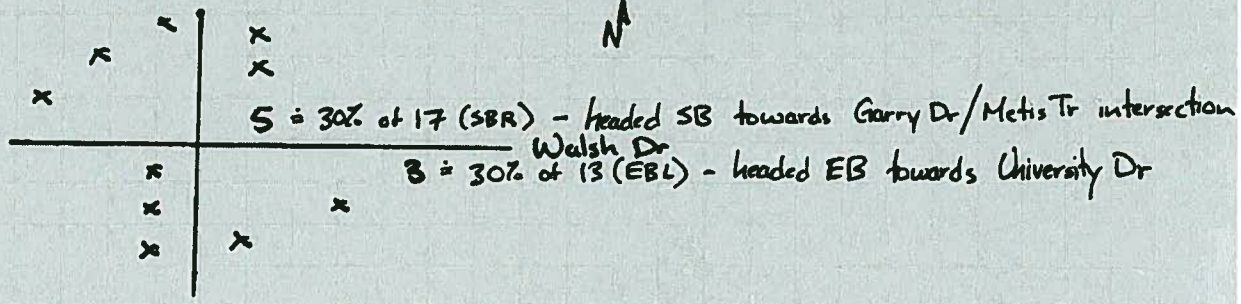


For Country Meadows Report:

10 year A.M volumes from FBO dist. on Whoop-Up & Benton (Metis) onto Garry Drive & Metis Trail



10 year A.M volumes from Garry & Metis onto Walsh Drive & Metis



by: _____ page: 1 / 4

Name of Contact: _____ Distribution: _____

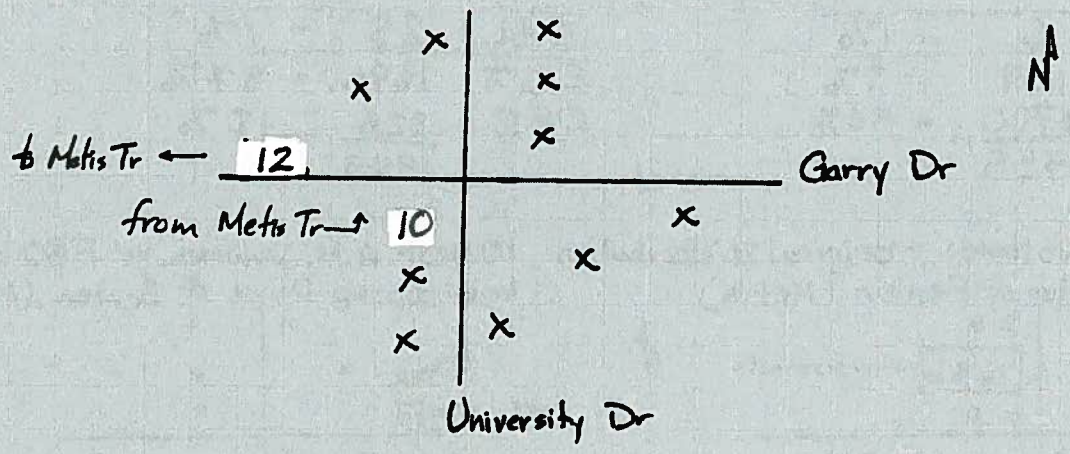
Organization: _____ File: _____

Subject: A.M. DISTRIBUTION Contact Date: _____

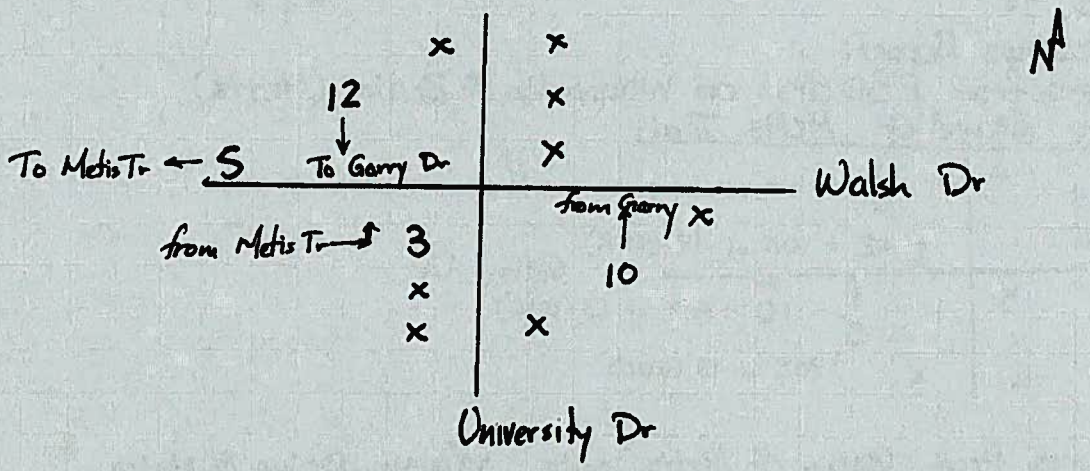
Telephone Conversation _____ Meeting ____ Phone: _____

For Country Meadows Report:

10 year A.M Volumes onto University & Garry



10year A.M volomes onto University and Walsh.



by: _____ page: 2 / 4

Name of Contact: _____ Distribution: _____

Organization: _____ File: _____

Subject: P.M. DISTRIBUTION Contact Date: _____

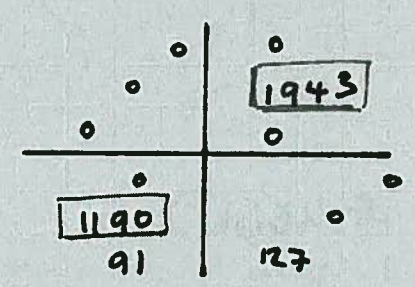
Telephone Conversation _____ Meeting ____ Phone: _____

From Piers Report:
Full build-out P.M. peak-hour - Whoop-Up Drive & Benton (Metis)

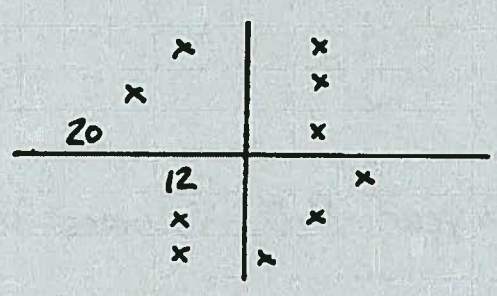
SBR	10	- 1%
WBT	2234	- 86%
NBL	334	- 13%
	2578	

EBL	16	- 1%
EBT	621	- 55%
EBR	206	- 11%
	1843	

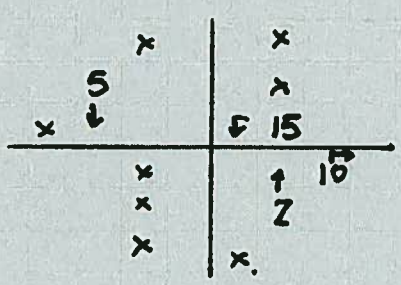
10 year P.M volumes - original distribution
↳ Whoop-Up Drive & Benton (Metis)



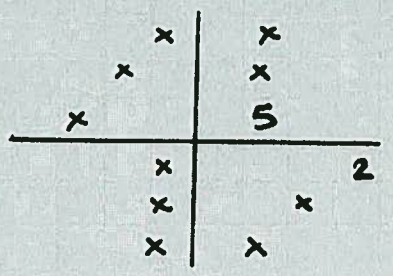
10 year P.M volumes w/ FBO dist.
↳ Whoop-Up Drive & Benton (Metis)



For Country Meadows Report:
10 Year P.M. volumes from FBO dist. on Whoop-Up & Benton (Metis) onto Garry Drive & Metis Trail



10 year P. M. Volumes from Garry & Metis onto Walsh & Metis



by: _____ page: 3 / 4

Name of Contact: _____ Distribution: _____

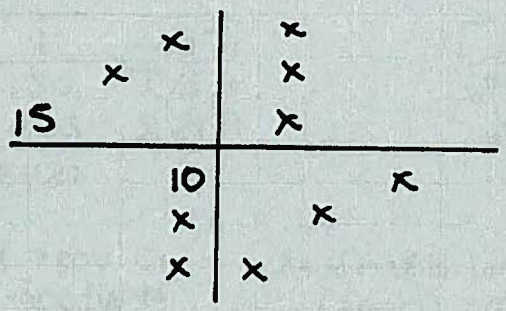
Organization: _____ File: _____

Subject: P.M. DISTRIBUTION Contact Date: _____

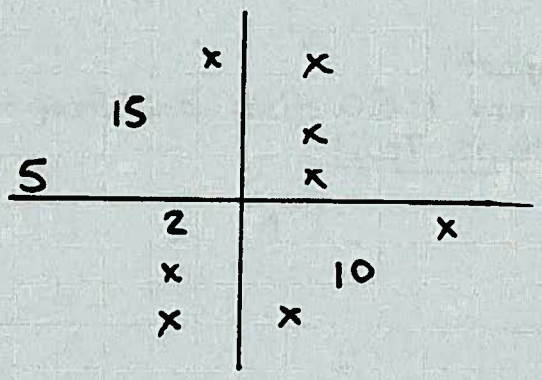
Telephone Conversation _____ Meeting ____ Phone: _____

For Country Meadows Report:

10 Year P.M. Volumes onto University ? Garry



10 year P.M. Volumes onto University & Walsh.



by: _____ page: 4 / 4

Ahmed Ali

From: Ahmed Ali
Sent: Thursday, September 24, 2009 12:04 PM
To: 'Dominic Cheng'; Mike Kitchen
Cc: Megan Fernandes; Ed Martin; Ray Martin; Dawn Scherer; Darwin Juell; Barry Peat; Gary Weikum
Subject: RE: Country Meadows Response (070944CE)

Hi Dominic/Megan,
We would need the report to be revised with the new flows on Metis Trail (the revised analysis has changed the volumes significantly. I have checked the numbers and they make sense this time!). All the relevant graphics and analysis tables for the affacted intersections and daily volumes on Metis Trail need to be revised as well. Please send us the REVISED report (with all the correspondence attached in an appendix) and we will be glad to sign-off the TIA. This revised report can be incldued as part of the ASP package.
Thank you,
Ahmed

Ahmed Ali, P.E., P.Eng., Ph.D.
Transportation Planning Manager
Infrastructure Services
City of *Lethbridge*

City Hall, 910 – 4th Avenue South, Lethbridge, Alberta, Canada T1J 0P6
Phone:403-320-4038, Cell: 403-393-4685, Fax: 403-329-4657
ahmed.ali@lethbridge.ca, www.lethbridge.ca

From: Dominic Cheng [mailto:dcheng@itransconsulting.com]
Sent: Thursday, September 24, 2009 11:53 AM
To: Mike Kitchen; Ahmed Ali
Cc: Megan Fernandes; Ed Martin; Ray Martin; Dawn Scherer
Subject: RE: Country Meadows Response (070944CE)

Hi Mike,
Attached is an appendix for the TIA submitted September 9, 2009. <**4495 TIA Communications.pdf**>
If you have any further comments or questions, please do not hesitate to contact me.
Thanks,

Dominic Cheng, EIT
Transportation Planner

HDR | iTRANS
4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5719 | Fax: 403.537.0251 | Email: dcheng@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

From: Mike Kitchen [mailto:mikek@mgcl.ca]
Sent: Thursday, September 24, 2009 9:05 AM
To: Dominic Cheng; Ahmed.Ali@lethbridge.ca

Ahmed Ali

From: Ahmed Ali
Sent: Tuesday, September 15, 2009 10:12 AM
To: 'Megan Fernandes'
Cc: Gary Weikum; Barry Peat; Darwin Juell
Subject: RE: Country Meadows ASP - Comments on TIA report

Hello Megan,
I have reviewed the revised report (September 2009) and have some minor comments and a few questions. I would be able to sign the TIA off on receiving a response from you.

The following comments are FYI - no action required

- Page ii para 2 you are referring to South Access 12 and the text says South Access 2 (I will correct it in my copy of the report)
- Exhibit 2-5 has some thing wrong with the plot
- You are referring to the Synchro Appendices in the report, you probably should refer to the electronic Synchro files
- The title of the report shall mention "evision or Revised Report
- Correspondence with the City staff including comments shall be included in Appendices
- A letter shall respond to comments (as to whether you have addressed the comment or have an explanation for it)

The following information is required before the sign-off

- Exhibit 5-1 background volumes, could you please let me know the reference for the SB volumes on Metis Trail (1215/724 vph) at Walsh Drive intersection? If you could attach a copy of the reference that will help
- The traffic volumes in the Signal warrant analysis sheets do not match with the forecast volumes for 2019
- Signal warrant analysis is not undertaken for Access 12/Garry Drive
- The Signal warrant analysis attached for Access 5/Garry Drive shows that a signal is warranted, but Table B-1 shows this intersection as unsignalized
- Please send all the electronic files (Trip gen, distr & assignment and signal warrants)

Please call me if you have any questions on the above.

Thank you,
Ahmed

From: Megan Fernandes [mailto:mfernandes@itransconsulting.com]
Sent: Monday, August 31, 2009 10:48 AM
To: Ahmed Ali
Subject: RE: Country Meadows ASP - Comments on TIA report

Hi Ahmed,

Thank you for the comments. I am out of the office right now and will be for the rest of the day.

I'll give you a call first thing tomorrow morning to discuss the comments and what is needed for sign-off.

Have a good day,

Megan

Megan Fernandes, P.Eng.
Project Manager

HDR | iTRANS

4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5717 | Fax: 403.537.0251 | Email: mfernandes@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

From: Ahmed Ali [mailto:Ahmed.Ali@lethbridge.ca]
Sent: Monday, August 31, 2009 10:20 AM
To: Megan Fernandes
Cc: Darwin Juell; Gary Weikum
Subject: RE: Country Meadows ASP - Comments on TIA report

Hello Megan,
Thank you for submitting the revised report, I have reviewed it and have the following comments.

Country Meadows TIA
Comments on the Revised Report

- Exhibit 4-1: NB through traffic volume (491 vph) at Garry Drive/University Drive does not match with the actual count (461 vph)
- Table 4-2 – It seems the Synchro file in the CD is not the one used for report, please send the correct Synchro file
- I cannot reconcile the numbers shown in Exhibit 5-3 as the sum of traffic volumes on Exhibit 5-1 and 5-2, please check (In the absence of the explanation for the volumes, I am unable to make comments on Metis' Trail intersection configurations).
- Page 24- re. the recommendation to improve University Drive/Walsh Drive in background conditions – I feel that no improvement may be necessary as the LOS is B and a v/c of 0.81 is not far from the acceptable 0.80.
- Exhibit 5-4 may not be required as the network would function satisfactorily in the background conditions.
- Table 6-1 and Table 6-2 – Trip rates for school use (ITE land-use 520) does not match with ITE rates
- Exhibit 6-2 – Site traffic assignment shows some anomalies with the assumed trip distribution.
- Text on page 46 as well as Exhibit 7-2 would need revision as many of the improvements recommended for the University Drive may not be necessary, please see the attached Synchro file.
- Section 7.2 – daily volumes seem to have been obtained by using daily trip generation rather than multiplying by the peak hour volumes by 10 as suggested in Section 7.2. The text might require revisions.
- Exhibit 7-3 – Daily volumes on Metis' Trail south of Garry Drive seem to be incorrect.
- Page 46. and Exhibit 7-5: Please revise the Exhibit 7-5 to show intersection spacing (as per previously sent comments)
- Revise Table C-1
- Include signal warrants for the new intersections (Access 5/Garry Drive may not need a traffic light)
- Executive Summary Page ii. – Revise the conclusions

I would suggest we discuss the above comments to agree on what should be done to get a sign-off for the TIA. Please call me at your convenience.
Thank you,
Ahmed

From: Megan Fernandes [mailto:mfernandes@itransconsulting.com]
Sent: Tuesday, August 18, 2009 3:52 PM
To: Ahmed Ali
Cc: Darwin Juell; Gary Weikum; Mike Kitchen; Ed Martin
Subject: RE: Country Meadows ASP - Comments on TIA report

Hello Ahmed,

Our revised TIA will be submitted by Martin Geomatics. We are couriering you under separate cover a CD with the electronic Synchro files.

Megan

Megan Fernandes, P.Eng.
Project Manager

HDR | iTRANS
4838 Richard Road SW, Suite 140 | WestMount Corporate Campus | Calgary, AB | T3E 6L1
Phone: 403.537.0250 x 5717 | Fax: 403.537.0251 | Email: mfernandes@itransconsulting.com
www.hdrinc.com
www.itransconsulting.com

From: Ahmed Ali [mailto:aali@lethbridge.ca]
Sent: Tuesday, August 11, 2009 9:14 AM
To: Megan Fernandes
Cc: Darwin Juell; Gary Weikum
Subject: Country Meadows ASP - Comments on TIA report

Hello Megan,

We have reviewed the TIA report and have the following comments:

- Assumed land-use/no. of planned residential units does not match with the ASP document of April 2009
- Analyze the existing intersection with the existing lane configuration for the background and full development scenarios and indicate any improvements required to mitigate the capacity issues (if any) and re-assess the intersections with improvements
- See specific comments on the attached pages from the report.

Please revise the report based on the above and the attached comments. We would not require the hard copies of Synchro reports, please send Synchro files instead.

Please call me if you have aquestions.

Thank you,
Ahmed

Ahmed Ali, P.E., P.Eng., Ph.D.
Transportation Planning Manager
Infrastructure Services
City of *Lethbridge*

City Hall, 910 – 4th Avenue South, Lethbridge, Alberta, Canada T1J 0P6
Phone:403-320-4038, Cell: 403-393-4685, Fax: 403-329-4657
aali@lethbridge.ca, www.lethbridge.ca