BYLAW 107/2000

BEING A BYLAW OF THE MUNICIPAL DISTRICT OF FOOTHILLS NO. 31 TO ADOPT AN AREA STRUCTURE PLAN

WHEREAS the Council of the Municipal District of Foothills No. 31 (hereinafter called the "Council") is empowered by Section 633(1) of the Municipal Government Act, being Chapter M-26.1, to adopt an Area Structure Plan which provides a framework for subsequent subdivision and development of an area of land within the Municipality's boundaries; and

WHEREAS the Council did direct the preparation of an Area Structure Plan for the properties legally described as Block 1 Plan 9211604 in S.W. 7-22-1 W5 and the balance of the quarter-section being legally described as S.W. 7-22-1 W5; and

WHEREAS the Area Structure Plan has been prepared under the direction of the Council;

NOW THEREFORE the Council of the Municipal District of Foothills No. 31 in the Province of Alberta, hereby enacts as follows:

1. This Bylaw may be cited as the "Sulky Ridge Area Structure Plan".

2. The Sulky Ridge Area Structure Plan being Schedule "A" attached hereto and forming part of this Bylaw.

3. That the Sulky Ridge Area Structure Plan may be amended by Bylaw from time to time in accordance with the Municipal Government Act, by the Municipal District of Foothills No. 31.

4. This Bylaw comes into full force and effect upon the third and final reading.

FIRST READING: July 11, 2000

Roy R. McLean
Reeve

Municipal Manager

SECOND READING: January 11, 2001

Roy R. McLean
Reeve

Municipal Manager

THIRD READING: January 11, 2001

Roy R. McLean
Reeve

Municipal Manager

PASSED IN OPEN COUNCIL assembled at the Town of High River in the Province of Alberta this 11 day of January 2001.

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1. INTRODUCTION

1.1 PURPOSE

This Area Structure Plan (ASP) has been prepared pursuant to the provisions of Section 633 of the Municipal Government Act and amendments thereto. It is intended to act as a guide to future subdivision and development in the SW 07 – 22 – 01 W5M. Section 633 of the Act reads as follows:

Area Structure Plans

Area structure plan

633(1) For the purpose of providing a framework for subsequent subdivision and development of an area of land, a council may, by bylaw, adopt an area structure plan.

(2) An area structure plan

(a) must describe:

(i) the sequence of development proposed for the area,

(ii) the land uses proposed for the area, either generally or with respect to specific parts of the area,

(iii) the density of population proposed for the area either generally or with respect to specific parts of the area, and

(iv) the general location of major transportation routes and public utilities, and

(b) may contain any other matters the Council considers necessary.

1.2 APPROVAL PROCESS

An Area Structure Plan is identified in the Municipal Government Act as a Statutory Plan. As noted in Section 633 of the Act, the Council may by by-law adopt an Area Structure Plan. In the process of preparing and adopting this Plan the Council must comply with the provisions of Section 636, 637 and 638 of the Municipal Government Act which are quoted as follows for easy reference.

Statutory plan preparation

636 While preparing a statutory plan a municipality must

(a) provide opportunities to any person who may be affected by it to make suggestions and representations,

(b) notify the public of the details of the plan preparation process and of the means to make suggestions and representations referred to in clause (a),

(c) notify the school authorities with jurisdiction in the area to which the plan preparation applies and provide opportunities to those authorities to make suggestions and representations,

(d) in the case of a municipal development plan, notify adjacent municipalities of the plan preparation and provide opportunities to those municipalities to make suggestions and representations, and

(e) in the case of an area structure plan, where the land that is the subject of the plan is adjacent to another municipality, notify that municipality of the plan preparation and provide opportunities to that municipality to make suggestions and representations.

Effect of plans

637 The adoption by a council of a statutory plan does not require the municipality to undertake any of the project referred to in it.

Plans Consistent

638 All statutory plans adopted by a municipality must be consistent with each other.

Municipal support for an Area Structure Plan is found in Section 5.3.5 of the Municipal Development Plan which reads as follows:

5.3.5 An Area Structure Plan drafted in accordance with the guidelines adopted by the Municipality shall be required as part of a Country Residential proposal that would create 8 new lots or more and for proposals of less than 8 new lots an Area Structure Plan may be required if in the opinion of Council one is necessary, due to:

a) the impact the proposal may have on adjoining lands;
b) the need to review, in greater detail, the infrastructure requirements of this proposal;
c) the proposal being a continuation of an existing subdivision and leads to a density greater than 8 lots per quarter section;
d) the proposal, in the opinion of Council being phase 1 of a development that will create 8 new lots or more.

1.3 INTERPRETATION

In this Plan:

(a) "Act" means the Municipal Government Act 1995 and amendments thereto.

(b) "Council" means the Council of the Municipal District of Foothills No. 31.

(c) "Developer" means the landowner, Harvey Poffenroth as listed on the title.

(d) "Land Use Bylaw" means a Bylaw of the M.D. of Foothills No. 31 passed by Council pursuant to the provisions of the Municipal Government Act and intended to prohibit, regulate and control the use and development of land and buildings within the M.D. of Foothills No. 31.

(e) "Municipal Development Plan" means the M.D. of Foothills No. 31's Municipal Development Plan.

(f) "Municipality" means the area bounded and incorporated by the M.D. of Foothills No. 31.

(g) " Plan Area " refers specifically to the lands within the SW 07 – 22 – 01 W5M as shown in Figure 1.

(h) "Proposed Subdivision" refers specifically to Lots 1 through 15, the internal road system, walkway system and public utility lot located within the Plan Area.

(i) "Subdivision Approving Authority" means the Council of the M.D. of Foothills No. 31.

(j) All other words and expressions have the meanings respectively assigned to them in the Municipal Development Plan, Land Use Bylaw or the Municipal Government Act.

1.4 BACKGROUND TO THE AREA STRUCTURE PLAN

In 1908, 4.0 +/- acres along the Southern boundary of SW 07 – 22 - 01 W5M was given to the M.D. of Foothills No. 31 for road widening. In 1971, an additional 1.0 +/- acre was given for road widening along the West boundary, as seen in Figure 1. The Developer is a long time resident of the Foothills area, and has resided on the property since 1927. In 1992, the Developer subdivided one 4.99 +/- acre parcel from the quarter section, in the Southeast corner of the of the Plan Area. The Developer holds title for both the 4.99 +/- acre parcel, as well as the balance. The 4.99 +/- acre parcel shall be cancelled and a new plan of subdivision shall be registered subject to an approval. Certificates of Title are attached as Appendix A.

1.5 PUBLIC PARTICIPATION

In order to ensure the concerns of the community were identified and addressed, a community input meeting was held on September 13, 1999. The majority of concerns dealt with the position of the internal subdivision road, and the availability of water. In response to the adjacent landowners' concerns, the initial location of the internal road was moved. The concerns from the adjacent landowners' about water will be addressed in section 4.3(a) of this document.

2. THE PLAN AREA

2.1LOCATION/OWNERSHIP

The Plan Area is located 4.0 kilometers South of Highway 22x. Secondary Highway 773 runs along the West boundary, as illustrated in Figure 2. The Plan Area is more specifically identified as the SW 07 – 22 – 01 W5M, excepting thereout road plan 442LK, road plan 6713Q, and Descriptive Plan 9211604, as shown in Figure 1. Descriptive Plan 9211604 is a 4.99 +/- acre lot which was subdivided from the SW 07 – 22 – 01 W5M in 1992. This 4.99 +/- acre parcel has remained under the Developers' ownership. Copies of the Certificates of Title are attached as Appendix A.

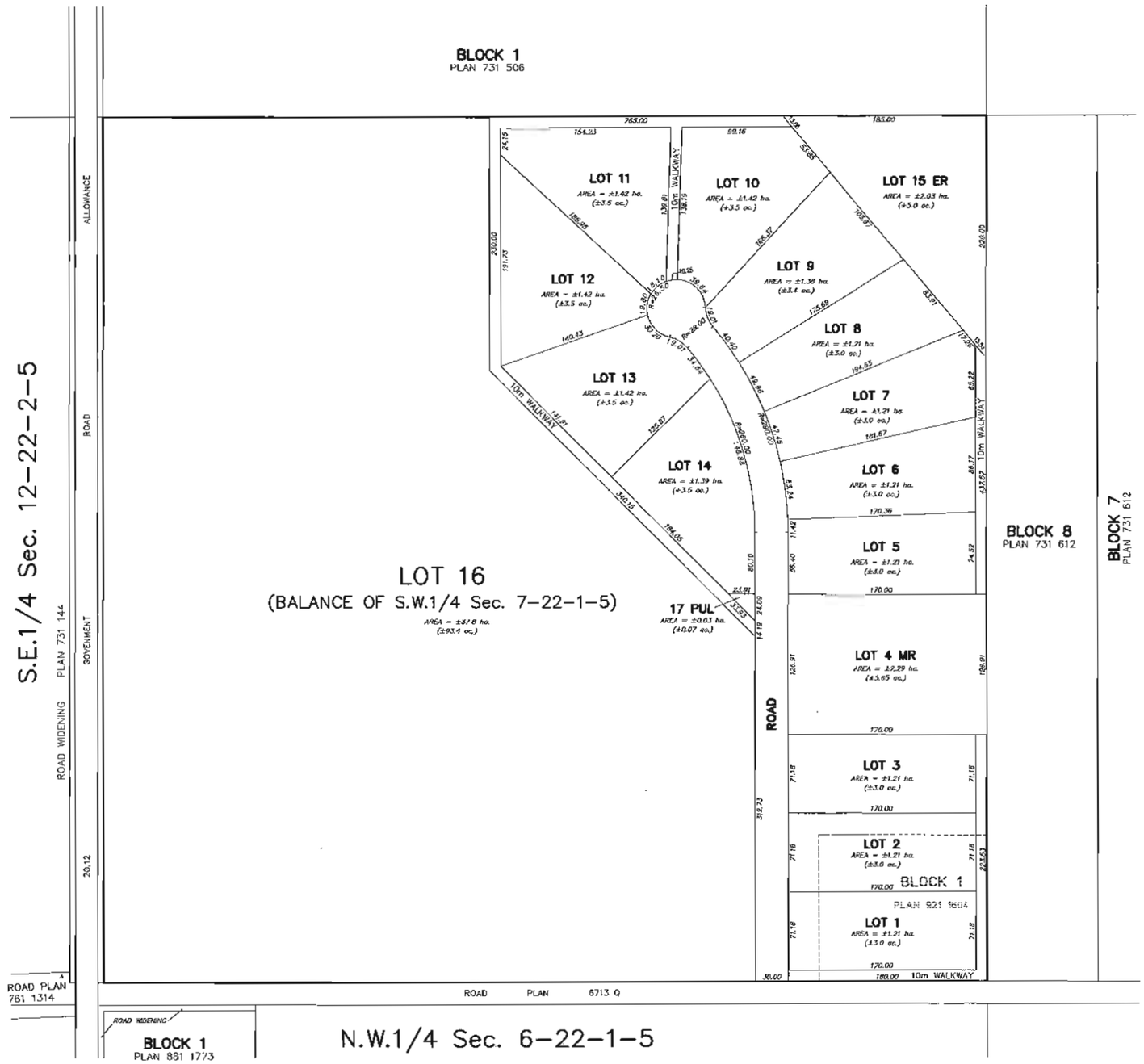
2.2 DEFINITION OF THE PLAN AREA

a) Boundaries of the Plan Area

The Plan Area is bounded on the West by Secondary Highway 773, and on the East by Block 8, Plan 731612 in the SE 07 – 22 – 01 W5M. The North boundary of the Plan Area is established by Block 1, Plan 731506, in the NW 07 – 22 – 01 W5M. The Southern boundary is defined by 226th Avenue. These boundaries are shown in Figures 1 & 2.

b) General Physical Description

The Plan Area gently slopes downward as you move from the Northeast corner of the quarter section to the Southwest. An intermittent drainage course flows through the Northeast corner of the Plan Area from the Northwest to the Southeast. A horse farm and horse training centre is located on the West half of the quarter section and will remain in operation on the future balance parcel. The topographical features can be seen in conjunction with the Plan Area in Figure 3.



M.D. OF FOOTHILLS No. 31
A L B E R T A

PROPOSED AREA STRUCTURE PLAN

WITHIN A PORTION OF THE

S.W.1/4 Sec. 7, Twp. 22, Rge. 1, W.5M.

SCALE 1 : 2000

0 10 20 40 60 80 100 150 200 300 Metres

NOTES

1. Distances are in metres and decimals thereof.
2. Subject area shown bounded thus ——— and contains ±62.7 ha. (±24.89 ha. excluding balance)
3. All roads are 30.0 metres in perpendicular width unless shown otherwise.
4. All distances on curves are arc lengths.
5. Boundary of Block 1, Plan 921 1604 to be incorporated into the new plan of subdivision shown thus ———————

TABLE OF ABBREVIATIONS

ac.	– acre	Rge.	– range
E	– East	S	– South
ER	– Environmental Reserve	Sec.	– section
ha.	– hectare	Twp.	– township
M.	– meridian	W	– West
MR	– Municipal Reserve		
N	– North		

FIGURE 1 – PLAN AREA

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CHK. BY: BEC

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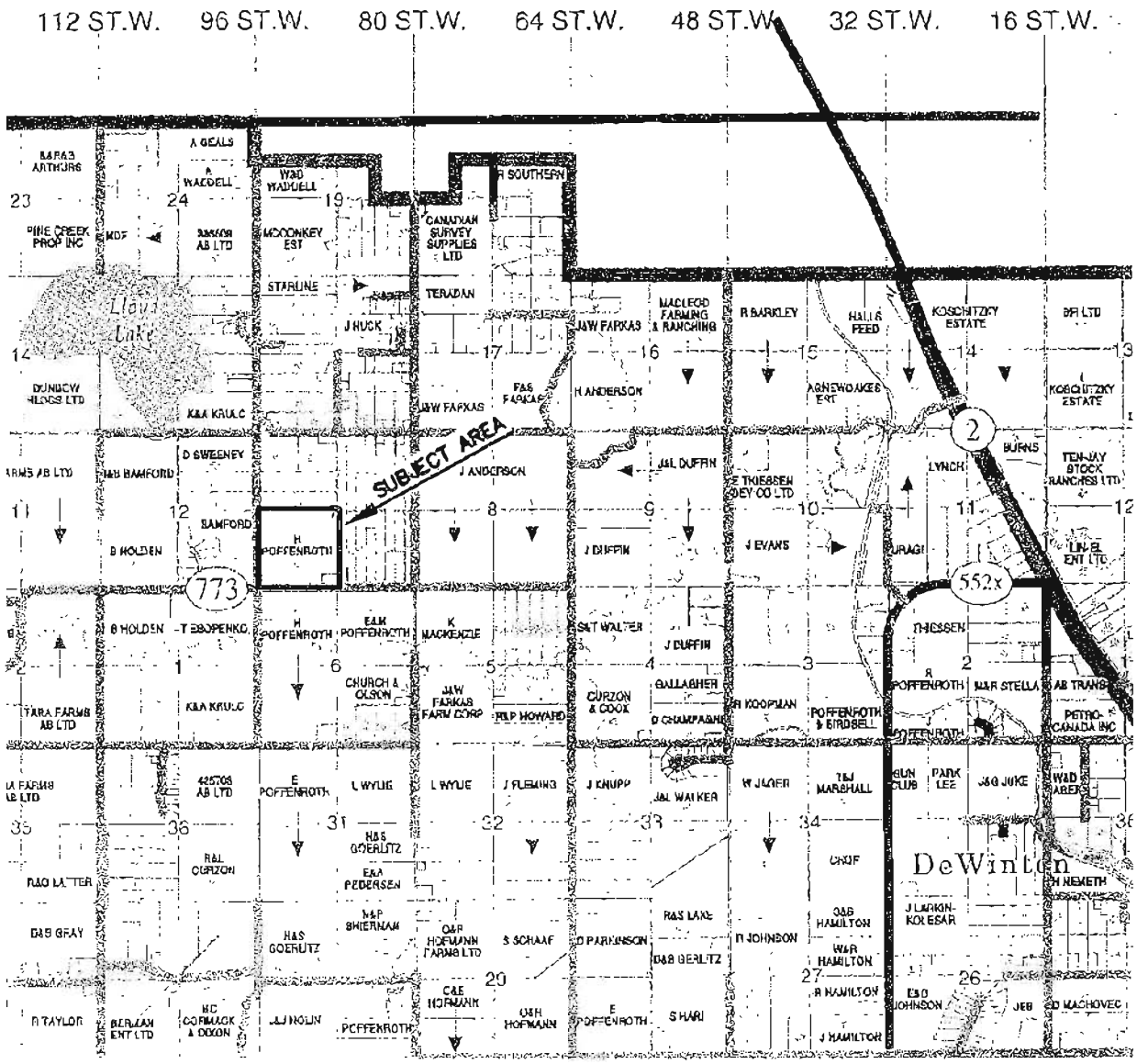
Figure 2:

Location Map

Not to Scale

SW 1/4 Sec. 7, Twp.22, Rge.1, W5M.



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DWN BY: LRC
DATE: DEC. 3, 1999

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3. PLAN GOALS AND OBJECTIVES

3.1 GOALS AND OBJECTIVES

a) To create an attractive rural Development comprised of thirteen Country Residential lots ranging from 3.0 to 3.5 +/- acres in size, plus a Municipal Reserve, an Environmental Reserve, and a Public Utility Lot.

b) To maintain the natural features of the area.

c) To provide an open space walkway system which will enhance pedestrian and equestrian movements and provide linkage to the Municipal Reserve and the Environmental Reserve.

d) To create a Development with lot sizes that are small enough to be easily cared for by the individual landowner, but still large enough to establish a country residential lifestyle.

e) To ensure that the Development conforms to the goals and objectives of the M.D. of Foothills No. 31 Municipal Development Plan.

4. DEVELOPMENT PROPOSAL

4.1 THE PLAN CONCEPT

The Developer is proposing a Country Residential development that will be compatible with the existing rural character of the area. Lots will range from 3.0 to 3.5 +/-acres in size, which is small enough to be easily maintained, but still large enough to maintain a country residential lifestyle. The Developer has incorporated a Municipal Reserve and an Environmental Reserve into the design. In addition to the Municipal Reserve and the Environmental Reserve, a walkway system has been designed around the outside of the Plan Area. The walkway system has also been designed to connect the Municipal Reserve, the Environmental Reserve, and the roads. The design creates a variety of walkway options of varying lengths, and allows all residents and adjacent landowners easy access to the walkway system. All lots are designed to overlook the existing horse training facility, which will remain in operation on the proposed balance parcel with appropriate lot setbacks to ensure compatibility.

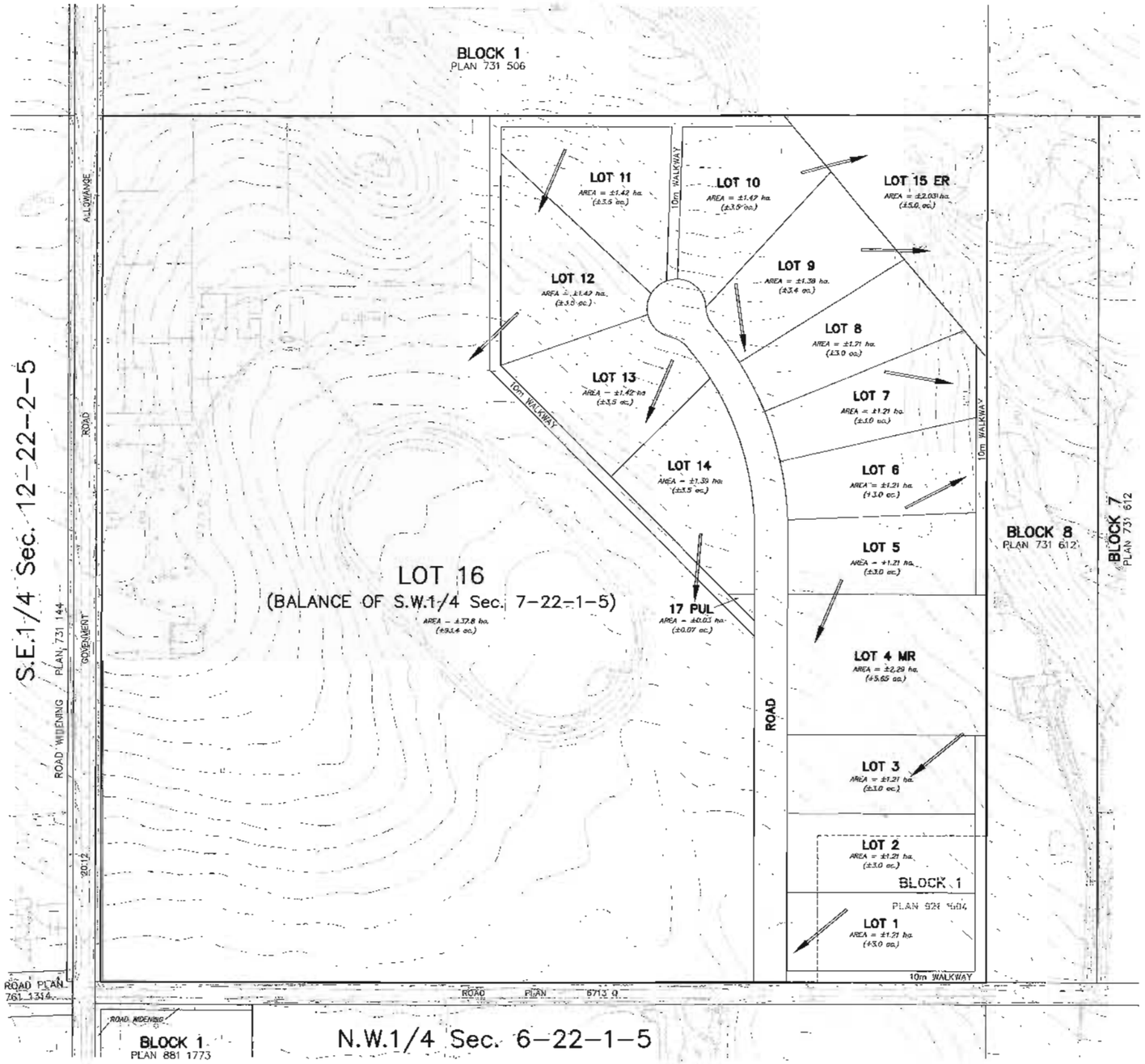
4.2 LAND USE COMPONENT

a) Country Residential District

This Area Structure Plan is compatible and consistent with the provisions of the Municipal Development Plan, and the Land Use By-law. Currently the Plan Area carries an Agricultural District (A) designation in the M.D. of Foothills No. 31 Land Use By-Law. In order to proceed with subdividing the land, the Plan Area will need to be redesignated to Country Residential District (CR).

b) Agricultural District

The balance of the Plan Area will remain designated as an Agricultural District (A). The Developer intends to continue farming and running his horse farm and horse training operation. There are currently two residences on the balance, which complies with the Land Use Bylaw, due to the size of the balance parcel. Additionally, a mobile home is located on the balance, of which a development permit has been obtained. This mobile home is used strictly for farm help purposes. Should Council approve, a Restrictive Covenant shall be placed on the balance lands restricting any further development from taking place.



M.D. OF FOOTHILLS No. 31
A L B E R T A

PROPOSED AREA STRUCTURE PLAN

WITHIN A PORTION OF THE

S.W.1/4 Sec. 7, Twp. 22, Rge. 1, W.5M.

SCALE 1 : 2000

0 10 20 40 60 80 100 150 200 300 Metres

NOTES

1. Distances are in metres and decimals thereof
2. Subject area shown bounded thus _____ and contains ±62.7 ha. (±24.89 ha. excluding balance)
3. All roads are 30.0 metres in perpendicular width unless shown otherwise
4. All distances on curves are arc lengths.
5. Boundary of Block 1, Plan 921 1604 to be incorporated into the new plan of subdivision shown thus - - - - - - - -
6. Surface water drainage patterns shown thus . . . . . ⟶

TABLE OF ABBREVIATIONS

ac.	– acre	Rge.	– range
E.	– East	S	– South
ER	– Environmental Reserve	Sec.	– section
ha.	– hectare	Twp.	– township
M.	– meridian	W	– West
MR	– Municipal Reserve		
N	– North		

FIGURE 3 – PLAN AREA WITH CONTOURS

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Therefore, the subdivision of the proposed lots within this Area Structure Plan shall be the only development on the SW 07 – 22 – 01 W5M, as per the Restrictive Covenant mentioned above.

c) Public Utility Lot (PUL)

At the request of Council, the Developer will service the Proposed Subdivision via a communal well system. In accordance with good engineering practices, the Developer plans to drill two wells within the Plan Area, in a location that will provide the best pumping results. The Public Utility Lot has been placed just south of Lot 14. Upon an approval from Council, this lot will contain the facilities needed to operate the communal well system.

d) Phasing

This development will be completed in one phase with the road, walkway system and lots being developed and serviced concurrently.

e) Density

The Municipal Development Plan states that, a quarter section may be subdivided to a total maximum density of 32 lots or one lot or unit per five acres under a Country Residential designation. We are proposing thirteen Country Residential lots plus a balance on the SW 07 – 22 – 01 W5M, which will be a total of fourteen lots. This is well below the maximum density, indicated in the Municipal Development Plan.

f) Impact on Adjacent Lands

Many of the quarter sections surrounding the Plan Area have already been subdivided. For instance, Country Residential parcels exist to the East, in the East ½ of section 07 – 22- 01 W5M. Smaller Agricultural parcels exist to the North, in the NW ¼ of 07 –22 –01 W5M, as well as to the Northwest in the NE ¼ of 12 - 22 – 02 W5M. Additionally, a ten lot Country Residential subdivision exists to the West of the Plan Area in the SE ¼ 12 – 22 – 02 W5M. The Plan Area is located close to Calgary, and with the number and type of subdivisions that have already been approved in this area, the Plan Area is well suited for this type of development, and would not impact the adjacent lands in a negative way.

A meat processing plant exists in the Northwest corner of the NW 06 – 22 – 01 W5M, which is just South of the Plan Area. All setback requirements from this plant were met in the design of the Plan Area, therefore, the Development of the Plan Area will not have a negative effect on the meat processing plant.

The Municipal Reserve and Environmental Reserve that the Developer has provided is easily accessible to the adjacent landowners and the landowners of the Plan Area through a 10 metre walkway system. This walkway system can be accessed by adjacent landowners either through the Municipal Reserve, or by using the walkway system to the South of the Municipal Reserve.

The balance of the SW 07 – 22 – 01 W5M will continue to be used as a horse farm and horse training facility. The access for the balance is on the West side of the quarter section, therefore, the Proposed Subdivision will not impact the access to the balance. An appropriate setback for the Proposed Subdivision, from the horse track (approximately 55 metres) was established to ensure that the Proposed Subdivision will not impact the horse training facility located on the balance.

The Developer hired Morasch Transportation Consultants Ltd., to review the impact the Plan Area would have on adjacent roads. In its' report (attached as Appendix C), Morasch Transportation Consultants Ltd. concluded that given the capacity of the Secondary Highway 773 and 226th Avenue these roadways have sufficient capacity to accommodate the increases in traffic that the Plan Area would create. Additionally, at the request of the M.D. of Foothills No. 31 Public Works Department, the Developer will install tapers on the internal and external roadways at the intersection of 226th St. and the Sulky Ridge ASP internal road. Additionally, the Developer will pay a road lot levy per new lot to further upgrade the external road. This amount is to be determined at the redesignation stage. Therefore, in regards to the existing external road system, the traffic from the Plan Area will not affect the adjacent landowners.

g) Walkway System

As noted earlier in this document, one of the goals of this development is to provide an open space walkway system. In keeping with this goal, a 10 meter (32.8ft) wide walkway system has been designed to follow around the outside of the Proposed Subdivision. The walkway system will provide access to the Environmental Reserve and will link the Environmental Reserve to the Municipal Reserve. Additionally, this

walkway system will provide the potential for linking other Municipal Reserves that may be dedicated on any adjacent lands, should they ever be developed.

The Developer proposes to landscape the walkway system, to ensure both visual and recreational variation for the users. To achieve this shrubs, trees and other features will be placed along the walkway. The Developer shall fence the walkways, further establishing the boundaries of the pathway system as well as offering an additional buffer to adjacent lands.

The Developer proposes a Community Association involving all landowners of the Proposed Subdivision. The Community Association will be established with a Restrictive Covenant registered on each new title within the Proposed Subdivision. The Developer proposes that an application be made by this Community Association, to the Council, to lease the walkway system from the M.D. of Foothills No. 31. If the Council will allow the Community Association to lease the walkway system they will be able to maintain and provide for the walkway system. Should the application for the Community Association to lease the walkway system be approved, it will undertake financial responsibility for the care of the walkway system.

4.3 ENVIRONMENTAL CONSIDERATIONS

a) Groundwater Study

A preliminary groundwater study was undertaken by Groundwater Exploration & Research Ltd., to address the feasibility of finding sufficient volumes of groundwater to sustain an additional 13 lots in the Plan Area. A copy of this study is attached as Appendix B.

The data in the study covered the Plan Area and the surrounding eight quarter sections of land. Utilizing available water well information from Environmental Protection's groundwater database, a total of 49 well records were available for review, including 2 well records from Section 7.

The water information provided by Groundwater Exploration & Research Ltd., shows that the water in the area would support the amount of lots that we are proposing, and will not interfere with neighbouring wells so long as the wells on the Plan Area are drilled in different water bearing zones. A communal water system will service the thirteen Country Residential lots and shall meet the requirements of

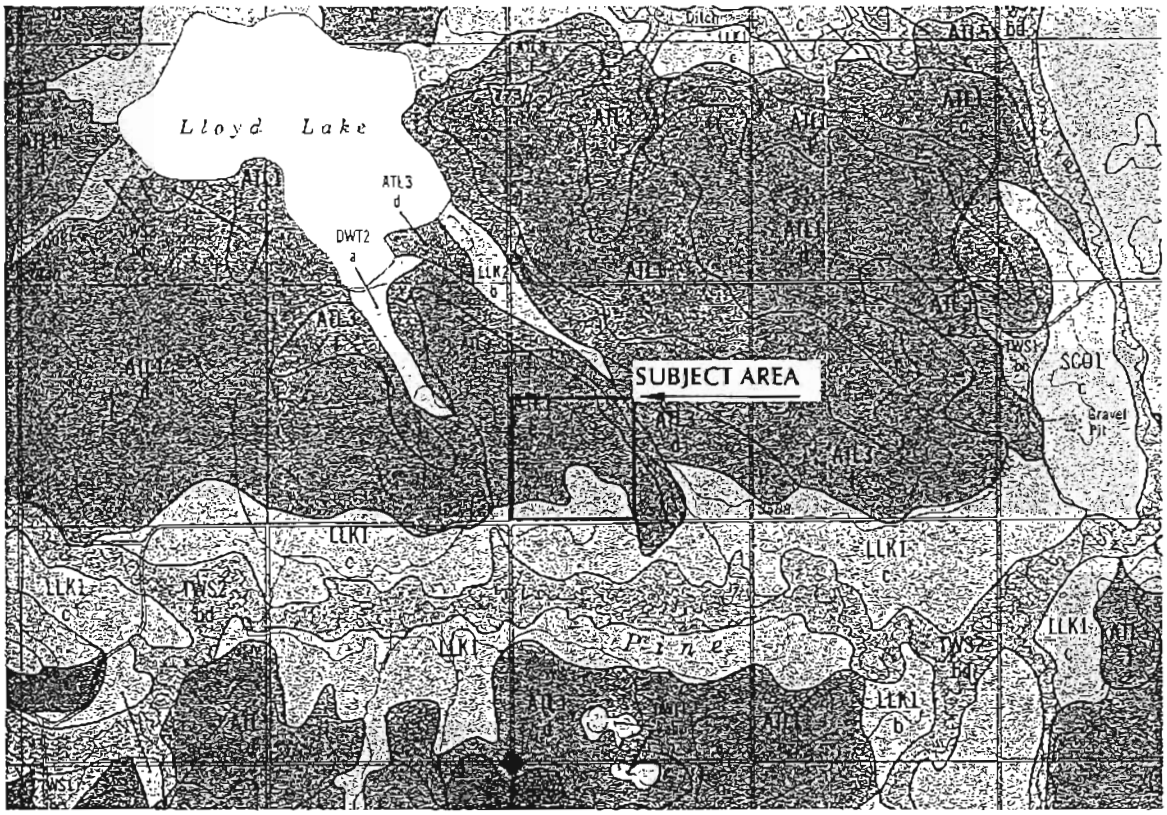
Council, and all recommendations from the Groundwater Exploration and Research Ltd., report attached as Appendix B.

b) Canada Land Inventory Class

The Plan Area was designed using the Soil Survey of the Calgary Urban Perimeter. The Soil Survey of the Calgary Urban Perimeter indicates that the Plan Area is primarily on soil that has a CLI rating of 4T, as shown in Figure 4. The Environmental Reserve does have a pocket of soil with a CLI rating of 3T, however, this area has been dedicated Environmental Reserve because of topographical concerns and the presence of an intermittent drainage course. Adjacent to Environmental Reserve is soil that has a CLI rating of 5T. In the Southern most part of the Plan Area, there is a pocket of soil that has a CLI rating of 2C.

Figure 4:

Canada Land Inventory Class for SW 7 – 22 – 1 W5M



Source: Soil Survey of the Calgary Urban Perimeter. Sheet 1. 1987.

ATL3 d	ANTLER SOIL - Blanket to veneer of fine loamy till draped over bedrock. CLI capability for agriculture - 3T.
ATL3 f	ANTLER SOIL - Blanket to veneer of fine loamy till draped over bedrock. CLI capability for agriculture- 5T.
ATL1 e	ANTLER SOIL - Fine loamy till. CLI capablity for agriculture - 4T.
LLK1 c	LLOYD LAKE SOIL - Fine silty to fine clayey glaciolacustrine. CLI capability for agriculture - 2C.

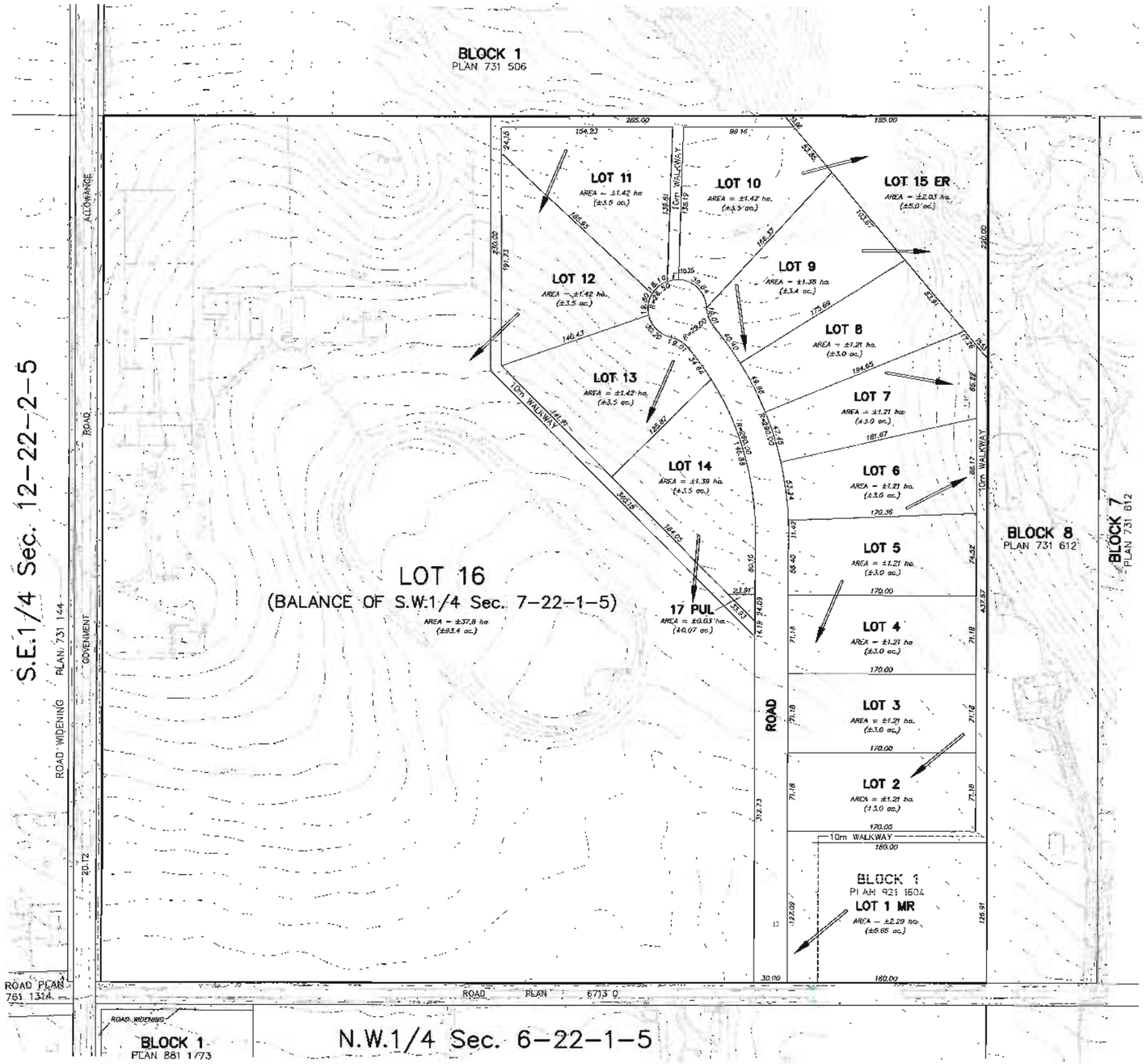
4.4 RESERVE LANDS

a) Environmental Reserve

A 5.0 +/- acre Environmental Reserve has been dedicated in the Northeast corner of the Plan Area where an intermittent drainage course exists. The Environmental Reserve steeply slopes downward to the Northeast into the intermittent drainage course area. The majority of the trees in the Plan Area will be preserved, as most of the trees in the Plan Area have been included in this Environmental Reserve.

b) Municipal Reserve

The M.D. of Foothills Municipal Development Plan requires that for any subdivision exceeding 19.81 acres a Municipal Reserve be dedicated. The Developer has dedicated a Municipal Reserve parcel of 5.65 +/- acres, which totals 10% of the area being subdivided (not including the Environmental Reserve). The Municipal Reserve has been placed in a location that is acceptable to the M.D. of Foothills No. 31 Council (as shown in Figure 1). However, upon the approval of Council, at the redesignation stage, the location of the Municipal Reserve may be moved to a location that is acceptable to Council and the Developer, further to additional comments from the area landowners. The alternative location that the Developer is suggesting for the Municipal Reserve is identified in Figure 5 of this Area Structure Plan.



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A L B E R T A

PROPOSED AREA STRUCTURE PLAN

WITHIN A PORTION OF THE

S.W.1/4 Sec. 7, Twp. 22, Rge. 1, W.5M.

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MR	– Municipal Reserve		
N	– North		

FIGURE 5 – ALTERNATIVE MUNICIPAL RESERVE LOCATION

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4.5 TRANSPORTATION

The Developer hired Morasch Transportation Consultants Ltd., to prepare a study that would review the impact that this subdivision would have on the adjacent roads (this study is attached as Appendix C).

a) Internal Road System

Upon review of the existing road system, and the Plan Area, Morasch Transportation Consultants Ltd., recommend that a southbound yield or stop sign control the location where the internal road intersects with 226th Avenue.

The M.D. of Foothills No. 31 Public Works Department requires that the Developer construct tapers on the internal road at the location that it intersects with 226th St. The Developer will construct these tapers to the standards of the M.D. of Foothills No. 31 Public Works Department. Additionally, the internal road system shall be developed with a double chip-seal surface, as per the road construction guidelines for the M.D. of Foothills No. 31.

b) External Road System

Morasch Transportation Consultants Ltd., concluded that improvements would not be necessary to the intersection of Secondary Highway 773 / 226th Avenue / 96th Street West as a result of the Plan Area. This conclusion was made because these roadways have sufficient spare capacity to accommodate the increases the Plan Area would create. Therefore, the creation of the Plan Area would not negatively impact the existing transportation system.

The M.D. of Foothills No. 31 Public Works Department has confirmed that the Developer will be required to build a modified T-intersection with tapers on the internal and external road, at the intersection of the Sulky Ridge internal road and 226th St. The Developer will construct the tapers and road upgrades as per the standards of the M.D. of Foothills No. 31 Public Works Department. Additionally, the Developer is to pay a road lot levy per new lot, an amount that shall be determined at the redesignation stage.

4.6 SERVICING

a) Water Supply

A communal water system will provide water to the thirteen Country Residential lots in the Proposed Subdivision. The system for the communal water supply will be located on the Public Utility Lot. The proposed location of Public Utility Lot is identified in Figure 1. As indicated in the groundwater report, sufficient water for this development should be readily available. Wells are to be drilled in accordance with the recommendations contained in the Groundwater Exploration & Research Ltd. report attached in Appendix B. Furthermore, the communal water system will meet the requirements of Council and all necessary licenses and permits will be obtained from Alberta Environment for the communal water system.

b) Sewage Disposal

Sewage disposal will be handled via septic tank and field. Standard field installation can occur on Lots 2, 3, 13, and 14. The remaining lots will be serviced by raised septic fields as per the recommendations in the report from Almor Testing Services Ltd. This report is attached as Appendix D. The septic fields will be properly engineered on each individual lot and will meet all provincial requirements.

c) Stormwater Management

In the Northeast corner of the Plan Area a natural intermittent drainage course exists. This area will drain the Environmental Reserve, as well as the adjacent lands. Proper ditching and road construction along the internal road will ensure that the Plan Area drains properly. All surface drainage will be designed by an engineer in conjunction with the engineering of the road system. The arrows on Figure 3 depict surface water drainage patterns within the Plan Area.

5.0 PLAN IMPLEMENTATION

5.1 PLAN IMPLEMETATION

The Area Structure Plan is in keeping with Country Residential subdivision standards within the M.D. of Foothills No. 31. When the Area Structure Plan is adopted by Council, in accordance with the provisions of the Municipal Government Act it becomes a Statutory Plan of the M.D. of Foothills No. 31. A copy of the adopting By-Law shall form a part of this plan.

Future land use redesignations will be required to redesignate the Plan Area to the appropriate Land Use District prior to subdivision.

APPENDIX A
CERTIFICATES OF TITLE

APPENDIX B
GROUNDWATER REPORT (WELLS)

#99125

Groundwater Supply Feasibility
Poffenroth Property: Area Structure Plan
SW-07-22-01-W5M

Submitted to:

Challenger Surveys & Services Ltd

Prepared by:

Groundwater Exploration & Research Ltd
October 1999

Groundwater Exploration & Research LTD

Box 15
Balzac, AB. CANADA T0M 0E0
Phone (403) 226-0330: Fax (403) 226-6593: Email: nowakb@cadvision.com

October 18, 1999
File No: 99125

Challenger Surveys & Services Ltd
#300, 6940 Fisher Road SE
Calgary, AB.
T2H 0W3

Attention: Brandy Clements

Dear Brandy:

RE: Poffenroth Property: SW-07-22-01-W5M
Area Structure Plan-Groundwater Feasibility Assessment

Enclosed find our report which addresses the groundwater feasibility in the immediate area of the Poffenroth property at SW-07-22-01-W5M in the Municipal District of Foothills.

Background Information

A 13 lot subdivision, each lot approximately 1.21 hectares in size, is being proposed for the 64.75 hectare [160 acres] Poffenroth property located 4 km south of Highway 22 in the vicinity of Lloyd Lake. Extensive acreage subdivision development exists to the east [SE-07] and northeast [NW-07] {see enclosed portion of the MD land ownership map}.

In accordance with the Municipal District of Foothills regulations, there is a requirement to prepare an Area Structure Plan for subdivisions with 8 or more parcels. This report addresses the feasibility of finding sufficient volumes of groundwater to sustain an additional 13 lots at the SW-07-22-01-W5M location.

Geomorphic/Geologic Setting

Much of the land in the area of SW-07-22-01-W5M is characterized by gently rolling topography which slopes southward toward the Pine Creek drainage system. A swale feature traverses the quarter section from northwest to southeast through the center of the quarter section [Priddis sheet 82 J/16; 1:50,000 scale]. The Poffenroth residence is located on the west central portion of SW-07; with the proposed country residential development on the east side of the quarter section. The elevation change across the quarter section is approximately 30 meters.

The bedrock in the area [Green, 1970: Geologic Map of Alberta; 1:267,000] is mapped as the Porcupine Hills Formation. The Porcupine Hills Formation consists of pale grey, thick bedded, cherty, calcareous sandstone; and pale grey calcareous mudstone of non-marine origin.

Borneuf [1980: Hydrogeology of the Kananaskis Lake area, Alberta; Alberta Research Council, Report 79-4] maps the area as having a groundwater potential of 33 to 164 m^3/day [5-25 igpm]. The regional groundwater flow is east and northeastward toward the Bow River drainage basin.

The surficial geology of the site has been mapped as moraine veneer with a glaciolacustrine offshore silt and clay deposit along the southern edge of the quarter section [Moran: 1986; Surficial geology of the Calgary Urban area; Alberta Research Council].

Pertinent Regulations

Country residential subdivision and groundwater supply is regulated by Section 23(3) of the Water Act and stated as follows:

"If, after this Act comes into force, a subdivision of land of a type or class of subdivision specified in the regulations is approved under the Municipal Government Act, a person residing within that subdivision on a parcel of land that adjoins or is above a source of water described in section 21 has the right to commence and continue the diversion of water under section 21 only if

(a) a report certified by a professional engineer, professional geologist or professional geophysicist, as defined in the Engineering, Geological and Geophysical Professions Act, was submitted to the subdivision authority as part of the application for the subdivision under the Municipal Government Act, and the report states that the diversion of 1250 cubic meters of water per year for household purposes under section 21 for each of the households within the subdivision will not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved, and

(b) the diversion of water for each of the households within the subdivision under section 21 is not inconsistent with an applicable approved water management plan.

Water Regulation [AR 205/98]

9(1) Subject to subsection (2), a type of subdivision of land for the purposes of section 23(3) of the Act is a subdivision that results in 6 or more parcels in a quarter section or in a river lot.

In essence, Section 23(3) of the Water Act asks two basic questions:

[a] Is there sufficient water to satisfy the maximum requirement of 1250 m^3/year for each lot in the proposed subdivision?

[b] Will the allocated volume of water per lot result in a significant adverse effect on neighbouring wells and licensed users existing at the time of subdivision application?

Groundwater Well Data

A survey of groundwater well data in SW-07 and the surrounding 8 quarter sections of land was undertaken utilizing available information from Alberta Environmental Protection's groundwater database file. A total of 49 well records were available for review; including 2 well records for SW-07; 14 records for NE-07; 5 for NW-07 and 14 records for SE-07. A summary of available water well information is summarized in Table 1, appended to this report.

[1] Well depths vary significantly from 18.3 to 91.5 meters over the nine quarter sections with a maximum range of 27.4 to 76.8 meters being observed in section 7. The range in well depths exceeds the elevation change of approximately 30 meters suggesting that the water wells are not completed in a water bearing zone that is continuous across Section 7.

[2] The depth of the completion interval varies from a high of 10.4-18.3 meters, to a low of 70.7-76.8 meters also providing evidence that there are multiple water bearing zones that are not continuous across the quarter section.

[3] Preliminary flow estimates vary from 19.6 to 654.4 m^3/day. The high variability in flow rate is typical of discontinuous water bearing zones. Based on 48 preliminary flow rates, the geometric mean flow is 60.2 m^3/day.

[4] There are two well records available for the Poffenroth residence in SW-07. A July 1962 well was drilled to a depth of 51.8 meters with an estimated flow of 52.4 m^3/day. A June 1992 well was drilled to a depth of 27.4 meters with an estimated flow rate of 130.9 m^3/day. The completion intervals and non-pumping water levels suggests that the two wells are completed in different water bearing zones.

[5] Both of the Poffenroth wells are completed in a shale/sandstone complex. The vast majority of wells in the eight quarter sections are completed in a shale/sandstone sequence; with a limited number of wells completed in fractured shale.

[6] There is a general trend of increasing depth to non-pumping water level with increasing well head, which generally indicates a recharge or downward flow system.

[7] Multi-level completions are indicated in a number of the wells. Multi-level completion is generally indicative of low yield wells.

[8] The water wells along the terrace area tend to be under good artesian pressure resulting in available drawdowns that exceed 11 meters.

Licenced Users

There is one licenced users within an 800 meter radius of the proposed country residential subdivision on the Poffenroth property. There is a groundwater allocation licence for 1230 m^3/year for the Red Deer Lake Meat Processors to the south of the subject property in 13-06-22-01-W5M.

Existing Q_{20} Tests

Groundwater Exploration & Research Ltd has undertaken the assessment of seven flow tests within the 9 quarter section block. Test results are summarized as follows:

Location	Owner	Transmissive Capacity (m^2/day	Calculated Q_{20} (m^3/day)
NE-07	Lott	0.74	6.8
SE-07	Stevens	0.53	10.8
NE-07	Mennie	11.77	21.3
NE-07	Mennie	2.53	7.67
SE-12	Banford	33.29	98.2
SE-12	Banford	0.72	11.5
SE-12	Banford	99.88	130.9

The flow test data, to date, indicates a considerable variation in transmissive capacity across the 9 quarter section block. The variability in transmissive capacity values is consistent with a physical aquifer model consisting of laterally discontinuous water bearing

units. In accordance with Alberta Environmental Protection guidelines, water requirements for country residential development vary from a minimum of 1.82 m^3/day [400 gpd/lot] to a maximum of 3.42 m^3/day [753 gpd/lot]. Available Q_{20} test data reflects a flow range of 6.8 to 98.2 m^3/day which exceeds minimum groundwater requirements.

Based on the 13 lot subdivision, the total minimum water requirement would be 23.7 m^3/day [3.6 Cgpm]; and the total maximum water requirement would be 44.5 m^3/day [6.8 Cgpm]. Based on 48 preliminary flow estimates from existing well records, the geometric mean flow rate was 60.2 m^3/day which exceeds the maximum water requirement of 44.5 m^3/day [6.8 Cgpm].

With respect to the potential for well interference as indicated in Section 23(3) of the Water Act, a calculation for well interference, neglecting recharge, at any given distance from the pumping well can be determined from:

$$u = r^2S/4Tt \text{ and}$$

$$s = QW(u)/4*pi*T$$

where:

u and W(u)	=	well function parameters
T	=	transmissive capacity in m^2/day calculated from actual pump test data
S	=	coefficient of storage, dimensionless
t	=	20 years of continuous pumping, in days
r	=	distance between pump well and neighbouring well
s	=	projected drawdown at the neighbouring well and assumed to be 1 meter or less
Q	=	maximum pumping rate of 1250 m^3/year or 3.42 m^3/day

The calculation for well interference is based on the general assumption that a maximum projected drawdown of 1 meter, after 20 years of continuous pumping and neglecting recharge, is an acceptable drawdown that would not unduly interfere with a neighbouring wells' performance.

With the above defined criteria, critical values for well separation distance and transmissive capacity [TC] value can be determined. Acceptable combinations of transmissive capacity and well separation distance are tabulated as follows:

Well Separation Distance (m)	Transmissivity (m^2/day)
25	3.5
50	3.0
75	2.5
100	2.5

For a maximum drawdown of one meter, the critical transmissive capacity is 3.5 m^2/day and a well separation distance of 25 meters; This means, that if all of the proposed 13 wells are completed in the same water bearing zone, then as long as the well separation distance is greater than 25 meters and the transmissive capacity exceeds 3.5 m^2/day, then any well interference can be deemed to be acceptable.

Based on existing flow test data in the area, the transmissivity capacity had a considerable range, varying from 0.53 to 99.9 m^2/day, with only three of the seven calculated transmissivity values exceeding a critical value of 3.5 m^2/day.

The TC value can only be determined from a pump test conducted on site specific wells drilled on each proposed parcel. Given that the proposed lot size is at least about 1.27 hectares, a well separation distance of 50 to 100 meters should be achievable.

Summary of Findings

Based on a feasibility assessment of existing water well information, flow tests and geologic information, the following conclusions have been drawn:

[1] Existing well depths, completion intervals and preliminary flow estimates, indicate that there are multiple water bearing zones existing both laterally and vertically.

[2] Based on the two existing Poffenroth wells in SW-07, there is an adequate amount of water to sustain 13 lots at the total maximum requirement of 44.5 m^3/day. Fourty eight preliminary flow test estimates across the block of 9 quarter sections, generates a geometric mean flow rate of 60.2 m^3/day, which also exceeds the total maximum water requirement.

[3] Due to the presence of fractured and/or discontinuous water bearing zones, the availability of groundwater needs to be assessed on a well by well basis. From historical well record information, it is anticipated that the well depths for the new subdivision would encompass a range of well depths, with completion in different water bearing zones, thereby reducing well interference on neighbouring wells.

[4] To minimize a concern for well interference, the critical parameters are a minimum transmissive capacity of 3.5 m^2/day and a well separation distance of at least 25 meter. The well separation distance parameter is generally feasible given the proposed nominal 1.27 hectare lot size.

[5] The transmissive capacity will need to be calculated on an individual well basis. Historical evidence indicates a wide range in transmissive capacity values is possible. A minimum well test duration of 12 hours pumping and 12 hours of recovery is sufficient to generate the required data.

If you have any questions or comments regarding the conclusions drawn in this groundwater feasibility assessment, contact the undersigned at your convenience. Thanking your for the opportunity to have been of service, we remain,

Respectfully yours,
Groundwater Exploration & Research Ltd

Bob Nowak

Bob Nowak; Ph.D., P.Geol.
Groundwater Geologist

Appendix

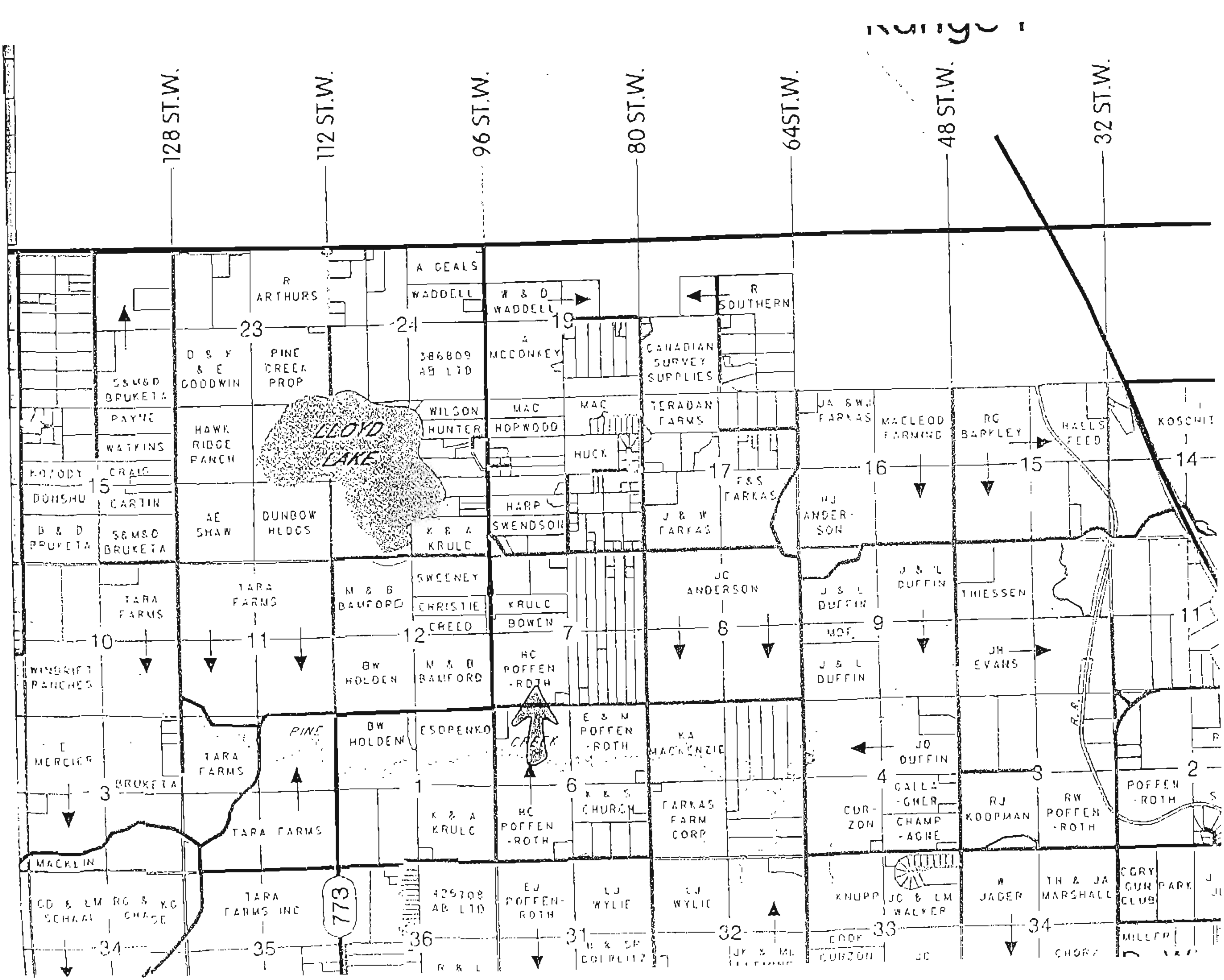
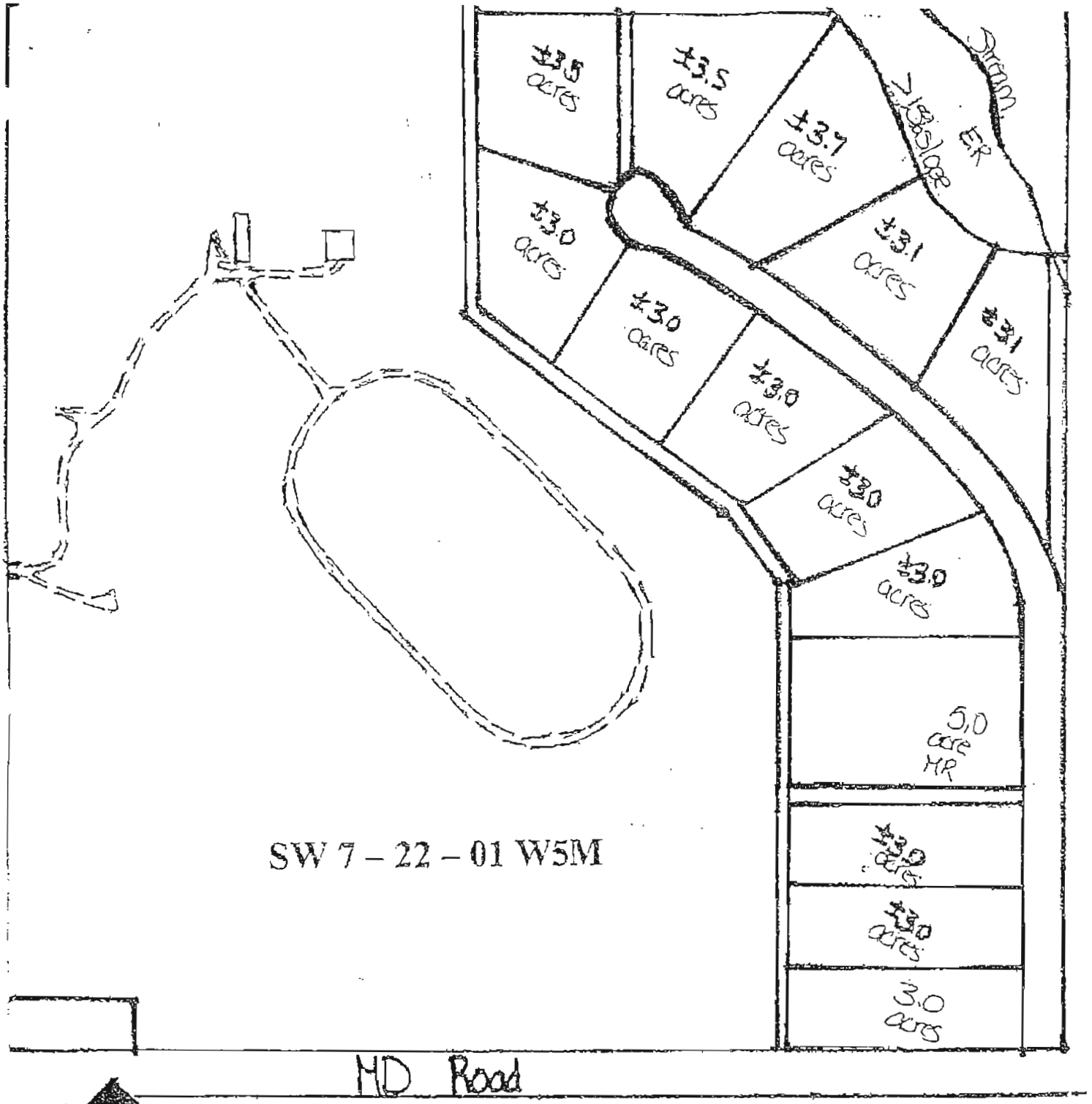

128 ST.W.
112 ST.W.
96 ST.W.
80 ST.W.
64ST.W.
48 ST.W.
32 ST.W.
A GEALS
WADDELL
W & D WADDELL
R SOUTHERN
R ARTHURS
D S Y & E GOODWIN
PINE CREEK PROP
386809 AB LTD
A MCCONKEY
CANADIAN SURVEY SUPPLIES
S&M&D BRUKETA
PAYNE
WATKINS
HAWK RIDGE RANCH
LLOYD LAKE
WILSON
HUNTER
MAC
HOPWOOD
TERADAN FARMS
JA & WJ FARKAS
MACLEOD FARMING
RC BARKLEY
HALLS FEED
KOSCHIT
KOZODY
CRAIG
DONSHU
CARTIN
AE SHAW
DUNBOW HLDGS
HUCK
HARP
SWENDSON
F&S FARKAS
J & W FARKAS
HJ ANDER-SON
D & D BRUKETA
S&M&D BRUKETA
K & A KRULC
TARA FARMS
M & B BAUFORD
SWEENEY
CHRISTIE
CREED
KRULC
BOWEN
JC ANDERSON
J & L DUFFIN
MOF
THIESSEN
JH EVANS
WINDRIFT RANCHES
BW HOLDEN
M & B BAUFORD
HC POFFEN-ROTH
R.R.
E MERCIER
BRUKETA
PINE
ESOPENKO
CREEK
E & M POFFEN-ROTH
KA MACKENZIE
JD DUFFIN
CALLA-GHER
CHAMP-AGNE
CUR-ZON
RJ KOOPMAN
RW POFFEN-ROTH
POFFEN-ROTH
K & S CHURCH
FARKAS FARM CORP
MACKLIN
GD & LM SCHAAL
RG & KG CHASE
TARA FARMS INC
773
425708 AB LTD
EJ POFFEN-ROTH
LJ WYLIE
KNUPP
JC & LM WALKER
W JAGER
TH & JA MARSHALL
CGRY GUN CLUB
PARK
MILLER
CHORA
COOK
CURZON
R & L
23
24
19
15
16
14
17
10
11
12
7
8
9
3
1
6
4
2
34
35
36
31
32
33

Table 1
Summary of Groundwater Well Data

Location	Landowner	Date Drilled	Td/Npwl (ft)	Flow Estimate (igpm)	Completion Interval (m)
TP22, R01					
SW-07	Poffenroth	Jun 92	90/58	20 gpm/4 hrs	80-90
SW-07	Poffenroth	Jul 62	170/120	8 gpm/2 hrs	unknown
NE-07	Long	Oct 92	120/65	8.5 gpm/12 hrs	75-105
NE-07	Henry	Dec 89	240/104	20 gpm/2 hrs	75-100 & 180-230
NE-07	Lott	Feb 90	200/73	30 gpm/3.3 hrs	80-100 & 150-185
NE-07	Lott	Jun 89	230/140	10 gpm/2 hrs	190-230
NE-07	Smyth	May 77	180/33	17 gpm/3.3 hrs	138-180
NE-07	Lott	Feb 91	200/72	20 gpm/2 hrs	135-190
NE-07	Long	Oct 89	110/36	30 gpm/3 hrs	60-70 & 90-105
NE-07	Beeman	Jan 72	100/?	10 gpm/?	60-70 & 85-100
NE-07	Beeman	Oct 72	102/?	7 gpm/?	60-70 & 85-95
NE-07	Beeman	Oct 72	100/?	8 gpm/?	60-70 & 85-100
NE-07	Beeman	Apr 73	90/?	8 gpm/?	75-90
NE-07	Mennie	Jun 88	90/48	10 gpm/2 hrs	55-80
NE-07	Mennie	May 99	120/43	3.25 gpm/2h hrs	100-120
NE-07	Mennie	Jun 99	140/51	3.5 gpm/24 hrs	80-140
NW-07	Hummel	Nov 83	205/120	5 gpm/3.5 hrs	185-205
NW-07	Bowen	Mar 79	140/86.8	14 gpm/1 hr	102-138
NW-07	Davison	Jun 93	175/56.6	15 gpm/2 hrs	105-155
NW-07	Reggin	Aug 80	210/100	12 gpm/2 hrs	140-160 & 185 - 205
NW-07	Stevenson	Jul 73	155/110	8 gpm/?	130-155
SE-07	Veale	May 89	120/53	5 gpm/2 hrs	90-120
SE-07	Beeman	Jun 73	103/?	6 gpm/?	unknown
SE-07	Eckert	Jul 80	195/55	8 gpm/3 hrs	145-192
SE-07	Poffenroth	Feb 93	100/80	15 gpm/12 hrs	85-95
SE-07	Poffenroth	Feb 93	130/81	15 gpm/12 hrs	90-96 & 100-116

Table 1 (continued)
Summary of Groundwater Well Data

Location	Landowner	Date Drilled	Td/Npwl (ft)	Flow Estimate (igpm)	Completion Interval (ft)
SE-07	Beeman	Feb 74	220/42	4 gpm/?	140-160 & 190-220
SE-07	Beeman	May 73	125/?	4 gpm/?	105-125
SE-07	Beeman	Oct 73	125/?	5 gpm/?	100-125
SE-07	Beeman	Apr 73	120/?	8 gpm/?	90-120
SE-07	MacMaster	Jul 80	160/75	13 gpm/1 hr	140-157
SE-07	Beeman	Jun 76	98/?	8 gpm/?	80-98
SE-07	Beeman	Mar 74	130/26	6 gpm/?	110-130
SE-07	Pichard	Oct 85	252/5	15 gpm/3 hrs	232-252
SE-07	Beeman	May 73	100/?	unknown	80-100
00-06	Rolly	May 60	300/160	6 gpm/2.3 hrs	235-300
NE-06	Poffenroth	May 75	90/20	10 gpm/2 hrs	75-85
NE-06	Longcake	May 91	60/7	100 gpm/2.3 hrs	34-60
NW-06	Poffenroth	Feb 74	65/?	20 gpm/1.3 hrs	48-61
NW-06	Poffenroth	Jun 80	93/50	7 gpm/2 hrs	72-85
TP22, R02					
NE-01	Sunrise Land	Feb 80	140/10	10 gpm/3 hrs	110-130
NE-01	Whitehead	Nov 79	112/10	8 gpm/3 hrs	95-112
NE-12	Tenham	Apr 76	195/95.5	3 gpm/10 hrs	155-195
NE-12	Tenham	Apr 76	120/58.2	5 gpm/9 hrs	85-105
NE-12	Sweeney	Oct 85	210/148	8 gpm/2.3 hrs	185-200
SE-12	Banford	May 97	153/92.4	20 gpm/12 hrs	110-135
SE-12	Banford	Apr 97	150/90.3	15 gpm/12 hrs	118-138
SE-12	Banford	May 97	220/85.1	8 gpm/12 hrs	200-220
SE-12	Banford	Apr 97	234/74.4	6 gpm/2 hrs	160-170 & 180-200 & 226-230



1 cm = approximately 133 feet or 41 metres

DRAFT – FOR DISCUSSIONAL PURPOSES ONLY

N

CHALLENGER

ALBERTA ENVIRONMENTAL PROTECTION

COMPUTER GENERATED WATER WELL DRILLER'S REPORT FORM

WELL I.D. 377148

THIS DATA MAY NOT BE FULLY CHECKED; THE PROVINCE DISCLAIMS ALL RESPONSIBILITY FOR ITS ACCURACY:

CONTRACTOR:

NAME: THOMPSON W

ADDRESS:

LICENCE NO.: JOURNEYMAN NO.:

WELL OWNER:

NAME: POFFENROTH, H.

ADDRESS: MIDNAPORE

POSTAL CODE:

WELL LOCATION: IC#: 01

~ OR LSD	SEC	TWP	RGE	W. MER
SW	07	022	01	W5

LOCATION VERIFICATION METHOD: MAP
LOCATION IN QUARTER:

LOT: BLOCK: PLAN:
WELL ELEV: Feet How obtain: NOT OBTAIN

FORMATION LOG DESCRIPTION:

Depth (Feet):	Lithology:
Ground to:	
27	Clay
43	Clay & Gravel
81	Sandstone
170	Shale

DRILLING METHOD: CABLE TOOL

TYPE OF WORK: NEW WELL

FLOWING WELL: No **RATE:** L Litres/Min
GAS PRESENT: No **OIL PRESENT:** No
DATE OF ABANDONMENT:
MATERIAL USED:
PROPOSED USE: STOCK

WELL COMPLETION DATA:

WELL FINISH: PERFORATED CASING/LINER
TOTAL HOLE DEPTH: 170 Feet

CASING TYPE:
SIZE OD: Inch WALL THICKNESS: Inch
BOTTOM AT: Feet

PERFORATED CASING/LINER:
TYPE: STEEL
SIZE OD: 5.50 Inch ID: Inch
WALL THICKNESS: Inch
TOP AT: Feet BOTTOM AT: 170 Feet
PERFORATED FROM: Feet TO: Feet
Feet TO: Feet
Feet TO: Feet

SIZE OF PERFORATIONS: Inch X Inch
HOW PERFORATED: UNKNOWN

SEAL TYPE:
INTERVAL TOP: Feet TO: Feet

GEOPHYSICAL LOG TAKEN:
RETAINED ON FILE:

SCREEN:
MATERIAL:
SIZE ID (CLEAR): Inch SLOT SIZE: Inch
INTERVAL TOP: Feet TO: Feet
Feet TO: Feet

INSTALLATION METHOD:
TOP FITTINGS:
BOTTOM FITTINGS:

PACK TYPE:
GRAIN SIZE: AMOUNT:

PITLESS ADAPTER TYPE:
DROP PIPE TYPE: LENGTH: Feet
DIAMETER: Inch
ADDITIONAL PUMP INFORMATION:

PRODUCTION TEST:

TEST DATE: July 1, 1962 START TIME: 1:00

Elapsed Time in Min:Sec	Depth to Water Level During Pumping (Feet)	Depth to Water Level During Recovery (Feet)
30:00		120.
120:00	140.	

WATER REMOVAL RATE DURING TEST: 8 Gal/Min
TEST DURATION: 2 Hours 0 Minutes
TESTING METHOD: UNKNOWN
DEPTH OF PUMP/DRILL STEM: Feet
WATER LEVEL AT END OF TEST: 140 Feet
NON-PUMPING (STATIC) WATER LEVEL: 120.0 FEET
TOTAL DRAWDOWN: 20 Feet

RECOMMENDED PUMPING RATE: Gal/Min
RECOMMENDED PUMP INTAKE AT: Feet
TYPE OF PUMP INSTALLED:
MODEL: H.P.:

DATE WORK STARTED:

COMMENTS:

(Maximum of 9 lines printed)

DATE WORK COMPLETED: July 2, 1962

ADDITIONAL TEST AND/OR PUMP DATA:

CHEMISTRIES TAKEN: N HELD: DOCUMENTS HELD: 1

WELL OWNER'S ANTICIPATED WATER REQUIREMENTS PER DAY:

ALBERTA ENVIRONMENTAL PROTECTION

COMPUTER GENERATED WATER WELL DRILLER'S REPORT FORM

WELL I.D. 365349

THIS DATA MAY NOT BE FULLY CHECKED; THE PROVINCE DISCLAIMS ALL RESPONSIBILITY FOR ITS ACCURACY:

CONTRACTOR:

NAME: SWEENEY DRILLING LTD.

ADDRESS: Box 11, Site 1, R.R.9
Calgary, Alberta T2J-5G5

LICENCE NO.: 0885 JOURNEYMAN NO. VH3547

WELL OWNER:

NAME: POFFENROTH, HARVEY

ADDRESS: RR9 CALGARY

POSTAL CODE:

WELL LOCATION: IC#:

~ OR LSD	SEC	TWP	RGE	W. MER
SW	07	022	01	W5

LOCATION VERIFICATION METHOD MAP
LOCATION IN QUARTER:

LOT: BLOCK: PLAN:
WELL ELEV: Feet How obtain: NOT OBTAIN

FORMATION LOG DESCRIPTION:

Depth (Feet):	Lithology:
Ground to:	
20	Clay & Rocks
40	Shale & Sandstone Ledges
60	Gray Shale
90	Green Shale & Sandstone Ledges

DRILLING METHOD: ROTARY

TYPE OF WORK: NEW WELL

FLOWING WELL No **RATE:**
GAS PRESENT: No OIL PRESENT: No
DATE OF ABANDONMENT:
MATERIAL USED:
PROPOSED USE: DOMESTIC

WELL COMPLETION DATA:

WELL FINISH: CASING/PERFORATED LINER
TOTAL HOLE DEPTH: 90 Feet

CASING TYPE: STEEL
SIZE OD: 5.56 Inch WALL THICKNESS: 0.188 Inch
BOTTOM AT: 40 Feet

PERFORATED CASING/LINER:
TYPE: PLASTIC
SIZE OD: 4.95 Inch ID: Inch
WALL THICKNESS: 0.265 Inch
TOP AT: 10 Feet BOTTOM AT: 90 Feet
PERFORATED FROM: 80 Feet TO: 90 Feet
Feet TO: Feet
Feet TO: Feet

SIZE OF PERFORATIONS: 0.062 Inch X 4.000 Inch
HOW PERFORATED: OTHER
SEAL TYPE: DRIVEN
INTERVAL TOP: Feet TO: 40 Feet
GEOPHYSICAL LOG TAKEN:
RETAINED ON FILE:
SCREEN:
MATERIAL:
SIZE ID (CLEAR): Inch SLOT SIZE: Inch
INTERVAL TOP: Feet TO: Feet
Feet TO: Feet
INSTALLATION METHOD:
TOP FITTINGS:
BOTTOM FITTINGS:
PACK TYPE:
GRAIN SIZE: AMOUNT:

PITLESS ADAPTER TYPE:
DROP PIPE TYPE: LENGTH: Feet
DIAMETER: Inch
ADDITIONAL PUMP INFORMATION:

PRODUCTION TEST:

TEST DATE: July 7, 1992 START TIME: 1:0

Elapsed Time in Min:Sec	Depth to Water Level During Pumping	Depth to Water Level During Recovery

WATER REMOVAL RATE DURING TEST: 20 Gal/Min
TEST DURATION: 4 Hours 0 Minutes
TESTING METHOD: AIR
DEPTH OF PUMP/DRILL STEM: 88 Feet
WATER LEVEL AT END OF TEST: 15 Feet
NON-PUMPING (STATIC) WATER LEVEL: 58.0 FEE
TOTAL DRAWDOWN: 75 Feet

RECOMMENDED PUMPING RATE: 20 Gal/Min
RECOMMENDED PUMP INTAKE AT: Feet
TYPE OF PUMP INSTALLED:
MODEL: H.P.:

DATE WORK STARTED: June 5, 1992

COMMENTS:
(Maximum of 9 lines printed)

DATE WORK COMPLETED: June 7, 1992

ADDITIONAL TEST AND/OR PUMP DATA:

CHEMISTRIES TAKEN N HELD: DOCUMENTS HELD: 1

WELL OWNER'S ANTICIPATED WATER REQUIREMENTS PER DAY:

APPENDIX C
TRANSPORTATION REPORT

SUBDIVISION: SW¼ 7 T22 R1 W5M

TRANSPORTATION STUDY

PREPARED FOR:
CHALLENGER SURVEYS AND SERVICES

PREPARED BY:
MORASCH TRANSPORTATION CONSULTANTS LTD.

December 8, 1999

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1.0 INTRODUCTION

1.1 BACKGROUND

Morasch Transportation Consultants Ltd. (MTCL) was retained through Challenger Surveys & Services Ltd. to undertake an analysis of transportation issues related to the proposed residential subdivision of 13 Country Residential lots in the Municipal District of Foothills No. 31.

1.2 STUDY OBJECTIVES

The purpose of this Transportation Study is to evaluate the proposed residential subdivision by analyzing the expected influence of the subdivision on the adjacent transportation network. In order to complete the analysis, existing operating conditions of the transportation network are established; the expected traffic characteristics of the proposed subdivision at full build-out are then superimposed on the baseline scenario to determine the post-development traffic conditions. Pre- and post-development traffic demand conditions are then evaluated on the basis of the capacity of key components of the transportation network within the influence area of the proposed subdivision.

The specific objectives of this Transportation Study are as follows:

(i) establish the existing operating conditions of Secondary Highway 773 and 226 Avenue, as well as the operating conditions of the Secondary Highway 773/ 226 Avenue/ 96 Street intersection, in order to establish baseline conditions;

(ii) determine the traffic volumes and travel characteristics anticipated to be generated by the proposed subdivision at full build-out;

(iii) determine the influence of the proposed subdivision on the surrounding transportation network, including the 226 Avenue and Secondary Highway 773 radways, and the Secondary Highway 773/ 226 Avenue/ 96 Street intersection.

2.0 STUDY AREA

2.1 SUBJECT LANDS - LOCATION

The Subject Lands are located within the boundaries of the Municipal District of Foothills No. 31, approximately four kilometres south of the Calgary city limits/ Highway 22X (Marquis de Lorne Trail). The location of the Subject Lands is illustrated in **Exhibit 2.1**, and **Exhibit 2.2**.

2.2 TRANSPORTATION NETWORK AND LOCAL AREA DEVELOPMENT

The existing regional transportation network in the vicinity of the proposed subdivision is shown in **Exhibit 2.3**.

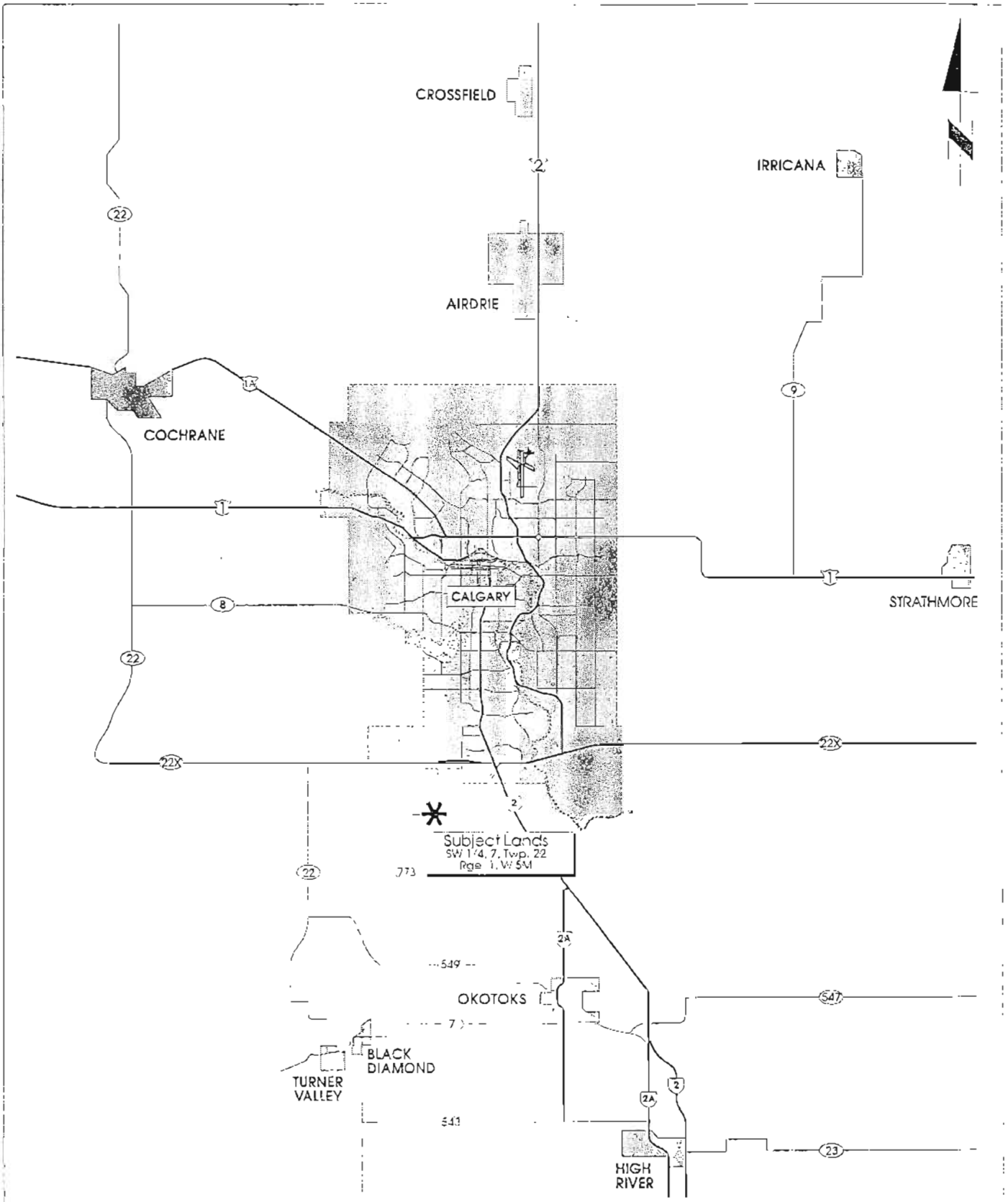
The proposed subdivision is located within the primary influence of the City of Calgary as a commuter destination route and commercial/services opportunity node. Primary access to Calgary is provided by Highway 22X (Marquis de Lorne Trail), located approximately 4 kilometres north of the proposed subdivision via Secondary Highway 773. Highway 22X is a 4 lane divided rural expressway facility west of the Calgary city limits. Current long-term plans identify Highway 22X west of Calgary as a potential future freeway facility.

2.2.1 Transportation Network

Presently, primary access to Highway 22X from the proposed subdivision is expected to be provided by Secondary Highway 773. Alternatively, a secondary access to Highway 22X is provided via 80 Street to the east.

Secondary Highway 773 is a two-lane undivided rural facility with a paved/ oiled surface. Access to Highway 22X from Secondary Highway 773 occurs at an all turns at-grade intersection. At the intersection of Secondary Highway 773 and 226 Avenue/ 96 Street; Secondary Highway 773 veers westward and then southward until it terminates at 388 Avenue west of Okotoks

Until recently, plans were in place to realign Secondary Highway 773 under the jurisdiction of the Municipal District of Foothills No. 31. However, it is now anticipated that Secondary Highway 773 is to fall under the jurisdiction of Alberta Infrastructure (formerly Alberta Transportation and Utilities) in 2000. Therefore, the status of the realignment of Secondary Highway 773 is considered to be unknown: MTCL has accordingly prepared this Study under this assumption. However, if Secondary Highway 773 was relocated in the future (e.g. to 80 Street), changes to the expected site traffic distribution may be expected to occur.



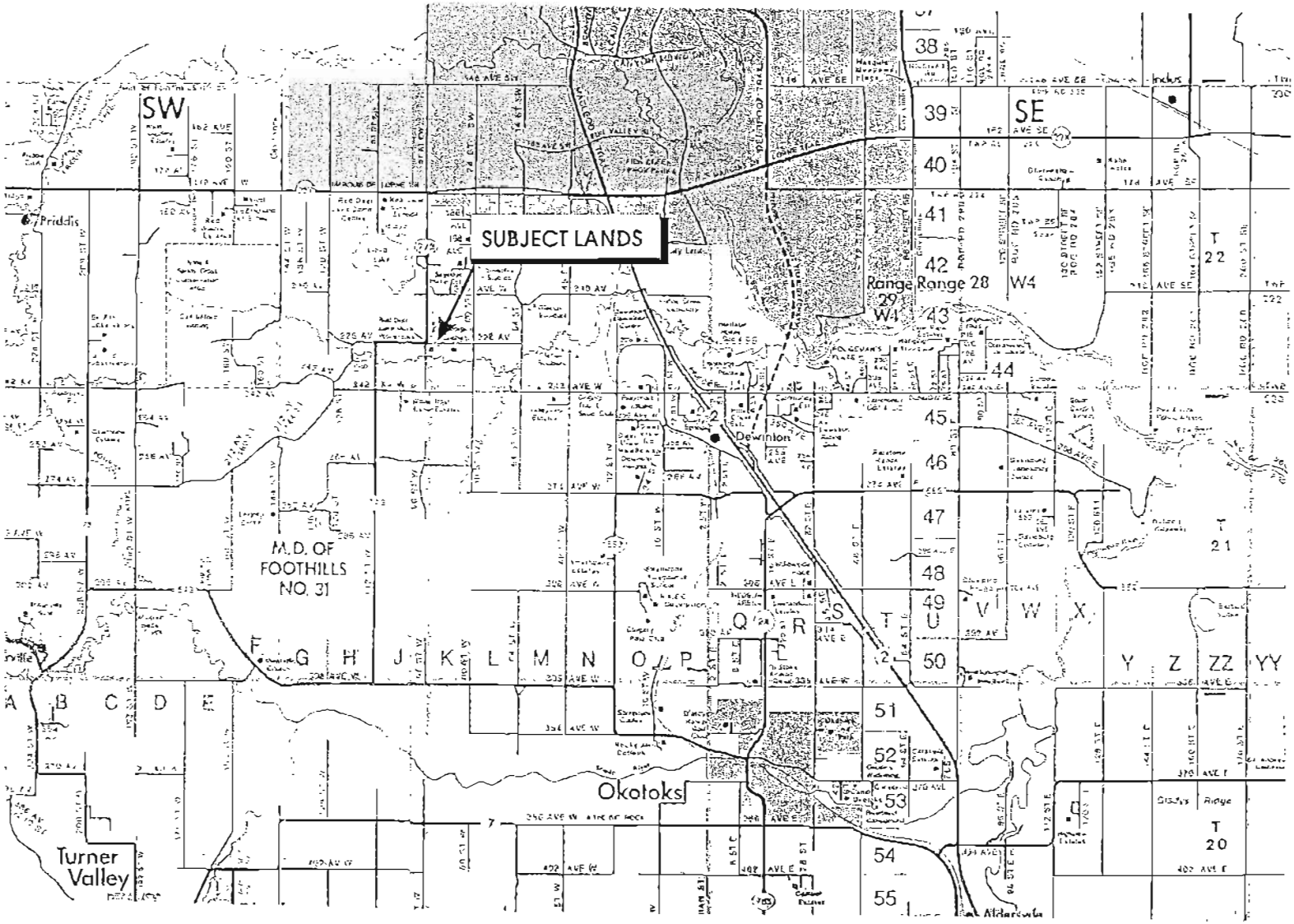
Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
REGIONAL SITE LOCATION MAP

Exhibit 2.1

Scale: N.T.S.

Page 3

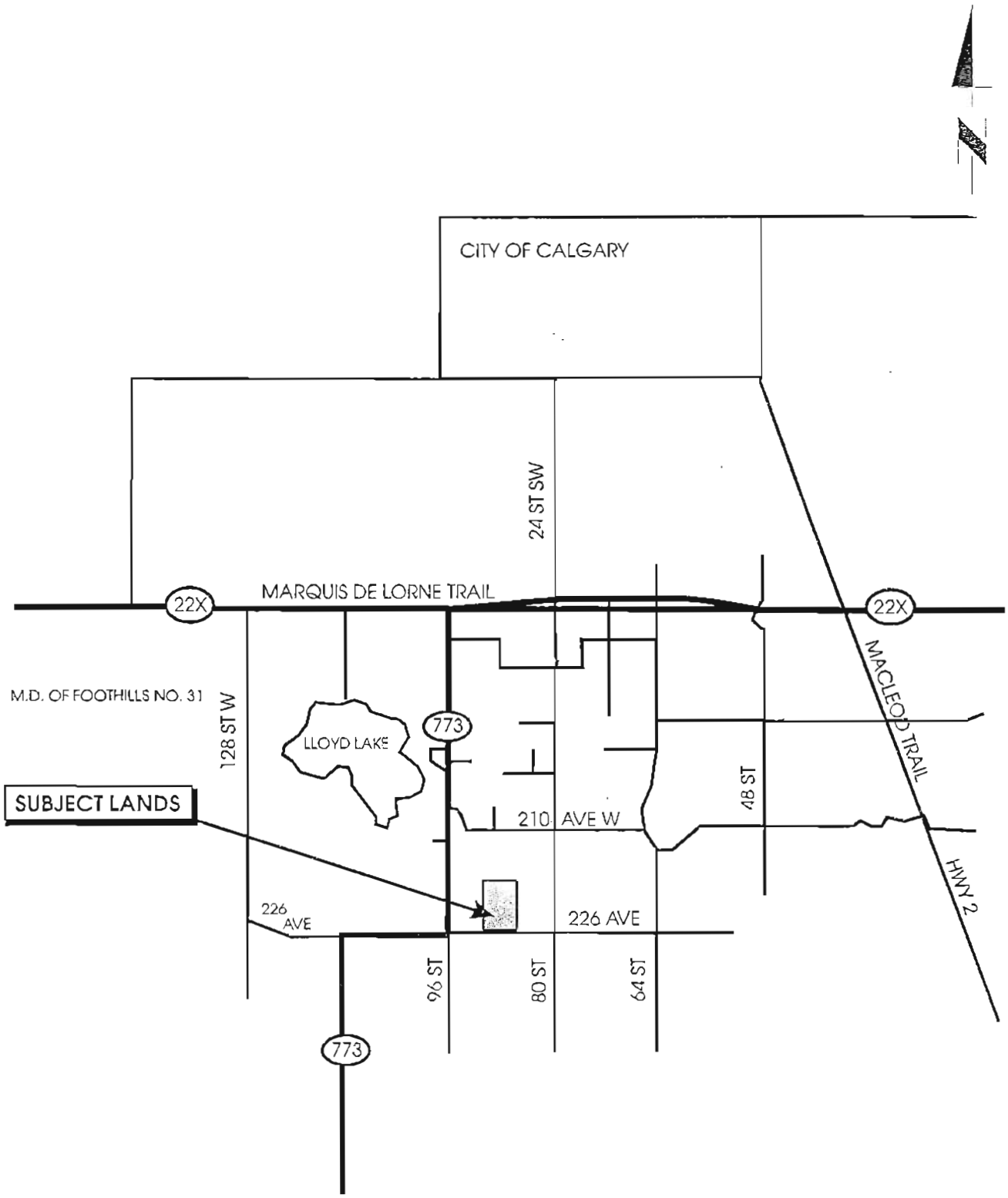
MORASCH TRANSPORTATION CONSULTANTS LTD



Subdivision - SW7 Twp 22 R1 W5M - Transportation Study
REGIONAL SITE LOCATION MAP 1

Exhibit 2.2

Scale: NTS



Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
SITE LOCATION MAP 2

Exhibit 2.3

Scale: NTS

Access to Secondary Highway 773 (and to 80 Street to the east) will be provided via 226 Avenue. 226 Avenue is an east-west two-lane rural roadway located immediately south of the proposed subdivision, and is graveled/ oiled between Secondary Highway 773 and 80 Street. 226 Avenue intersects Secondary Highway 773 approximately 600 metres west of the subdivision access road intersection at the point where Secondary Highway 773 transitions from north-south to an east-west roadway alignment. The profile of 226 Avenue east of Secondary Highway 773 is characterized by flat and gently rolling sections to the west and east of the proposed subdivision access road intersection.

The intersection of Secondary Highway 773 and 226 Avenue has a fourth leg created by 96 Street, which is an unpaved north-south road extending south of the intersection. The Secondary Highway 773/ 226 Avenue/ 96 Street intersection is presently controlled by yield signs on westbound 226 Avenue and northbound 96 Street. Traffic generated by the subdivision is not expected to utilize 96 Street on a routine basis, if at all.

2.2.2 Local Area Land Uses

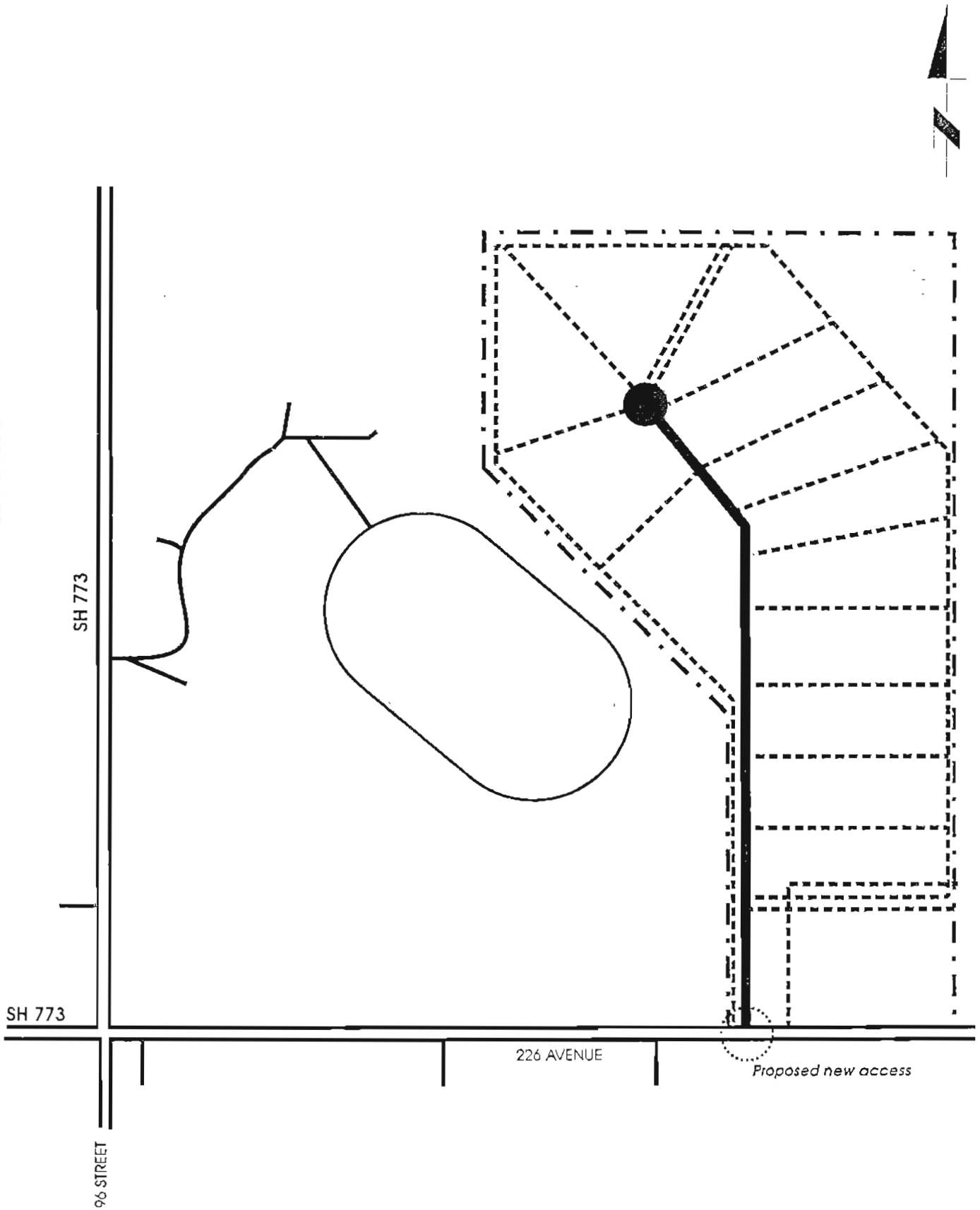
For transportation purposes, the area surrounding the Subject Lands is characterized primarily by agricultural, rural residential, and country residential subdivision land uses. A commercial enterprise - the Red Deer Lake meat processors - is located in the southeast corner of the intersection of Secondary Highway 773/ 226 Avenue/ 96 Street, with an access off the south side of 226 Avenue. Trips generated by the plant have been included in the background assumptions of the Study. In addition, a community mailbox and vehicle lay-by is located immediately east of the Secondary Highway 773/ 226 Avenue/ 96 Street intersection on the south side of 226 Avenue, immediately west of the Red Deer Lake meat processors entrance.

2.3 SUBJECT LANDS - DESCRIPTION, SITE DEVELOPMENT AND ACCESS

The proposed Area Structure Plan (the "Subject Lands") is legally described as a portion of the SW¼, Section 7, Township 22, Range 1, West of the 5th Meridian. The Subject Lands consist of 61.5 acres (24.89 ha).

Development of the proposed subdivision is assumed to consist of 13 single family residential lots, plus one MR parcel in the southeast portion of the subdivision. The residential lots range in size from ±3.0 acres to ± 3.6 acres (refer to **Exhibit 2.4**).

Proposed vehicular access to the subdivision is via a single north-south access road which terminates an a cul-de-sac at the north end. The proposed internal access road intersects the north side of 226 Avenue approximately 600 metres east of Secondary Highway 773.



Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
PROPOSED SUBDIVISION AND ACCESS

Exhibit 2.4

Not To Scale:
SCHEMATIC ONLY

3.0 TRAFFIC CHARACTERISTICS

3.1 BACKGROUND TRAFFIC

In order to establish existing operating conditions of Secondary Highway 773, 226 Avenue and the Secondary Highway 773/ 226 Avenue/ 96 Street intersection, traffic data was collected by MTCL at the Secondary Highway 773/ 226 Avenue/ 96 Street intersection. The traffic data was recorded on Tuesday, November 30, 1999 for a standard 6-hour time period, as follows:

- AM Period 7:00 AM - 9:00 AM
- Noon Period 11:00 AM - 1:00 PM
- PM Period 4:00 PM - 6:00 PM

From this data MTCL extracted the AM peak hour and PM peak hour time periods. The AM peak hour is classified as the highest hour of traffic volume between 7:00 AM and 9:00 AM, while the PM peak hour is the highest hour of traffic between 4:00 PM and 6:00 PM.

From the total 6-hour recorded data, a reasonable estimate of expected daily (24-hour) traffic volumes on Secondary Highway 773, 226 Avenue and 96 Street can be made in the vicinity of the intersection, and is used in the study. For reference purposes, the observed peak hour traffic and estimated 24-hour traffic volumes are contained in Appendix A.

3.2 SITE TRAFFIC GENERATION

Trip generation estimation calculations for the proposed subdivision have been performed for the AM Peak hour, the PM Peak hour, and the 24-hour time periods at full build-out of the subdivision. The number of residential lots included in the trip generation consists of the proposed 13 residential lots. Trip generation rates are sourced from the Institute of Transportation Engineers Trip Generation publication (6th Edition), and from prior experience in the M.D. of Foothills and other jurisdictions. The trip generation calculations for the proposed subdivision are contained in **Table 3.1** for the morning and afternoon peak hour periods, and in **Table 3.2** for the 24 hour period.

Table 3.1
Trip Generation: Morning and Afternoon Peak Periods

Units	AM Peak Hour Trip Rate (trip ends/ unit)	AM Peak Hour Trips	Inbound %	Inbound #	Outbound %	Outbound #
13 homes	0.80 /home	10	25%	3	75%	8
		10	*IN:*	*3*	*OUT:*	*8*
* * * *						
Units	PM Peak Hour Trip Rate (trip ends/ unit)	PM Peak Hour Trips	Inbound %	Inbound #	Outbound %	Outbound #
13 homes	1.00 /home	13	65%	8	35%	5
		13	*IN:*	*8*	*OUT:*	*5*

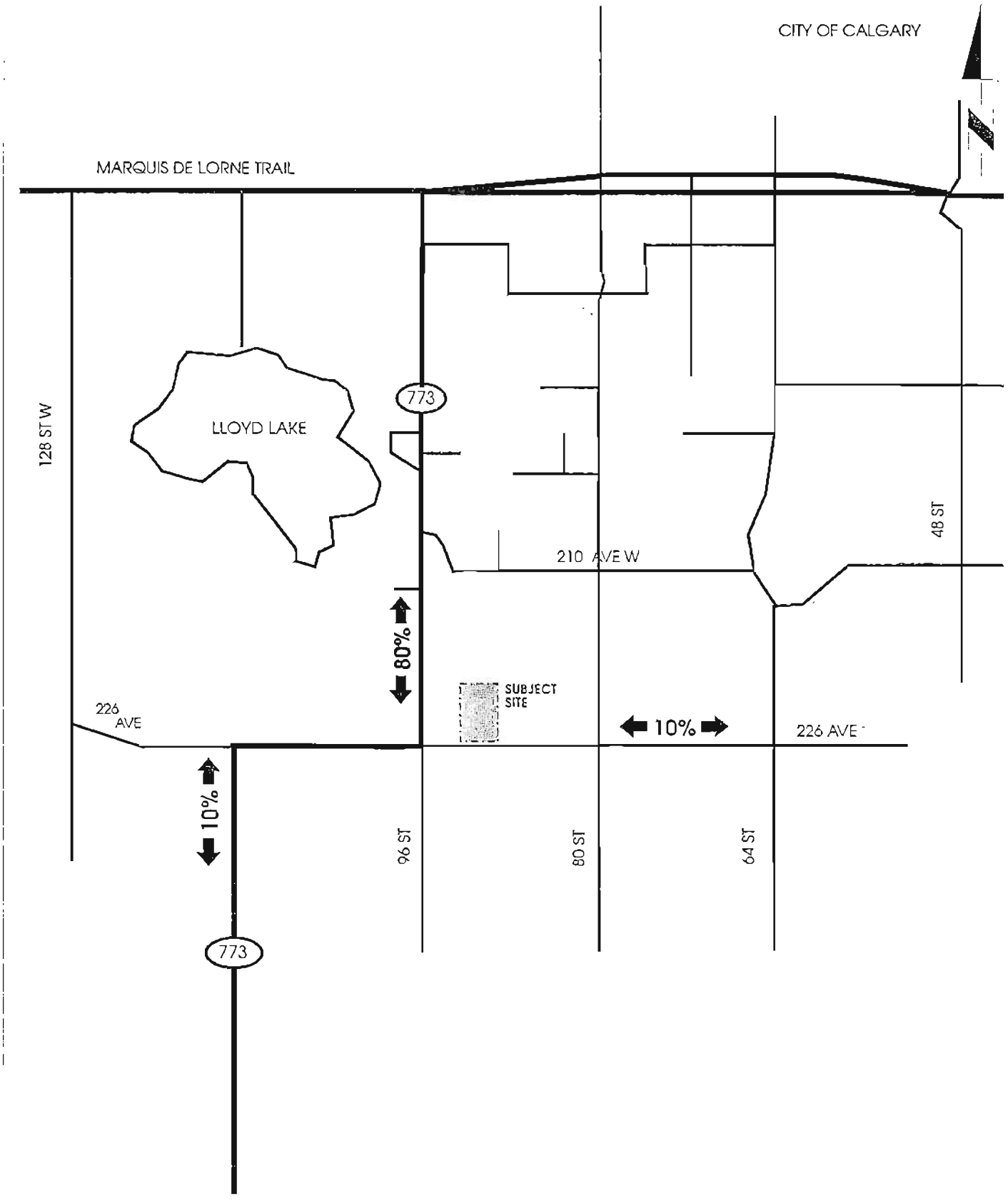
Table 3.2
Trip Generation: Typical Weekday (24 Hour) Period

Units	24 Hour Trip Rate (trip ends/ unit)	24 Hour Trips	Inbound %	Inbound #	Outbound %	Outbound #
13 homes	8.00 /home	104	50%	52	50%	52
		104	*IN:*	*52*	*OUT:*	*52*

(Note: minor errors are due to spreadsheet rounding)

3.3 SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT

Trips have been distributed to the local and regional transportation network on the basis of anticipated employment locations and non-work related primary trip attractors, including shopping areas and other services. In this study it was assumed that major trip attractors, including employment locations and shopping and other services, are located predominantly in the City of Calgary because of its proximity to the Subject Lands. Regional access to Calgary would be gained primarily via Secondary Highway 773 and Highway 22X. Consideration is given to the possibility that a portion of trips would utilize 80 Street to access Highway 22X as an alternative route. **Exhibit 3.1** illustrates the trip distribution assumptions made in the Study.



Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
TRAFFIC DISTRIBUTION PERCENTAGES

Exhibit 3.1

Scale: NTS

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MORASCH TRANSPORTATION CONSULTANTS LTD.

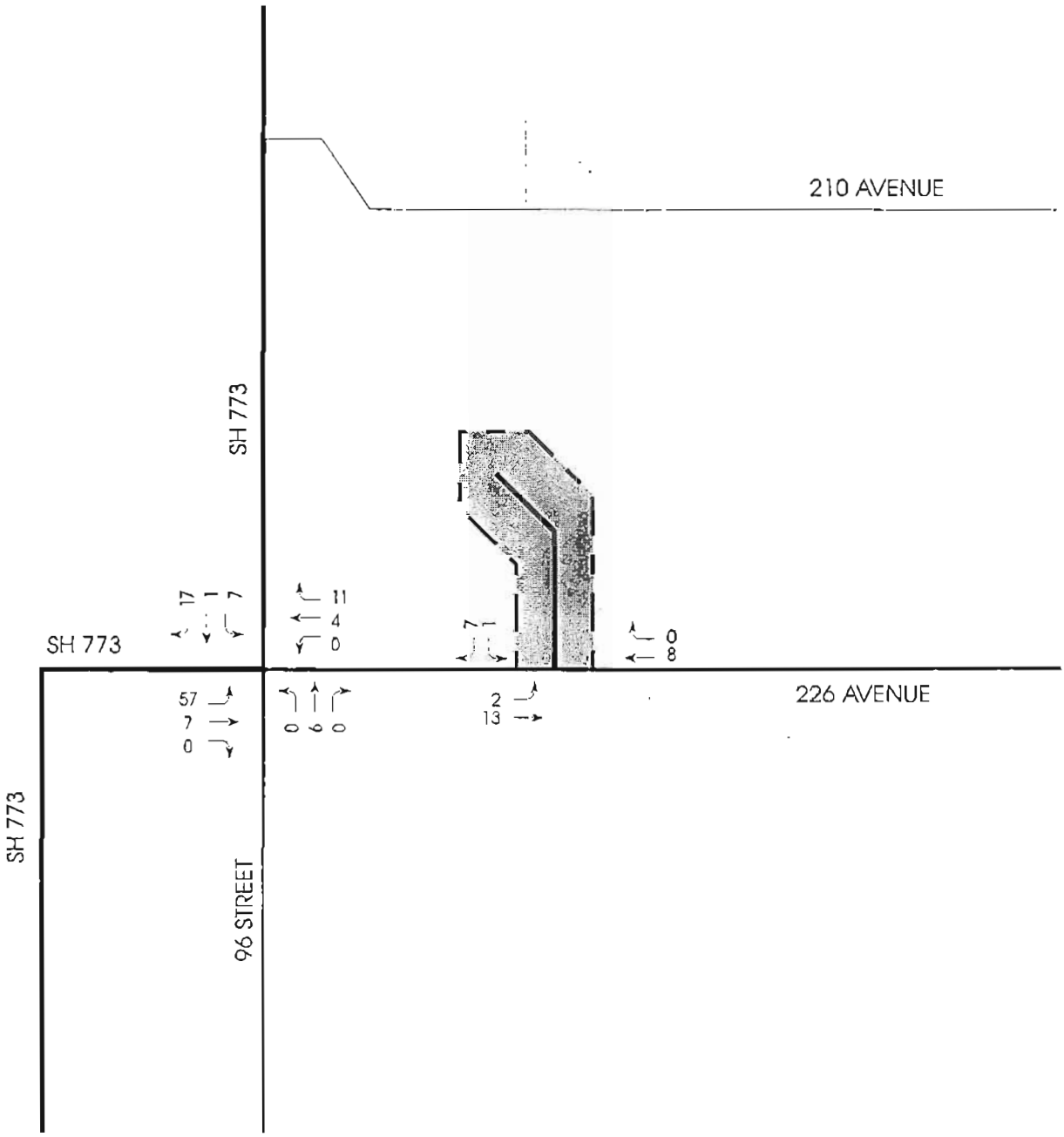
In addition to primary employment and services attractors in the Calgary area, other trip attractors in the area south of Calgary, both employment and non-employment oriented, were assumed to result in the distribution of a portion of site traffic west and south on Secondary Highway 773, and east on 226 Avenue.

The assignment of trips to the transportation network is based on the most efficient and shortest route to and from the origin and destination within the expected distribution pattern. Graphical representation of the Site generated peak hour traffic, and 24-hour site generated traffic volumes are contained in Appendix B.

3.3 POST-DEVELOPMENT TRAFFIC CHARACTERISTICS

Site generated trips were superimposed onto observed AM and PM peak hour background traffic volumes, and onto the estimated daily (24-hour) background traffic volumes on Secondary Highway 773 and 226 Avenue.

The total post-development traffic volume forecasts are shown graphically in **Exhibit 3.2** for the AM peak hour period, **Exhibit 3.3** for the PM peak hour period, and **Exhibit 3.4** for the 24-hour period.



Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
TOTAL ESTIMATED TRAFFIC - FULL SUBDIVISION BUILD-OUT
AM PEAK HOUR

Exhibit 3.2

Scale: NTS

Page: 12

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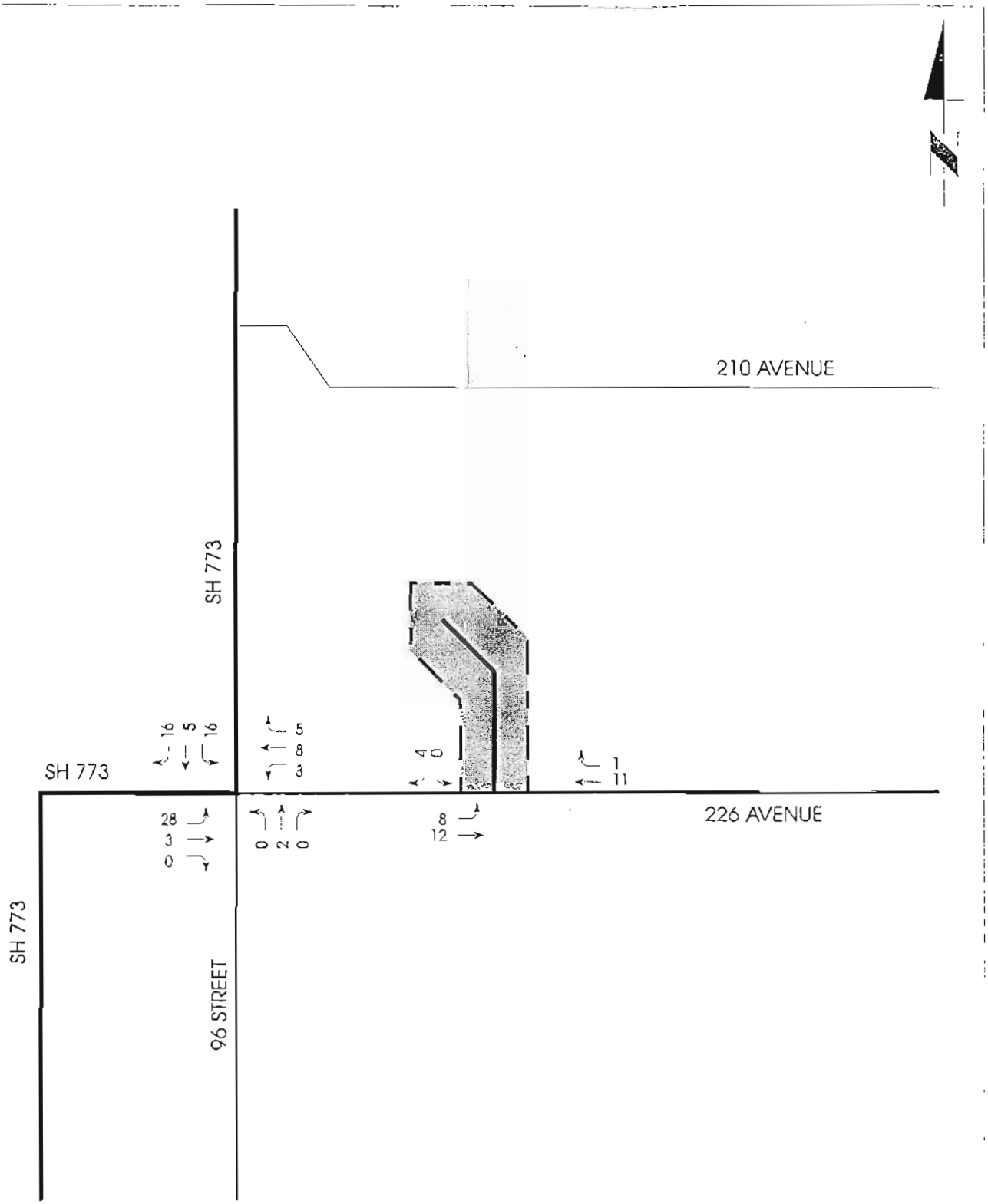


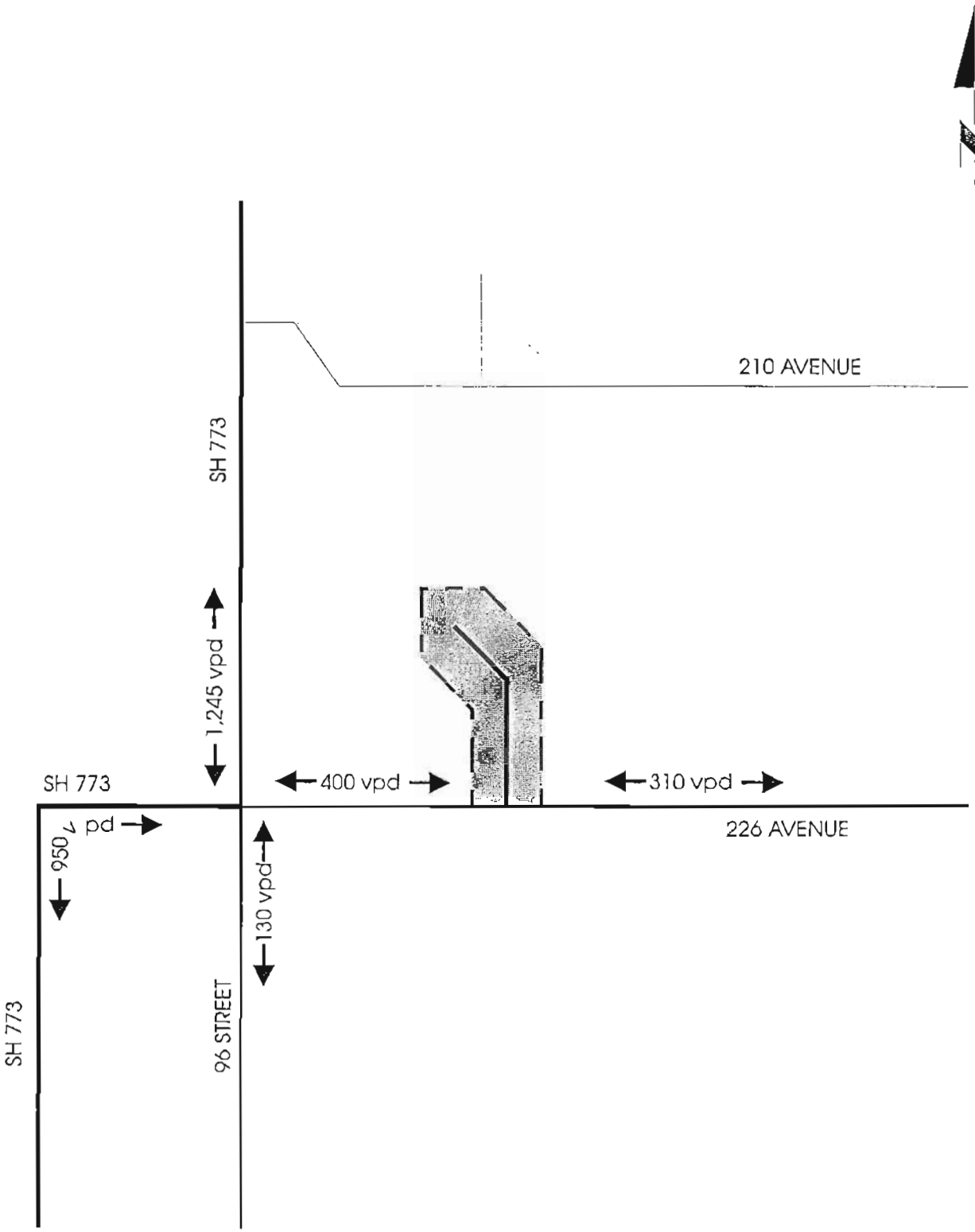
Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
TOTAL ESTIMATED TRAFFIC - FULL SUBDIVISION BUILD-OUT
PM PEAK HOUR

Exhibit 3.3

Scale: NTS

Page: 13

MORASCH TRANSPORTATION CONSULTANTS LTD.



Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
TOTAL ESTIMATED TRAFFIC - FULL SUBDIVISION BUILD-OUT
24 HOUR VOLUMES

Exhibit 3.4

Scale: NTS

Page: 14

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4.0 TRANSPORTATION ANALYSIS

4.1 INTRODUCTION: METHODOLOGY

In analyzing the influence of the proposed subdivision on the adjacent transportation network, the capacity of the network to accommodate the additional expected traffic demand was evaluated. This involves comparing the existing and post-development traffic volumes on Secondary Highway 773 and 226 Avenue over a daily (24-hour) period, and evaluating the pre- and post-development intersection demand/ capacity at the Secondary Highway 773/ 226 Avenue/ 96 Street intersection.

Standard techniques for determining the performance of stop-sign controlled intersections are normally applied to evaluate pre- and post-development intersection demands relative to intersection capacity during the morning and/ or afternoon peak hour periods. However, in the case of the Secondary Highway 773/ 226 Avenue/ 96 Street intersection, standard techniques are not applicable since this intersection is controlled by yield signs, and the main road (SH 773) is not intersected by the secondary roads in a standard configuration. Therefore, for purposes of intersection analysis, MTCL has compared the pre- and post-development traffic demand volumes and, combined with field observation, used the relative increase of traffic under post-development conditions as a basis of evaluation.

4.2 AM PEAK HOUR

Based on traffic data collected by MTCL in November, 1999, full development of the proposed subdivision is expected to increase the traffic demand at the Secondary Highway 773/ 226 Avenue/ 96 Street intersection by less than 10% during the morning peak hour period. This increase represents a minimal increase to demand, and will primarily be concentrated to only two legs of the intersection (i.e. 226 Avenue and the north-south leg of Secondary Highway 773). Presently, the operating conditions of this intersection suggest that spare capacity exists in the intersection during the morning peak hour period. Given that the approach to Secondary Highway 773 from 226 Avenue is controlled (yield sign), the intersection is expected to have sufficient capacity to accommodate development-related traffic increases.

4.3 PM PEAK HOUR

Based on traffic data collected by MTCL in November, 1999, full development of the proposed subdivision is expected to increase the traffic demand at the Secondary Highway 773/ 226 Avenue/ 96 Street intersection by less than 15% during the afternoon peak hour period. Presently, the operating conditions of this intersection suggest that spare capacity exists in the intersection and, as is the case with morning traffic, the increase due to the

proposed subdivision represents a minimal increase to demand. Therefore, the intersection is expected to have sufficient capacity to accommodate development-related traffic increases.

4.4 DAILY TRAFFIC (24 HOUR)

Presently 226 Avenue east of Secondary Highway 773 has a daily estimated traffic demand of approximately 300 vehicles per day (vpd). The north-south leg of Secondary Highway 773 has a daily estimated traffic demand volume of 1,150 vpd north of 226 Avenue, and the east-west leg of Secondary Highway 773 has a daily estimated traffic demand volume of approximately 940 vpd west of 226 Avenue. Based on these volumes and roadway classifications, it is concluded that these roadway segments currently operate with spare capacity.

The proposed subdivision is expected to generate in the order of 110 vehicle trips per day (two-way total, rounded). Based on the existing daily traffic volumes on Secondary Highway 773 in the vicinity of the Subject Lands, the proposed subdivision is expected to increase daily traffic by less than 1% west of 226 Avenue, and less than 8% north of 226 Avenue. The proposed subdivision is expected to increase daily traffic on the short segment of 226 Avenue immediately east of Secondary Highway 773 and west of the subdivision access road by less than 35%. East of the subdivision access, the proposed subdivision is expected to increase traffic volumes on 226 Avenue by less than 5%. Given the capacity of these roadways, it is concluded that Secondary Highway 773 and 226 Avenue have sufficient spare capacity to accommodate increases to traffic demand expected from the proposed subdivision.

4.5 SCHOOL BUS SERVICE

The Foothills School Division presently provides school bus service along the Secondary Highway 773 and 226 Avenue corridors. The Separate school system presently provides a school bus service on 80 Street, north of 226 Avenue. Depending on the school busing requirements and eligibility of future residents of the subdivision, it may be necessary to extend or modify school bus service to service the proposed subdivision. Determination of the actual need to extend school busing to, or into, the future subdivision would be made by the respective school authorities.

5.0 CONCLUSIONS

Morasch Transportation Consultants Ltd. has completed a Transportation Study for a proposed 61.5 acre Area Structure Plan. The intent of the ASP is to create 13 residential lots and one municipal reserve lot, as well as an internal access road within the Municipal District of Foothills No. 31. The purpose of the Study is to evaluate the influence of the proposed subdivision on the existing transportation network, by analyzing the relationship between the expected traffic demands and the capacity of transportation network facilities. The analysis was conducted to include current conditions (baseline operation), as well as post-development conditions. The time periods in the analysis are the morning (AM) and afternoon (PM) peak hour periods, and the weekday 24-hour period. The main conclusions and recommendations which were drawn from the Transportation Study are as follows.

5.1 The proposed subdivision is expected to generate in the order of 110 vehicle trips per day, approximately 10 trips during the AM peak hour period, and approximately 15 trips during the PM peak hour period (rounded values).

5.2 Access to the proposed subdivision is proposed via an internal roadway which intersects the north side of 226 Avenue approximately 600 metres east of Secondary Highway 773. From here, 226 Avenue provides access to Secondary Highway 773 or 80 Street. Based on existing observed travel patterns and the location of the proposed subdivision, it is expected that Secondary Highway 773 will provide primary access to the regional transportation network, with a secondary access opportunity to 80 Street to the east.

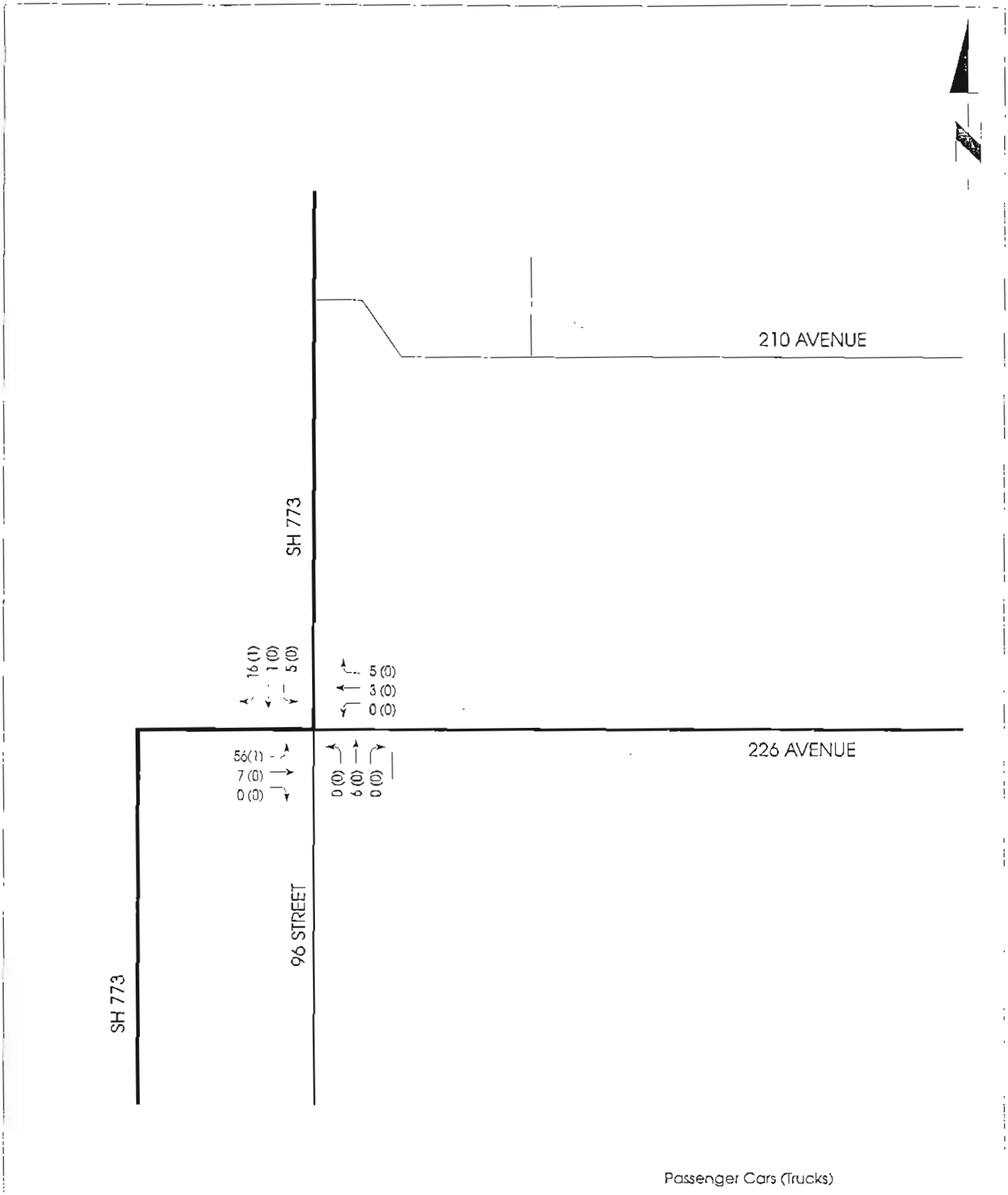
5.3 Based on the evaluation, it is concluded that the Secondary Highway 773/ 226 Avenue/ 96 Street intersection has sufficient capacity to accommodate traffic increases caused by the proposed subdivision during the morning and afternoon peak hour periods. Based on this conclusion, no improvements to the intersection would be warranted as a result of the proposed subdivision on the basis of intersection capacity.

5.4 Given the capacity of the Secondary Highway 773 and 226 Avenue roadways, it is concluded that these roadways have sufficient spare capacity to accommodate increases to traffic demand expected from the proposed subdivision, with no improvements warranted.

5.5 It is recommended that vehicular access to 226 Avenue from the proposed subdivision access road be controlled by a southbound yield or stop sign.

APPENDICES

Appendix A - Background Traffic Volumes



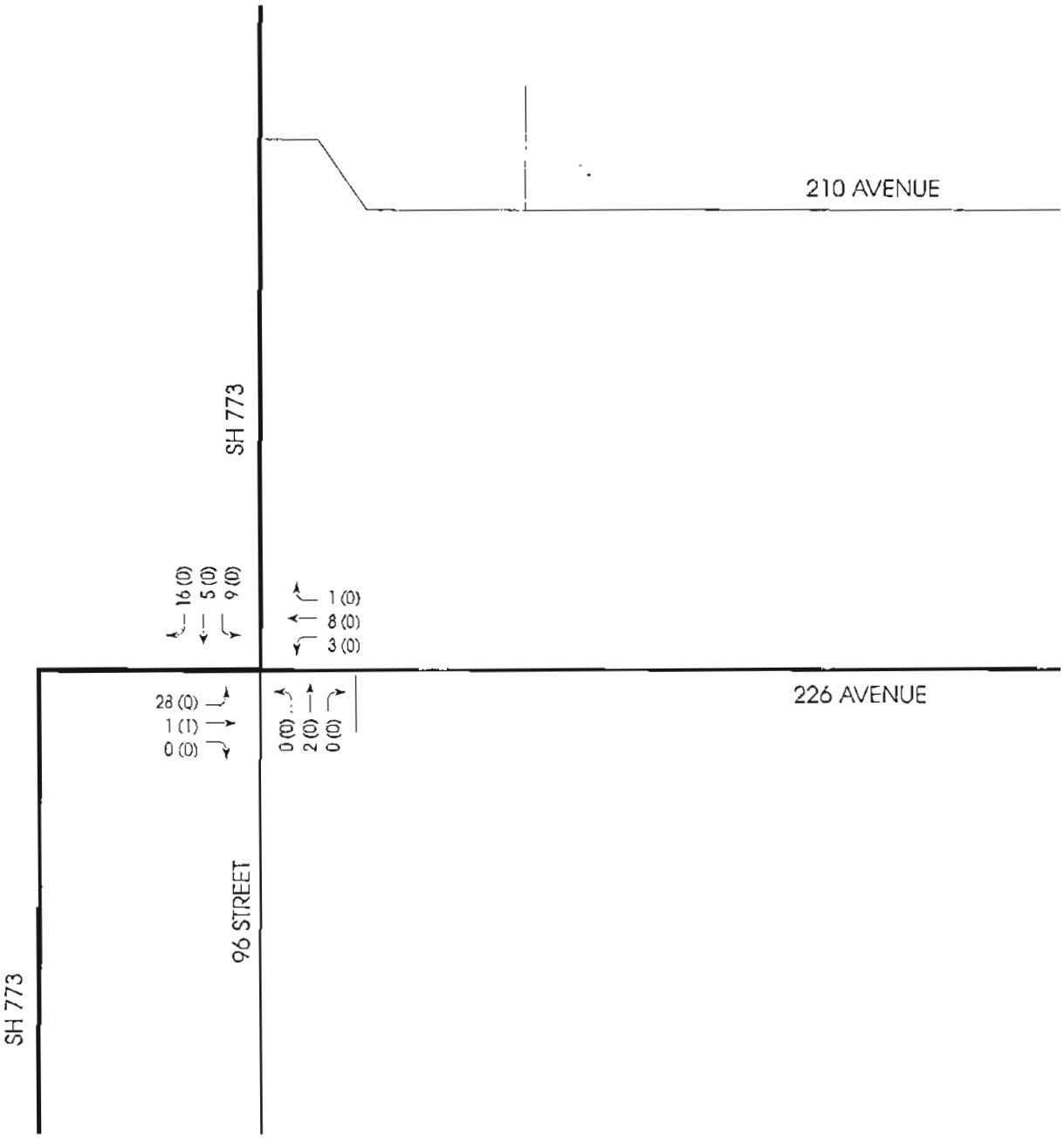
Source: MTCL Intersection Counts, November 30, 1999

Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
November 30, 1999 - Traffic Count
AM PEAK HOUR - 7:15 - 8:15 am

Exhibit A-1

Scale: NTS

MORASCH TRANSPORTATION CONSULTANTS LTD



Passenger Cars (Trucks)

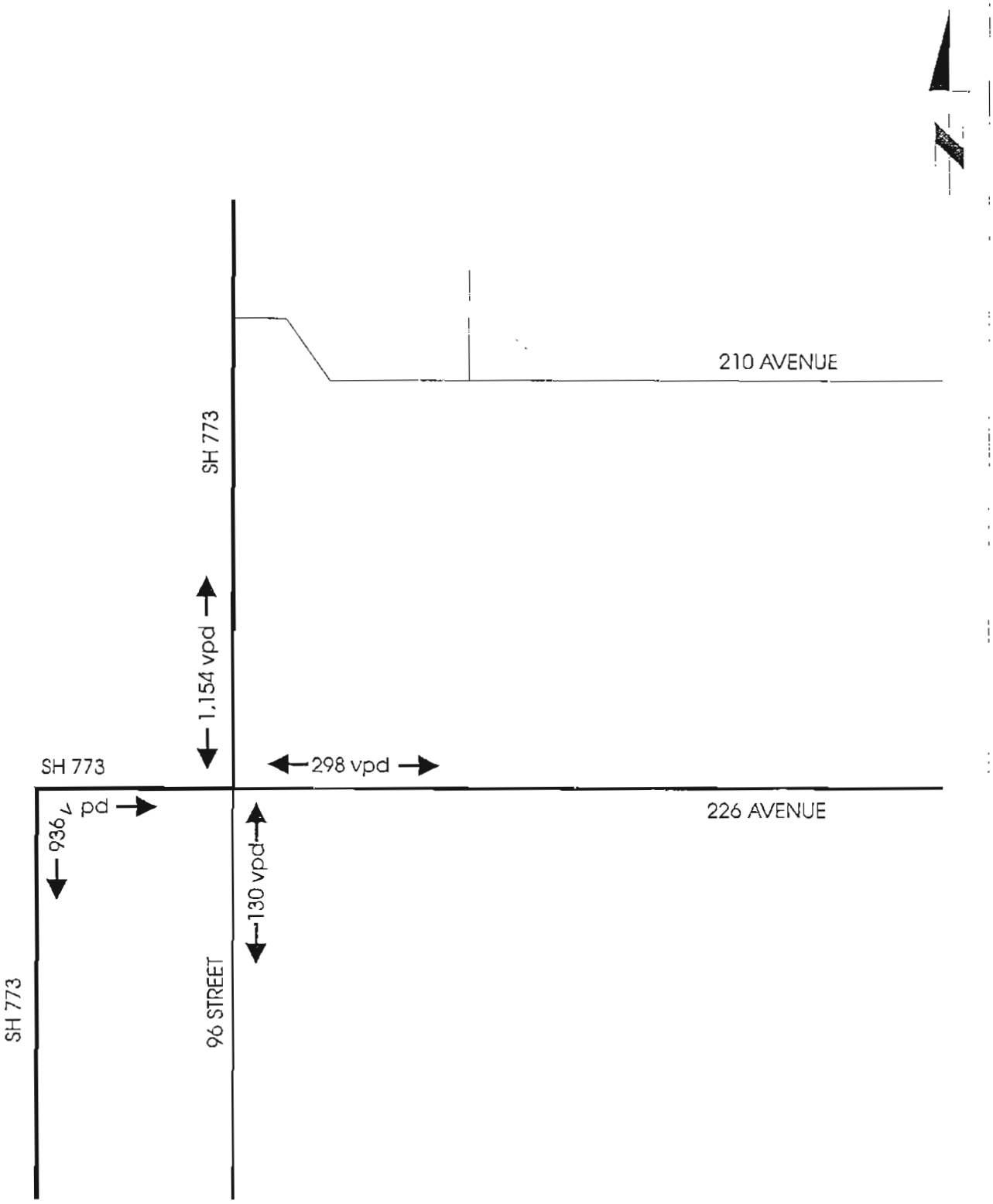
Source: MTCL Intersection Counts, November 30, 1999

Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
November 30, 1999 - Traffic Count
PM PEAK HOUR - 5:00 - 6:00 pm

Exhibit A-2

Scale: NTS

MORASCH TRANSPORTATION CONSULTANTS LTD



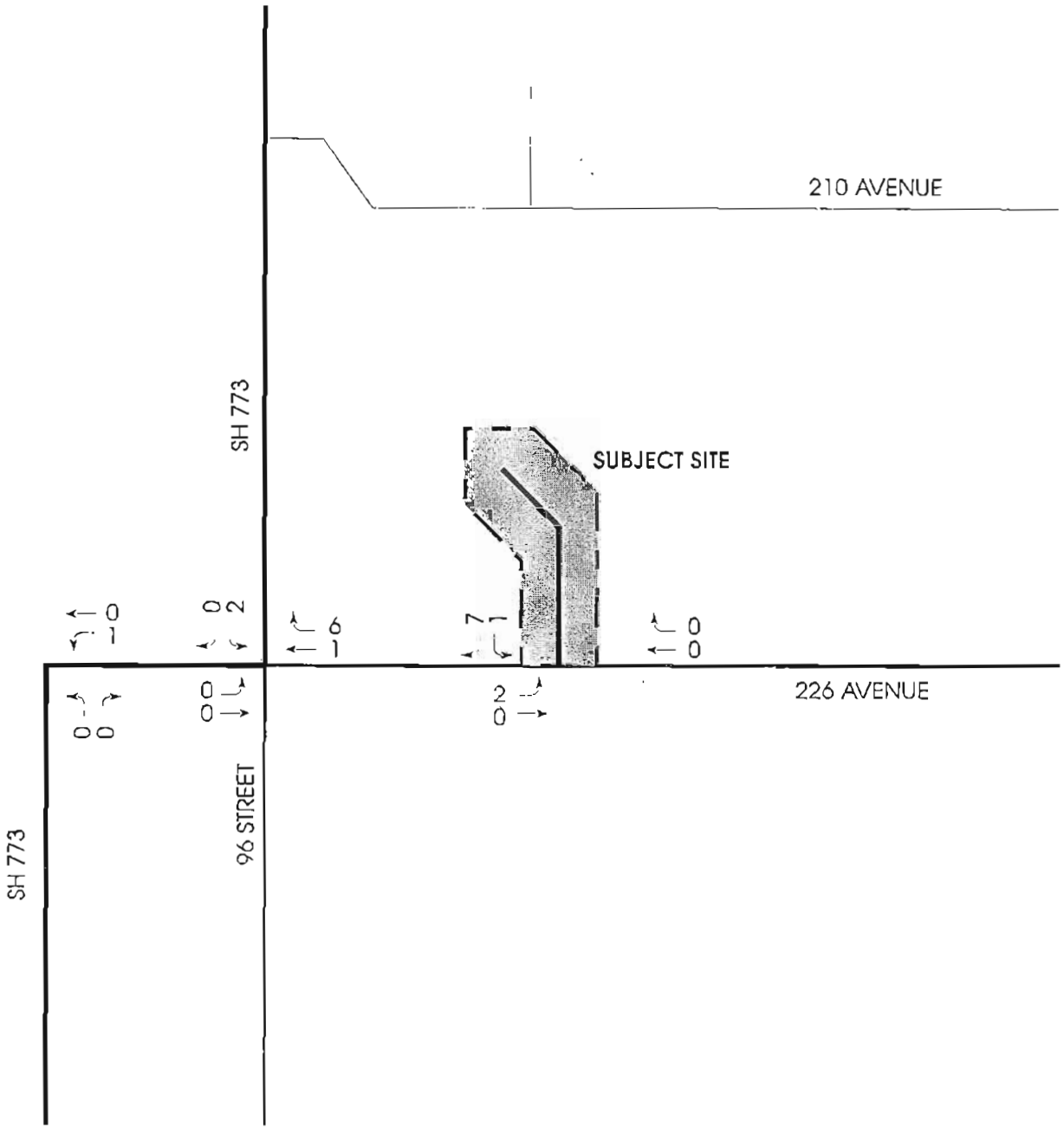
Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
CURRENT 24 HOUR TRAFFIC VOLUMES (ESTIMATED)

Exhibit A-3

Scale: NTS

MORASCH TRANSPORTATION CONSULTANTS LTD.

Appendix B - Site Generated Traffic Volumes

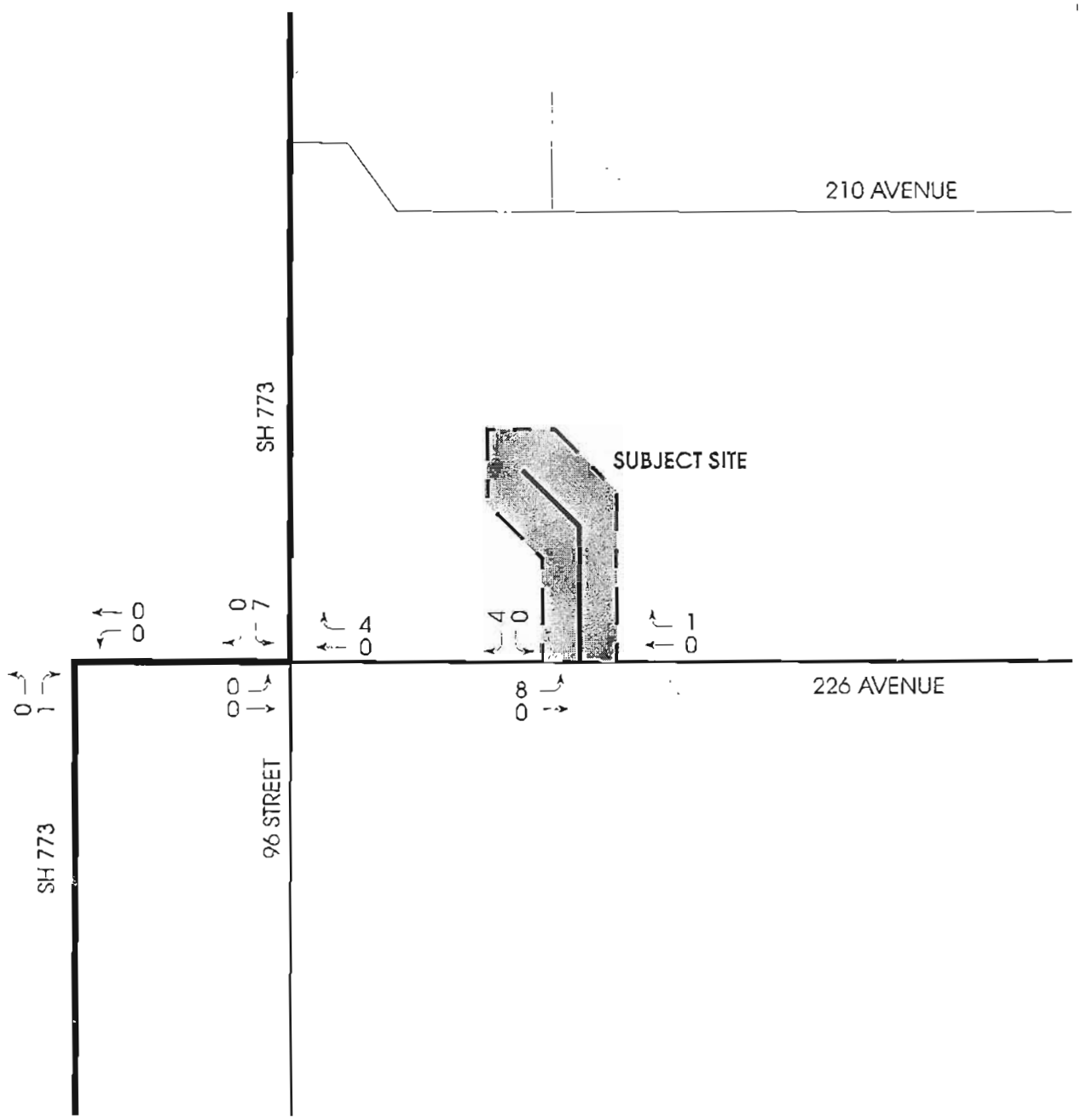


Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
SITE GENERATED TRAFFIC
AM PEAK HOUR

Exhibit B-1

Scale: NTS

MORASCH TRANSPORTATION CONSULTANTS LTD.

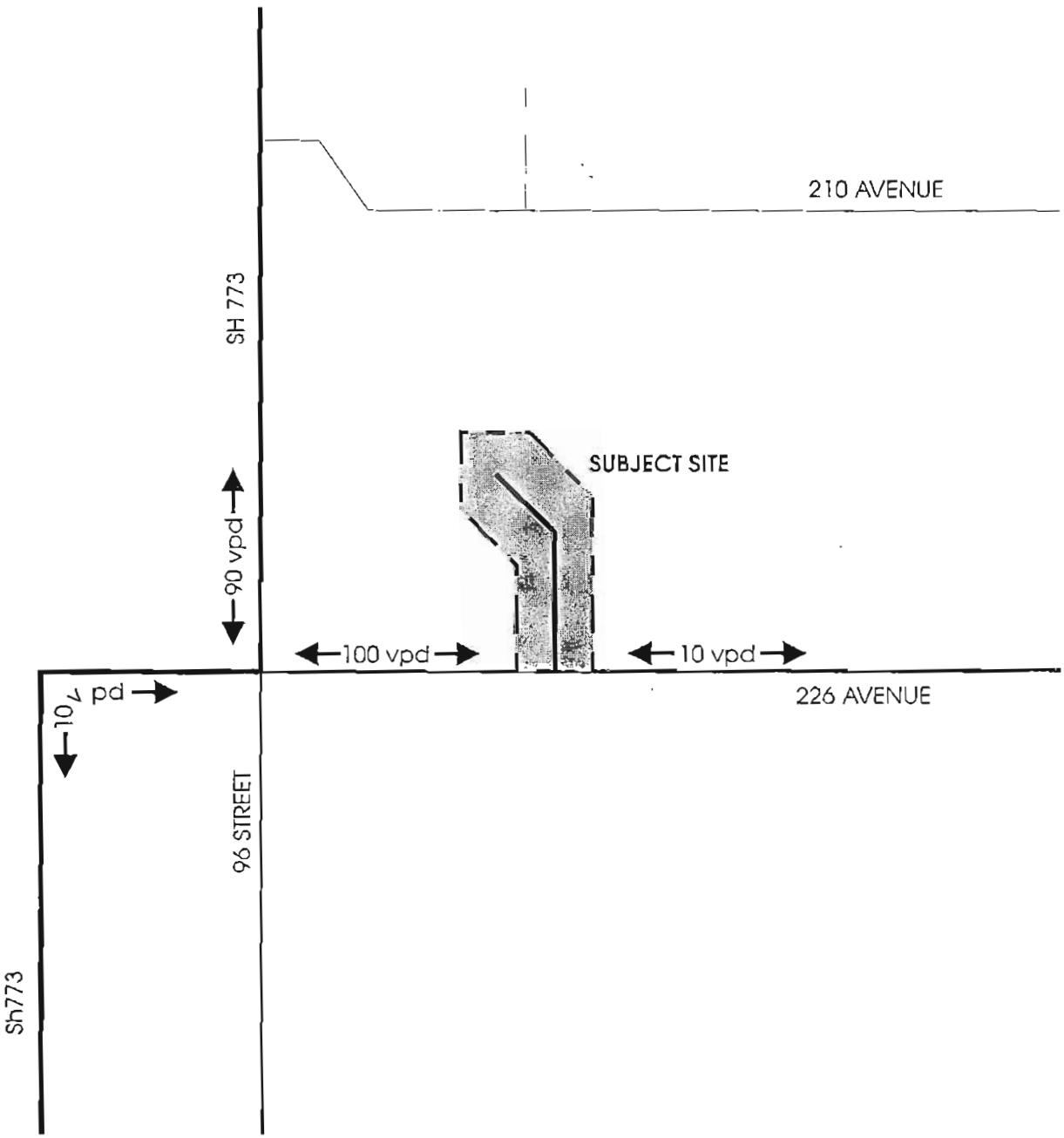


Subdivision, SW 7, Twp 22 R1 W5M - Transportation Study
SITE GENERATED TRAFFIC
PM PEAK HOUR

Exhibit B-2

Scale: NTS

MORASCH TRANSPORTATION CONSULTANTS LTD



Highway 773 Project - Transportation Study
SITE GENERATED TRAFFIC
24-HOUR PERIOD

Exhibit B-3

Scale: NTS

MORASCH TRANSPORTATION CONSULTANTS LTD.

APPENDIX D
PERCOLATION STUDY

ALMOR TESTING SERVICES LTD.

7505 - 40 ST. S E., CALGARY, ALBERTA T2C 2H5 TELEPHONE (403) 236-8880

1999 12 03 99-088-01-5

Challenger Surveys and Services Ltd.
300, 6940 Fisher Rd SE
Calgary, Alberta
T2H 0W3

Attention: Ms. Brandy Clements

Re: Shallow Subsurface Conditions
SW ¼, Sec 7, Twp 22, Rge 01, W5M
Harvey Poffenroth Acreage

Almor Testing Services Ltd. was retained to evaluate the percolation rate of the shallow subsurface soils and groundwater conditions, in accordance with the MD of Foothills and Alberta Environmental Protection guidelines, at the above referenced project. No consideration has been given to specific foundation subsoil conditions, within the building envelopes. The proposed subdivision, to be subdivided into 14 Lots, is identified by the attached Site Plan.

The field investigation for the preliminary water table and percolation rate testing was performed on November 10, 1999. The percolation test holes and groundwater monitoring test holes, located by our personnel, were advanced by a mobile auger drill. Frost was not present in the test holes.

1.0 SOIL CONDITIONS

The soil conditions at the septic tile field locations (excluding the surficial topsoil and lesser "browns" horizon), consist predominately of olive silt, with a trace to some clay and a trace to some sand. The soils are in a damp condition and were of a stiff to very stiff consistency. Natural moisture contents ranged from 5.6% to 16.3% at the 0.9m depth. Soil saturation tests performed on the shallow subsoils yielded a range from 63.2% to 64.1%. A review of the water supply chemistry will be required for the determination of the Sodium Absorption Ratio (SAR) value. Providing the water supply chemistry yields an SAR value of less than 24, the product range will be below the suggested limits of 1500 to 2200 for a potential reduction in long term efficiency. If the SAR value is higher, an increased septic field is to be considered.

.../2

2.0 SEPTIC FIELD - PERCOLATION RATE TESTS

The percolation test holes were advanced at alternate septic field locations in each lot, to a depth of approximately 0.9m below the depth of native topsoil and the "browns" horizon. Loose materials from the bottom and sides of the test holes were cleaned, prior to filling the base with gravel and the water for a minimum depth of 0.45m (18 inches). The water was allowed to soak for a minimum 12 to 24 hour period. The holes were recharged with water and the percolation rates were observed and recorded on November 11, 1999. The results are presented in the attached Table 1.

3.0 GROUNDWATER CONDITIONS

Free water or saturated soil conditions were not observed, during test hole drilling. Hand-slotted, 30mm PVC standpipe were installed in each test hole, for review of near surface water table. The standpipe were installed to depths ranging from 1.45m to 3.1m below the existing ground surface. Wetted bentonite granules were placed from the ground surface to a depth of 0.3m, to limit surface water infiltration. The standpipes were monitored the next day and one week subsequent to installation and groundwater was not present, as noted in Table 2.

TABLE 2
GROUNDWATER CONDITIONS

Test Hole No.	Depth of Standpipe	------ Depth Below Existing Ground Surface (m) ------- At Completion Nov 10	Nov 17
1	3.3	dry	dry
4	1.65*	dry	dry
8	1.95*	dry	dry
12	1.45*	dry	dry
14	2.9	dry	dry

* Auger Refusal

Typically, highest groundwater conditions are experienced during the months of June to August, as they are periods of groundwater table recharge and therefore seasonal fluctuation is then into consideration. It is apparent, where bedrock is not present, that the near surface water table will be below a vertical distance of 1.5m from the weeping lateral trench bottom, as specified by Alberta Environmental Protection guidelines for location of disposal fields in this time period. In review of this test hole data, shallow water table conditions are not a consideration. Bedrock is a concern in the areas of Lots 4 to 12. The soils are dry but water can pond on the hard shallow substrate.

4.0 CLOSING

In review of the percolation rates recorded to be between 2.0 min/cm and 23.6 min/cm, the shallow groundwater table is below a minimum 1.5m distance from the weeping lateral trench bottom (2.4m below grade) and providing the SAR test data is within the recognized limits, we recommend that these field locations are suitable for standard disposal field tile systems. However, bedrock depths are not suitable in Lots 4 to 12, therefore raised septic fields of some 0.5m to 1.0m will be suitable on the hill and sideslopes.

We trust this meets with your present requirements.

Respectfully submitted,
ALMOR TESTING SERVICES LTD.

PROFESSIONAL ENGINEER ALBERTA JAMES B. MONTGOMERY

PERMIT TO PRACTICE
ALMOR TESTING SERVICES LTD.
Signature
Date Dec 20 88
PERMIT NUMBER: P 2200
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

J.B. Montgomery, P.Eng.

SD:ms:A99275

Attachments

TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #1A

Location: Refer to Site Plan

Soil Type: Sandy SILT

Time of Reading	min./cm
20 min.	2.9
40 min.	2.9
Hour 1	3.1
80 min.	3.1
100 min.	2.9
Hour 2	2.9

Percolation Hole #1B

Location: Refer to Site Plan

Soil Type: Sandy SILT, trace pebbles

Time of Reading	min./cm
20 min.	3.2
40 min.	3.5
Hour 1	3.4
80 min.	3.3
100 min.	3.3
Hour 2	3.4

Percolation Hole #2A

Location: Refer to Site Plan

Soil Type: Sandy SILT, trace pebbles

Time of Reading	min./cm
20 min.	2.7
40 min.	2.6
Hour 1	2.7
80 min.	2.6
100 min.	2.6
Hour 2	2.5

TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #2B

Location: Refer to Site Plan

Soil Type: Silty SAND, trace pebbles

Time of Reading	min./cm
20 min.	4.5
40 min.	5.0
Hour 1	5.0
80 min.	5.0
100 min.	5.1
Hour 2	4.9

Percolation Hole #3A

Location: Refer to Site Plan

Soil Type: Silty SAND

Time of Reading	min./cm
20 min.	3.2
40 min.	3.4
Hour 1	3.2
80 min.	3.3
100 min.	3.3
Hour 2	3.3

Percolation Hole #3B

Location: Refer to Site Plan

Soil Type: Sandy SILT, trace pebbles

Time of Reading	min./cm
20 min.	6.3
40 min.	6.5
Hour 1	6.7
80 min.	6.7
100 min.	6.3
Hour 2	6.5

TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #4A

Location: Refer to Site Plan

Soil Type: SILT, some sand to sandy

Time of Reading	min./cm
20 min.	8.0
40 min.	8.0
Hour 1	9.0
80 min.	8.0
100 min.	9.0
Hour 2	8.0

Percolation Hole #4B

Location: Refer to Site Plan

Soil Type: Sandy SILT, trace clay, trace gravel

Time of Reading	min./cm
20 min.	5.7
40 min.	5.7
Hour 1	6.1
80 min.	6.1
100 min.	6.7
Hour 2	6.7

Percolation Hole #5A

Location: Refer to Site Plan

Soil Type: SILT, some clay, trace sand, trace pebbles

Time of Reading	min./cm
20 min.	20.0
40 min.	12.5
Hour 1	12.5
80 min.	12.3
100 min.	11.1
Hour 2	11.8

TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #14B

Location: Refer to Site Plan

Soil Type: SILT, some sand to sandy, trace clay

Time of Reading	min./cm
20 min.	7.4
40 min.	6.7
Hour 1	7.7
80 min.	8.0
100 min.	8.7
Hour 2	8.0

TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #10A

Location: Refer to Site Plan

Soil Type: SILT, some sand to sandy, trace gravel

Time of Reading	min./cm
20 min.	5.7
40 min.	8.0
Hour 1	8.0
80 min.	9.1
100 min.	9.2
Hour 2	9.3

Percolation Hole #10B

Location: Refer to Site Plan

Soil Type: SILT, some fine sand, trace clay, trace to some gravel

Time of Reading	min./cm
20 min.	5.0
40 min.	6.7
Hour 1	7.1
80 min.	6.7
100 min.	6.7
Hour 2	6.9

Percolation Hole #11A

Location: Refer to Site Plan

Soil Type: SILT, some fine sand, trace to some gravel

Time of Reading	min./cm
20 min.	6.1
40 min.	6.1
Hour 1	6.9
80 min.	6.9
100 min.	6.8
Hour 2	6.8

TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #11B

Location: Refer to Site Plan

Soil Type: SILT, trace to some clay, trace to some fine sand, some gravel

Time of Reading	min./cm
20 min.	6.7
40 min.	8.0
Hour 1	8.3
80 min.	8.7
100 min.	8.5
Hour 2	8.6

Percolation Hole #12A

Location: Refer to Site Plan

Soil Type: SILT, some clay, trace fine sand, trace gravel

Time of Reading	min./cm
20 min.	25.0
40 min.	18.2
Hour 1	18.2
80 min.	18.2
100 min.	15.4
Hour 2	16.7

Percolation Hole #12B

Location: Refer to Site Plan

Soil Type: SILT, some clay, some sand, trace to some gravel

Time of Reading	min./cm
20 min.	16.7
40 min.	10.0
Hour 1	10.0
80 min.	11.1
100 min.	13.3
Hour 2	12.5

TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #13A

Location: Refer to Site Plan

Soil Type: Grass covered topsoil browns

Time of Reading	min./cm
20 min.	4.7
40 min.	4.7
Hour 1	5.0
80 min.	5.0
100 min.	4.9
Hour 2	5.0

Percolation Hole #13B

Location: Refer to Site Plan

Soil Type: SILT, some clay, some fine sand, trace to some gravel

Time of Reading	min./cm
20 min.	18.2
40 min.	10.5
Hour 1	10.0
80 min.	10.0
100 min.	10.0
Hour 2	10.0

Percolation Hole #14A

Location: Refer to Site Plan

Soil Type: SILT, some sand to sandy, trace clay

Time of Reading	min./cm
20 min.	5.7
40 min.	5.7
Hour 1	7.6
80 min.	7.7
100 min.	6.7
Hour 2	6.9

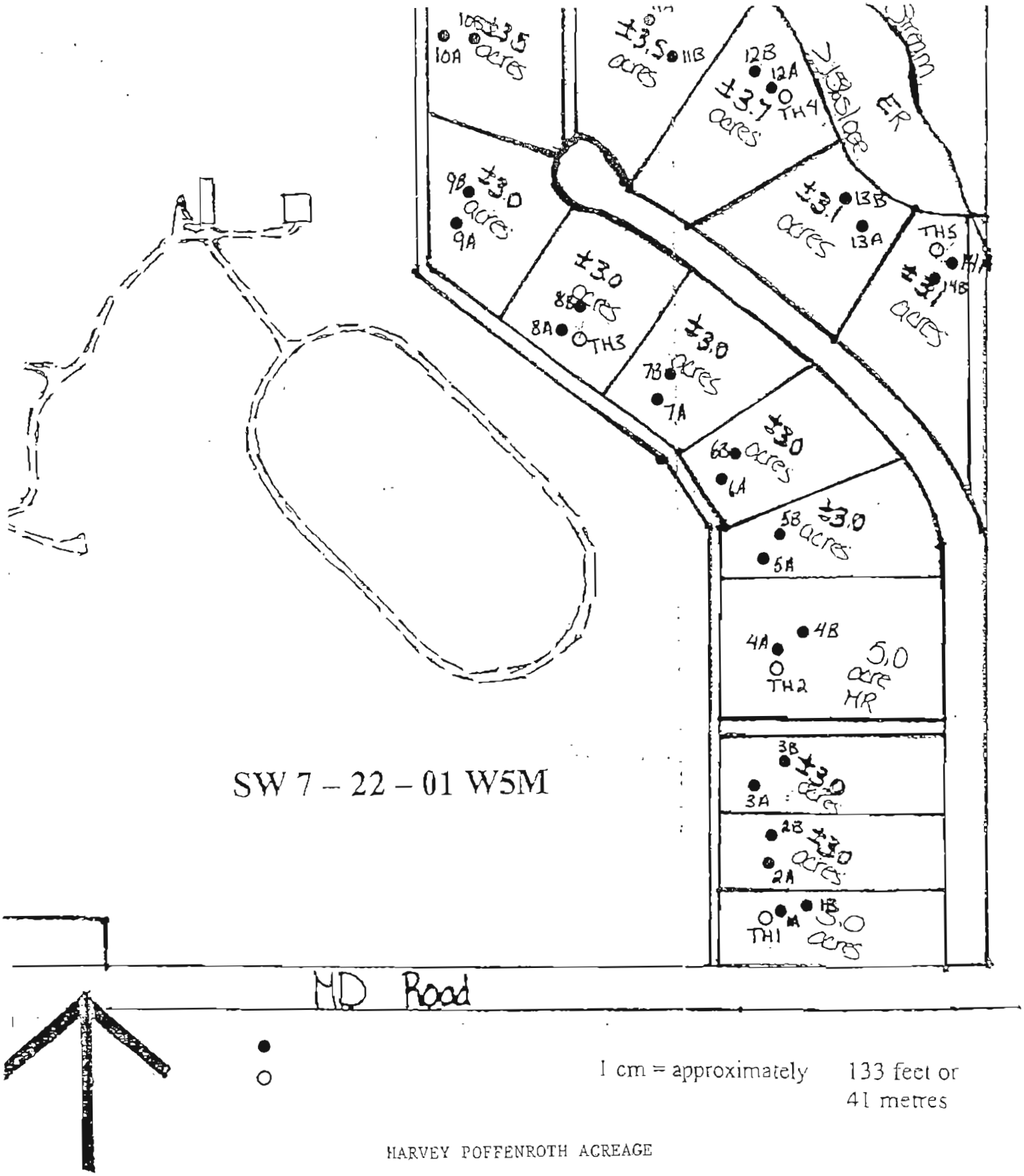
TABLE 1
PERCOLATION TEST RESULTS

Percolation Hole #14B

Location: Refer to Site Plan

Soil Type: SILT, some sand to sandy, trace clay

Time of Reading	min./cm
20 min.	7.4
40 min.	6.7
Hour 1	7.7
80 min.	8.0
100 min.	8.7
Hour 2	8.0



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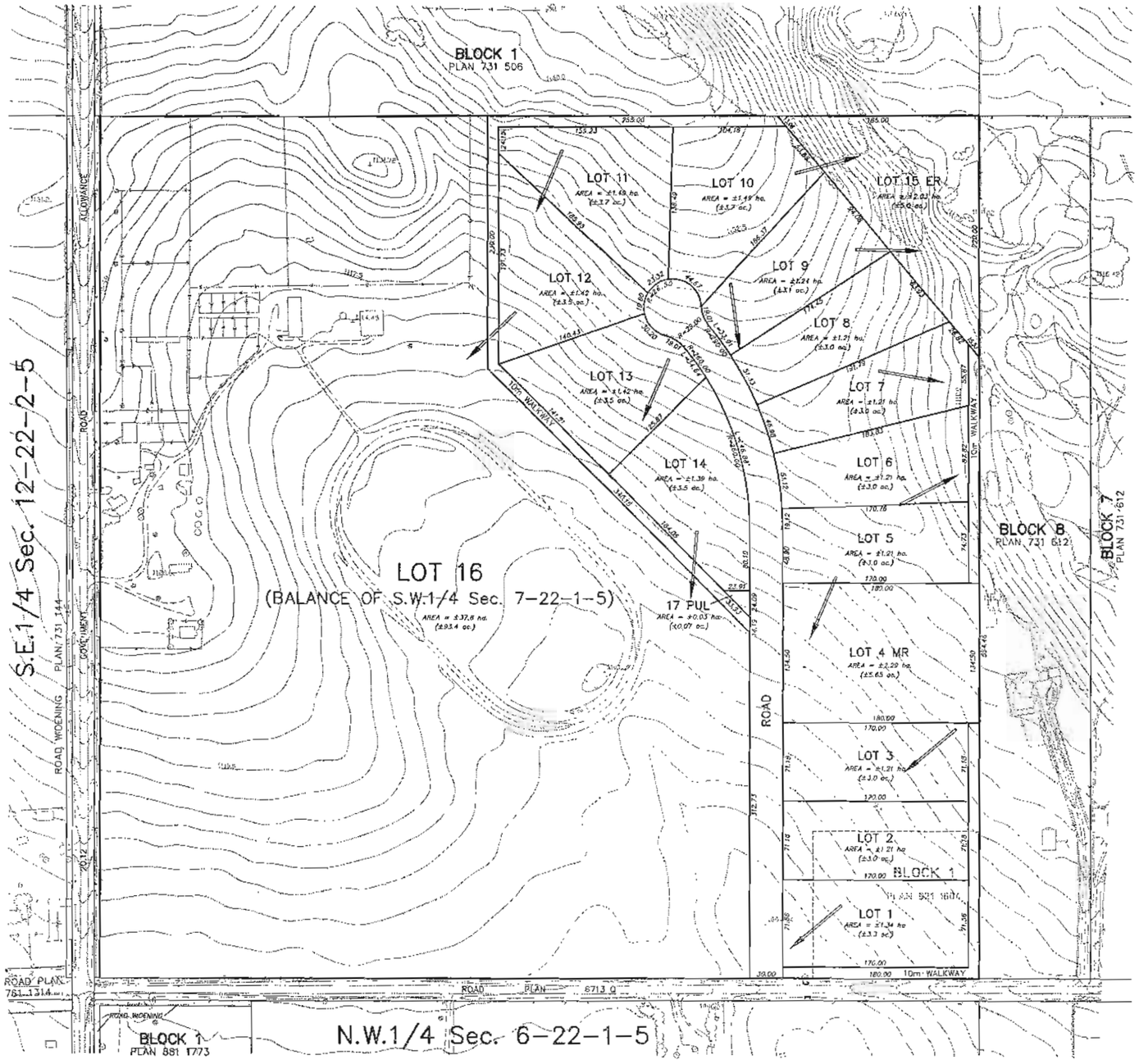

M.D. OF FOOTHILLS No. 31
A L B E R T A

PROPOSED AREA STRUCTURE PLAN

WITHIN A PORTION OF THE

S.W.1/4 Sec. 7, Twp. 22, Rge. 1, W.5M.

SCALE 1 : 2000

0 10 20 40 60 80 100 150 200 300 Metres

NOTES

1. Distances are in metres and decimals thereof.
2. Subject area shown bounded thus ——— and contains ±62.7 ha. (±24.89 ha. excluding balance)
3. All roads are 30.0 metres in perpendicular width unless shown otherwise.
4. All distances on curves are arc lengths.
5. Boundary of Block 1, Plan 921 1604 to be incorporated into the new plan of subdivision shown thus - - - - - -
6. Surface water drainage patterns shown thus . . . . . →

TABLE OF ABBREVIATIONS

ac.	– acre	Rge	– range
E.	– East	S	– South
ER	– Environmental Reserve	Sec.	– section
ha.	– hectare	Twp	– township
M.	– meridian	W	– West
MR	– Municipal Reserve		
N	– North		

FIGURE 3 – PLAN AREA WITH CONTOURS

FILE: 01-11304TNT3
DWN BY: MG
DATE: MAY 1, 2001
CHK. BY: BEC

CHALLENGER GEOMATICS LTD.
CALGARY, ALBERTA
(403) 253-8101 FAX 253-1985

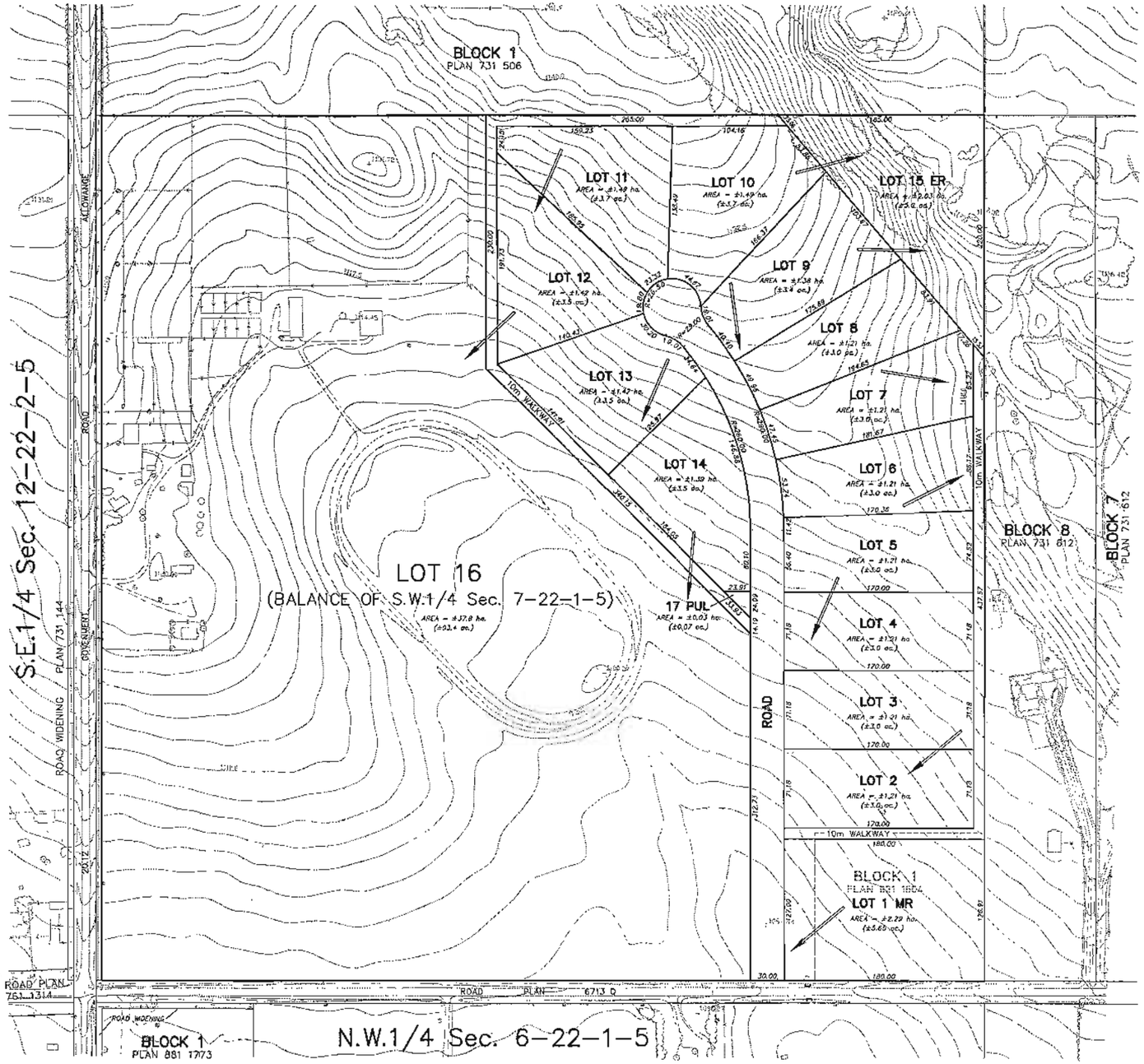

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FIGURE 5 – ALTERNATIVE MUNICIPAL RESERVE LOCATION

FILE: 99-11304TNT1
DWN BY: MG
DATE: APR. 29, 2001
CHK. BY: BEC

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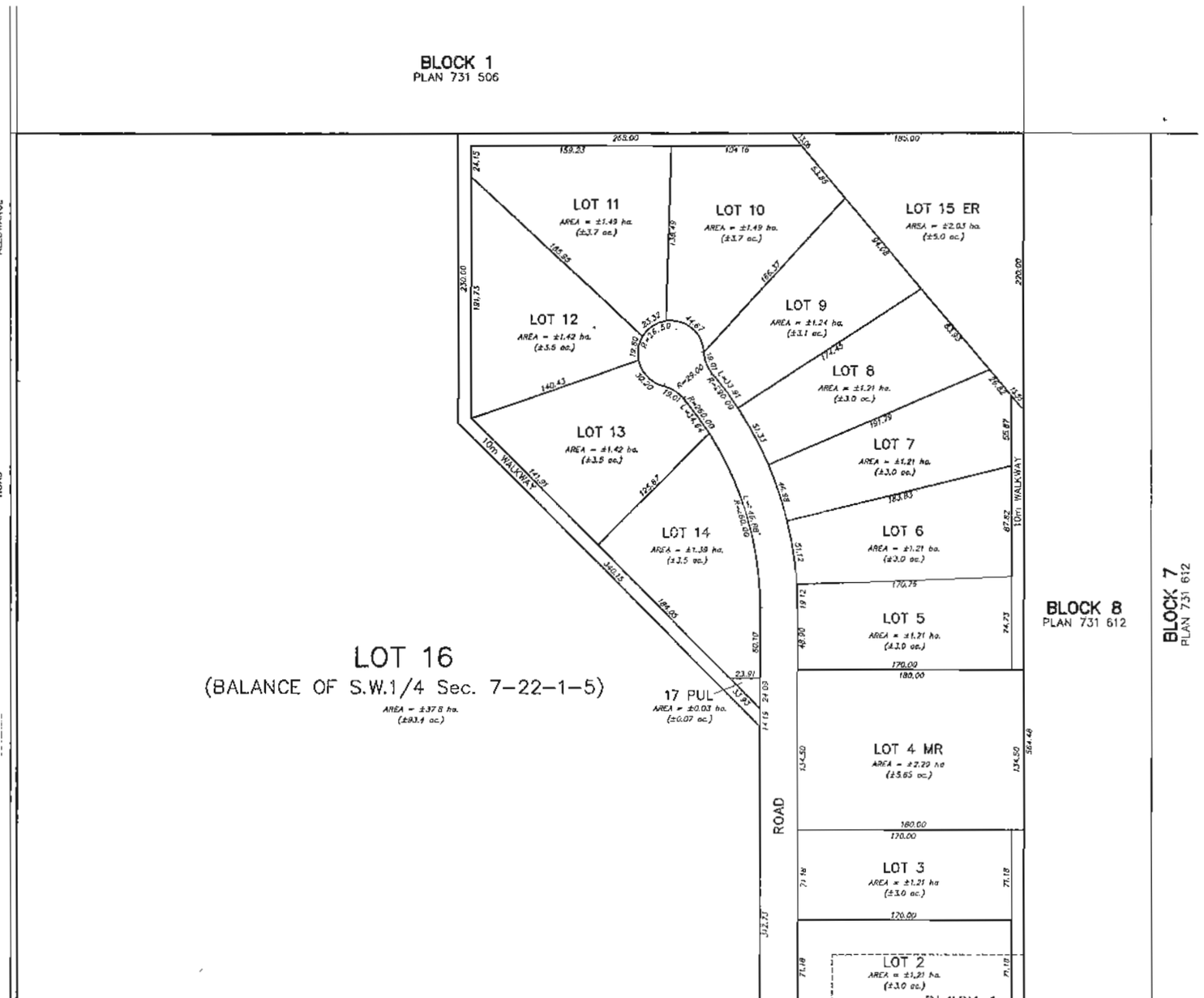

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NOTES

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3. All roads are 30.0 metres in perpendicular width unless shown otherwise.
4. All distances on curves are arc lengths.
5. Boundary of Block 1, Plan 921 1604 to be incorporated into the new plan of subdivision shown thus - - - - - - - - - -

TABLE OF ABBREVIATIONS

ac	– acre	Rge.	– range
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