GULF OIL CANADA LTD.
PARSONS LAKE PROJECT
DEVELOPMENT OF GRANULAR BORROW
AND CONSTRUCTION METHODS FOR PLANT
SITE ROADS AND GRAVEL PADS
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DEVELOPMENT OF GRANULAR BORROW AND CONSTRUCTION METHODS FOR PLANT SITE ROADS AND GRAVEL PADS

Prepared By

STEARNS-ROGER CANADA LTD./POOLE CONSTRUCTION LIMITED
A PARSONS LAKE JOINT VENTURE

Stearns-Roger/Poole
Edmonton, Alberta

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1.0 INTRODUCTION

The development of the gravel borrow resource and the utilization of the material will have a very significant environmental and economic impact on the Parsons Lake Project. Stearns-Roger/Poole and Gulf personnel have examined the engineering and geotechnical information for the Project Site and using construction practices developed under Arctic conditions, have assembled the following detailed development plan.

This plan has evolved in close co-operation with the civil design group and each major design decision has been examined for conformance with the basic construction development procedure. Execution of gravel construction in accordance with the following procedure will, in our opinion, complete all facilities presently being considered (roads, pads and airstrip) utilizing the smallest practical quantity of borrow material.

2.0 BORROW AREA DEVELOPMENT

2.1 Borrow Quantity Analysis

Preliminary analysis of the designated granular borrow areas indicates that Areas 1 & 2 contain more than a sufficient quantity of gravel to fulfill the project requirements and this study has therefore been restricted to these areas.

Two independent calculations were made for the area, one by Gulf Oil Canada Ltd. using the contour method and one by Stearns-Roger/Poole

using the cross section method. Both parties based their evaluations on test log data contained in the KLOHN LEONOFF report of October 1974 and the R.M. HARDY GEOTECHNICAL report of May 1976. Variations in final quantities between the two methods are likely due to variations in extrapolating the extent of the basic information provided in the reports. For the purpose of this report, an average of the two methods has been used to establish a total potential quantity of gravel in Areas 1 & 2 of 3,000,000 cubic yards.

In order to develop the cross sectional quantity review, a control base line was established through the pit (Appendix A) with 0+00 being the most easterly point of Area 2, with a ground elevation at the south east corner of 75 and progressing westerly to station 60+00 of Area 1, to the highest ground elevation of 145 in the north west corner. The natural cross slope of the borrow area from the north west corner to the south east corner is approximately 1.5% and the average cross slope from the north pit boundary to south pit boundary is approximately 0.5%.

To prevent any excessively fast run-off over the pit surface and/or drainage flushing through the exposed and thawed layer of gravel, the natural grade of the pit should be maintained. It is evident that the existing and natural slope is providing adequate drainage of the bench with no definition of channelization. If this status quo can be maintained throughout the excavation process, it is apparent that the pit floor would remain not only consistant with the natural bench contour but could be left at any point during the excavation without undue change or impact to the natural conditions. Although it is not antici-

pated, should it become apparant during excavation that the 1.5% gradient is not sufficient to prevent ponding or retention of free water, it can be increased to a gradient sufficient to provide adequate drainage. Due care and attention must be given to insure that it is not increased to a point whereby flushing of the granular material occurs.

Included as Appendix B are the cross sections and quantity calculations used in the Stearns-Roger/Poole quantity analysis. The cross sections clearly indicate the formations of highly ice rich silt pockets and massive ice lenses to be encountered and the expected levels of excavation required to complete the present scope of work.

Preliminary quantity evaluations indicate a total borrow excavation requirement of approximately 2,352,000 cubic yards. This would deplete the pit area to a general elevation of 100 as indicated on the plot plan (Appendix A) leaving approximately three quarter million cubic yards of the total estimated borrow potential as a workable, well drained gravel deposit, available for the future use of others.

A comprehensive grid control survey will be maintained during the pit excavation operation to provide quantity analysis, interim progress reports and ground condition and grade control.

2.2 Overburden Excavation

The organic material and/or frozen silts overlaying the granular deposit

is classed as overburden. The yield ratio for the total area 1 & 2 is approximately 12:1 of useable material versus waste material, considered a reasonably good recovery rate. The overburden varies in thickness from 0.5 feet to 4.0 feet, an average of 1.4 feet over the entire 140 acre borrow 1 & 2 area. As indicated by the variation in thickness, the yield varies considerably for various areas in the pit. The overburden ratio for the pit area contained within the 100 contour is 9:1, somewhat lower than the average pit ratio.

2.3 Waste Material Excavation

The proposed method of gravel pit excavation will leave humps of unuseable highly ice rich silts, sand and massive ice material protruding from the pit floor. To maintain a free draining and graded borrow excavation, it will be necessary to remove this unsuitable material during the course of construction. Optimum pit efficiency and accessibility would dictate removal of this deleterious material as it is encountered during the harvesting procedure. The only time the removal can be physically accomplished, however, is during the winter months under frozen conditions. The ice rich silts are almost impossible to handle when in a thawing or thawed state and the disposal area, being constructed of the same type of material, would be impossible to negotiate while thawed; therefore, the work can only be done while in a frozen state over a winter road to the frozen disposal area. It is estimated that possibly 1/3 of this material will be rippable, while the balance will require drilling and blasting prior to removal.

When the ice rich silt (approximately 60% ice content) is encountered, the gravel excavation will proceed around and down beside the unsuitable material. To prevent the intrusion of the silt into the surrounding gravel, as it thaws and slumps, a gravel dyke would be left around the area to contain the slumped silt. The water released as the ice rich silt melts would be allowed to percolate through the gravel dike and the surrounding thawed bedded gravel. The quantity of water thus released should not increase the moisture content of the gravel to any degree that would be considered detrimental to the use of the gravel. On the contrary, it would be of assistance to the compaction of the material when placed. To control the rate and amount of thaw in these highly ice rich silt deposits, it may be necessary to leave a gravel cover. This would be evaluated and the appropriate action taken at the time of excavation.

Massive ice should be removed when encountered providing a suitable and practical disposal area is designated. The ice melt during excavation would not occur so rapidly that it would create any excavation or drainage problems as it integrates with the natural moisture content of the surrounding gravel material, or part of the pit drainage pattern.

One alternative available as a disposal area could be the south bank of the borrow area below elevation 100. This would be the most economical and most feasable site from the contractor's and owner's standpoint. The ice would be ripped or blasted, loaded, hauled across the pit and dumped over the edge. The ice should not be confined in a localized area or very thick layer as it would regain its mass and inhibit the

rate of melting. Accordingly, it should be deposited in single dumps, along the entire length of the borrow area. This should accelerate the thaw of the ice due to being placed in a thin layer on a southern exposed bank. Here again, the melt should not occur so rapidly as to create any run-off problems, but only tend to prolong the natural run-off and run-off period across the 800 foot expanse of Hans Creek flood plain and Hans Creek.

Another alternative would be to handle the massive ice in a similar manner as described above for the ice laden silt. This alternative would definitely require that a gravel cover be maintained over the ice to control and restrict the melt. Minor melting would not be of any concern as additional moisture to the natural moisture content of the gravel. Disposal of this material would be to the designated waste area (Appendix C) during the winter months.

Sand pockets expected to be encountered will be excavated as the need requires. If the material is deemed suitable for construction, it will be excavated in a manner similar to the gravel. Sand required for backfill slurry will be stockpiled separately. Unsuitable sand or sand not required would be designated as waste and excavated and disposed of in the same manner as prescribed for silt.

In addition to the unuseable material to be wasted from the gravel borrow excavation, there will be approximately 50,000 cubic yards of excavation required to level out the plant site prior to pad construction. The material to be excavated is a very high ice rich silt,

excavated in the winter so as not to disturb or destroy any of the surrounding perma frost. The material will require blasting for removal and if deemed useable fill material, would be dozed directly into place; if not, it would be excavated and hauled for disposal in the designated waste area shown on Appendix C.

Quantity evaluations indicate that the maximum waste pile volume would be approximately 700,000 cubic yards, made up as follows:

Gravel Borrow Overburden	263,000 cubic yards
Gravel Borrow Waste	
Ice Rich Silts	152,000 cubic yards
Massive Ice	118,000 cubic yards
Sand	119,000 cubic yards
Plant Site Excavation	50,000 cubic yards

2.4 Waste Fill Area

Due to the nature of the material and the problems associated with handling and disposal, the overburden would be excavated under frozen conditions. The material would be ripped and dozed into either stock-piles or large windrows, then loaded with front end loaders into off-highway trucks and hauled to a designated waste area. The moisture or ice content of the overburden material is very high and it becomes very unstable when in a thawed state; because of this it is recommended that the waste pile be placed in a confined low area to prevent the material from flowing onto the surrounding tundra and possibly into

a drainage course. The lake north of the gravel pit at 557,800 M.E. and 7,641,700 M.N. would be suitable for this purpose. The lake water would be pumped down prior to freeze-up to ensure that maximum utilization of the area is obtained by minimizing the amount of lake ice under the spoil pile. The dump would be started in the south east corner of the area at elevation of 140 and be placed by end dumping in a westerly direction. Confinement within the 140 contour at an approximate average depth of 9 feet requires a waste area of 2,000,000 square feet to accommodate the 700,000 cubic yards of potential waste material expected to be excavated (Appendix C). Wasting the unuseable material in this area should not disturb any of the existing drainage patterns and would completely confine the thaw slump. The leading edge of the pile would be allowed to seek its own angle of repose through the freeze-thaw cycle.

2.5 Gravel Excavation

Harvesting of the useable granular material would be accomplished in a manner similar to the overburden excavation. The bulk of the excavation, however, would only proceed during the warm summer months, with limited activity in winter months, for the following reasons:

2.5.1 Quality Control

It is easier to identify the gravel from frozen silt when excavating during warm weather and longer periods of day light.

2.5.2 Equipment Operation

Equipment functions more economically and much more efficiently when warm than when brittle cold. The cost of ripping frozen gravel material is extremely high

2.5.3 Operator Efficiency

Productivity levels of the equipment operators are considerably higher when performing their duties under warm conditions and the long daylight hours encountered during the summer months.

In conclusion, the best time for excavation would be during the summer and the best method of excavation would be to harvest the material from the borrow area in successive layers as it thaws. The thawed layer of granular material will be pushed into piles or large windrows and from these piles loaded into end dump trucks for transporting. In this manner the harvesting equipment can easily circumvent any pockets of deleterious ice rich material and pile only the useable granular material. The gravel would go directly to a fill area in progress and/or to a stockpile adjacent to the north pit boundary and the secondary road (Appendix C). The material stockpiled during the summer would be placed in fills during the winter to provide a year round construction schedule.

Until the borrow pit limits have been accurately defined by additional testing (in particular the northern pit boundary), the general excavation plan provides for extending the natural north slope down to the excavated level of 100 at the same time conforming to the boundaries of natural contour. The 100 elevation would provide a secondary plateau to the Hans Creek flood plain at elevation 85, similar to, but lower than the plateau that presently exists.

2.6 Drainage

It is recognized that proper drainage of the pit area is of paramount importance. The drainage run across the pit is long and flat so it is expected that the outflow at the lower pit edge will be little more than seepage and a relatively clear effluent.

If the normal volume of pit drainage water, including ice melt, is not more than the volumes usual to an average spring run-off, then the existing and normal drainage pattern would be maintained. It must be considered that a drainage system, which closely approximates a natural condition, is the most acceptable. The natural lay of the gravel source must be recognized in attempting to evaluate the drainage criteria - the average existing elevation of the gravel pit area is 125, the average elevation of the Hans Creek flood plain is 85, so that the run-off (from the north) now proceeds across the 1200 foot extent of the pit plateau, down the approximate 3:1 embankment slope at the south pit limit to the Hans Creek flood plain, across this plain (average distance of 800 feet) and finally flowing into Hans Creek. The normal run-off drains a small area and there are no channels or drainage courses showing in the pit area indicating that it is relatively insipid. The run-off volume is distributed thinly over a large area creating no natural disturbance or channalization. The intention during excavation is to maintain this natural drainage pattern as much as possible. At completion of the gravel harvesting and pit levelling operation required for this project, it is expected that the floor of the pit would be at the same cross grade as presently exists; there would still be an approximate 15 foot embankment at the south limit of the pit and the Hans Creek flood plain would be untouched.

Consideration has been given to volumes of drainage water greater than normally anticipated, or to a discharge that may have changed flow characteristics (due to the excavation of the gravel) to the extent that it threatens to change the natural conditions. Should this occur, it would be necessary to construct a catch water ditch along the south perimeter of the pit, which would carry the water to a stilling pond located within the pit boundary but at an elevation below 100. This retention pond would be designed to maintain the water level at no higher than elevation 100 and of sufficient capacity to positively ensure that no danger exists to overtopping of the containment dykes, thereby precipitating considerable damage to the south bank of the gravel pit and to the Hans Creek flood plain. The overflow weir section permitting the outflow of the water from the pond and maintaining the pond level must be extensively designed with a series of drop structures, lowering the water down from the pond to the flood plain and into Hans Creek. Considerable thought must be given to the potential problems and conditions that may occur when confining and collecting water into an unnatural situation.

In conclusion, it is extremely hard to conceive that the relatively small drainage basin involved with the gravel pit would provide a sufficient quantity of water gather to be of any great concern or warrant the disruption of the natural and apparently adequate normal drainage pattern.

3.0 GRAVEL STOCKPILE

During each summer thaw period it will be necessary to stockpile a sufficient quantity of gravel to sustain the construction schedule until the next seasonal thaw.

Various methods of stockpiling for the conditions and type of material to be handled have been assessed. The most suitable and probably the most reliable stockpile from which to recover material during the winter months would be a pile placed by a radial stacking conveyor.

To reduce stockpile losses, the required stockpile area should be prepared when in a frozen condition by placing a granular pad of sufficient thickness to maintain the tundra under the pile in a frozen state during the stockpiling operation. This should preclude the gravel from penetrating the active layer and promote almost total recovery of the material excavated during the following winter.

Stockpiling with a stacking conveyor will produce a loose uncompacted pile with a reduced moisture content. Aeration during harvesting and movement of the material by truck and conveyor should reduce the natural moisture content of the gravel by approximately 2% to 3%. These factors tend to minimize the freezing response of the piled material and certainly enhances the probability of easier stockpile excavation and the possibility of obtaining a considerable quantity of unfrozen material during the winter construction period.

The stockpile dimensions for the 732,000 cubic yards required the first winter is approximately 1080' x 445' and 55' high. This will require a pad 1150' x 460'. The massiveness of the pile will further assist in keeping the majority of the material in a thawed condition. It is expected that the freeze in the outer skin of the stockpile will be approximately 10 feet; this means that approximately 70% of the material excavated from the stockpile during the winter will be unfrozen when excavated; and if transported and placed without too much lost time, could be in an unfrozen or semi-frozen condition when compacted.

Segregation is sometimes a problem with this method of piling due to the gravel dropping off the end of the conveyor. This situation can be alleviated by gradually raising the conveyor as the pile grows and keeping the material drop as minimal as possible. Excavation with a dozer pushing to a loader, mixing the top material with the bottom material, will further reduce this expected segregation.

The material for stockpiling will be harvested in the borrow pit as the material thaws, loaded into trucks and hauled to the stockpile area. The gravel is dumped into a stationary belt feeder, then conveyed on horizontal conveyor sections to the radial stacking conveyor. The horizontal sections are zig zagged orremoved to accomodate the stockpile growth, finally ending up with the feeder dumping directly onto the stacker to complete the pile.

Excavation of the stockpile during the winter would be accomplished with a dozer ripping the frozen skin and pushing down full face to a loader.

4.0 EMBANKMENT CONSTRUCTION

4.1 Gravel Placement

The proposed method of construction for both the roads and facility pads would be an end dump fill progressing away from the source of material. Material deposited from the hauling units would be levelled with rubber-tired dozers (Cat 824 B), then smoothed with a motor grader (Cat 16 G) and compacted by the use of grid rollers and vibratory rollers to provide either a smooth uniform surface on which the insulation would be placed or the completed road or pad surface.

The fills would be placed generally in two lifts. The bottom lift would be approximately one foot thick, placed in one lift and compacted. The insulation would then be placed on this smooth and consolidated pad and then covered with 2 to 3 feet of granular fill in one pass or lift. This thickness of cover is required to provide adequate protection for the insulation.

When placing the lifts by the end dump method, if larger and heavier stones are present, they tend to roll to the bottom of the leading fill edge, consequently leaving the top surface of the completed lift made up of the smaller stones and fines. This provides a smooth and finished surface which should not require any additional treatment or special surface course.

Analysis of the gravel material available indicate it to be predominately 3/4 inch minus, reasonably well graded and clean with very few stones up to 6" and having a field moisture content of approximately 5%. This

should provide very adequate construction material and will be very compatible to the proposed method of fill construction. Due to the gravel being very clean, the surface of the fills will undoubtedly ravel considerably during the summer as the road surface thaws. However, the material is sufficiently well graded that it will consolidate adequately with proper compaction and summer reconsolidation to provide competant embankments.

4.2 Insulation

To provide insulation material for the established design parameters and scope of work indicated at this time, will require approximately nine million square feet of Styrofoam HI 60 x 2" thick.

This insulation material comes in sheets 2'-0" x 8'-0" and would be delivered to the site in pallets of 8'-0" x 8'-0" x 4'-0" and distributed as necessary on the completed gravel base pads. Placing of the insulation on the base pad would be immediately ahead of the protective cover lift of main fill. The labour force placing the insulation would be geared to match the productivity of the advancing end dump cover fill when placing during winter.

Insulation pads will be placed on the tundra when frozen. However, when one foot of gravel material is placed in the winter and left un-insulated through the summer period, the thermal capacity of the gravel being higher than the tundra would accelerate the thaw beneath the gravel and would promote a detrimental effect to the active

layer balance. On this basis, it would appear that only the amount of material that can successfully be insulated and covered, prior to six inches of thaw occuring below the base of the gravel material, should be placed.

It is obvious that not being able to place gravel during the summer months of mid June to mid October would seriously increase the costs of the site work and be ultimately detrimental to the construction schedule.

We have considered two methods by which this problem could be overcome:

1) Place enough gravel pad to ensure an ongoing summer placement schedule but protect the underlying perma frost by placing the insulation material, pinning it down by means of nails, etc. and painting the surface to protect it from the elements detrimental to the styrofoam. The final gravel cover material would proceed as previously described This method does contain the possibility of a high degree of insulation loss due to wind damage or other external causes that are beyond the control of the contractor.

2) Similarly place gravel pad as required to ensure an ongoing summer placement program. Prior to this pad becomming non-trafficable, the insulation would start to be placed at the outer edge of the constructed pad and be covered with a 4 - 6 inch gravel pad. By placing the insulation and cover from the outer edge toward the completed fill allows the hauling units to cross over the pad, turn while still on the pad and dump on the newly placed row of insulation.

The pile of gravel would then be distributed in a layer over the uncovered section of insulation by means of a small dozer with ground pressures of only 8 - 10 psi. The balance of the cover fill would then be placed as described during the summer months.

4.3 Compaction

Both grid roller and vibratory compaction will be used. During the summer compaction effort, water would be sprinkled on the fills to aid in compaction and bring the top six inches to one foot of material up to the optimum moisture content. This will help to control the traffic dust and insure that high densities and the maximum possible consolidation of fills is obtained. The grid roller will provide good surface compaction and being an impact type compactor will have a tendancy to crush the surface stones, which again will enhance the running surface of the fill area. This type of compaction will, however, only consolidate about one foot of granular material, which is adequate for the insulation pad, but not sufficient to consolidate the 2' - 3' depth of cover over the insulation. To effectively achieve high densities in granular material placed 2' - 3' thick requires a vibratory type compactor similar to a Bros 850 base roller. This type of compaction will also be used to increase densities and provide reconsolidation of material placed in the winter that does not obtain the desired consolidation when placed.

4.4 Trimming

The road slopes and/or perimeter pad slope trimming would be carried out continuously to provide an accurate cross section, to utilize all the material within the embankment section and to provide a neat and finished embankment. The trimming would all be done with the equipment working from the top of the fill and by carrying the loose material upwards on the slopes so that there is no excess material left beyond the toe of the slopes as staked for construction. This procedure would apply for both the summer and winter construction.

During the course of construction, it will most likely be required to remove minor grade discrepancies caused by differential settlement or error. To ensure that an adequate supply of well suited material (fine well graded gravel) is available for this purpose, we may find that it is expeditious to set a reasonable quantity of this material aside in a separate stockpile within the pit, as it is encountered during the gravel harvesting operation.

5.0 SUPPORT FACILITIES

5.1 Gravel Construction Camp

The present construction schedule assumes a January 1, 1978 release date and dictates that a gravel construction camp capable of accommodating 50/60 men is required in 1978. This facility may utilize equipment available in the Delta area, if suitable.

The gravel construction camp will consist of sleeping units, kitchen-diner complex, storage and office. This temporary construction camp facility located in the gravel pit area will be utilized by the gravel crew from startup until the main construction camp is available.

When the main construction camp becomes operational, all available trailer units from the gravel construction camp would be utilized in some capacity.

5.2 Mobile Shelters

Multi purpose, 10' x 32' totally self contained mobile shelters will be required in various locations on the jobsite area. These units will be dispersed to work areas and utilized as lunch rooms, warm up shelters and, if required, life support in the event of emergency situations.

These shelters will have their own running gear together with generator, water, fuel and sewage facilities.

Mobile units will be required for the start of the gravel placement operation and they would be purchased and shipped concurrent with the main camp facility. These units must be ordered in March 1978 and shipped via river barge during the 1978 navigation season.

5.3 Equipment Maintenance and Service Facilities

An equipment maintenance/service and storage facility will be required at the gravel pit area to support the gravel operation.

The facility will be a pre-engineered metal building with the majority of the area used for repairs and one bay for service, which will include oil, grease, high pressure water cleaning system, etc. A 10 ton overhead crane and sufficient storage space for replacement parts, minor tools and equipment shall be provided. A parts van will be located adjacent to the service building for additional inventory.

5.4 Fuel Storage

In order to sustain the gravel operation from start-up in February 1978 through mid November 1978, fuel will be drawn from a Gulf tank farm located on the East Channel of the MacKenzie River in the Delta area.

The fuel will be transported by winter road prior to spring breakup. A tank farm at the gravel pit area capable of storing the required quantity will have been set up in order to carry the operation from spring 1978 until mid November 1978 when the winter road to Swimming Point is again operational; at which time fuel will again be transported by winter road and stored at the gravel pit prior to spring breakup to carry the operation through September 1979.

Temporary tank farms would be designed and constructed to meet applicable regulations for spacing, dikes, liners, etc.

6.0 CONSTRUCTION SCHEDULE

6.1 General

To establish pre-estimate criteria and a basis for schedules, we have assumed a construction season from March 15 to December 15 and have defined the period of April 15 to September 15 as the anticipated five month frost free or summer season. The period from December 15 to March 15 has been determined to be a period of reduced activity. The manpower efficiency drop during cold weather and the total darkness experienced at that time of the year, as well as the involvement of the Christmas and New Years holiday season contribute to the problems of this period. December 15 to March 15 has been set aside as a time for equipment overhaul, if and as required.

Basing the work schedule on two twelve hour shifts, seven days a week from March 15 to December 15 and allowing for various downtime factors such as weather, etc. we assess the probable equipment production time to be 4,760 hours each season.

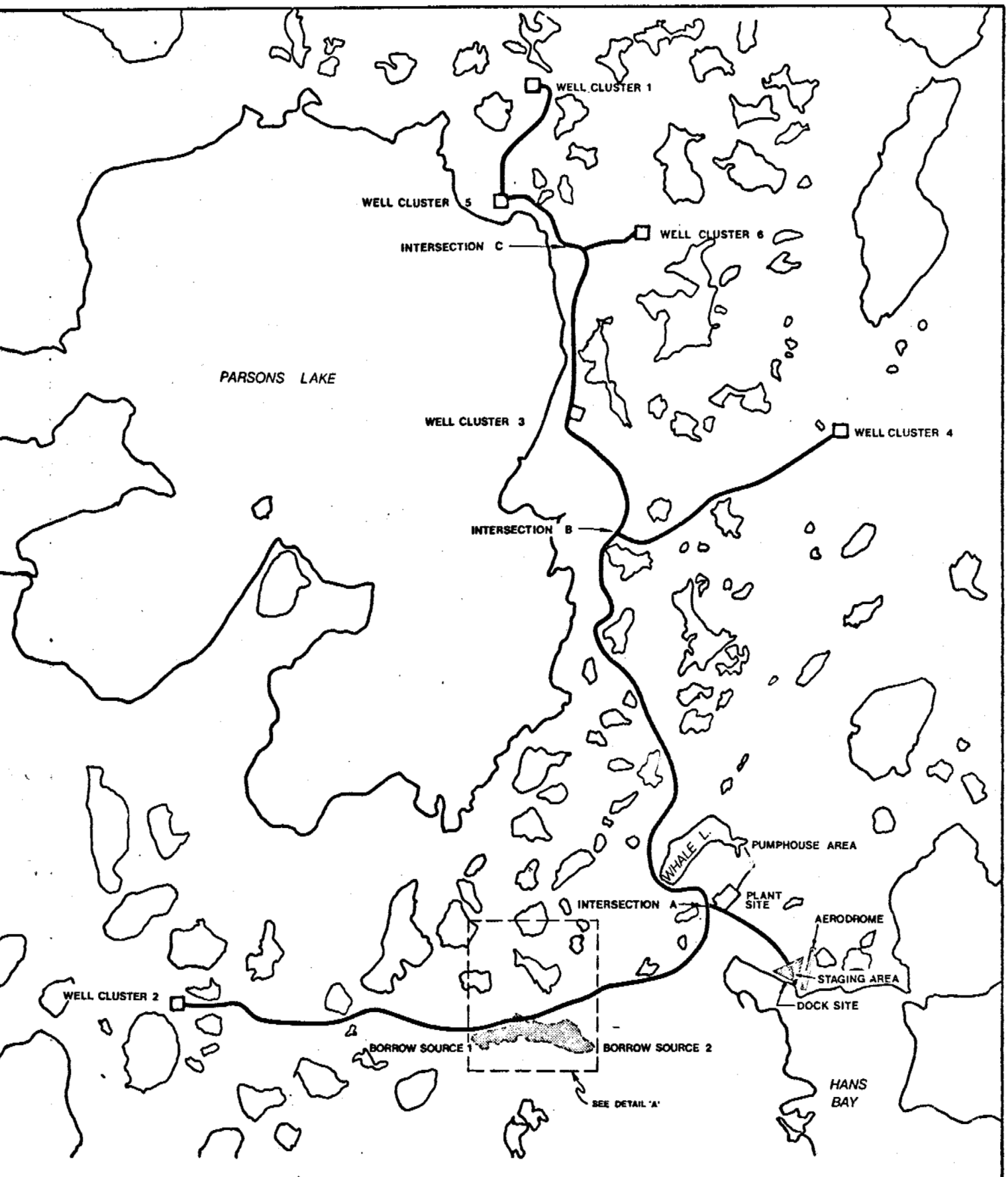
6.2 Gravel Scope

To establish a scope of work for the preparation of this report, preliminary quantity take-offs have been completed on the various facility pads and roads. Definitive quantities provided by the Design Engineers should have no effect on the basic work methods or work sequence.

The quantity take-off includes the general design parameters that have been confirmed to date and on which the final design quantities will be based:

Plant Site	- Insulated 4' fill
Transporter Road	- 35' top; insulated 4' fill
Staging Area	- Approximately 20 acres 4' insulated fill
S.T.O.L. Strip & Parking Apron	- Insulated 4' fill
Secondary Roads: (see general site plan - Appendix A)	
Borrow Pit to Inter A	- 35' top width; insulated 4' fill
Inter A to W.C. 3, 4 & 5	- 20' top width; insulated 4' fill
W.C. 5 to W.C. 1	- 20' top width; insulated 3' fill
Inter C to W.C. 6	- 20' top width; insulated 3' fill
Borrow Pit to W.C. 2	- 20' top width; 5' fill not insulated
Well Clusters	- 400' x 600'; insulated 3' fill

To transpose the fill quantities (compacted cubic yards) into the quantity of borrow material required to make the embankments, we have used a total shrink factor of 30%. This should provide adequate allowance for the normal shrink from bank cubic yards to compacted cubic yards and losses due to the compression of the active layer (estimated at 9 inches), as well as initial maintenance gravel required for grade consolidation and care of differential settlement. The quantities represented in this report are cubic yards of borrow required (bank cubic yards)..



Scale: 1" - 6400'

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GENERAL SITE LAYOUT

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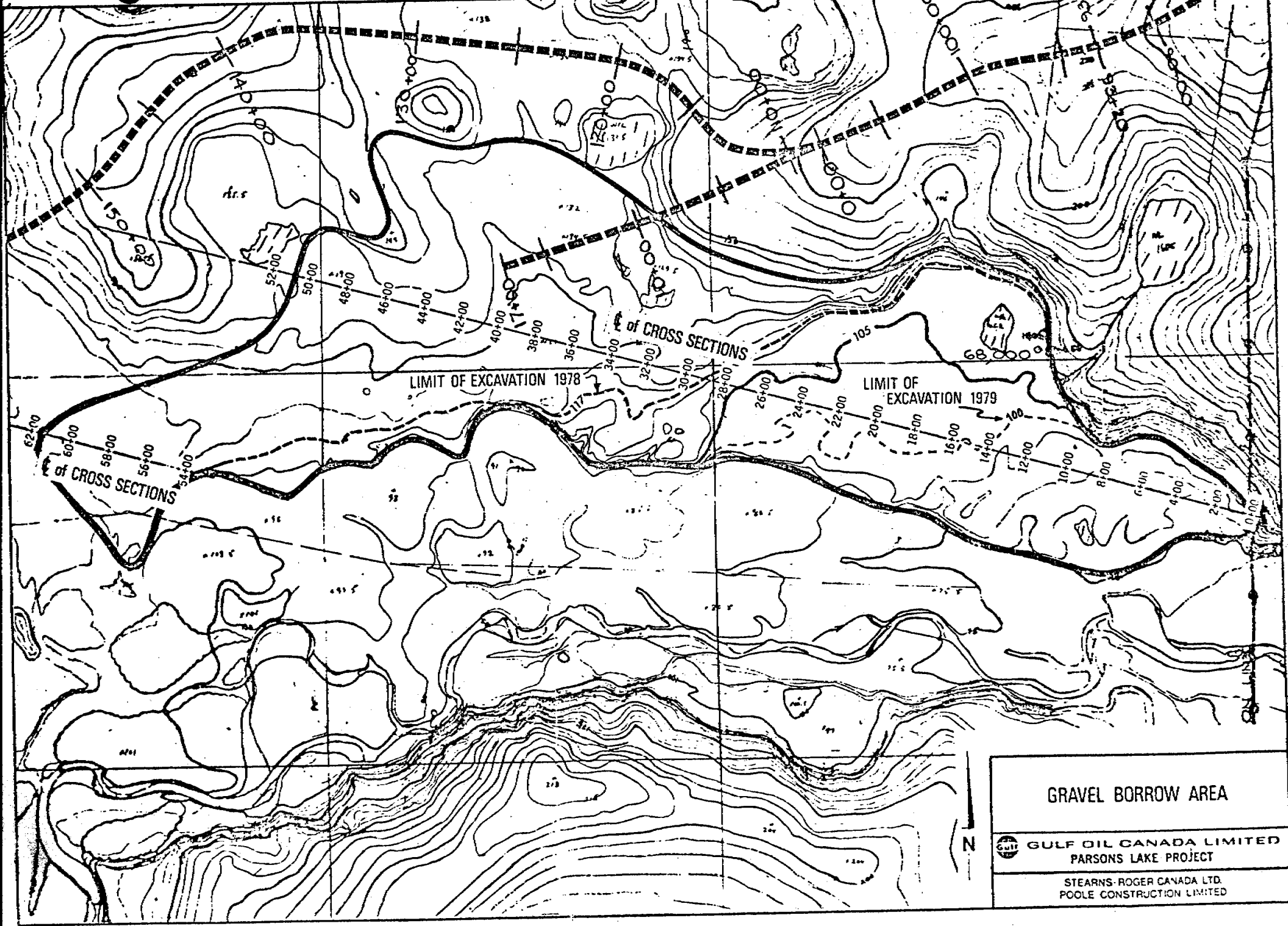
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PARSONS LAKE PROJECT
BORROW AREA 1 & 2 QUANTITY SUMMARY
HORIZONTAL LAYERS

ELEVATION	TO ELEVATION	GRAVEL*	OVERBURDEN*	SILTS*	ICE*	SAND*
140	135	8,960	9,820			
135	130	49,595	49,990	1,210		2,670
130	125	137,420	50,580	10,930	13,080	4,335
125	120	309,850	75,830	53,270	33,830	10,440
120	115	412,580	24,120	31,665	38,290	15,635
115	110	423,005	8,800	14,340	23,560	38,375
110	105	424,100	14,830	17,750	7,260	25,550
105	100	385,410	28,800	23,280	2,020	22,000
100	95	415,315	49,410	12,555	8,275	29,870
95	90	315,940	6,930	11,480	1,180	20,040
90	85	213,810	18,040	4,260		14,550
85	80	137,325	11,070	220		2,960
80	75	69,305	1,400	2,440	7,700	17,485
75	70	54,315	900	1,240		33,670
TOTAL		3,356,930	350,520	184,640	135,195	237,580

* NOTE: All quantities referred to in the table are in cubic yards.

ELEVATION 140 TO ELEVATION 135

STATION TO STATION		GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00					
10 + 00	12 + 00					
12 + 00	14 + 00					
14 + 00	16 + 00					
16 + 00	18 + 00					
18 + 00	20 + 00					
20 + 00	22 + 00					
22 + 00	24 + 00					
24 + 00	26 + 00					
26 + 00	28 + 00					
28 + 00	30 + 00					
30 + 00	32 + 00					
32 + 00	34 + 00					
34 + 00	36 + 00					
36 + 00	38 + 00					
38 + 00	40 + 00					
40 + 00	42 + 00					
42 + 00	44 + 00		1,330			
44 + 00	46 + 00	4,280	2,560			
46 + 00	48 + 00	4,480	5,930			
48 + 00	50 + 00	200				
50 + 00	52 + 00					
52 + 00	54 + 00					
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		8,960	9,820			

ELEVATION 135 TO ELEVATION 130

STATION TO STATION		GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00					
10 + 00	12 + 00					
12 + 00	14 + 00					
14 + 00	16 + 00					
16 + 00	18 + 00					
18 + 00	20 + 00					
20 + 00	22 + 00		440			
22 + 00	24 + 00		150			
24 + 00	26 + 00					
26 + 00	28 + 00					
28 + 00	30 + 00		1,110	605		
30 + 00	32 + 00			605		
32 + 00	34 + 00					
34 + 00	36 + 00					
36 + 00	38 + 00					
38 + 00	40 + 00					
40 + 00	42 + 00		8,850			740
42 + 00	44 + 00	4,645	7,040			1,335
44 + 00	46 + 00	17,810	1,330			595
46 + 00	48 + 00	19,350	8,220			
48 + 00	50 + 00	3,440	7,850			
50 + 00	52 + 00	2,870	4,000			
52 + 00	54 + 00	1,480	1,700			
54 + 00	56 + 00		9,300			
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		49,595	49,990	1,210		2,670

ELEVATION 130 TO ELEVATION 125

STATION TO STATION		GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00					
10 + 00	12 + 00					
12 + 00	14 + 00					
14 + 00	16 + 00					
16 + 00	18 + 00					
18 + 00	20 + 00					
20 + 00	22 + 00	1,185	1,590	240		
22 + 00	24 + 00	1,645	370	240		
24 + 00	26 + 00	465	550	910		
26 + 00	28 + 00		280	910		
28 + 00	30 + 00		1,110	2,610		
30 + 00	32 + 00		1,300	3,130		
32 + 00	34 + 00		6,670	520	1,020	
34 + 00	36 + 00		1,550		1,020	
36 + 00	38 + 00					
38 + 00	40 + 00					
40 + 00	42 + 00	8,825	7,130		1,390	150
42 + 00	44 + 00	20,330	2,700		2,335	2,165
44 + 00	46 + 00	27,620			945	2,020
46 + 00	48 + 00	19,335	9,700			
48 + 00	50 + 00	20,700	2,960			
50 + 00	52 + 00	23,700	6,000		1,260	
52 + 00	54 + 00	8,065	2,370	1,185	3,185	
54 + 00	56 + 00	2,590		1,185	1,925	
56 + 00	58 + 00	1,850	6,300			
58 + 00	60 + 00	1,110				
TOTAL		137,420	50,580	10,930	13,080	4,335

ELEVATION 125 TO ELEVATION 120

STATION TO STATION		GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00					
10 + 00	12 + 00					
12 + 00	14 + 00					
14 + 00	16 + 00					
16 + 00	18 + 00					
18 + 00	20 + 00					
20 + 00	22 + 00	2,535	370			
22 + 00	24 + 00	3,575	670			
24 + 00	26 + 00	2,220	550	630		
26 + 00	28 + 00	1,390	2,000	630		
28 + 00	30 + 00	3,465	3,700	4,465		
30 + 00	32 + 00	6,445	5,930	6,685	315	
32 + 00	34 + 00	8,595	5,560	6,055	315	2,610
34 + 00	36 + 00	5,410	19,870	5,980		2,610
36 + 00	38 + 00		17,700	6,965		
38 + 00	40 + 00	8,475	10,960	4,815		2,240
40 + 00	42 + 00	25,285		410	2,525	2,240
42 + 00	44 + 00	38,275	890	410	4,080	
44 + 00	46 + 00	39,260		4,980	5,445	
46 + 00	48 + 00	38,930	5,330	6,465	5,630	
48 + 00	50 + 00	37,390	1,930	2,000	4,520	
50 + 00	52 + 00	25,965		520	6,890	
52 + 00	54 + 00	14,020		1,130	4,110	370
54 + 00	56 + 00	11,725		1,130		370
56 + 00	58 + 00	22,150	370			
58 + 00	60 + 00	14,740				
TOTAL		309,850	75,830	53,270	33,830	10,440

ELEVATION 120 TO ELEVATION 115

STATION	TO STATION	GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00					
10 + 00	12 + 00					
12 + 00	14 + 00					
14 + 00	16 + 00					
16 + 00	18 + 00					
18 + 00	20 + 00					
20 + 00	22 + 00	2,870	890			
22 + 00	24 + 00	4,240	740			
24 + 00	26 + 00	4,850	440			
26 + 00	28 + 00	5,170	1,000			
28 + 00	30 + 00	10,965	670	1,480	500	
30 + 00	32 + 00	23,430	1,780	1,480	3,665	
32 + 00	34 + 00	26,820	2,740	220	3,165	
34 + 00	36 + 00	25,370	8,560	2,410		
36 + 00	38 + 00	20,130	6,740	11,000	2,665	
38 + 00	40 + 00	19,680		8,815	2,665	2,965
40 + 00	42 + 00	24,810				2,965
42 + 00	44 + 00	34,670	560			
44 + 00	46 + 00	47,780			3,185	
46 + 00	48 + 00	43,950		295	9,815	665
48 + 00	50 + 00	34,950		3,130	8,890	665
50 + 00	52 + 00	32,370		2,835	3,000	1,595
52 + 00	54 + 00	19,115			740	4,185
54 + 00	56 + 00	14,280				2,595
56 + 00	58 + 00	13,075				
58 + 00	60 + 00	4,055				
TOTAL		412,580	24,120	31,665	38,290	15,635

ELEVATION 115 TO ELEVATION 110

STATION TO STATION		GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00					
10 + 00	12 + 00		740			
12 + 00	14 + 00					
14 + 00	16 + 00					
16 + 00	18 + 00					
18 + 00	20 + 00		150			
20 + 00	22 + 00	2,890	550			
22 + 00	24 + 00	4,780	840			
24 + 00	26 + 00	5,715	550			
26 + 00	28 + 00	7,845	1,040			
28 + 00	30 + 00	18,705	1,930	1,020	465	2,335
30 + 00	32 + 00	32,245	930	1,020	1,685	2,335
32 + 00	34 + 00	31,725	2,070	1,870	1,220	
34 + 00	36 + 00	28,900		1,870		6,945
36 + 00	38 + 00	32,900				10,800
38 + 00	40 + 00	30,835				4,850
40 + 00	42 + 00	17,410				2,555
42 + 00	44 + 00	22,965				1,555
44 + 00	46 + 00	41,800			1,425	
46 + 00	48 + 00	42,005		1,575	8,315	220
48 + 00	50 + 00	38,245		4,280	8,670	220
50 + 00	52 + 00	31,520		2,705	1,780	2,910
52 + 00	54 + 00	19,855				3,280
54 + 00	56 + 00	12,260				370
56 + 00	58 + 00	405				
58 + 00	60 + 00					
TOTAL		423,005	8,800	14,340	23,560	38,375

ELEVATION 110 TO ELEVATION 105

STATION	TO STATION	GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00		330			
10 + 00	12 + 00	925	1,320			
12 + 00	14 + 00	925	780			
14 + 00	16 + 00					
16 + 00	18 + 00					
18 + 00	20 + 00	740	1,020			
20 + 00	22 + 00	3,705	1,180			
22 + 00	24 + 00	4,850	1,500			
24 + 00	26 + 00	8,185	890			
26 + 00	28 + 00	12,240	3,740		260	
28 + 00	30 + 00	24,075			260	2,370
30 + 00	32 + 00	37,020	180			2,370
32 + 00	34 + 00	31,075	3,890	280		1,220
34 + 00	36 + 00	29,280		910		5,850
36 + 00	38 + 00	34,095		3,280		5,610
38 + 00	40 + 00	21,500		2,835		1,890
40 + 00	42 + 00	9,445		185		2,650
42 + 00	44 + 00	23,835				1,740
44 + 00	46 + 00	41,705			1,110	
46 + 00	48 + 00	41,540		1,220	2,335	
48 + 00	50 + 00	38,135		2,835	2,260	
50 + 00	52 + 00	33,450		3,910	1,035	925
52 + 00	54 + 00	20,705		2,295		925
54 + 00	56 + 00	6,670				
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		424,100	14,830	17,750	7,260	25,550

ELEVATION 105 TO ELEVATION 100

STATION TO STATION		GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00					
2 + 00	4 + 00					
4 + 00	6 + 00					
6 + 00	8 + 00					
8 + 00	10 + 00	140	720			
10 + 00	12 + 00	2,920	1,240			
12 + 00	14 + 00	3,520	2,260			
14 + 00	16 + 00	740				
16 + 00	18 + 00		7,220			
18 + 00	20 + 00	2,640	2,560			
20 + 00	22 + 00	6,615	10,210			590
22 + 00	24 + 00	9,735	700			590
24 + 00	26 + 00	14,130	3,590	1,000		295
26 + 00	28 + 00	24,120	300	1,000	750	295
28 + 00	30 + 00	27,810			750	4,280
30 + 00	32 + 00	31,380		305		4,280
32 + 00	34 + 00	25,845		305		3,910
34 + 00	36 + 00	13,390		4,815		3,910
36 + 00	38 + 00	14,740		8,780		
38 + 00	40 + 00	18,910		5,075		1,740
40 + 00	42 + 00	12,890		1,110		1,925
42 + 00	44 + 00	11,520				185
44 + 00	46 + 00	32,000				
46 + 00	48 + 00	39,555		445	260	
48 + 00	50 + 00	38,575		445	260	
50 + 00	52 + 00	37,795				
52 + 00	54 + 00	16,440				
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		385,410	28,800	23,280	2,020	22,000

ELEVATION 100 TO ELEVATION 95

STATION	TO STATION	GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00	555	370			
2 + 00	4 + 00	220	370			
4 + 00	6 + 00	105	150			
6 + 00	8 + 00	105	370			
8 + 00	10 + 00	965	110			
10 + 00	12 + 00	5,660	470		410	
12 + 00	14 + 00	15,435	3,000	150	1,745	295
14 + 00	16 + 00	10,740	5,930	150	1,340	295
16 + 00	18 + 00	19,085			2,390	
18 + 00	20 + 00	26,280	8,450	1,035	2,390	2,815
20 + 00	22 + 00	18,150	18,740	1,035		6,280
22 + 00	24 + 00	22,140	8,520			8,055
24 + 00	26 + 00	23,925	2,300			5,610
26 + 00	28 + 00	22,035	630			1,020
28 + 00	30 + 00	21,040				
30 + 00	32 + 00	24,815		4,870		
32 + 00	34 + 00	21,530		5,095		2,750
34 + 00	36 + 00	8,455		220		2,750
36 + 00	38 + 00	6,945				
38 + 00	40 + 00	16,020				
40 + 00	42 + 00	9,075				
42 + 00	44 + 00	4,295				
44 + 00	46 + 00	29,815				
46 + 00	48 + 00	34,925				
48 + 00	50 + 00	24,575				
50 + 00	52 + 00	31,795				
52 + 00	54 + 00	16,630				
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		415,315	49,410	12,555	8,275	29,870

ELEVATION 95 TO ELEVATION 90

STATION	TO STATION	GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00	2,205	150			
2 + 00	4 + 00	2,020	670			
4 + 00	6 + 00	2,000	740			
6 + 00	8 + 00	1,610	810			
8 + 00	10 + 00	3,165	110			
10 + 00	12 + 00	12,630	1,300		590	
12 + 00	14 + 00	29,430	120	925	590	5,835
14 + 00	16 + 00	19,610	1,370	925		5,835
16 + 00	18 + 00	22,925	370			
18 + 00	20 + 00	43,075				
20 + 00	22 + 00	33,795	740			4,185
22 + 00	24 + 00	28,075	440	1,260		4,185
24 + 00	26 + 00	26,355		1,260		
26 + 00	28 + 00	11,930	110			
28 + 00	30 + 00	3,315				
30 + 00	32 + 00	9,630		2,445		
32 + 00	34 + 00	13,685		3,555		
34 + 00	36 + 00	7,370		1,110		
36 + 00	38 + 00	945				
38 + 00	40 + 00	10,020				
40 + 00	42 + 00	9,075				
42 + 00	44 + 00	575				
44 + 00	46 + 00	2,890				
46 + 00	48 + 00	6,850				
48 + 00	50 + 00	8,650				
50 + 00	52 + 00	4,110				
52 + 00	54 + 00					
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		315,940	6,930	11,480	1,180	20,040

ELEVATION 90 TO ELEVATION 85

STATION	TO STATION	GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00	4,400	740			
2 + 00	4 + 00	4,850	370			
4 + 00	6 + 00	8,760	2,960			
6 + 00	8 + 00	7,795	4,070			
8 + 00	10 + 00	10,630	4,020			
10 + 00	12 + 00	19,335	3,560			
12 + 00	14 + 00	22,500	720			2,220
14 + 00	16 + 00	12,670	930			2,220
16 + 00	18 + 00	17,955	670	520		
18 + 00	20 + 00	37,445		520		
20 + 00	22 + 00	25,205				4,130
22 + 00	24 + 00	8,770				4,130
24 + 00	26 + 00	10,290				
26 + 00	28 + 00	7,055				
28 + 00	30 + 00					
30 + 00	32 + 00	12,630		1,610		925
32 + 00	34 + 00	3,520		1,610		925
34 + 00	36 + 00					
36 + 00	38 + 00					
38 + 00	40 + 00					
40 + 00	42 + 00					
42 + 00	44 + 00					
44 + 00	46 + 00					
46 + 00	48 + 00					
48 + 00	50 + 00					
50 + 00	52 + 00					
52 + 00	54 + 00					
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		213,810	18,040	4,260		14,550

ELEVATION 85 TO ELEVATION 80

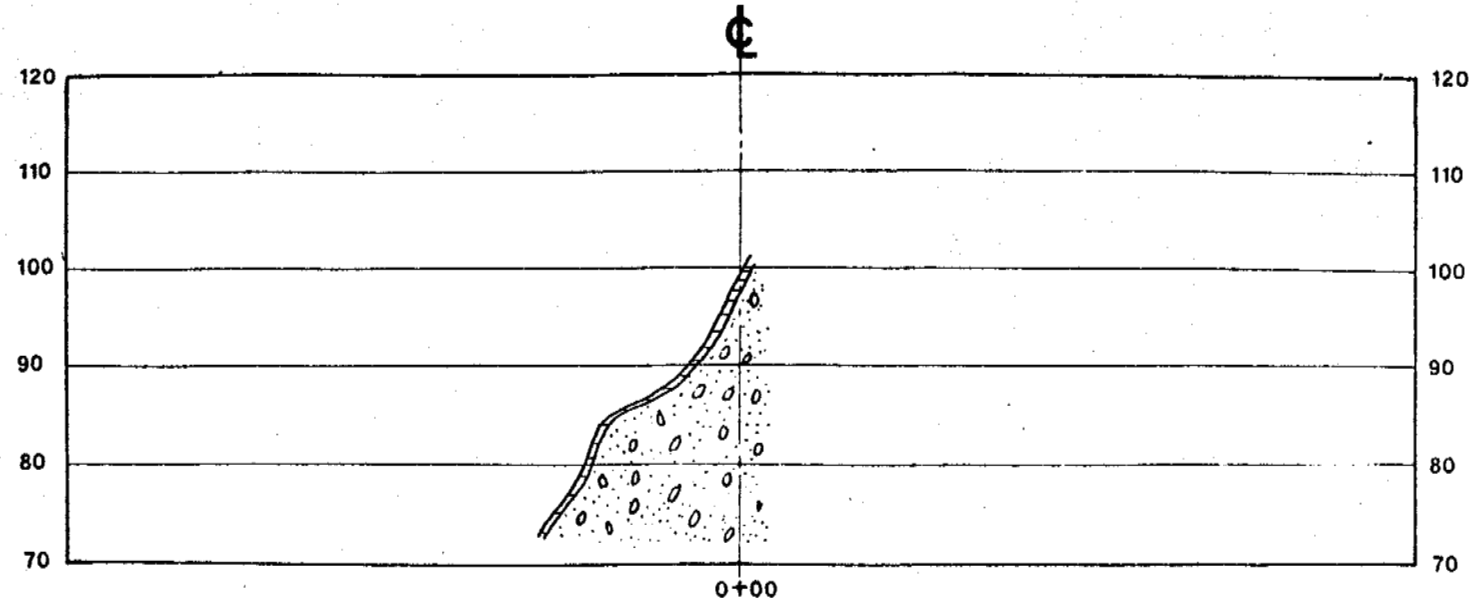
STATION	TO STATION	GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00	3,435	220			740
2 + 00	4 + 00	8,125	810			1,480
4 + 00	6 + 00	20,075	670			740
6 + 00	8 + 00	18,185	150			
8 + 00	10 + 00	7,370	1,290			
10 + 00	12 + 00	4,000				
12 + 00	14 + 00	2,130				
14 + 00	16 + 00	620				
16 + 00	18 + 00	8,475	7,930			
18 + 00	20 + 00	19,665				
20 + 00	22 + 00	11,815				
22 + 00	24 + 00	3,870				
24 + 00	26 + 00	5,835				
26 + 00	28 + 00	1,965				
28 + 00	30 + 00					
30 + 00	32 + 00	10,925		110		
32 + 00	34 + 00	10,925		110		
34 + 00	36 + 00					
36 + 00	38 + 00					
38 + 00	40 + 00					
40 + 00	42 + 00					
42 + 00	44 + 00					
44 + 00	46 + 00					
46 + 00	48 + 00					
48 + 00	50 + 00					
50 + 00	52 + 00					
52 + 00	54 + 00					
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		137,325	11,070	220		2,960

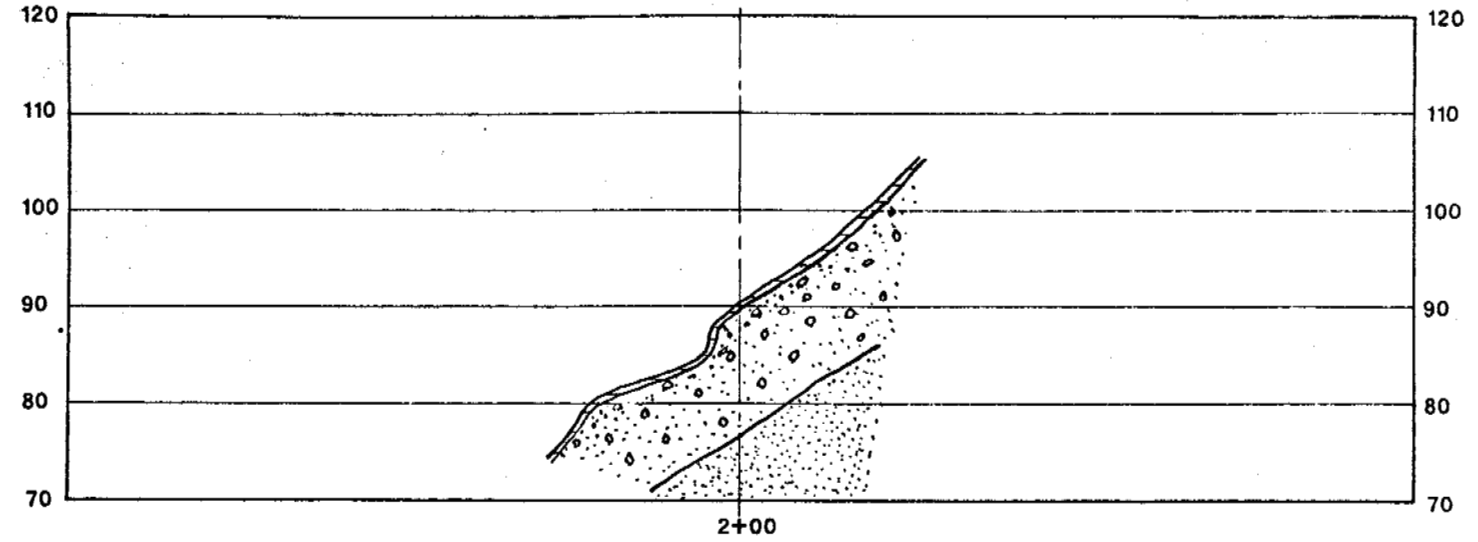
ELEVATION 80 TO ELEVATION 75

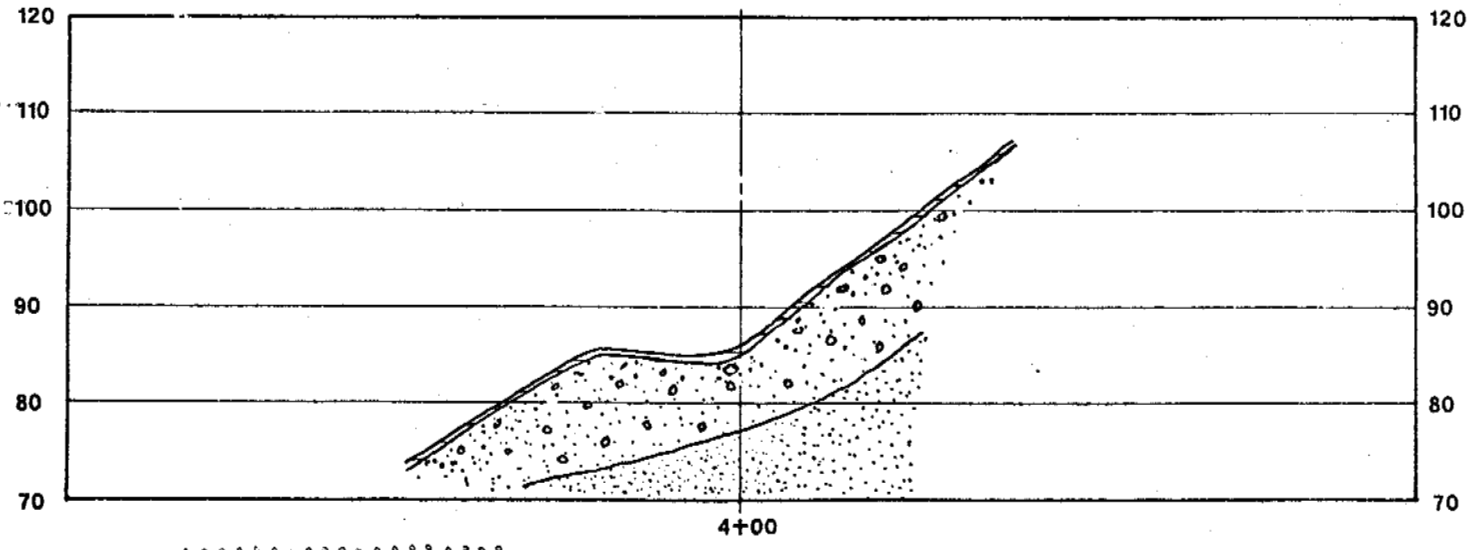
STATION TO STATION		GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00	6,640	150			1,890
2 + 00	4 + 00	8,815	440			5,150
4 + 00	6 + 00	13,535	590			6,850
6 + 00	8 + 00	9,980				3,595
8 + 00	10 + 00	2,075				
10 + 00	12 + 00					
12 + 00	14 + 00					
14 + 00	16 + 00	6,870		1,220	3,850	
16 + 00	18 + 00	6,870	220	1,220	3,850	
18 + 00	20 + 00	1,705				
20 + 00	22 + 00	1,705				
22 + 00	24 + 00					
24 + 00	26 + 00					
26 + 00	28 + 00					
28 + 00	30 + 00					
30 + 00	32 + 00	5,555				
32 + 00	34 + 00	5,555				
34 + 00	36 + 00					
36 + 00	38 + 00					
38 + 00	40 + 00					
40 + 00	42 + 00					
42 + 00	44 + 00					
44 + 00	46 + 00					
46 + 00	48 + 00					
48 + 00	50 + 00					
50 + 00	52 + 00					
52 + 00	54 + 00					
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		69,305	1,400	2,440	7,700	17,485

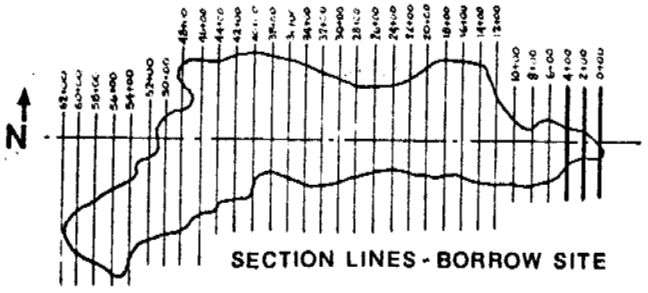
ELEVATION 75 TO ELEVATION 70

STATION	TO STATION	GRAVEL	OVERBURDEN	SILTS	ICE	SAND
0 + 00	2 + 00	4,680				4,095
2 + 00	4 + 00	2,665				10,260
4 + 00	6 + 00	1,335				12,740
6 + 00	8 + 00	555				6,575
8 + 00	10 + 00					
10 + 00	12 + 00					
12 + 00	14 + 00					
14 + 00	16 + 00	19,760		620		
16 + 00	18 + 00	19,760	900	620		
18 + 00	20 + 00					
20 + 00	22 + 00					
22 + 00	24 + 00					
24 + 00	26 + 00					
26 + 00	28 + 00					
28 + 00	30 + 00					
30 + 00	32 + 00	2,780				
32 + 00	34 + 00	2,780				
34 + 00	36 + 00					
36 + 00	38 + 00					
38 + 00	40 + 00					
40 + 00	42 + 00					
42 + 00	44 + 00					
44 + 00	46 + 00					
46 + 00	48 + 00					
48 + 00	50 + 00					
50 + 00	52 + 00					
52 + 00	54 + 00					
54 + 00	56 + 00					
56 + 00	58 + 00					
58 + 00	60 + 00					
TOTAL		54,315	900	1,240		33,670









LEGEND

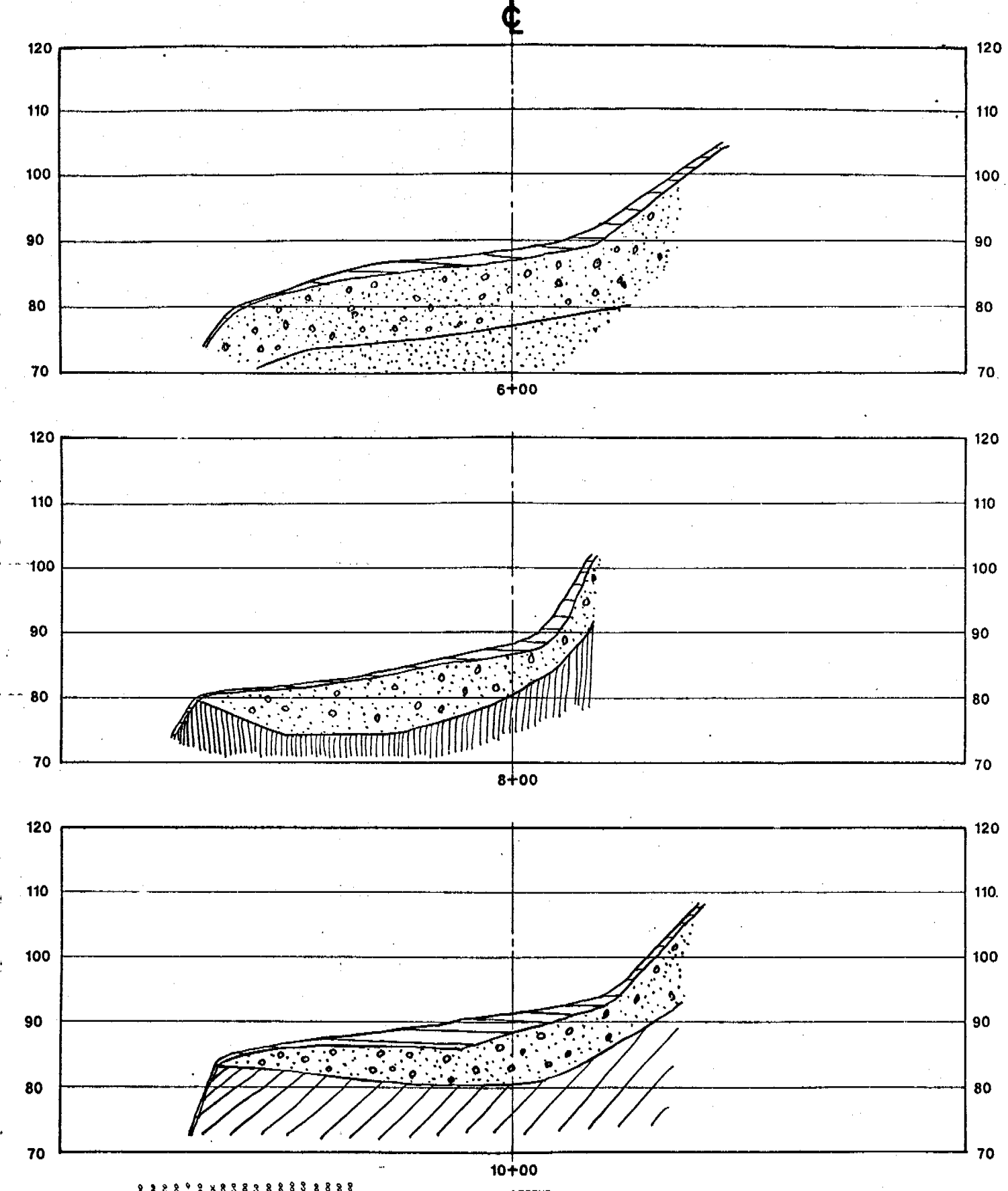
- ORGANIC
- GRAVEL
- SAND
- CLAY
- SILT
- ICE

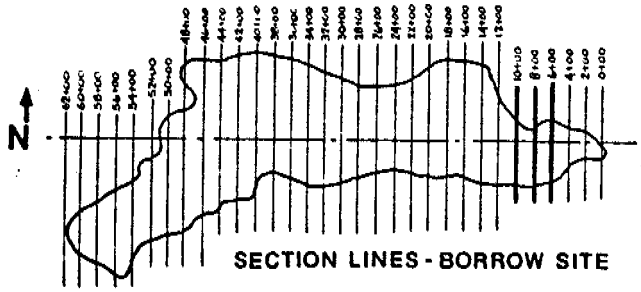
Scale: Hor. - 1" - 200'
Vert, - 1" - 20'

BORROW SOURCE CROSS SECTIONS

GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED





LEGEND

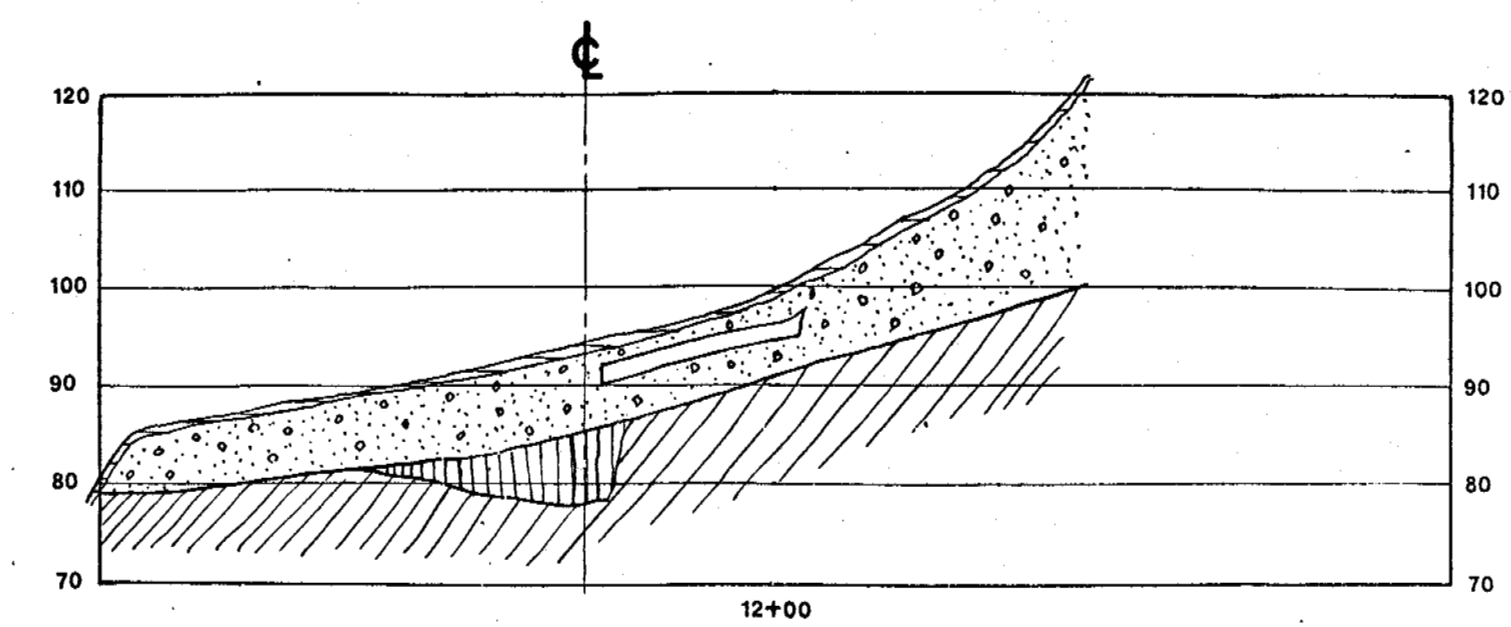
- ORGANIC
- GRAVEL
- SAND
- CLAY
- SILT
- ICE

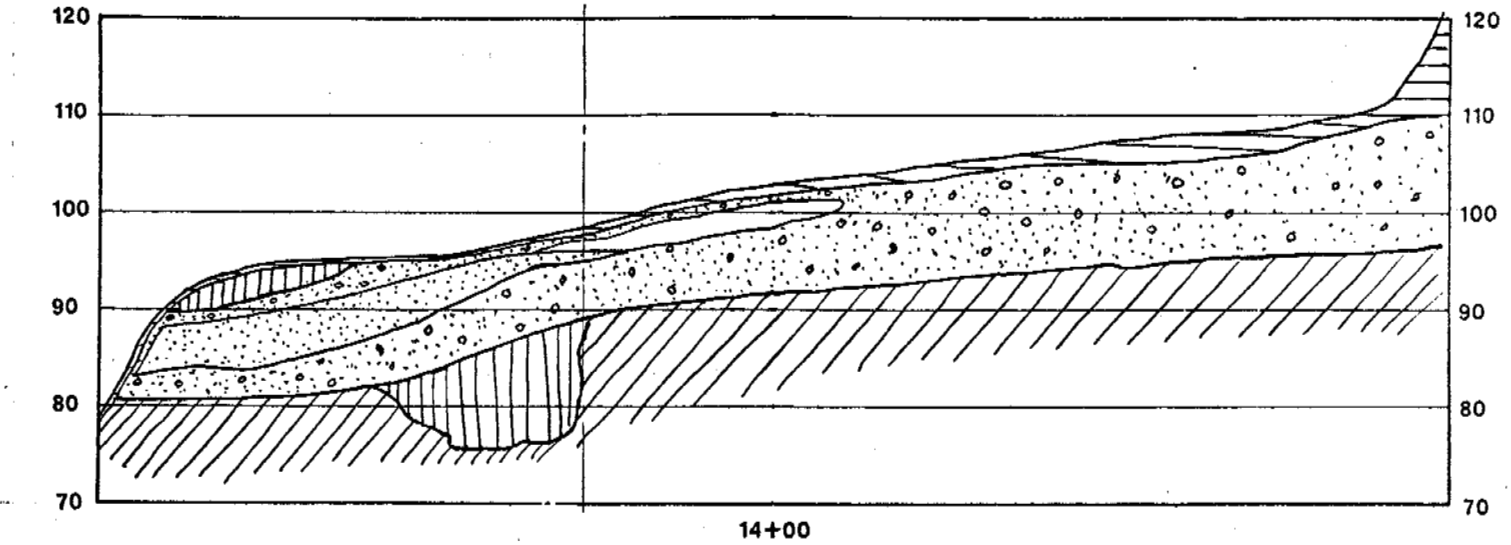
Scale: Hor. - 1" - 200'
Vert. - 1" - 20'

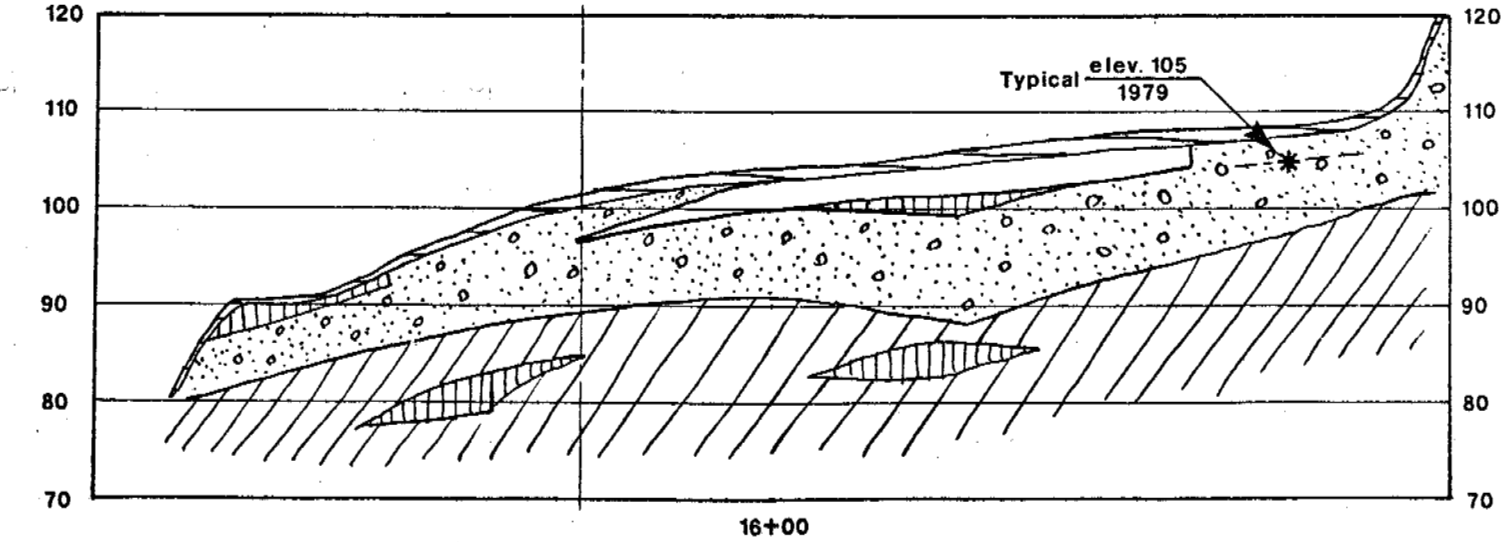
BORROW SOURCE CROSS SECTIONS

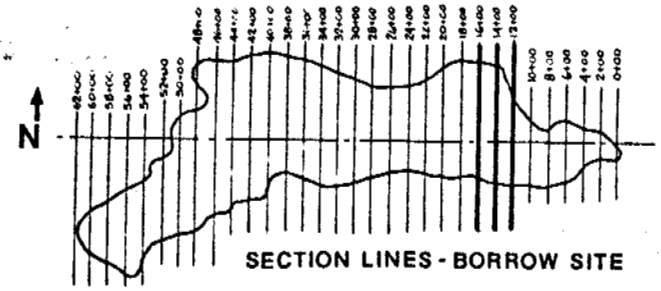
GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED









LEGEND

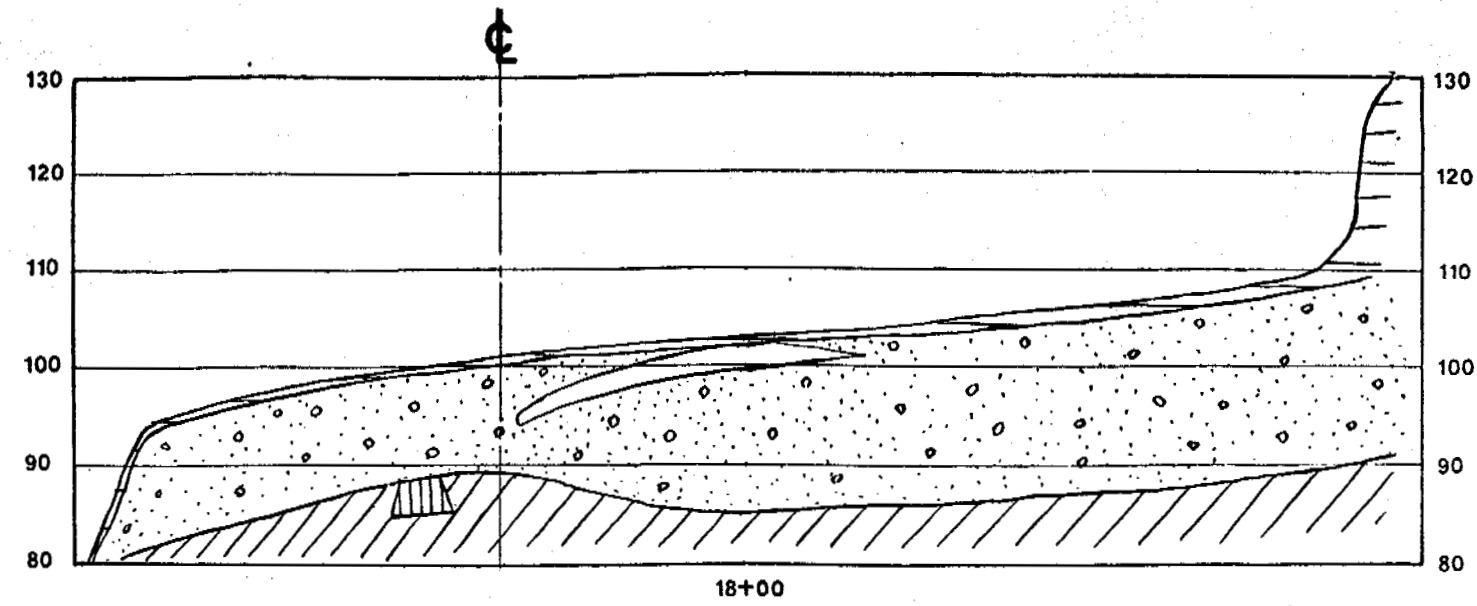
- ORGANIC
- GRAVEL
- SAND
- CLAY
- SILT
- ICE

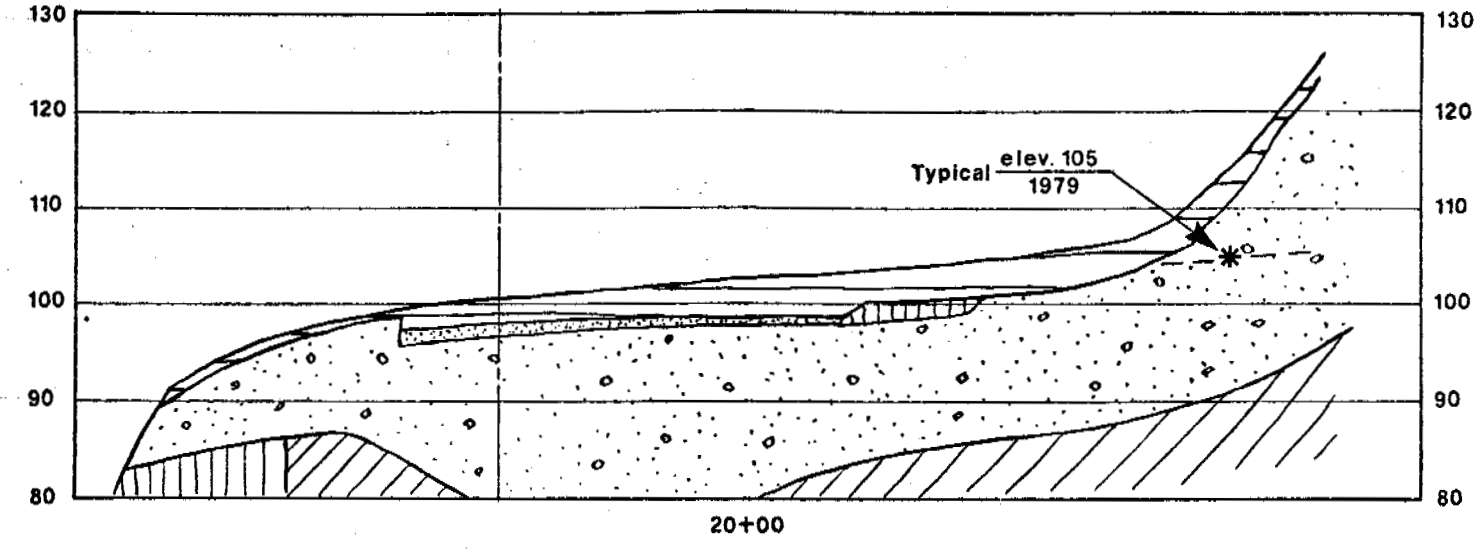
Scale: Hor. - 1" · 200'
Vert. - 1" · 20'

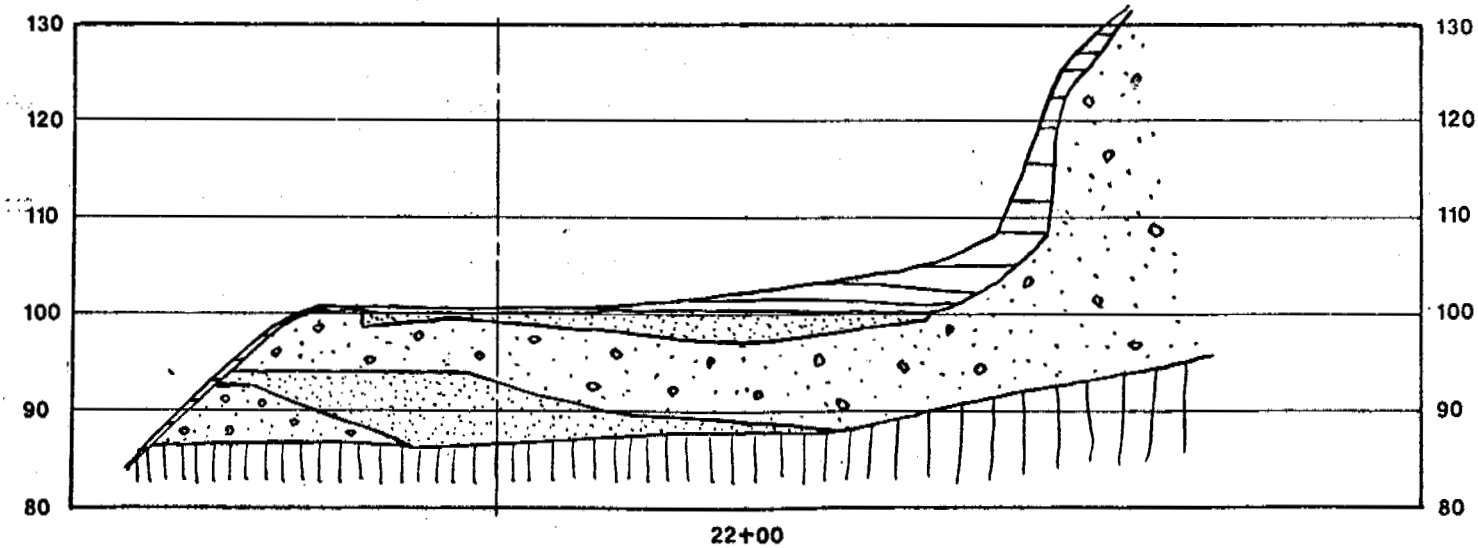
BORROW SOURCE CROSS SECTIONS

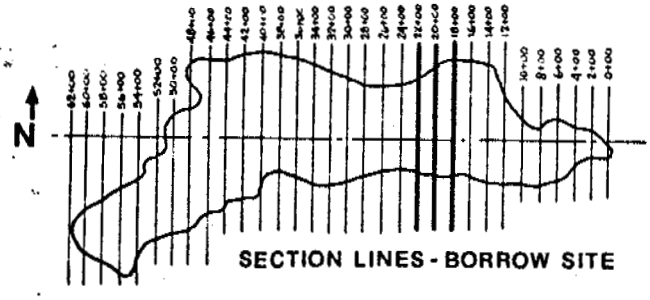
GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED









LEGEND

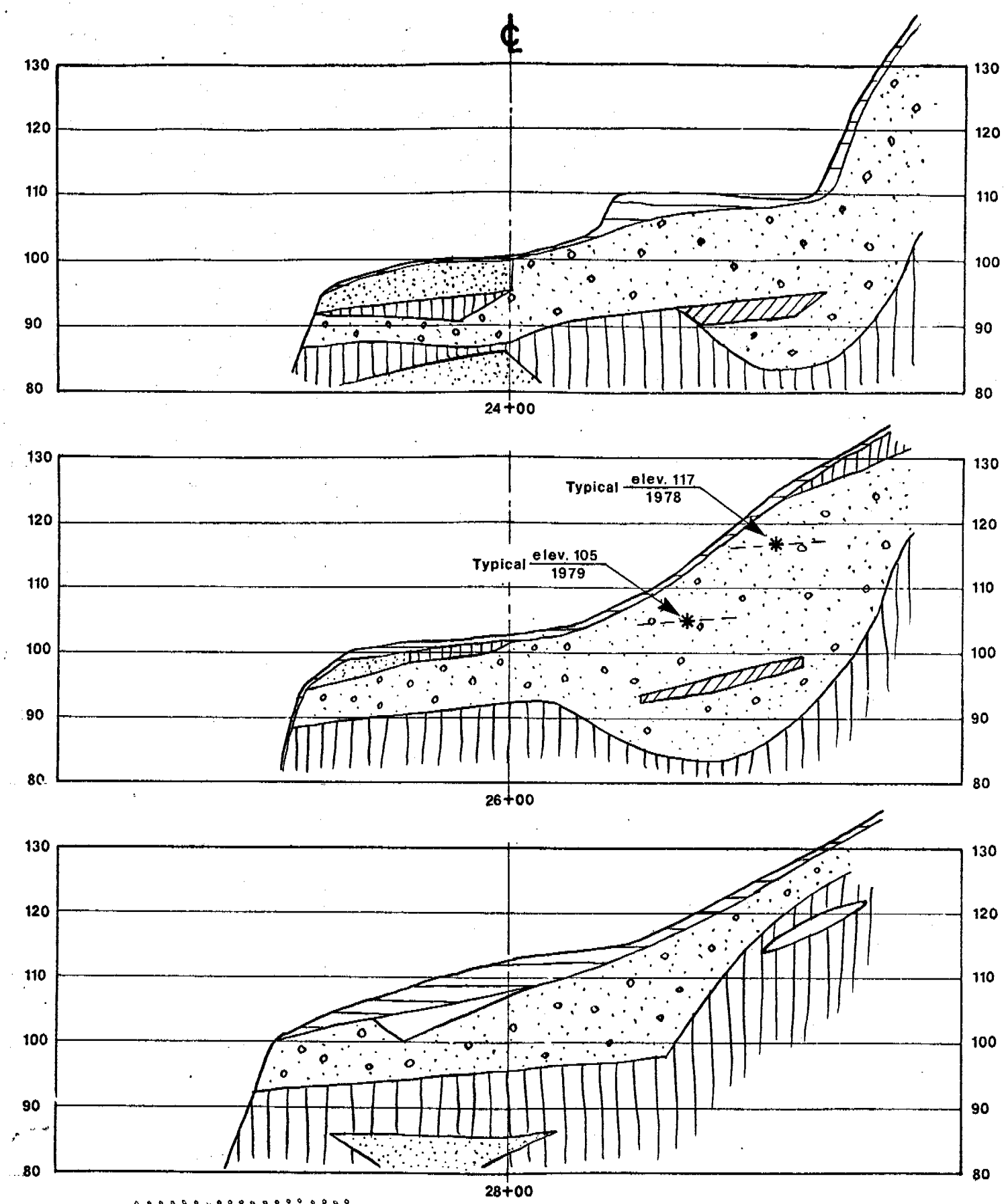
- ORGANIC
- GRAVEL
- SAND
- CLAY
- SILT
- ICE

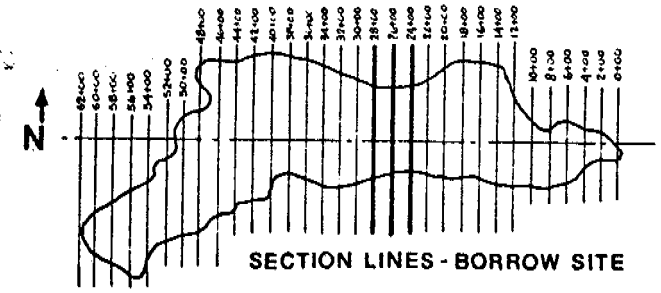
Scale: Hor. - 1" · 200'
Vert. - 1" · 20'

BORROW SOURCE CROSS SECTIONS

GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED





LEGEND

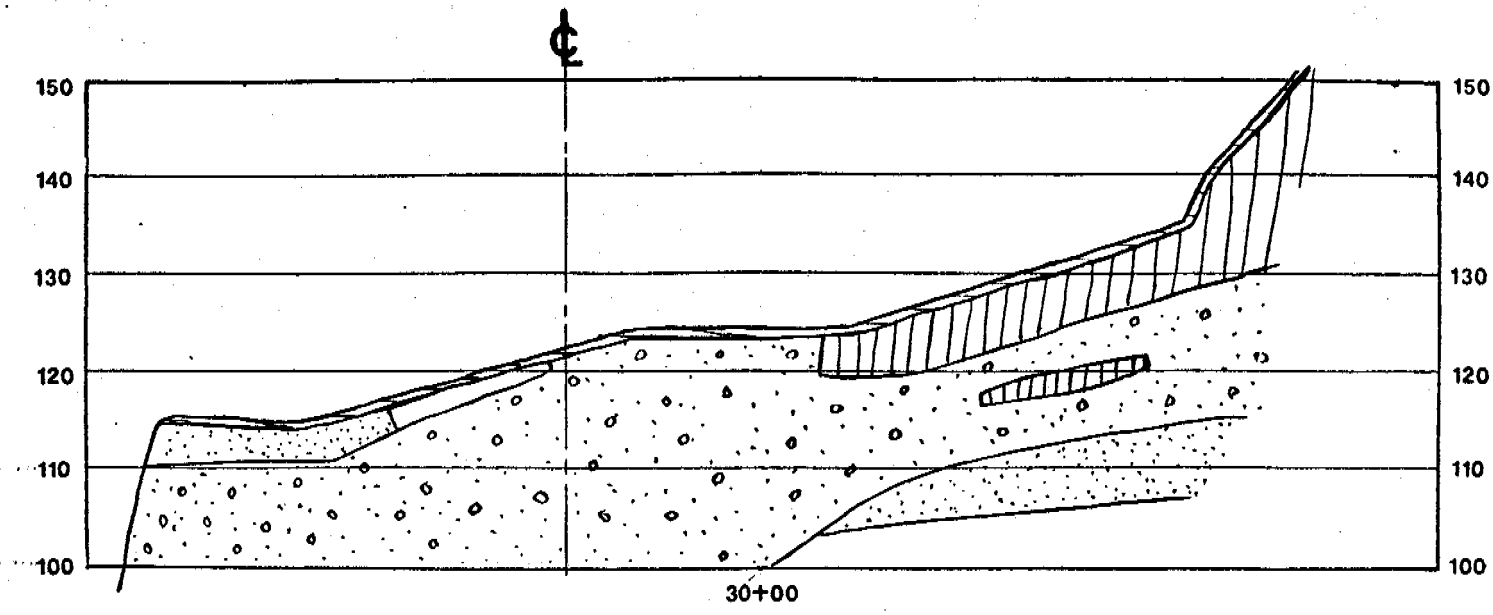
- ORGANIC
- GRAVEL
- SAND
- CLAY
- SILT
- ICE

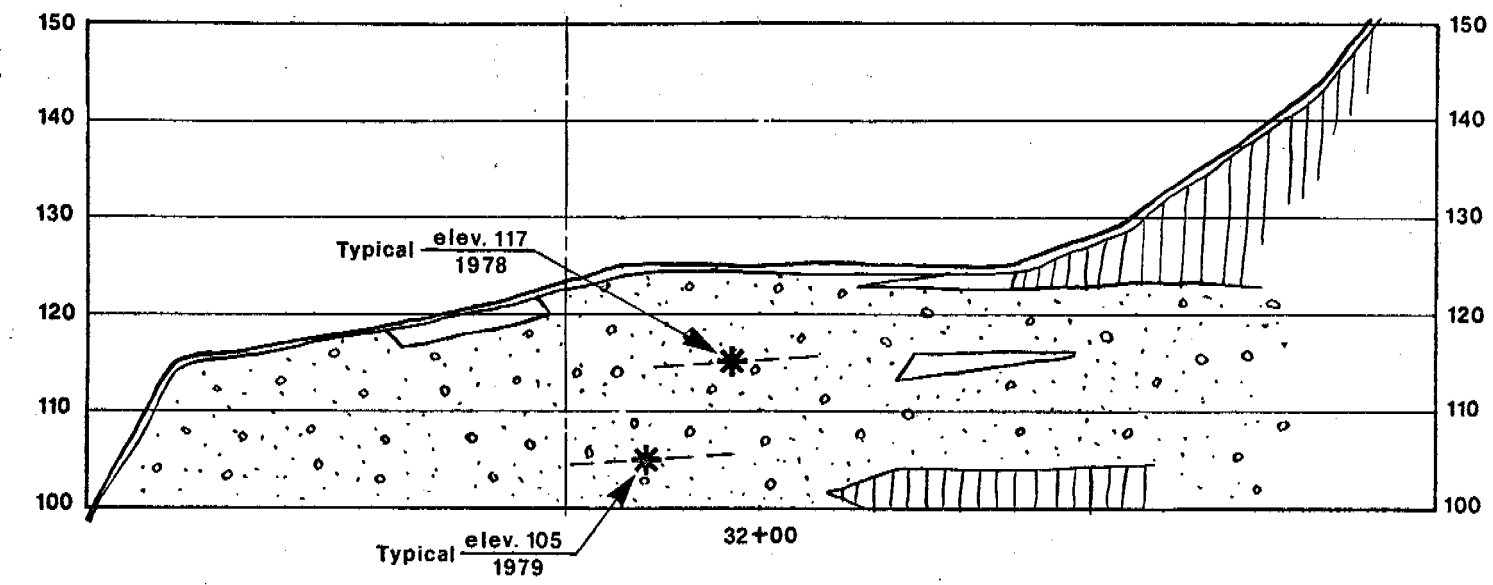
Scale: Hor. - 1" - 200'
Vert, - 1" - 20'

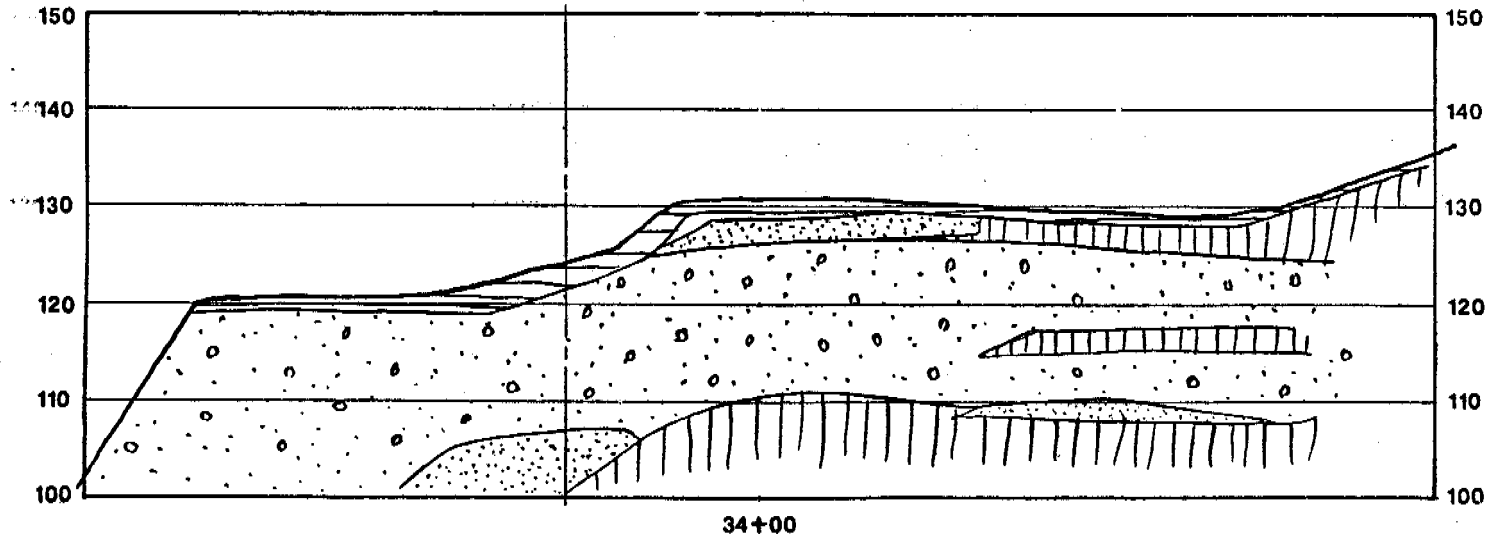
BORROW SOURCE CROSS SECTIONS

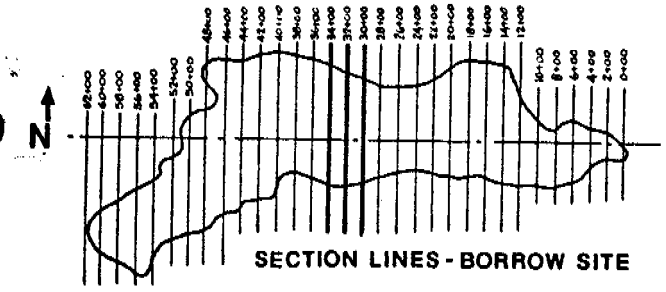
GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED









LEGEND

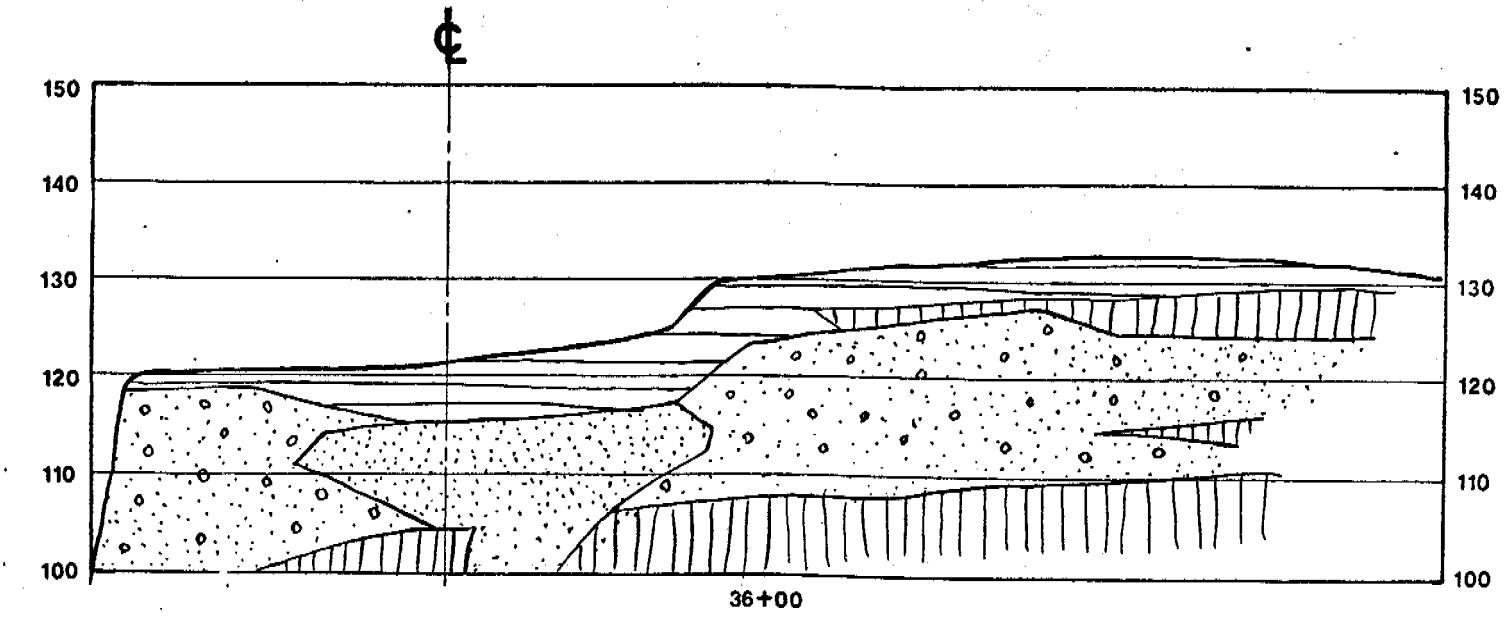
- ORGANIC
- GRAVEL
- SAND
- CLAY
- SILT
- ICE

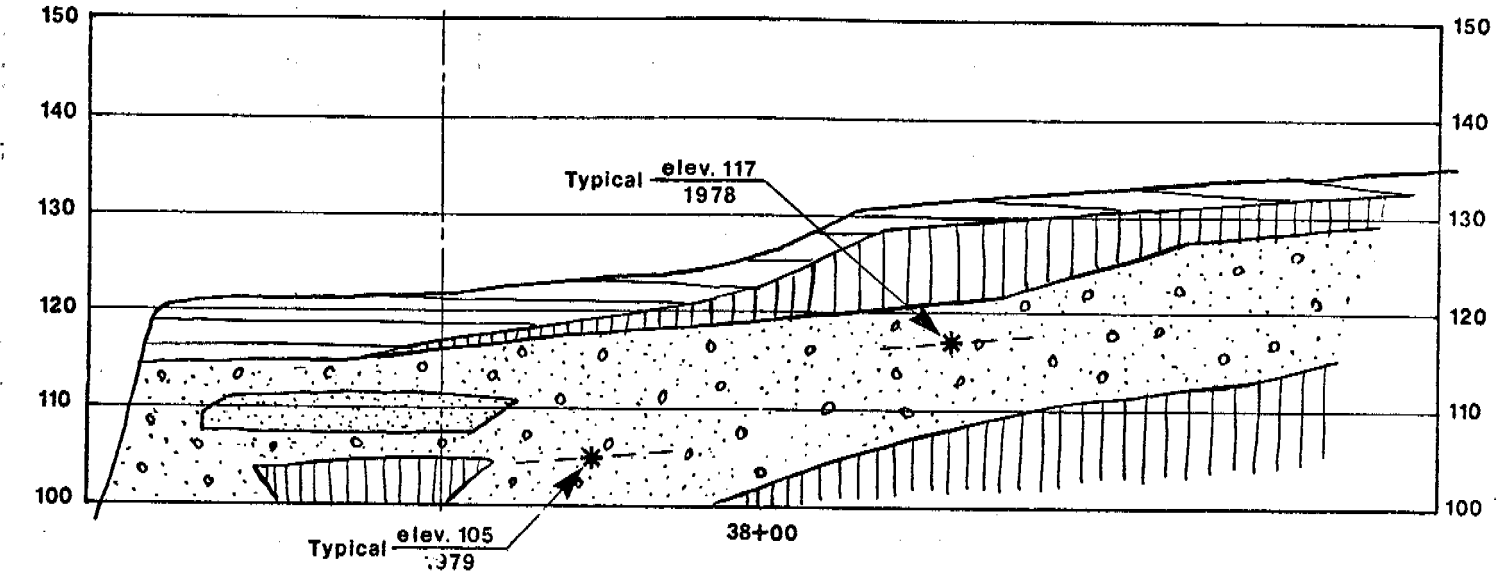
Scale: Hor. - 1" - 200'
Vert. - 1" - 20'

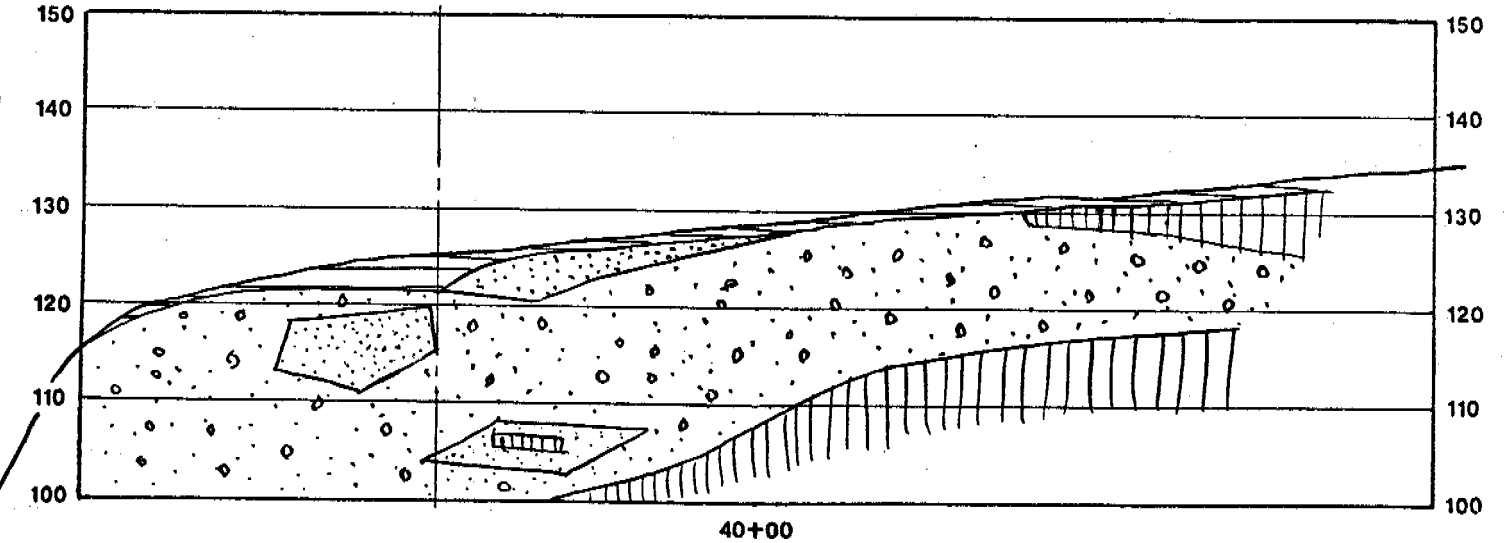
BORROW SOURCE CROSS SECTIONS

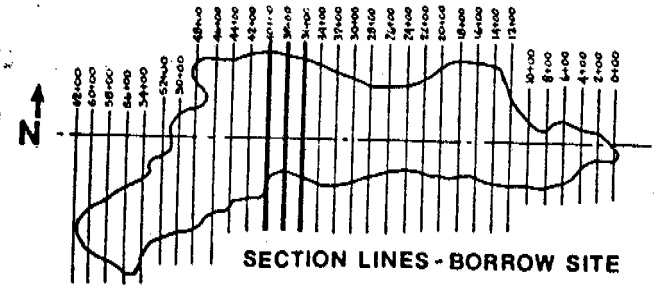
GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED









LEGEND

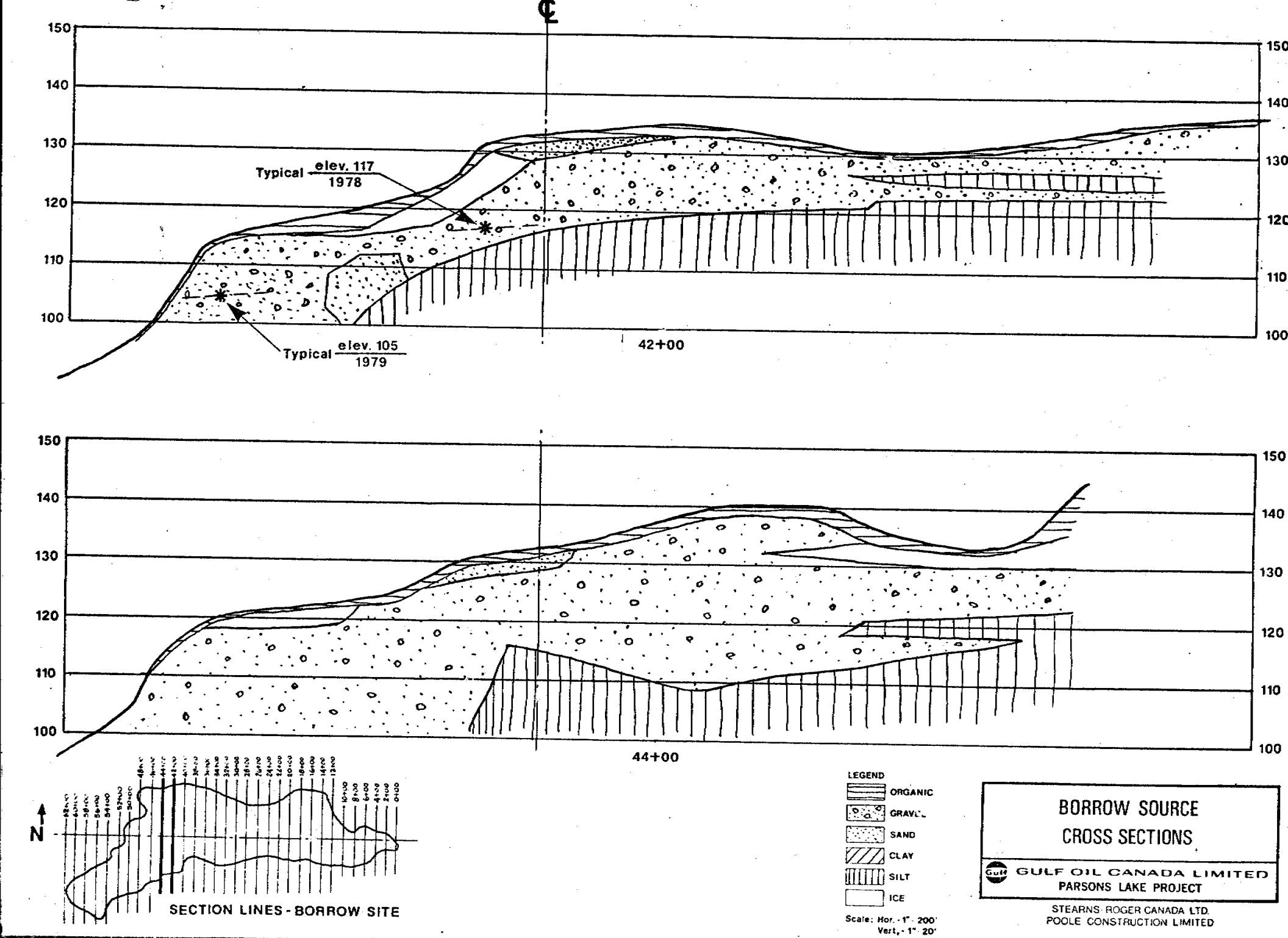
- ORGANIC
- GRAVEL
- SAND
- CLAY
- SILT
- ICE

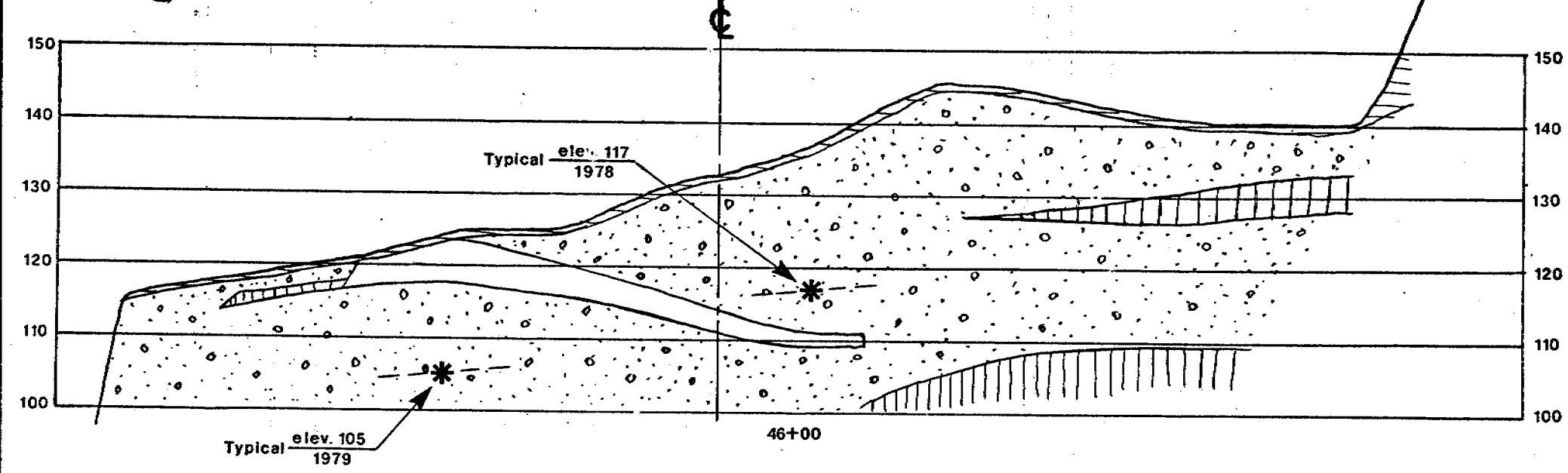
Scale: Hor. - 1" - 200'
Vert. - 1" - 20'

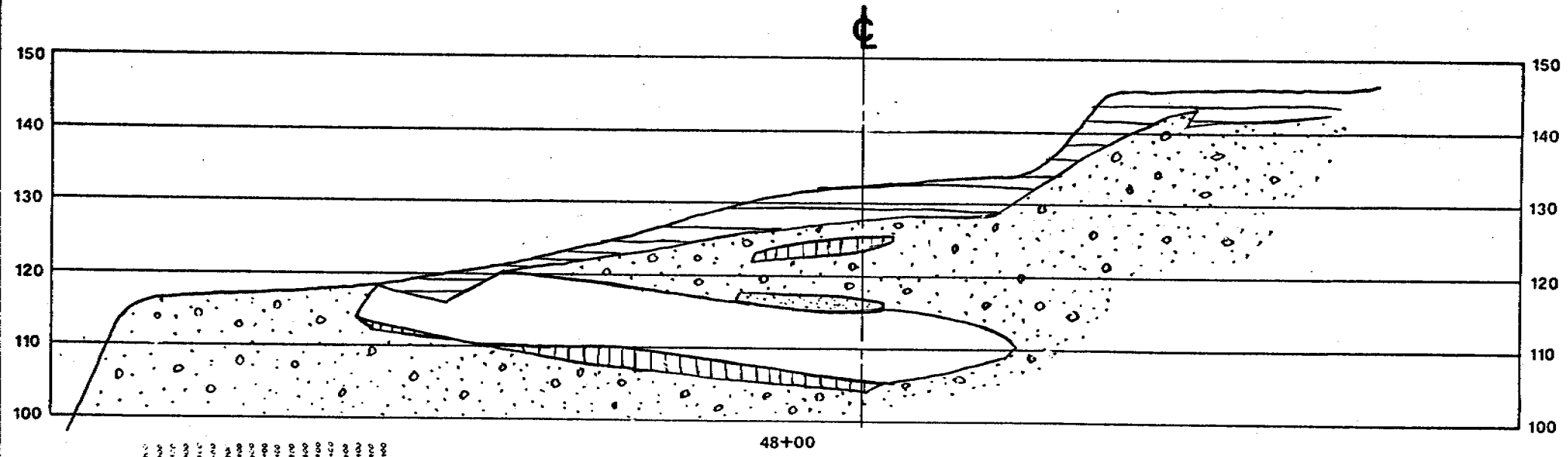
BORROW SOURCE CROSS SECTIONS

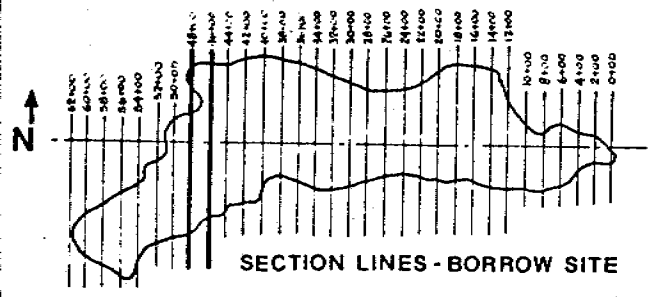
GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED


150
140
130
120
110
100
Typical elev. 117 1978
Typical elev. 105 1979
42+00
44+00
N
SECTION LINES - BORROW SITE
LEGEND
ORGANIC
GRAVEL
SAND
CLAY
SILT
ICE
Scale: Hor. - 1" - 200'
Vert. - 1" - 20'
BORROW SOURCE
CROSS SECTIONS
GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT
STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED







LEGEND

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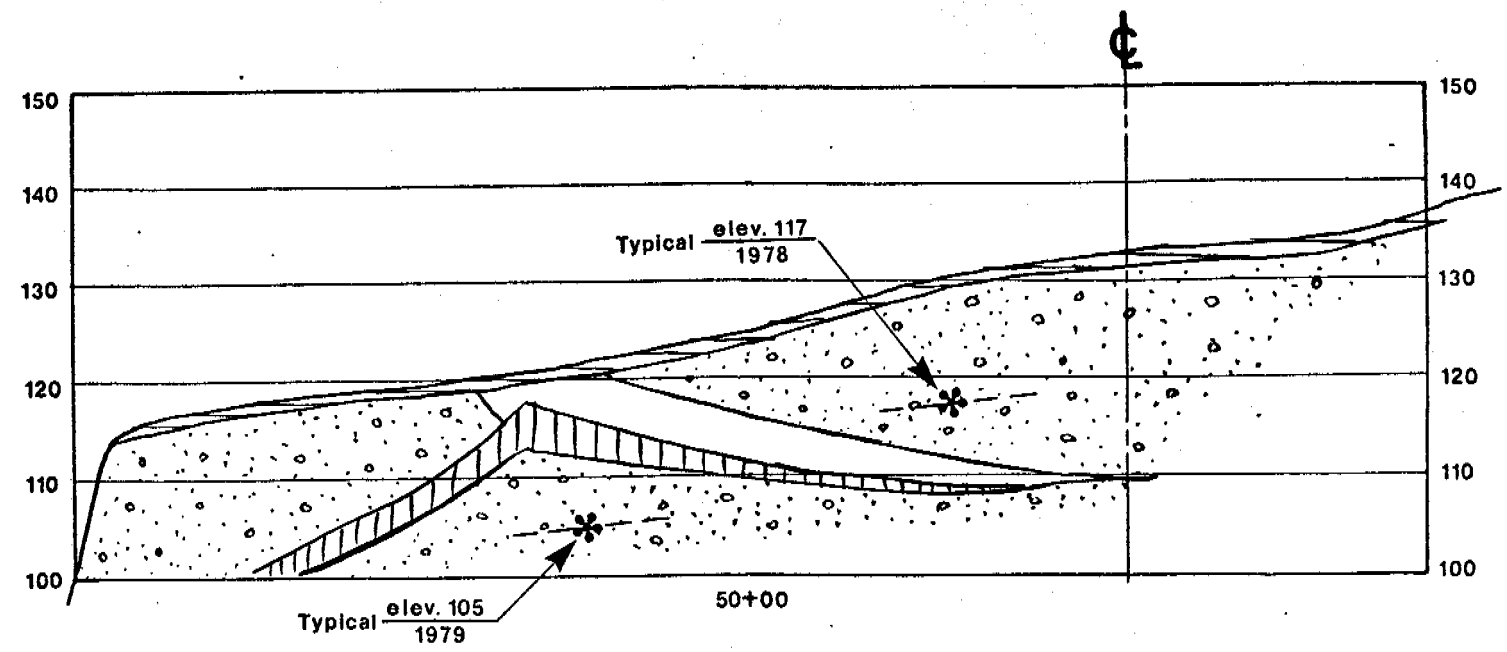
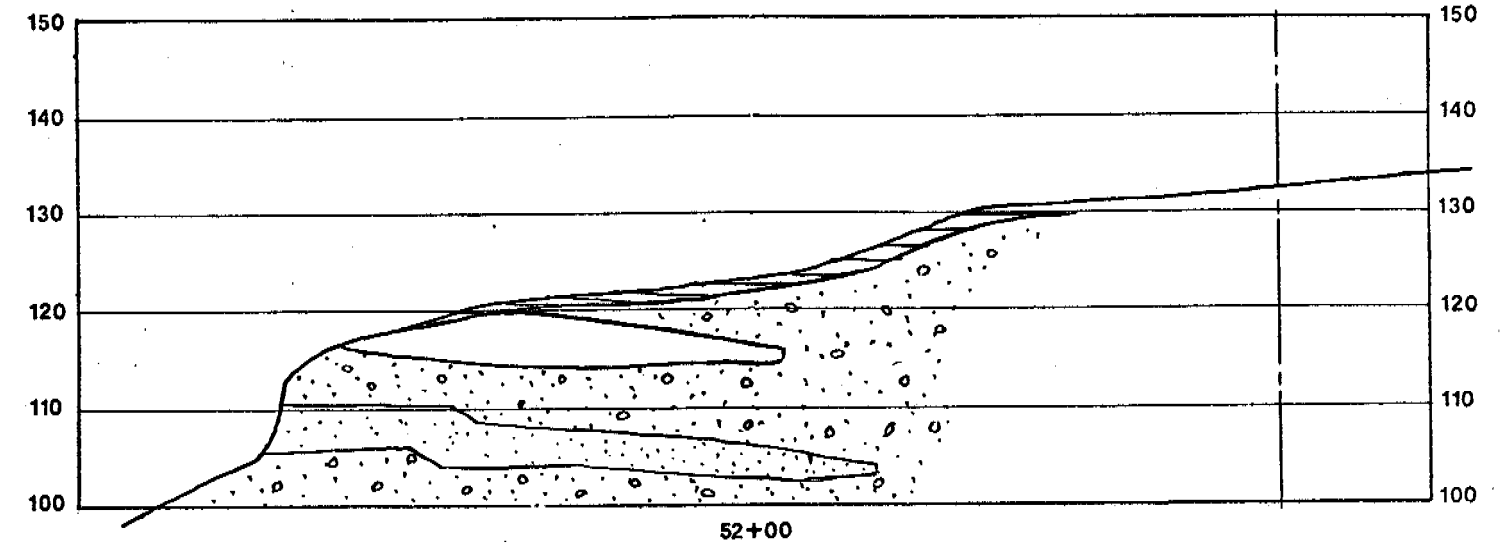
Scale: Hor. - 1" - 200'
Vert. - 1" - 20'

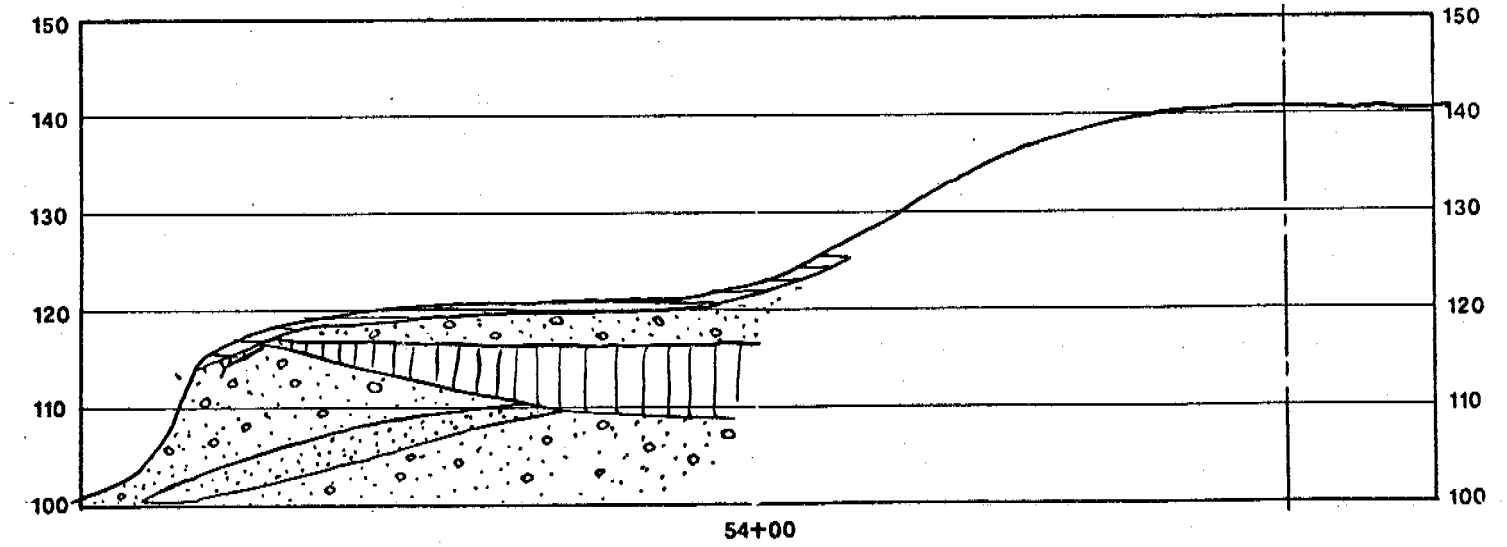
BORROW SOURCE CROSS SECTIONS

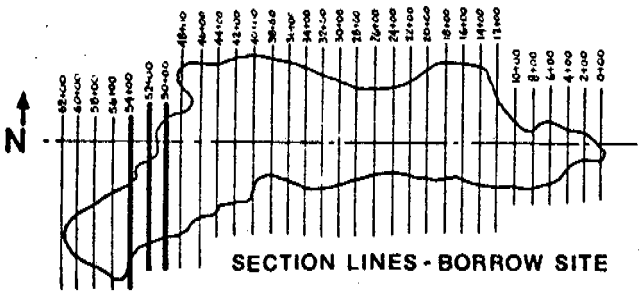
GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD.
POOLE CONSTRUCTION LIMITED









LEGEND

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BORROW SOURCE CROSS SECTIONS

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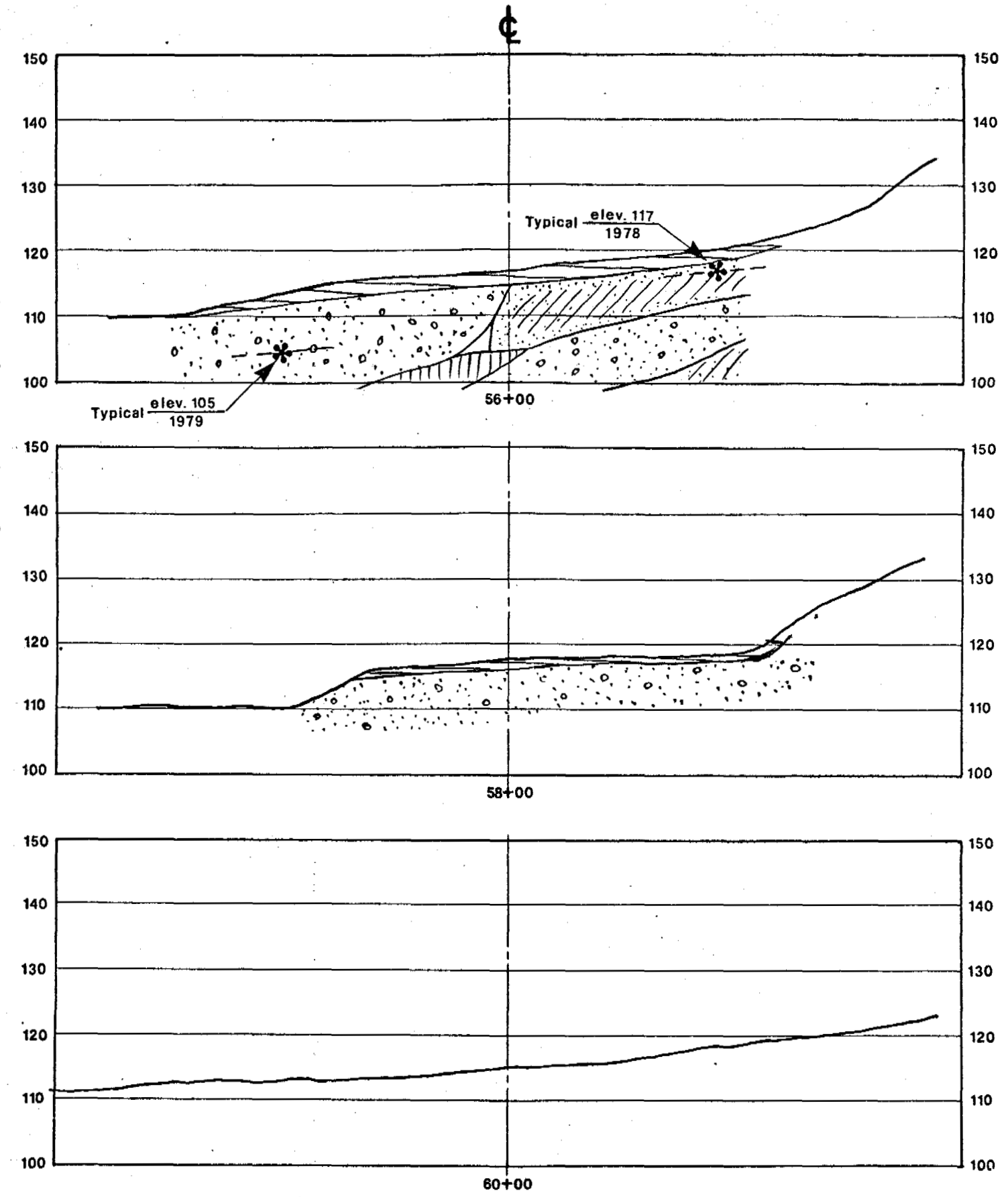

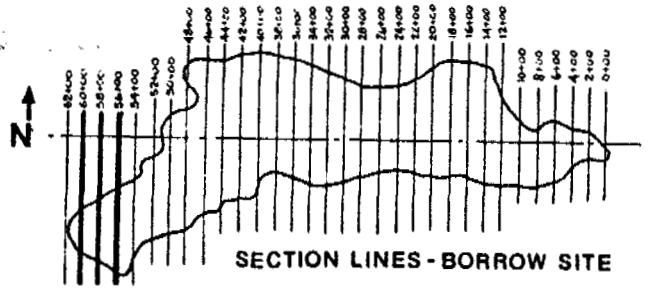

LEGEND

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Scale: Hor. - 1" : 200'
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BORROW SOURCE CROSS SECTIONS

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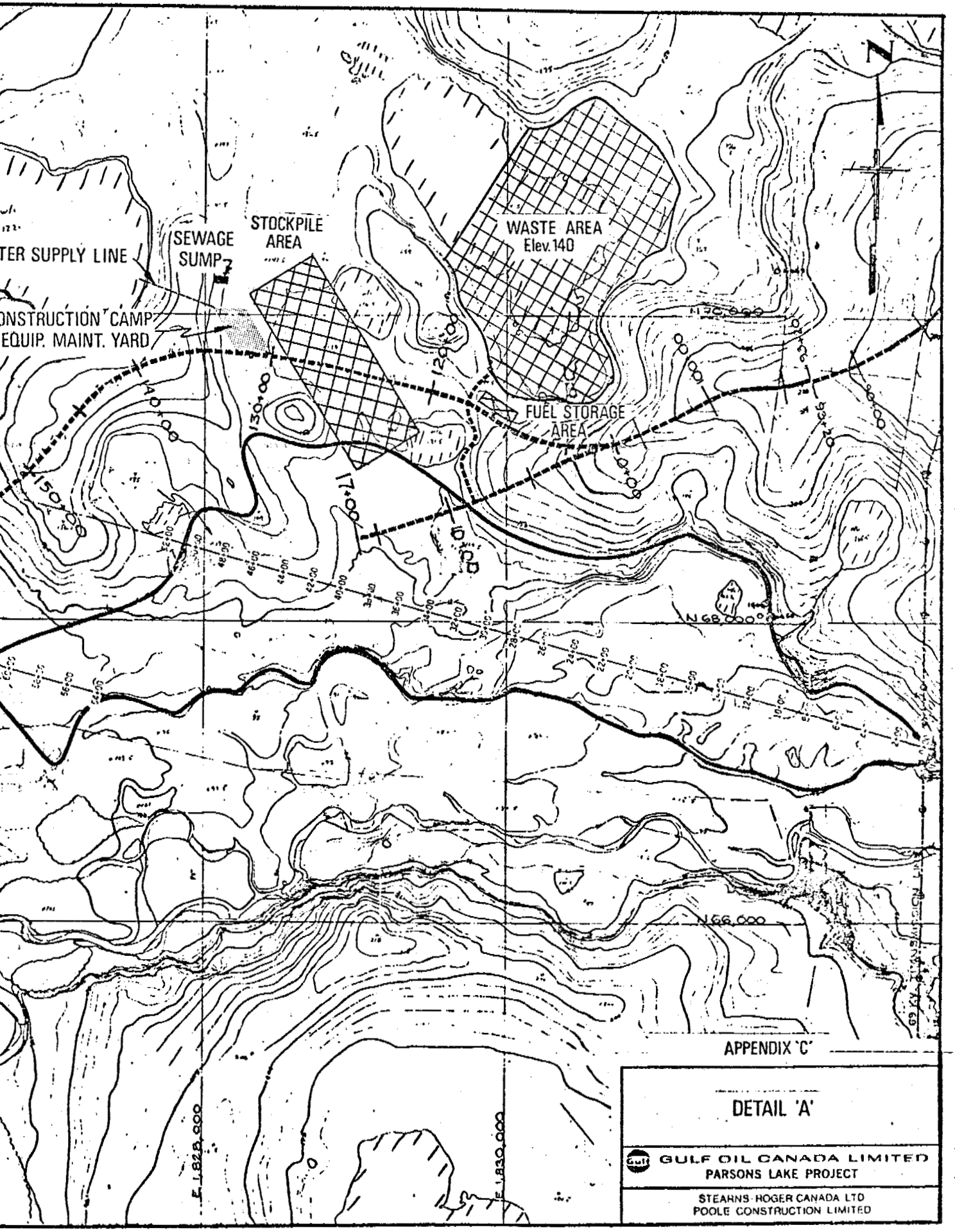

APPENDIX 'C'

DETAIL 'A'

GULF OIL CANADA LIMITED
PARSONS LAKE PROJECT

STEARNS-ROGER CANADA LTD
POOLE CONSTRUCTION LIMITED