SCHEDULE "A" ATTACHED TO BACK OF BY-LAW BOOK

COUNTY OF LETHBRIDGE NO. 26
IN THE PROVINCE OF ALBERTA
BY-LAW NO. 831

A BY-LAW OF THE COUNTY OF LETHBRIDGE NO. 26 IN THE PROVINCE OF ALBERTA TO ADOPT AN AREA STRUCTURE PLAN FOR THE DORAM HEIGHTS SUBDIVISION.

WHEREAS, Section 64(1) of the Planning Act 1980 and Amendments thereto allows the Council to adopt the Area Structure Plan for the Doram Heights Subdivision.

AND WHEREAS, the Council of the County of Lethbridge No. 26 deems it advisable to adopt the Area Structure Plan for the Doram Heights Subdivision area.

NOW THEREFORE, be it resolved that the Council of the County of Lethbridge No. 26, duly assembled, hereby enact that the Area Structure Plan for the Doram Heights Subdivision, as attached here as Schedule "A", is hereby adopted.

GIVEN first reading this 13th day of June 1986.

R.W. Lapworth
Reeve

County Manager

GIVEN second reading this 21st day of August 1986.

R.W. Lapworth
Reeve

County Manager

GIVEN third and final reading this 21st day of August 1986.

R.W. Lapworth
Reeve

County Manager

H-6

Sutherland
Associates
Real Estate Ltd.
(403) 329-6606

DELIVERED

Mr. N. Paladino
Development Officer
County of Lethbridge
Lethbridge, Alberta

Dear Mr. Paladino:

RE: Doram Heights Area Structure Plan

Subsequent to our meeting of today I have provided details of amendments to the engineering firm. Every attempt will be made to have copies of the amended document by Friday June 13.

In the event the amended copies are not received, this will confirm the amendments as follows.

A. Page 6: Wording has been updated to include the correct name of the zone (GC-R) and the definition of that zone.

B. Map #6: is replaced by the revised Map#6 depicting 19 lots.

C. Page 16: adjustment as to revised lot size and number. (Section 4.5)

D. Page 17: additional information relative to revised lot sizes.

E. Page 19: expanded description of architectural controls. (Section 5.2.4)

F. Page 20: expanded description of plans for refuse collection (Section 5.2.6)

: new section 5.2.8 describing planned fire protection system, expanded to include proposed subdivision of portion of adjacent lands to contain reservoir.

I trust this information is consistent with the comments made at today's meeting.

Yours truly,

Michael Sutherland

H-6

Avenue North, Lethbridge, Alberta T1H 0H3

Sutherland Associates
Real Estate Ltd.
(403) 329-6606

(A) Lot Sizes:

The development plan has been revised considerably to now include 19 lots of an average size of 1.15 acres.

On completing a survey for subdivision this number may increase by 1 or 2 but the lots will all be in the one acre category as requested.

Calculations are as follows:

Total Parcel:	29.887 acres
Deduct:	
Internal Roads	3.952 acres
Municipal Reserve	.8645 acres
Environmental Resource	3.211 acres
Total Deducted	8.0275 acres
BALANCE DEVELOPABLE	21.8595 acres

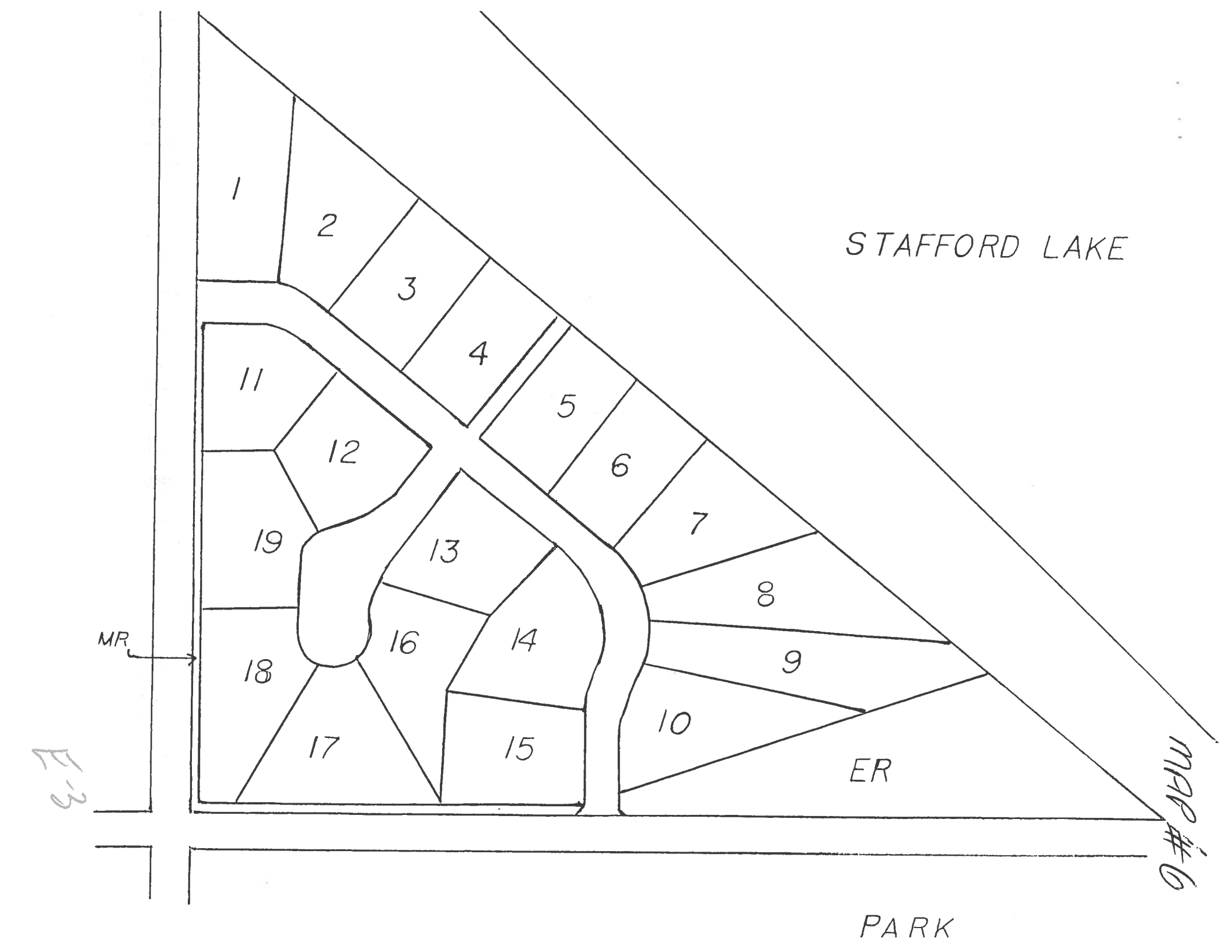
With the 19 lots shown the average size is 1.15 acres. Should the subdivision survey provide 2 additional lots this will still yield an average size of 1.09 acres.

This size of lot information now replaces all references to "...1/2 to 1/3 acre..." throughout the Area Structure Plan, is particular item 5.2.3. on page 19.

In addition MAP NUMBER 6 is replaced by the new MAP NUMBER 6 dated May 27, 1986 and attached.

E-3

920 Third Avenue North, Lethbridge, Alberta T1H 0H3


STAFFORD LAKE
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MR
ER
MAP #6
PARK
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Sutherland
Associates
Real Estate Ltd.
(403) 329-6606

(B) Storm Water Retention and

(C) Surfacing of Roads

Our intention of gravel surface roads and ditches remains unchanged.

The land is deemed ideal to absorb storm waters and natural patterns will not be disturbed to any great extent.

Furthermore, the large lots are completely effective to deal with runoff from each dwelling and its related driveways, etc.

E-3

920 Third Avenue North, Lethbridge, Alberta T1H 0H3

(D) Garbage Collection:

Architectural controls to be registered against each subdivided title will be very specific that each residence will be required to construct a container.

These will be required to be architecturally consistent with specific plans for each residence. (i.e. in terms of materials, size, etc.).

The enclosures will be capable of handling 2 to 4 garbage cans and each enclosure will be completely closed, with access either from the top or front side.

These will be placed on concrete pads as large as the base of the enclosure.

Contractual arrangements with private garbage collection firms will be required by each owner. These firms will bill each individual user according to use.

This is to be added to section 5.2.6 (page 20).

E-3

(E) Fire Protection:

A lined reservoir will be created on Doram properties immediately west of the development site.

This reservoir will be designed in a manner consistent with insurance requirements and in conjunction with recommendations by the Town of Coaldale Fire Department.

The final positioning of the reservoir will be determined by optimum accessibility to each residence.

Water may be purchased from S.M.R.I.D. or possibly the Town of Coaldale as required to maintain the resevoir capacity. Appropriate measures will be taken in terms of the safety of the reservoir (i.e. children, vandals, etc.)

This section is added to the Area Structure Plan as item 5.2.8.

E-3

(F) Architectural and Building Control:

The subdivided parcels will include architectural controls registered against each title.

These controls will be specific as to the fact each site will permit only one single-family residence. Garage and small accessory buildings (i.e. for storage, recreational vehicles, etc.) will also be permitted.

Because the development group intends to sell single, "packaged" units, virtually full control will be maintained as to site layout, landscaping, size, etc. Only interior finishing will be left to the imagination of the purchasers.

While this inclusion of controls may restrict the participation of some, we are confident the interest is sufficiently strong to permit a high quality, controlled development of the site.

Architectural controls will refer to such aspects as:

1. The range of materials to be used for exterior cladding will be set out. i.e. Cedar, aluminum siding, stucco, brick, asphalt roofing. "Earth-tone" basic in the browns, greens, shakes, roof pitch, etc.

2. The range of colors for staining/painting etc. in terms of exterior cladding, trim, fences, garbage enclosure, etc., will be detailed.

3. The positioning of septic fields and cisterns, will be determined as required by Health Department by-law.

4. The optimum amount of developable area in relation to lot size will be defined as part of the development agreement. This coverage ratio will likely be 20% of the total site. i.e. a lot of 1.15 acres includes approximately 50,000 sq. ft. of land. At 20% coverage, the house, garage, ancillary buildings, could total 10,000 sq. ft. more or less.

E-3

(F) Architectural and Building Control:

4. (continued)

Enforcement of construction will be controlled by the developer (Doram Heights), through applications for building permits for each unit. This will allow the Provincial Labour and Building Standards Branch to ensure the plans are consistent with the registered capabilities of each lot.

The actual architectural controls will be prepared by the "Doram Heights" lawyers and registered with each title as subdivided.

This replaces the first paragraph under item 5.2.4.

E-3

DORAM HEIGHTS

AREA STRUCTURE PLAN

PREPARED BY :

THE McELHANNEY GROUP LTD.

FEBRUARY, 1986

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APPENDICES

1.0 INTRODUCTION

The preparation of the Doram Heights Subdivision Area Structure plan has been undertaken in order to provide the guidlines for an orderly and quality development of approximately 12.1 hectares in the Southwest quarter of Section 13, Township 2, Range 19, West of the 4th Meridian. The site is located on the Southwest shore of Chin Coulee Lake (also called Stafford Reservoir), approximately 9.6 km East of the Town of Coaldale. The location of the site is shown on Map 1.

In order to allow a country residential development in the Doram Heights area an application to the Oldman River Regional Planning Commission was made to redesignate part of the SW 1/4-13-9-19-W4 to a "Special Area for Country Residential Use" pursuant to Section 12 of the Rural Land Use Amendments (1980) to the Regional Plan 1974.

The redesignation application obtained final approval from the Alberta Planning Board on May 15, 1984.

The main objective of this plan is to provide a specific framework of information, policies and guidelines to anticipate and to prepare for future country residential development in this area.

1.1 Objectives

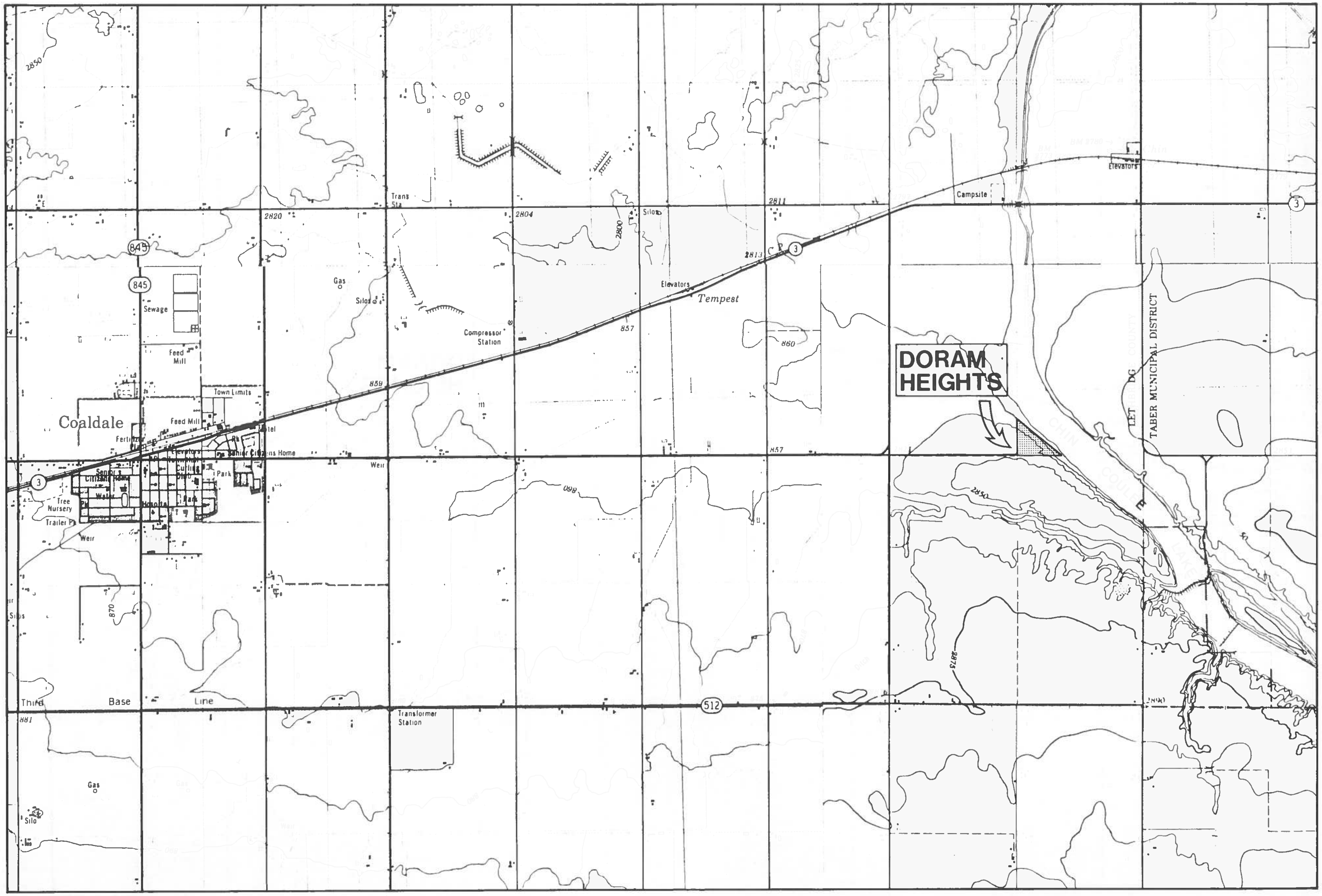
The Area Structure plan must contain information as prescribed by the Planning Act (1980):

64(2) "An area structure plan shall

(a) conform to any general municipal plan in existence and affecting the area that is the subject of the area structure plan;

(b) describe,

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



DORAM
HEIGHTS
Coaldale
Tempest
Elevators
Campsite
Compressor Station
Transformer Station
Sewage
Feed Mill
Town Limits
Tree Nursery
Trailer Pk
Third
Base
Line
Weir
Gas
Silo
Trans Sta
845
512
3
2850
2820
2811
2813
2804
2800
860
859
857
870
881
TABER MUNICIPAL DISTRICT

(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.

(c) contain any other matters the council considers necessary.

In addition to the above requirements the County of Lethbridge has requested that special attention be paid to the following:

Stafford Reservoir forms part of the S.M.R.I.D. water storage system for irrigation purposes but in addition it is the source for potable water for the Town of Taber. Other towns in the vicinity might in the future also obtain water from this reservoir. Water pollution is therefore a real concern and sanitary sewage disposal and storm drainage of the development will be designed to prevent such pollution.

2.0 SITE ANALYSIS AND EVALUATION

2.1 Topography and Drainage

The area under consideration is a triangular shaped portion of land on the Southwesterly shoreline of Chin Coulee Lake. The property is physically separated from the Lake by an access right of way (owned by S.M.R.I.D.) along the Lake's perimeter.

The majority of the Lands are gently sloping in a North Easterly direction towards the Lake, with a ten percent plus or minus slope along the Northeast boundary.

A small irrigation ditch (60 cm wide, 30 cm $\pm$ deep) is located on the sloped area of the property along the Northeast boundary. This ditch was dug by the present owners of the land, but is no longer is use.

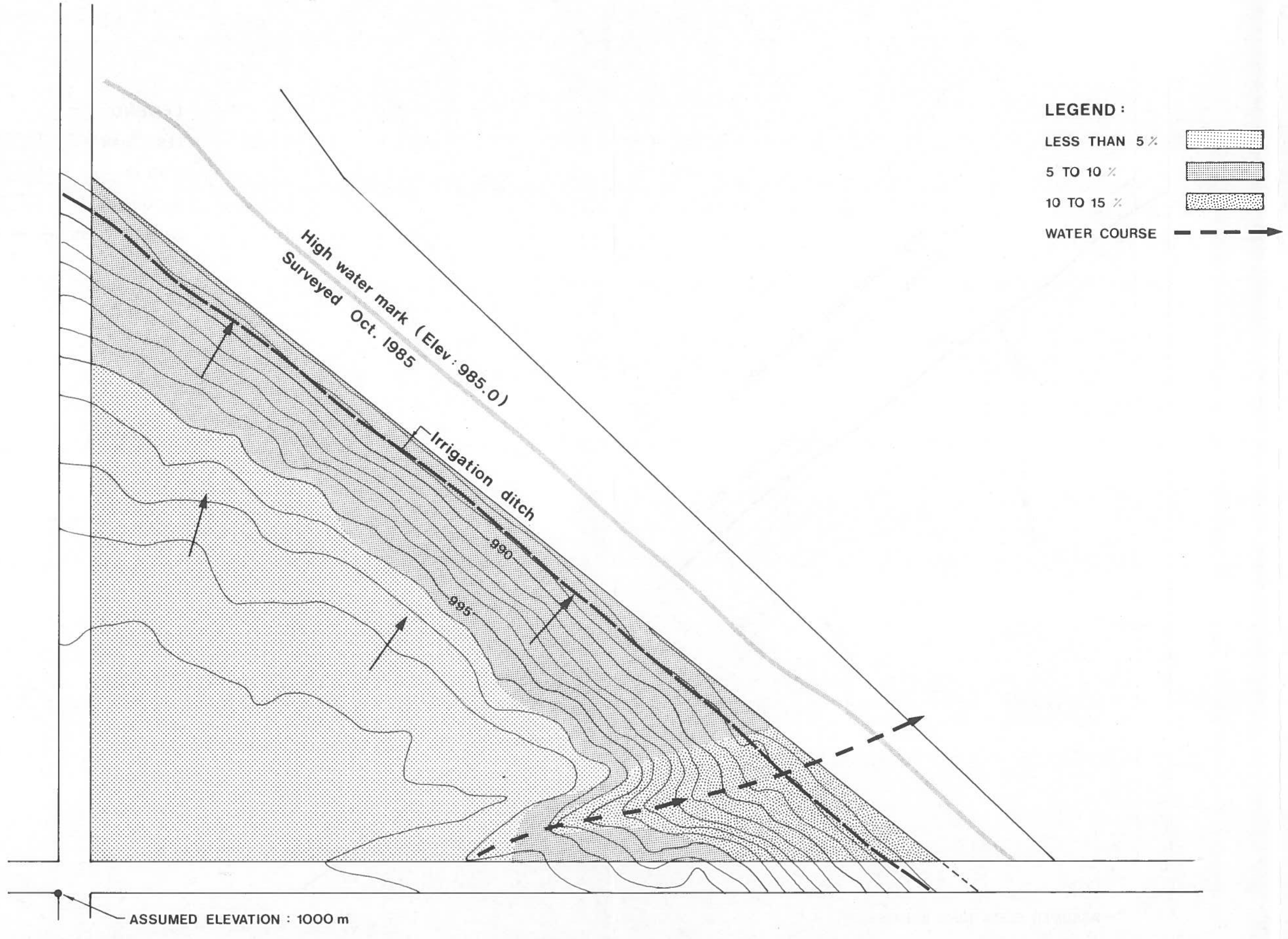
2.2 Soils

The site is covered by topsoil varying in depth from 50 to 200 mm. This is underlain in the Southeast corner of the site by a silty clay with occasional pebbles and rock, believed to be a ground morain till. In the remainder of the site a silty clay was encountered which is believed to be of Glacio-Lacustrine origin likely underlain by till. Bedrock is shale and sandstone of the Foremost formation.

The agricultural classification is CLI 5 and 6 indicating agricultural soils with severe limitations and improvement practices are not feasible.

2.3 Land Ownership

The entire A.S.P. area is held under one Certificate of Title. The owners of this property are Mr. Ray Carl Doram and Mr. Roy Joseph Doram of Coaldale. The land ownership for this site and the adjacent lands are indicated on Map 3.



LEGEND :

LESS THAN 5 %

5 TO 10 %

10 TO 15 %

WATER COURSE

2.4 Existing Land Use

The County of Lethbridge No. 26 Land Use Bylaw No. 666 classifies the study area as Rural Agricultural (R-A). The R-A classification permits the land to be used for extensive agriculture, first farm residence and auxiliary buildings and for a second farm residence (subject to section 76 of the Planning Act 1977). The A.S.P. area and the adjacent lands are mainly used for grazing. Some smaller areas in the vicinity are irrigated; the majority of the land however is not. Due to the soil properties the grazing should be classified as poor.

Just recently the Town of Coaldale created a recreational park immediately south of the study area along the shore line of Chin Coulee Lake. The park land (20 acres approximately) is being leased by the town from the land owners. The recreational purpose of the park is water-oriented. One boat launching ramp were installed and swimming in the lake is allowed.

All existing land uses are shown on Map 4.

2.5 Existing Utilities

The A.S.P. area and the adjacent lands are mainly raw agricultural. Due to requirements of the park, hydro and telephone will be installed early in 1986.

The park, south of the study area has its own well and sanitary facilities.

In the near future, the Town of Coaldale will install a water pumping station near the park's lands. The water drawn from the lake will provide the town's potable water. (The purification plant will be in the town). The future raw water supply main will run in the East-West Right-of-Way, South of the study area.

Road

Road

14
9-19-4

13
9-19-4

CHIN

COULEE

LAKE

Road Plan No. 2457 HY

Reg'd Plan No. B293 JK

Reg'd Plan No. 7811245

11
9-19-4

12
9-19-4

Road

Road

14
9-19-4

13
9-19-4

CHIN

COULEE

LAKE

Reg'd. Plan No. 7811245

Road Plan No. 2457 HY

Reg'd. Plan No. 8203 JK

11
9-19-4

12
9-19-4

Existing 3 Phase Power

Road

Road

OVH 3 Phase Power Line N/S Along West Side of Road Allowance to Hwy No. 3

Road Plan No. 2457 HY

Reg'd. Plan No. 8293 JK Gas Pipe Line

Reg'd Plan No. 7811245

CHIN

COULEE

LAKE

Future raw water supply
(Town of Coaldale)

14
9-19-4

13
9-19-4

11
9-19-4

12
9-19-4

2.6 Existing Transportation Network

The existing transportation network in the vicinity, as shown on maps 1 and 5 is based on the grid system of the 3rd system of survey performed around the turn of the century.

Access to the site is off the East-West gravelled road allowance immediately south of the study area. This gravel road leads due West to the town of Coaldale.

In addition, an upgraded N-S road allowance runs approximately 3.2. km North and South from the S.W. corner of Section 14. This road allowance connects to Highway #3 to the North (a paved 2 lane artery) which is the link to the Town of Coaldale and the City of Lethbridge to the West. To the South this road allowance ties into the gravelled extension of secondary highway No. 512. Adjacent to the West boundary of the study area is a dedicated undeveloped road allowance.

3.0 POLICIES AND PLANS

3.1 Existing Hierarchy of Planning Documents

The Planning Act, 1980 establishes a hierarchy of documents in which the Area Structure Plan is one component. In this instance, in the absence of a General Municipal Plan which would govern the area in question, the Area Structure Plan must conform with the general policies outlined in the Regional Plan. These policies are briefly reviewed below.

Pursuant to section 12 of the Rural Land Use Amendment 1980, on April 5, 1984 the Commission passed a resolution to redesignate the Doram Heights area to a "Special Area for Country Residential Use" and this resolution subsequently was ratified by the Alberta Planning Board on May 15, 1984.

Further Section 13 of the Rural Land Use Amendment states that:

"When a Special Area for Country Residential Use is established pursuant to a written request of a Council, no subdivision application for country residential use shall be approved in the area unless the subdivision conforms with or forms part of an area structure plan based on criteria agreed to and established by the municipality and the Commission for the special area."

This Area Structure plan was then undertaken to conform with this section to:

(1) establish the criteria for future development

(2) allow a subdivision application for this area and obtain approval of the same.

4.0 THE DEVELOPMENT PLAN

The Development plan is a design illustrated on Map 6 and is intended to act as an outline plan to guide future subdivision. Subdivision proposals are not required to specifcally conform to this design if the applicant can find a suitable alternative.

4.1 General Overview

From the foregoing analysis and development considerations, the Development Plan for Doram Heights was conceived to provide an attractive country residential development along the shoreline of Chin Coulee Lake.

The particular features of the Development Plan are:

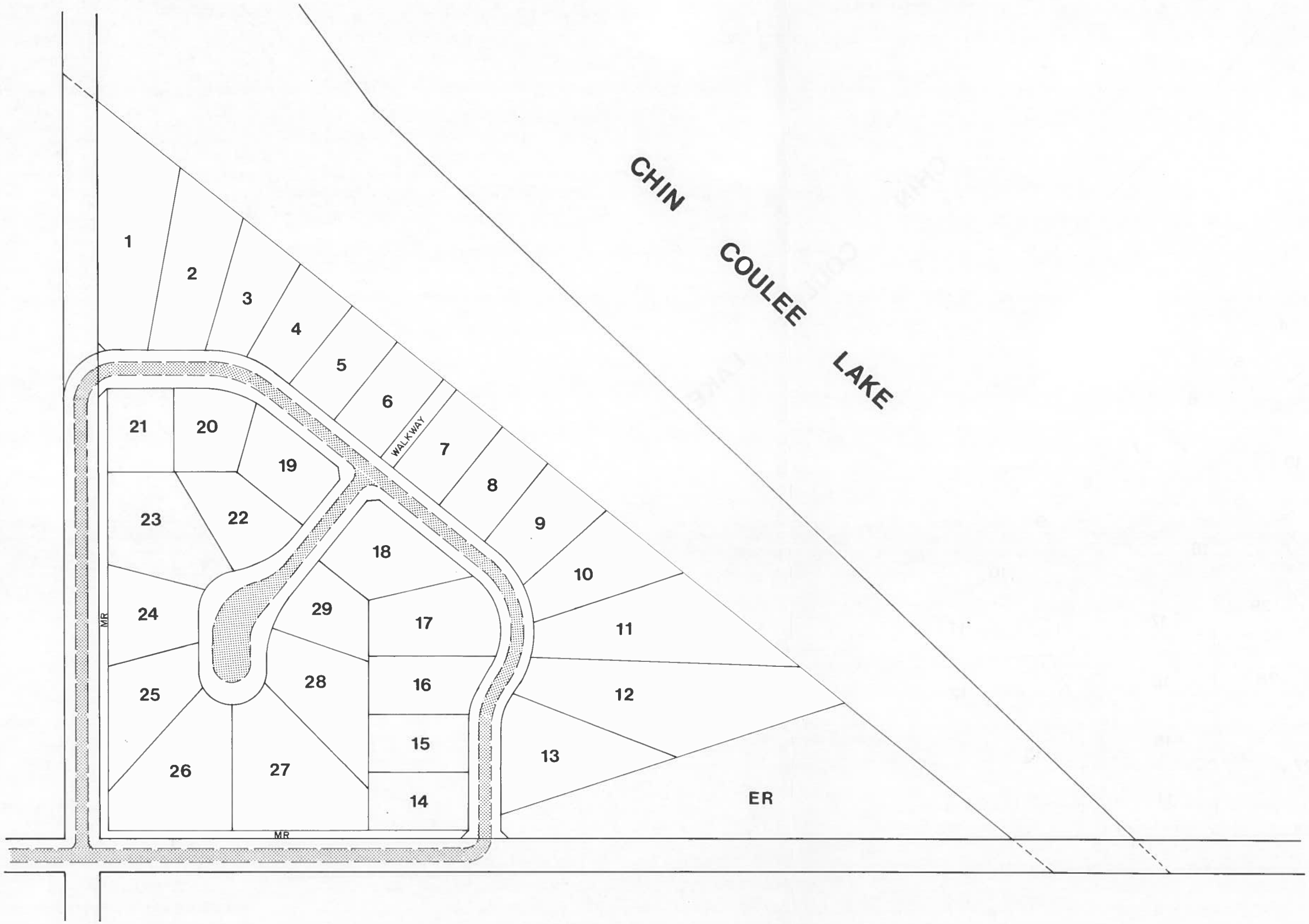
- Lot sizes: 1/3 to 1/2 acre approximately, various shapes
- Three clusters of housing units interlinked by an internal road system
- Access to the shore for the development
- The "introverted" development reduces the potential conflict between the general public and the development and clearly delineates the respective maintenance responsiblities.

The remainder of this section discusses the particular aspects of the Development plan in greater detail.

4.2 Site Access

The main access to the site will be the East-West road allowance between Section 11 and 14-9-19-W4M.

This road will also serve as access road to the park of the Town of Coaldale and to the proposed raw water pumping station. The developed road will be quite adequate to handle the additional traffic of this relatively small subdivision as traffic peaks of the park and this subdivision will not coincide.


CHIN
COULEE
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WALKWAY
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This road will also be maintained and plowed in winter time as access to the above pumping station for maintenance vehicles will be required at all times.

4.3. Internal Roads and Walks

For safety reaons, two points of access to the development were designed. A centrally located walkway provides access to the Lake for the lot owners that do not have frontage along the Lake.

4.4 Utilities

4.4.1 Concerns

Water pollution of Lake Stafford is recognized to be of extreme concern to S.M.R.I.D. and the municipalities that presently draw or in the future may draw water from the reservoir for their municpal water system. The following sections discuss sewage disposal and storm water drainage in more detail.

4.4.2 Sanitary Sewage

The cost of a sewage collection system and a waste stabilization pond would be prohibitive to a development of this size, especially since additional land would have to be found at least 300 metres away from this development for the stabilization pond (sewage lagoon). The pond's discharge certainly should not be directed to the lake while effluent irrigation would not be cost effective due to the small amount of sewage produced annually by this development.

It is, therefore, recommended that sanitary sewage be disposed in a private system (on each Lot).

In March 1984 a study was undertaken by Hardy Associates (1978) Ltd. to determine the suitability of the soils in the A.S.P. area for the installation of weeping tile disposal fields (see Appendix A)

The study concluded that the soils were well suited for such installation and that they would remain permeable throughout the life of such a system. This study also concluded that these tests were done during low levels in Stafford Lake and groundwater levels are likely to rise when the water in Stafford Lake is raised.

For this reason a groundwater level monitoring program was undertaken by Hardy Associates (1978) Ltd. in the summer of 1985, when Chin Coulee Lake was at full service level. (See Appendix B).

The two boreholes drilled on the flat lands (up to a depth of 9.55 m) remained dry during the monitoring period.

A third borehole was advanced next to the small irrigation ditch. This private irrigation ditch however is no longer in use.

It is expected that this will eliminate the fluctuation of the groundwater levels in this area.

The above would indicate that the installation of subsurface disposal fields on the flat lands would be safe and that no contamination of the Chin Coulee Lake waters will occur.

As the saturated sand layer near borehole 1 is at a depth of 3.5 m, a safe operation of tile fields should also be possible here.

The recommendation by Hardy Associates, is that "any subsurface sewage disposal system be offset a minimum of 100 m from the full level of Stafford Reservoir", should be followed as a rule unless it can be proven, on a site specific basis, that a safe operation of a tile filed is possible closer to the lake. The individual fields will have to be designed and built in strict accordance with the specifications (and inspection) by the Alberta Department of Labour, Plumbing Inspection Branch.

As an additional security the Council of the County of Lethbridge could pass a bylaw that such field be inspected annually as to their proper working condition and oblige the individual owners to have any deficiencies repaired forthwith.

4.4.3 Water

Water will be supplied by individual wells on each lot or by cistern.

4.4.4 Storm Drainage

It is recommended that storm drainage be handled overland through roadside ditches outfalling in the coulee near the southeast corner of the development. In order to keep the change in total C-rate (absorption and percolation rate) of the site to a minimum it is recommended that the internal road is just gravelled. It is also recommended that the grade of the roadside ditches will be kept at the very minimum so that they will act as a stormwater detention basin and that a zero increase run-off can be attained.

4.4.5 Shallow Utilities

Suitable arrangements will be made by the developer with the utilities companies to extend these to the proposed development and each individual lot.

4.5 Development Potential

With the proposed internal roads and lot sizes of 1/3 to 1/2 acre, the development potential of Doram Heights is approximately 29 lots.

Only a 5 meter wide buffer strip along the developed road allowances has been set aside as municipal reserve. The remainder of the required municipal reserve may be taken by the County of Lethbridge as cash in lieu. The coulee area in the southeast corner is set aside as environmental reserve. These aspects will be incorporated into the development agreement.

The area breakdown of the Development Plan is summarized below.

	ha	% of Total Area
Internal roadways (20 m wide)	1.6	13.2
Municipal reserve	0.35	2.9
Environmental reserve	1.30	10.8
Lot area	8.85	73.1
Total	12.1	100.0%

4.6 Proposed Land Use

The only permitted use in Doram Heights will be country residential.

4.7 Financing

All expenses as directly related to development will be financed by the developer.

5.0 IMPLEMENTATION

5.1 Phasing

The complete area will be developed as follows:

5.1.1 Subdivision and Registration

5.1.2 Marketing Master Plan and Servicing

5.1.3 Construction of Houses

Construction of houses by the developer, to be offered as lot/dwelling serviced packages.

5.2 Development Guidelines and Standards

In order to ensure that Doram Heights is a high quality country residential development the following development standards should be implemented.

5.2.1 Corner Lot Restrictions

Sight angles must be protected to maintain a degree of safety, therefore standards should be adopted as to setbacks, recognizing the uniqueness of each lot and the limited traffic at the project in general.

5.2.2 Yard Requirements

Certain minimum yard requirements are needed to provide both fire separation and guarantee the availability of an area for landscaping.

Front yards should be a minimum of 8 metres with parking being allowed but no open storage. The front yard could be landscaped or combined with preservation of certain natural foliage.

A minimum side yard of 5 metres should be maintained. This would allow a minimum separation between buildings. Dwellings will be placed according to a Master Plan to optimize privacy and site lines within the entire site.

5.2.3 Minimum Lot Size

In accordance with the policies of the Country of Lethbridge and to ensure adequate space requirements for the tile fields, the lot sizes will be 1/3 to 1/2 acre, of various shapes.

5.2.4 Architectural Control

To obtain an aesthetical streetscape, architectural controls will have to be enforced.

Details of such controls, such as exterior finishes allowed, colour scheme, etc. will be resolved between the Development officer and the developer at the development permit stage. These controls will be registered against the titles.

5.2.5 Landscaping

Together with the architectural standards, the landscaping will to a large degree determine the quality of the development. Therefore the development permit application should include a landscaping plan. The following are suitable guidelines:

- The front yard shall be landscaped to the satisfaction of the Development Officer.
- In the case of corner lots, the minor street frontage shall also be landscaped to the satisfaction of the Development Officer.

- Landscaping may consist of any or all of the following:
  (a) trees, shrubs, lawn, flowers;
  (b) large feature rocks, bark chips, field stone;

(c) berming, terracing;

(d) other innovative landscaping features, including preservation of natural foliage in combination with new landscaping.

- Where screen planting is required, evergreen trees and flowering trees may be used (e.g. May Day Tree, Russian Olive, flowering crab), in combination with suitable building materials.

5.2.6 Refuse Collection

Suitable arrangements for refuse collection will be made in the conditions for development permit.

5.2.7 Other Development Standards

It is difficult to prepare a set of standards that would account for every possible situation. The Development Officer should be able to enforce additional standards as he sees necessary. Therefore to allow for unforseen circumstances a statement such as the following may be required.

The Development Officer may require special standards: including the quality or compatibility of any proposed development such as, but not limited to, the control of architecture, exterior building finishes, landscaping, siting, setback variation, parking areas, and access.

5.3 Implementation

Under Section 62 of The Planning Act, 1977, an Area Structure Plan may be adopted by by-law. The by-law adoption procedure is outlined in Part 6, Division 1 of The Planning Act and includes advertising the intention to adopt a by-law, public hearings and three readings. An outline of this bylaw is included on the following page.

County of Lethbridge No. 26 Bylaw No ---

A bylaw of the County of Lethbridge No. 26 in the Province of Alberta to adopt an Area Structure Plan for the Doram Heights Subdivision.

WHEREAS, Section 64(1) of the Planning Act 1980 and Amendments thereto allows the Council to adopt the Area Structure Plan for the Doram Heights Subdivision.

AND WHEREAS, the Council of the County of Lethbridge No. 26 deems it advisable to adopt the Area Structure Plan for the Doram Heights Subdivision area.

NOW THEREFORE, be it resolved that the Council of the County of Lethbridge No. 26, duly assembled, hereby enact that the Area Structure Plan for the Doram Heights Subdivision, as attached here as Schedule A, is hereby adopted.

READ a first time this _____ day of _____, A.D. 19___

_____ _____
Reeve Manager

READ a second time this _____ day of _____, A.D. 19___

_____ _____
Reeve Manager

READ a third time this _____ day of _____, A.D. 19 ___

_____ _____
Reeve Manager

APPENDIX A

Report on

STAFFORD LAKE SUBDIVISION

PERCOLATION TEST

Prepared for

MR. ROY DORAM/MR. RAY DORAM

c/o SUTHERLAND ASSOCIATES

REAL ESTATE LTD.

LETHBRIDGE, ALBERTA

Prepared by

HARDY ASSOCIATES (1978) LTD.

LETHBRIDGE, ALBERTA

JOB NO. LXO7126

MARCH 1, 1984

TABLE OF CONTENTS

1.0 INTRODUCTION

On February 17, 1984, Hardy Associates (1978) Ltd. was retained by Mr. Michael Sutherland of Sutherland Associates Real Estate Ltd., on behalf of Mr. Ray Doram and Mr. Roy Doram, to conduct percolation tests in a proposed subdivision. The purpose of the percolation tests was to establish the viability of individual septic systems for each of the proposed residential parcels.

Authorization to proceed with the work was given in a letter from Mr. Sutherland dated February 17, 1984.

The purpose of this report is to convey the results of the percolation tests and the soils tests conducted at the proposed subdivision site.

2.0 SITE DESCRIPTION

The proposed residential project is located in the southwest quarter of section 13, township 9, range 19, west of the 4th meridian which is approximately 11 km east of the town of Coaldale, Alberta. The proposed parcel is triangular in shape bordered on the east and the south by presently undeveloped road allowances and on the northeast by the Chin Coulee Lake. The area at the proposed development is approximately 12 hectares. The present land use is undeveloped pasture.

3.0 SCOPE OF WORK

On February 22, 1984, seven test holes were advanced at the approximate locations shown in Plate 1, of Appendix "A" by a Bob Cat skid steer loader equipped with a 0.23 m diameter auger supplied through Tamaki

Fencing Services of Lethbridge, Alberta. Five of the holes were advanced to a depth of 0.9 m to conduct the percolation tests and two of the holes were advanced to a depth of 3.0 m in an attempt to establish the presence of a shallow ground water table.

Soil samples were recovered from the five percolation test holes and returned to our laboratory for grainsize analysis and Sodium Adsorption Ration determination.

4.0 SOIL CONDITIONS ENCOUNTERED

The soil conditions encountered in the shallow (0.9 m) percolation test boreholes was as follows:

Test holes 1 and 2 encountered from 75 mm to 200 mm of topsoil underlain by a silty, low to medium plastic clay with occasional pebbles and rocks. This material is believed to be a ground morain till.

Test holes 3 through 5 encountered 50 mm of topsoil underlain by a light grey brown silty clay. This material is believed to be of glacio-lacustrine origin and is likely underlain by till at depth.

The soil conditions encountered in the deeper (3.0 m) test holes was as follows:

Deep hole 1 encountered the ground morain till throughout its depth. Two trials were required to advance the second deep hole. The first attempt could not be drilled to the full depth due to rocks in the bottom of the hole. The second attempt revealed 50 mm of topsoil underlain by 2.4 m of silty clay with some fine sand which was in turn underlain by 0.6 m

of medium coarse sand.

No free water was encountered in any of the test holes.

5.0 RECOMMENDATIONS

The percolation test results shown in Appendix "B" Table 1 indicate that the percolation rates of the soils range from 2.9 to 9.0 minutes per 25 mm. These values indicate that the soils are suitable for syphon chamber and disposal field with 3 or 4 system flushes per day.

The specific design of the system for each residence would depend on the individual housing unit on each lot. However, a typical 3 bedroom home would required 52 m of 203 mm diameter weeping tile in the laterals.

The Sodium Adsorption Ratio test results shown in Table 2 Appendix "B" indicate that the soils should remain permeable throughout the life of the system.

At the time of the investigation no free water was encountered in any of the test holes. However, the water level in Chin Coulee Lake was also at a low level. Since special measures such as a selected system or a disposal mound are required if the groundwater table is within 1.5 m of the ground surface it is recommended that the groundwater level be monitored again in June when the lake level has reached its maximum.

It should also be noted that Alberta Regulation 340/77 Article 184-3 states that:

> "A subsurface weeping tile effluent disposal field or an evaporation mound shall be located not less than:

a) 1 m (3 ft) from any property line
b) 15 m (50 ft) from any well or other water source
c) 3 m (10 ft) from a septic tank
d) 10 m (30 ft) from any basement or cellar
e) 3 m (10 ft) from any (non-basement) building"

6.0 CONCLUSION

Based on the percolation and soils testing done to date the subsoils of the proposed residential developemnt appear suitable for the use of weeping tile disposal fields. However, since the groundwater table is expected to rise when the level of Chin Coulee Lake is raised in the spring, it is strongly recommended that groundwater monitoring and a flow analysis be conducted in the late spring or early summer when groundwater levels are at a maximum to determine the potential for contamination of the Chin Lake reservoir.

We thank you for the opportunity to assist you with this project. If we can be of any further assistance or if you have any questions or comments please contact our office.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF ALBERTA
PERMIT NUMBER
P 226
HARDY ASSOCIATES (1978) LTD.

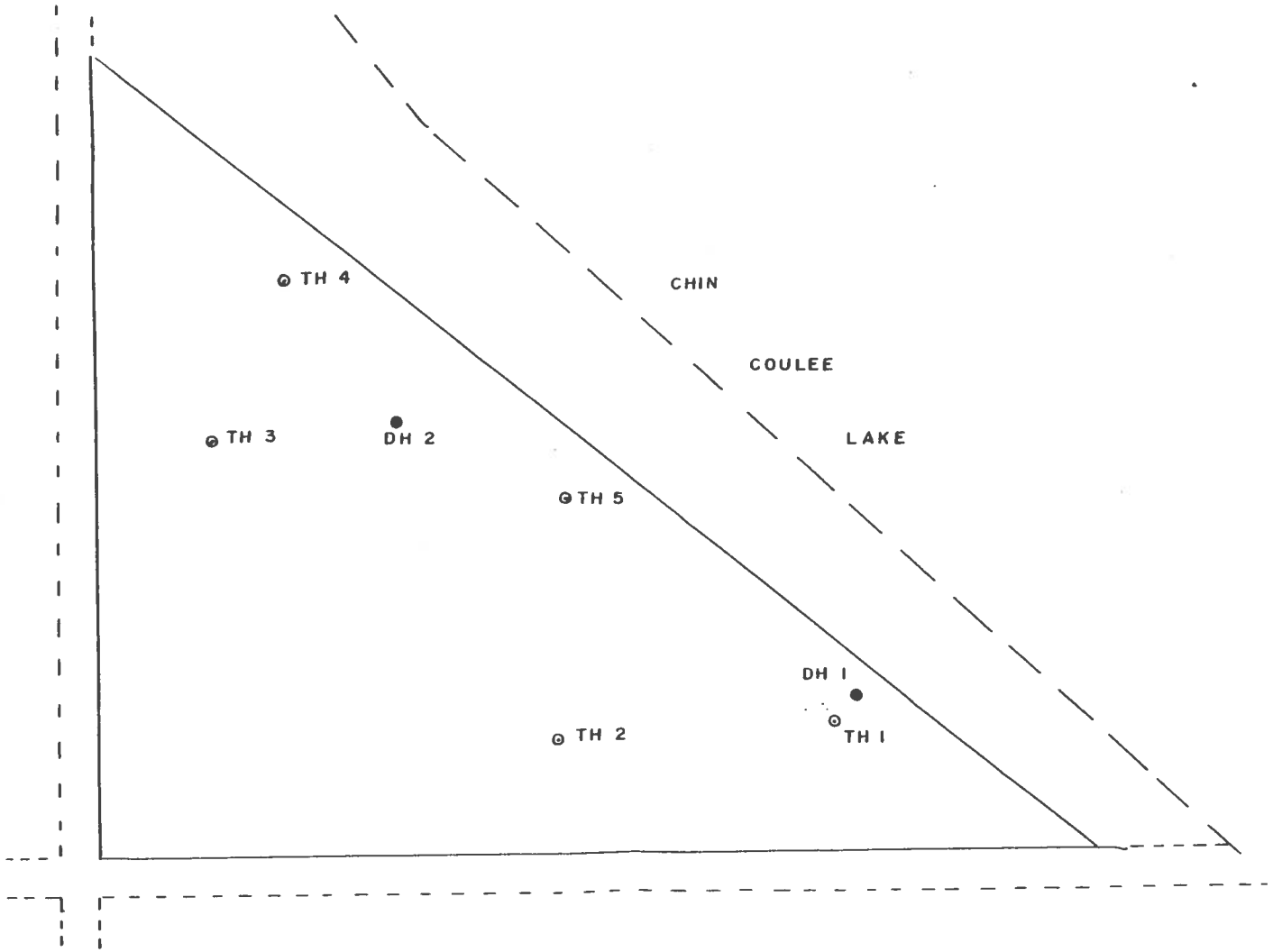
Respectfully submitted,
HARDY ASSOCIATES (1978) LTD.

PROFESSIONAL ENGINEER ALBERTA

Per: J.K. Manby, P. Eng.

JKM:tr

Per: G.P. Lewkowich, P.Eng.



ONS	REFERENCES ⊙ PERCOLATION TEST HOLE ● GROUNDWATER TEST HOLE	SCALE DATE MADE CHKD APPD	HARDY ASSOCIATES (1978) LTD. CONSULTING ENGINEERING & PROFESSIONAL SERVICES	APPROXIMATE BOREHOLE LOCATIONS No. LX 07126 PLATE 1

HT14 - 79/06

PERCOLATION TEST RESULTS

The percolation test results are shown in Table I:

TABLE I
PERCOLATION TEST RESULTS

Test Hole No.	Percolation Rate minutes per 25 mm
1	9.0
2	6.4
3	2.9
4	7.9
5	3.2

TABLE II
SODIUM ADSORPTION RATIO (S.A.R.)

Test Hole No.	S.A.R.
1	0.48
2	3.04
3	1.29
4	1.72
5	0.44

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

LAB ORDER NO.	LX07126
CLIENT	Roy & Ray Doram
SAMPLE	
SOURCE	
HOLE | DEPTH	DATE REC'D.
TECHNICIAN	HA/JC DATE TESTED Feb. 27/84

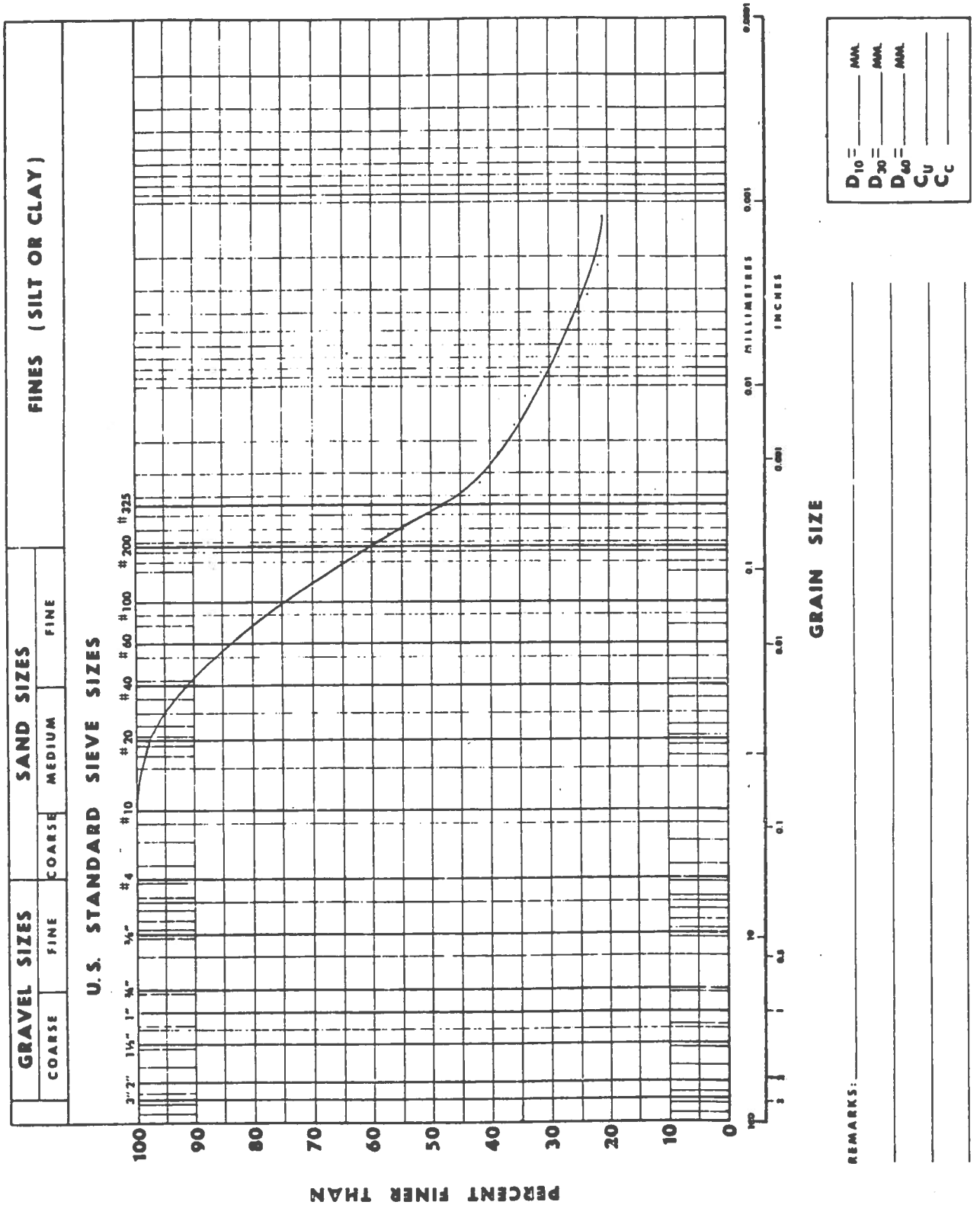


PLATE 2

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

LAB ORDER NO.	LX07126
CLIENT	Roy & Ray Doram
SAMPLE	
SOURCE	
HOLE 2 DEPTH	DATE REC'D.
TECHNICIAN HA/JC	DATE TESTED Feb. 27/84

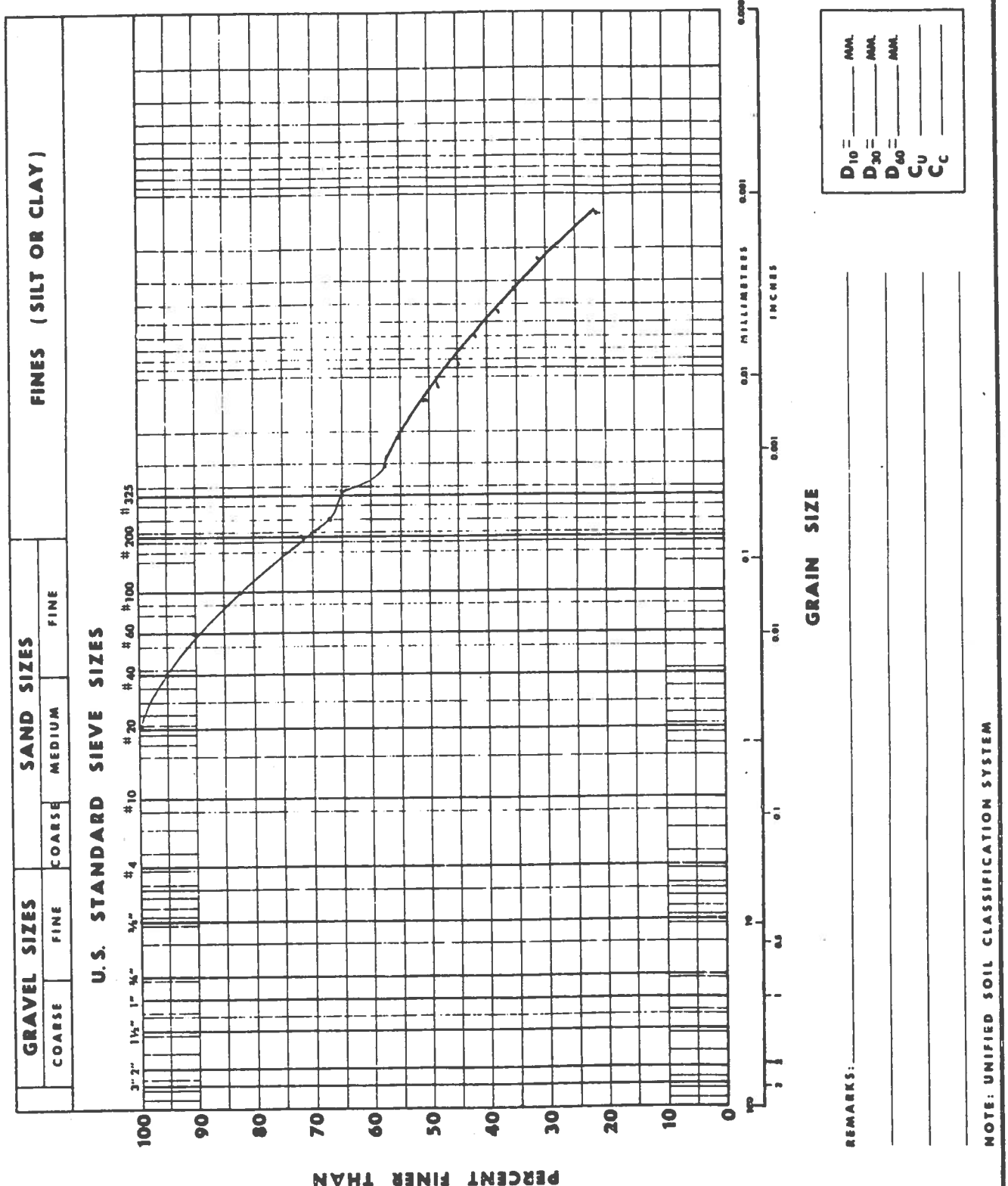
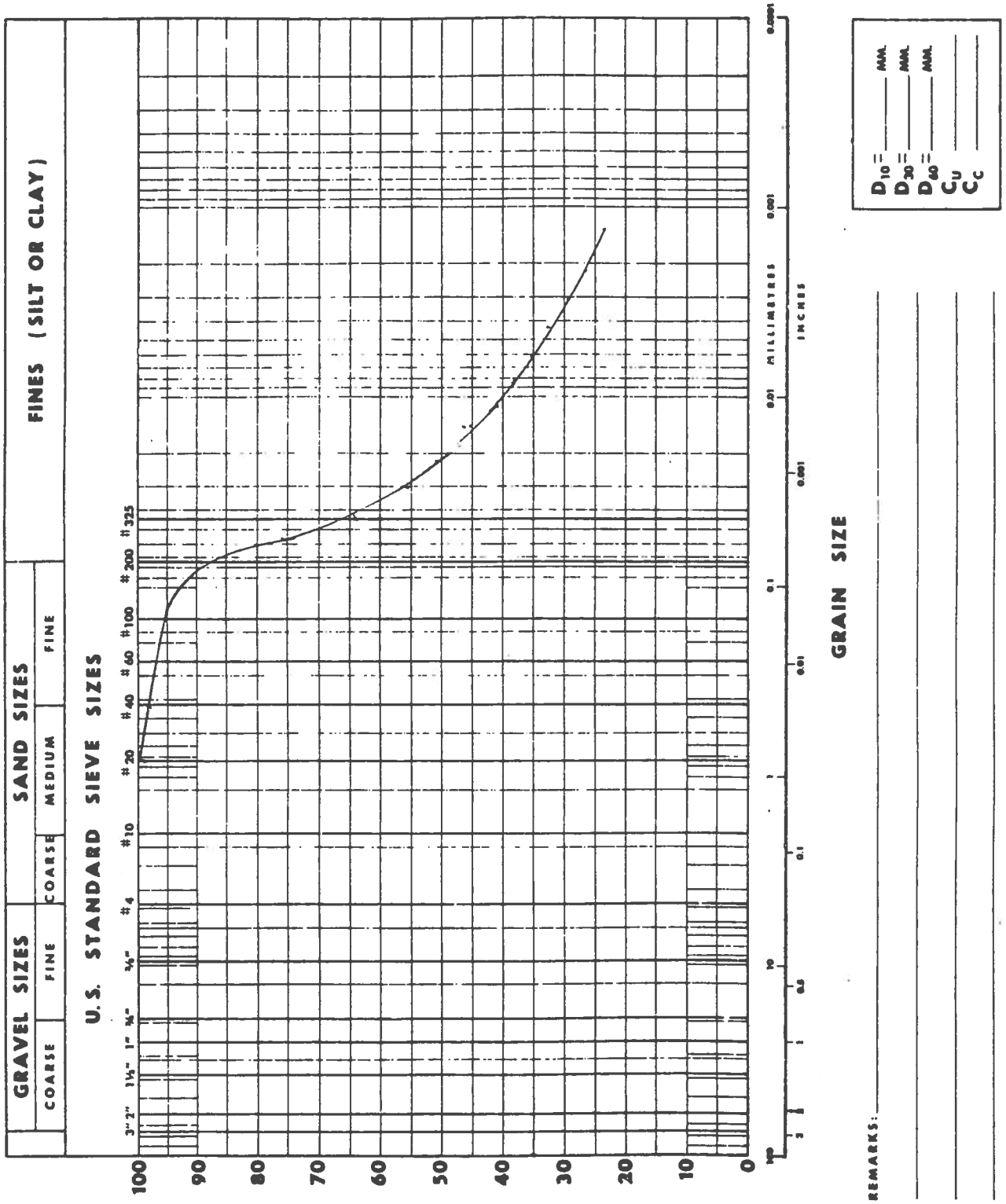


PLATE 3

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

LAB ORDER NO.	LXO7126
CLIENT	Roy & Ray Doram
SAMPLE	
SOURCE	
HOLE 3 DEPTH	DATE REC'D.
TECHNICIAN HA/JC	DATE TESTED Feb.27/84

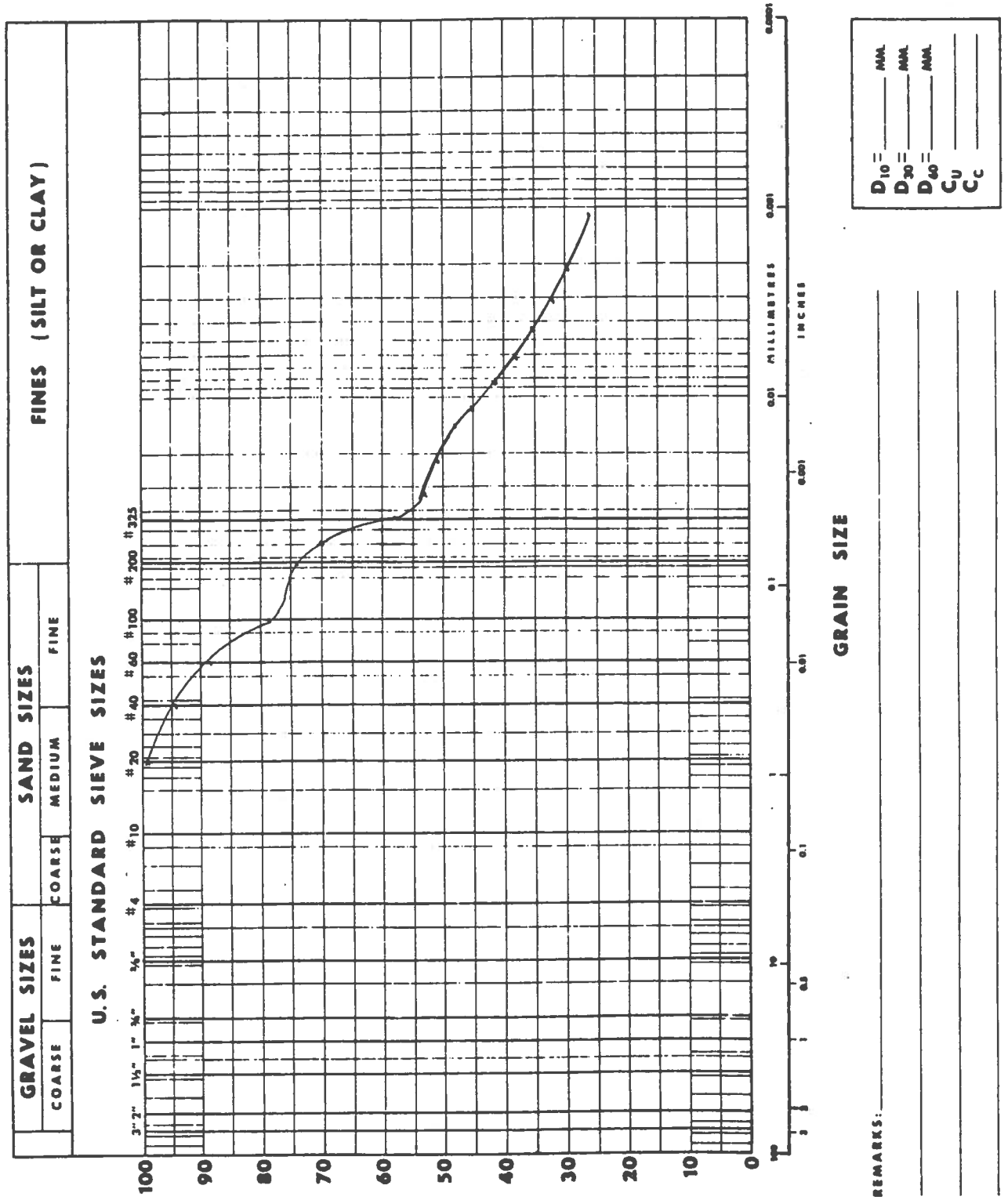


PLATE

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

LAB ORDER NO.	LXO7126
CLIENT	Roy & Ray Doram
SAMPLE	
SOURCE	
HOLE 4 DEPTH	DATE REC'D.
TECHNICIAN HA/JC	DATE TESTED Feb. 27/84



REMARKS:

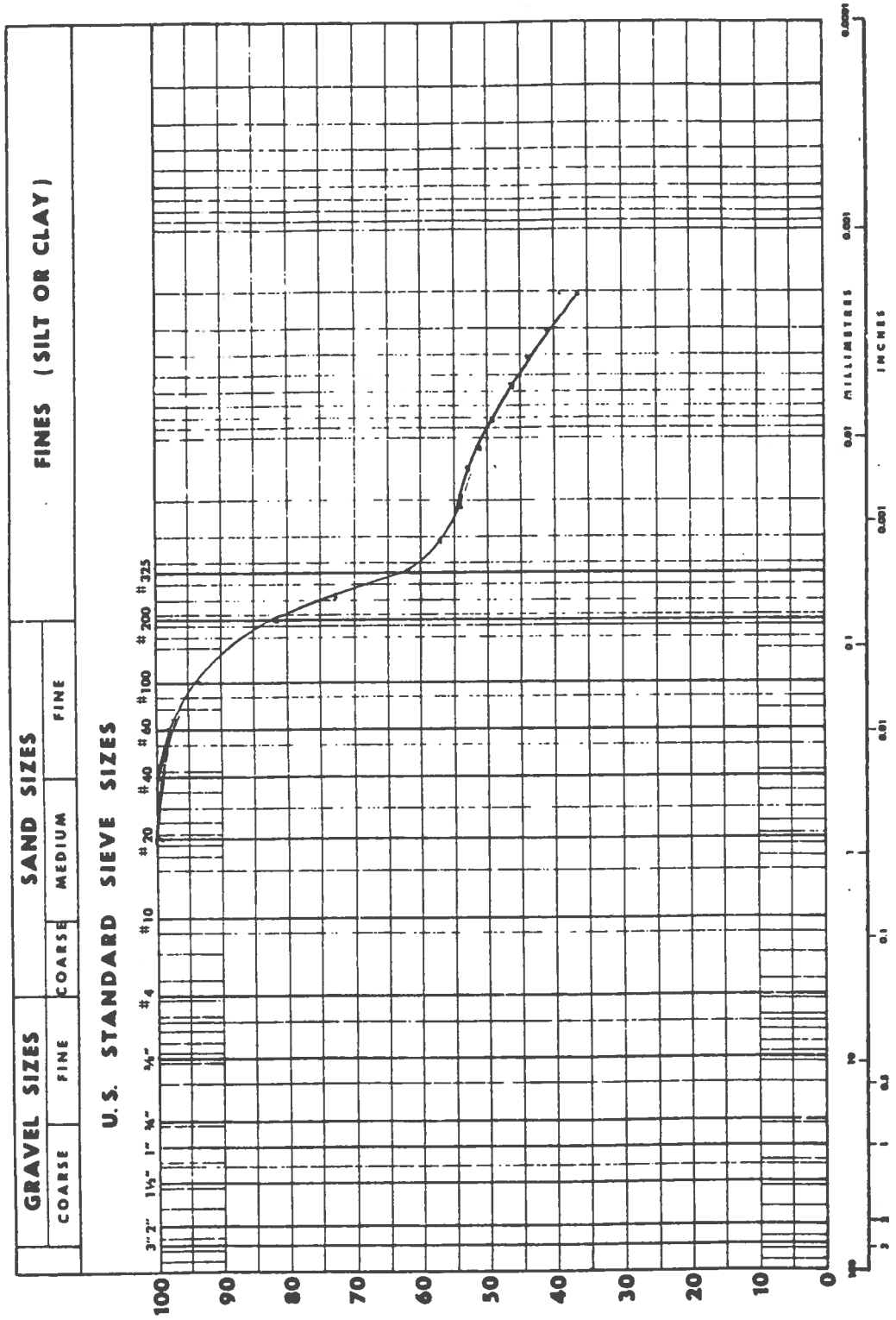
NOTE: UNIFIED SOIL CLASSIFICATION SYSTEM

PLATE

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GRAIN SIZE CURVE

LAB ORDER NO.	LX07126
CLIENT	Roy & Ray Doram
SAMPLE	
SOURCE	
HOLE 5 DEPTH	DATE REC'D.
TECHNICIAN HA/JC	DATE TESTED Feb.27/84



PLATE

APPENDIX B

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

Our Project No. LX07480
Your Reference No.

November 14, 1985

The McElhenney Group
450, 999 - 8th Street SW
Calgary, Alberta
T2R 1J5

Attention: Mr. Fernand Theunissen, P. Eng.

Dear Sir:

RE: Doram Heights Subdivision
Offset from Stafford Lake

In our report titled Doram Heights, Groundwater Level Monitoring Program, dated September 9, 1985, it was recommended that any subsurface sewage disposal system be offset a minimum of 100 m from the design highwater level of Stafford Reservoir.

This recommendation meets the requirements of Alberta Plumbing and Drainage Regulation 340/77, Division 2, Part 21, Article 185 (4b), Sewage Effluent Discharge to the Ground Surface. Article 185 (3b) and 186 provide for a 15 m horizontal offset from a water source and 1.5 m minimum vertical distance from any water table if a subsurface weeping tile effluent disposal field is used. Therefore, if no surface discharge of effluent occurs, the minimum horizontal offset from Stafford Lake or other water sources can be reduced from the 100 m recommendation given in our report.

Based on the results of our investigation, the minimum depth of water table of borehole 1 was 1.86 m below existing ground surface. Therefore, an offset in the order of 65.0 m could be expected if the requirements of Article 186 are strictly adhered to.

.../2

We trust that the above meets your requirements at this time. If you have any questions or comments, please contact our office at your convenience.

Respectfully submitted,

HARDY ASSOCIATES (1978) LTD.

Per:

J. K. Manly, P. Eng.

Per:

G. F. Lewkowich, P. Eng.

JKM:tmb

HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

GEOTECHNICAL INVESTIGATION
on
DORAM HEIGHTS
GROUNDWATER LEVEL MONITORING PROGRAM

Prepared for
THE McELHENNEY GROUP
CALGARY, ALBERTA

Prepared by
HARDY ASSOCIATES (1978) LTD.
LETHBRIDGE, ALBERTA

PROJECT NO. LX07480
SEPTEMBER 9, 1985

CC Sutherland Real Estate Ltd.

TABLE OF CONTENTS

1.0 INTRODUCTION

At the request of Mr. Fernand Theunissen, P.Eng. of The McElhenney Group Hardy Associates (1978) Ltd. has conducted a groundwater level monitoring program at the site of the proposed Doram Heights development. The purpose of this was to determine the static groundwater level at the site and determine if any fluctuations in water level occur with changing levels in Stafford Lake Reservoir.

Authorization to proceed with the work was given in a letter dated May 30, 1985.

2.0 FIELD WORK CONDUCTED

On June 17, 1985 three boreholes were advanced at the site using a truck-mounted drilling rig owned and operated by Double "D" Drilling Ltd. of Picture Butte Alberta. The borehole locations are shown on Plate 1, Appendix "A".

The subsoils encountered in each borehole were visually logged in the field and Standard Penetration Tests were conducted at regular intervals to determine the relative density and/or consistency of the material encountered. In addition, soil samples were recovered from the auger flights at regular intervals to determine the moisture profile at each location. All samples were carefully preserved and returned to our Lethbridge laboratory for further analysis and testing.

On completion of each borehole a slotted PVC standpipe was installed to monitor the future groundwater levels.

Following completion of the drilling program, each borehole was surveyed to establish baseline elevations for the monitoring program.

3.0 SUBSOIL CONDITIONS

The subsoil conditions varied at the site. Borehole 1 encountered a very stiff, medium-plastic clay containing occasional pebbles and coal and oxide inclusions to a depth of 3.5 m underlain by a wet to saturated silty sand. On the day of drilling the water level in the sands was 3.81 m below ground surface (elevation 86.45).

Boreholes 2 and 3 encountered dry to moist silty clay material throughout the full depth of each hole and both boreholes were dry on completion.

A more detailed description of the soils and a summary of laboratory testing results is shown on the borehole logs Plates 2 through 6 Appendix "A".

4.0 GROUNDWATER MONITORING

Groundwater levels and lake levels were monitored at various dates as shown in Table 1. These results indicate that boreholes 2 and 3 encountered no groundwater throughout the monitoring period and that groundwater levels in borehole 1 increased 1.79 m throughout the monitoring period.

During the same period the surface level in Stafford Reservoir increased approximately 0.49 m.

Borehole No.	Ground Surface Elevation	Depth of Hole	Depth of Water			
			June 17	June 25	July 10	Aug. 12
1	90.26	6.3	86.45	86.97	88.41	88.24
2	95.56	8.5	Dry	Dry	Dry	Dry
3	90.93	9.55	Dry	84.88	87.18	Dry

5.0 DISCUSSION AND RECOMMENDATION

Based on the results of our investigation we expect no impact on the ground water regime in the vicinity of boreholes 2 and 3.

Discussion with Saint Mary River Irrigation District and UMA Engineering Ltd. indicate that the outlet and inlet flows to Stafford Reservoir are regulated to maintian a relatively constant level in Stafford Reservoir. This is consistent with the change in lake level of 0.494 m observed during the monitoring period.

The 1.79 m fluctuation in groundwater levels in borehole 1 may be accounted for by leakage from a small (approximately 0.5 m wide) irrigation ditch adjacent to the borehole. It is our understanding that this ditch flows intermittently only.

However, due to the presence of saturated sands at 3.5 m below ground surface in the vicinity of borehole 1, we recommend that any subsurface sewage disposal system be offset a minimum of 100 m from the design full level of Stafford Reservoir or 30.0 m from the present irrigation ditch.

In addition, all other Board of Health requirements must be met on a site specific basis.

6.0 CLOSURE

We appreciate the opportunity of assisting you with this project. If you have any questions or comments please contact our office at your convenience.

Respectfully submitted

HARDY ASSOCIATES (1978) LTD.

Per: for

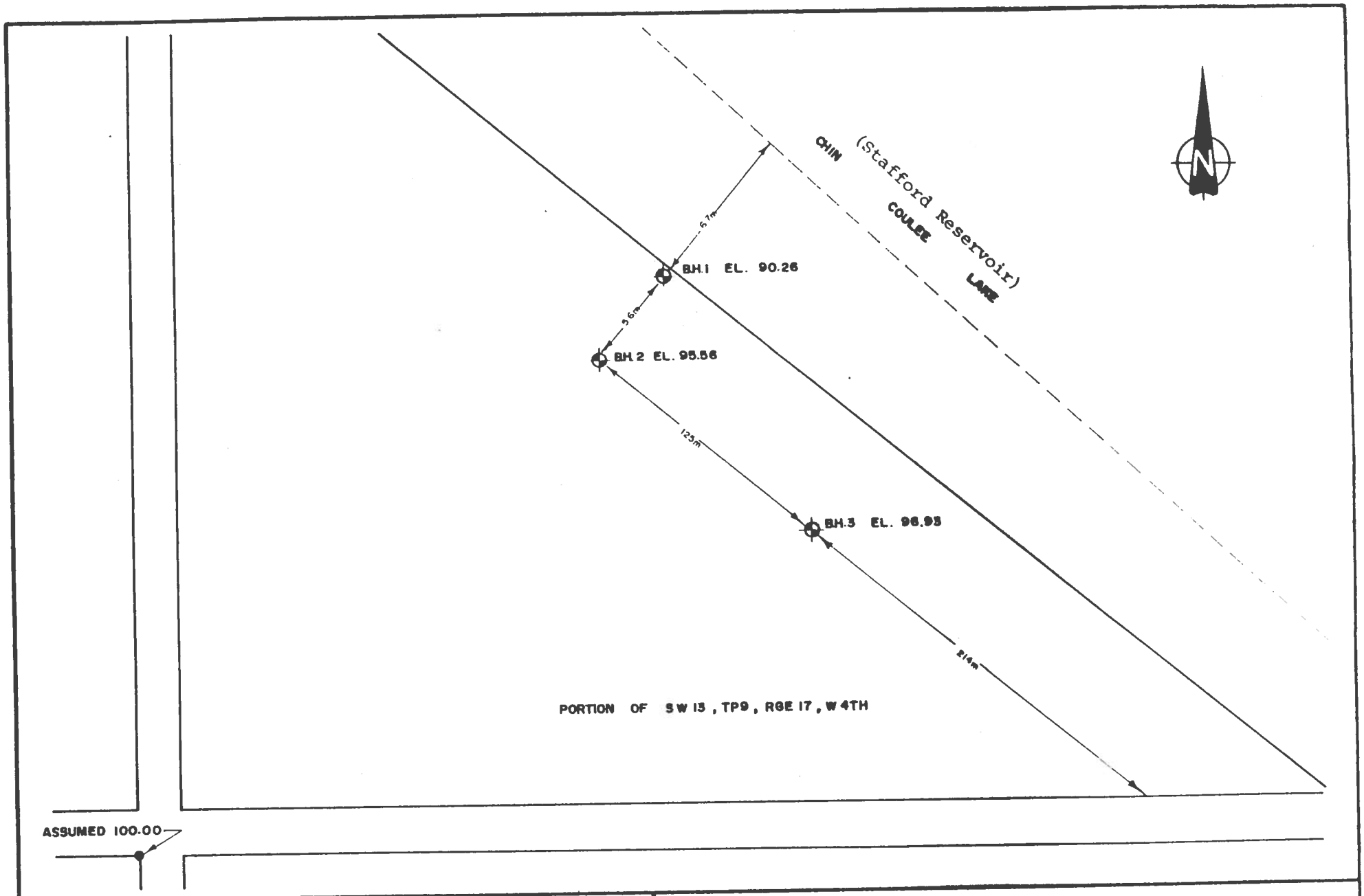
J.K. Manly, P. Eng.

THE ASSOCIATION OF PROFESSIONAL ENGINEERS GEOLOGISTS and GEOPHYSICISTS OF ALBERTA
PERMIT NUMBER
P 226
HARDY ASSOCIATES (1978) LTD.

Per:

G.F. Lewkowich, P. Eng.

JKM/blf



HARDY ASSOCIATES (1978) LTD.
CONSULTING ENGINEERING & PROFESSIONAL SERVICES

DORAM HEIGHTS

BORE HOLE LOCATION PLAN

JOB L-X07480

DWN: RLKOOY DATE: JUNE 18/85 SCALE 1:2000

Plate 1

BOREHOLE LOG

HARDY ASSOCIATES (1978) LTD.

PROJECT: DORAN HEIGHTS

LOGGED/DWN: JKI/RLR | CKD: JKH | DATE OF INVEST: June 17, 1985 | JOB NO: LX07480 | HOLE NO: 1

DRILL TYPE: Auger

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT % — Wp- □ W- O W_l- Δ — 10 20 30 40 50 60

DATUM: Assumed 100.00

SURFACE ELEVATION: 90.26

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE: CONDITION	TYPE	PENETRATION RESISTANCE	OTHER TESTS
		CLAY- Silty, medium plastic, brown, dry				
1		CLAY- Silty, very stiff, medium plastic, occasional pebbles, coal and oxide inclusions, dry to moist, till textured		D_1	N=15	
2						
3				D_2	N=28	
4		SAND- Silty, medium grained, wet to saturated				
5		SAND- Saturated, water bearing, medium grained, occasional gravel sizes		D_3	N>50	
6		End of hole at 6.28 m				

Plate 2

HT11 - 79/05

HARDY ASSOCIATES (1978) LTD.

CONSULTING ENGINEERING & PROFESSIONAL SERVICES

BOREHOLE LOG

PROJECT: DORAM HEIGHTS

LOGGED/DWN	CKD	DATE OF INVEST.	JOB NO.	HOLE NO.
JKM/KLK	JKM	June 17, 1985	LX07480	2

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT % — Wp- □ W- O W_l- Δ — 10 20 30 40 50 60

DEPTH m

SOIL SYMBOL

SOIL DESCRIPTION

DATUM Assumed 100.00

SURFACE ELEVATION 95.56

SOIL SAMPLE: CONDITION, TYPE, PENETRATION RESISTANCE

DRILL TYPE: Auger

OTHER TESTS

DEPTH (m)	SOIL DESCRIPTION
7	
8	Drill refusal at 8.5 m
	Dry on completion Slotted standpipe installed
9	

Plate 4

HT11 - 79/05

HARDY ASSOCIATES (1978) LTD.

CONSULTING ENGINEERS & PROFESSIONAL SERVICES

BOREHOLE LOG

PROJECT: DORAN HEIGHTS

LOGGED/DWN: JIM/KLK | CKD: JIM | DATE OF INVEST: June 17, 1985 | JOB NO: L.07480 | HOLE NO: 3

DRILL TYPE: Auger

CASING RESISTANCE blows foot (0.3m)

WATER CONTENT % Wp- □ W- O W_l- Δ

10 20 30 40 50 60

DATUM: Assumed 100.00

SURFACE ELEVATION: 96.93

DEPTH m	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE CONDITION	SOIL SAMPLE TYPE	SOIL SAMPLE PENETRATION RESISTANCE	OTHER TESTS
0		CLAY- Silty, occasional pebbles, light brown, oxide salt and coal inclusions, dry, till textured				
1		dry to moist, hard		D_1	N=26	
2						
3		moist		D_2	N=30	
4						
5						
6						

Plate 5

HT11 - 79/05

HARDY ASSOCIATES (1978) LTD.

CONSULTING ENGINEERING & PROFESSIONAL SERVICES

BOREHOLE LOG

PROJECT DORAY HEIGHTS

LOGGED/DWN	CKD	DATE OF INVEST	JOB NO	HOLE NO
JRM/RLK	JRM	June 17, 1985	LX07480	3

DRILL TYPE: Auger

CASING RESISTANCE blows/foot (0.3m)

WATER CONTENT % Wp- □ W- O W_l- Δ

10 20 30 40 50 60

DEPTH m

SOIL SYMBOL

SOIL DESCRIPTION

DATUM Assumed 100.00

SURFACE ELEVATION 96.93

SOIL SAMPLE: CONDITION | TYPE | PENETRATION RESISTANCE

OTHER TESTS

7

8

9

10

Dry on completion

D_3 N=34

Standpipe installed

Plate 6

HT11 - 79/05