PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

P225101

CONSTRUCTION REPORT
VANGORDA REHABILITATION
PWGSC PROJECT 760831
VANGORDA PLATEAU, FARO MINE
YUKON TERRITORY

SRK - ROBINSON INC.

Consulting Engineers

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P225101

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YUKON TERRITORY

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P225101

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YUKON TERRITORY

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1.0 INTRODUCTION

1.1 General

Public Work and Government Services Canada (PWGSC) contracted Pelly Construction Limited (PCL) of Whitehorse, Yukon Territory to complete works associated with the rehabilitation of the existing Vangorda mine rock containment facility located at the Vangorda Plateau, Faro Mine, Yukon Territory. A general plan of the Vangorda Plateau is shown on Figure P2251001. SRK-Robinson Inc. (SRKR) was retained by PCL as the design consultant. The work primarily involved the upgrading of an existing seepage collection system located around the perimeter of the containment facility, recontouring slopes within a section of the rock pile, and providing instrumentation to monitor both the physical stability of the rock pile and any impact on groundwater quality. This report presents a discussion on the field design changes and procedures that took place during construction.

1.2 Description of Responsibilities

The responsibilities for design, construction, surveying, groundwater well installations and inspections are described in the following sections.

1.2.1 Design

SRK-Robinson Inc. was responsible for the design of the following components:

- seepage collection channel;

- recontouring of the existing rock pile slopes;
- groundwater well sand piezometers; and
- seepage monitoring weirs.

1.2.2 Construction

Pelly Construction Limited (PCL) was responsible for the construction of the seepage collection channel, recontouring of the rock pile slopes, installation of the groundwater wells and piezometers. Survey work associated with both the channel construction and the resloping was carried out by Yukon Engineering Services (YES). Midnight Sun Drilling (MSD) installed the groundwater monitoring wells and the piezometers.

1.2.3 Inspection Services

Inspection services were provided by SRKR and EBA Engineering Ltd. SRKR had technical control of the channel construction and rock slope recontouring and inspected the works periodically during construction. EBA provided fulltime inspection of the groundwater well and piezometer installations.

1.3 Background

In May 1990, SRK conducted a geotechnical investigation of the area in preparation for the design of the mine existing rock containment facility. Test pits were excavated along the alignment of the original seepage collection ditch. The locations of these test pits and the results of the investigation were provided in the final design report issued in March, 1994.

Other geotechnical data from the area consisted of test pit logs and laboratory test results completed by Montreal Engineering Company, Limited (Moneco) in 1977, EBA Engineering Consultants Ltd. in 1990 and Piteau Associates Engineering Limited in 1992. Extracts from these reports were also provided in the design report.

1.4 Drawings

Drawings (D-size) of the work completed work at the site have been prepared and provided as part of this report. Reduced copies of these drawings are included at the back of the report.

3.0 DESIGN CHANGES

3.1 Seepage Collection Channel

3.1.1 General

During the construction of the seepage collection channel, several modifications to the original design were required due to soil conditions encountered during the excavation. The following sections discuss each of the design changes in more detail.

3.1.2 Rock Excavation

During the excavation of the channel phyllitic bedrock was encountered above the channel subgrade from Station 0+100 to 0+320. The original design had estimated that the bedrock would be encountered between 0+100 and 0+250. In accordance with the design, the bedrock was overexcavated to a depth of 0.5 m below the design subgrade level in preparation for sealing with compacted till. It was noted, however that in places the bedrock extended all the way to the original ground and not as originally estimated to within 1 to 1.5 m of the original ground. As a result, till placement on the sideslopes was limited to a maximum height of 2 m vertically above the topside of the till blanket, along the channel base. Rock fill was placed over the till blanket but did not extend to the crest of the channel where bedrock was exposed all the way up the sideslope.

3.1.3 Upstream Sediment Control Berm

In order to control sediment migration from the till berms into the channel, a small berm of blasted rock was constructed along the uphill crest of the channel from STA 0+100 to 0+750. The height of the berm was about 0.45 m.

3.1.4 Overexcavation (STA 0+870 to 0+920)

Between STA 0+870 and 0+920, the new channel intercepted the original ditch and the spoil used to backfill the ditch formed and the uphill sideslope of the new channel. It was found that the backfill material contained frozen soil that was considered unsuitable foundation for the rock fill cover. Tension cracks were observed along the section of the channel in this area, which were indicative of settlement due to thawing of the backfill. As a result of these observations, it was decided to overexcavate the material in this area and backfilled with shot rock from the quarry.

3.2 Groundwater Monitoring Wells

Modifications to the original program presented in the final design report were made in the field to improve detection of any seepage losses from the channel and to assess any impact on the regional groundwater table. A discussion of these changes is presented below.

- The modifications to groundwater wells GW-94 -01 to GW-94-04 involved installing the wells to a maximum depth of about 15 m or to 4 m below the water table, whichever occurred first. If the water table was encountered, the sand pack was to extend no more than 1 metre above the screen. If no water was encountered the sand pack was to extend to no more than 10 m above the screen to intercept any seepage from the channel. The well screens were also reduced from 3 m to 1.5 m.

- The modification also involved the installation of an additional well (GW-94-05) downgradient from Well GW-94-03, between the channel and the Vangorda Creek. This well was to be located as far down the hill as possible to minimise drilling cost and was to be drilled until the water table was intercepted.

- The modification to the piezometer installations involved reducing the well screen in each well from 3 m to 1.5 m and extending the pipe to no more than 4 m below original ground.

3.3 Seepage Monitoring

A preliminary design for a flow monitoring was included in the final design report. Following discussions with Bud MacAlpine of Water Resources, modifications to the seepage monitoring concept was made. It was agreed that v-notch weirs would be installed at three of the finger drains instead of one weir at the end of the collection channel. The weirs would be located at the outlets to fingerdrains 3, 5 and 6. The weirs would consist of a steel plate about 8 feet by 4 feet square installed across the channel and embedded about 3 feet into the ground. A v-notch would be cut into the steel plate with a 90° angle. The notch would be at least 300 mm deep and would be positioned at least 300 mm above the ground. The weir would be located on a steep section of the channel to minimize ponding.

3.4 Waste Rock Resloping

In the original design, it was hoped that at least three zones (A, B and C) in the existing waste rock pile would be recontoured and that a test area on Zone A would be covered with till. It was recognized that this phase of the work was subject to available funds. On completion of the seepage channel, the groundwater well and piezometer installation, the remaining funds limited work on the rock pile to resloping a 190 m wide section in Zone A from STA 0+150 to STA 0+340 and placing a 2 m thick cover of compacted till over an area from STA 0+150 to 0+220.

4.0 FIELD AND LABORATORY TESTING

4.1 General

Compaction tests and gradation analyses were completed during the construction by EBA. Modified Procter tests were completed on representative samples of the glacial till that was used to seal the exposed phyllite rock along the channel from STA 0+100 to 0+320 and to cover the resloped rock on the pile. EBA completed a gradation analysis on a sample of the till used as a seal for the channel and on a representative sample of the rock fill that was placed over the exposed subgrade till in the channel.

4.2 Channel Base Seal

Glacial till was placed to a depth of 0.5 m to seal the exposed phyllite from STA 0+100 to 0+320. A Standard Proctor compaction test performed on a sample of the till used for the seal indicated a maximum dry density of 2020 kg/m^3 with an optimum moisture of 12 percent. Results of the test are presented in Appendix B. As the Standard Proctor produces a lower density than the Modified, the required degree of compaction was raised to 98 percent

4.3 Rockpile Till Cover

A Modified and a Standard Procter test were performed on sample of the glacial till used to cover the rock slope on the waste rock pile. The results were 2230 kg/m^3 for the Modified test and 2115 kg/m^3 for the Standard test. Details of these tests are provided in Appendix B.

4.4 Blasted Rock Cover

Blasted rock from a quarry established near the site was used to provided erosion protection of the channel sideslope. EBA performed a sieve analysis on a representative sample of the rock material to determine compliance with the design specifications. The results (D_{50} = 140 mm, D_{90} = 250 mm and D_{15} = 75 mm) indicated that the material was acceptable and would meet the performance requirements.

5.0 CONSTRUCTION PROCEDURES

5.1 General

Construction activities on the site commenced in March 1994, with clearance of the snow in the area between the original ditch and the toe of the waste rock pile. Snow and ice were also removed from the ditch and from the top of the spoil stockpile along the western perimeter of the site. Activities included construction of the seepage collection channel, installation of the groundwater monitoring wells, connecting the fingerdrains into the channel, resloping of a section of the waste rock pile and placing a 2-metre thick cover over a zone of the resloped area. SRKR provided technical control and periodic inspection of the construction activities. Select photographs of

key aspects of the construction are included in Appendix C. The following sections present a discussion of the construction activities.

5.2 Seepage Collection Channel

5.2.1 Clearing and Snow Removal

PCL began clearing snow from the area between the original ditch and toe of the waste rock pile in March 1994. They also commenced snow removal from the ditch and from the spoil stockpile. The snow removal above the ditch was necessary to avoid delays in excavation of the main channel due to runoff from the snowmelt. The snow and ice was cast over the bank below the existing access road.

5.2.2 Foundation Preparation

On completion of the snow removal, PCL commenced backfilling of the original ditch between STA 0+700 and 1+000 which was done to provide a working platform for the excavation of the deeper sections of the new channel. The backfill material consisted of the glacial till that had been stockpiled along the western edge of the original ditch. Although the material contained pockets of frozen soil, all snow and ice was removed from the soil before placement.

5.2.3 Excavation

On completion of the backfilling of the original ditch, YES carried out an initial survey of the ground surface along the alignment of the new channel and established grade stakes for the excavation. PCL commenced excavation of the channel at the end of March using a Cat 235 excavator and a D-10 bulldozer. Subexcavation of the phyllite rock between STA 0+100 and 0+320 also started. By April 12, 1994, 40 percent of the bulk excavation along the channel had been completed including the subexcavation of the bedrock. YES completed a final survey of the rock subcut on April 8, 1994.

Between Station 0+870 and 0+910, spoil used to backfill the original ditch on the uphill side was excavated and backfilled with shot rock to provide a stable sideslope for the new channel. At the same location but on the opposite sideslope, a small area of peat was encountered between Station 0+880 and 0+900, which would also form

part of the channel sideslope. The peat was considered unsuitable for foundation material below the rock cover and was removed prior to placing the rock cover.

The frozen till that had been used to backfill the original ditch from Station 0+685 to 0+715 had softened due to thawing and as this material would form the uphill sideslope of the new channel, it was removed and replaced with shot rock.

By mid May, the entire channel had been excavated and YES had completed a final survey of the subgrade till surface.

Review of the as-built sections along the entire length of the channel, indicated that generally the till surface had been excavated to the lines and grades shown on the design drawings. However, there were some areas where the excavation had extended beyond the design limits. The total volume of till excavated was calculated from these sections and was found to be in the order of 43,000 m^3. However, it was agreed between PCL and GSW that the till excavation quantity would be used for payment would be calculated on the basis of the design till line and the original ground. The volume calculated for payment was 37,461 m^3.

The final alignment of the channel is shown on the site plan in Figure P2251002 and on the detailed plan and profiles shown in Figures P2251003 to P2251006. Typical sections through the channel are presented in Figures P2251007 to P2251009.

5.2.4 Channel Base Seal

Placement of the glacial till seal over the subcut phyllite bedrock from STA 0+100 to 0+320 began on April 15, 1994 and was completed by April 27, 1994. Based on a gradation test performed by EBA, the material contained 54 percent clay and silt, 33 percent sand and 13 percent gravel. The till was placed in two 25 cm lifts and compacted by a sheepsfoot roller to the compaction specifications of 93 percent of the Modified Procter maximum dry density which is equivalent to 98 percent of the Standard Proctor maximum dry density. Density tests were performed by EBA on the compacted till using a nuclear densimeter. Results of the compaction and density tests including the gradation analyses are presented in Appendix B of this report. A profile along the subcut and the till seal along the centreline of the channel is presented on Figure P2251003.

5.2.5 Rock Cover Placement

Following approval by the GSC inspector, PCL began placing the shot rock cover over sections of the excavated subgrade that were prepared. This work commenced on April 11, 1994 and was completed by June 9, 1994. The shot rock was obtained from a quarry that was established by PCL specifically for this project at allocation shown on Figure P2251001. The material consisted primarily of a dark green, medium grained, altered gabbro. The purpose of the rock cover was to provide long term erosion protection of the underlying till and also to provide adequate passage of the seepage from the fingerdrains. The material was hauled to the site from the quarry using two 769 rock trucks and was placed by the Cat 235 excavator. In places, the D-10 was also used to spread the material. No compaction of this material was required.

The shotrock cover was generally placed at, or in excess of, the required 0.45 m above the till base and the slope of the cover conforms with the design requirement of 3:1 (Horizontal to Vertical). While the gradation of the shotrock is finer than expected, SRKR believes the channel will function as designed and will direct seepage flow from the fingerdrains into Little Creek Pond. The volume of shotrock placed in the channel was calculated based on survey data provided by YES and amounted to about 17,000 m^3. As the thickness of the shotrock exceeded the design thickness in many places, it was agreed that the quantity of rock that would be used for payment would be based on 0.45 m above the as-built till surface. The shotrock volume for payment amounted to 10,902 m^3.

The depth of the rock cover along the alignment of the channel is shown on the profiles presented in Figures P2251003 to P2251006.

5.2.6 Fingerdrain Plugs

Where the original fingerdrains extended beyond the new channel, the drainrock in the drains was removed and backfilled with compacted glacial till to seal the channel and prevent potential leakage to the environment.

5.3 Waste Rock Resloping and Till Cover

5.3.1 Resloping

Resloping of Zone A of the Vangorda waste rock pile began on May 6, 1994 using a D10 bulldozer. By May 13, 1994, waste rock on the south side of the rockpile had been resloped between STA 0+150 and 0+220 to an angle of about 20° (2.7:1) The resloping was initiated at a point about 10 m below the top of the rock pile and feathered out on the crest of the till berm below. By May 19, 1994 the resloping had advanced to STA 0+340 and the section from STA 0+150 to 0+220 had been flattened to 18° (3:1). As funds for the project, at that time were close to the maximum allocated for this phase of the work, no further resloping was done. Placement of the till cover was initiated. As payment for the resloping was based on machine time only, no measurement was made of the volume of rock recontoured. However, based on the initial survey data used in the design report, it was estimated that about 40,000 m^3 of material was resloped.

5.3.2 Till Cover

The placement of a two metre till cover over the recontoured waste rock began on June 1, 1994. Because the funds remaining in the budget were limited, the extent of the cover was confined to STA 0+150 to 0+220. The till for the cover was obtained from a stockpile that was located at the east end of the rockpile as shown on Figure P2251002. The cover was constructed in four 0.5 m thick lifts and compacted with a sheepsfoot roller to the required 93 percent of the Modified Procter maximum dry density or 98 percent of the Standard Procter maximum dry density. Density tests of the compacted till were completed by EBA using a nuclear densometer. Results of the density tests are presented in Appendix B. A total of 15,730 m^3 of till was placed over an area of about 8000 m^2. Typical sections through the cover and the resloped rock are presented on Figure P2251010. A perspective view of the till cover and recontouring of the slopes is shown on Figure P2251011.

6.0 INSTRUMENTATION

6.1 General

During the construction of seepage channel and the resloping of the rock pile, permanent instrumentation was installed to monitor the seepage flow from the rock pile, potential seepage losses from the channel and piezometric heads that may develop in the existing till berm around the rock pile. The following sections discuss the types of instrumentation installed and the methods of installation.

6.2 Groundwater Wells and Piezometers

A total of five groundwater wells and nine piezometers were installed by EBA and Midnight Sun Drilling (MSD) utilizing a CME 750 auger drill from April 20 to May 1, 1994. Both solid shaft and hollow stem augers were used during drilling. Water was encountered in all the monitoring wells, however, the piezometers were all dry. A summary of well installation information is presented in Table 1. Essentially all wells were installed according to the design specifications. However, some minor installation changes and modifications were necessary due to variable field and soil conditions. Some of the well depths varied because the drill utilized could not penetrate the dense till at lower depths. It was also noted that most of the wells were placed in seasonally frozen ground and consequently the Puregold bentonite grout may not have set-up properly. Also some of the protective wellhead casings had slid into the hole as the ground thawed.

On June 10, 1994, all the wells were inspected, repaired, and re-levelled as required. Also, all threaded caps were replaced with friction fit (pull off) caps, and 50 mm diameter water bailers/samplers were suspended inside each well with braided nylon rope, to facilitate future sampling. A second set of water level readings in all monitoring wells were taken on June 21, 1994 by EBA and are presented on Table 1.

All material quantities, drilling times and individual well details are shown on the borehole logs presented in Appendix C.

TABLE 1

Vangorda Waste Rock Containment Facility - Faro, Y.T.

Groundwater Wells and Piezometer Installation Summary

Well No.	Stickup above Ground Elevation (m)	Depth from Top of Pipe (m)	Depth to Static Water Level May 3, 1994 (m)	Depth to Static Water Level June 21, 1994 (m)	Ground Elevation (m)	Coordinates (Mine Grid)	
						North	East
P94-01A	0.61	12.37	no water	N/R	1136.555	10014.802	8893.956
P94-01B	0.61	6.05	no water	N/R	1136.493	10013.012	8894.394
P94-02A	0.53	10.72	10.57 (bailed empty)	N/R	1138.410	10157.070	8935.215
P94-02B	0.56	6.12	no water	N/R	1138.332	10155.070	8933.309
P94-02C	0.61	13.34	13.08 (bailed empty)	N/R	1129.840	10137.120	8888.761
P94-03A	0.61	14.10	no water	N/R	1134.373	10188.741	9245.064
P94-03B	0.61	9.80	no water	N/R	1134.459	10187.816	9248.427
P94-04A	0.61	12.70	12.17 (bailed empty)	N/R	1134.609	10142.198	9448.836
P94-04B	0.61	8.99	no water	N/R	1134.326	10145.418	9442.209
GW94-01	0.58	12.80	8.28	7.45	1117.445	9782.317	8945.534
GW94-02	0.53	15.70	14.33	8.65	1117.405	10008.160	8810.969
GW94-03	0.64	11.94	11.28	9.15	1118.431	10306.670	9020.492
GW94-04	0.54	14.48	14.33	9.65	1116.165	10310.048	9261.925
GW94-05	0.76	16.13	11.56	See Note 5	1101.673	10396.139	9083.394

Notes:
1. All depths measured from top of pipe
2. Water levels were measured on May 3, 1994
3. Piezometers containing water were bailed dry
4. N/R = Not Recorded
5. Artesian conditions cause water to spill over the pipe.

6.3 Flow Gauges

A total of 3 v-notch weirs were installed at the outlets to Fingerdrains 3, 5 and 6. The weirs consist of a steel plate about 2.4 m by 1.2 m square installed across the outlet and embedded about 1 m into the ground. A v-notch was cut into the steel plate with a 90° angle. The notch was about 30 cm deep and was positioned at least 30 cm above the ground.

Flows recorded at each of the weirs by DIAND and PWGSC are presented in the following table:

Weir at Fingerdrain No.	July 13, 1994 (L/min)	August 10, 1994 (L/min)
3	1	3
5	1.5	0.6
6	2	10.2

7.0 POST CONSTRUCTION OBSERVATIONS

In September 1994, mine site personnel observed tension cracks which had developed along a 50-metre section of an extension to the access road constructed alongside the seepage collection channel from STA 1+240 to 1+290. SRKR inspected the cracks during a site visit to Faro mine site on September 12, 1994. At that time, the cracks extended longitudinally along the 15 metre wide berm. The tension cracks were, in places, 30 cm wide and extended about 1.5 m deep. At one location, the crack is within 5 m of the downstream crest of the new channel. However, there was no structural damage to the channel itself. The maximum thickness of the berm at this location is about 3 to 4 m.

We understand that the cracks developed in late June, 1994 following placement of additional fill by PCL on the downhill side of the original berm in mid June, 1994.

The fill used had been stockpiled along the outer crest of the original berm and was pushed out over the edge and compacted with a sheepsfoot compactor. This material had been originally excavated during construction of the channel. SRKR understands that during the initial stages of the project, snow in the original seepage collection ditch was removed and cast over the downhill side of the original berm. The snow was then covered over with material excavated from the channel.

On October 4, 1994, SRK again inspected the berm during another site visit to Faro. It was noted that although there was no horizontal movement of the toe, in places the ground had settled about 1 metre and there was seepage discharging from the toe.

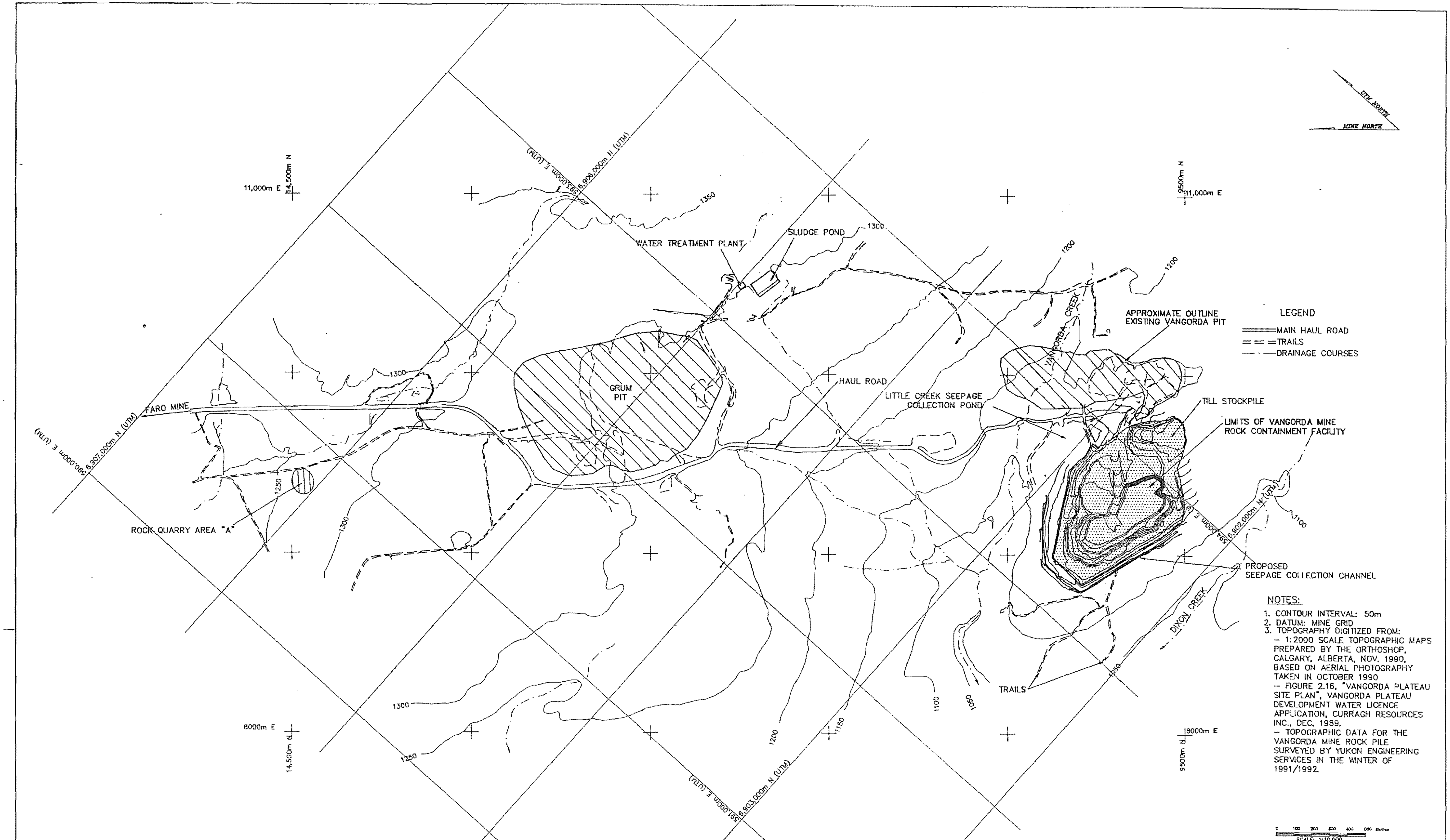
On the basis of these observations, we believe that the settlement of the fill and the observed seepage are directly related to the thawing of the underlying snow. We also believe that the settlement of the fill will continue but at a decreasing rate and will likely not impact the new channel. It is our opinion that no remedial action is required at this time. However, the settlement should be monitored on a regular basis by the new mine owner. At the beginning of next years construction season, sufficient consolidation will have occurred and the resulting depression can be backfilled and recompacted.

This report, **P225101, Construction Report, Vangorda Rehabilitation Faro Mine, Yukon Territory,** has been prepared by:

SRK-ROBINSON INC.

Peter Healey, P.Eng.
Project Manager

R-50/tg


UTM NORTH
MINE NORTH
11,000m E
14,500m N
6,906,000m N (UTM)
591,000m E (UTM)
1350
1300
SLUDGE POND
WATER TREATMENT PLANT
1200
VANGORDA CREEK
APPROXIMATE OUTLINE EXISTING VANGORDA PIT
9500m N
11,000m E
LEGEND
MAIN HAUL ROAD
TRAILS
DRAINAGE COURSES
GRUM PIT
HAUL ROAD
LITTLE CREEK SEEPAGE COLLECTION POND
TILL STOCKPILE
LIMITS OF VANGORDA MINE ROCK CONTAINMENT FACILITY
FARO MINE
6,907,000m N (UTM)
590,000m E (UTM)
1250
ROCK QUARRY AREA "A"
6,902,000m N (UTM)
592,000m E
1100
PROPOSED SEEPAGE COLLECTION CHANNEL
DIXON CREEK
TRAILS
1050
1150
8000m E
14,500m N
6,903,000m N (UTM)
591,000m E (UTM)
8000m E
9500m N
NOTES:
1. CONTOUR INTERVAL: 50m
2. DATUM: MINE GRID
3. TOPOGRAPHY DIGITIZED FROM:
– 1:2000 SCALE TOPOGRAPHIC MAPS PREPARED BY THE ORTHOSHOP, CALGARY, ALBERTA, NOV. 1990, BASED ON AERIAL PHOTOGRAPHY TAKEN IN OCTOBER 1990
– FIGURE 2.16, "VANGORDA PLATEAU SITE PLAN", VANGORDA PLATEAU DEVELOPMENT WATER LICENCE APPLICATION, CURRAGH RESOURCES INC., DEC, 1989.
– TOPOGRAPHIC DATA FOR THE VANGORDA MINE ROCK PILE SURVEYED BY YUKON ENGINEERING SERVICES IN THE WINTER OF 1991/1992.
SCALE: 1:10,000

NO	DESCRIPTION	DATE	APPR'D
4	AS BUILT	15/11/94	
3	ISSUED FOR CONSTRUCTION	3/04/94	PMH
2	ISSUED FOR REVIEW	21/01/94	PMH
1	ISSUED FOR COMMENTS – PCL	15/01/94	PMH

REVISIONS

DESIGNED PMH — DATE JAN.94
DRAWN — DATE
CHECKED — DATE
APPROVED — DATE

SRK–ROBINSON INC.
Consulting Engineers

GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

GENERAL ARRANGEMENT PLAN

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251061	P225101	P2251001	4

GW-94-05

℄ SEEPAGE COLLECTION CHANNEL

GW-94-04

LITTLE CREEK SEEPAGE COLLECTION POND

GW-94-03

593,000m E (UTM)

6,902,500m N (UTM)

9500m E

10,300m N

MINE NORTH

TRUE NORTH

℄ DRAIN No.4

DRAIN No.5

DRAIN No.6

P94-03 A

P94-03 B

P94-02 E

P94-02 W

P94-02 C

P94-04 DR A

P94-04 B

P94-01 B

P94-01 A

℄ DRAIN No.3

GW-94-02

VANGORDA WASTE ROCK PILE

℄ SEEPAGE COLLECTION CHANNEL

GW-94-01

℄ DRAIN No.2

PREPARED SLOPE

TILL BLANKET

℄ DRAIN No.1

TILL STOCKPILE

TO VANGORDA PIT

593,500m E (UTM)

6,902,000m N (UTM)

9500m E

9500m N

LEGEND

- GROUNDWATER MONITORING WELLS
- PIEZOMETER NEST

NOTES:

1. ROCK PILE TOPOGRAPHY DERIVED FROM SURVEY DATA PROVIDED BY CURRAGH RESOURCES, 1993.
2. CONTOURS OF REGRADED SLOPE AND TILL BASED ON SURVEY DATA PROVIDED BY YES, 1994.
3. MINE GRID DATUM.

0 20 40 60 80 100 Metres

SCALE: 1:2000

NO	DESCRIPTION	DATE	APP'D
4	AS BUILT	18/11/94	
3	ISSUED FOR CONSTRUCTION	8/03/94	PMH
2	ISSUED FOR REVIEW	21/01/94	PMH
1	ISSUED FOR COMMENTS - PCL	18/01/94	PMH

REVISIONS

DESIGNED	PMH	DATE JAN.94
DRAWN	RSP	DATE
CHECKED		DATE
APPROVED		DATE

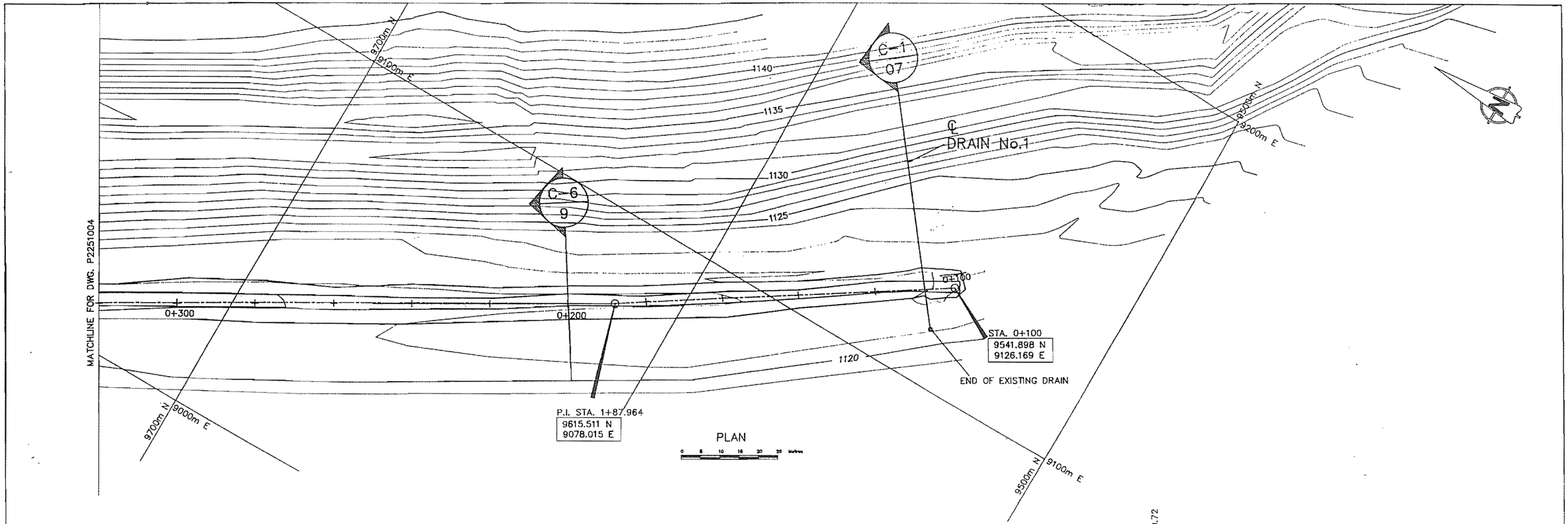
SRK-ROBINSON INC. Consulting Engineers

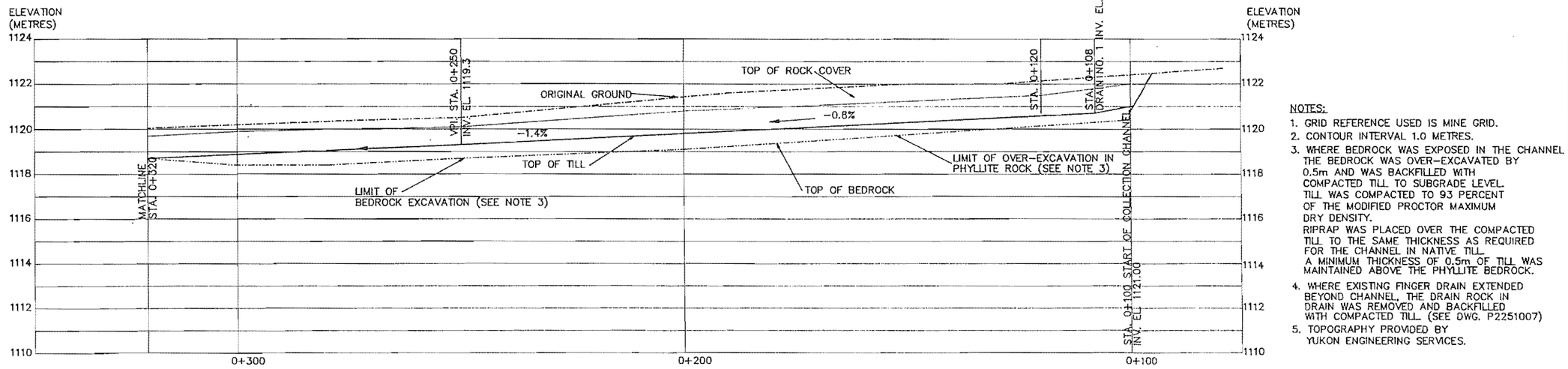
GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

SITE PLAN

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
SITEPLAN.DWG	P225101	P2251002	4





PROFILE

0 1 2 3 4 5 Metres
VERTICAL SCALE: 1:100

0 5 10 15 20 25 Metres
HORIZONTAL SCALE: 1:500

NOTES:

1. GRID REFERENCE USED IS MINE GRID.
2. CONTOUR INTERVAL 1.0 METRES.
3. WHERE BEDROCK WAS EXPOSED IN THE CHANNEL THE BEDROCK WAS OVER-EXCAVATED BY 0.5m AND WAS BACKFILLED WITH COMPACTED TILL TO SUBGRADE LEVEL. TILL WAS COMPACTED TO 93 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY.
   RIPRAP WAS PLACED OVER THE COMPACTED TILL TO THE SAME THICKNESS AS REQUIRED FOR THE CHANNEL IN NATIVE TILL. A MINIMUM THICKNESS OF 0.5m OF TILL WAS MAINTAINED ABOVE THE PHYLLITE BEDROCK.
4. WHERE EXISTING FINGER DRAIN EXTENDED BEYOND CHANNEL, THE DRAIN ROCK IN DRAIN WAS REMOVED AND BACKFILLED WITH COMPACTED TILL. (SEE DWG. P2251007)
5. TOPOGRAPHY PROVIDED BY YUKON ENGINEERING SERVICES.

DESIGNED	PMH	DATE	JAN.94
DRAWN	MP	DATE	
CHECKED		DATE	
APPROVED		DATE	

NO	DESCRIPTION	DATE	APP'D
	REVISIONS		
4	AS BUILT	16/11/94	
3	ISSUED FOR CONSTRUCTION	8/03/94	PMH
2	ISSUED FOR REVIEW	21/01/94	PMH
1	ISSUED FOR COMMENTS - PCL	12/01/94	PMH

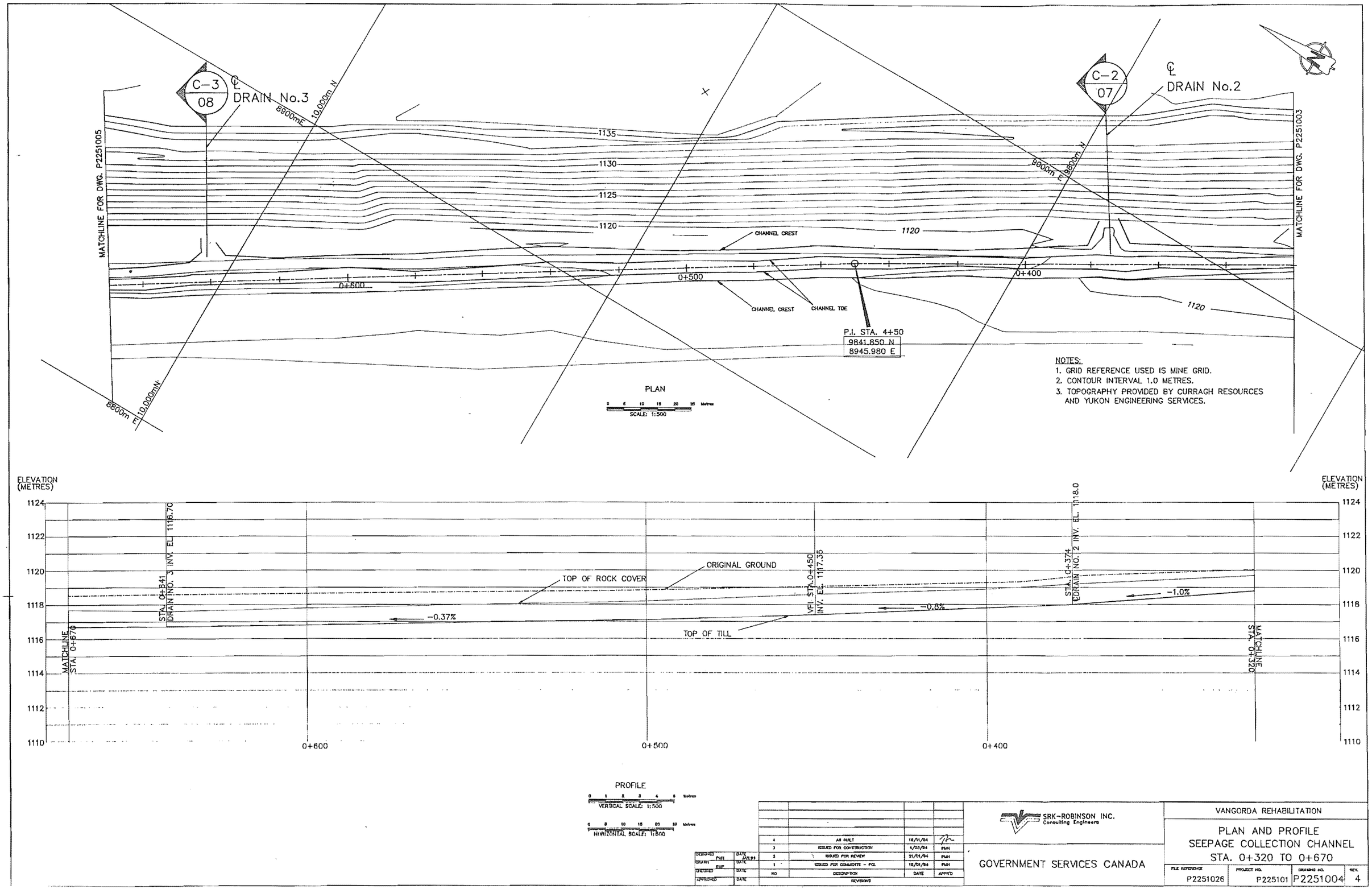
SRK-ROBINSON INC.
Consulting Engineers

GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

PLAN AND PROFILE
SEEPAGE COLLECTION CHANNEL
STA. 0+100 TO 0+320

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251027	P225101	P2251003	4



NO	DESCRIPTION	DATE	APP'D
	REVISIONS		
4	AS BUILT	18/11/94	
3	ISSUED FOR CONSTRUCTION	6/03/94	PMH
2	ISSUED FOR REVIEW	21/01/94	PMH
1	ISSUED FOR COMMENTS - FCL	18/01/94	PMH

DESIGNED PMH DATE 23/1/94
DRAWN PMH DATE
CHECKED DATE
APPROVED DATE

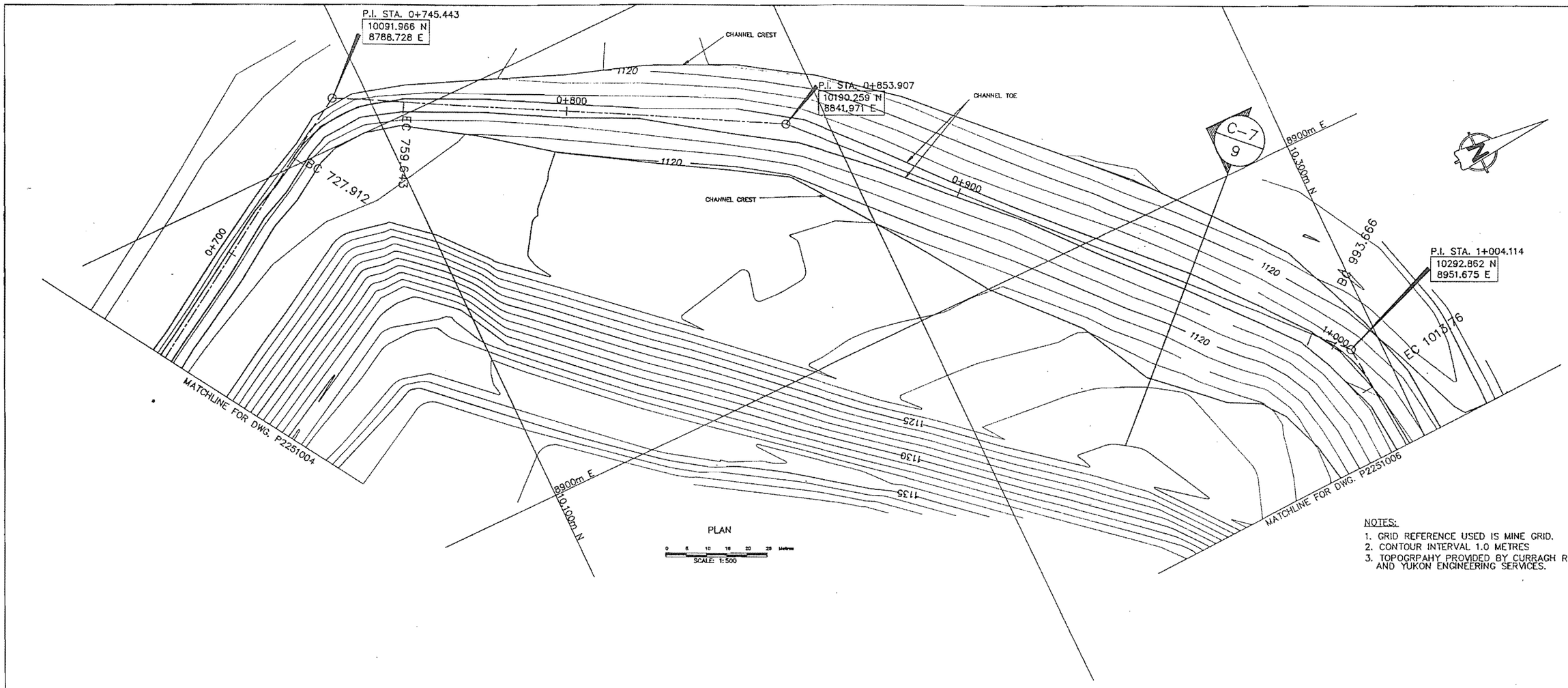
SRK-ROBINSON INC. Consulting Engineers

GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

PLAN AND PROFILE
SEEPAGE COLLECTION CHANNEL
STA. 0+320 TO 0+670

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251026	P225101	P2251004	4

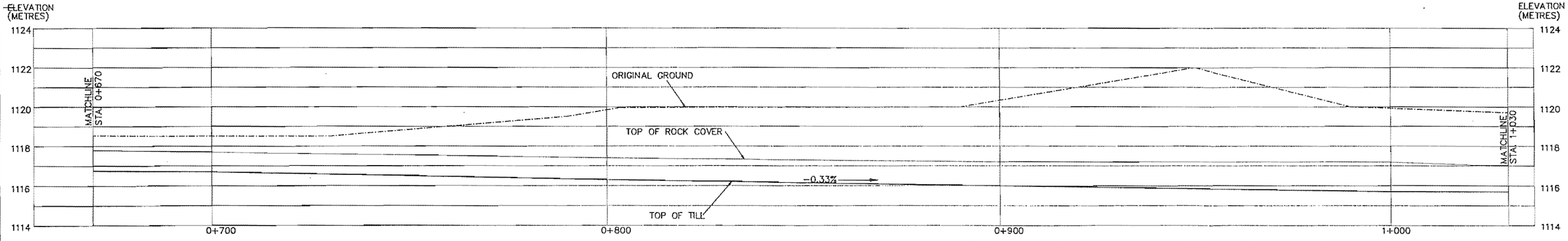


PLAN

SCALE: 1:500

NOTES:

1. GRID REFERENCE USED IS MINE GRID.
2. CONTOUR INTERVAL 1.0 METRES
3. TOPOGRPAHY PROVIDED BY CURRAGH RESOURCES AND YUKON ENGINEERING SERVICES.



PROFILE

VERTICAL SCALE: 1:100

HORIZONTAL SCALE: 1:500

4	AS BUILT	18/11/94		
3	ISSUED FOR CONSTRUCTION	4/03/94	PMH	
2	ISSUED FOR REVIEW	21/01/94	PMH	
1	ISSUED FOR COMMENTS – PCL	18/01/94	PMH	
NO	DESCRIPTION	DATE	APPVD	

REVISIONS

DESIGNED PMH DATE JAN.94
DRAWN RWP DATE
CHECKED DATE
APPROVED DATE

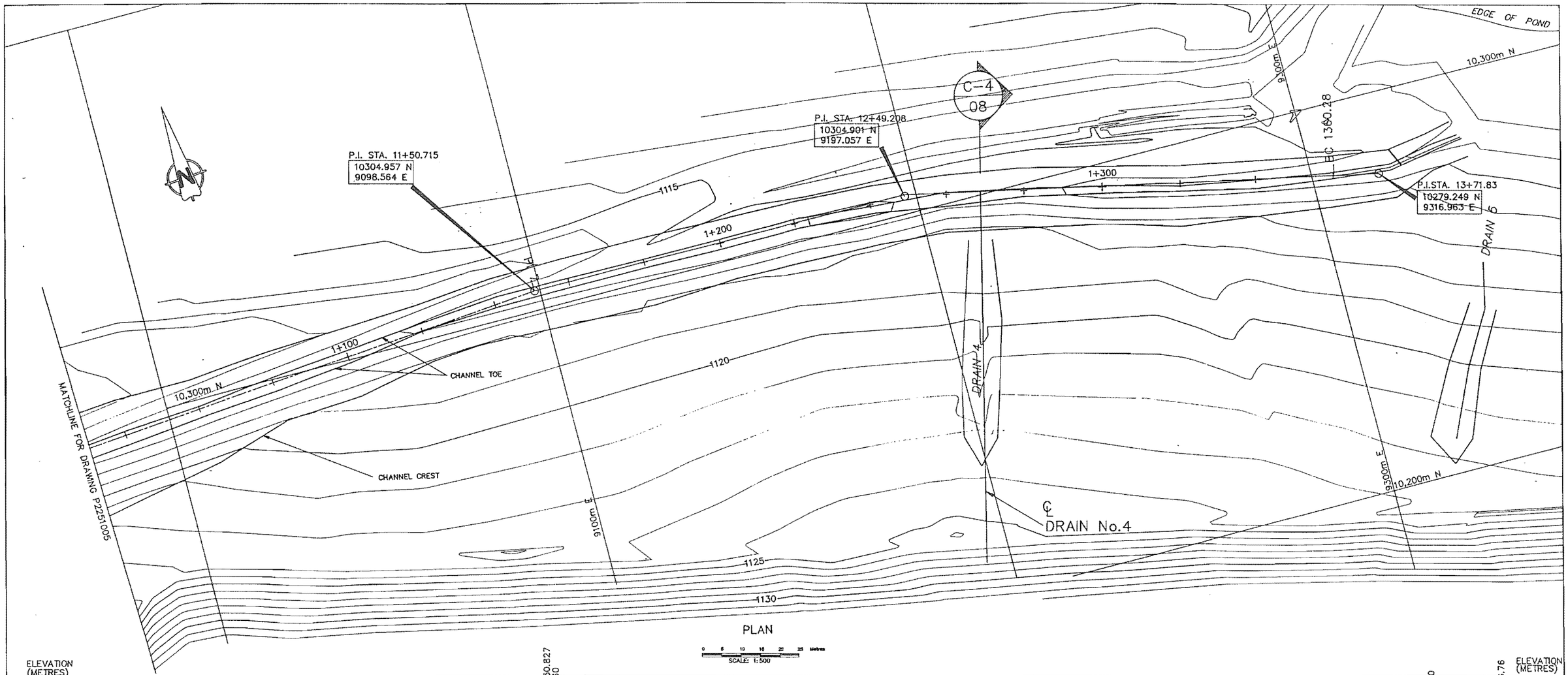
SRK-ROBINSON INC.
Consulting Engineers

GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

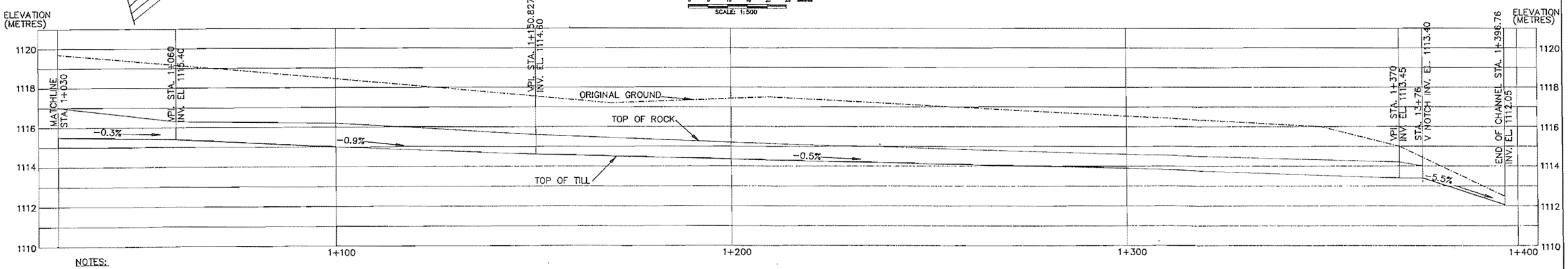
PLAN AND PROFILE SEEPAGE COLLECTION CHANNEL STA. 0+670 TO 1+030

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251025	P225101	P2251005	4



PLAN

SCALE: 1:500



PROFILE

VERTICAL SCALE: 1:100

HORIZONTAL SCALE: 1:500

NOTES:

1. GRID REFERENCE USED IS MINE GRID.
2. CONTOUR INTERVAL 1.0 METRES.
3. TOPOGRAPHY PROVIDED BY CURRAGH RESOURCES AND YUKON ENGINEERING SERVICES.

NO	DESCRIPTION	DATE	APP'D
4	AS BUILT	10/11/94	
3	ISSUED FOR CONSTRUCTION	3/04/94	PMH
2	ISSUED FOR REVIEW	21/01/94	PMH
1	ISSUED FOR COMMENTS - PCL	13/01/94	PMH

REVISIONS

DESIGNED	PMH	DATE JAN.94
DRAWN	JDP	DATE
CHECKED		DATE
APPROVED		DATE

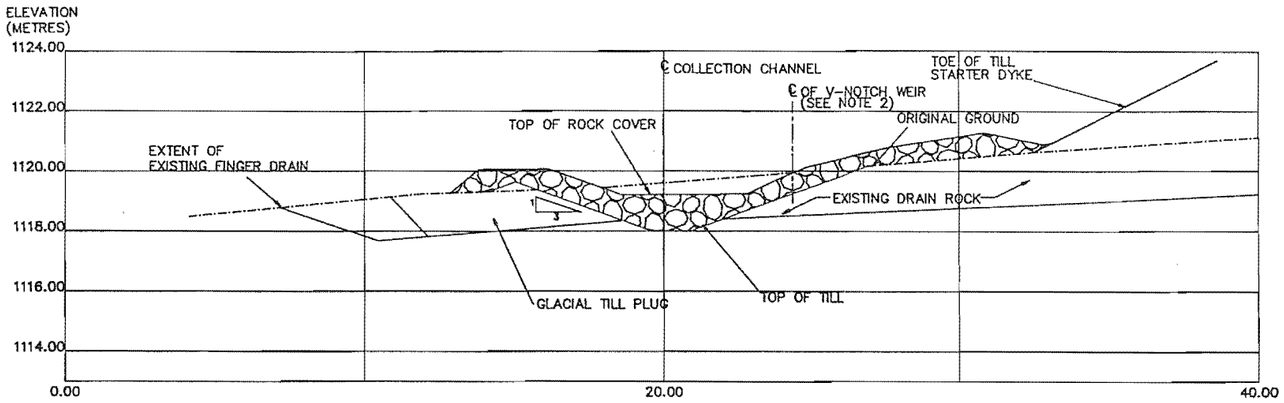
SRK-ROBINSON INC.
Consulting Engineers

GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

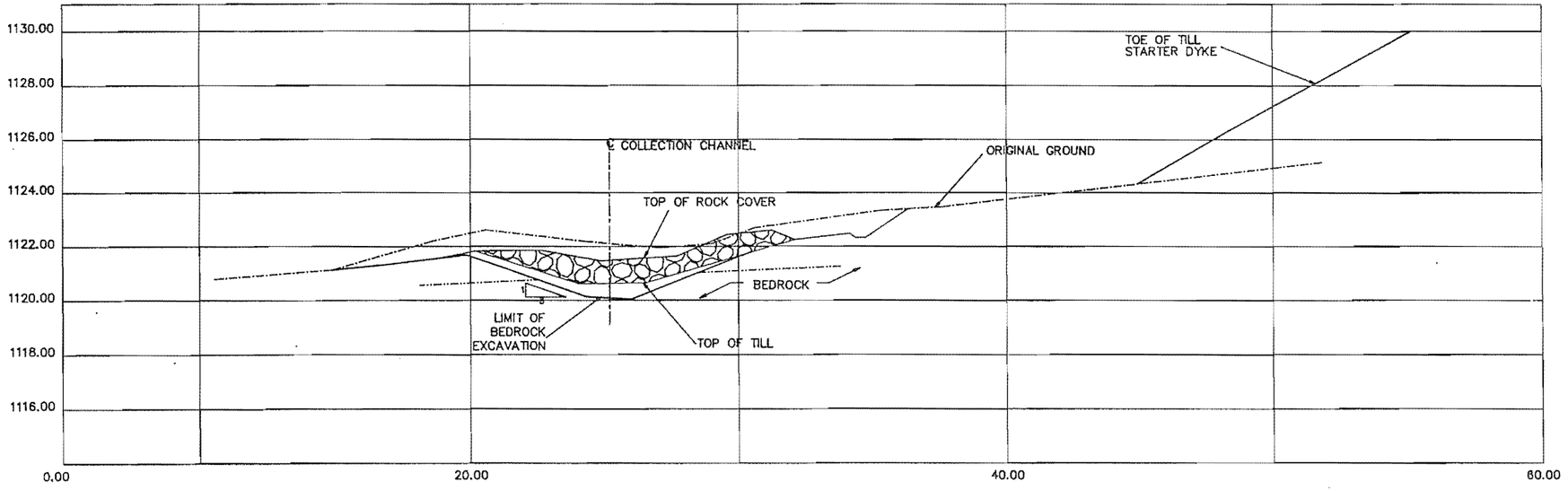
PLAN AND PROFILE
SEEPAGE COLLECTION CHANNEL
STA. 1+030 TO 1+396.5

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251024	P225101	P2251006	4



STA.3+74 DRAIN No. 2 (C-2 / 04)

0 1 2 3 4 6 Metres
SCALE: 1:100



STA. 0+120 (C-1 / 03)

0 1 2 3 4 6 Metres
SCALE: 1:100

NOTES:

1. DRAIN ROCK IN EXISTING FINGER DRAIN BELOW NEW CHANNEL WAS REMOVED AND REPLACED WITH GLACIAL TILL COMPACTED TO 93 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY. DRAIN ROCK REMOVAL AND REPLACEMENT WAS EXTENDED LEAST 5 METRES BELOW DOWNSTREAM CREST OF NEW CHANNEL.
2. V-NOTCH WEIR CONSISTS OF A 1.2 X 2.4 METRE STEEL PLATE EMBEDDED 900mm INTO GROUND. THE NOTCH HAS A 90° ANGLE AND IS 200mm DEEP.

NO	DESCRIPTION	DATE	APPVD
	REVISIONS		
4	AS BUILT	16/11/94	
3	ISSUED FOR CONSTRUCTION	4/03/94	PSH
2	ISSUED FOR REVIEW	21/01/94	PSH
1	ISSUED FOR COMMENTS - PCL	18/01/94	PSH

DESIGNED PSH DATE JAN/94
DRAWN RMP DATE
CHECKED DATE
APPROVED DATE

SRK-ROBINSON INC.
Consulting Engineers

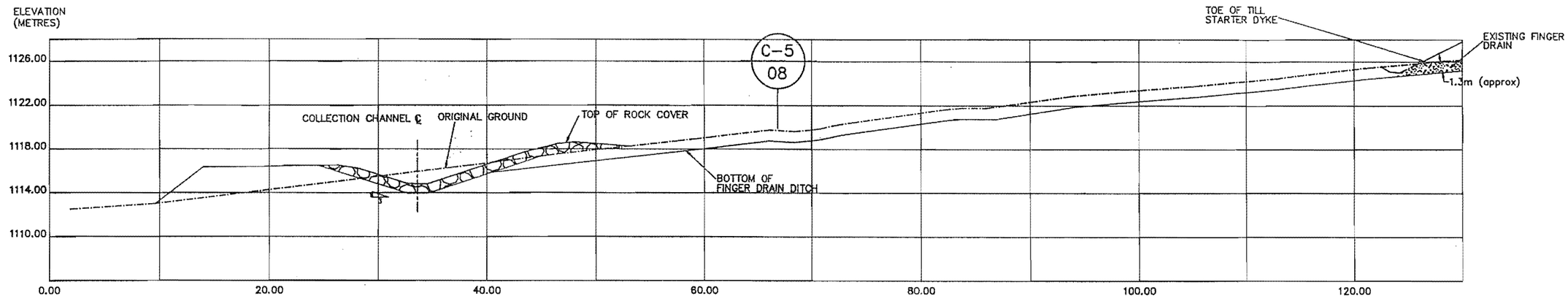
GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

PROFILE AND SECTION

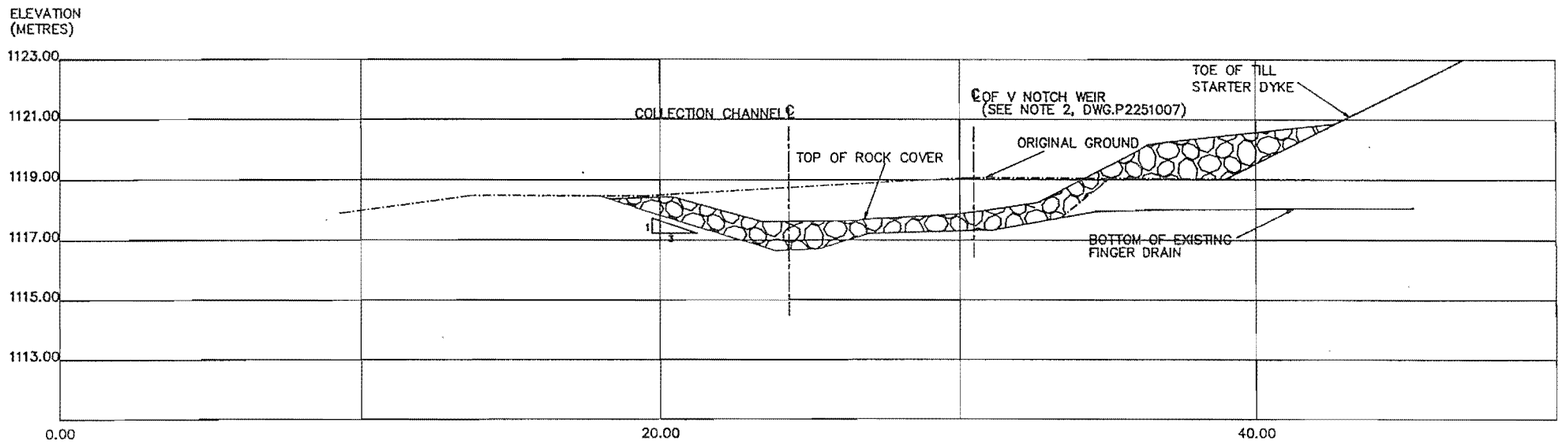
FINGER DRAIN NOS. 1 AND 2

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251037	P225101	P2251007	4



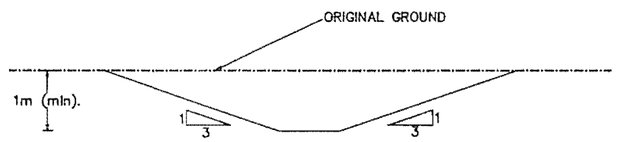
PROFILE DRAIN No. 4 (C-4 / 06)

SCALE: 1:200



STA. 0+641 DRAIN No. 3 (C-3 / 04)

SCALE: 1:100



TYPICAL SECTION
DRAINAGE DITCH (C-5 / 08)

SCALE: 1:50

NO	DESCRIPTION	DATE	APP'D
4	AS BUILT	12/11/24	
3	ISSUED FOR CONSTRUCTION	4/03/24	PGH
2	ISSUED FOR REVIEW	21/01/24	PGH
1	ISSUED FOR COMMENTS - PCL	12/01/24	PGH

REVISIONS

DESIGNED PGH DATE 12/01/24
DRAWN RDP DATE
CHECKED DATE
APPROVED DATE

SRK-ROBINSON INC.
Consulting Engineers

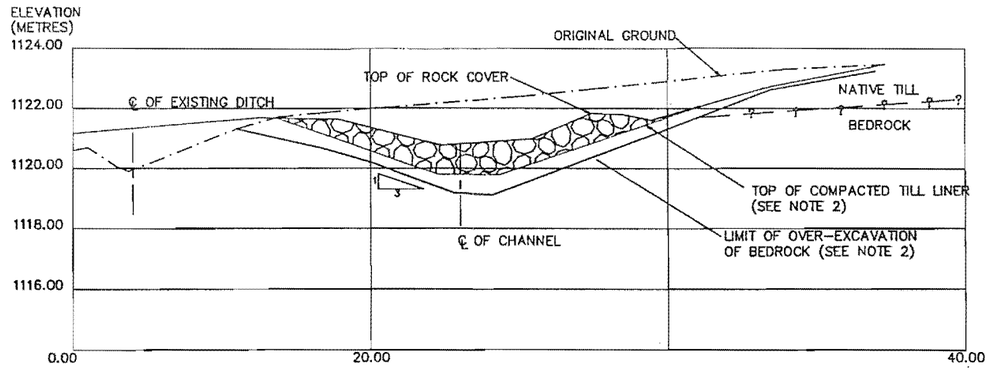
GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

PROFILE AND SECTION

FINGER DRAIN NO. 3 AND 4

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251038	P225101	P2251008	4

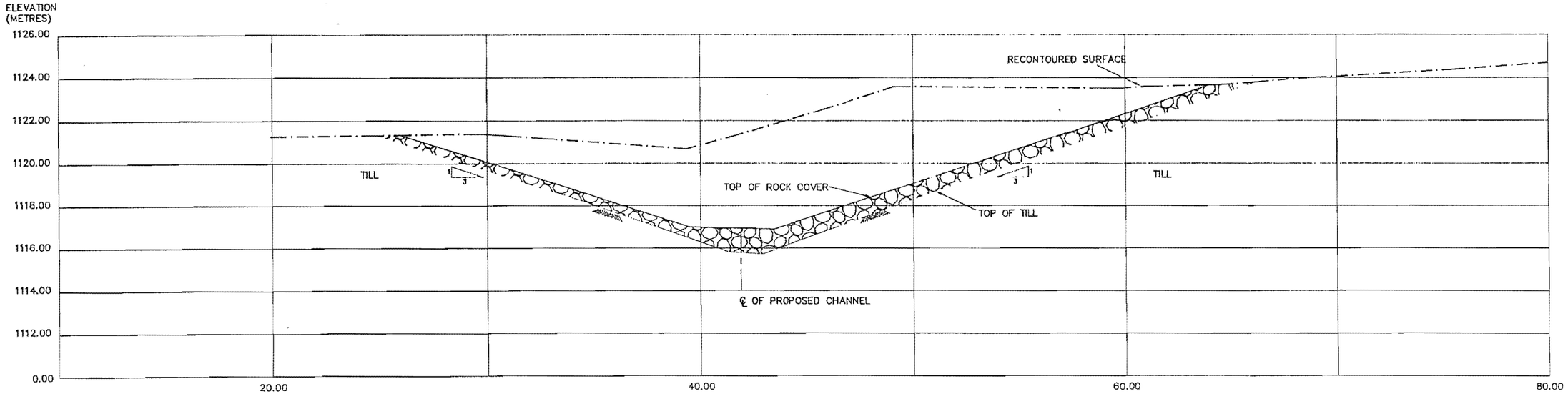


CHANNEL SECTION STA. 0+200 C-6 / 03

SCALE: 1:100

NOTES:

1. DEPTH OF TILL MAY VARY IN FIELD.
2. WHERE BEDROCK OR PERMEABLE SOILS WERE EXPOSED DURING CHANNEL EXCAVATION, THE BEDROCK OR PERMEABLE SOILS WERE OVER-EXCAVATED TO A DEPTH OF AT LEAST 0.5m BELOW SUBGRADE AND BACKFILLED WITH GLACIAL TILL COMPACTED TO 93 PERCENT MODIFIED PROCTOR MAXIMUM DRY DENSITY.



CHANNEL SECTION STA. 0+960 C-7 / 05

SCALE: 1:100

NO.	DESCRIPTION	DATE	APP'D
4	AS BUILT	18/11/94	
3	ISSUED FOR CONSTRUCTION	4/03/94	PSH
2	ISSUED FOR REVIEW	21/01/94	PSH
1	ISSUED FOR COMMENTS - PCL	18/01/94	PSH

REVISIONS

DESIGNED PSH DATE SEP/94
DRAWN KMP DATE
CHECKED DATE
APPROVED DATE

SRK-ROBINSON INC.
Consulting Engineers

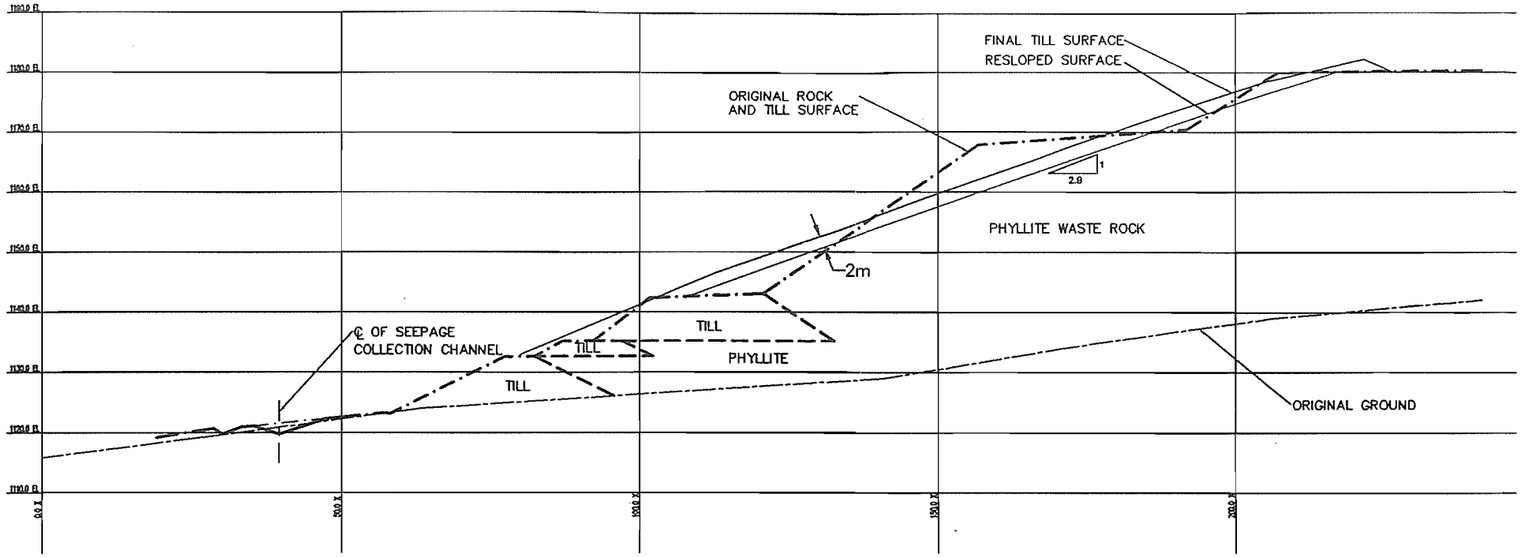
GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

CHANNEL SECTION

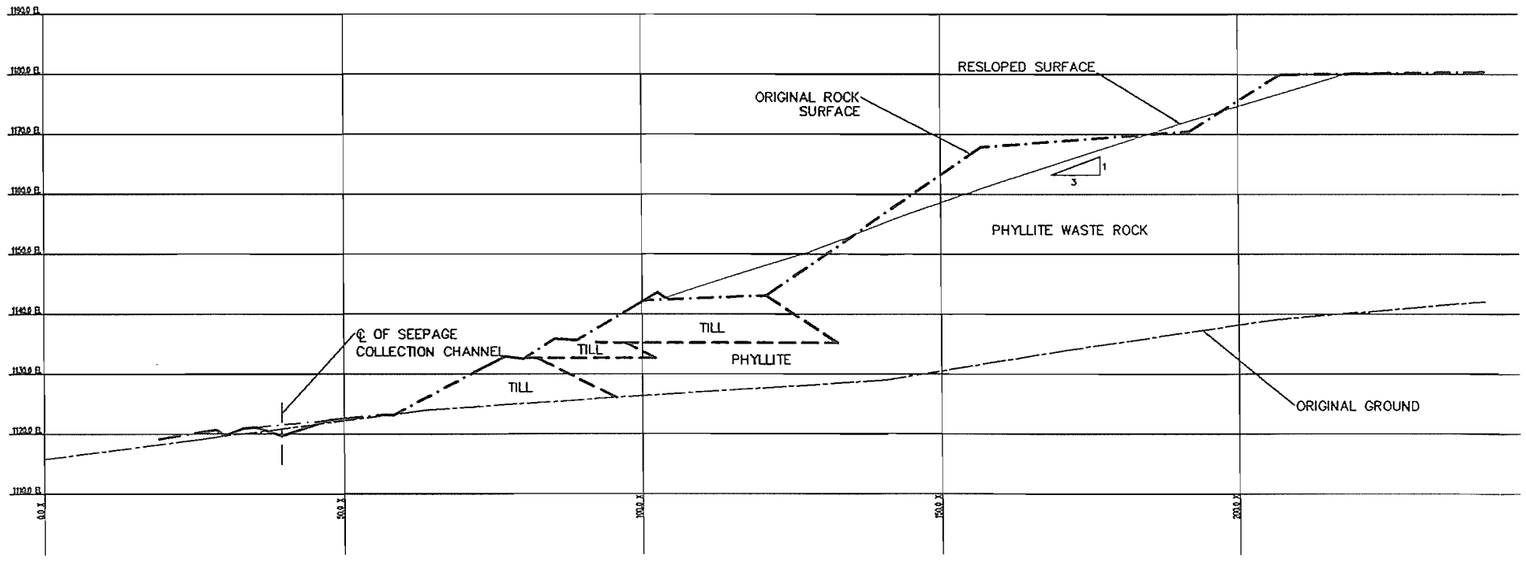
STA. 0+200 AND 0+960

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251036	P225101	P2251009	4



STATION 0+200 D-1 / 02

0 5 10 15 20 25 Metres
SCALE 1:500



STATION 0+264 D-2 / 02

0 5 10 15 20 25 Metres
SCALE 1:500

4	AS BUILT	18/11/94		
3	ISSUED FOR CONSTRUCTION	9/03/94	PMH	
2	ISSUED FOR REVIEW	21/01/94	PMH	
1	ISSUED FOR COMMENTS - PCL	15/01/94	PMH	
NO	DESCRIPTION	DATE	APP'D	

REVISIONS

DESIGNED	DJT	DATE
DRAWN	BPP	DATE
CHECKED		DATE
APPROVED		DATE

SRK-ROBINSON INC.
Consulting Engineers

GOVERNMENT SERVICES CANADA

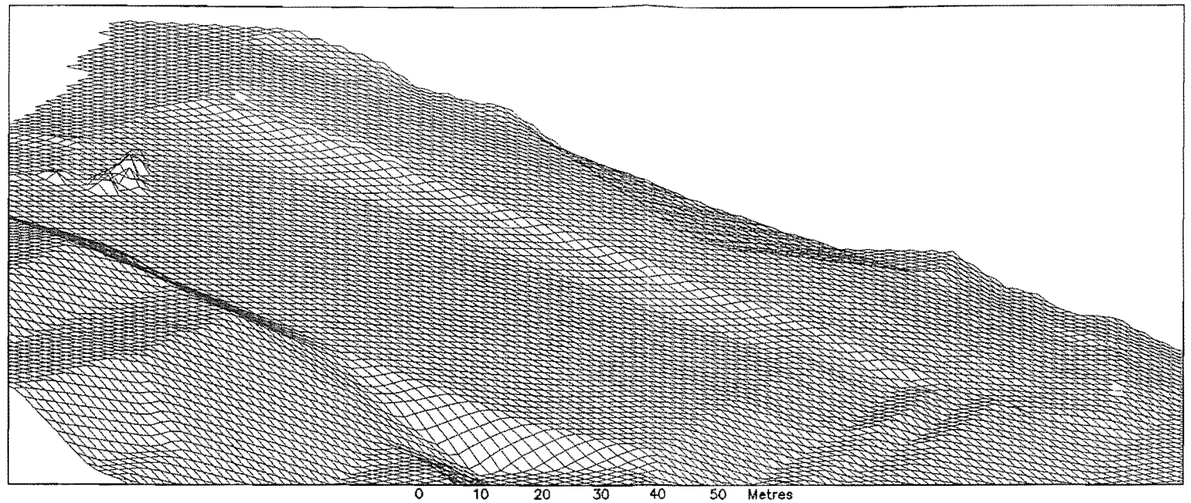
VANGORDA REHABILITATION

ROCK PILE SECTIONS

FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
P2251053	P225101	P2251010	4

0 20 40 60 80 100 Metres

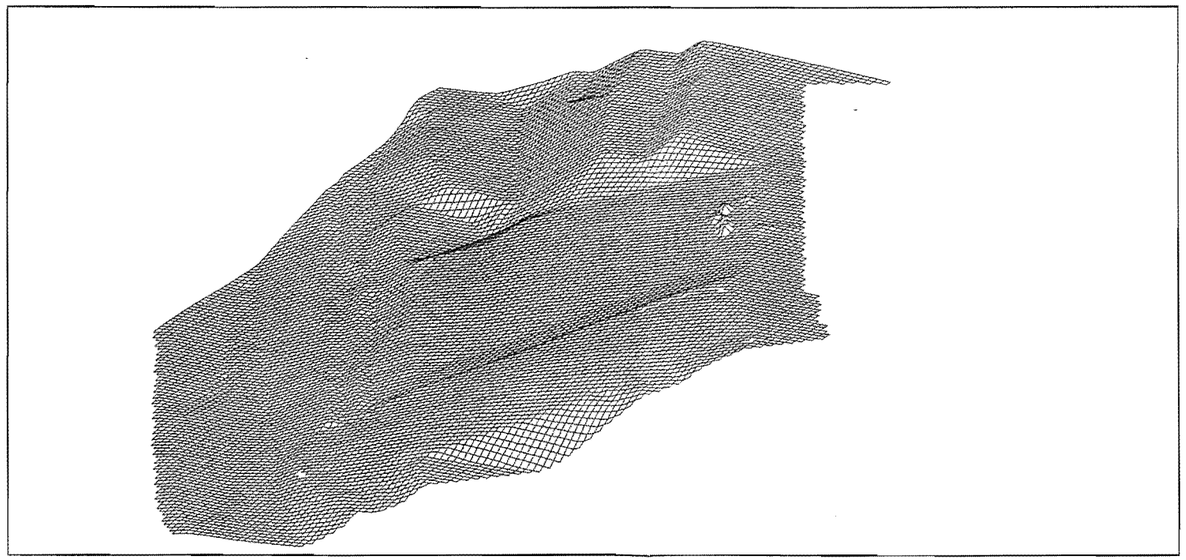
1:2000



0 10 20 30 40 50 Metres

1:1000

PERSPECTIVE VIEW – VIEWPOINT1
LOOKING SOUTHWEST



0 20 40 60 80 100 Metres

1:2000

PERSPECTIVE VIEW – VIEWPOINT2
LOOKING NORTHWEST

STEFFEN ROBERTSON AND KIRSTEN
Consulting Engineers

GOVERNMENT SERVICES CANADA

VANGORDA REHABILITATION

ROCK PILE RESLOPING
AND TILL COVER

PROJECT NO.	DATE	APPROVED	FIGURE
P225101	NOV.,1994		P2251011

NAME: C:\PROJECTS\VANGORDA\P225101\ASBUILT\3D-CONTR.DWG DATE: NOV 14, 1994 TIME: 1:44 PM

APPENDICES

APPENDIX A	Borehole Logs from Piezometer and Groundwater Well Installation
APPENDIX B	Results of Laboratory and Field Testing
APPENDIX C	Photographs

APPENDIX A
Borehole Logs from Piezometer and Groundwater Well Installation

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-01
MONITORING WELL INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6909782.32 E588945.53	ELEVATION: 1116.745 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
0.0					ORGANICS AND SILT, some moss and roots, some white ash
					SILT (TILL) - sandy, some gravel, trace to some clay, stiff, low plastic, fine grained sands, subangular particles brown
1.0					- seasonally frozen (Nbn) to 1.2 m - damp below 1.2 m
2.0					
3.0					- becomes softer, higher clay content - colour changes to brownish grey - some phyllite pieces in sample (10%)
			20		
4.0					
5.0					- stiffer, harder drilling, drier
6.0					- more phyllite rock (20%), with some pieces of quartzite
			27		
7.0					- grinding rock
					- water at 7.6 m depth measured on 94/05/03
8.0					

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40 | PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: BCF	COMPLETION DEPTH: 12.5 m
REVIEWED BY:	COMPLETE: 94/04/30
Fig. No:	Page 1 of 2

94/05/27 12:41PM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-01
MONITORING WELL INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6909782.32 E588945.53	ELEVATION: 1116.745 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
8.0						28.0
9.0					- drier, hard drilling	30.0
			64		- grinding rock	32.0
10.0						34.0
11.0					BEDROCK - phyllite - very hard drilling, - fine, muddy cuttings with pieces of phyllite	36.0
12.0						38.0
			95			40.0
					END OF BOREHOLE NOTE: - Hole sloughed to 11 m, and had to be redrilled to 12.4 m. Auger bit had broken off due to excessive pressure and heat from drilling bedrock MONITORING WELL INSTALLATION - 0.15 m sand layer on bottom - 1.5 m screen+12.2 m 50 mm PVC pipe - 8 bags sand to 5 m below grade - 0.5 bags bentonite to 4.3 m - some water in hole pushing pipe up - mixed 3 bags grout + 30 gal. water for wells 94-01 and 94-02 - top of PVC 0.58 m above ground	42.0
13.0						44.0
14.0						46.0
						48.0
15.0						50.0
16.0						52.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 12.5 m
	REVIEWED BY:	COMPLETE: 94/04/30
	Fig. No:	Page 2 of 2

94/05/27 12:42PM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-02
MONITORING WELL INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910008.16 E588810.97	ELEVATION: 1116.705 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

SOIL DESCRIPTION

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
0.0					ORGANICS AND SILT, some moss and roots, some white ash	0.0
					SILT (TILL) - sandy, some gravel, trace to some clay, stiff, low plastic, fine grained sands, subangular particles brown	2.0
1.0					- seasonally frozen (Nbn) to 1.2 m	4.0
					- damp below 1.2 m	
					- grinding rock	6.0
2.0						8.0
3.0	X		25			10.0
					- more phyllite rock (20%), with some	12.0
4.0					- higher moisture content, almost wet	14.0
					- colour changes to darker brown	
5.0						16.0
						18.0
6.0	X		24			20.0
						22.0
7.0					- softer, higher clay content, low to medium plastic	24.0
					- colour changes to darker brown, almost black	
8.0						26.0
						28.0
9.0	X		20			30.0
					SILT AND CLAY - some sand, trace of gravel firm, low to med plastic, fine grained sands, subangular particles some quartzite and phyllite pieces,	
10.0						32.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: BCF	COMPLETION DEPTH: 15.5 m
REVIEWED BY:	COMPLETE: 94/04/30
Fig. No:	Page 1 of 2

94/06/01 10:57AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-02
MONITORING WELL INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910008.16 E588810.97	ELEVATION: 1116.705 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
10.0					damp to moist, dark grey
11.0					
12.0					
			33		
13.0					- higher clay content, wet on sampler at 12.5 m, less gravel and very fine silts
14.0					- water at 13.8 m depth measured on 94/05/03
15.0					
			47		- damp to moist, some phyllite - no water at this depth
16.0					END OF BOREHOLE NOTE: - some yellowish brown sandy silt was found on augers between 9.1-12.2 m - water was noticed on A-rods from about 10.7 m below grade MONITORING WELL INSTALLATION - 0.15 m sand layer on bottom - 1.5 m screen+15.2 m 50 mm PVC pipe - 10 bags sand to 5 m below grade - 0.5 bags bentonite to 4.4 m - used grout mixed from GW94-01 - top of PVC 0.53 m above ground
17.0					
18.0					
19.0					
20.0					

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID

10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 34.0 36.0 38.0 40.0 42.0 44.0 46.0 48.0 50.0 52.0 54.0 56.0 58.0 60.0 62.0 64.0

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Whitehorse, Yukon

LOGGED BY: BCF	COMPLETION DEPTH: 15.5 m
REVIEWED BY:	COMPLETE: 94/04/30
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94/06/01 10:57AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-03
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910306.67 E589020.49	ELEVATION: 1117.731 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
0.0					SILT (TILL) - sandy, some clay, some gravel, very stiff, low to medium plastic, fine grained sands, subangular particles, dark brown
					- frozen to approx. 7.0 m, Nbn - Vx
1.0					
2.0					- grinding rock, very hard drilling
3.0					- higher gravel content, some quartzite rock
			45		- some medium grained, uniformly graded sand deposits in sample
					- temperature measured at -0.2 deg. C
4.0					- more rock
					- becomes softer, higher moisture content when thawed
					- colour changes to brownish grey
					- very stiff till, less rock
5.0					
6.0					- temperature measured at -0.2 deg. C
			70		
7.0					
8.0					

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID

10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-03
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910306.67 E589020.49	ELEVATION: 1117.731 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
8.0					
9.0			41		
10.0					
11.0					– water at 10.6 m depth measured on 94/05/03
12.0					– possible 150 mm thick sand seam (sand materials noted on augers) – grinding rock, not drillable with CME 750 END OF BOREHOLE
13.0					NOTE: – no water level at 1200 hrs – 2.1 m water in hole at 1240 hrs MONITORING WELL INSTALLATION – 1830 hrs – 0.15 sand layer on bottom – 1.5 m screen+12.2 m 50 mm PVC pipe – 15.5 bags sand to 5.3 m below grade – 1 bag bentonite to 4.8 m – mixed 2 bags grout + 25 gal. water – install protective casing + endcap – Top of PVC 0.63 m above ground
14.0					
15.0					
16.0					

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 28.0, 30.0, 32.0, 34.0, 36.0, 38.0, 40.0, 42.0, 44.0, 46.0, 48.0, 50.0, 52.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 11.9 m
	REVIEWED BY:	COMPLETE: 94/04/23
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VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-04
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910310.05 E599261.93	ELEVATION: 1115.465 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40 | PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
0.0					SILT (TILL) - gravelly, sandy, trace of clay, roadway fill material	0.0
1.0						2.0
						4.0
2.0						6.0
					SILT (TILL) - sandy, gravelly, some clay, frozen (Nbn), low plastic, fine grained sands, subangular particles, brown	8.0
3.0					- temperature measured at -0.2 deg. C	10.0
						12.0
4.0						14.0
					- hole sloughed to 4.5 m - switched to hollow stem augers	
5.0					- less gravel content, higher moisture content	16.0
						18.0
6.0						20.0
						22.0
7.0					- harder drilling	24.0
						26.0
8.0						28.0
9.0					- higher silt and clay content	30.0
10.0					- grinding rock	32.0

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LOGGED BY: BCF	COMPLETION DEPTH: 14.1 m
REVIEWED BY:	COMPLETE: 94/04/25
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94/06/01 11:00AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-04
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910310.05 E599261.93	ELEVATION: 1115.465 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

SOIL DESCRIPTION

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	DEPTH (ft)
10.0					34.0
11.0					36.0
12.0					38.0
					40.0
					42.0
13.0					44.0
14.0					46.0
			70		48.0
15.0					50.0
					52.0
16.0					54.0
					56.0
17.0					58.0
					60.0
18.0					62.0
					64.0
19.0					
20.0					

- soft spot (0.15 m)
- grinding rock
- finish drilling today at 1900 hrs
- continue on 94/04/24 at 0800 hrs
- very dusty dry till, very hard
- very hard drilling
- broke down from 1030 - 1630 hrs
- water at 13.9 m depth measured on 94/05/03
- very hard till with some phyllite

END OF BOREHOLE

MONITORING WELL INSTALLATION
- 0.15 m sand layer on bottom
- 1.5 m screen+14 m, 50 mm PVC pipe
- 9.5 bags sand to 9.0 m below grade
- 1 bag bentonite to 8.3 m
- mixed 4 bags grout + 45 gal. water
- installed protective casing + endcap
- top of PVC 0.69 m above ground

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 14.1 m
	REVIEWED BY:	COMPLETE: 94/04/25
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94/06/01 11:00AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-05
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910396.14 E589083.39	ELEVATION: 1100.973 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

SOIL DESCRIPTION

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
0.0					ORGANICS AND SILT - some moss, some roots, some snow cover	0.0
					SILT (TILL) - some gravel, some sand, trace of clay, stiff, low plastic, fine grained sands, moist to wet, greyish brown	2.0
1.0						4.0
2.0					- water at 2.0 m depth measured after 5 hrs	6.0
					SAND AND GRAVEL - trace of silt, loose, fine grained, subrounded to sub-angular, damp, brown	8.0
3.0					SILT (TILL) - gravelly, some sand, trace to some clay, low plastic, frozen (Vs) 15%, grey	10.0
					- stiffer drilling	
4.0					- increasing clay content	12.0
					- grinding rock	14.0
5.0					- grinding rock	16.0
					- softer drilling	18.0
6.0					- stiffer drilling	20.0
					- sample still frozen (Nbn-Vr)	
					- ice coatings surround smaller sub-rounded gravels, silt sample does not melt when heated	22.0
7.0					- finish drilling today at 1730 hrs	24.0
					- continue on 94/04/21 at 0840 hrs	
					- stiffer drilling, some grinding	26.0
8.0					- more grinding rock	
					- large rock	28.0
					- soft spot	
9.0					WATER LEVEL	30.0
					- more silt-till, some excessive moisture, very cold, possibly frozen	
10.0					- softer drilling	32.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 15.4 m
	REVIEWED BY:	COMPLETE: 94/04/21
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94/05/27 12:46PM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-05
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910396.14 E589083.39	ELEVATION: 1100.973 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
10.0					- stiffer, some grinding rock - hard drilliing - grinding rock	34.0
11.0					- some hard and soft layers	36.0
12.0					- more very stiff till in sample - sample is quite warm	40.0
13.0					- softer drilling	42.0
14.0						46.0
15.0						48.0
						50.0
16.0					END OF BOREHOLE NOTE: - 5 m of water in hole at 1100 hrs - 10.4 m water in hole at 1140 hrs MONITORING WELL INSTALLATION - 0.15 m sand layer on bottom of hole - 1.5 m screen+15.2 m, 50 mm PVC pipe - 26 bags sand to 5.2 m below grade - some slough over sand (2 m) - 1 bag bentonite from 3.2 - 2.5 m - mixed 2 bags grout + 25 gal. water - install protective casing + endcap - top of PVC 0.76 m above ground	52.0
17.0						54.0
18.0						56.0
19.0						58.0
20.0						60.0
						62.0
						64.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 15.4 m
	REVIEWED BY:	COMPLETE: 94/04/21
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94/05/27 12:47PM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-01A
PIEZOMETER INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910014.8 E588893.96	ELEVATION: 1135.855 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
0.0					SILT (TILL) – sandy, some gravel, some clay, low plastic, fine grained sands, subangular particles, damp to moist, brown
1.0					– soft drilling
2.0					
3.0			9		– very little recovery of sample
4.0					– softer, higher moisture content
5.0					– harder drilling, more rock
6.0			30		– more gravel, stiff, dark brown with some grey
7.0					
8.0					– more rock, stiffer drilling
9.0			35		– higher sand content, still very stiff
10.0					– soft spot (0.15 m)
11.0					
12.0			33		– higher silt and clay content, more greyish in colour
13.0					END OF BOREHOLE
14.0					NOTE:
15.0					– augers pulled out for use on P94-01B
16.0					– some slough in hole (0.6 m)
17.0					PIEZOMETER INSTALLATION
18.0					– 0.15 m sand layer on bottom
19.0					– 1.5 m screen+12.2 m, 50 mm PVC pipe
20.0					– 6 bags sand to 9.22 m below grade
					– 0.75 bags bentonite to 8.69 m
					– used grout mixed from P94-01B
					– install protective casing + endcap
					– top of PVC 0.61 m above ground

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0, 32.0, 34.0, 36.0, 38.0, 40.0, 42.0, 44.0, 46.0, 48.0, 50.0, 52.0, 54.0, 56.0, 58.0, 60.0, 62.0, 64.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 11.8 m
	REVIEWED BY:	COMPLETE: 94/04/26
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VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-01B
PIEZOMETER INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910013.01 E588894.4	ELEVATION: 1135.793 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
0.0					SILT (TILL) – sandy, some gravel, some clay, low plastic, fine grained sands, subangular particles, damp to moist, brown
1.0					– soft drilling
					– EMBANKMENT FILL MATERIAL
2.0					
3.0					
					– softer, higher moisture content
4.0					
5.0					
					– harder drilling, more rock
					– color changes to brownish grey
			33		
6.0					END OF BOREHOLE
					PIEZOMETER INSTALLATION
					– 0.15 m sand layer on bottom
					– 1.5 m screen+6.1 m, 50 mm PVC pipe
7.0					– 5 bags sand to 3.35 m below grade
					– 0.75 bags bentonite to 2.89 m
					– mixed 6 bags grout + 80 gal. water
					– install protective casing + endcap for both holes P94-01A, P94-01B
8.0					– top of PVC at 0.61 m above ground
9.0					
10.0					

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0, 32.0

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LOGGED BY: BCF	COMPLETION DEPTH: 5.4 m
REVIEWED BY:	COMPLETE: 94/04/26
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94/05/27 12:49PM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-02A
PIEZOMETER INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910157 E588935.21	ELEVATION: 1137.70 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40 | PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
0.0					SILT (TILL) – sandy, some gravel, some clay, firm, low plastic, fine grained sands, subangular particles damp to moist, brown	0.0
					– EMBANKMENT FILL MATERIAL	
1.0						2.0
						4.0
			10			6.0
2.0						
						8.0
3.0						10.0
			7		– very soft, higher moisture content	
						12.0
4.0					– firmer, higher plasticity	
						14.0
			6		– softer, almost wet	16.0
5.0					– grinding rock	
						18.0
					– harder drilling	
6.0						20.0
					– more gravel, stiff, dark brown with some grey – very hard drilling – higher gravel content – 50 mm SS sample with 75 blows/foot	
						22.0
7.0						

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LOGGED BY: BCF	COMPLETION DEPTH: 10.7 m
REVIEWED BY:	COMPLETE: 94/04/27
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94/06/01 11:02AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-02A
PIEZOMETER INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910157 E588935.21	ELEVATION: 1137.70 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	STANDARD PENETRATION 10 20 30 40 / PLASTIC M.C. LIQUID 10 20 30 40	PERCENT GRAVEL 20 40 60 80 / PERCENT SAND 20 40 60 80 / PERCENT SILT OR FINES 20 40 60 80 / GROUND ICE DESCRIPTION 20 40 60 80	DEPTH (ft)
7.0								24.0
8.0					– softer with higher moisture			26.0
								28.0
9.0								30.0
								32.0
10.0 ▽					– higher sand content, low plastic, damp to moist, brown – water at 10.0 m depth measured on 94/05/03			▽
								34.0
11.0					– 50 mm SS sample with 42 blows per foot			36.0
					END OF BOREHOLE NOTE: – augers pulled out for use on P94-02B – some slough in hole (0.46 m) PIEZOMETER INSTALLATION – 0.15 m sand layer on bottom – 1.5 m screen+9.14 m, 50 mm PVC pipe – 6 bags sand to 7.62 m below grade – 0.75 bags bentonite to 7.16 m – mixed 4 bags grout + 50 gal water for both holes 94-02A, 94-02B – install protective casing + endcap – top of PVC 0.53 m above ground			38.0
12.0								40.0
								42.0
13.0								44.0
14.0								

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF REVIEWED BY: Fig. No:	COMPLETION DEPTH: 10.7 m COMPLETE: 94/04/27 Page 2 of 2

94/06/01 11:03AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-02B
PIEZOMETER INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910155 E588933.3	ELEVATION: 1137.632 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

SOIL DESCRIPTION

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	DEPTH (ft)
0.0					0.0
1.0					2.0
					4.0
2.0					6.0
					8.0
3.0					10.0
					12.0
4.0					14.0
					16.0
5.0					18.0
6.0					20.0
7.0					22.0
					24.0
8.0					26.0
					28.0
9.0					30.0
					32.0
10.0					34.0
					36.0
11.0					38.0
					40.0
12.0					42.0
					44.0
13.0					46.0
					48.0
14.0					50.0
					52.0
15.0					54.0
16.0					

SILT (TILL) - sandy, some gravel, some clay, firm, low plastic, fine grained sands, subangular particles damp to moist, brown
- EMBANKMENT FILL MATERIAL

- very soft, higher moisture content

- firmer, higher plasticity

- softer, almost wet

- grinding rock

- harder drilling

END OF BOREHOLE

NOTE:
- some slough in hole (0.15 m)

PIEZOMETER INSTALLATION
- 0.15 m sand layer on bottom
- 6 bags sand to 3.05 m below grade
- 1.5 m screen+6.09 m, 50 mm PVC pipe
- 0.75 bags bentonite to 2.59 m
- mixed 4 bags grout + 50 gal water for both holes 94-02A, 94-02B
- install protective casing + endcap
- top of PVC 0.56 m above ground

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 5.6 m
	REVIEWED BY:	COMPLETE: 94/04/27
	Fig. No:	Page 1 of 1

94/06/01 11:14AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-02C
PIEZOMETER INSTALLATION	DRILL: CME 750 – SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910137.12 E588888.76	ELEVATION: 1129.14 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	STANDARD PENETRATION 10 20 30 40 / PLASTIC M.C. LIQUID	PERCENT GRAVEL 20 40 60 80 / PERCENT SAND 20 40 60 80 / PERCENT SILT OR FINES 20 40 60 80 / GROUND ICE DESCRIPTION 20 40 60 80	DEPTH (ft)
0.0					SILT (TILL) – sandy, some gravel, some clay, firm, low plastic, fine grained sands, subangular particles damp to moist, brown and grey			0.0
					– EMBANKMENT FILL MATERIAL			
1.0								2.0
								4.0
2.0								6.0
								8.0
3.0					– some pieces of phyllite rock			10.0
			13					12.0
4.0								14.0
								16.0
5.0								18.0
								20.0
6.0					– higher moisture content, softer – 15 – 20% phyllite			
			13					22.0
7.0					– color changes to light brown – very hard drilling – rock – too hard to penetrate, changed bits on auger drill			24.0
8.0					– softer, color changes to reddish brown			26.0
					Original Ground Surface at 8.1 m			28.0
9.0					– color changes to yellowish brown			30.0
					– light brown, higher moisture			32.0
10.0								

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 12.7 m
	REVIEWED BY:	COMPLETE: 94/04/30
	Fig. No:	Page 1 of 2

94/06/01 11:04AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-02C
PIEZOMETER INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910137.12 E588888.76	ELEVATION: 1129.14 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	STANDARD PENETRATION 10 20 30 40 / PLASTIC M.C. LIQUID 10 20 30 40	PERCENT GRAVEL 20 40 60 80 / PERCENT SAND 20 40 60 80 / PERCENT SILT OR FINES 20 40 60 80 / GROUND ICE DESCRIPTION 20 40 60 80	DEPTH (ft)
10.0								34.0
11.0					- grinding rock			36.0
12.0								38.0
								40.0
					- water at 12.5 m depth measured on 94/05/03			
13.0								42.0
					END OF BOREHHOLE NOTE: - hole sloughed and had to be re-drilled to 13 m PIEZOMETER INSTALLATION - 0.15 m sand layer on bottom - 3 bags sand to 9.2 m below grade - 1.5 m screen+12.2 m, 50 mm PVC pipe - 0.5 bags bentonite to 8.85 m - mixed 1 bag grout with mixture remaining from GW94-01, GW94-02 - install protective casing + endcap - top of PVC 0.61 m above ground			44.0
14.0								46.0
								48.0
15.0								50.0
								52.0
16.0								54.0
								56.0
17.0								58.0
								60.0
18.0								62.0
								64.0
19.0								
20.0								

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 12.7 m
	REVIEWED BY:	COMPLETE: 94/04/30
	Fig. No:	Page 2 of 2

94/06/01 11:05AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-03A
PIEZOMETER INSTALLATION	DRILL: CME 750 – SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910188.74 E589245.06	ELEVATION: 1133.673 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	STANDARD PENETRATION 10 20 30 40 / PLASTIC M.C. LIQUID	PERCENT GRAVEL 20 40 60 80 / PERCENT SAND 20 40 60 80 / PERCENT SILT OR FINES 20 40 60 80 / GROUND ICE DESCRIPTION 20 40 60 80	DEPTH (ft)
0.0					SILT (TILL) – sandy, some gravel, some clay, firm, low to medium plastic, fine grained sands, subangular particles, brown and grey			0.0
					– seasonally frozen (Nbn) to 1.7 m – damp to moist			2.0
1.0								4.0
2.0								6.0
								8.0
3.0					– softer			10.0
			8					12.0
4.0								14.0
								16.0
5.0					– stiffer			18.0
								20.0
6.0			11					22.0
								24.0
7.0								26.0
8.0								

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: BCF	COMPLETION DEPTH: 13.5 m
REVIEWED BY:	COMPLETE: 94/04/28
Fig. No:	Page 1 of 2

94/06/01 11:05AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-03A
PIEZOMETER INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910188.74 E589245.06	ELEVATION: 1133.673 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
8.0					- softer - higher moisture content, color changes to brown	
					Original Ground Surface at 8.5 m	28.0
9.0						30.0
			24			
10.0						32.0
						34.0
11.0						36.0
					- more stiff	38.0
12.0						40.0
			22			
13.0						42.0
						44.0
14.0					END OF BOREHOLE NOTE: - 0.15 m slough to 13.6 m PIEZOMETER INSTALLATION - 0.15 m sand layer on bottom - 1.5 m screen+12.2 m, 50 mm PVC pipe - 3 bags sand to 11.0 m below grade - 0.5 bags bentonite to 10.5 m - used grout mixed from P94-03B - install protective casing + endcap - top of PVC at 0.61 m above ground	46.0
						48.0
15.0						50.0
16.0						52.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 13.5 m
	REVIEWED BY:	COMPLETE: 94/04/28
	Fig. No:	Page 2 of 2

94/06/01 11:06AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-03B
PIEZOMETER INSTALLATION	DRILL: CME 750 – SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910187.82 E589248.43	ELEVATION: 1133.759 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m) | SAMPLE TYPE | SAMPLE NO | SPT(N) | WELL INSTALLATION

SOIL DESCRIPTION

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft)

SILT (TILL) – sandy, some gravel, some clay, firm, low to medium plastic, fine grained sands, subangular particles, brown and grey

– seasonally frozen (Nbn) to 1.7 m
– damp to moist

– softer

– stiffer

– softer
– higher moisture content, colour changes to brown

Original Ground Surface at 8.5 m

END OF BOREHOLE

PIEZOMETER INSTALLATION
– 0.15 m sand layer on bottom
– 1.5 m screen+9.14 m, 50 mm PVC pipe
– 3 bags sand to 6.55 m below grade
– 0.5 bags bentonite to 6.1 m
– mixed 4 bags grout + 50 gal. water
– install protective casing + endcap for holes P94-03A and P94-03b
– top of PVC 0.61 m above ground

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 9.1 m
	REVIEWED BY:	COMPLETE: 94/04/28
	Fig. No:	Page 1 of 1

94/06/01 11:07AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-04A
PIEZOMETER INSTALLATION	DRILL: CME 750 – SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910142.2 E589448.84	ELEVATION: 1133.909 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	STANDARD PENETRATION 10 20 30 40 / PLASTIC M.C. LIQUID	PERCENT GRAVEL 20 40 60 80 / PERCENT SAND 20 40 60 80 / PERCENT SILT OR FINES 20 40 60 80 / GROUND ICE DESCRIPTION 20 40 60 80	DEPTH (ft)
0.0					SILT (TILL) – sandy, some gravel, some clay, low plastic, brown and grey, some rock pieces – EMBANKMENT FILL MATERIAL – seasonally frozen to approx. 2.4 m			0.0
1.0								4.0
2.0					– softer drilling, higher moisture			8.0
3.0			13					10.0
4.0								12.0
5.0								16.0
6.0			15					20.0
7.0								24.0
8.0								26.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 12.1 m
	REVIEWED BY:	COMPLETE: 94/04/28
	Fig. No:	Page 1 of 2

94/06/01 11:08AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-04A
PIEZOMETER INSTALLATION	DRILL: CME 750 – SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910142.2 E589448.84	ELEVATION: 1133.909 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40 | PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
8.0					– stiffer drilling, obvious change in color, higher sand content	
					Original Ground Surface Area	28.0
9.0					– quite stiff, almost hard	30.0
					– dry silt powder with layers of phyllite rock	
					– grinding rock	32.0
10.0					– very stiff drilling	
					– hard dry till, light grey	34.0
11.0						36.0
					– water at 11.6 m depth measured on 94/05/03	38.0
12.0						40.0
			80			
					END OF BOREHOLE	42.0
13.0					PIEZOMETER INSTALLATION	
					– 0.15 m sand layer on bottom	44.0
					– 1.5 m screen+12.2 m, 50 mm PVC pipe	
					– 2.5 bags sand to 9.6 m below grade	
14.0					– 0.5 bags bentonite to 9.1 m	46.0
					– mixed 3 bags grout + 40 gal. water for both P94-04A and P94-04B	
					– install protective casing + endcap	48.0
15.0					– top of PVC 0.61 m above ground	
						50.0
16.0						52.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 12.1 m
	REVIEWED BY:	COMPLETE: 94/04/28
	Fig. No:	Page 2 of 2

94/06/01 11:09AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: P94-04B
PIEZOMETER INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910145.42 E589442.21	ELEVATION: 1133.626 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	STANDARD PENETRATION 10 20 30 40 / PLASTIC M.C. LIQUID 10 20 30 40	PERCENT GRAVEL 20 40 60 80 / PERCENT SAND 20 40 60 80 / PERCENT SILT OR FINES 20 40 60 80 / GROUND ICE DESCRIPTION 20 40 60 80	DEPTH (ft)
0.0					SILT (TILL) - sandy, some gravel, some clay, low plastic, brown and grey, some rock pieces - EMBANKMENT FILL MATERIAL - seasonally frozen to approx. 2.4 m			0.0
1.0								2.0
								4.0
2.0								6.0
					- softer drilling, higher moisture			8.0
3.0								10.0
								12.0
4.0								14.0
								16.0
5.0								18.0
								20.0
6.0					- stiffer drilling, obvious change in colour, higher sand content			22.0
7.0					Original Ground Surface Area			24.0
								26.0
8.0	☒		40			● ■		28.0
					END OF BOREHOLE PIEZOMETER INSTALLATION - 0.15 sand layer on bottom - 1.5 m screen+7.6 m, 50 mm PVC pipe - 2.5 bags sand to 5.6 m below grade - 0.5 bags bentonite to 5.2 m - used grout mixed from hole P94-04A - install protective casing + endcap - top of PVC 0.61 m above ground			30.0
9.0								32.0
								34.0
10.0								36.0
								38.0
11.0								

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 8.4 m
	REVIEWED BY:	COMPLETE: 94/04/29
	Fig. No:	Page 1 of 1

94/06/01 11:15AM

APPENDIX B
Results of Laboratory and Field Testing

CONTENTS:

B-1	Proctor Compaction Test Results Channel Base Seal
B-2	Proctor Compaction Test Results Rock Pile Cover
B-3	Gradation Test Results Shot Rock Cover
B-4	Density Test Results Channel Base Seal
B-5	Density Test Results Till Cover

B-1

Proctor Compaction Test Results
Channel Base Seal

MOISTURE-DENSITY RELATIONSHIP

ASTM Designation D698, D1557

Project Number: 0201-11365
Project: Vangorda Waste Dump Rehab.
Address: Faro, YT

Sample Number:
Date Sampled:
Sample Location

Date Tested: March 31, 1994 By: JSB
Client: Pelly Construction
Attention:

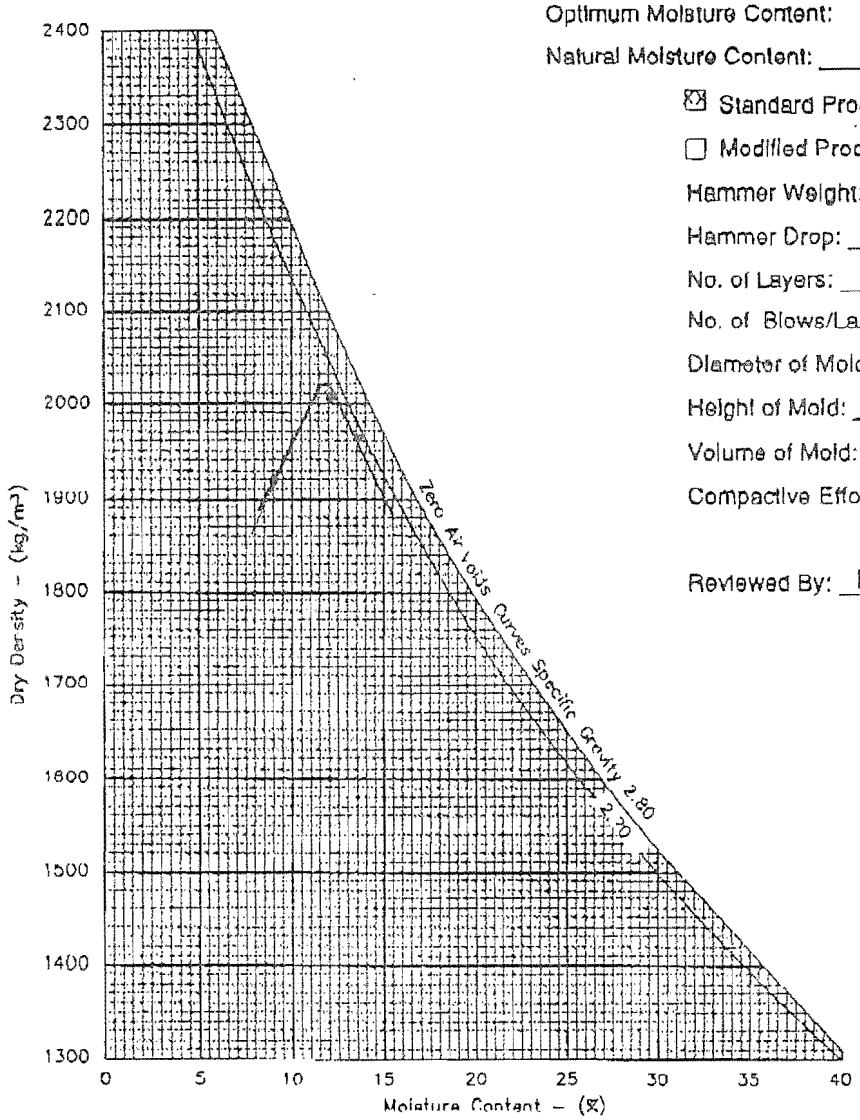
Sample Description: SILT (TILL)-sandy, some clay, some gravel

Maximum Dry Density: 2020 kg/m³
Optimum Moisture Content: 12.0 %
Natural Moisture Content: %

☒ Standard Proctor (ASTM D698)
☐ Modified Proctor (ASTM D1557)

Hammer Weight: 2.494 kg
Hammer Drop: 304.8 mm
No. of Layers: 3
No. of Blows/Layer: 25
Diameter of Mold: 101.4 mm
Height of Mold: 116.3 mm
Volume of Mold: 0.000938 m³
Compactive Effort: 593.5 kJ/m³

Reviewed By: R. Trimble P.Eng.



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B-2

Proctor Compaction Test Results
Rock Pile Cover

MOISTURE - DENSITY RELATIONSHIP

ASTM Designation D698, D1557, or D2049

Project No.: 0201-11365

Project: Vangorda Waste Rock Containment

Address: Faro, YT

Date Tested: June 8/94 By: PJM

Client:

Attention:

Sample No.:

Sample Location:

Sample Description: SILT - gravelly, some sand

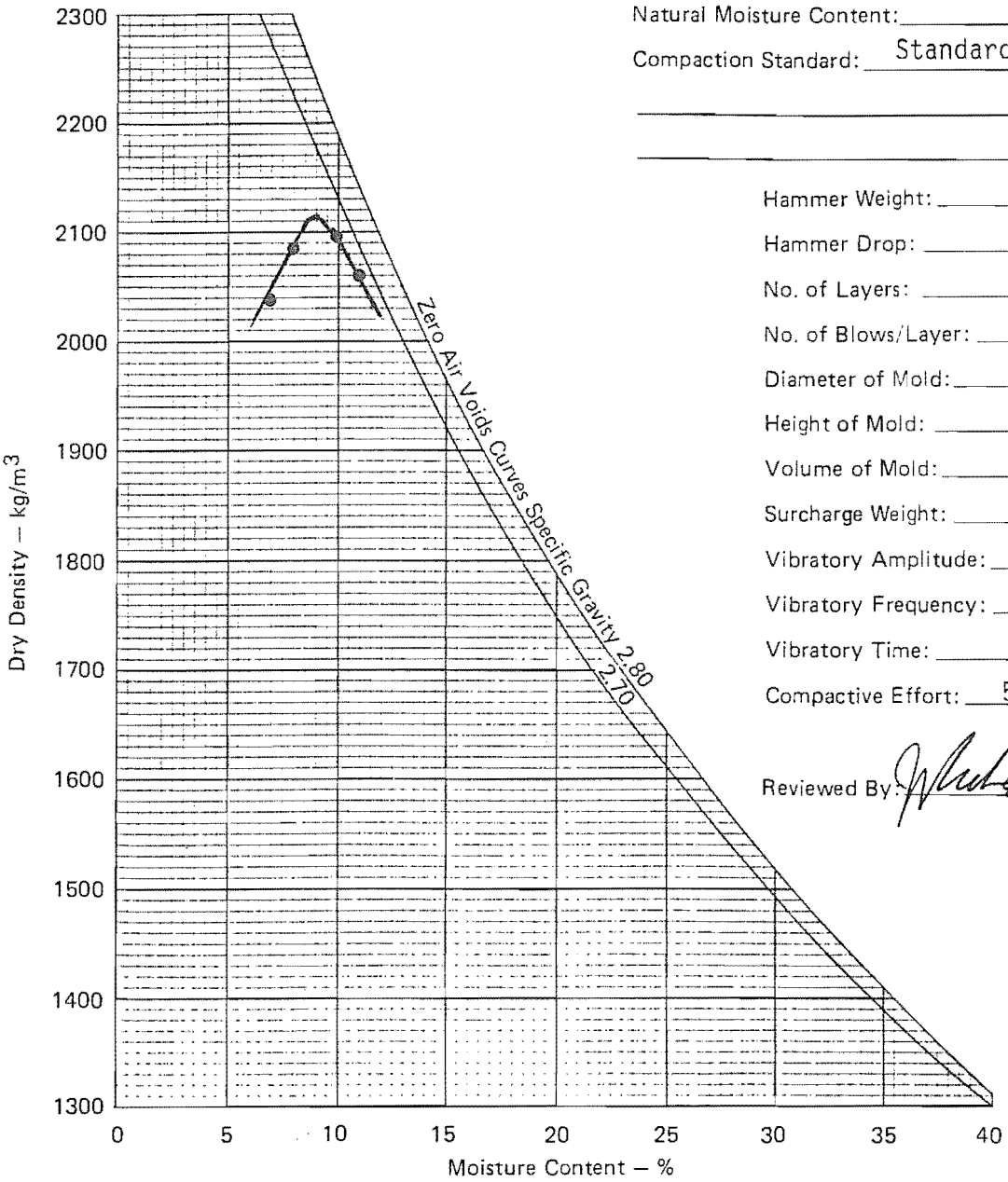
Minimum Dry Density: kg/m^3

Maximum Dry Density: 2115 kg/m^3

Optimum Moisture Content: 9.0 %

Natural Moisture Content: %

Compaction Standard: Standard Proctor



Hammer Weight: 2.494 kg

Hammer Drop: 304.8 mm

No. of Layers: 3

No. of Blows/Layer: 56

Diameter of Mold: 152.4 mm

Height of Mold: 116.5 mm

Volume of Mold: 0.00212 m^3

Surcharge Weight: kg

Vibratory Amplitude: mm

Vibratory Frequency: vib./min.

Vibratory Time: min.

Compactive Effort: 590.3 kJ/m^3

Reviewed By: P.Eng.

MOISTURE-DENSITY RELATIONSHIP

ASTM Designation D698, D1557

Project Number: 0201-11365
Project: Vangorda Waste Rock Containment
Address: Faro, YT

Date Tested: June 8, 1994 By: PJM
Client: Pelly Construction
Attention: Mr. Bill Dunn

Sample Number:
Date Sampled:
Sample Location

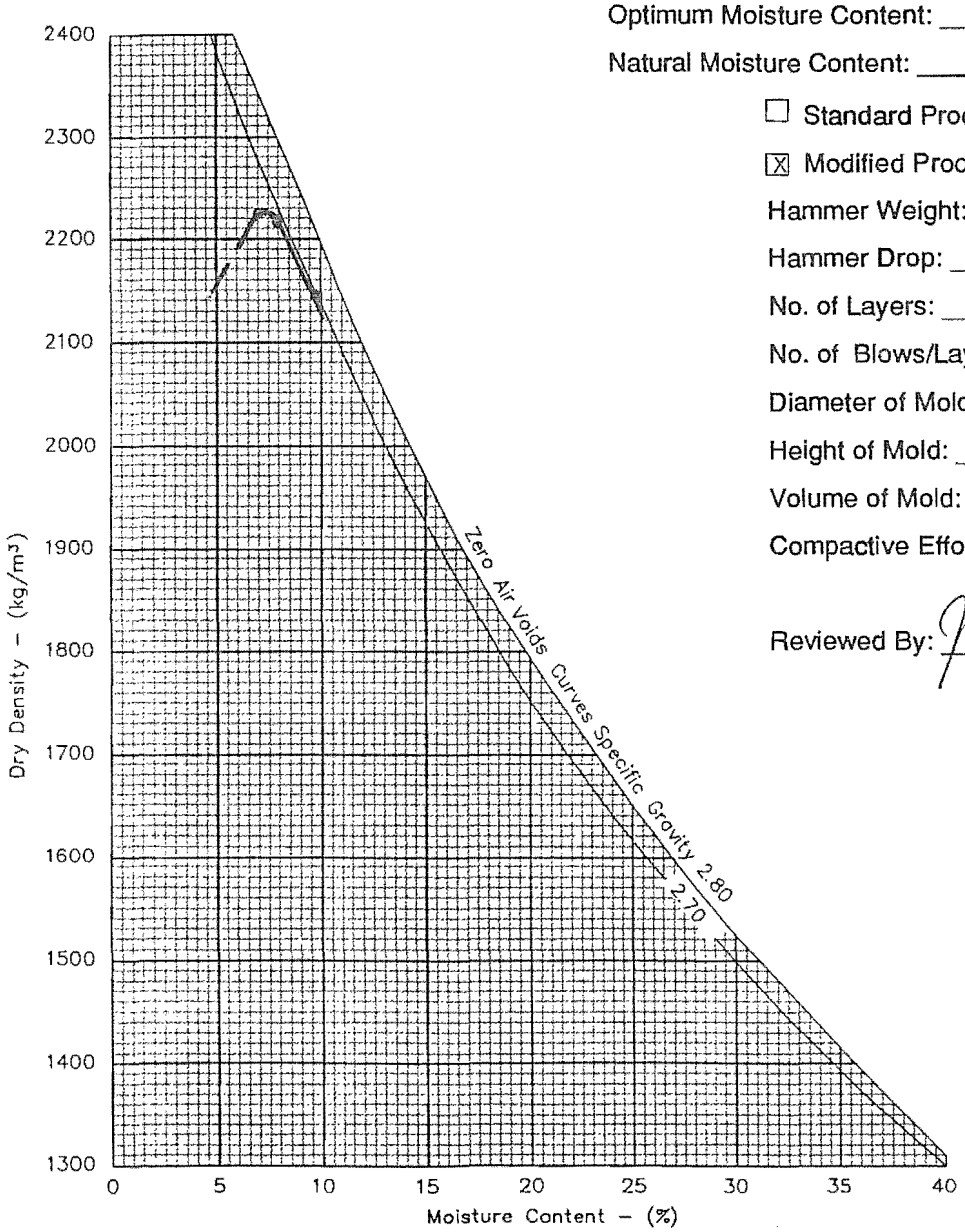
Sample Description: SILT - gravelly, some sand, some clay

Maximum Dry Density: 2230 kg/m^3
Optimum Moisture Content: 7.5 %
Natural Moisture Content: %

☐ Standard Proctor (ASTM D698)
☒ Modified Proctor (ASTM D1557)

Hammer Weight: 4.5 kg
Hammer Drop: 457 mm
No. of Layers: 5
No. of Blows/Layer: 56
Diameter of Mold: 152.4 mm
Height of Mold: 116.5 mm
Volume of Mold: 0.00212 m^3
Compactive Effort: 269.3 kJ/m^3

Reviewed By: [signature] P.Eng.



B-3

Gradation Test Results
Shot Rock Cover

EBA Engineering

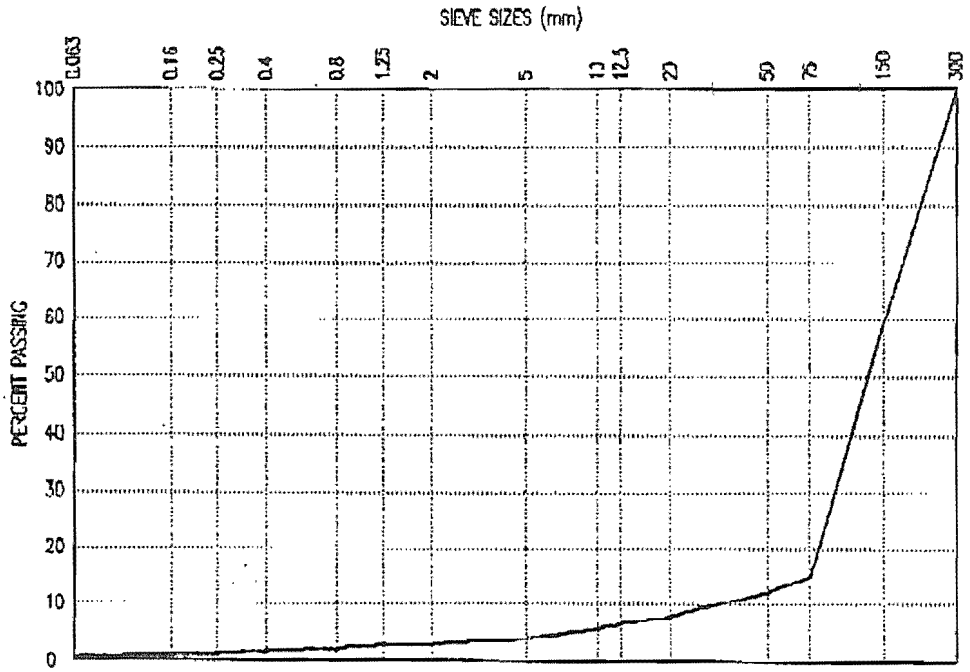
LARGE AGGREGATE ANALYSIS REPORT

Project: Vangorda Waste Rock Cont. Fac.
Address: Faro Minesite, YT
Project Number: 0201-11365
Date Sampled: 94/04/29 By: BCF
Client: Pelly Construction Ltd.
Attention: Mr. Bill Dunn, P.Eng.
Soil Description: QUARRIED ROCK - RIPRAP

Sample Number:
Sample Location: Station 0+940, midway up side slope
Time: 1000 Temp:
Date Tested: 94/05/06 By: BCF
Natural Moisture Content:
Crushed Faces: Faces:

Remarks:

Sieve	% Passing
300	100.0
150	59.7
75	15.0
50	12.2
20	7.8
12.5	6.6
10	5.7
5	4.0
2	3.0
1.25	3.0
0.8	2.2
0.4	1.7
0.25	1.4
0.16	1.2
0.063	0.9



Reviewed By:

B-4

Density Test Results
Channel Base Seal

DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365

Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 7866

Soil Description: SILT (TILL)- sandy, some gravel, some clay

Temperature Air: ______ °C Soil: ______ °C

Specified Compaction: 98.0

Compaction Standard: Standard Proctor

Minimum Dry Density:

Maximum Dry Density: 2020

Optimum M.C.: 12.0

Date Tested: 94.04.27 By: BCF

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
1 /300	0+240 - Base of Trench		11.7	1951	96.6
2 /300	0+240 - Left Bank		11.7	1933	95.7
3 /300	0+240 - Right Bank		11.2	1961	97.1
4 /300	0+220 - Base of Trench		10.6	2062	102.0+
5 /300	0+220 - Left Bank		10.9	2011	99.6
6 /300	0+220 - Right Bank		10.6	2034	100.7
7 /300	0+200 - Base of Trench		13.2	1948	96.4
8 /300	0+200 - Left Bank		12.5	1946	96.3
9 /300	0+200 - Right Bank		12.5	1977	97.9
10 /300	0+180 - Base of Trench		10.4	1997	98.9
11 /300	0+180 - Left Bank		11.3	1967	97.4
12 /300	0+180 - Right Bank		10.9	2002	99.1
13 /300	0+160 - Base of Trench		11.4	2007	99.4
14 /300	0+160 - Left Bank		10.5	1995	98.8
15 /300	0+160 - Right Bank		10.2	1992	98.6
16 /300	0+140 - Base of Trench		11.6	1930	95.5

15700

Remarks:

Reviewed By: [signature] P.Eng.

ATTENTION: MR. BILL DUNN
PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7

cc PELLY CONSTRUCTION LTD.
FILE COPY

eba

2144 CONT/90

DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365
Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 7866
Soil Description: SILT (TILL)- sandy, some gravel, some clay
Temperature Air: _____ °C Soil: _____ °C
Specified Compaction: 98.0
Compaction Standard: Standard Proctor
Minimum Dry Density: _____
Maximum Dry Density: 2020
Optimum M.C.: 12.0
Date Tested: 94.04.27 By: BCF

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
17 /300	0+140 - Left Bank		11.8	1929	95.5
18 /300	0+140 - Right Bank		11.8	1963	97.2
19 /300	0+100 - Base of Trench		0.0	1934	95.8
20 /300	0+120 - Base of Trench		8.1	2019	99.9
21 /300	0+120 - Left Bank		7.8	2017	99.8
22 /300	0+120 - Right Bank		8.9	2002	99.1
23 /300	0+140 - Base of Trench		8.8	2010	99.5
24 /300	0+140 - Left Bank		9.1	2021	100.0
25 /300	0+160 - Base of Trench		10.2	2038	100.9
26 /300	0+160 - Left Bank		9.9	2032	100.6
27 /300	0+160 - Right Bank		9.8	2021	100.0
28 /300	0+280 - Base of Trench		8.8	1990	98.5
29 /300	0+280 - Left Bank		8.4	1992	98.6
30 /300	0+300 - Base of Trench		9.2	1992	98.6
31 /300	0+180 - Base of Trench		8.6	1941	96.1
32 /300	0+200 - Base of Trench		9.4	1936	95.8

Remarks: _____

Reviewed By: _____ P.Eng.

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ATTENTION: MR. BILL DUNN
PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7

DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365
Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 7866
Soil Description: SILT (TILL)- sandy, some gravel, some clay
Temperature Air: _____ °C Soil: _____ °C
Specified Compaction: 98.0
Compaction Standard: Standard Proctor
Minimum Dry Density: _____
Maximum Dry Density: 2020
Optimum M.C.: 12.0
Date Tested: 94.04.27 By: BCF

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
33 /300	0+220 - Base of Trench		8.0	1944	96.2
34 /300	0+240 - Base of Trench		8.5	1977	97.9
35 /300	0+260 - Base of Trench		9.5	1978	97.9
				3437.9 / 35	= 98.2 average

Remarks: _____

Reviewed By: _____ P.Eng.

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Y1A 2T7

B-5

Density Test Results
Till Cover

DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365
Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 4004
Soil Description: SILT - gravelly, some sand, some clay
Temperature Air: ____ °C Soil: ____ °C
Specified Compaction: 98.0
Compaction Standard: Standard Proctor
Minimum Dry Density: ____
Maximum Dry Density: 2115
Optimum M.C.: 9.0
Date Tested: 94.06.10 By: BCF

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
36 /200	STA 0+160 - 10 m Below Crest	-0.45	10.9	2014	95.2
37 /200	STA 0+190 - 10 m Below Crest	-0.45	11.2	2037	96.3
38 /200	STA 0+210 - 10 m Below Crest	-0.45	11.0	2058	97.3
39 /200	STA 0+205 - 30 m Below Crest	-0.45	11.4	1965	92.9
40 /200	STA 0+170 - 30 m Below Crest	-0.45	12.1	1980	93.6
41 /200	STA 0+155 - 30 m Below Crest	-0.45	11.0	2032	96.1
42 /200	STA 0+165 - 70 m Below Crest	-0.45	10.6	2076	98.2
43 /200	STA 0+180 - 70 m Below Crest	-0.45	8.2	1888	89.3
44 /200	STA 0+200 - 70 m Below Crest	-0.45	14.2	1951	92.2
45 /200	STA 0+200 - 105 m Below Crest	-0.45	10.1	2017	95.4
46 /200	STA 0+185 - 100 m Below Crest	-0.45	11.5	2025	95.7
47 /200	STA 0+160 - 110 m Below Crest	-0.45	11.4	1983	93.8

Remarks: ____

Reviewed By: [signature] P.Eng.

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PELLY CONSTRUCTION LTD.
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Whitehorse, YT
Y1A 2T7

DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365
Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 4004
Soil Description: SILT - gravelly, some sand, some clay
Temperature Air: _____ °C Soil: _____ °C
Specified Compaction: 98.0
Compaction Standard: Standard Proctor
Minimum Dry Density: _____
Maximum Dry Density: 2115
Optimum M.C.: 9.0
Date Tested: 94.06.13 By: BCF

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
48 /200	STA 0+160 - 20 m Below Crest	-0.45	8.8	2073	98.0
	Retest From June 10				
49 /200	STA 0+180 - 20 m Below Crest	-0.45	9.0	2072	98.0
	Retest From June 10				
50 /200	STA 0+200 - 30 m Below Crest	-0.45	7.8	2089	98.8
	Retest From June 10				
51 /200	STA 0+190 - 60 m Below Crest	-0.45	9.1	2103	99.4
	Retest From June 10				
52 /200	STA 0+160 - 80 m Below Crest	-0.45	8.3	2080	98.3
	Retest From June 10				
53 /200	STA 0+160 - 100 m Below Crest	-0.45	9.6	2071	97.9
	Retest From June 10				

Remarks: _____

Reviewed By: _____ P.Eng.

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Y1A 2T7

DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365
Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 4004
Soil Description: SILT (TILL)

Temperature Air: 14.0 °C Soil: _____ °C
Specified Compaction: 98.0
Compaction Standard: Standard Proctor
Minimum Dry Density: _____
Maximum Dry Density: 2115
Optimum M.C.: 9.0
Date Tested: 94.06.21 By: JRT

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
54 /200	0+180 - 40 m from Crest	+1.1	9.4	2021	95.6
55 /200	(Retest #54)	+1.1	9.1	2108	99.7
56 /200	0+160 - 40 m from Crest	+1.1	8.4	2073	98.0
57 /200	0+165 - 80 m from Crest	+1.1	10.1	2079	98.3
58 /200	0+185 - 80 m from Crest	+1.1	8.4	2104	99.5
59 /200	0+205 - 80 m from Crest	+1.1	9.5	1984	93.8
60 /200	(Retest #59)	+1.1	7.8	2083	98.5
61 /200	0+180 - 110 m from Crest	+1.1	7.9	2053	97.1
62 /200	(Retest #61)	+1.1	8.6	2137	101.0
63 /200	0+208 - 110 m from Crest	+1.1	8.7	2118	100.1

Remarks: _____

Reviewed By: Richard Wilcox P.Eng.

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DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365

Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 7866

Soil Description: SILT (TILL)

Temperature Air: _____ °C Soil: _____ °C

Specified Compaction: 95.0

Compaction Standard: Standard Proctor

Minimum Dry Density: _____

Maximum Dry Density: 2115

Optimum M.C.: 9.0

Date Tested: 94.06.24 By: BCF

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
64 /250	STA 0+200 - 25 m From Crest	-0.3	8.8	2048	96.8
65 /200	STA 0+175 - 25 m From Crest	-0.3	9.1	2010	95.0
66 /200	STA 0+155 - 25 m From Crest	-0.3	10.2	2008	94.9
67 /250	STA 0+190 - 40 m From Crest	-0.3	9.8	2122	100.3
68 /250	STA 0+170 - 45 m From Crest	-0.3	8.6	2108	99.7
69 /250	STA 0+155 - 45 m From Crest	-0.3	9.2	2109	99.7
70 /250	STA 0+160 - 80 m From Crest	-0.3	9.5	2103	99.4
71 /250	STA 0+180 - 80 m From Crest	-0.3	9.8	2122	100.3
72 /250	STA 0+200 - 80 m From Crest	-0.3	7.0	2137	101.0
73 /250	STA 0+190 - 110 m From Crest	-0.3	8.6	2073	98.0
74 /250	STA 0+170 - 110 m From Crest	-0.3	8.4	2106	99.6
75 /250	STA 0+155 - 110 m From Crest	-0.3	8.9	2102	99.4

Remarks: _____

Reviewed By: _____ P.Eng.

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Whitehorse, YT
Y1A 2T7

DENSITY TEST RESULTS

ASTM Designation D2922 & D3017, or D1556

Project No.: 0201-11365
Project: Vangorda Waste Dump
Faro, YT

Client: PELLY CONSTRUCTION LTD.
111 Industrial Road
Whitehorse, YT
Y1A 2T7
MR. BILL DUNN

Test Apparatus: Nuclear Mach. No.: 4062
Soil Description: SILT (TILL)

Temperature Air: _____ °C Soil: _____ °C
Specified Compaction: 95.0
Compaction Standard: Standard Proctor
Minimum Dry Density: _____
Maximum Dry Density: 2115
Optimum M.C.: 9.0
Date Tested: 94.06.28 By: BCF

Test No./ Probe Depth	Location	Elevation	% Moisture Content	Dry Density Kg/m³	% Compaction
76 /250	STA 0+195 - 10 m Below Crest	Grade	10.3	2022	95.6
77 /250	STA 0+185 - 40 m Below Crest	Grade	8.9	2068	97.8
78 /250	STA 0+175 - 70 m Below Crest	Grade	9.6	2140	101.2
79 /250	STA 0+163 - 95 m Below Crest	Grade	9.7	2023	95.7
80 /250	STA 0+155 - 115 m Below Crest	Grade	11.1	2062	97.5
81 /250	STA 0+175 - 115 m Below Crest	Grade	10.1	2079	98.3
82 /250	STA 0+195 - 100 m Below Crest	Grade	10.4	2058	97.3
83 /250	STA 0+199 - 60 m Below Crest	Grade	9.7	2139	101.1
84 /250	STA 0+168 - 45 m Below Crest	Grade	7.5	2047	96.8
85 /250	STA 0+157 - 15 m Below Crest	Grade	9.5	2102	99.4

Remarks: _____

Reviewed By: Michael Noble P.Eng.

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Y1A 2T7

APPENDIX C

Photographs

Photo C-1 Excavation of snow from existing drainage ditch at STA 0+900.

Photo C-2 Snow clearing from area above proposed channel and snow removal from existing channel.

Photo C-3 Backfilling of existing ditch with spoil from original stockpile (STA 0+900).

Photo C-4 Recontoured area after existing ditch was backfilled (STA 0+800 to 1+000).

Photo C-5 Snow clearance along proposed channel alignment from STA 0+100 to 0+700.

Photo C-6 Snow removal from existing ditch on the north side of the Vangorda Waste Dump from STA 1+000 to 1+200.

Photo C-7 Excavation of existing bedrock at STA 0+140.

Photo C-8 Shaping of channel on north side of waste pile from STA 1+260 to 1+000.

Photo C-9 Final grade in excavation of channel from STA 0+300 to 0+600 prior to riprap placement.

Photo C-10 Riprap placement along end section of channel from STA 1+360 to 1+100.

Photo C-11 Riprap placement along channel section (STA 1+200).

Photo C-12 Riprap placement along channel from STA 1+300 to 1+100.

Photo C-13 View looking south over the waste pile. Vangorda Pit is shown in the left hand corner with Little Creek Pond and Dam in the foreground. Riprap placement is in progress in the channel on the north side of the pile.

Photo C-14 View north of the waste rock pile and the channel under construction.

Photo C-15 Borrow area for riprap.

Photo C-16 Riprap borrow pit.

Photo C-17 Excavation to final grade of the channel on the north side of the waste pile.

Photo C-18 Removal of peat zones on the west bank of the channel at STA 0+900.

Photo C-19 Completed section of the channel with riprap protection (STA 1+340 to 1+100).

Photo C-20 Compaction of glacial fill seal along bottom of channel from STA 0+220 to 0+100.

Photo C-21 Compaction of initial lift of fill to seal bedrock at bottom of channel. (STA 0+100 to 0+150).

Photo C-22 Glacial till seal over bedrock from STA 0+100 to 0+220.

Photo C-23 Over excavation of frozen organic soil on the east side of channel from STA 0+880 to 0+920.

Photo C-24 Over excavation of unsuitable material along east side of channel from STA 0+880 to 0+920.

Photo C-25 Channel excavation to final grade along southern leg of channel from STA 0+430.

Photo C-26 Channel excavation to final grade at STA 0+900.

Photo C-27 Shotrock stockpiled on south side of channel prior to placement at STA 0+400.

Photo C-28 Typical shotrock protection at STA 0+830.

Photo C-29 Aerial view of completed channel along the north side of the pile (STA 1+100 to 1+350). Little Creek seepage collection pond is shown in the background.

Photo C-30 Riprap placement in channel at western end of pile from STA 0+800 to 1+000.

Photo C-31 Completed channel from station 1+200 to outlet into Little Creek Pond.

Photo C-32 Completed channel at STA 0+900.

Photo C-33 Aerial view of south side of the waste rock pile. Riprap protection of channel section from 0+100 to 0+600 is in progress. Resloping of rock pile from STA 0+170 to 0+220 is seen in top left hand corner.

Photo C-34 Ground view of the channel section shown in Photo C-27.

Photo C-35 View of the north side of the waste pile and the channel with Little Creek Pond in the middleground and Vangorda Pit in the foreground.

Photo C-36 View looking north of the channel and the waste rock pile.

Photo C-37 Groundwater well. GW-94-03 with bailer.

Photo C-38 View looking south from GW-94-03 of completed channel.

Photo C-39 Groundwater well GW-94-05. Water inside protective cap spills over lip as a result of artesian conditions.

Photo C-40 Completed channel along STA 0+150 to 0+700.

Photo C-41 V-noted weir at fingerdrain No. 3.

Photo R-1 Resloping of waste rock pile from STA 0+170 to 0+220.

Photo R-2 D-10 resloping waste on south side of pile.

Photo R-3 Resloping of waste pile looking down.

Photo R-4 Resloping slopes on Vangorda waste rock pile looking up.

Photo R-5 View looking north of fill placement over recontoured area of waste rock pile.

Photo R-6 Initial lift of the fill cover placed over recontoured rock.