BYLAW 2105/D&P/00

BEING A BYLAW OF THE TOWN OF STONY PLAIN IN THE PROVINCE OF ALBERTA FOR THE PURPOSE OF ADOPTING THE WILLOW PARK AREA STRUCTURE PLAN

WHEREAS Section 633(1) of the Municipal Government Act 1994 enables the Municipal Council to adopt by bylaw an area structure plan for the purpose of providing a framework for subsequent subdivision and development of an area of land in a municipality;

AND WHEREAS the Willow Park Area Structure Plan addresses the requirements of an area structure plan as outlined in Section 633(2) of the Municipal Government Act 1994;

NOW THEREFORE, the Council of the Town of Stony Plain in the Province of Alberta, pursuant to authority conferred upon it by the Municipal Government Act 1994 enacts as follows:

1. That this bylaw shall be cited as the "Willow Park Area Structure Plan";

2. Schedule "A" attached hereto is hereby adopted as part of this bylaw.

3. That this bylaw shall come into force and take effect upon the date of third reading and signing in accordance with Section 213, Municipal Government Act 1994.

Read a first time this 10th day of July , A.D. 2000.

Donna Cowan
Mayor Donna Cowan

S Middleton
Sharon Middleton
Secretary Treasurer

Public Hearing held 14th day of August , A.D. 2000.

Read a second time as amended this 14th day August , A.D. 2000.

Donna Cowan
Mayor Donna Cowan

S Middleton
Sharon Middleton
Secretary Treasurer

Read a third time this 14th day August , A.D. 2000.

Donna Cowan
Mayor Donna Cowan

S Middleton
Sharon Middleton
Secretary Treasurer

SCHEDULE A
BYLAW 2105/D+P/00

Town of Stony Plain

Willow Park
Area Structure Plan

Prepared for

865144 Alberta Ltd.

by
Lovatt Planning Consultants Inc.
and
Infrastructure Systems Ltd.

August 2000

Town of Stony Plain
Willow Park
Area Structure Plan
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1.0 INTRODUCTION

1.1 Purpose

This Area Structure Plan provides a framework for the residential development of the lands located in the south, central segment of the Town of Stony Plain, at the northeast corner of the intersection of Meridian Road (48th Street) and 79th Avenue. The plan has been prepared on behalf of 865144 Alberta Ltd. which controls almost to 80 percent of the subject lands, and complies with both the Town's Area Structure Plan information needs, and the requirements of Section 633 of the Municipal Government Act. As such, the Area Structure Plan describes the proposed land use pattern, population density, circulation system, infrastructure, and staging pattern, amongst other relevant items.

1.2 Locational Context

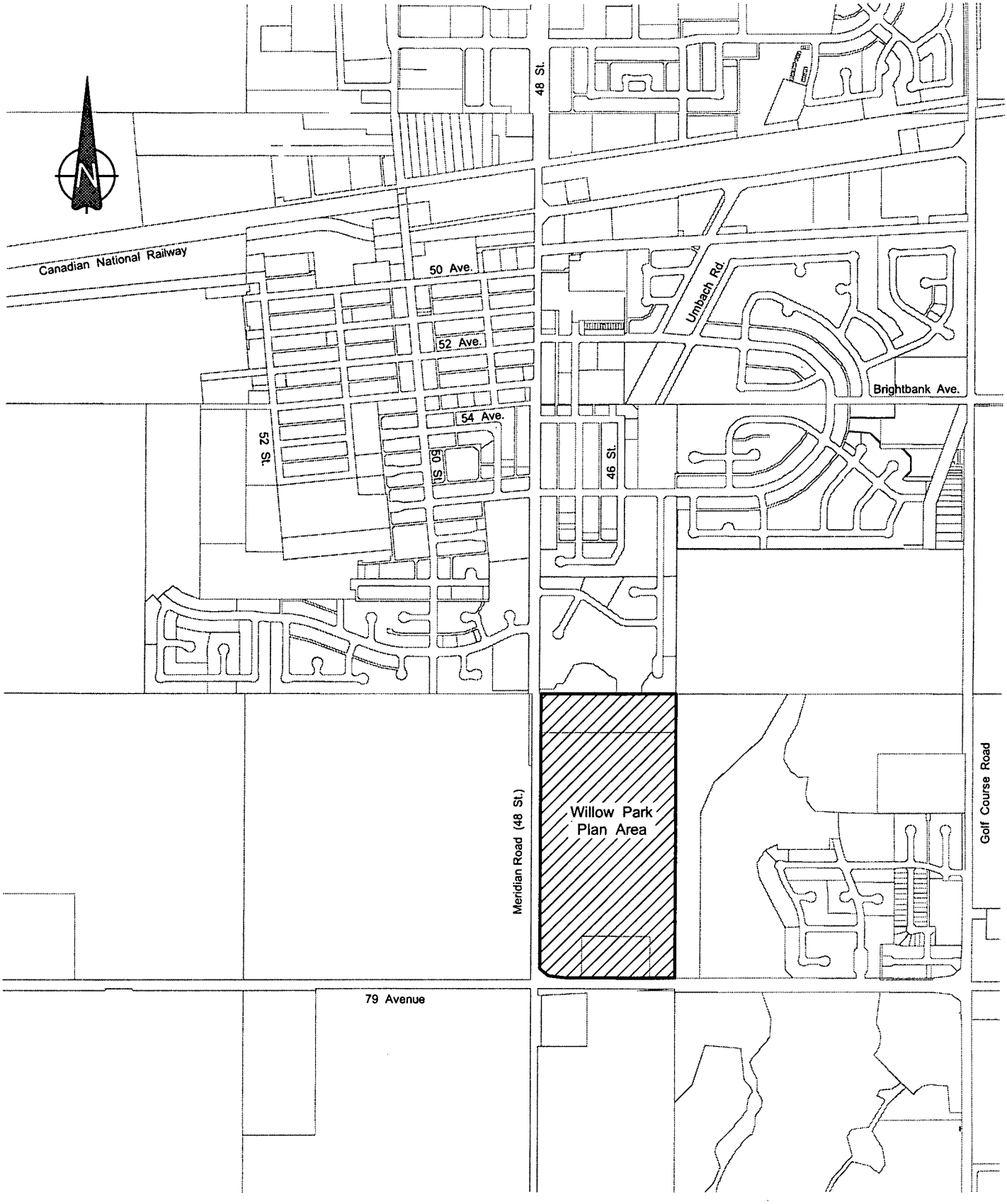
The Willow Park Area Structure Plan applies to the lands legally described as the fractional Southwest ¼ of Section 25-52-28 W4M, comprising some 30 hectares (74 acres). The plan area is bounded on the west by Meridian Road; on the north by John Paul II School; on the east by a major public utility lot (69 PUL) and a large swath of the Atim Creek natural area; and 79th Avenue on the south. The public utility lot accommodates both the East Trunk Sanitary Sewer and a significant storm drainage feature (Stream Course 3). The lands to the west of Meridian Road and to the south of 79th Avenue are currently undeveloped, but are proposed as future residential by the Town's Municipal Development Plan. The location of the Willow Park plan area within the Town is shown on Figure 1.

1.3 Policy Context

The residential land use proposed for most of the subject site by this Area Structure Plan complies with the Town of Stony Plain Municipal Development Plan Bylaw No. 2053/D7P/98. The Municipal Plan designates the subject lands as Residential - Short Term.

Excepting a 4.05 hectare (10.0 acre) Urban Service (US) church parcel located at the north end of the plan area, and a 1.5 hectare (3.5 acre), more or less, Vehicular Oriented Commercial (C-2) site located in the southwest corner, the area is districted Urban Reserve (UR) by the Town's Land Use Bylaw No. 1166. Neither the church parcel nor the commercial site are developed.

The purpose of the Urban Reserve District is *to protect lands suited for urban development from premature development which may prejudice the future use of the land, until such time as the desired development can proceed in a manner consistent with the general municipal plan or an area structure plan. The reclassification of the land to other land use districts will normally occur subsequent to the acceptance of an Area Structure Plan, and subsequent to the approval of a proposed subdivision.* This Area Structure Plan provides the framework for subsequent redistricting, subdivision and development, as contemplated by the Urban Reserve District.



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Infrastructure Systems Ltd.
ENGINEERS PLANNERS LANDSCAPE ARCHITECTS

Willow Park Area Structure Plan

Figure 1

LOCATION PLAN

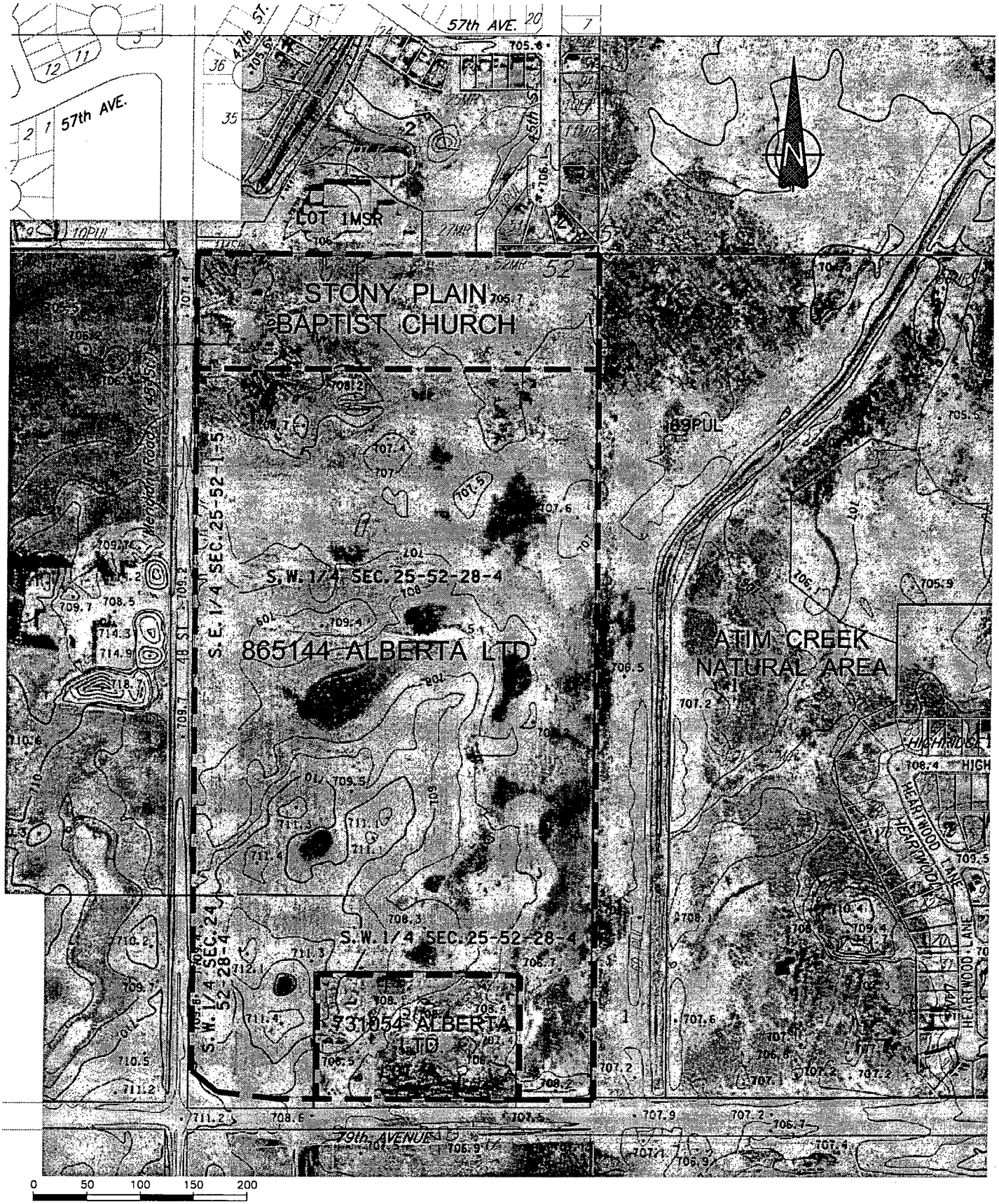
Town of Stony Plain

1.4 Land Ownership

The land ownership pattern for Willow Park is shown on Figure 2 and is summarized in Table 1 below. As is noted in Section 1.1, 865144 Alberta Ltd. controls the majority of the lands comprising the plan area.

Table 1: Willow Park Land Ownership

Owner	Legal Description	Area		Percent (%) of Total
		Hectares	*Acres*	
865144 Alberta Ltd.	Fractional Part of SW ¼ 25-52-28 W4M	23.48	57.97	79
Stony Plain Baptist Church	Plan 0020171	4.05	10.00	12
731054 Alberta Ltd.	Plan 624RS	2.43	6.00	8
Total		**29.96**	**73.97**	**100**



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Willow Park Area Structure Plan

Figure 2

EXISTING CONDITIONS & LAND OWNERSHIP

Town of Stony Plain

2.0 EXISTING CONDITIONS

The existing conditions of the plan area are illustrated by Figure 2. The majority of the plan area is cultivated and is being used for agricultural purposes. The 2.43 hectare parcel located adjacent 79th Avenue contains a residence. This parcel also accommodates a home business type of industrial use with associated ancillary buildings. Considerable on-site storage of materials and debris is evident. Services (well water and private sewage disposal system) also are provided on-site, and access is available directly off 79th Avenue.

A few low lying areas are scattered throughout the Willow Park lands and some willow and bush stands are evident. However, other than a tree stand located on the church site, no significant natural features are contained within the plan area. ,

The Willow Park area is characterized by gently rolling, hummocky topography, with a high point in the southwest, and a low point in the northeast. The overall grade varies by some 6.0 metres, and surface drainage is predominantly towards the east and north. Soil conditions are described as a layer of top soil underlain by silt and silty clay layers. The site is unencumbered by any easements, and road widening has been provided for both Meridian Road and 79th Avenue.

A gravel crushing operation is located to the west of the area, across Meridian Road. However, this operation is a temporary use and, as is noted in Section 1.2, these westerly lands, as well as the land to the south of Willow Park, are designated residential by the Town's Municipal Development Plan. A school/park facility is located to the north of the plan area and the combined Atim Creek and public utility amenity features to the east, further support Willow Park's development potential as a viable residential community. No incompatible facilities are located nearby which could potentially affect this potential.

3.0 THE DEVELOPMENT CONCEPT

3.1 Development Objectives

The development concept proposed for Willow Park is illustrated by Figure 3. It is important to note that although the concept provides a framework for future subdivision, it may be subject to change at the detailed design stage.

The concept recognizes the applicable community values as listed in Municipal Development Plan. These values are:

- The community values the identity of Stony Plain as a district community with unique qualities.
- The community values a choice in housing type.
- The community values mobility and accessibility to a municipal infrastructure.

and are recognized by applying the following Area Structure Plan objectives:

1. To develop a uniquely located and cohesive neighbourhood which reflects the Town's strong values, identity and quality of life standards.

2. To create a residential neighbourhood which promotes and protects the high quality of adjacent open space, public facility and natural area amenity features.

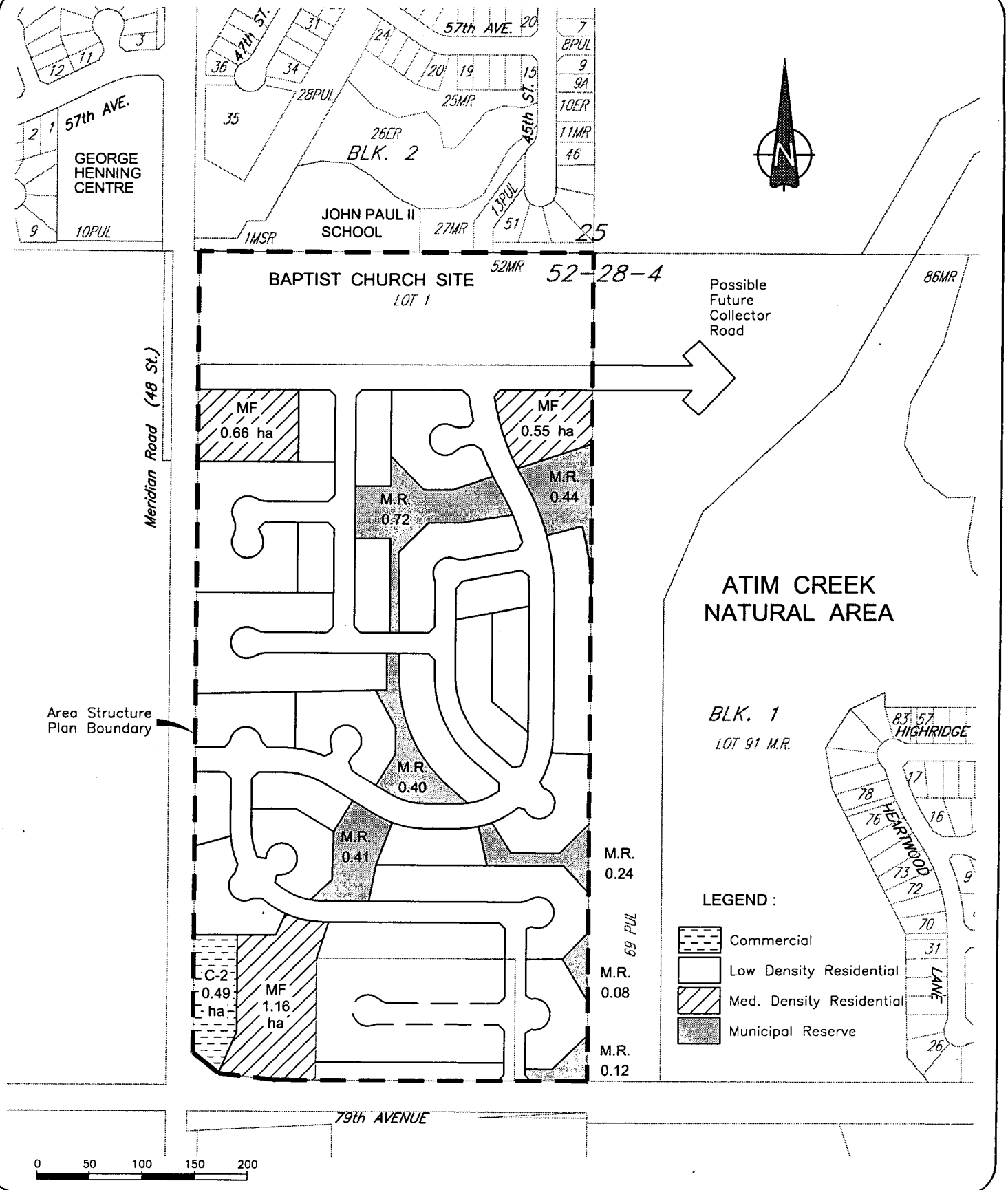
3. To provide a meaningful choice of housing options within a defined community setting.

4. To allow for the development of an internal trail system which is integrated with the Atim Creek open space system, and the Town's comprehensive trail network.

5. To provide for a functional, safe internal circulation system which protects the integrity of the adjoining arterial roadways, while allowing for a high quality of access to these roadways.

6. To encourage efficiencies in the provision of municipal services.

To the extent possible, the foregoing objectives and the design concept apply the applicable new residential development policies of the Town's Municipal Development Plan. Table 2 provides a summary of the land use breakdown proposed by the concept.



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Willow Park
Area Structure Plan

Figure 3

DEVELOPMENT CONCEPT

Town of Stony Plain

Table 2: Willow Park Land Use Breakdown

	Hectares	Acres	Percent
Gross Developable Area[1]	29.92	73.94	100.0
East/West Collector Road	0.95	2.34	3.0
Municipal Reserve	2.41	5.96	8.1
Institutional	4.05	10.00	13.4
Commercial	0.49	1.21	1.7
Residential Roads	5.54	13.69	18.5
Net Residential[2]	**16.56**	**40.93**	**55.3**
Single Family	14.17	35.02	
Multiple Family	2.39	5.91	

Notes:

1. Subject to final survey at time of subdivision. Gross area is based on digital base, not C of T's, so that the area is 0.04 hectares less than the land area shown on Table 1.
2. Number of dwelling units.

Single Family (14.17 hectares @ 16 units/net hectare)	227
Multiple Family (2.39 hectares @ 25 units/net hectare)	60
Total Units	**287**

3.2 Overview of the Development Concept

The development concept recognizes the aspirations of the owners of the three parcels comprising the Willow Park plan area. As such, the northerly 4.05 hectare parcel owned by the Baptist Church is proposed to be developed as an institutional church complex, while the 2.43 hectare parcel located along 79th Avenue, in the south portion of the plan area, is designed so that it can be developed independent of the surrounding lands. The balance of the plan area, comprising the single 23.48 hectare parcel, is proposed to be developed primarily for single family residential purposes. Three multiple family and one commercial site also are proposed.

Depending on market conditions at the time of development, the multiple family sites may be converted to single family enclaves.

Alternatively, to maintain maximum flexibility, the site proposed at the northwest corner of the plan area may be developed for commercial purposes in lieu of the southwest site shown on Figure 3, in which case the southwest site would be consolidated with the adjacent multiple family site.

However, if a larger commercial area is required, the multiple family site abutting the southwest commercial lands (currently districted C-2) may be converted to commercial. Regardless, one commercial site along Meridian Road will likely be maintained for that purpose. The design is sufficiently flexible to respond to these options which, in turn, provide the capability to respond to changes in market conditions.

An east/west collector road is proposed to intersect with Meridian Road in the north portion of the plan area. This collector is being provided in lieu of an arterial road as required by the transportation policies of the Municipal Development Plan. However,the east/west collector is not required to access the Willow Park lands. Regardless, the right-of-way will be protected through this Area Structure Plan and, once developed, the north/south internal roads serving the Willow Park residential community can be extended to intersect with the collector.

Also, although the conceptual alignment for the east/west collector as shown in the Municipal Development Plan is located exclusively on the Baptist Church site, north of the lands owned by 865144 Alberta Ltd., the design concept shown on Figure 3 assumes the collector right-of-way will be located directly south of the church site, exclusively on the 865144 Alberta Ltd. property. The church facility, proposed to be constructed in the west portion of the site, will be accessed directly off Meridian Road. The east portion of this site may be considered for future multiple family development.

A minor collector road is proposed to extend into the plan area off Meridian Road at a point approximately central to the west boundary of the plan area. This point of entry may be the major entrance into the community, and will be enhanced by applying a high quality of entrance feature treatment. This collector is proposed to intersect with the east/west collector in the longer term. Although designated as a minor collector within the Willow Park lands, the relatively small planning unit comprising Willow Park will result in relatively low traffic volumes, so that safety will not be compromised with lots fronting onto this roadway. The low volume of traffic anticipated for the internal collector, combined with the concentration of all residential development south of the future east/west collector, provides for a small cohesive neighbourhood unit as per those Municipal Development Plan policies directed at new communities.

A second access into the plan area is proposed in the southeast corner of the area, off 79th Avenue. This access road is intended to straddle the boundary of the southerly country residential parcel and, as is noted above, allows that parcel to be developed independent of the surrounding lands. This road connection also provides for a high quality of access into the proposed Willow Park community from the regional road network.

A linear open space park system is proposed to extend through the residential area to link with the school to the north, and the Atim Creek natural reserve lands to the east. Flaring of the linear feature at strategic locations may allow for local playground development.

3.3 Residential Development

As is noted above, most of the Willow Park lands will be developed for single family housing on a mix of lot sizes. Of the total 16.56 hectares (40.93 acres) proposed for residential development, 14.17 hectares (35.02 acres) is proposed for single family type accommodation, while 2.39 hectares (5.91 acres) is proposed for medium density multiple family accommodation. Assuming typical new growth densities of 16 dwelling units per net hectare (6.5 units per acre), and 30 dwelling units per hectare (12 units per net acre), the land areas translate into 227 single family units and 60 multiple family units. This results in a total of 287 units, of which 79 percent is low density and 21 percent is medium density. The resultant overall density is 11 units per gross hectare. This density is below the minimum Municipal Development Plan residential new growth density policy of 13 to 15 units per gross hectare.

However, since gross developable lands typically exclude lands designated for arterial roads and major institutional uses such as churches, the gross developable area of Willow Park for density calculation purposes can be reduced accordingly by 4.05 hectares (10.00 acres), to 25.87 hectares (63.92 acres). The revised gross developable area results in a housing density of 13 units per gross hectare (5 units per gross acre). This density complies with Municipal Development Plan Policy 2.9.

The three multiple family sites proposed within the Willow Park plan area are sited in conformance with Municipal Development Plan Policy 2.19. This policy indicates that appropriate siting of multi-family development should consider criteria such as:

- proximity to institutional and recreational facilities and open space;
- proximity to an arterial or collector roadway providing direct and easy access; and
- proposed density relative to existing and/or proposed planning areas.

Two of the three multi-family sites are proposed to be located at the north end of the plan area, across from institutional uses, and are easily accessed off the future east/west collector. The multi-family site proposed for the northeast corner of the area backs onto a significant open space feature (Atim Creek natural area) and is accessed via the internal collector. The southerly multi-family site is located adjacent 79th Avenue and the proposed commercial site. Although access to the adjacent arterial and nearby collector is indirect, the site is located to respect the existing lot ownership pattern, to allow for a transition between proposed commercial and single family development, and to provide an appropriate use for an awkward remnant parcel *sandwiched* between an existing country residential parcel and the commercial site. Although the type, location and scale of multiple family housing proposed within the three sites may change in response to market trends, clustered low rise street oriented housing is proposed in the short term. The site in the northeast corner, which backs onto the Atim Creek natural area, is particularly well located to be developed as a good quality integrated duplex/triplex housing complex.

However, as is noted in Section 3.2, some of the proposed sites may be converted to single family and/or commercial, depending upon market conditions at the time of development, and the development concept is sufficiently flexible to allow such conversion without impacting the circulation pattern.

Although not part of this Area Structure Plan, architectural guidelines to ensure development control may be applied at the time of lots sales, marketing and housing construction. These guidelines may vary to some extent between development clusters to promote some diversity and flexibility within the plan area, without jeopardizing overall quality and cohesiveness. Examples of the types of guidelines to be applied include:

- Roofing and siding material;
- Colour;
- Fencing and landscaping; and,
- Minimum house size.

The application of architectural guidelines, while still encouraging some diversity, supports Municipal Development Plan Policy 2.13 which states that residential units *should be designed and located along a street to create a visually interesting landscaping.*

3.4 Population Density and School Generation

Assuming a density of 3.5 persons and 2.6 persons per single family and multiple family dwelling unit, respectively, the population for the Willow Park Area Structure Plan is estimated at some 951 persons. The resulting school generation projections for Willow Park, assuming a generation factor of 0.65 students per dwelling unit, is 618 students. Existing nearby school facilities are sized to accommodate the anticipated school population.

3.5 Parks and Open Space

The design concept provides for a central linear park feature which links Willow Park with the Atim Creek natural area and existing school facilities to the east, and John Paul II School and the Whispering Waters neighbourhood to the north. The linear feature will add to Stony Plain's extensive trail network. Strategic flaring located along the internal collector will allow for playground development to serve future residents. The linear feature is wholly contained within the parcel owned by 865144 Alberta Ltd. and comprises some 2.41 hectares (5.96 acres). This area corresponds to the amount of Municipal Reserve owing under existing Deferred Reserve Caveat #002 059 857. A Deferred Reserve Caveat is also registered on the Baptist Church site. However, no caveat is registered on title for the 2.43 hectare county residential parcel.

3.6 Commercial

The design concept proposes to retain a portion of the existing C-2 districted site located in the southwest corner of the Willow Park plan area. This site was originally redistricted to allow for a funeral home facility and, although it remains undeveloped, the site 's location at the intersection of two arterial roadways provides an opportunity for some other form of suitable commercial use. Based on current market trends, reducing the size of the site increases its development potential since the smaller area (0.49 hectares) is more likely to attract a viable vehicular/convenience commercial facility than the 1.5 hectare site currently districted C-2. Access into the commercial site is assumed to be off Meridian Road. If the site is not sold for commercial development within a reasonable time frame, it may be considered for residential development purposes, and the northwest multiple family site may be developed for commercial purposes instead.

4.0 Municipal Services and Transportation

4.1 Introduction

The engineering design information provided below is submitted as a supplement to the Area Structure Plan for the proposed Willow Park in Stony Plain. The report provides, in general, the framework for the development of this parcel, and addresses domestic water supply, sanitary discharge, and the stormwater drainage concept. In addition, a transportation concept is submitted, which may be adjusted at the time of subdivision. As a minimum throughout, all design will conform to the latest edition of the Town of Stony Plain Servicing Standards.

4.2 Water Distribution

The development will be fed by connections to an existing 300 mm water main along 48th Street, and an existing 450 mm main on 79th Avenue. The internal distribution network will be designed as an efficient looped system, with capacity to provide adequate fire protection. The proposed water distribution system is shown on Figure 4.

4.3 Sanitary Sewerage

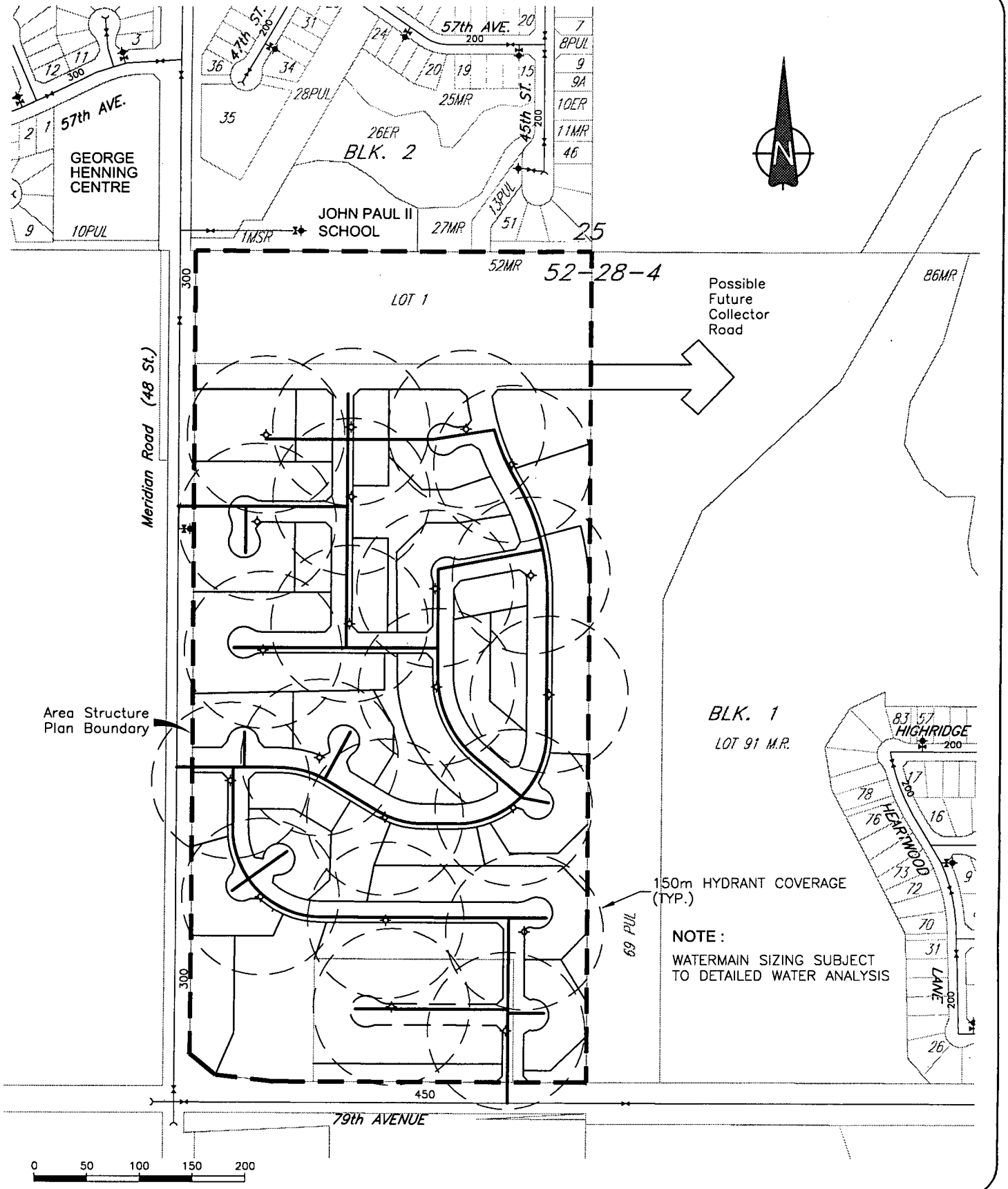
Sanitary discharge from Willow Park will be connected to the Towns' East Sanitary Trunk Sewer, which bounds the site to the east (see Figure 5). As dictated by topography, it is likely that two connections will be made to the sewer in order to achieve adequate depth of cover within the development area.

4.4 Stormwater Drainage

In accordance with the requirements of the Town, storm drainage from Willow Park will be directed to the existing ditch to the east of the development area, known as Stream Course 3 (see Figure 6). This watercourse has been designed to accommodate on-stream storage from adjacent future development. It is proposed to either widen the channel, and construct a containment wetland area on stream, or provide a storm drainage wetland area adjacent to the watercourse. A stormwater management analysis will be undertaken prior to subdivision to establish the optimum configuration of the required stormwater management system.

4.5 Lot Grading

Generally, basement footing elevations should be a minimum of 300 mm above the identified high ground water. A Geotechnical Investigation report prepared by J.R. Paine & Associates Ltd. report indicates that the ground water table was at a minimum depth of 2.39 metres below existing ground in November, 1999. Both the report an a supplemental letter are contained in Appendix A. In some instances, on-site grading may be necessary to ensure that the footing elevation of any dwelling complies with the above criteria.



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Willow Park
Area Structure Plan

Figure 4

WATER DISTRIBUTION

Town of Stony Plain

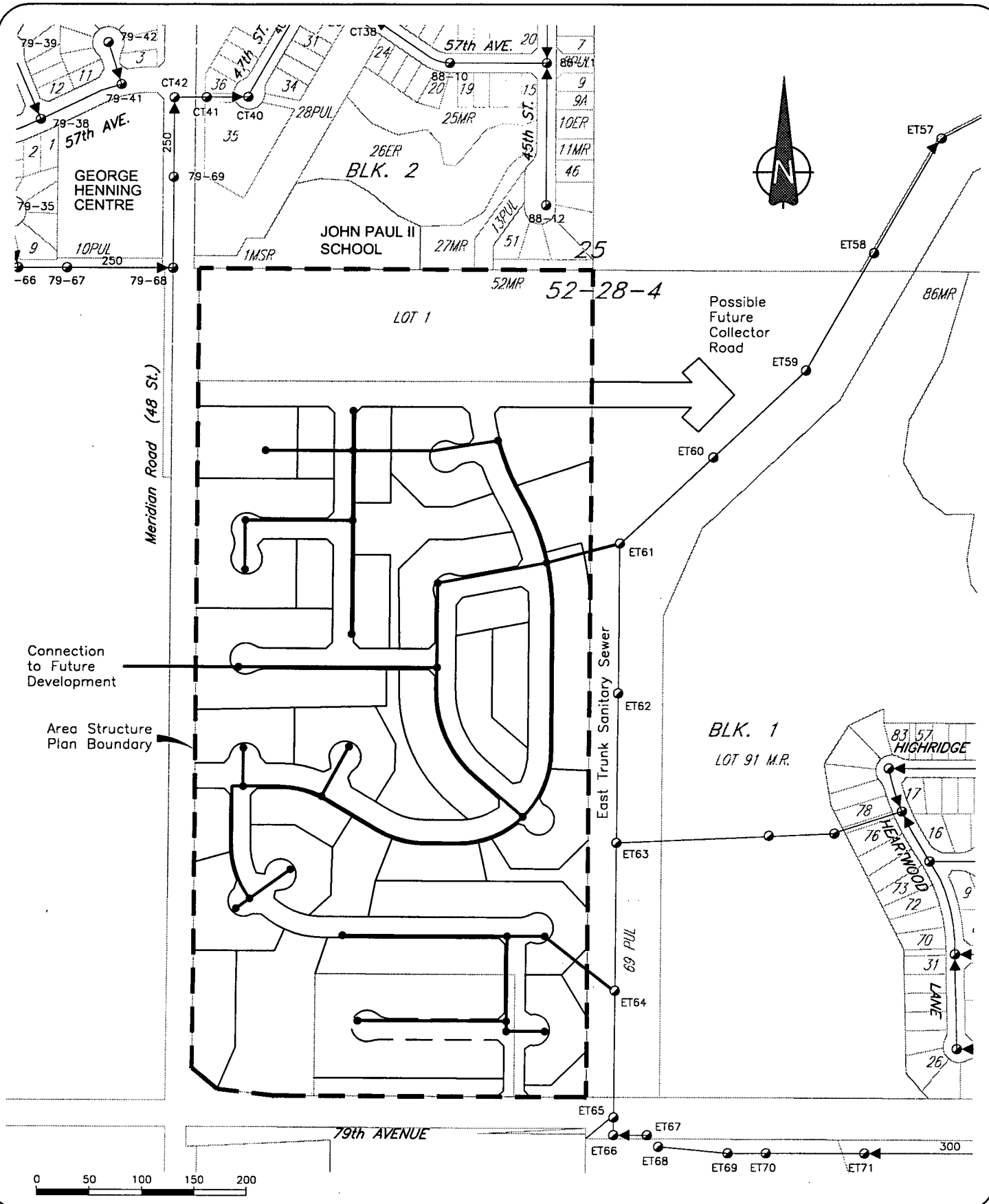

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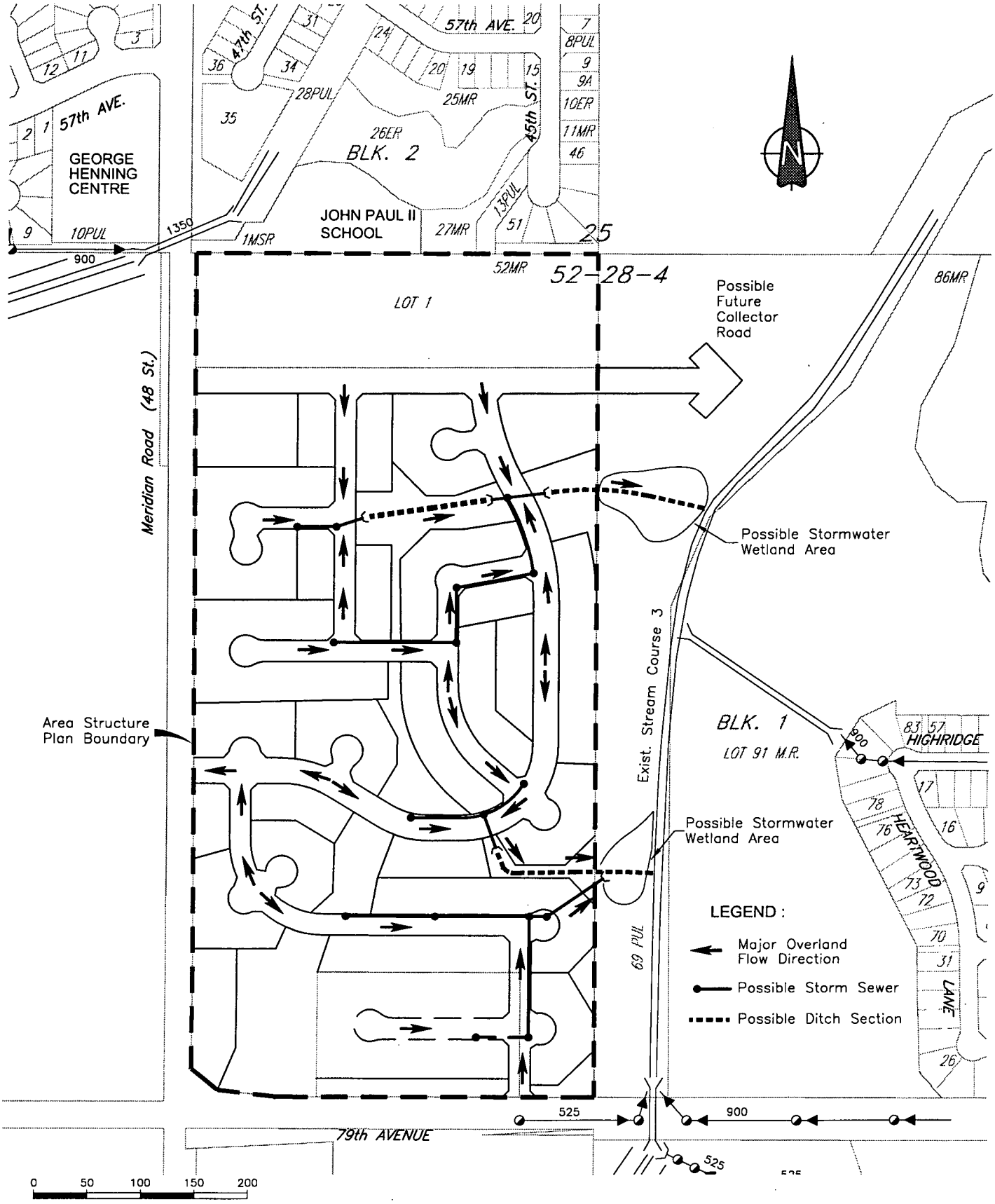
Figure 5

SANITARY SEWERAGE

Town of Stony Plain



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Willow Park
Area Structure Plan

Figure 6

STORMWATER DRAINAGE

Town of Stony Plain

4.6 Transportation

Generally, the road cross sections will comply with the typical sections contained within the Town's Servicing Standards Manual. However, variations on these sections may be considered at the time of detailed design. In other areas of Stony Plain, right of way widths have been widened beyond that required by the Town, in order to move the deep utilities from beneath the road. In this way, trench settlement issues have been significantly reduced, providing long-term maintenance benefits to the Town. It is likely that a similar type of design may be incorporated into Willow Park. The circulation pattern is shown on Figure 7.

It should be noted that any deviation from the Town's standard cross sections will be made only after consideration and approval by the Towns' Director of Engineering and Planning.

4.7 Shallow Utilities

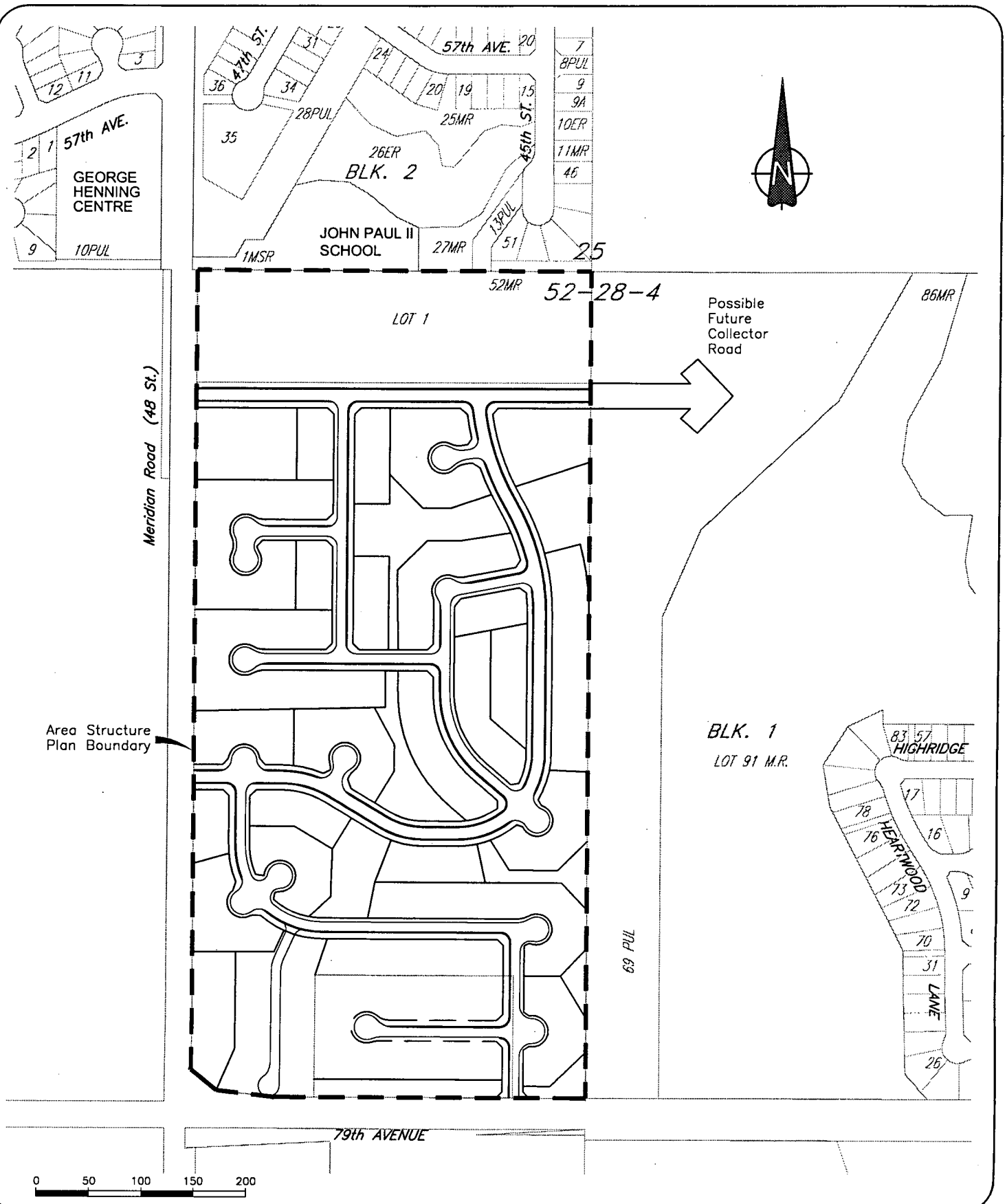
Power, gas, telephone, and cable TV will be provided to the site by extension of existing facilities

4.8 Geotechnical Investigation

The site specific geotechnical investigation carried out by J.R. Paine & Associates determined that, based on the results from a series of seven boreholes throughout the development area, the site is suitable for residential development.

4.9 Staging

The proposed staging pattern is shown on Figure 8. It is likely that the first three stages of development will extend east from Meridian Road, at the point of the major entrance into the Willow Park neighbourhood, and then north along the internal collector.



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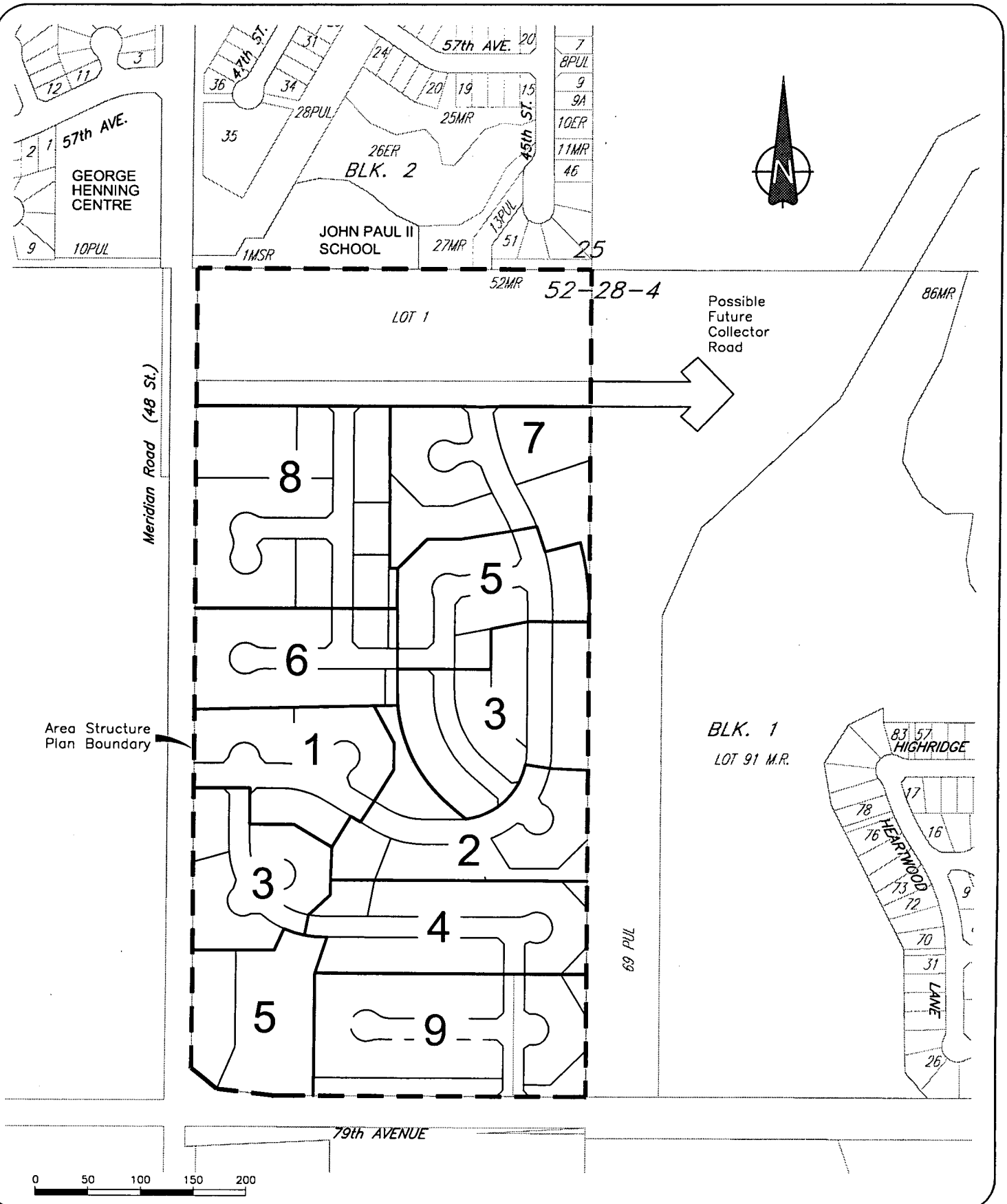
Area Structure Plan

Figure 7

TRANSPORTATION

Town of Stony Plain



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Willow Park
Area Structure Plan

Figure 8

STAGING

Town of Stony Plain

5.0 Implementation

This Area Structure Plan for the Willow Park lands will be implemented in accordance with the Town of Stony Plain's redistricting and subdivision approval processes. An application to redistrict and subdivide Stage 1 from Urban Reserve (U-R) to Single Detached Residential District (R-1B) is being submitted concurrent with this ASP submission.

Appendix A - Geotechnical Investigation, J.R. Paine & Associates Ltd.

J.R. Paine & Associates Ltd.

REPORT NO: 3267-1

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL SUBDIVISION
48 STREET & 79 AVENUE
SW ¼-25-52-28-W4M
STONY PLAIN, ALBERTA

November, 1999

J.R. PAINE & ASSOCIATES LTD.
17505 106 Avenue
EDMONTON, Alberta
T5S 1E7

Phone: 489-0700
Fax: 489-0800

REPORT NO. 3267-1

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL SUBDIVISION
48 STREET & 79 AVENUE
SW ¼-25-52-28-W4M
STONY PLAIN, ALBERTA

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GEOTECHNICAL INVESTIGATION

PROJECT: Proposed Residential Subdivision

LOCATION: SW ¼-25-52-28-W4M
STONY PLAIN, Alberta

CLIENT: 661884 Alberta Ltd.
c/o Doug Little
10410 - 127 Street
Edmonton, Alberta
T5N 1V7

ATTENTION: Mr. Doug Little

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation undertaken for a proposed residential subdivision development located on the south edge of Stony Plain. The objectives of the drilling program were to determine the nature and condition of the existing subsurface soil and ground water conditions for potential implementation of the noted development.

Authorization to proceed with the drilling program was granted by Mr. Doug Little. The fieldwork was completed in November, 1999.

2.0 PROJECT AND SITE DESCRIPTION

The project consists of a fully serviced residential subdivision, with a storm management pond, paved roads and larger rural lots.

The potential residential subdivision development is located on the northeast corner of the intersection of 48 Street and 79 Avenue, on the south edge of Stony Plain, Alberta. At the time of the investigation, the site was being used as farmland and consisted of fairly rolling terrain. The site drainage was not well defined, although the overall drainage was toward the east.

The site was bounded by a school to the north; a low lying slough area with bullrushes and bushes to the east; 79 Avenue to the south and 48 Street to the west.

At the time of the investigation there was a large slough with bullrushes and bushes in the middle of the site with high ground to either side.

Access to the site was obtained from 48 Street to the west, by way of a opening in the fence. Travel within the site was possible for normal wheeled vehicles, however during spring thaw and periods of high rainfall, travel within the site would be impossible in lower lying areas.

3.0 FIELD INVESTIGATION

The subsurface soil investigation for this project was performed on November 2, 1999, utilizing a truck mounted B47 drill unit owned and operated by SPT Drilling Ltd., of St. Albert, Alberta. Seven Testholes were advanced to 7.3 metres depth below ground surface. J.R Paine personnel selected the Testhole locations. The Testhole locations are shown on the attached site plan.

The testholes were advanced with solid stem augers in 1.5 metre increments. A continuous visual description was recorded on site, which included the soil types, depths, moisture, transitions, and other pertinent observations. Disturbed samples were removed from the auger cuttings at 750 millimetre intervals for moisture content, Atterberg limits and sulphate content determination. Standard Penetration Tests, c/w split spoon sampling were also taken at regular 1.5 metre depth intervals.

Following the drilling operation, slotted piezometric standpipes were inserted into the testholes for water table determination, with a bentonite seal placed at the surface of the Testhole to prevent surface water infiltration.

The elevation of the Testholes were determined based on an Alberta Survey Control Marker (ASCM) near the intersection of 79 Avenue and 48 Street. The elevation of the ASCM was taken to be 710.47 metres.

4.0 LABORATORY TESTING

All bag samples returned to the laboratory were tested for moisture content. Representative samples were further tested to determine the liquid and plastic limits of the Atterberg limit series. Selected samples were also tested to determine the concentration of soluble soil sulphates. The results of all laboratory and field-testing are provided on the attached Testhole logs.

5.0 SOIL CONDITIONS

A detailed description of the soils encountered and testing performed can be found on the attached Testhole logs. In general, a surface cover of topsoil was encountered in the testholes, followed by silt and silty clay layers for the balance of the testholes, with the clay content within the silt varying randomly with depth.

TOPSOIL

Topsoil was encountered at the surface of each Testhole and ranged between 300 and 450 millimetres in thickness. The topsoil consisted of a rich mixture of humus and peat and was extremely soft but dry at the time of the investigation.

CLAY

Underlying the surficial topsoil in the testholes, clay was encountered to a depth of approximately 1.0 metre. The clay was silty, high plastic, moist, and stiff to very stiff in consistency.

SILT

Underlying the clay in the testholes, silt was encountered to termination depth, with occasional zones of silty clay encountered. The silt was a mottled olive-light brown colour, moist to saturated at depth, with occasional very clayey zones, and was firm to soft in consistency, and medium to high plastic. The silt is extremely sensitive, SPT blow counts on the silt ranged from 6

to 15 averaging around 10, indicating a firm soil, where the pocket penetrometer readings taken from the disturbed grab samples indicated a soft to very soft soil. The visual and sensitive nature of this material indicated a silt soil, but the Unified Soil Classification (USC) system based on the soil's liquid limit and plasticity index would place this material in the range of CI to CH (medium to high plastic clay).

SILTY CLAY

Clay zones were encountered within the silt and are described as being silty to very silty, medium brown and moist to very moist, with a firm to stiff consistency and a high plasticity. In Testholes 99-4 the silty clay layer was encountered from a depth of 1.8 to 4.9 metres below ground surface.

SAND

A sand deposit was encountered between 5.8 and 6.4 metres depth below ground surface in Testhole 99-1 and at a depth of 7.0 metres in Testhole 99-3. The sand was silty, medium to fine grained, medium dense, brown and saturated.

6.0 GROUNDWATER CONDITIONS

Slotted piezometers standpipes were inserted into all seven of the testholes for groundwater table measurement. The water levels were monitored following completion, 7 days and 14 days after completion of drilling. Observed groundwater levels are summarized as follows:

Watertable Readings
Depth Below Ground Surface (m)

Testhole	End of Drilling November 2, 1999	7 Days November 9, 1999	14 Days November 16, 1999
99-1	dry	5.56	5.56
99-2	6.40	5.69	5.69
99-3	4.27	3.20	3.20
99-4	dry	3.05	3.05
99-5	dry	3.39	3.39
99-6	dry	2.39	2.39
99-7	dry	2.62	2.62

The water levels appear to be stabilized, although it should be noted that groundwater levels may fluctuate on a seasonal or yearly basis.

7.0 RECOMMENDATIONS

7.1 Foundations

1. No major problems with construction of residential units on the native soils encountered throughout the study area are anticipated. The proposed housing units may be supported by continuous or spread footings bearing on undisturbed native soils. The upper soils were very moist in the Testholes, therefore wider footings may be required in some situations. The footing elevation should allow for 1.2 metres of earthen cover over the footings in order to reduce the movement caused by seasonal variations in moisture contents and/or frost action.

2. Lot grading plans are unknown, however it is expected that final lot grading will largely correspond to existing conditions. If general lot grading will produce areas of fill extending in depth below that of the footing elevation, it is strongly recommended that qualified geotechnical personnel inspect house excavations. Generally, it is not recommended that footings be constructed on non-engineered fill. In such cases, the following alternatives are commonly recommended:

   i) Remove the fill down to native soil and replace with a compacted granular material. A normal footing foundation may then be utilized.

   Or

   ii) Utilize a pile foundation.

4. In the case of a pile foundation, standard length piles may extend deep enough to intercept the groundwater table in the native silty soil, which will likely slough and produce ingressing groundwater, making cast-in-place pile construction difficult. Casing may be required, depending on pile depth, and should be available on site during piling operations. In the event casing is not required, slowly ingressing groundwater will be encountered, and therefore the pile concrete should be on-site during the pile drilling allowing for quick concrete placement after the pile is inspected.

5. No loose, disturbed, remolded or slough material should be allowed to remain in the open footing excavations. Hand cleaning is advised if an acceptable surface cannot be prepared by mechanical equipment. All basement excavations must be dug by a backhoe operating remote from the bearing surface.
6. The surficial silt soils are extremely sensitive. Accordingly, footing excavations should be protected from drying, rain, snow, freezing and the ingress of surface or groundwater.
7. A 150-millimetre layer of sand or sand-gravel mixture should be placed immediately below all floor slabs. This material should be uniformly compacted to 100 percent of the corresponding Standard Proctor density at optimum moisture content.
8. A non-deteriorating vapour barrier should be placed immediately below the floor slab to prevent desiccation of the subgrade material.
9. Observed groundwater levels were between 2.4 and 5.7 metres below ground surface. Accordingly, ingressing groundwater is not likely to be encountered during foundation excavations. Basements should be provided with a suitable peripheral drainage system with an adequate filter placed at footing elevation and connected positively with an approved drainage system.
10. It is recommended that floor joists and basement slabs be placed prior to backfilling the excavation in order to minimize any detrimental effects on the foundation walls caused by backfilling operations.
11. Water dispersed on the property from roof drains must not be allowed to reduce the integrity of the foundations. To ensure these, provisions must be made to ensure the runoff is not allowed to accumulate around the basement. See Section 7.5 for details.
12. The time span between start of excavation to installation of basement footings, walls, peripheral weeping tile and backfilling operations should be minimized in order to prevent any problems developing with the excavation due to ingressing of ground or surface waters, or desiccation of the subsoil.
13. Other foundation types, besides footings, should be evaluated for the specific site conditions on which they are to be used.

14. During winter construction, it is essential that all interior fill and load bearing materials remain frost-free. Recommended winter construction practices, with respect to hoarding and heating of the forms and the fresh concrete, should be followed. In order to minimize the potential frost heave problems the interior of the building must be heated as soon as the walls have been poured. The period in which the excavation is left open to freezing conditions should be as short as possible. If doubts remain as to the suitability of the foundation during construction, the builder should consult a qualified geotechnical engineer.

7.2 Underground Utilities

1. The subsurface soil conditions in the testholes generally ranged fair to poor, with some satisfactory areas, for the installation of underground utilities. The satisfactory conditions were encountered in the upper soils, and poor conditions within the very moist silt soils above and below the watertable. The watertable was between approximately 2.4 and 5.7 metres depth below ground surface in the Testholes.
2. Depending on the excavation depths, temporary dewatering measures may be required during utility installation. It is likely that groundwater seepage would be moderate, depending on the relative percentage of clay within the silt soil at any given location and depth. Therefore pumping from the trenches during installation is the recommended dewatering method envisioned by our firm. Well points would not be feasible due to the fine-grained nature of the soil. Delays in construction may occur.
3. Due to the high content of silt in the near surface material, the majority of the trenches will require increased cutback angles of 45 degrees or more in order to remain stable, due to their low strength and high moisture content. Shoring of deeper trenches may be required in the wet, very sandy silt, and silty sand. Excavations below the watertable will likely be unstable. No deep trenches below 6 metres are assumed to be required for this project. Base heave may occur in areas with high watertables, with trenches below approximately 6 meters in depth. Actual cutback angles cannot be determined without performing a detailed analysis. For this reason, this information should be used as a guideline only and the optimum cutback angles for utility trenches should be determined in the field during construction. The Occupational Health and Safety Act, General Safety Regulation Items

173 and 174 should be strictly followed except where superseded by this report.

4. Temporary surcharge loads, such as spill piles, should not be allowed within 2.0 metres of an unsupported excavation face while mobile vehicles should be kept back at least 1.0 metre. All excavations should be checked regularly for signs of sloughing or failures, especially after rainfall periods.

5. To minimize pipe loading, trench widths should be minimal but compatible with safe construction operations. The trench width must be wide enough to accommodate pipe bedding and compaction equipment.

6. The moisture content of the soils in the testholes was variable but generally was moist to saturated, ranging from 20 to 40 percent. The wetter soils will be difficult to compact at natural moisture contents. Pipe bedding and trench backfill procedures should adhere to good construction practice. The compaction standard, should be based on One-Point Proctor criteria, as the Standard Proctor Density (SPD) compaction standard will be very difficult to achieve. Trench compaction requirements should be 100 percent of the corresponding One-Point density above 1.5 metre depth below design subgrade and 97 percent of the corresponding One-Point below this level. The maximum lift thickness is 300 millimetres. It is important to dry these soils enough to obtain machine compaction in order to minimize trench settlement. Considerable area may be required to spread out the trench spill piles and dry the soils. Opening relatively long portions of utility trench is not recommended for this site. It must be noted that placing very moist or wet backfill in the trenches will jeopardize the road subgrade and may cause extra, more costly subgrade treatment methods to be required. The cost of drying the backfill versus larger pavement structures will need to be assessed.

7. The variable condition of the subgrade soils will cause a corresponding variability in the utility trench pipe bedding conditions. The silt soil is very moist to saturated in nature. These soils may provide poor pipe bedding support. The backfill material beneath and above the pipe should be an approved bedding sand material, where soil conditions allow. This material should be hand placed and hand tamped, with care taken to fill the underside of the pipe. To overcome the installation difficulties which may be encountered within the silt soils, where ingressing groundwater and/or poor bearing conditions may be encountered,

it is recommended that a washed rock and geotextile separator be utilized for the pipe bedding. The exact dimensions of the specialized bedding should be determined in the field during construction.

8. It should be noted that the ultimate performance of the trench backfill is directly related to the consistency and uniformity of the backfill compaction, as well as the underground contractor construction procedures. In order to achieve this uniformity, the lift thickness and compaction criterion should be strictly enforced.

7.3 Surface Utilities

1. The topsoil, peat, and other deleterious materials encountered should be removed prior to construction of roads, sidewalks and other surface utilities.
2. The design concepts of boulevard servicing and common trenching should be considered for this site due to the sensitive silt soil. Keeping the design subgrade elevation as high as possible is also recommended. Site subgrade would benefit from fills. The Testhole soils become wet with depth therefore good borrow will be limited to approximately the top meter.
3. The surface soil conditions will generally be poor to satisfactory. However, the native silt is extremely sensitive therefore any disturbances of these soils will lead to problems. Difficulty will likely be encountered in areas containing utility trenches within the wet silt zones due to mixing during trench backfilling. The condition of the subgrade will also depend on the backfill quality of the underground utilities, due to the disturbance and mixing of subgrade soils during construction. In addition, the groundwater table level in the eastern portion of the site is likely to cause significant frost heaving conditions, without the proper design considerations.
4. The near surface inorganic silts are very sensitive in nature. Cement stabilization should be considered for subgrade preparation in native undisturbed silt or clay subgrade situations. Past experience has shown that cement stabilization is effective in increasing the bearing of silt. Application rates would best be determined by our firm in the field during construction. The estimated stabilization of 25 to 35-kg of cement per square metre of

subgrade mixed to a depth of 300 millimetres. Care must be taken not to allow any excess moisture changes in these soils and some moisture conditioning is likely to be required.

5. The use of a thick pit run gravel subbase will likely be necessary in trenched areas, or in cut areas, depending on the degree of mixing with wet subgrade soils and the amount of drying performed during utility installation. The estimated thickness of the pit run layer is 600 - 900 millimetres minimum depth. The pit run may need to extend below the sidewalks as well. The subcut of the roadway should be performed by hoe and truck haul to minimize disturbance of the silt soil. A woven geotextile should also be utilized, with the estimated type being Amoco 2002 or equivalent. The pit-run gravel is placed on the geotextile in an end-dump fashion with no equipment operating on the bare geotextile. The gravel should be placed in one lift by light tracked equipment, then compacted with a smooth drum roller to the maximum density possible. Care must be taken not to over compact the gravel and cause pumping in the wet soils. All compaction of the pit-run should be by non-vibratory methods. Observations by our firm during underground construction will help determine the subgrade treatment required. All subgrades should be proof rolled after final compaction and any areas showing visible deflections should be inspected and repaired.

6. In all cases the subgrade should be inspected by qualified personnel during construction to determine the recommended subgrade treatment.

7. It is recommended that all areas behind the back of curb/sidewalk be backfilled as soon as possible to avoid water permeating into the subgrade from free standing puddles which could cause subgrade softening.

8. The following 2 year staged pavement design may be applied to the proposed residential roadways. An assumed California Bearing Ratio of 3.0 percent was used in the design as well as a design life of 20 years. The asphaltic concrete grades refer to City of Edmonton specifications.

Recommended Staged Roadway Structures
Stony Plain Subdivision

	Local Residential	Minor Collector No Buses
Design ESALs	3.5×10^4	9.0×10^4
STAGE 1		
Option 1		
Soil Cement Base		
Asphaltic Concrete (ACR)	60	85
Soil Cement Base	200	200
Cement Stabilized Subgrade Preparation	300	300
Option 2		
Granular Base Course		
Asphaltic Concrete (ACR)	75	90
Granular Base(20 mm Crush)	250	300
Cement Stabilized Subgrade Preparation	300	300

Note: Pit-run subbase of 600 to 900 mm with geotextile will likely be required in cut or trenched areas.

STAGE 2

All Options

35 millimetres of Asphaltic Concrete Overlay (ACO). Thinner 30 millimetres of ACO is acceptable if it can be proven that it is possible to place this thickness of asphalt properly.

Note: ACR = City of Edmonton Designation Asphaltic Concrete Residential
ACB = City of Edmonton Designation Asphaltic Concrete Base
ACO = City of Edmonton Designation Asphaltic Concrete Overlay

9. The observed watertable depths are generally moderate to low at this site, between approximately 2.4 to 5.7 metres depth below existing ground surface. Silt has high frost susceptibility. A watertable within approximately 3.0 metres of the road surface can cause significant frost heaving to these silty soils. The closer the watertable to the surface, the higher the frost heave potential. The standpipe showed a stabilized groundwater level above this threshold in Testholes 99-6 and 99-7 toward the southeast portion of the site. It is recommended that with the high watertable encountered in Testholes 99-6 and 99-7, the design road surface elevation be set as high as possible to reduce the frost heave potential. Therefore, cuts should be avoided at this portion of the site, and fills of a minimum 1.0 metre to subgrade elevation should be designed.

7.4 Cement

Tests on selected soil samples from the Testholes indicated low to negligible concentrations of water-soluble soil sulphates in the site subsoils. Based on observed sulphate levels, The following alternatives are therefore advised:

1. Underground Concrete Pipe

   Concrete used for all underground pipes must be constructed of C.S.A. Type 50, sulphate resistant Portland cement.

2. Curbs and Sidewalks

   All concrete for surface improvements such as sidewalks and curbs may be made using CSA Type 10, normal Portland cement.

3. Foundation Construction

   All concrete used for residential construction and coming into direct contact with the soil may be made with CSA Type 10, normal Portland cement. A minimum 28-day compressive strength of 25 megapascals is recommended for the foundation concrete. In addition, all concrete subject to freeze thaw conditions must be air entrained with 5 to 7 percent air. Individual locations may show higher or lower concentrations of soluble soil sulphates and thus additional soil testing on particular sites may prove valuable.

7.5 Hydrogeological Concerns

1. Water dispersed on the property from the roof leaders must not be allowed to accumulate against the foundation walls. To ensure positive drainage, the soil surface of all lots should be made sloping away from all buildings. This will require a positive lot grading of at least five percent away from the foundation walls toward the sidewalk for a minimum of 2.0 metres from all buildings. In cases where the lot drainage runs from the back of the lot to the front, runoff should be kept 1.2 metres away from the house.
2. At least the top 1.0 metre of backfill around the basement walls should be a suitable impermeable clay material, although compacted silt would be acceptable.
3. In order to ensure no flow paths for water from the roof leaders occur adjacent to the foundation walls, the following two alternatives are proposed:
   a) A concrete splash pad, placed beneath the downspouts, a minimum of 1.2 metres long and firmly anchored to the house foundation can be used.

   Or

   b) A permanent downspout extension could be used to carry water away from the foundation wall.
4. Peripheral weeping tile lines will be required. All lines should be placed at or slightly below footing elevation and will require a suitable clean tile rock drainage filter, with a minimum of 150 millimetres of filter around the line.
5. Design house footing elevations should be checked against the level of the groundwater table. The watertable readings at this site were low throughout the majority of the site, except in the south eastern portion where the groundwater readings were higher. Therefore, directing house weeping tile flow to storm services may be required for the eastern portion of the site, and should be determined on a lot specific basis. Also, the need for storm services will depend on the level of flow desired from future basement sump pumps. Comparison of proposed footing elevations with watertable levels in the vicinity would be necessary to determine where storm services are required. It should be noted that the groundwater levels fluctuate from season to season, and are likely going to be approximately 1.0 meters higher in the spring then the measured levels in this report.

6. In instances where high rainfall occurs during excavation, basement subgrade softening may occur, which may require the use of a washed rock base. It is recommended that if free water is noted in any basement excavation at this site a geotechnical engineering firm should be contacted to inspect the site and provide the recommended action to account for the water.

7. Groundwater seepage rates into utility trenches from the native soils may be moderate given the sensitive nature of the silt material encountered. Trench dewatering may be necessary in deeper trenches especially towards the eastern portion of the site. It is recommended that underground construction proceed expediently and long excavations should not be left open for an extended period of time.

7.6 Storm Water Management Facility

1. It is understood that a storm water management facility are planned for roughly the centre of this subdivision. Testhole 99-3 was advanced in the area of the existing Slough approximately where the pond is to be built. The soil conditions for the pond show a clayey silt, medium plastic to a depth of 4.4 metres, and the observed groundwater level is 3.2 metres below existing ground surface. The silt is relatively permeable, therefore a wet pond may not be very practical. Therefore it is recommended to build a dry pond to handle the storm water flows.

2. The recommended maximum sideslopes in the dry pond is 7H:1V for stability purposes, based on the anticipated silty soil conditions. Erosion protection in the from of rip-rap should be placed where water velocities are anticipated. The side slopes should be seeded to grass as soon as possible in order to prevent erosion.

3. Due to the high groundwater level observed in this area, seepage into the pond from the base and sideslopes are likely below 3.2 metres. The infiltration rate may be substantial due to the relatively high permeability of the silt soils. The base and sidewalls are also expected to be soft with poor bearing capacity. Seasonal fluctuation of the ground water level may produce even higher water levels. Dry pond should be set at a maximum bottom depth of 2.2 metres below the existing ground level, or at an elevation of approximately 705.6 metres.

4. Pond construction should be performed utilizing a backhoe or dragline, as excavation by scrapers may not be feasible due to the elevated moisture conditions and corresponding poor bearing conditions of the silt.
5. All berm compaction should be to 95% of the corresponding standard Proctor density.
6. Additional evaluation after the nature of the water management facility is better defined is recommended.

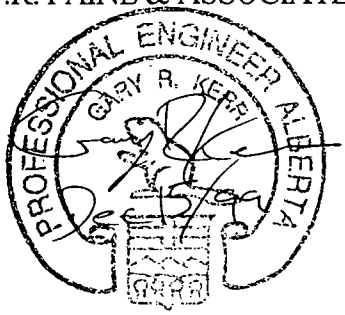
8. CLOSURE

This report has been prepared for the exclusive and confidential use of Doug Little and the Town of Stony Plain. Use of this report is limited to the proposed Stony Plain residential subdivision northeast of the intersection of 48 Street and 79 Avenue only. The recommendations given are based on the subsurface soil conditions encountered during test boring, current construction techniques and generally accepted engineering practices. No other warranty, expressed or implied, is made. Due to geological variability of many soils formations, no interpolation of soil conditions between or away from the testholes has been made or implied. Soil conditions are known only at the test boring location. Should other soils be encountered during construction or other information pertinent become available, the undersigned should be contacted as the recommendations may be altered or modified.

We trust this information is satisfactory. If you should have any further questions or comments, please do not hesitate to contact our office.

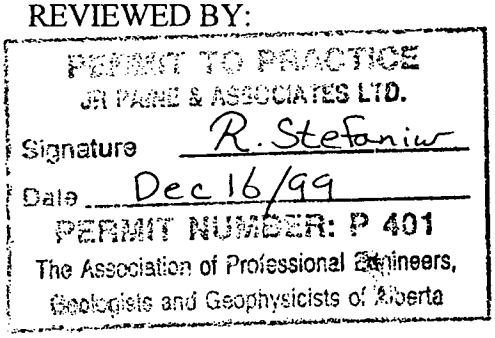
Respectfully Submitted:

J.R. PAINE & ASSOCIATES LTD.



Gary R Kerr, P. Eng.

REVIEWED BY:



Roman Stefaniw, P. Eng.

Reviewed by Rick Evans, P. Eng.

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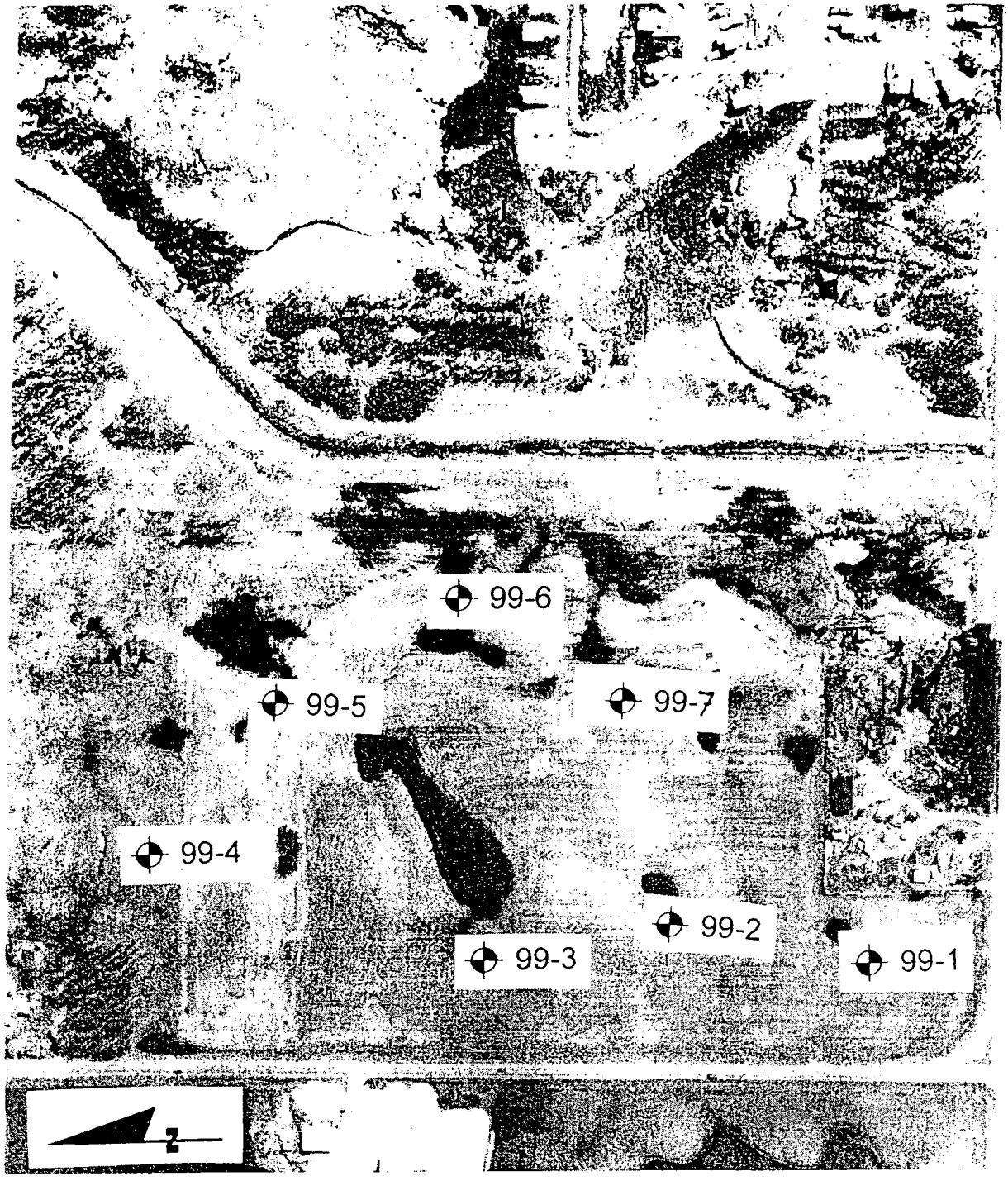
APPENDIX



J.R. Paine & Associates Ltd. CONSULTING AND TESTING ENGINEERS	
Approximate Testhole Locations Stony Plain Subdivision 48 Street and 79 Avenue Stony Plain, Alberta	
SCALE: NTS	FILE #: 3267-1
DRAWN BY: others/GRK	DATE: 99/11/26

SUBDIVISION: STONY PLAIN (48 ST & 79 AV)	DOUG LITTLE	TEST HOLE NO: 99-1
	SPT: SOLID STEM & CATHEAD	PROJECT NO: 3267-1
	PROJECT ENGINEER: GRK	ELEVATION: 710.68 (m)

SAMPLE TYPE: Disturbed; Shelby Tube; SPT; Bulk

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND

DEPTH(m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SPT(N)
0.0	SOIL	TOPSOIL: (460mm thick)		
	CH	SILTY CLAY: light brown, moist, high plastic, stiff to very stiff		
1.0		1.0 m		11
	SILT	SILT: mottled olive – light brown, moist, clayey, low to medium plastic, very sensitive –Below 1.2m: moist, sandy –Below 1.7m: v moist, v soft		10
3.0				
4.0				11
		4.9 m		
5.0	CH	SILTY CLAY: sandy, light brown, moist, medium to high plastic, firm		11
		5.8 m		
6.0	SM	SAND: silty, wet, compact		
		6.4 m		
	MI	SILT: wet, sandy, grey, very sensitive		13
7.0				
8.0		END OF HOLE 7.32m Standpipe installed to 7.32 m Slough: none at 0 hrs Water: none at 0 hrs Water: 5.56m at 7 and 14 days		
9.0				

▲ Pocket Pen. (kPa) ▲ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

TEST RESULTS

ELEVATION(m): 710.0, 709.0, 708.0, 707.0, 706.0, 705.0, 704.0, 703.0, 702.0

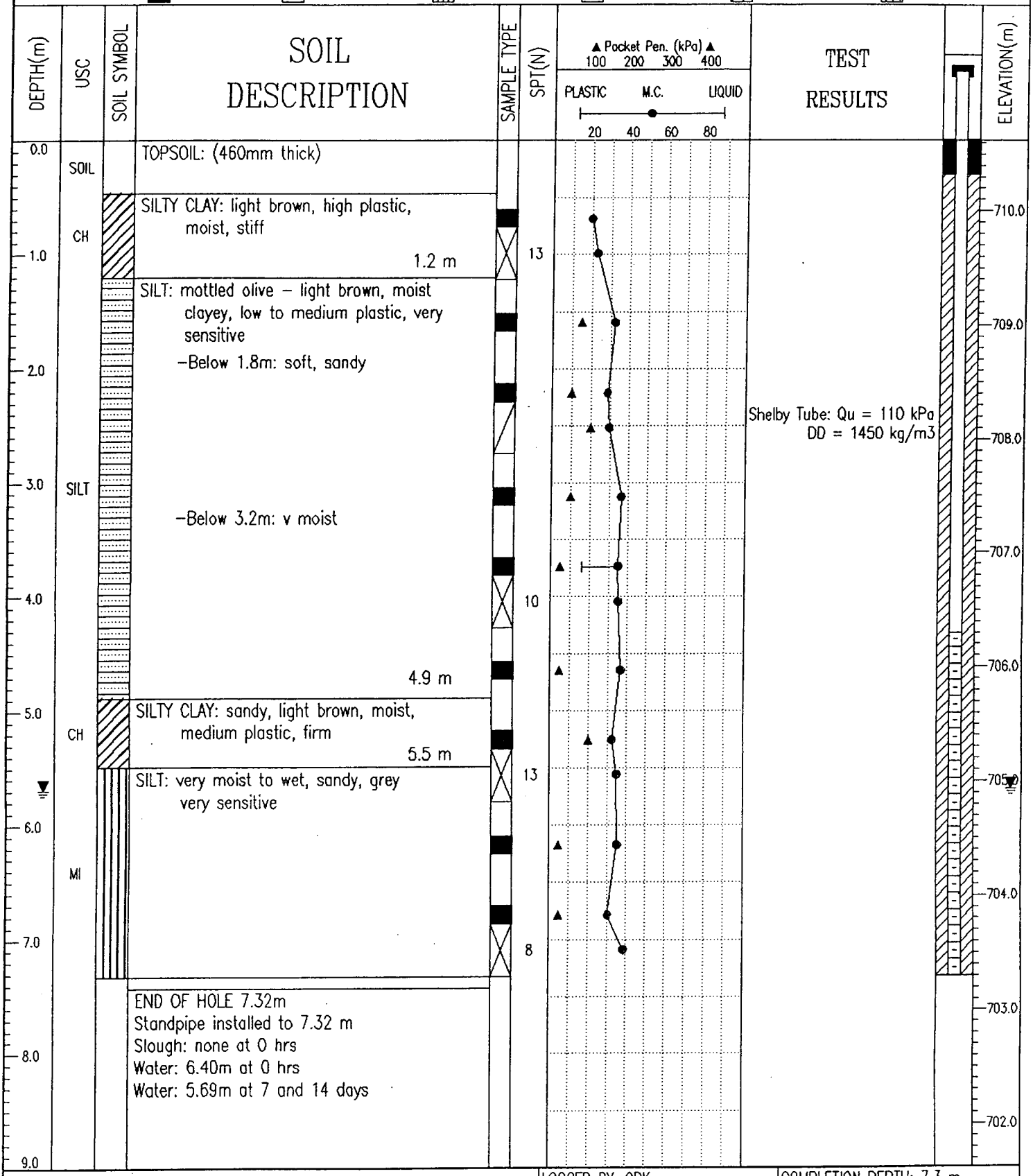
J.R. Paine & Associates Edmonton, Alberta	LOGGED BY: GRK	COMPLETION DEPTH: 7.3 m
	REVIEWED BY: RE	COMPLETE: 11/02/99
	Fig. No: 1	Page 1 of 1

99/12/13 12:18PM (ELEV09HP)

SUBDIVISION: STONY PLAIN (48 ST & 79 AV)	DOUG LITTLE	TEST HOLE NO: 99-2
	SPT: SOLID STEM & CATHEAD	PROJECT NO: 3267-1
	PROJECT ENGINEER: GRK	ELEVATION: 710.62 (m)

SAMPLE TYPE: Disturbed | Shelby Tube | SPT | Bulk

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



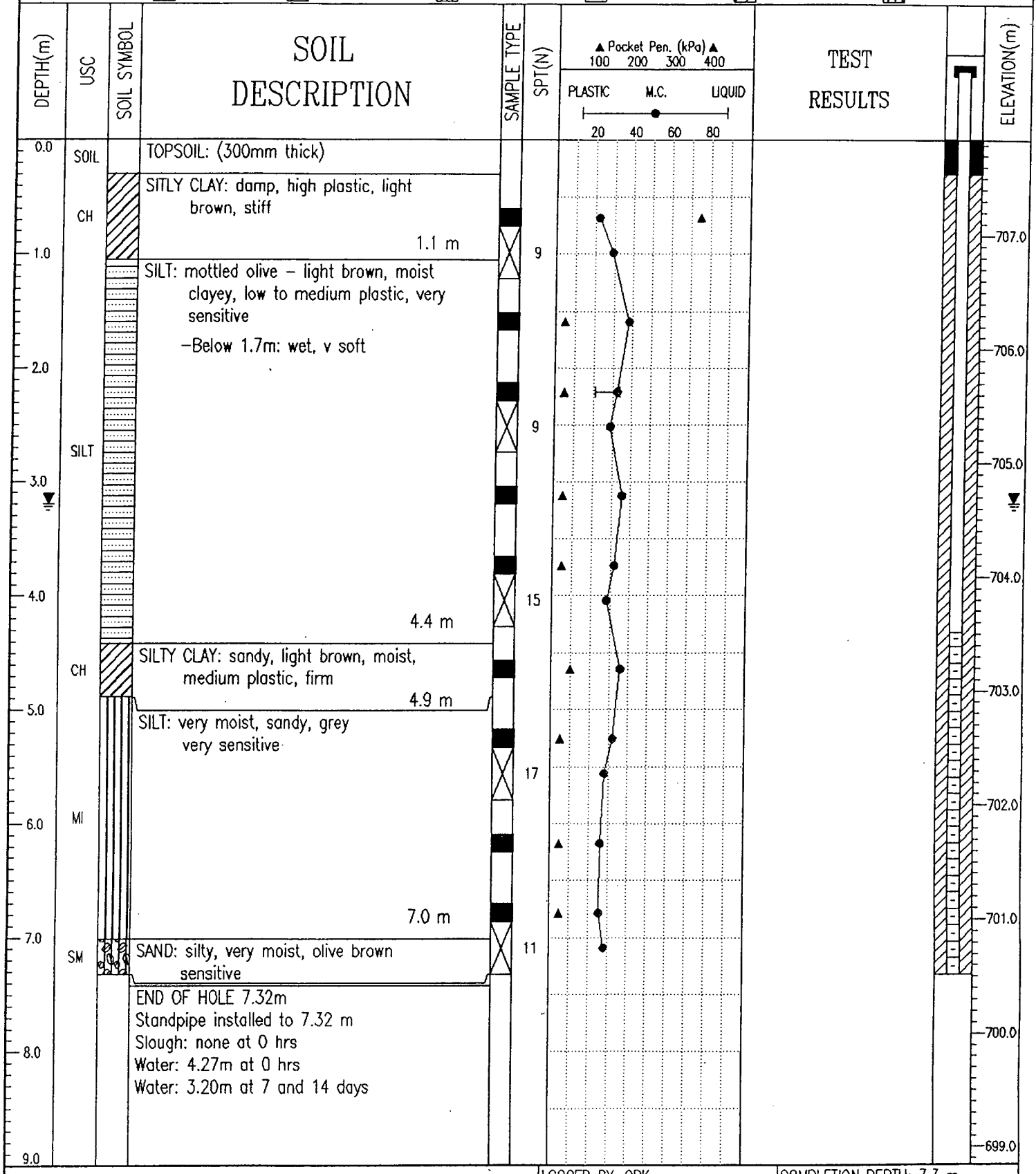
J.R. Paine & Associates Edmonton, Alberta	LOGGED BY: GRK REVIEWED BY: RE Fig. No: 1
	COMPLETION DEPTH: 7.3 m COMPLETE: 11/02/99 Page 1 of 1

99/12/13 12:18PM (ELEV09HP)

SUBDIVISION: STONY PLAIN (48 ST & 79 AV)	DOUG LITTLE	TEST HOLE NO: 99-3
	SPT: SOLID STEM & CATHEAD	PROJECT NO: 3267-1
	PROJECT ENGINEER: GRK	ELEVATION: 707.84 (m)

SAMPLE TYPE: Disturbed | Shelby Tube | SPT | Bulk

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



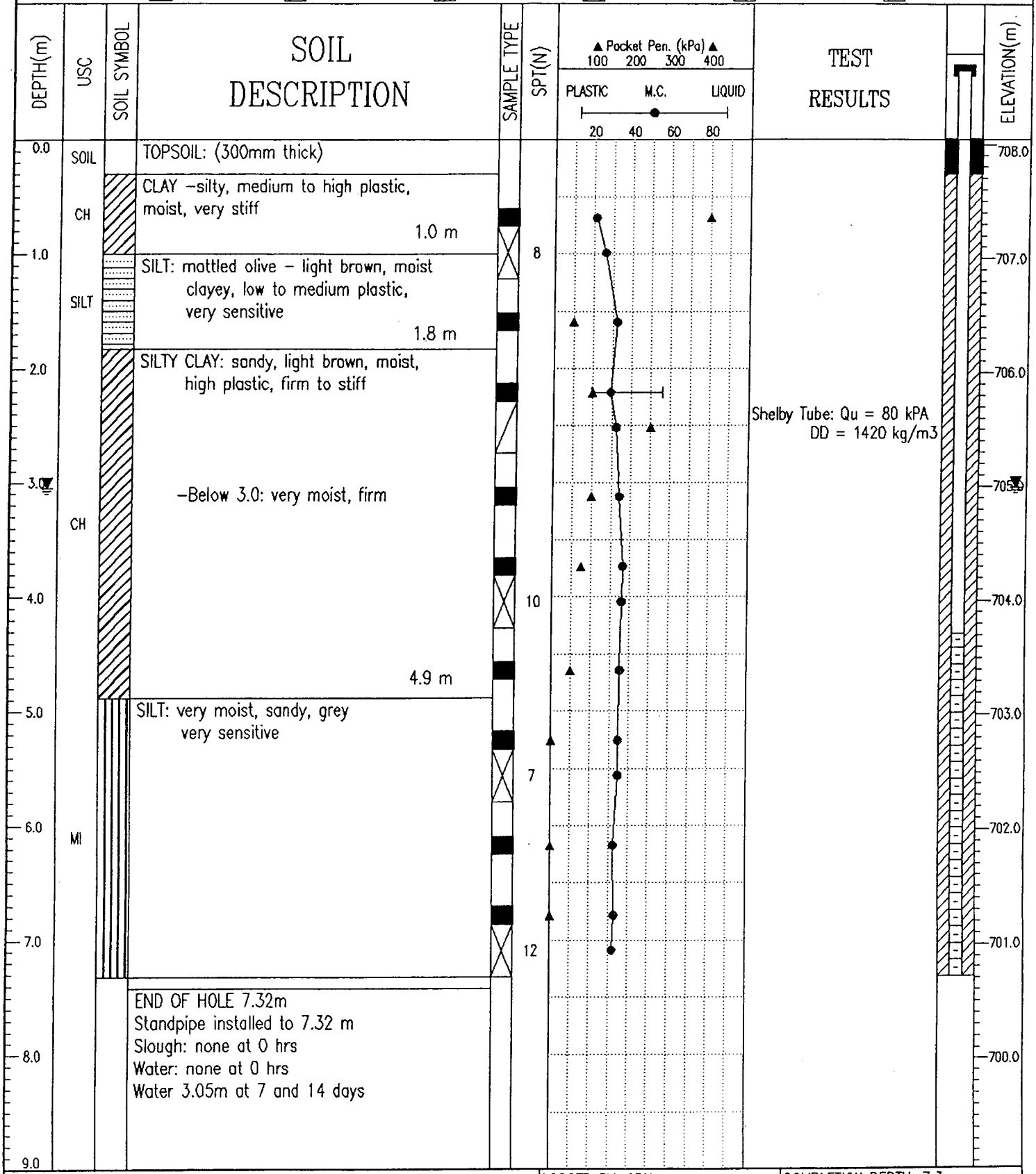
J.R. Paine & Associates Edmonton, Alberta	LOGGED BY: GRK	COMPLETION DEPTH: 7.3 m
	REVIEWED BY: RE	COMPLETE: 11/02/99
	Fig. No: 1	Page 1 of 1

99/12/13 12:19PM (ELEV09HP)

SUBDIVISION: STONY PLAIN (48 ST & 79 AV)	DOUG LITTLE	TEST HOLE NO: 99-4
	SPT: SOLID STEM & CATHEAD	PROJECT NO: 3267-1
	PROJECT ENGINEER: GRK	ELEVATION: 708.04 (m)

SAMPLE TYPE: Disturbed | Shelby Tube | SPT | Bulk

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



J.R. Paine & Associates
Edmonton, Alberta

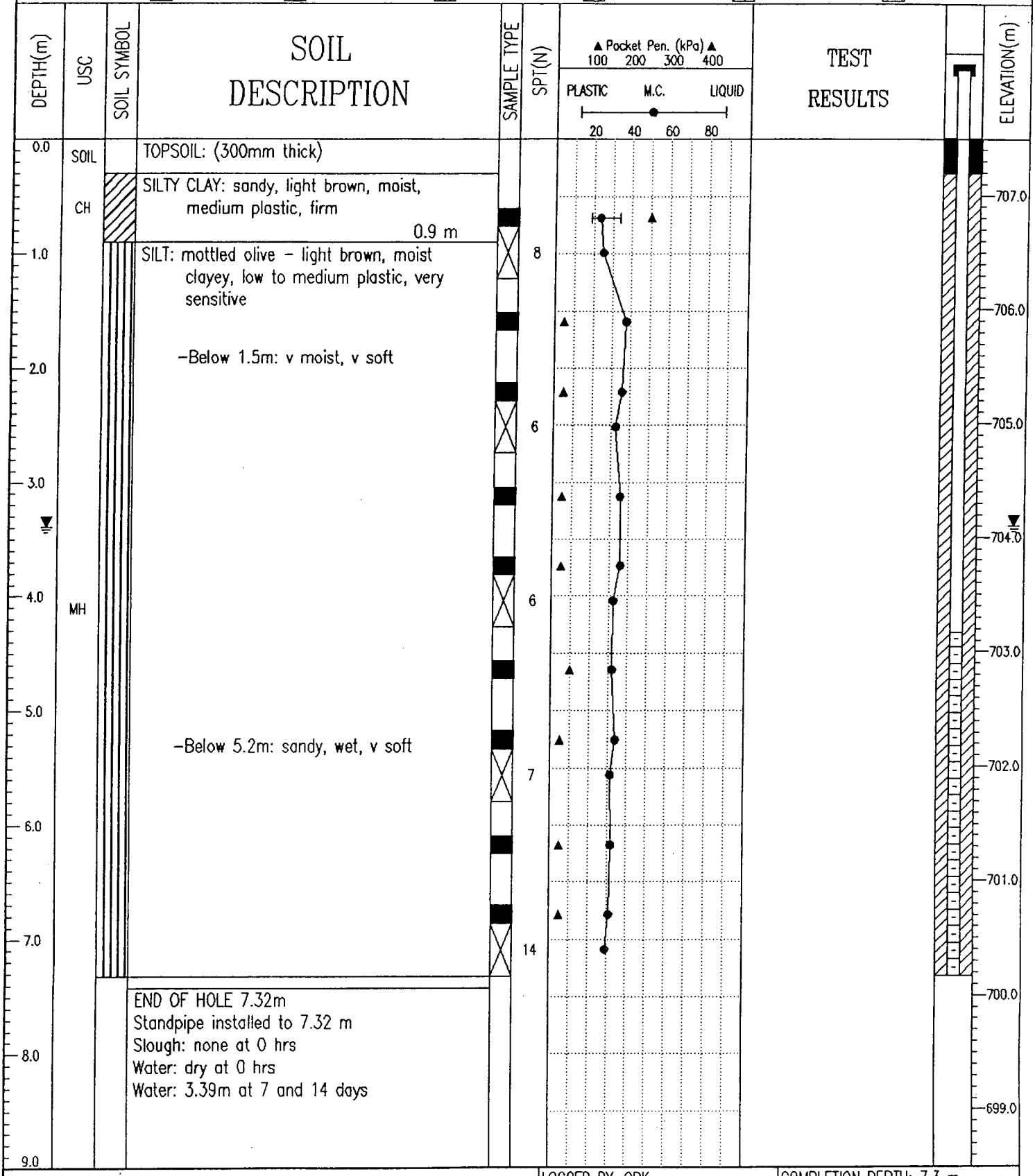
LOGGED BY: GRK	COMPLETION DEPTH: 7.3 m
REVIEWED BY: RE	COMPLETE: 11/02/99
Fig. No:	Page 1 of 1

99/12/16 04:10PM (ELEV09HP)

SUBDIVISION: STONY PLAIN (48 ST & 79 AV)	DOUG LITTLE	TEST HOLE NO: 99-5
	SPT: SOLID STEM & CATHEAD	PROJECT NO: 3267-1
	PROJECT ENGINEER: GRK	ELEVATION: 707.49 (m)

SAMPLE TYPE: Disturbed; Shelby Tube; SPT; Bulk

BACKFILL TYPE: BENTONITE; PEA GRAVEL; SLOUGH; GROUT; DRILL CUTTINGS; SAND



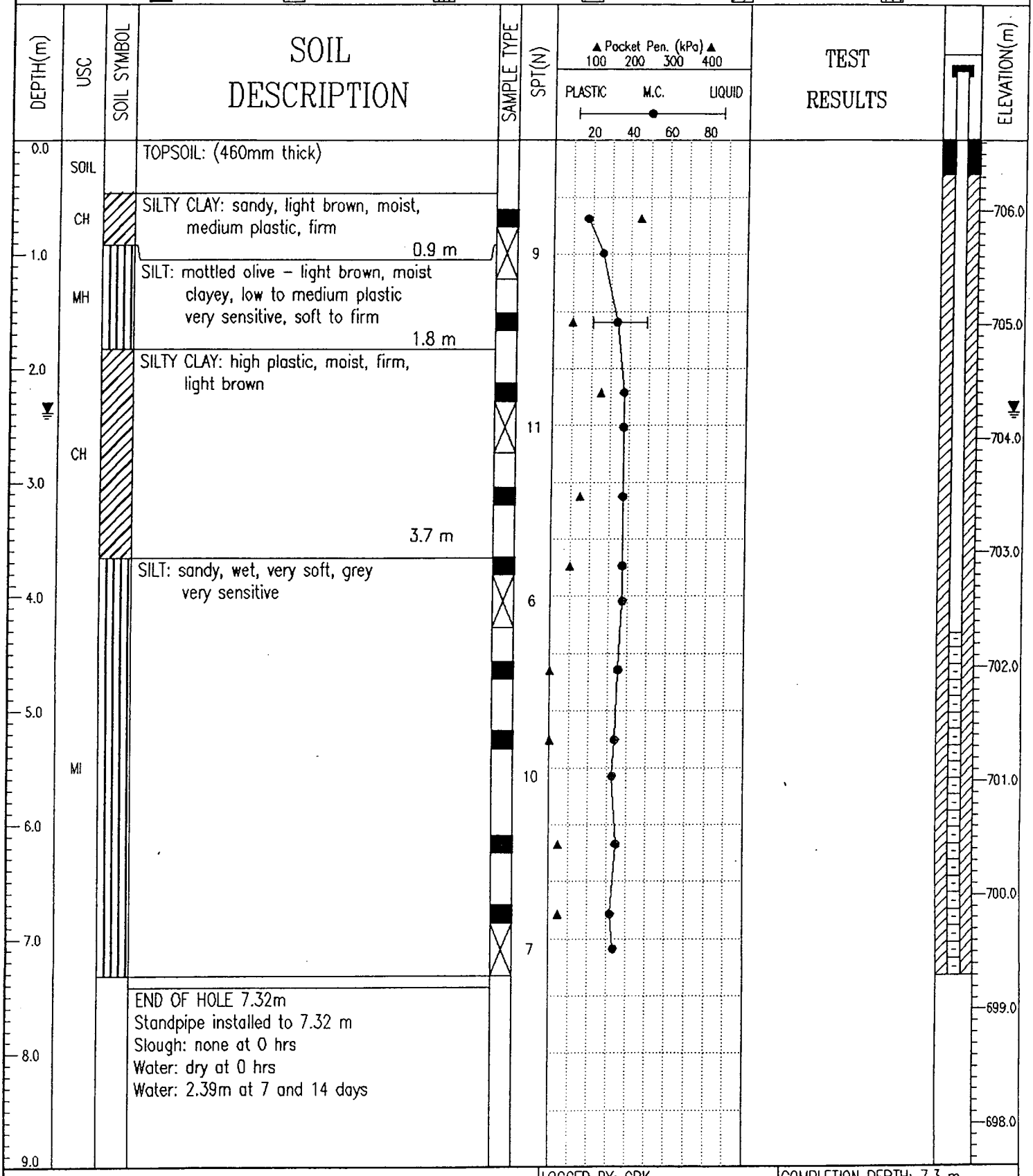
J.R. Paine & Associates Edmonton, Alberta	LOGGED BY: GRK	COMPLETION DEPTH: 7.3 m
	REVIEWED BY: RE	COMPLETE: 11/02/99
	Fig. No: 1	Page 1 of 1

99/12/13 12:19PM (ELEV09HP)

SUBDIVISION: STONY PLAIN (48 ST & 79 AV)	DOUG LITTLE	TEST HOLE NO: 99-6
	SPT: SOLID STEM & CATHEAD	PROJECT NO: 3267-1
	PROJECT ENGINEER: GRK	ELEVATION: 706.62 (m)

SAMPLE TYPE: Disturbed | Shelby Tube | SPT | Bulk

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



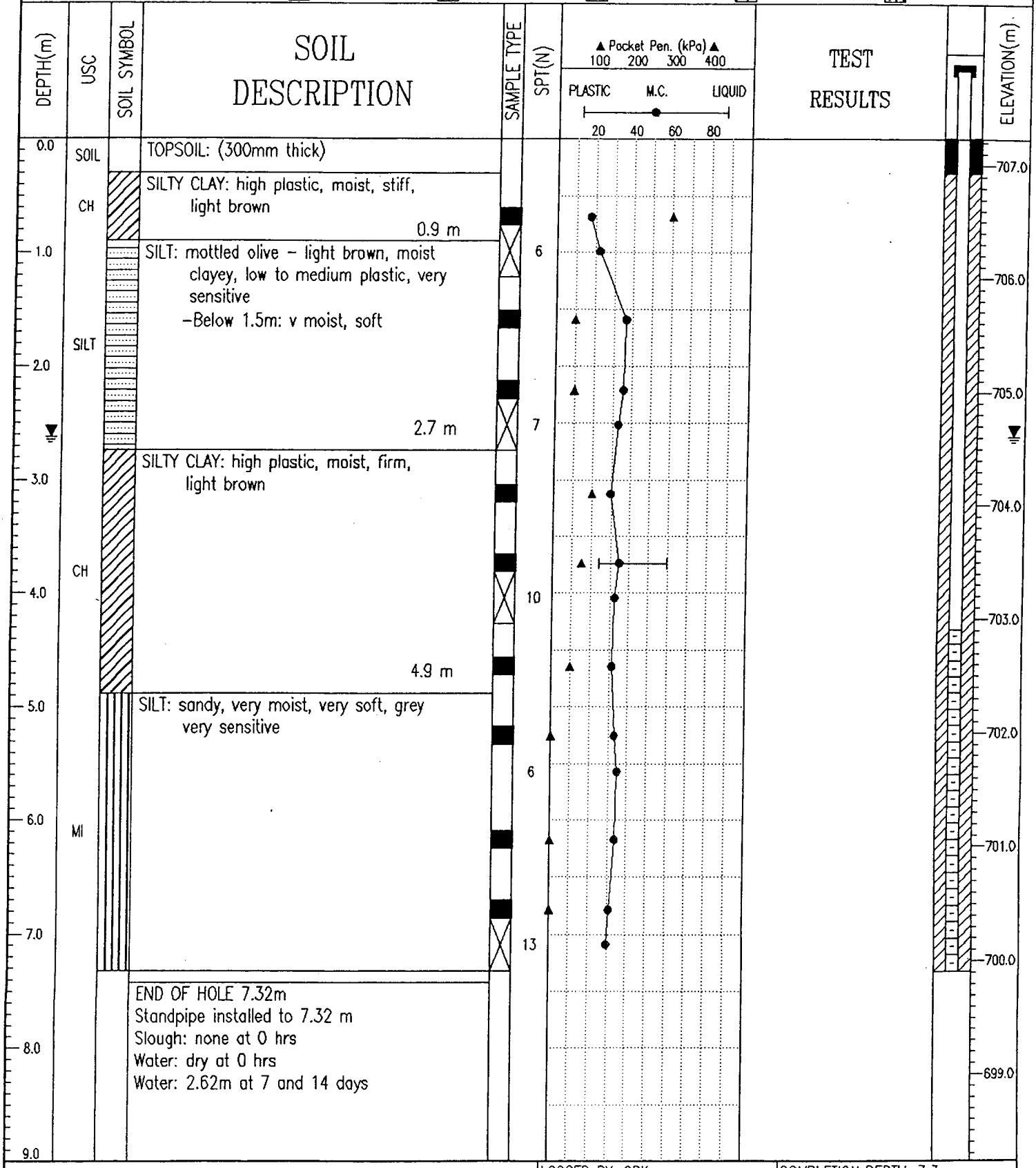
J.R. Paine & Associates Edmonton, Alberta	LOGGED BY: GRK	COMPLETION DEPTH: 7.3 m
	REVIEWED BY: RE	COMPLETE: 11/02/99
	Fig. No: 1	Page 1 of 1

99/12/13 12:19PM (ELEV9SHP)

SUBDIVISION: STONY PLAIN (48 ST & 79 AV)	DOUG LITTLE	TEST HOLE NO: 99-7
	SPT: SOLID STEM & CATHEAD	PROJECT NO: 3267-1
	PROJECT ENGINEER: GRK	ELEVATION: 707.23 (m)

SAMPLE TYPE: Disturbed | Shelby Tube | SPT | Bulk

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



J.R. Paine & Associates Edmonton, Alberta	LOGGED BY: GRK	COMPLETION DEPTH: 7.3 m
	REVIEWED BY: RE	COMPLETE: 11/02/99
	Fig. No: 1	Page 1 of 1

99/12/13 12:19PM (ELEV09HP)

J.R. Paine & Associates Ltd.

CONSULTING AND TESTING ENGINEERS
EDMONTON — GRANDE PRAIRIE — PEACE RIVER — WHITEHORSE

17505-106 Avenue
Edmonton, Alberta
T5S 1E7

June 12, 2000
File No. 3267-1

INFRASTRUCTURE SYSTEMS LTD.
100, 5008-86 Street
EDMONTON, Alberta
T6E 5S2

ATTENTION: Mr. Laurence London, P. Eng.

Dear Sir:

Re: Watertable Readings
48 Street and 79 Avenue
Residential Subdivision
STONY PLAIN, Alberta

On April 25, 2000, our firm obtained further watertable readings at the above mentioned subdivision. Our firm prepared the Geotechnical Report for the subject site. The readings obtained are as follows, along with the previous Report readings:

Watertable Readings
Depth Below Ground Surface (m)

Testhole	End of Drilling Nov. 2/99	7 Days Nov. 9/99	14 Days Nov. 16/99	Apr. 25/00
99-1	dry	5.56	5.56	4.86
99-2	6.40	5.69	5.69	Blocked
99-3	4.27	3.20	3.20	3.37
99-4	dry	3.05	3.05	3.25
99-5	dry	3.39	3.39	Missed
99-6	dry	2.39	2.39	2.71
99-7	dry	2.62	2.62	2.91

We will endeavour to obtain further readings in the next week. It will likely be possible to clear Standpipe 99-2 and obtain a reading as ice was blocking the pipe April 25. Standpipe 99-5 was not located in April and will be read if possible this week as well.

We trust this information is satisfactory. If you should have any questions or comments, or require further input, please feel free to contact our office.

Yours truly,

J.R. PAINE AND ASSOCIATES LTD.

Rick Evans, P. Eng.

RE\re

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