CREATING AND DELIVERING BETTER SOLUTIONS

www.eba.ca

August 30, 2005 EBA File: 1100060.006

Tahera Diamond Corporation
Suite 803 – 121 Richmond Street West
Toronto, Ontario
M5H 2K1

Attention: Dan Johnson
Executive Vice President, Operations

Subject: C1 Diversion - Geotechnical Design
Jericho Diamond Project, NU

1.0 INTRODUCTION

Further to a request by Tahera Diamond Corporation (TDC), EBA Engineering Consultants Ltd. (EBA) has prepared a design for C1 Diversion Structure and C1 Diversion Channel at the Jericho Diamond Mine in Nunavut.

Open pit mining will intercept the existing natural drainage path from the Lake C1 outflow to the C1 drainage system. To avoid the inflow of Lake C1 water to the pit and to mitigate the impact of the mine development on the downstream fish habitat, TDC as per the conditions outline in the NWB1JER0410 water licence and the DFO authorization will construct a channel that will direct the outflow from Lake C1 around the planned mining activities and reconnect to the lower reaches of the natural Stream C1 (Figure 1, Photograph 1). TDC have provided EBA hydrological information and geotechnical design information prepared by Steffen Robertson and Kirsten (Canada) Inc. (SRK) and others that came from the water license application. TDC retained EBA to prepare the detail geotechnical design for C1 Diversion alignment so that TDC can incorporate channel features required by the DFO Authorization and the criteria outlined in Jericho Water License. TDC also requested that EBA as part of the detail design process assess the influence of potential ice-rich permafrost conditions and provide design and construction measures to reduce the influence of the development on permafrost and site degradation.

The diversion channel development will be at a minimum setback distance of 30 m from the crest of the pit slope as shown in Drawing No. 1100060006-01a. The C1 Diversion Channel has been characterized as comprising three reaches referenced as Reach A, Reach B, and Reach C. Reach A crosses bedrock controlled terrain from Station 0+000 at the Diversion Dam to Station 0+277. Reach A and the culvert crossing of the Carat Lake Water Line Road have been designed as part of the road network as these areas lie in bedrock conditions.

Reach B extends from the outlet of the culvert at Station 0+277 to about 0+332 and is located on terrain that is transitional from a thin veneer of granular colluvium and sand and gravel till over bedrock to a thick blanket of these materials over bedrock. The invert of the culvert outlet is designed to lie at an elevation of 484.6 m. The natural grade down-gradient of the culvert outlet for the remainder of Reach B dips gently at about 8 percent for a distance of about 55 m in the northeast direction.

Reach C (Station 0+332 to approximate Station 0+512) extends cross-slope from the end of Reach B to the lower reaches of the Natural C1 drainage. Mineral soils through this reach are dominantly sand and gravel tills with varied ice contents to depths of about 10 m or greater.

2.0 BACKGROUND INFORMATION

Information used included Jericho Water License Application, the actual water license, the DFO authorization and supporting background documents and engineering maps from site provided by TDC, which included the following details:

1) Base plan showing Jericho ultimate crest of pit and the Channel alignment overlaid on 1995 topography and selected features;
2) July 2005 Topographic Contour information using survey information collected on a grid of 6 to 10 m typically;
3) Excerpts from the Nunavut Water Board License NWB1JER0410 – Type A and Department of Fisheries and Oceans (DFO) Authorization Letter dated April 15, 2005;
4) Culvert materials available for use, as well as the following Technical Memorandums from the Water License Application;
    - 2003 SRK Technical Memorandum G Water Management Facilities Design Criteria;
    - 2003 SRK Technical Memorandum C Supplemental Climate and Hydrology;
    - 2003 SRK Technical Memorandum B Supplemental Permafrost Characterization; and
    - 2003 SRK Technical Memorandum A Supplemental Geotechnical Data.

In addition, EBA met with TDC and Mainstream Aquatics Ltd. (MAL, Note: formerly R.L. & L. Environmental Services Ltd.) so that items related to fish habitat were communicated to all parties.

Nunavut Water Board License Excerpt

Under the Nunavut Water Board License NWB1JER0410 – Type A TDC have been requested to address the following:

Part D, **Item 2** - The licensee shall submit to the board for approval, design plans and drawings stamped by a Geotechnical Engineer, at least 60 days prior to construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or waste. The Licensee shall ensure that such facilities are designed and constructed to engineering standards such that at a minimum they comply with the Dam Safety Guidelines.

Part D, **Item 16** - The Licensee shall, at least sixty days prior to the construction of the C1 Diversion, submit to the Board for approval the final detailed design plan stamped by a Geotechnical Engineer and/or Engineering Geologist. This report shall be developed in accordance with Schedule D, **Item 15**.

Schedule D, **Item 15** – The detailed design report for the construction of the Stream C1 Diversion and associated dam structure referred to in Part D, Item 16 of the Licence, shall include but not necessarily be limited to the following:

- Detailed implementation schedule for construction;
- Design criteria and parameters;
- The report shall discuss options for adjusting the design of the two channel diversion energy dissipation pools to become a narrow, longer pool configuration and why this is to be considered or not;
- Consideration for the use of the pools and temporary cofferdams
- Measures to be employed to control sediment;
- Stabilization along the banks of the channel considers the use of vegetation;
- Final design plan for culverts including specific location of installation; and
- Monitoring proposed during construction.

<u>DFO Requirements</u>

With respect to criteria outlined in the DFO Authorization, the following needs to be considered:

6.3. 940 m^2 of fish habitat in the 470-m long diversion channel shall be enhanced by incorporating natural channel features into [Reach C] design.

6.3.1. The enhancement shall benefit production habitat for Arctic char, Arctic grayling, burbot, lake trout, round whitefish and slimy sculpin.

6.3.2. Final detailed design drawings for the diversion channel shall be submitted to DFO for review and approval at least sixty days (60) prior to construction and shall incorporate the following features into the lower 150 m [Reach C] portion of the channel:

6.3.2.1 A sinuous configuration, which includes at least 10 meanders with a 6 metre radius, shall be incorporated into the channel to mimic natural channel form and maximize channel length;

6.3.2.2. Ten riffles shall be incorporated into the channel design;

6.3.2.3 A low flow channel shall be incorporated into the channel design;

6.3.2.4 A channel gradient shall be designed to ensure fish passage;

6.3.2.5. Boulders shall be placed in the channel to provide physical in-stream cover; and

6.3.2.6. A long, narrow pool shall be incorporated into the design at the lowermost and uppermost portion of the channel.

3.0 EXISTING SITE CONDITIONS

Mr. Bill Horne, P. Eng., of EBA observed the site on June 28th, 2005 and Mr. Mark Watson, P. Eng., completed a walkover of the site on July 20th and 21st, 2005. Mr. Horne and Mr. Watson were accompanied by Mr. Mike Monk, P. Eng. of EBA and Mr. Allan Reeves, P.Geol. of TDC. Mr. Monk had been providing civil construction quality control services on the mine site since April, 2005.

EBA design personnel observed the existing drainage conditions and the terrain in the area of the dam and channel alignment.

3.1 NATURAL C1 DRAINAGE

Photographs 2 through 5 show surface flows observed in Reaches 1 and 2 of the C1 drainage on July 21. A detailed description of the channel conditions associated with the natural channel was reported by MAL previously and pertinent information from the MAL (formerly R. L.& L Environmental Services Ltd.) report is attached in Appendix A. The MAL report that in 5 years of baseline studies by TDC, fish use of Stream C1 was limited to the first 100 metres upstream from Carat Lake (December 18, 2003 MAL Memorandum to DFO).

In general, the natural drainage referred to as Stream C1 comprises multiple channels in Reaches 1, 2 and 3. On July 21, 2005, water was flowing preferentially at surface in one channel for most of the length of the drainage.

EBA observed some evidence of recent natural erosion from periods of peak runoff, therefore although the drainage paths are well vegetated the system remains dynamic at peak flows and is subjected to erosion.

3.2 DIVERSION CHANNEL REACH A

Reach A will start at the diversion structure [Station 0+000] and will run parallel to and along the west side of the Carat Lake Access Road. The end of Reach A has been made coincident with the outlet of the culvert crossing of the road (Station 0+227). This terrain in this area is bedrock with a thin veneer of sand and gravel till (Photograph 6). Drilling data indicates bedrock along the entire length of Reach A. No existing perennial surface water channels cross Reach A.

3.3 DIVERSION CHANNEL REACH B

Reach B is located in terrain that is at the transition from a thin veneer to a thick blanket of granular colluvium and sand and gravel till over bedrock. Original ground elevation at Station 0+227, the start of Reach B, is about 485 m and the ground elevation at Station 0+332, the end of Reach B is about 480 m. The proposed culvert outlet will daylight at approximately Elevation 484.6 m. The natural grade down gradient from the culvert outlet dips gently at about 10 percent for a distance of about 55 m in the northeast direction (Photograph 7). Borehole BH-03-01 (see Drawing No. 1100060006-01a for borehole locations) completed in 2003 at Elevation 486 m showed 3 m of sandy gravel with cobbles over bedrock. Borehole 96 BGC-11 at Elevation 480.60 m showed 10.7 m of soil cover over bedrock. The upper 4.3 m of Borehole 96-BGC-11 was described as coarse sand and gravel with no excess ice. Ice-rich glacial till was encountered below 4.3 m.

3.4 DIVERSION CHANNEL REACH C

The Reach C centreline approximately follows the 478.5 m contours, cross-slope for a distance of approximately 70 metres and then curves to blend with the terrain and meet with natural Stream C1. The point of discharge to the natural stream is at a distance of about 125 m upstream of Carat Lake. Reach C crosses low lying imperfectly drained terrain mapped as glacial till. The vegetation cover is native grasses and shrubs. Typical gradients are about 3 to 6 percent.

Previously completed boreholes common to the terrain unit include 96-BGC-12 (El 479.6 m), -13 (El. 478.7 m),-14 (El 473.4 m) and –16 (El 482.5 m) and are provided in Appendix B. Borehole locations are shown on Drawing No. 110006006-1a (Appendix C). Different drilling techniques were used for the 96 BGC holes. Subsurface conditions are also varied. Ice-rich permafrost at start depths as shallow as 1.0 m (96 BGC 14) and 1.4 m (96-BGC-13) were reported in holes cored with refrigerated drill fluids. Ice-rich permafrost in boreholes drilled using air rotary probable ice-rich soils at 3.3 m or greater depth (96-BGC-16). In summary, the observed and interpreted depth to ice-rich permafrost varied significantly. It is inferred from EBA's review of the above information and site observations that ice-rich soils may well be encountered at shallow depth for a substantial length of the Reach C zone.

It is also important to note that in three of four boreholes the upper 1.5 to at least 3 m were logged as sand and gravel with trace amounts of silt. In the fourth hole, the sand and gravel contained some silt. Therefore, the permeability of the surface layer is quite varied and has the potential to be quite permeable in an unfrozen condition.

Water from the pit area watershed presently flows at surface across the Reach C right-of-way as shown in Figure 1 and in Photographs 8 through 11. This water has been diverted since 1996 from Stream C1 by an exploration road berm constructed inside the pit area. The natural C1 Stream flow toward the berm is impeded but the berm does not prevent flow underneath and around it. A manmade cut slope exists for an approximate 100 m long section of the 1996 diversion. This cutslope is upgradient of Reach C and within the pit boundaries. For an approximate 20 m length of the cutslope, a small arc shaped solifluction slump is creeping into the 1996 diversion channel. All of this area falls within the pit limits and will be excavated as part of mining operations.

Also notable is the channel performance associated with the bypassed flow path from the exploration road berm. This flow path crosses Reach C. Drainage flows from relatively low gradients of less than 2 percent to gradients of 3 to 6 percent. On flatter gradients, the channel has widened and water pools locally before the slope breaks to “3 plus” percent gradients. On the 3 to 6 percent slope gradients the artificial flow path has naturalized and formed a stable and vegetated channel. However, where the channel reaches a break to slightly flatter gradients, the flow disperses and becomes primarily ephemeral. Ground surface conditions where the channel disperses are saturated and wet to walk on during the short summer season.

3.5 DIVERSION TO REACH A

A water diversion structure is required to divert the Lake C1 stream outflow into Reach A of the C1 Diversion Channel (Figure 1) and to avoid seepage to the open pit. The proposed diversion structure lies down gradient of an approximate 3 m high bedrock controlled break in the channel bottom. There is an existing run-of-mine road and water line embankment (Carat Lake Road) and the temporary culvert at this location.

Photographs 12, 13 and 14 show the area of the proposed diversion structure. Although no borehole information exists in this area, there is considerable evidence of rock outcrop and subcrop. Fractured bedrock outcrops on both abutments and in portions of the base of the pool. Sand and gravel with trace to some silt mantles the slopes and possibly has filled a portion of the channel bottom. On July 21 the flow of water from C1 Lake outflow stream was partially impeded and pooled by the road embankment but not cutoff. The water level was below the invert elevation of the temporary culvert inlet and was flowing ephemerally from the pool through and/or underneath the road embankment.

3.6 HYDROLOGICAL AND HYDROGEOLOGICAL OBSERVATIONS

It is expected that the low gradient terrain and till deposits existing inside the boundaries of the planned open pit act as both surface and subsurface storage for runoff which combines with the C1 Lake outlet flows and eventually consolidates into to Reaches 3, 2 and 1 and into Carat Lake. The flow of water in Reaches 1, 2 and 3 is therefore directly influenced and naturally regulated by discharge from outflow from Lake C1 and the flat lying terrain upslope.

On July 21, much of the active layer was saturated, particularly in proximity to any surface waters and streams. In general, it is EBA's opinion from visually observing the patterns and relative volumes of flow, that the patterns of flow are determined by topography, the development of the active layer and soil permeability in the active layer. The restrictive layer below the streams and saturated ground conditions are either typically ice-rich sand and gravel or frozen sand and gravel with some silt. This type of flow pattern is common in permafrost and has been observed by the undersigned in other permafrost regions. Typically, as summer and fall seasons arrive, the surface water flows will reduce to become almost entirely ephemeral and in some areas will completely drain.

4.0 ASSESSMENT OF THE C1 DIVERSION

Drawings prepared by SRK in 2004 as part of the water license application with ditch cross-sections and profiles for a preliminary design are provided in Appendix D. A detailed alignment design was made with a 30 m setback from the proposed pit crest. The alignment was chosen to be compatible with the proposed mine plan and infrastructure.

Reach A has been integrated with the Carat Lake Fresh-Water Line Road and flows along the west side of the road embankment.

Reach B follows relatively well drained gently sloped terrain with little evidence to-date of widespread excess ice. Depth to bedrock in Reach B is approximately 3 m in the uppermost elevation of this reach and increases to about 10 m near the lowest elevation.

In Reach C, the probability of ice-rich permafrost is high and the soil cover is a thick blanket of glacial till. The possibility of ice-rich permafrost in Reach C coupled with the fact that slope gradients along the excavated channel profile of about 3 percent, make an excavated channel design and construction process across this terrain susceptible to settlement from permafrost thaw degradation as a result of surface water flow or once other site disturbance occurs.

Based on EBA's review of the existing site conditions and the available information, it is considered technically feasible to construct an excavated C1 Diversion Channel in general accordance with the license requirements. However, it is EBA's opinion that the detailed design would better satisfy all the requirements and provide protection of the ice-rich permafrost by constructing Reach C with a confining downstream fill embankment and only minor excavation for the low flow channel. The detail layout and discussion of the design criteria are provided in Section 5.0 of this report.

The creation of low gradient drainage on terrain near the crest of the future pit artificially introduces a potential seepage and permafrost degradation hazard which, unless mitigated, could influence the stability of the open pit wall.

In view of the serious consequence of pit wall instability as a safety issue, it is recommended by EBA to construct C1 Diversion at least 30 m from the crest of the open pit and provide an insulation cover of overburden and waste rock over the ice-rich tills between the C1 diversion channel and the pit to avoid permafrost degradation in that area.

5.0 EBA C1 DETAIL DESIGN

5.1 GUIDING CRITERIA

EBA has incorporated the following design criteria:

1) Provide a berm with a minimum 5 m wide running surface on the pit side of the at 30 m channel setback for Reach C;
2) Provide insulating waste mineral soil/rock cover between the channel and the pit to protect against permafrost degradation;
3) Construct Reach C outlet to blend with Stream C1 and so Reach C can be constructed with fish habitat enhancements (see Section 2.0);
4) Reduce the influence of permafrost degradation;
5) Avoid or minimize sediment transport;
6) Consider the use of vegetation to reduce erosion along the banks of the channel in Reach C;
7) Provide monitoring program during construction; and
8) Recommend implementation schedule for construction.

5.2 DIVERSION STRUCTURE DESIGN

The principal criteria requirement for the diversion structure is to redirect the Lake C1 outflow stream into the C1 diversion channel. EBA recommends that the diversion structure be constructed as a channel block using zoned fills that would facilitate the implementation of the widest possible range of additional cut-off measures, if persistent seepage bypass were to occur.

The design is a zoned fill blended into perennially frozen ground and geosynthetic lined channel system. Given the very low head of water retained by the structure, the nature of the block design is such that any seepage will be small and will progressively reduce as freezeback occurs. A plan and section view of the Diversion Block design is presented in EBA Drawing No. 110006006-02.

A heavy polypropylene geomembrane liner system is included with protective underlay and cover of heavy (16 oz) non woven fabric. The polypropylene liner system offers optimum flexibility and elasticity and therefore is most likely to accommodate deformations due to settlement of fill or thawed foundation soils. The non woven fabric would also act as a cushioning material for the polypropylene liner.

A seepage collection system has not been incorporated into design, as any seepage is expected to be minor and seepage flows would flow into the pit and be handled through the pit sump and pumping system.

5.3 CHANNEL DESIGN

EBA used the channel design cross-sections designed by SRK as part of the previous work. The channel dimensions are designed for discharging peak flows of 0.7 m^3/s to satisfy 1 in 200 year precipitation event. The 1 in 200 year event is applicable assuming that there is no credible threat to human life and no likelihood of catastrophic environmental damage. The design channel was designed to carry this volume with a freeboard of 0.3 m.

Bankfull dimensions at "low flows" are expected to be contained within a trapezoidal shaped channel that is 0.6 m wide at the base by 0.2 to 0.3 m deep. As a comparison, the 1999 Mean Wetted Channel Width was reported to be 1.15 to 2.0 m in Reaches 1 to 3 with maximum water depths of 0.15 m. Both the low-flow design section and the natural sections are capable of conveying a surface discharge of about 0.2 m^3/s. To put these discharge rates into perspective, SRK report that 1999, 2000 and 2001 measured flows in Stream C1 near the outlet of C1 lake were below 0.14 m^3/s at peak spring runoff and that following peak runoff the flows were less than 0.04 m^3/s.

EBA has revised the original cut channel design for Reach C to channel construction using fill embankment to confine peak flows with minor cuts required for enhanced fish habitat. Advantages and disadvantages of the fill construction for Reach C follow.

Advantages:

- Fill construction through Reach C is required to achieve channel invert gradients that will convey water to the lower natural reaches of Stream C1;
- For Reach C, where the possibility of excess ground ice is high, fill construction reduces the potential thaw degradation by optimizing the use of the existing freeze-thaw stable active layer;
- Fill construction provides better protection against seepage to the pit;

- Select fill construction can reduce permafrost degradation and, in fact, can aggrade permafrost and reduce the need and long-term reliance upon the geosynthetic liner associated with a trench cut construction, thereby making the C1 Diversion more sustainable for post closure use and more natural fish habitat;
- Reduces time-of construction site disturbance and the conditions for sediment control are more predictable; and
- Uses overburden and waste rock materials from the open pit development to cover and insulate the permafrost conditions as presently exist within those reaches influenced by the open pit.

Disadvantages are:

- Footprint width of the fill channel design and construction is wider than the trench cut design and must be so in order to satisfy the fish habitat enhancement requirements and provide protection to the pit; and
- The introduction of the channel development and C1 water near the pit crest in terrain with potential ice-rich permafrost presents a risk of water losses that could reach the pit and present a safety issue if not mitigated.

Drawing Nos. 1100060006-1(a, b & c) through -3 show the designed alignment and design sections. The design of Reach C is intended to simulate the natural flow regime. In other words, low channel flows in Reach C will only occur when the active layer in Reach C channel bottom is saturated and there is inflow from Lake C1 via Reach B. Under these conditions, surface water will flow in Reach C without the use of a geosynthetic liner. EBA has considered construction timing, site preparation, material types and berm configurations that if implemented will use to full advantage natural freezing to reduce the potential for loss of water to both the open pit and down gradient of the C1 Diversion.

Preservation of the permafrost between the open pit and the channel is of utmost importance. Failure to do so could result in seepage losses toward the future pit wall resulting in thermal degradation and possible pit wall instability. In order to avoid seepage losses, the upgradient and pit side embankment of the C1 Diversion is dimensioned with minimum 5 m wide running surface to permit heavy equipment traffic and to positively preserve and aggrade permafrost. Furthermore, an approximate 2 m insulating sand and gravel/rock cover will be used in the zone between Reach C and the pit crest in areas suspected to contain high levels of ground ice. Fills used for the embankment adjacent to the channel will be chosen selectively to provide low permeability when frozen to act as a natural liner/cutoff. Geothermal and hydrogeological considerations determine the berm dimensions and therefore the berm dimension will exceed those that would be required to control runoff if the channel was simply lined with a geosythetic liner.

Channel invert elevations have been chosen to maintain a positive natural gradient toward the outlet of the channel while also controlling water levels in the channel at elevations so that water does not flow toward the pit.

Unlike the a cut design for Reach C (see Section H-H on Drawing 1CT004.06-W-3, Appendix D) which suggests a sinusoidal 3 m wide channel bottom width with a low flow channel cut in the center, EBA has used a design with a channel base width of 12 m or greater with a sinusoidal low flow channel. The wide channel bottom has been chosen to provide sufficient area for the 6 m radius sinusoidal low-flow channel, to improve hydraulic design aspects, constructability and maintenance. A winding sinusoidal channel incorporating as much as possible of the natural terrain with intact vegetation, would also be more suitable as the fish habit enhancement.

The design of the north embankment configuration is controlled by the expected low flow water table and access with equipment. The embankment height is designed to aggrade permafrost to act as a natural barrier.

The fish habitat enhancement channel characteristics as described in Section 2.0 of this report have been incorporated. Pools have been included for energy dissipation in Reach B and start of Reach A. Flow across Reach C will be primarily in the sinusoidal channel excepting periods of peak runoff when flows exceed 0.2 m^3/s. During peak runoff, flows depths outside the sinusoidal cannel will be only 25 millimetres deep and dispersed enough to maintain vegetative cover and thereby avoid erosion.

In view of the geothermal and hydrogeological aspects involved, reproducing the low flow regime on terrain with possible ice-rich permafrost may take several years to reach equilibrium. Ongoing monitoring and maintenance will be integral to the success of the design.

6.0 CONSTRUCTION PLAN AND SCHEDULE

6.1 CONSTRUCTION

EBA has prepared the following construction guidelines to reduce sediment transport, site degradation and facilitate potential fish passage into Reach C during periods of adequate water flow.

Construction will include the following 2005/2006 activities:

1) Construction of Reach A located in bedrock and the installation of the Carat Lake road culvert crossing will be done August-September 2005 to accommodate the fresh water line construction.

2) Construction of the C1 Diversion Structure will take place in October-November 2005 once water flows have ceased and the ground is adequately frozen.

3) Construction of energy dissipation step pools in Reach B and start of Reach A are best carried out in 2005 and winter 2006 when there is frozen ground conditions and snow cover so that snow can be used to pad excavation equipment over the vegetated ground surface.

4) Site preparation along the footprint of the north and south confinement berms which also serves as a vehicle access from Carat Lake Road to Stream C1 should be carried out in late fall 2005. This would allow stripping of the organics, removal of boulders and removal of any open work gravels, cobbles near ground surface that act as conduits for water beneath the proposed berms. Placement of the initial lifts of sand and gravel fill (till borrow) at the base of the berms should also be placed and compacted to about 1 m above existing grade.

5) Construction of remainder of the sand and gravel fill berms with armour protection should be carried out during January or February and when the prepared subgrade grade has frozen to a depth of at least 1 m.

6) Excavation of the sinusoidal fish channel and channel armouring within Reach C should be carried out during frozen ground conditions and when there is adequate snow cover so that snow can be used to pad excavation equipment over the vegetated ground surface without destroying vegetation and supporting organic cover;

7) Adjustments of cobbles and boulders to improve habitat may be ongoing. Some of this might be handwork while other work may require frozen ground and snow cover for equipment access.

Reach B Energy Dissipation Pools

EBA Drawing Nos. 1100060006-2 and-3 show the design for the energy dissipation pools at the outlet of the Carat Lake Road Culvert Crossing. Fish habitat enhancement features are incorporated downstream from this point. Upstream of the proposed culvert and diversion structure is a natural fish impasse in the C1 Stream.

The culvert will be a corrugated steel pipe with 36 inch (900 mm) diameter. The invert gradient will not exceed 1 percent and the culvert length will not exceed 30 m in length. The Carat Lake Road culvert crossing will receive and pass the calculated 1:200 year flow event of 0.7 m^3/s

Culvert invert elevation at the culvert outlet will be at Elevation 484.6 m.

6.2 REACH C DETAIL CONSTRUCTION

The trough shaped low-flow channel that will be used for fish habitat enhancement structures should be constructed during frozen ground conditions. Detailed fieldwork will utilize the natural vegetation base in the Reach C where possible.

Other detail work would include the installation of silt curtain barriers along Reach A, B and C to trap sediment caused by the construction process once the water starts flowing in the 2006 freshet.

Predicting the pattern of thaw settlement is difficult and, therefore, it is judged that Reach C of the Diversion may require in-channel work for from time to time until hydrogeological and thermal equilibrium are reached. This work could include rearmouring of berms, placement of boulders in the streambed, etc. and will be carried out under the direction of habitat biologist during the summer of 2006.

6.3 MONITORING

A geotechnical engineer will assess the prepared subgrades and material to be used for construction. Prior to commencement of flows from Lake C1, silt curtain barriers will be installed throughout the channel sections in Reaches A, B and C to promote settling of fines created from the construction process. It is recommended that silt curtains be installed every 50 meters or so and near the culvert outlet.

The diversion structure construction will be monitored by a geotechnical engineer and be subject to regular inspections by operations personnel as well as the annual inspection by a qualified dam engineer in conjunction with annual site inspection.

Monitoring of the fish habitat enhancement features will be done seasonally by qualified aquatic biologists.

7.0 CLOSURE

The recommendations provided herein are based on our review of the information described in Section 2.0. It is recommended that site preparation and observation of the fill placement for the embankments be monitored by qualified personnel under the direction of a geotechnical engineer. Quality control of the liner materials and installation should undertaken by liner specialists. Time of construction changes which may or may not be required to field-fit the design should be approved by a qualified geotechnical engineer.

This letter report has been prepared in accordance with generally accepted geotechnical engineering practices. No other warranty is made, either express or implied. Reference should be made to EBA's Geotechnical General Conditions, attached to this letter report, for further limitations.

EBA trusts that this report satisfies your present requirements. If you require any additional information please contact us.

Respectfully submitted,
EBA Engineering Consultants Ltd.

Reviewed by:

Aug 30/05
M.D. WATSON
LICENSEE

W.T. HORNE
LICENSEE
Aug 30/05

Mark Watson, P. Eng
Senior Geotechnical Engineer
Arctic Practice
Direct Line: 780.451.2130 x277
mwatson@eba.ca

Bill Horne, P. Eng.
Senior Project Engineer
Circumpolar Region
Direct Line: 780 451.2130 x276
bhorne@eba.ca

MDW:ln

THE ASSOCIATION OF
PROFESSIONAL ENGINEERS,
GEOLOGISTS and GEOPHYSICISTS
OF THE NORTHWEST TERRITORIES
05/08/30
PERMIT NUMBER
P 018
EBA ENGINEERING
CONSULTANTS LTD.

Enclosures: Figure 1
Photographs
Appendices A to F

FIGURE

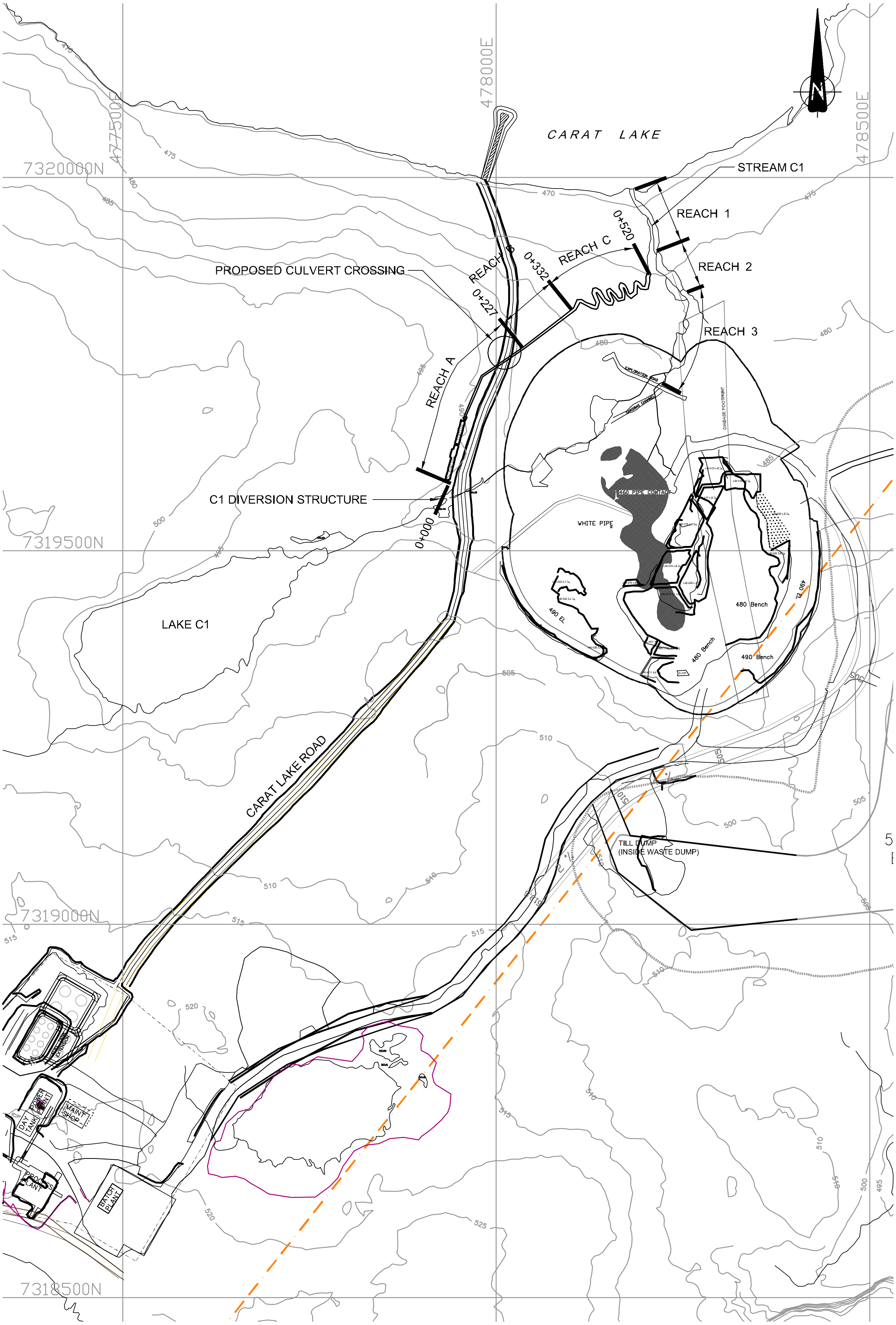


Figure 1

General Site Plan

1100060006R04B.dwg

PHOTOGRAPHS

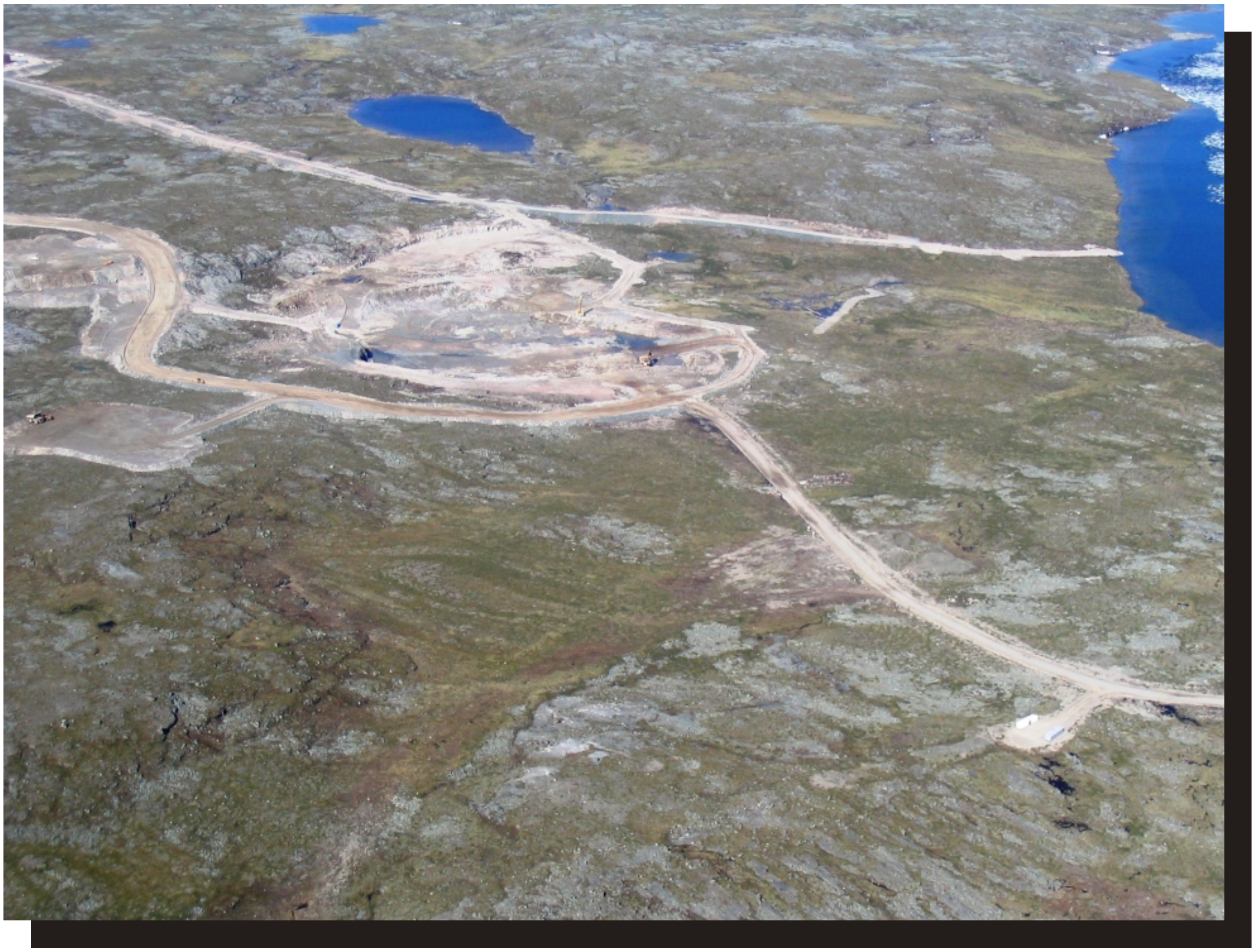


Photo 1
Aerial view looking west at pit and C1 Lake drainage system July 6, 2005

Photo 2
Looking north toward Carat Lake from C1 Stream. View of lower reach of C1 Stream on July 21st, 2005

Photo 3
Looking south from C1 Stream. View of typical Reach 2 section

Photo 4
Typical step in channel in Reach 2 during low flow

Photo 5
"Dry" C1 Stream channel bed. C1 Stream consists of multiple channels

Photo 6
Looking west from Reach C. Extensive rock outcrop upslope of Carat Lake Road is visible and is typical of Reach A. Stakes with blue ribbon mark a 30m setback from the pit boundary

Photo 7
Looking downslope from Carat Lake Road in northeast direction. Stakes are in terrain that is typical of Reach B down-gradient of the proposed culvert crossing. Toe of road fillis in foreground.

Photo 8
In pit view of 1996 exploration diverted flow - looking south

Photo 9
Looking southwest from proposed Reach C area. Outflow from 1996 exploration diversion flows across Reach C. Channel has naturalized.

Photo 10
View of naturalized channel shown in Photograph 3

Photo 11
Looking in the north direction from downgradient of Reach C. Outflow from 1996 exploration diversion becomes more dispersed

Photo 12
Panorama of Lake C1 outflow looking west from Carat Lake Road (July 21, 2005)

Photo 13
Looking north along alignment of proposed diversion structure key trench (June 28, 2005).
Temporary culvert is to be removed.

APPENDIX

APPENDIX A

C1 CHANNEL DESCRIPTION EXCERPT FROM JERICHO DIAMOND PROJECT AQUATICS STUDIES PROGRAM (1999) PROVIDED BY MAINSTREAM AQUATICS LTD. (FORMERLY R. L.& L ENVIRONMENTAL SERVICES LTD.)

JERICHO DIAMOND PROJECT
AQUATIC STUDIES PROGRAM (1999)

Prepared for

TAHERA CORPORATION
1408 Crown Street
North Vancouver, British Columbia
V7J 1G5

Prepared by

R.L. & L. ENVIRONMENTAL SERVICES LTD.
17312 - 106 Avenue
Edmonton, Alberta
T5S 1H9
Phone: (780) 483-3499

March 2000

Suggested Citation: R.L. & L. Environmental Services Ltd. 1999. Jericho Diamond Project Aquatic Studies Program (1999). Report prepared for Tahera Corporation. R.L. & L. Report No. 738F: 93 p. + 5 app.

ACKNOWLEDGEMENTS

The authors would like to thank Mr. Bruce Ott, Environmental Manager of Tahera Corporation for providing information and guidance during the study. The assistance provided by Mr. Mike Johnson is also gratefully acknowledged. Special thanks go to Michelle Tanguay and Heather Murdock of Tahera Corporation for their hard, conscientious work during the field programs.

Timely assistance provided by Mr. Scott Wytrychowski of Kitikmeot Geosciences Ltd. is also appreciated. Jeff Maurice (Scientific Licences for Department of Fisheries and Oceans) provided the necessary collection permit required to complete this project.

Phytoplankton, chlorophyll *a*, and stream periphyton samples were identified by David Beliveau of Bio-Aquatics Research and Consulting Ltd. and zooplankton samples were identified by Mariola Jankowicz of the University of Alberta.

Detailed quantification of stream characteristics was undertaken by Mike Miles and Shane Moore of M. Miles and Associates Ltd. Their hard work and diligence allowed accurate assessments of stream conditions. Sincere thanks goes to both individuals for their efforts in the field and office. We also appreciate the use of photographs provided by M. Miles and Associates Ltd.

The following R.L. & L. Environmental Services Ltd. personnel participated in this program:

Richard Pattenden - Project Manager and Principal Author
Alison Little - Fisheries Biologist, Field Crew Leader and coauthor
Chantal Pattenden - Biological Technician and Field Crew Leader
Gordon Latham - Biological Technician
Rob Stack - Biological Technician
Mike Braeuer - Biological Technician

4.2 FISH HABITAT

Quantification of fish habitat during the 1999 aquatic studies program first required synoptic surveys of waterbodies to establish their potential value as fish habitat. This involved fish sampling and inventory level assessment of physical characteristics and habitat types. Results of the synoptic surveys indicated that several waterbodies had limited or no potential as fish habitat (see Section 3.4), which was substantiated by the absence or low numbers of fish (see Section 3.3). Waterbodies with limited or no potential as fish habitat included Lakes C2 and D10, and Streams C3 and C19. The remaining waterbodies (Lake C1 and Stream C1) contained habitat that was sufficient to support fish populations. Lake C1 contains only small resident populations of lake trout and of slimy sculpin. These populations are isolated from others in the Carat Lake watershed, due to a barrier on Stream C1 (see following section). As such, these fish populations are self-sustaining and do not rely on stock replenishment from Carat Lake. Due to its small size, simple physical characteristics, and isolation from the remainder of the Carat Lake watershed, detailed habitat surveys of Lake C1 were not undertaken. General characteristics of the lake are summarized in Section 3.1.

Based on these findings, detailed surveys of fish habitat were restricted to Stream C1. The following section provides summary data that describes the characteristics of the stream, including its longitudinal profile, unique features, physical characteristics, and quantification of habitat types.

4.2.1 Physical Characteristics of Stream C1

Stream C1 originates as the outlet to Lake C1 and flows a distance of 1031 m before draining into Carat Lake (Figure 4.3; Plate 4.1). Stream C1 is a complex system that has been modified by exploration activity in the Jericho Diamond Project Area. Its major features include a natural barrier to fish passage (5.3 m in height) that is located 815 m upstream from Carat Lake (Plate 4.2) and a large impounded area (351 m from confluence) that was formed by a berm constructed during the winter of 1995-96 (Plate 4.3). This berm was built to contain drilling fluids that were produced during exploration activity (Canamera Geological Ltd., unpublished data). The impoundment inundated a portion of the existing channel and diverted part of the stream discharge to the west (Plate 4.4). This diverted water flows over the tundra and rejoins Stream C1 near its confluence with Carat Lake.

Stream C1 can be differentiated into 10 reaches based on changes in gradient and physical characteristics (Figures 4.3 and 4.4, and Table 4.3). Reach 10 (closest to Lake C1) is the longest reach (200 m), whereas Reach 9 is the shortest (16 m). Reaches 1, 2, 7, and part of 5 exhibit relatively high gradients (2.7 to 7.1 m/100 m). Reach 9 exhibits the highest gradient, with an elevation gain of 5.3 m over a distance of 16 m (33.1 m/100 m). This section is impassible to fish. Reaches 3, 4, 6, 8, and 10 have very low gradients (≤5 m/100 m) and are generally dominated by areas of ponded water. The physical characteristics of each reach are influenced by these major features.

Reaches with higher gradients exhibited narrower widths and had flowing water; the low gradient reaches exhibited dispersed areas of ponded water with trace flow. The majority of the reaches had well-defined channel embankments; the only exception was the impoundment (Reach 4). Substrate types in most reaches were dominated by cobble and boulder substrates. Exceptions were Reaches 4 and 6, which contained a preponderance of organic substrates. Gravel substrates were not abundant in Stream C1, but were widely distributed. Silt and sand substrates were rarely encountered; however, they were most evident in Reaches 5 and 8. Anecdotal information during field surveys indicated that the sand recorded in Reach 5 originated from sand bags that had been placed in this stream section (Figure 4.3).

4.2.2 Habitat Types in Stream C1

Habitat types present in Reaches 1 to 8 were quantified to assess their importance to fish. The work was restricted to these reaches because they represented the section of Stream C1 that was accessible to fish populations originating from Carat Lake.

The habitat types present were dictated by the physical features of each reach (Table 4.4). In general, RIFFLE and/or RUN type habitats dominated. In high gradient sections, their combined values exceeded 75% in terms of surface area and frequency of occurrence. In lower gradient reaches, FLAT and DISPERSED habitat types were more prevalent. This was particularly evident in Reach 8.

In terms of the area of habitat that was potentially available to fish, the impounded area (Reach 4) contained the greatest amount (5842 m^2). All other reaches contained less than 1000 m^2. The combined area of habitat available to fish below the impounded section in July 1999 was 1117 m^2 (Reaches 1 to 3), compared to 2126 m^2 upstream of the impoundment (Reaches 5 to 8). Habitat complexity (frequency of occurrence) was highest in Reach 1 (31 habitat units). Overall, habitat complexity was higher downstream compared to upstream of the impounded area (62 versus 17 habitat units, respectively).

These data indicated that potential fish habitat was available to fish in Reaches 1 to 8. The area of habitat above the impoundment was twice that of the downstream section, although, Reaches 1 to 3 were more complex than sections farther upstream.

Construction of a berm across the drainage path of Stream C1 resulted in the formation of an impounded area upstream of the berm and diversion of part of the stream flow to the west. The impoundment inundated an unknown amount of existing fish habitat, but the inundated area was still suitable for fish use. In contrast, the diversion of stream flow may have reduced the amount of fish habitat in the original stream channel downstream from the point of diversion.

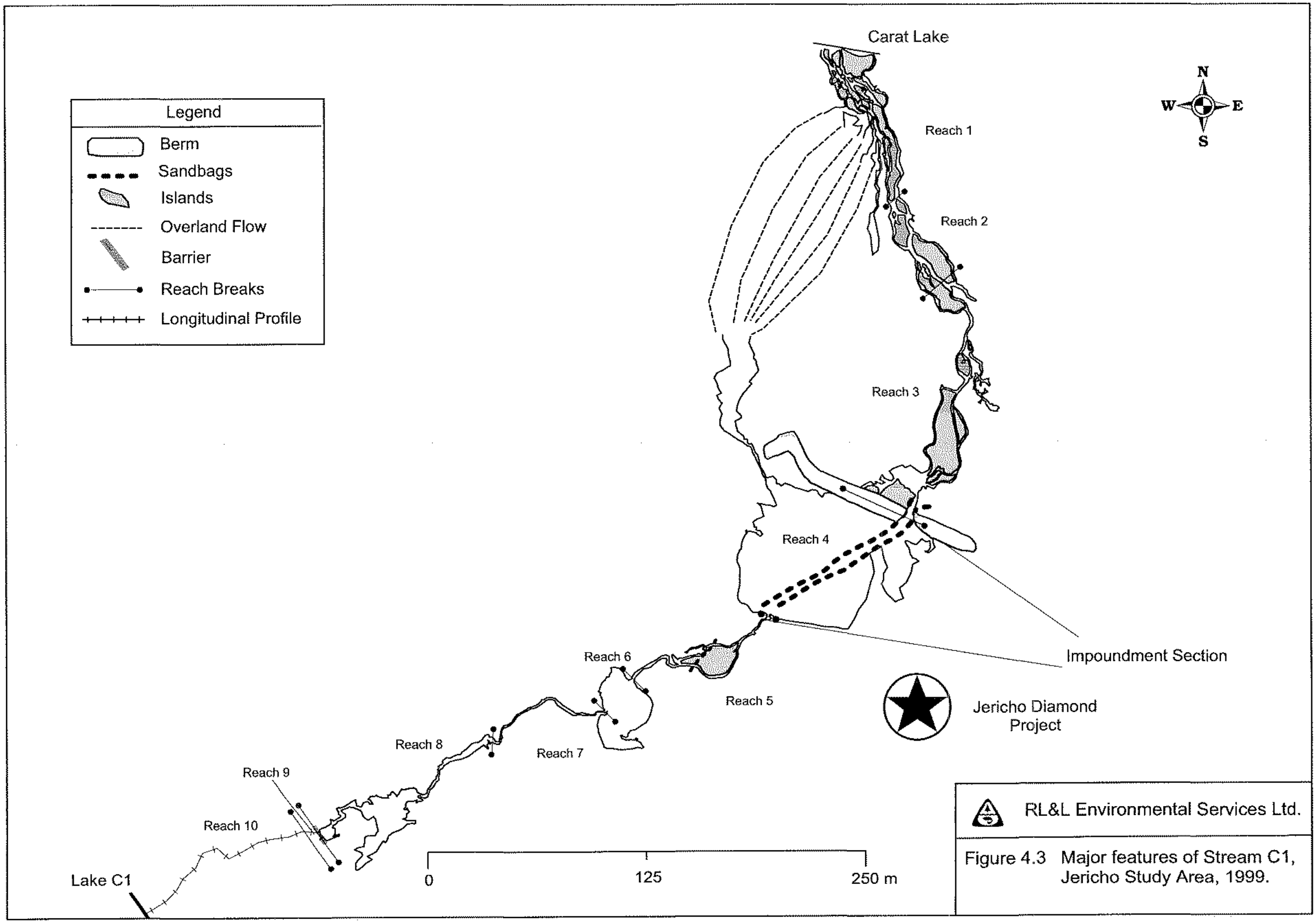


Figure 4.3 Major features of Stream C1, Jericho Study Area, 1999.

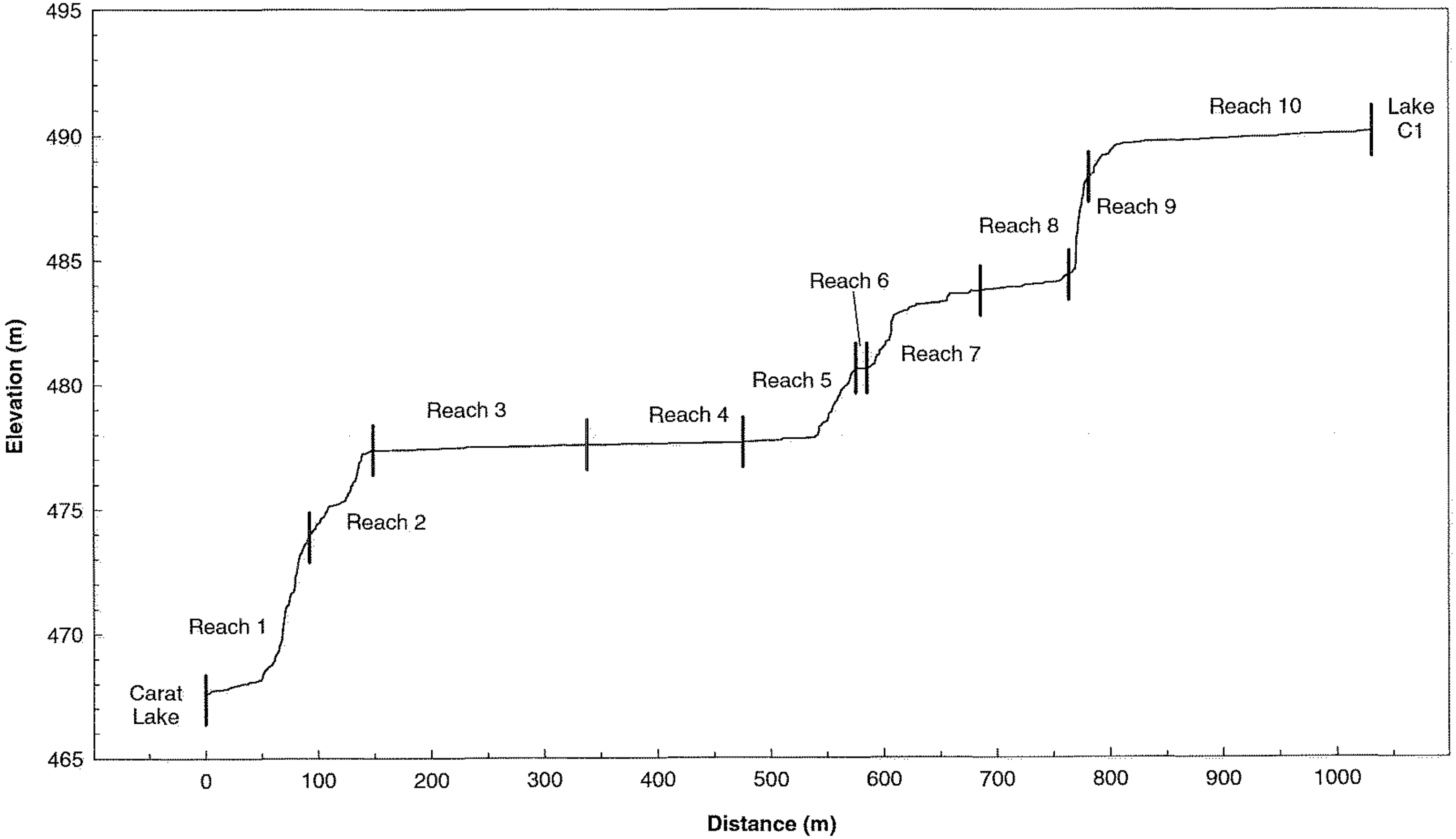


Figure 4.4 Gradient profile for Stream C1, Jericho Study Area, 1999.

Table 4.3 Summary of stream characteristics in reaches of Stream C1 in the Jericho Study Area, 1999.

Reach	Gradient (m/km)	Length (m)	Sample Size	Mean Wetted Width (m)	Mean Depth (m)		Mean Velocity (m^3/s)	Mean Percent Channel Type			Mean Percent Bank Type		Substrate Type[a] (%)					
					Average	Max		Single	Multiple	Dispersed	Defined	Ill-Defined	Om	Si/Sa	Gr/Pe	Co	Bo	Be
1	7.1	92	9	1.25	0.08	0.15	0.1		89	11	100		2	1	5	66	27	
2	5.0	70	5	2.03	0.08	0.11	0.13		100		100				5	42	53	
3	0.1	177	9	1.15	0.08	0.12	0.09		100		89	11	9		9	71	11	
4	0.2	134	6		0.28													
5	2.7	102	9	0.84	0.08	0.11	0.16	100			100			8	10	47	36	
6	0.1	24	1			0.67							100					
7	3.8	82	5	1.04	0.13	0.16	0.28	100			100		16	2	12	36	34	
8	0.5	134	6	4.57	0.18	0.24	0.09		67	33	67	33	2	27	12	5	48	3
9	33.1	16	ns[b]															
10	0.2	200	ns															

[a] See Appendix A3 for definitions.

[b] Not sampled.

Table 4.4 Summary of habitat types (area and occurrence) in reaches of Stream C1 in the Jericho Study Area, 1999.

Reach	Group	Coverage (m^2)		Frequency	
		Area	Percent	Number	Percent
1	Flat	43	12.1	4	12.9
	Pool	2	0.6	1	3.2
	Riffle	173	48.9	14	45.2
	Run	136	38.4	12	38.7
	Subtotal	**354**	**100**	**31**	**100**
2	Flat	4	2	1	11.1
	Pool				
	Riffle	154	76.2	6	66.7
	Run	44	21.8	2	22.2
	Subtotal	**202**	**100**	**9**	**100**
3	Dispersed	305	54.4	1	4.5
	Flat				
	Pool				
	Riffle	169	30.1	11	50
	Run	87	15.5	10	45.5
	Subtotal	**561**	**100**	**22**	**100**
4	Impounded	**5842**	**100**	**1**	**100**
5	Flat				
	Pool	17	12	1	20
	Riffle	107	75.4	3	60
	Run	18	12.7	1	20
	Subtotal	**142**	**100**	**5**	**100**
6	Pond	**971**	**100**	**1**	**100**
7	Flat				
	Pool	4	4.5	1	20
	Riffle	76	85.4	3	60
	Run	9	10.1	1	20
	Subtotal	**89**	**100**	**5**	**100**
8	Boulder Garden	113	12.2	1	16.7
	Dispersed	676	73.2	1	16.7
	Flat	93	10.1	2	33.3
	Pool	0	0	0	0
	Riffle	42	4.5	2	33.3
	Run	0	0	0	0
	Subtotal	**924**	**100**	**6**	**100**

To ascertain whether this diversion affected fish habitat availability, discharge in the original stream channel was compared to that in the diverted channel (Table 4.5). During June 1999, the proportion of water diverted away from the original channel was substantial. Based on five measurements, the average discharge in the original channel was 0.012 m^3/s compared to 0.062 m^3/s in the diversion. This represented a difference of 0.050 m^3/s or a reduction in flow of 67%. It should be noted that these values are not precise estimates of stream discharge in each channel, but instead, should be used to ascertain the relative differences in discharge.

Table 4.5 Comparison of discharge in two channels of Stream C1 during spring in the Jericho Study Area, 1999.

Date	Discharge (m^3/s)		Difference	
	Original Channel	Diversion	Discharge (m^3/s)	Percent
June 4	0.007	0.037	-0.030	-68.2
June 5	0.01	0.056	-0.046	-69.7
June 7	0.011	0.059	-0.048	-68.6
June 9	0.018	0.085	-0.067	-65.0
June 14	0.015	0.073	-0.058	-65.9
Average	**0.012**	**0.062**	**-0.050**	**-67.1**

Based on these findings, it can be assumed that the amount of fish habitat provided by Stream C1 has been reduced by the diversion of water away from the original channel. Due to the lack of data collected prior to construction of the berm, it is not possible to quantify the magnitude of this reduction.

4.2.3 Summary

Stream C1 is a complex system that has been modified by exploration activity in the Jericho Diamond Project Area. It contains 10 reaches, which exhibit variable physical characteristics. Reaches with high gradients (2.7 to 7.1 m/100 m) exhibited narrower widths with flowing water; the low gradient reaches exhibited dispersed areas of ponded water with trace flows. Reach 9 is a barrier to fish passage; it exhibits an elevation gain of 5.3 m over a distance of 16 m (33.1 m/100 m). Substrate types in most reaches were dominated by cobble and boulder substrates, except in the ponded areas; gravel substrate was widely distributed, but were not abundant. High gradient sections were typically RIFFLE and/or RUN type habitats, whereas low gradient sections were primarily FLAT and DISPERSED type habitats. Although there was a larger area of potential fish habitat upstream of the impoundment, the downstream sections had a higher habitat complexity. The presence of the berm across Stream C1 has reduced stream flows in the original channel by approximately 67%.

4.3 TROPHIC STATUS

In general, waterbodies in the subarctic are considered to be oligotrophic. Oligotrophic waterbodies are characterized by a low rate of primary production due to low nutrient levels. These characteristics in turn, limit the productive potential of fish communities that reside in these waterbodies. The following section summarizes information that categorizes the trophic status of selected waterbodies in the Jericho Study Area. Parameters investigated included nutrient levels, biomass indices of primary producers, and an assessment of the potential for fish production.

4.3.1 Nutrient Concentrations

At most sites, water samples for nutrient analyses were collected on 26 July 1999. The only exception occurred at the two sites on Stream C1, which were collected on 6 September 1999. Nutrient concentrations were low in all

APPENDIX

APPENDIX B

BOREHOLE LOGS FROM 2003 SRK TECHNICAL MEMORANDUM A SUPPLEMENTAL GEOTECHNICAL DATA.

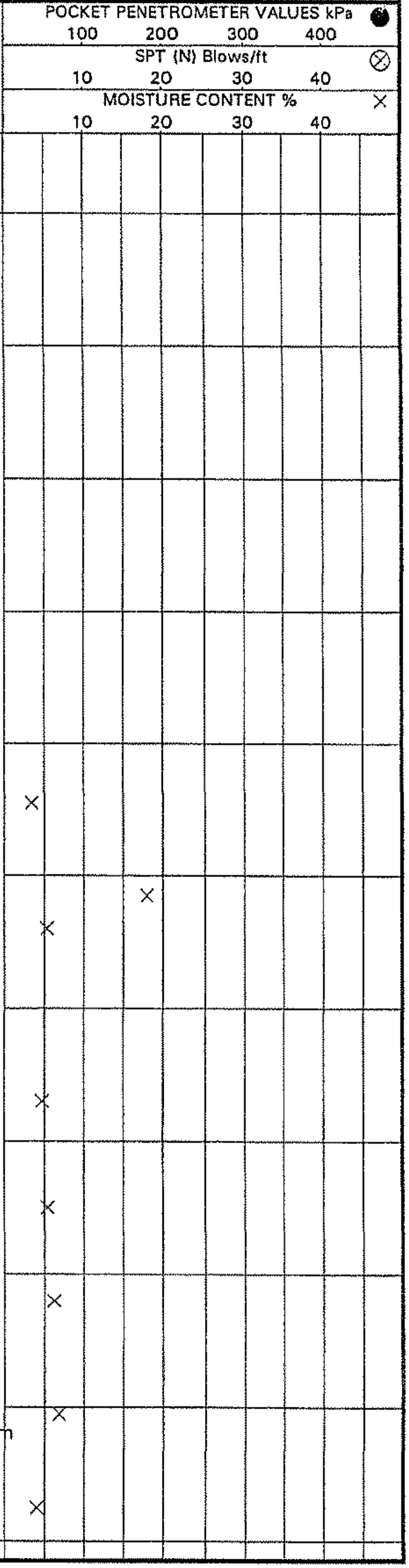
DRILL HOLE96-BGC-11

Page 1 of 2
Project No. 0081-001-05

Date Drilled: 6 AUG 96	LOCATION: OPEN PIT
Rig: HT-700	ELEVATION: 480.60
Contractor: FOUNDEX	CO-ORD: E 478,119 N 7,319,750
Hammer Type: JERICHO-CORE	SOIL DESCRIPTION

NOTES: - All gradation descriptions are field estimates

Depth (m)	Sample Type Recovery & Number	Blows/0.15m	Symbols	SOIL DESCRIPTION	INSTRUMENT INSTALLATION / ICE Thermistor temp. bead location / ICE
0				SAND & GRAVEL (SW), coarse, cobbles to 12", dry, well graded, lt. beige 1.5m easy drilling granular core washed away	0-2.5m Unfrozen 2.5m-4.3m Nbf
4	1			SAND (SP), (TILL), some silt, assorted sub-angular cobbles to 12cm, 35% matrix, well graded, grey	4.3m-5.0m Nbe, Vs to 1cm
5	2			ICE, trace silt, massive	5.0m-5.3m (Excess water drained during shipping)
	3 4 5 6 7 8			SAND (SP-SW), (TILL), some silt, assorted cobbles, sub-angular to 15cm (75%), silt & sand well graded grey matrix (25%)	5.0m-5.3m Ice: Massive 5.3m-5.6m Nbe, Vs 5.6m-6.0m Nbe, Vr 6.0m-9.1m Nbn, trace Vr 9.1m-10.66m Nbn
10					



DHL-CA 0811B 7 NOV 96

BGC
BRUCE GEOTECHNICAL CONSULTANTS INC.
AN APPLIED EARTH SCIENCES COMPANY

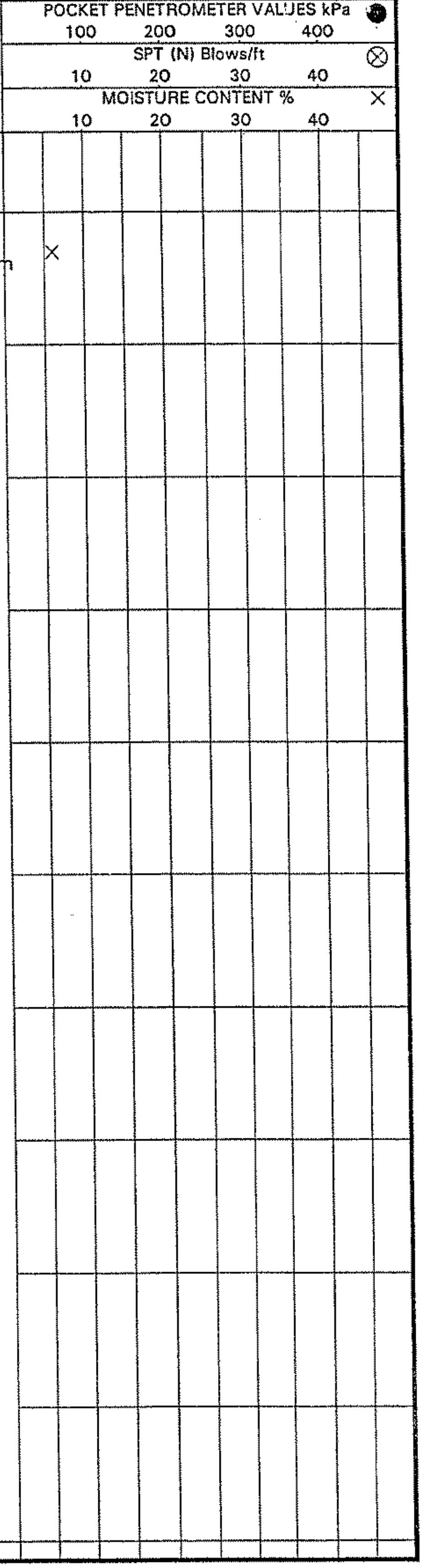
JERICHO DIAMOND PROJECT
1996 OVERBURDEN GEOTECHNICAL
SITE INVESTIGATIONS

DRILL HOLE96-BGC-11

Project No. 0081-001-05

Date Drilled: 6 AUG 96	LOCATION: OPEN PIT
Rig: HT-700	ELEVATION: 480.60
Contractor: FOUNDEX	CO-ORD: E 478,119 N 7,319,750
Hammer Type: JERICHO-CORE	SOIL DESCRIPTION

Depth (m)	Sample Type Recovery & Number	Blows/0.15m	Symbols	SOIL DESCRIPTION	INSTRUMENT INSTALLATION / ICE
				NOTES: - All gradation descriptions are field estimates	
10	9				
				GRANITE (BEDROCK)	9.1m-10.66m Nbn
				END OF HOLE AT 10.66m	
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					



BRUCE GEOTECHNICAL CONSULTANTS INC.
AN APPLIED EARTH SCIENCES COMPANY

JERICHO DIAMOND PROJECT
1996 OVERBURDEN GEOTECHNICAL
SITE INVESTIGATIONS

Page 1 of 1

Project No. 0081-001-05

DRILL HOLE96-BGC-12

Date Drilled: 7 AUG 96	LOCATION: JERICHO-OPEN PIT
Rig: HT-700	ELEVATION: 479.60
Contractor: FOUNDEX	CO-ORD: E 478,205 N 7,319,656
Hammer Type: CORE	SOIL DESCRIPTION

Depth (m) | Sample Type Recovery & Number | Blows/0.15m | Symbols

INSTRUMENT INSTALLATION / ICE

POCKET PENETROMETER VALUES kPa ● 100 200 300 400

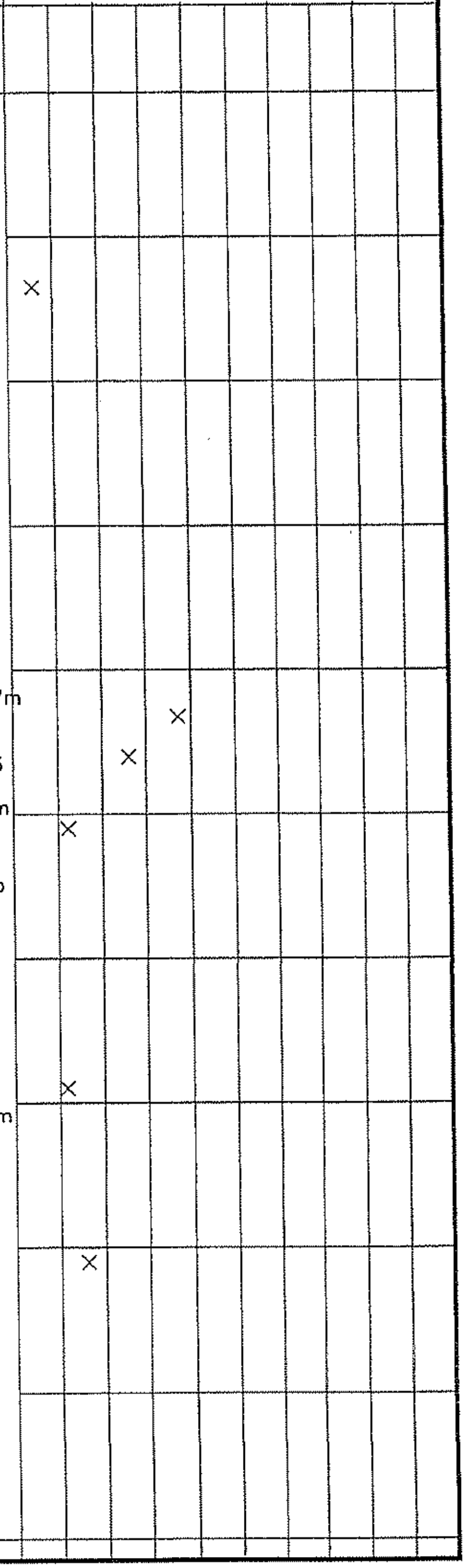
SPT (N) Blows/ft ⊗ 10 20 30 40

MOISTURE CONTENT % × 10 20 30 40

NOTES: - All gradation descriptions are field estimates

Thermistor temp. bead location / ICE

Sample	Soil Description	Ice
	SAND & GRAVEL (SW), trace silt, well graded, grey	0.0m-4.11m Unfrozen
1		
	2.98m slow drilling, matrix washed away, loose rocks concentrated at bit	
2	SAND (SP), few stones to 1.5", clean medium coarse some very fine sand interbeds to 1cm, no excess water when thawed	4.11m-4.57m Nbn
3	SILT (ML-SM), some sand, some fine gravel 1 stone to 2" well graded, wet	4.57m-4.65 Nbe, Vs
4		4.65m-5.9m Nbe, Vr Vs lenses to 1mm
		5.9m-7.0m Nbn
5	SAND & GRAVEL (SW), some silt, well graded stones to 4"	7.0m-8.38m Nbn trace Vc
6	8.0m large cobbles 15% of run up to 4"	
	END OF HOLE AT 8.38m	



DHL-CA 0811B 7 NOV 96

BGC BRUCE GEOTECHNICAL CONSULTANTS INC.
AN APPLIED EARTH SCIENCES COMPANY

JERICHO DIAMOND PROJECT
1996 OVERBURDEN GEOTECHNICAL SITE INVESTIGATIONS

Page 1 of 1
Project No. 0081-001-05

DRILL HOLE96-BGC-13

Date Drilled: 9 AUG 96
Rig: HT-700
Contractor: FOUNDEX
Hammer Type: CORE/REFRIG

LOCATION: JERICHO-OPEN PIT
ELEVATION: 478.70
CO-ORD: E 478,301 N 7,319,770

Depth (m) | Sample Type Recovery & Number | Blows/0.15m | Symbols

SOIL DESCRIPTION

NOTES: - All gradation descriptions are field estimates

INSTRUMENT INSTALLATION / ICE

Thermistor temp. bead location / ICE

Depth (m)	Sample Number	Soil Description
0	1	SAND (SP), trace silt, trace gravel to 1cm, very fine, moderately graded, light brown
1.4	2 3	SAND & SILT (SP), (TILL), some silt, 25% matrix, 75% assorted cobbles/boulders to 15cm+, sub-angular, well graded
4		GRANITE (BEDROCK)
5.05		END OF HOLE AT 5.05m

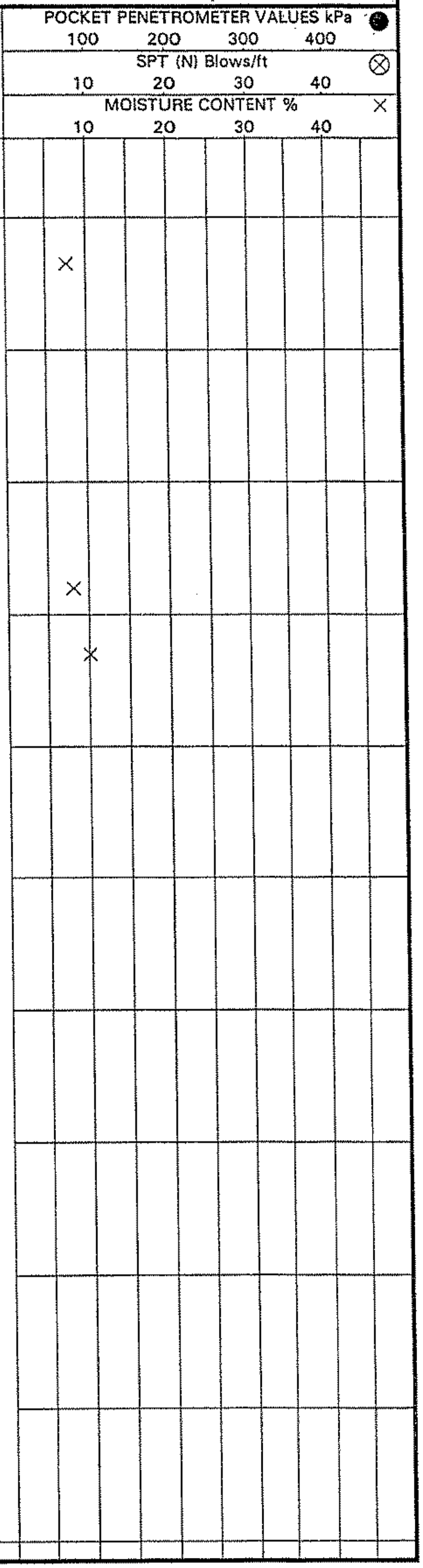
0.0m-1.0m Unfrozen

1.0m-1.4m Nbn

1.4m-3.0m Nbe, Vc to 1mm, Vr

3.0m-4.0m Nbn trace Vc

4.0m-5.0m No ice in fractures



DHL-CA 0811B 7 NOV 96

BGC **BRUCE GEOTECHNICAL CONSULTANTS INC.**
AN APPLIED EARTH SCIENCES COMPANY

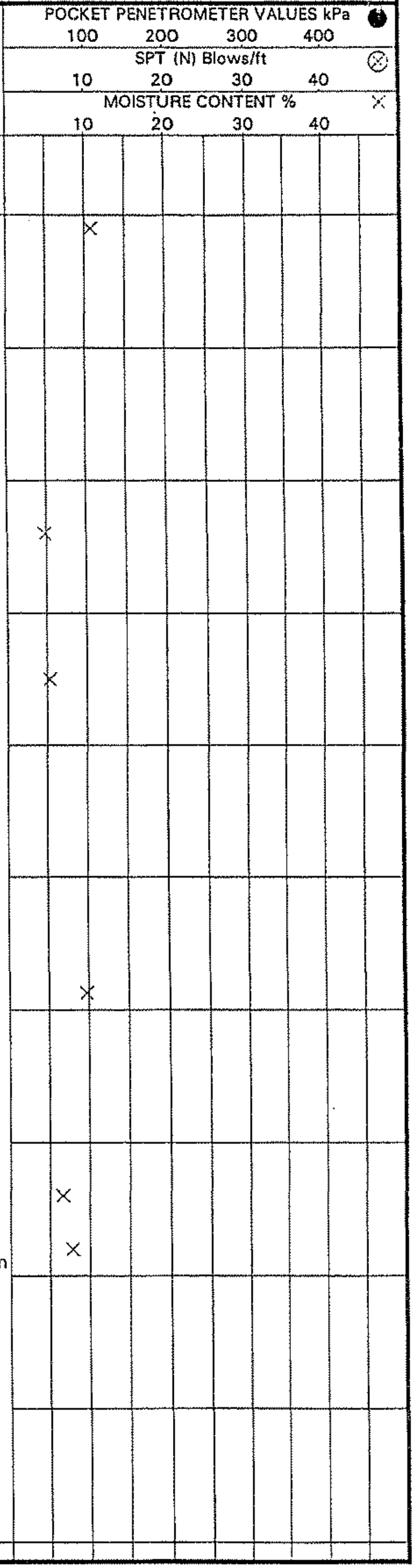
JERICHO DIAMOND PROJECT
1996 OVERBURDEN GEOTECHNICAL
SITE INVESTIGATIONS

DRILL HOLE96-BGC-14

Project No. 0031-001-05

Date Drilled: 11 AUG 96	LOCATION: JERICHO-OPEN PIT
Rig: HT-700	ELEVATION: 473.40
Contractor: FOUNDEX	CO-ORD: E 478,116 N 7,319,899
Hammer Type: CORE/REFRIG	SOIL DESCRIPTION

Depth (m)	Sample Type Recovery & Number	Blows/0.15m	Symbols	SOIL DESCRIPTION	INSTRUMENT INSTALLATION / ICE
				NOTES: - All gradation descriptions are field estimates	Thermistor temp. bead location / ICE
0	1			SAND (SP), (TILL), gravelly, some silt,assorted sub-angular cobbles to 15cm+, few boulders, matrix 60%, well graded, wet when thawed	Unfrozen
1					1.0m-7.8m Nbe Vs to 3mm trace Vr, Vc
2	2				
3	3				
6	4				
7	5				
8	6			7.8m trace clay lenses	7.8m-9.14m Nbe trace Vc, Vr
9				END OF HOLE AT 9.14m	



DHL-CA 0811B 7 NOV 96

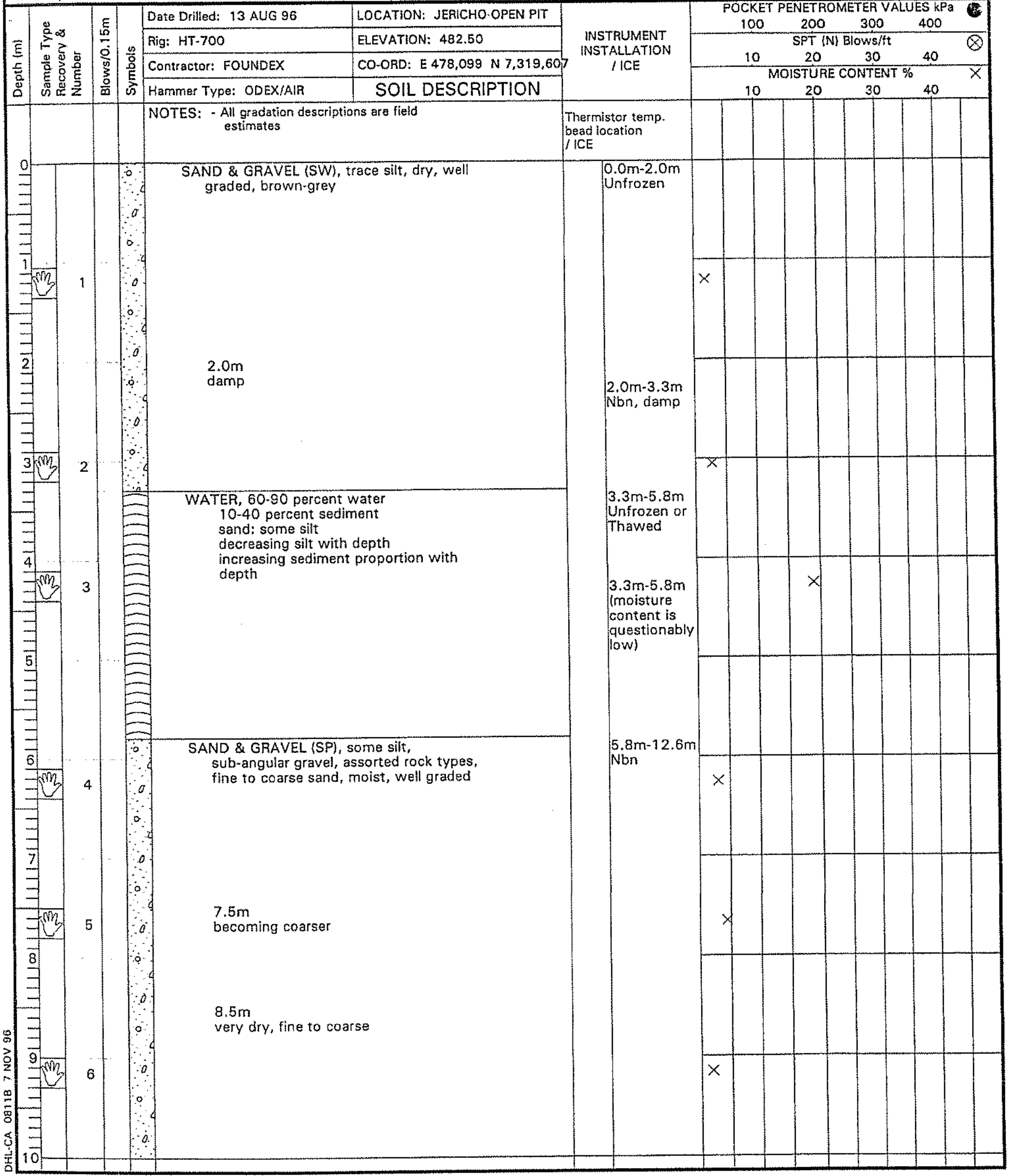
BGC BRUCE GEOTECHNICAL CONSULTANTS INC.
AN APPLIED EARTH SCIENCES COMPANY

JERICHO DIAMOND PROJECT
1996 OVERBURDEN GEOTECHNICAL
SITE INVESTIGATIONS

DRILL HOLE96-BGC-16

Date Drilled: 13 AUG 96	LOCATION: JERICHO OPEN PIT
Rig: HT-700	ELEVATION: 482.50
Contractor: FOUNDEX	CO-ORD: E 478,099 N 7,319,607
Hammer Type: ODEX/AIR	SOIL DESCRIPTION

NOTES: - All gradation descriptions are field estimates



Sample	Soil Description	Instrument Installation / ICE
1 2	SAND & GRAVEL (SW), trace silt, dry, well graded, brown-grey 2.0m damp	0.0m-2.0m Unfrozen 2.0m-3.3m Nbn, damp
3	WATER, 60-90 percent water 10-40 percent sediment sand: some silt decreasing silt with depth increasing sediment proportion with depth	3.3m-5.8m Unfrozen or Thawed 3.3m-5.8m (moisture content is questionably low)
4 5 6	SAND & GRAVEL (SP), some silt, sub-angular gravel, assorted rock types, fine to coarse sand, moist, well graded 7.5m becoming coarser 8.5m very dry, fine to coarse	5.8m-12.6m Nbn

DHL-CA 0811B 7 NOV 96

BRUCE GEOTECHNICAL CONSULTANTS INC.
AN APPLIED EARTH SCIENCES COMPANY

JERICHO DIAMOND PROJECT
1996 OVERBURDEN GEOTECHNICAL
SITE INVESTIGATIONS

SRK Consulting
Engineers and Scientists

BOREHOLE LOG

PROJECT : 2003 Geotechnical Program
SITE : Jericho - Response to comments
FILE NO : JERICHO (1CT004.04)
BORING DATE : 2003-08-01 **TO** 2003-08-02 **DATUM :**
AZIMUT : 0.00 **DIP :** 90.00 **COORDINATES :** 7319755.00 N 478071.00 E

BOREHOLE : *BH-03-01*
PAGE : 1 **OF** 1
CASING : NQ
CORE BARREL : Triple tube

SAMPLE CONDITION		**TYPE OF SAMPLER**		**LABORATORY AND IN SITU TEST**	
☒	Remoulded	SS	Split spoon	GS	Grain size analysis
▨	Undisturbed	ST	Thin walled Shelby tube	C	Consolidation
■	Lost	PS	Piston sampler	D	Unit weight (kN/m³)
◧	Rock core	DC	Diamond core barrel	k	Permeability (cm/s)

Field Vane	(Su)	◇	intact
	(Sur)	◆	remoulded
Swedish cone	(Cu)	▽	intact
	(Cur)	▼	remoulded
Dyn. Cone Pen. Test		×--------------×	

STRATIGRAPHY

ELEVATION - m / DEPTH - m	DESCRIPTION	SYMBOL
486.10		
486.00 0.10	MOSS/ORGANICS TILL, Sandy GRAVEL with cobbles	
482.90 3.20	Bedrock , GRANITE, mostly pink, coarse to fine grained, very hard, iron oxide and hematite on fracture surfaces, fractures dipping at 60 to 90 degrees	+
478.20 7.90	END OF BOREHOLE	

SAMPLES

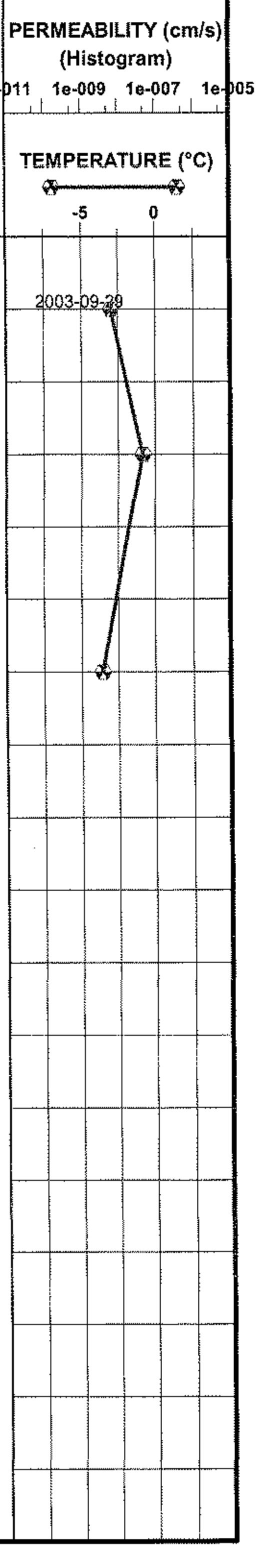
TYPE AND NUMBER	CONDITION	RECOVERY %	N or RQD
DC-1	◧	8	
DC-2	◧	25	
DC-3	◧	87	47
DC-4	◧	100	77

DEPTH - m: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

WATER LEVEL - m

WATER CONTENT and LIMITS (%)
W_P W W_L
20 40 60 80

LABORATORY and IN SITU TESTS



C:\Geotec73\Stdelog_SRK_m07.sty PLOTTED: 2003-10-02 15:00hrs

Table A5.2

Tahera Borehole Logs for September 2000 Geotech Drilling Program Jericho Project

BH No.	Location (UTM, NAD 27)	Size	Depth (m)	Log
00SRKGeotech 1	477,499E	BTW	0 - 0.2	Organics
	7,318,460N		0.2 - 3.05	Silty sand till with minor gravel (<10%)
	520 m (approx)		3.05 - 4.6	Increased gravel & cobbles in silty sand matrix
			4.6 - 7.6	As previous, poor recovery, silty sand matrix
			7.6 - 8.5	Broken bedrock
			8.5	Bedrock
00SRKGeotech 2	476,207E	BTW	0 - 0.1	Organics
	7,318,783N		0.1 - 0.6	Gravels & cobbles in silty sand matrix
	515 m (approx)		0.6 - 1.5	Boulders (granite)
			1.5 - 3.05	Cobbles & silty sand
			3.05 - 5.2	Increasing cobbles and coarse sand
			5.2 - 8.8	Gravels in fine silty sand matrix
			8.8	Bedrock
00SRKGeotech 3	476,189E	BTW	0 - 0.15	Organics
	7,318,681N		0.15 - 1.2	Fine silty sand with minor gravel
	525 m (approx)		1.2 - 3.7	Assorted cobbles & gravel in silty sand
			3.7 - 4.6	Gravel, pebbles & cobbles in silty sand
			4.6	Bedrock
00SRKGeotech 4	475,940E	BTW	0 - 0.25	Organics
	7,318,831N		0.25 - 3.7	Silty sand till with minor gravels
	515 m (approx)		3.7 - 19.8	Very bouldery (granite) with silty sand till matrix. No discernable evidence of permafrost noted
			19.8	Hole abandoned
00SRKGeotech 5	478,216E	BTW	0 - 0.13	Organics
	7,319,806N		0.13 - 3.05	Coarse sand (beach), minor silt.
	519 m (approx)		3.05 - 4.9	Boulders & cobbles, minor sand
			4.9	Bedrock
00SRKGeotech 6	478,099E	BTW	0 - 0.25	Organics
	7,319,782N		0.25 - 0.5	Very silty sand, no gravel
	515 m (approx)		0.5 - 2.7	Mixed cobbles & silty sand
			2.7 - 4.0	Broken bedrock
			4.0	Bedrock
00SKRGeotech 7	476,911.5E	BTW	0 - 0.2	Organics
	7,319,251.1N		0.2 - 0.6	Silty sand till & pebbles
	510 m (approx)		0.6 - 3.2	Silty sand till & minor pebbles; permafrost at 0.6m
			3.2	Bedrock
00SRKGeotech 8	476,204E	BTW	0 - 0.08	Organics
	7,318,735N		0.08 - 2.4	Silty sand till with minor gravel
	520 m (approx)		2.4 - 4.6	Boulders and cobbles, silty sand matrix
			4.6 - 6.1	Cobbles & broken bedrock with silty sand
			6.1	Bedrock

APPENDIX

APPENDIX C DRAWINGS

PLAN

NOTE:
1. SHADED AREAS DENOTE FILL AREAS.

SPECIFICATIONS

WATER AND SEDIMENT CONTROL

The contractor shall employ all necessary measures required to control runoff during construction. Water control and dewatering is the responsibility of the Contractor.

The Contractor shall be responsible to maintain downstream water quality at all times and shall employ all measures necessary to mitigate against downstream siltation or other deleterious material from entering the water course. As a minimum, the contractor shall install a silt curtains at 50 m intervals in Reaches A, B and C and near the culvert outlet. Construction, operation and maintenance of silt curtains and any other mitigative measures, are the responsibility of the Contractor.

EXCAVATION

The contractor is advised that frozen conditions may be encountered during construction and that ground ripping may be required to complete the work.

GRANULAR MATERIALS

The granular materials used in construction of the C1 Diversion Channel are discussed below. All granular materials shall consist of hard, durable particles, be free of roots, topsoil and other deleterious material.

Sand and Gravel Till

Sand and gravel till shall comprise native till material having particles no larger than 200 mm material in diameter. Oversized material contained in the source material shall be removed prior to use in construction or removed during placement.

Type 1 Riprap

Type 1 riprap is used in areas with high flow velocities and erosion potential. Type 1 riprap shall have a particle size distribution as presented in Table 1.

TABLE 1
Type 1 Riprap

Particle Size (mm)	Percent Passing
450	100
350	50 - 80
300	20 - 50
200	0

Type 2 Granular Fill

Type 2 granular fill is used in construction of ditch stops and for erosion protection. Type 2 granular fill shall have a particle size distribution as presented in Table 2.

TABLE 2
Type 2 Granular Fill

Particle Size (mm)	Percent Passing
150	100
100	50 - 100
50	25 - 65
25	10 - 40
5	0 - 15

Type 3 Granular Fill

Type 3 granular fill is a 50 mm minus crush used for culvert backfill. Type 3 granular fill shall have a particle size distribution as presented in Table 3.

TABLE 3
Type 3 Granular Fill

Particle Size (mm)	Percent Passing
50	100
20	70 - 100
10	45 - 100
5	35 - 70
2.5	25 - 55
0.63	12 - 35
0.08	3 - 9

Type 4 Granular Fill

Type 4 granular fill is used for liner bedding material. Type 4 granular fill shall have a particle size distribution as presented in Table 4.

TABLE 4
Type 4 Granular Fill

Particle Size (mm)	Percent Passing
25	100
12.5	70 - 100
5	50 - 100
2	30 - 70
0.425	10 - 40
0.08	0 - 8

Waste Rock

Waste rock, for use in capping the inlet cutoff structure, shall have a top size of 1 m.

LINER SYSTEM

The liner system as detailed on the Drawings shall be supplied and installed in accordance with Appendix E.

FILL PLACEMENT

Construction shall be performed in accordance with current best practice and with equipment best adapted to the work to be performed. Materials shall be placed so that each zone is homogenous, free of stratifications, lenses, pockets, and layers of material of different textural grading not conforming to the requirements specified herein.

Loading, transporting, dumping and spreading of all materials shall be carried out in such a manner as to avoid segregation. Should segregation occur, the materials shall be removed and replaced with materials meeting the Specifications as required by the Engineer.

Type 1 Riprap

Type 1 riprap shall be placed in Reach B and in construction of the ditch stops as indicated on the Drawings. Riprap shall be placed to the minimum thickness and may be placed in a single lift. Riprap shall be placed to be well nested and free of large void spaces.

Type 2 Granular Fill

Type 2 granular fill shall be placed as shown on the Drawings, in lifts not exceeding 500 mm. The material shall be placed and compacted to the satisfaction of the engineer. The material shall be placed to avoid segregation and nesting of coarse particles. Moisture conditioning may be required prior to compaction.

Type 2 granular fill shall be placed as erosion protection on all exposed sand and gravel till surfaces, unless otherwise noted on the Drawings. The minimum placement thickness shall be 200 mm.

Type 3 Granular Fill

Type 3 granular fill shall be placed within 500 mm of the culvert. The material shall be placed in lifts not exceeding 150 mm in thickness and shall be compacted to 95% of the maximum dry density (ASTM D698). Moisture conditioning may be necessary to achieve compaction requirements.

Type 3 material shall be placed and compacted around the culvert haunches by hand techniques or other means approved by the Engineer.

Type 4 Granular Fill

Type 4 granular fill shall be placed as shown on the Drawings. The material shall be placed in lifts not exceeding 150 mm in thickness and shall be compacted to 95% of the maximum dry density (ASTM D698) or as approved by the engineer. Moisture conditioning may be necessary to achieve compaction requirements.

Sand and Gravel Till

Sand and gravel till shall be placed as shown on the Drawings. The material shall be placed in lifts not exceeding 200 mm in thickness and shall be compacted to 95% of the maximum dry density (ASTM D698) or as approved by the engineer. Moisture conditioning may be necessary to achieve compaction requirements. Cobbles greater than 200 mm diameter and boulders shall be either blasted out or hand removed and wasted to the toe of slope on the outside berms.

HABITAT ENHANCEMENTS

A fish pool shall be constructed to dimensions and lines shown on the drawings. The base and sideslopes shall be lined with Type 2 granular fill and Type 1 riprap as shown on the Drawings.

Random boulders, having a diameter of 300 mm, shall be placed in Reach C as directed by the Engineer.

Riffles shall be constructed in Reach C as directed by the Engineer.

INSTRUMENTATION

Ground temperature cables shall be installed to measure ground temperatures in the berms and below original ground level, as directed by the Engineer.

Ground temperature cables, PVC casings, and instrument housings will be supplied and installed by the Geotechnical Engineer on behalf of the Owner, with Contractor assistance.

Ground temperature cables shall be installed after berm contouring is complete.

Drill holes for ground temperature cable installations shall be 100 mm ID or greater. Drill holes shall be drilled in the presence of the Engineer.

Ground temperature cables shall be installed inside PVC pipe placed in the drill hole. The PVC pipe shall be Schedule 40 PVC 25 mm ID pipe or approved equivalent with a water tight end cap. The portion of cable extending above berm fill shall be protected with a weather proof housing.

The outside of the PVC pipe shall be backfilled with clean dry sand such that there are no air voids around the pipe.

After installation, the location of each instrument shall be determined by surveying with an accuracy of 100 mm horizontally and 20 mm vertically.

QUALITY ASSURANCE

Quality assurance testing shall be carried out during construction of the C1 Diversion Channel by the Engineer or an independent testing firm engaged by the Owner.

Table 5 summarizes the required testing frequency for each of the construction materials. The testing frequency may be adjusted as determined by the Engineer. Additional testing shall be carried out as requested by the Engineer.

TABLE 5
Test Frequency of Placed Material

Test	Sand and Gravel Till	Type 1 Riprap	Type 2 Granular Fill	Type 3 Granular Fill	Type 4 Granular Fill
In Situ Density	one per 500 m^3	N/A	N/A	one per 100 m^3	one per 100 m^3
Grain Size	one per 1000 m^3	note 1	one per 1000 m^3	one per 300 m^3	one per 300 m^3
Moisture Density Relationship	one per 5000 m^3	N/A	N/A	one per 2000 m^3	one per 2000 m^3

1. Riprap samples shall be evaluated by the Engineer from time to time to determine if in his/her judgment it meets the gradation criteria of this Specification.

DRAWING No.	DRAWING TITLE	DATE	REV
-	-	DD/MM/YY	

REFERENCE DRAWINGS

No.	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR CONSTRUCTION	AUG/05	MDW
A	ISSUED FOR REVIEW	AUG/05	MDW

REVISION

EBA ENGINEERING CONSULTANTS LTD.

DESIGNED BY: MDW
DRAWN BY: RGR
DATE: 28/07/05
SCALE: AS SHOWN
PROJECT No.: 1100060.006
ACAD FILENAME: 1100060006R01A.dwg

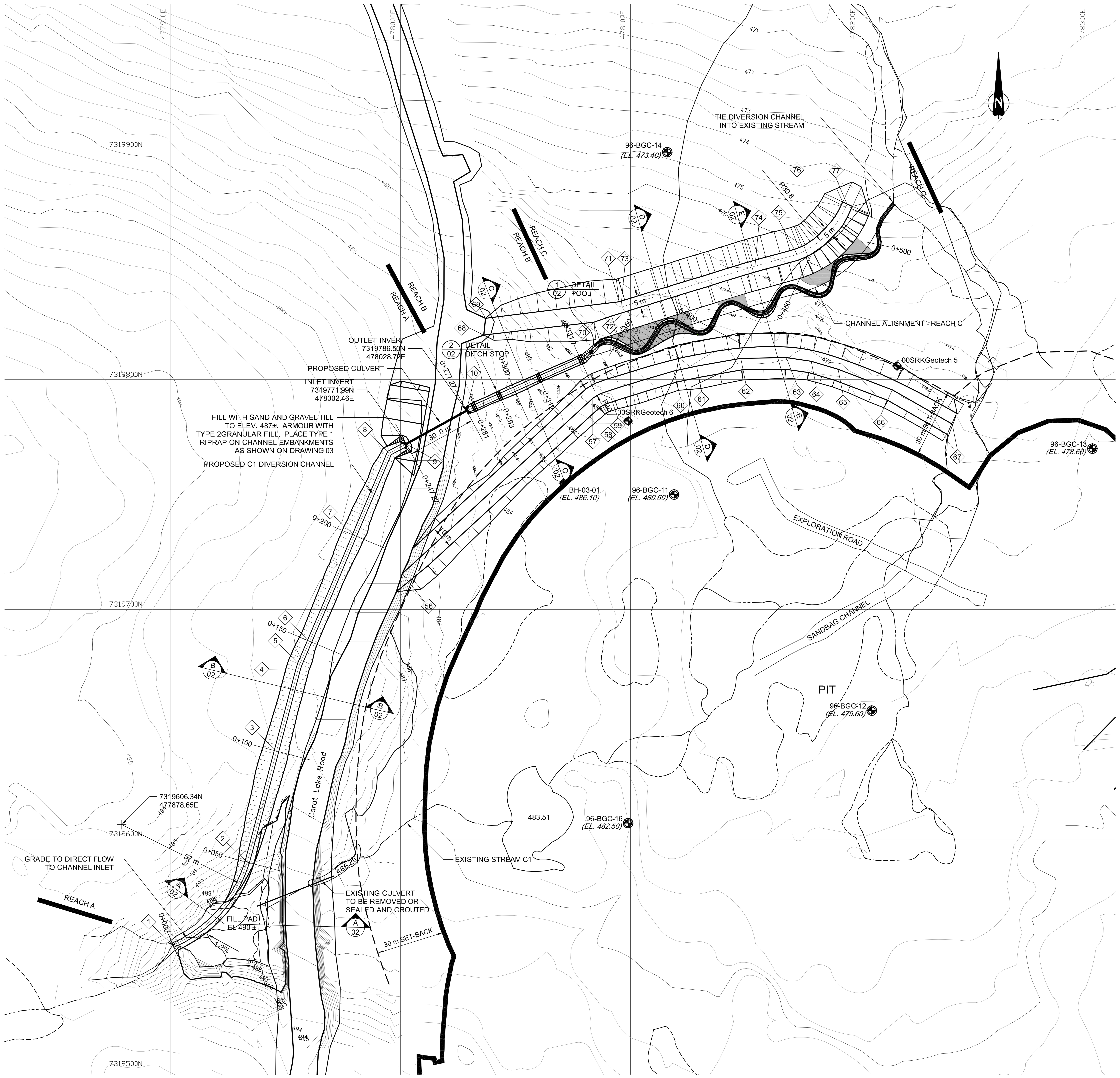
ORIGINAL
SIGNED AND SEALED
Seal: Mark Watson, P.Eng. Date: August 29, 2005
Permit: Derek Cathro, P.Eng. Date: August 29, 2005
The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

TAHERA
Diamond Corporation

JERICHO PROJECT

DIVERSION CHANNEL
SITE PLAN

REVISION ISSUE: 0
DRAWING No.: 1100060006-01a



PLAN

CO-ORDINATE LAYOUT TABLE

POINT	STATION	NORTHING	EASTING	ELEV (m) / RADIUS (m)
1	0+000	7 319 606.34	477 878.65	487.345
2	0+050	7 319 590.00	477 933.27	486.845
3	0+100	7 319 638.36	477 946.05	--
4		7 319 674.05	477 955.46	485.976
5		7 319 676.16	477 956.15	485.953
6	0+150	7 319 686.15	477 960.43	--
7	0+200	7 319 732.18	477 979.94	--
8		7 319 768.06	477 995.16	484.955
9	0+247.27	7 319 771.99	478 002.46	484.872
10	0+277.27	7 319 786.50	478 028.72	484.600

CO-ORDINATE LAYOUT TABLE

POINT	STATION	NORTHING	EASTING	ELEV (m) / RADIUS (m)
56		7 319 715.52	478 000.77	488.280
57		7 319 791.95	478 083.64	482.981
58		7 319 784.36	478 090.32	RAD = 10
59		7 319 793.86	478 086.85	482.749
60		7 319 803.77	478 118.86	481.671
61		7 319 805.85	478 128.79	481.599
62		7 319 809.28	478 148.02	481.460
63		7 319 809.57	478 167.79	481.317
64		7 319 807.97	478 178.64	481.236
65		7 319 804.49	478 190.32	481.147
66		7 319 795.57	478 213.96	480.968
67		7 319 780.68	478 240.01	480.757
68		7 319 819.41	478 036.21	484.789
69		7 319 826.74	478 036.99	484.605
70		7 319 824.98	478 084.10	483.630
71		7 319 833.93	478 095.13	482.970
72		7 319 829.16	478 096.61	482.970
73		7 319 831.55	478 095.88	482.970
74		7 319 849.40	478 154.18	481.262
75		7 319 854.48	478 172.46	480.579
76		7 319 891.33	478 157.36	RAD = 39.8
77		7 319 876.38	478 194.45	479.058

NOTE:
1. SHADED AREAS DENOTE FILL AREAS.

REFERENCE DRAWINGS

DRAWING No.	DRAWING TITLE	DATE	REV
–	–	DD/MM/YY	

REVISION

No.	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR CONSTRUCTION	AUG/05	MDW
A	ISSUED FOR REVIEW	AUG/05	MDW

EBA ENGINEERING CONSULTANTS LTD.

DESIGNED BY: MDW
DRAWN BY: RGR
DATE: 28/07/05
SCALE: AS SHOWN
PROJECT No.: 1100060.006
ACAD FILENAME: 1100060006R06A.dwg

ORIGINAL
SIGNED AND SEALED

Seal: Mark Watson, P.Eng.
Date: August 29, 2005

Permit: Derek Cathro, P.Eng.
Date: August 29, 2005

The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

TAHERA
Diamond Corporation

JERICHO PROJECT

DIVERSION CHANNEL
SITE PLAN

REVISION ISSUE
0

DRAWING No.
1100060006–01b

PLAN

CO-ORDINATE LAYOUT TABLE

POINT	STATION	NORTHING	EASTING	ELEV (m) / RADIUS (m)
11	0+300	7 319 795.80	478 049.47	--
12	0+331.7	7 319 808.71	478 078.32	479.945
13		7 319 809.45	478 079.91	480.027
14		7 319 815.20	478 085.78	479.796
15		7 319 809.93	478 090.20	RAD = 6.8
16	0+350	7 319 815.84	478 093.66	--
17		7 319 812.31	478 100.63	479.342
18		7 319 818.18	478 102.64	RAD = 6.2
19		7 319 814.37	478 107.55	479.128
20		7 319 822.76	478 112.99	478.848
21		7 319 818.89	478 117.89	RAD = 6.2
22		7 319 824.57	478 120.48	478.62
23		7 319 820.93	478 127.54	478.39
24		7 319 826.06	478 130.21	RAD = 5.8
25	0+400	7 319 822.63	478 134.87	--
26		7 319 823.96	478 135.59	478.124
27		7 319 829.37	478 138.16	477.956
28		7 319 827.06	478 144.26	RAD = 6.5
29		7 319 832.54	478 140.71	477.955
30		7 319 827.37	478 144.06	RAD = 6.2
31		7 319 832.95	478 146.68	477.666
32		7 319 829.48	478 153.80	477.442
33		7 319 834.62	478 156.47	RAD = 6.0
34		7 319 832.12	478 161.88	477.174
35		7 319 837.47	478 164.63	477.005
36		7 319 834.46	478 170.03	RAD = 6.2
37	0+450	7 319 840.36	478 171.92	--
38		7 319 840.29	478 172.09	476.763
39		7 319 837.24	478 179.12	476.549
40		7 319 842.62	478 181.63	RAD = 6.0
41		7 319 840.30	478 187.09	476.281
42		7 319 848.10	478 188.26	476.058
43		7 319 846.65	478 194.83	RAD = 6.3
44		7 319 852.93	478 194.72	475.827
45		7 319 853.64	478 202.69	475.602
46		7 319 859.58	478 202.39	RAD = 6.0
47	0+500	7 319 858.70	478 208.25	--
48		7 319 860.08	478 208.32	475.334
49		7 319 864.03	478 207.66	475.137
50		7 319 866.08	478 207.85	474.977
51		7 319 870.04	478 209.49	474.737
52		7 319 876.64	478 214.49	474.065
53		7 319 870.04	478 209.61	--
54		7 319 888.17	478 160.86	--
55		7 319 838.88	478 177.31	--

REFERENCE DRAWINGS

DRAWING No.	DRAWING TITLE	DATE	REV
–	–	DD/MM/YY	

REVISION

No.	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR CONSTRUCTION	AUG/05	MDW
A	ISSUED FOR REVIEW	AUG/05	MDW

EBA ENGINEERING CONSULTANTS LTD.

DESIGNED BY: MDW
DRAWN BY: RGR
DATE: 28/07/05
SCALE: AS SHOWN
PROJECT No.: 1100060.006
ACAD FILENAME: 1100060006R07A.dwg

ORIGINAL
SIGNED AND SEALED

Seal: Mark Watson, P.Eng.
Date: August 29, 2005

Permit: Derek Cathro, P.Eng.
Date: August 29, 2005

The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

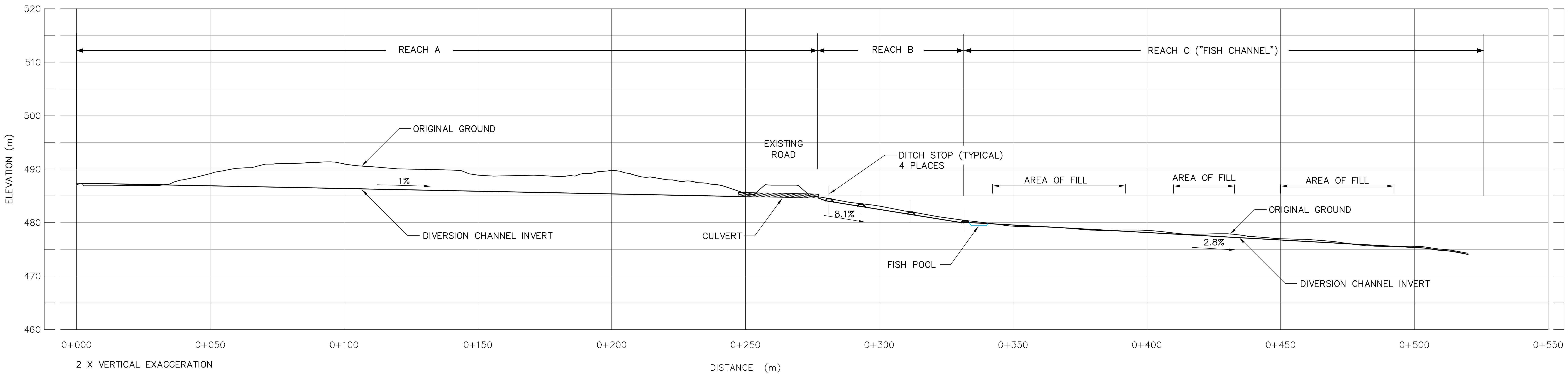
TAHERA
Diamond Corporation

JERICHO PROJECT

DIVERSION CHANNEL
SITE PLAN

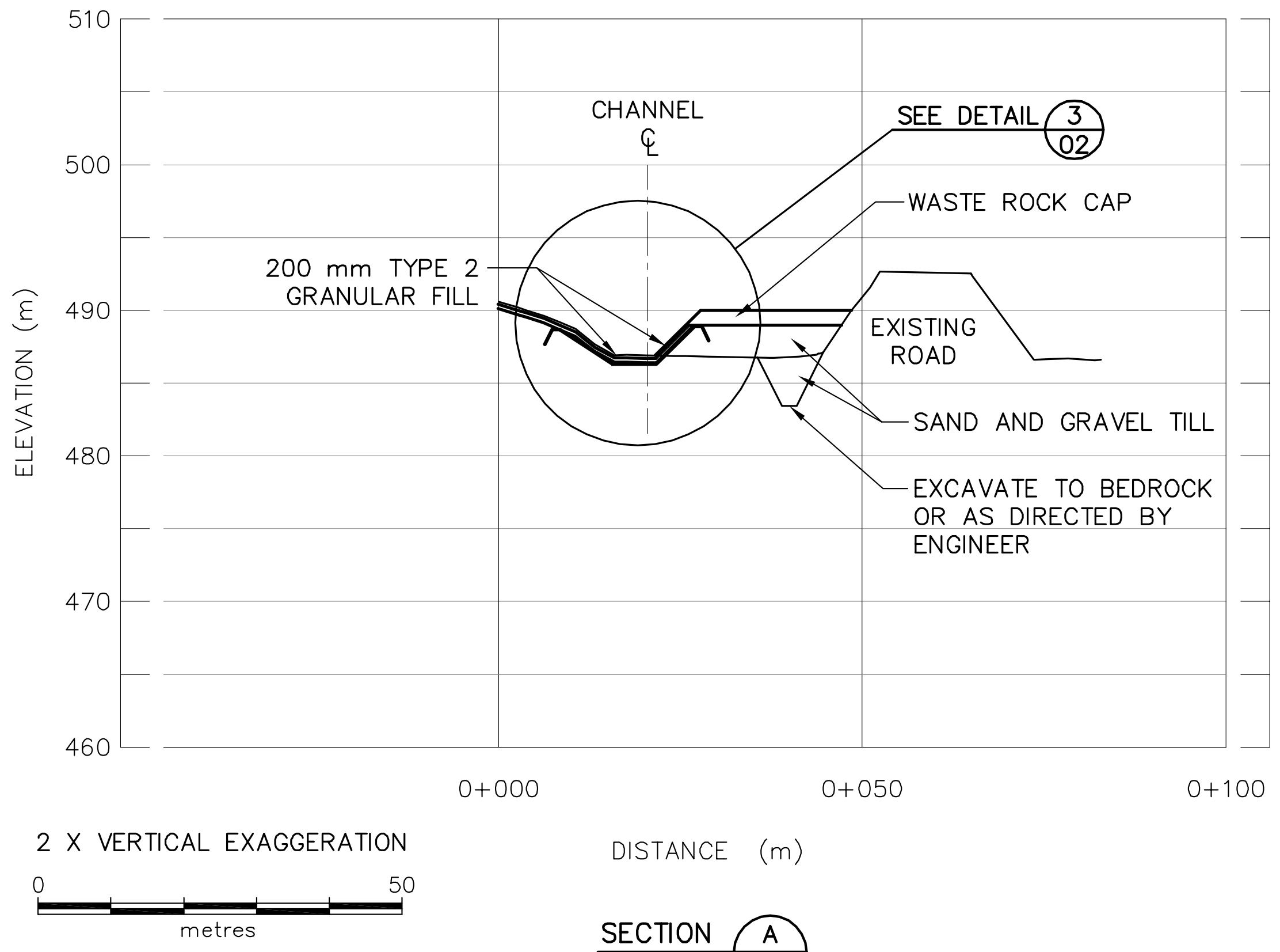
REVISION ISSUE
0

DRAWING No.
1100060006–01c



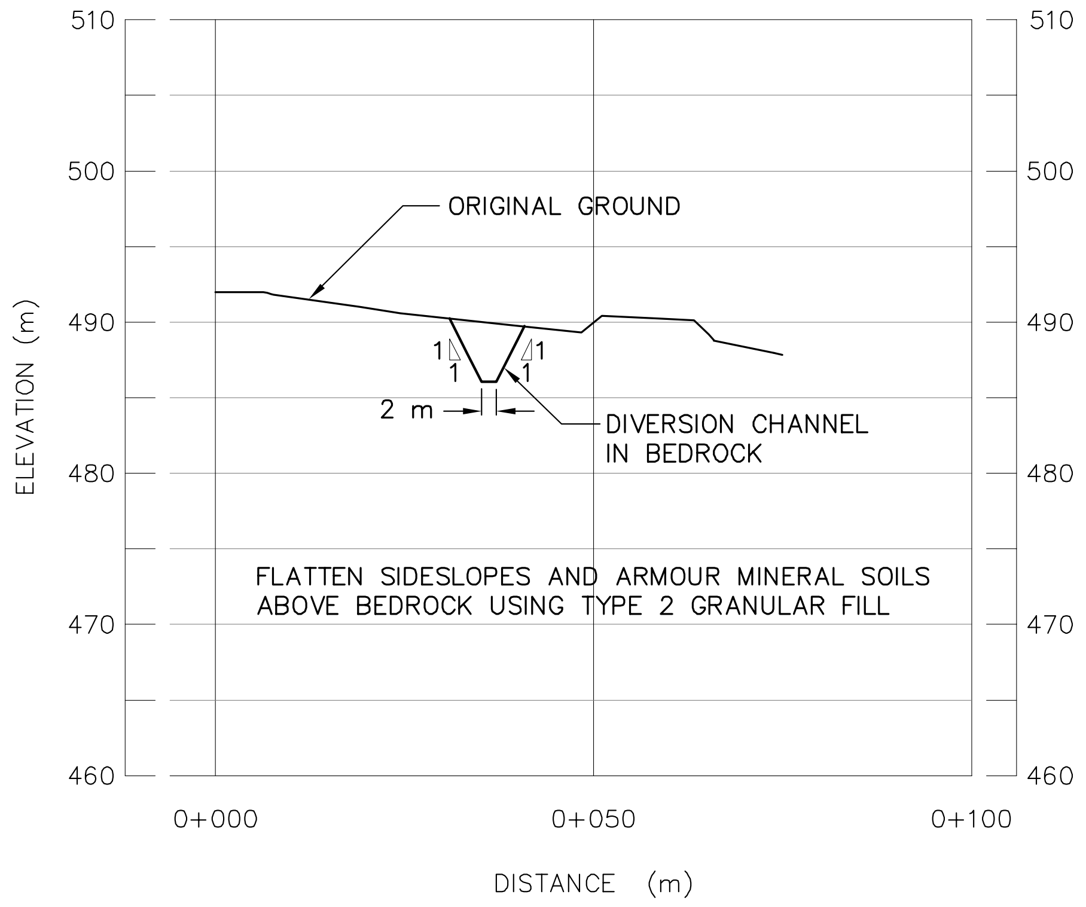
PROFILE

NOTE:
1. ALL DIMENSIONS IN METRES.



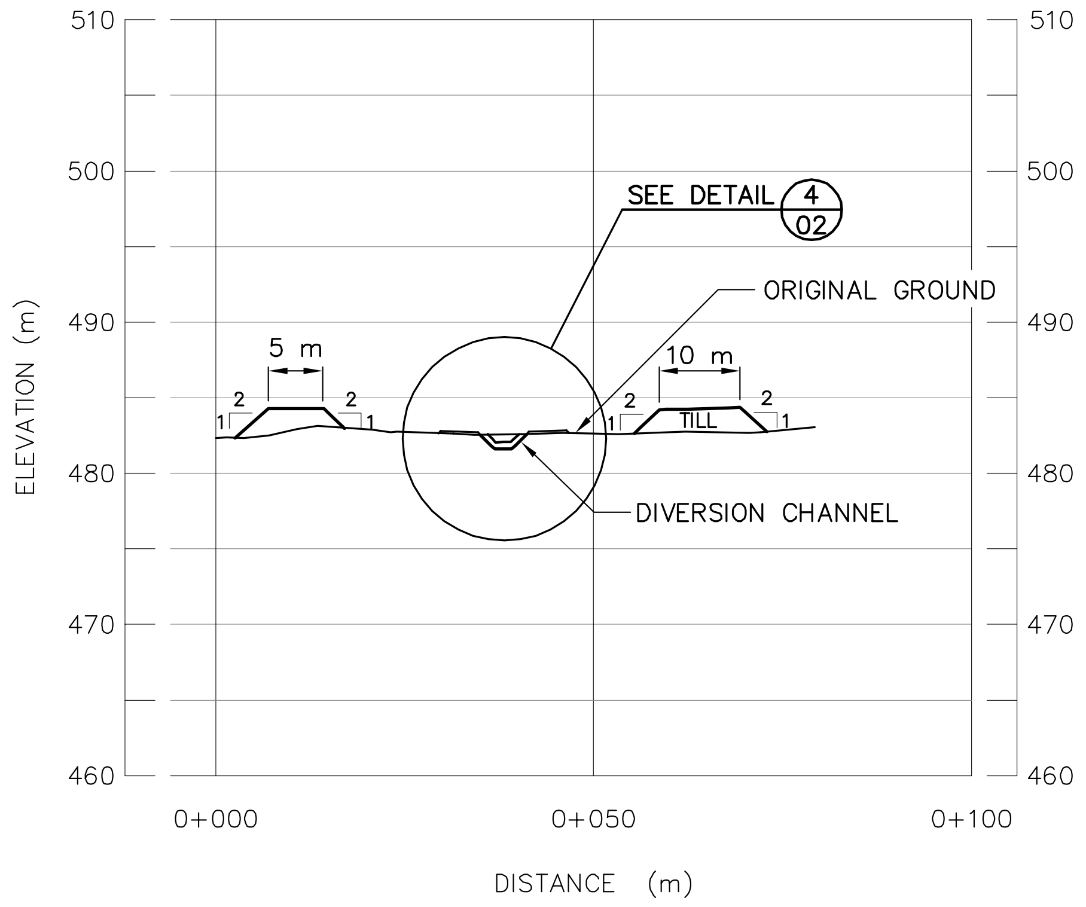
SECTION A/01

FILL PAD – TYPICAL



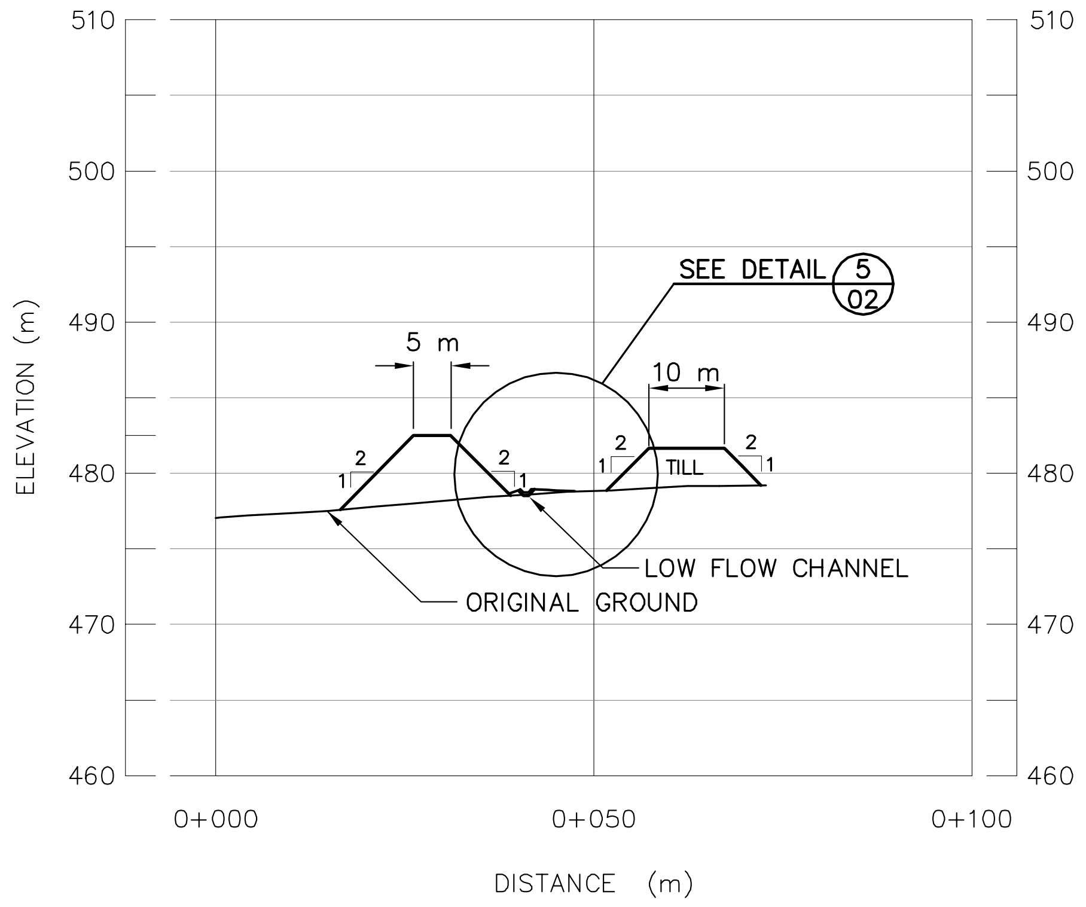
SECTION B/01

TYPICAL CHANNEL SECTION – REACH A



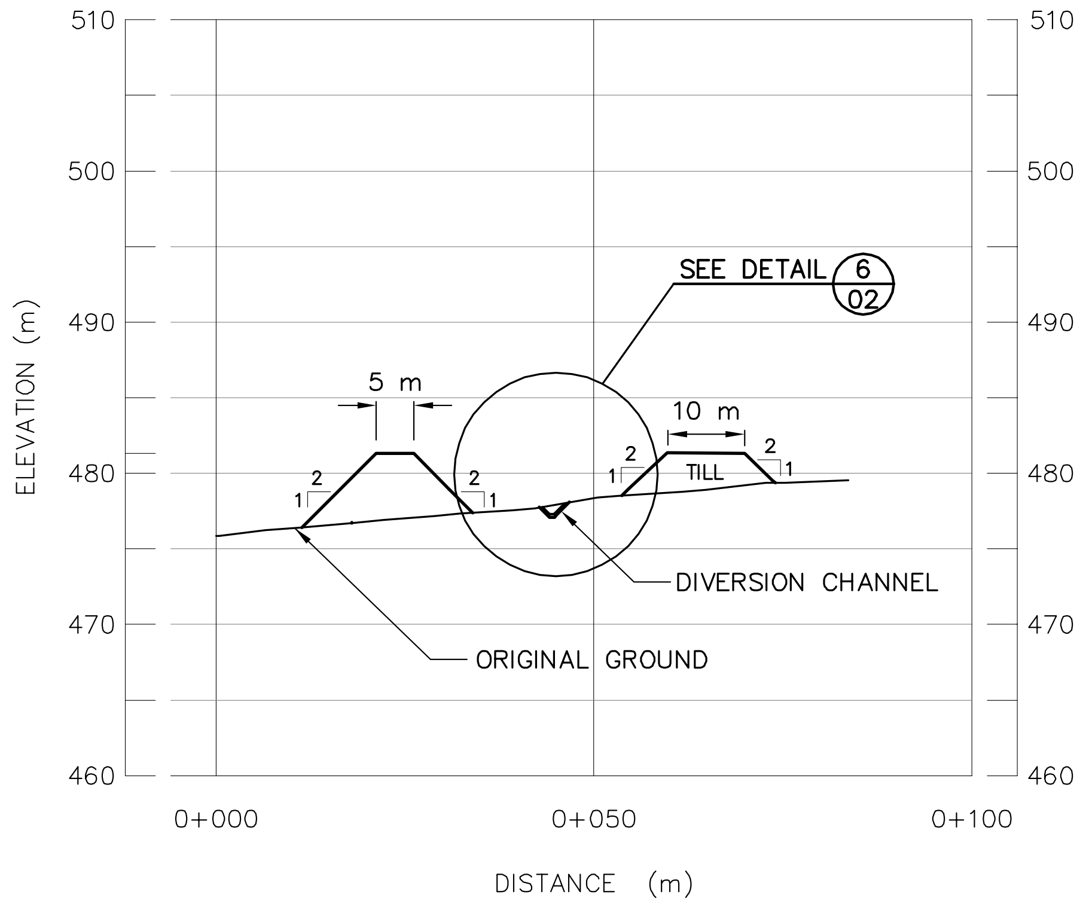
SECTION C/01

TYPICAL CHANNEL SECTION – REACH B



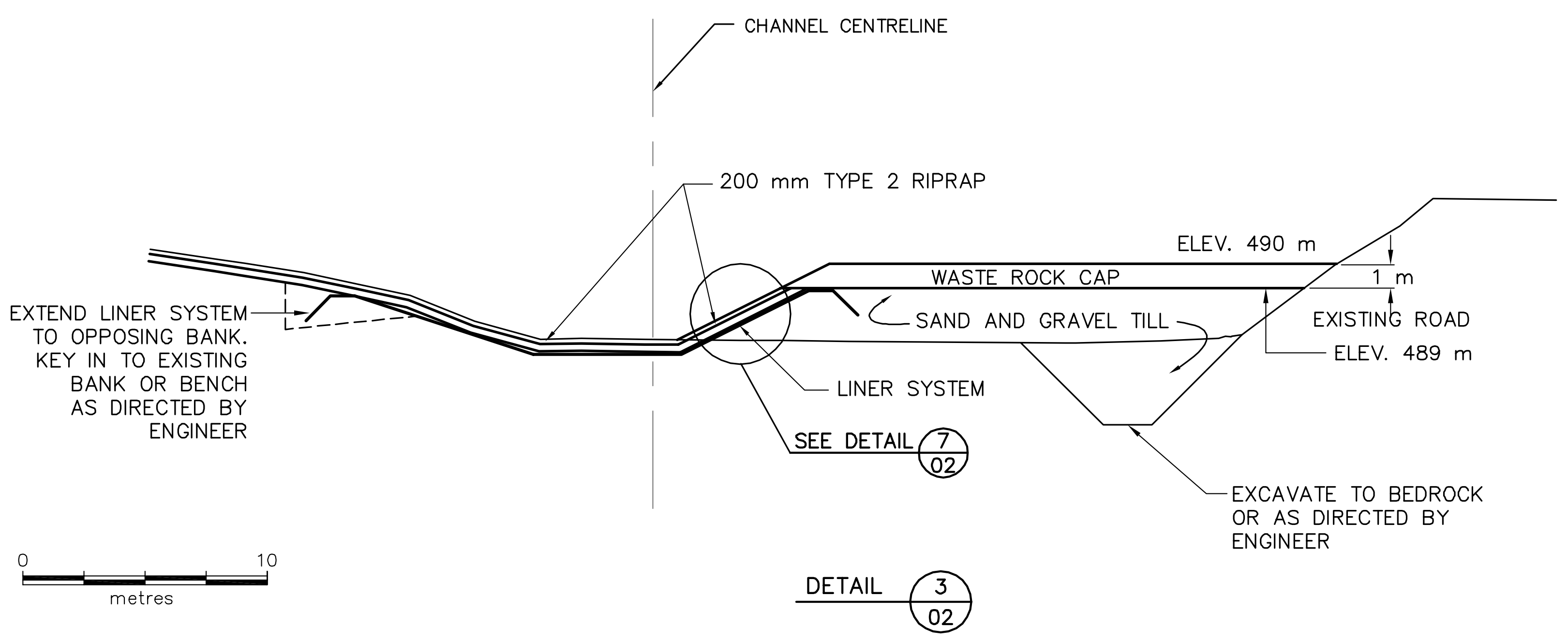
SECTION D/01

TYPICAL CHANNEL SECTION IN FILL – REACH C

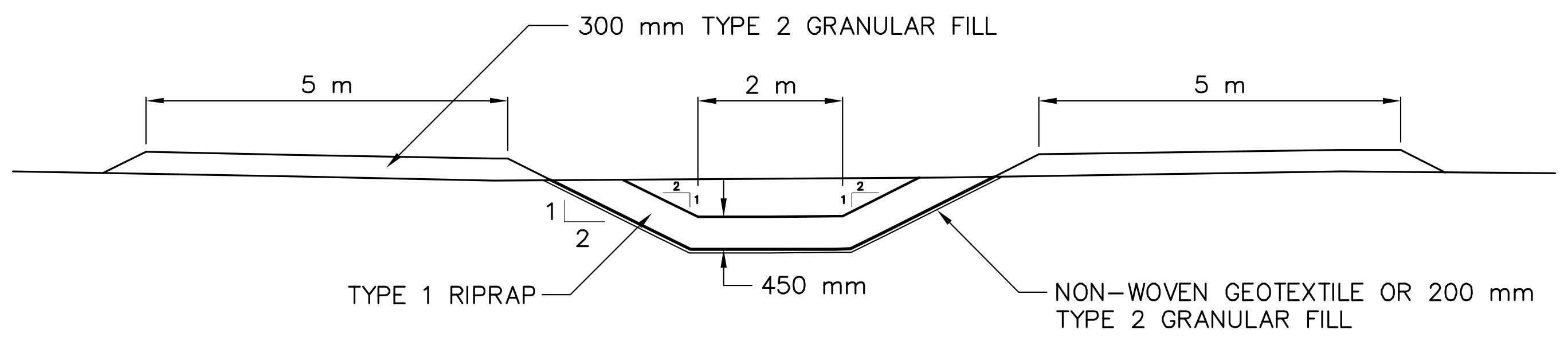


SECTION E/01

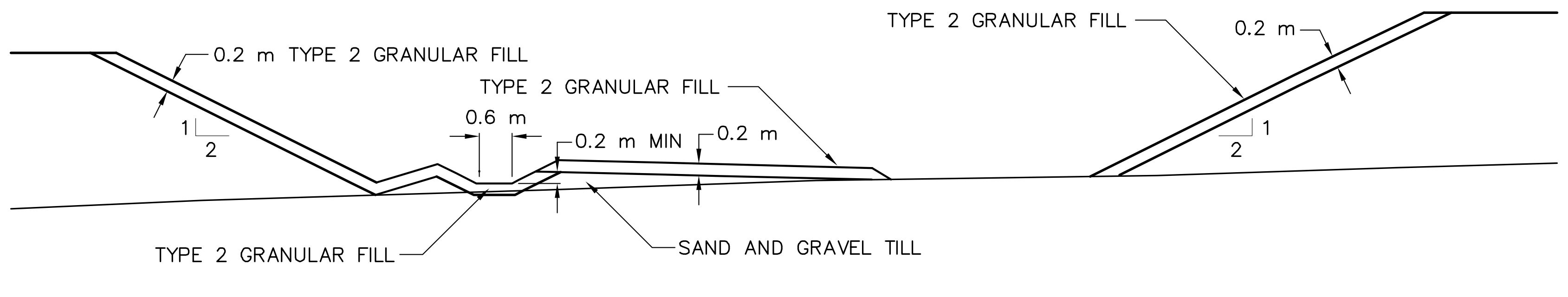
TYPICAL CHANNEL SECTION IN CUT – REACH C



DETAIL 3/02

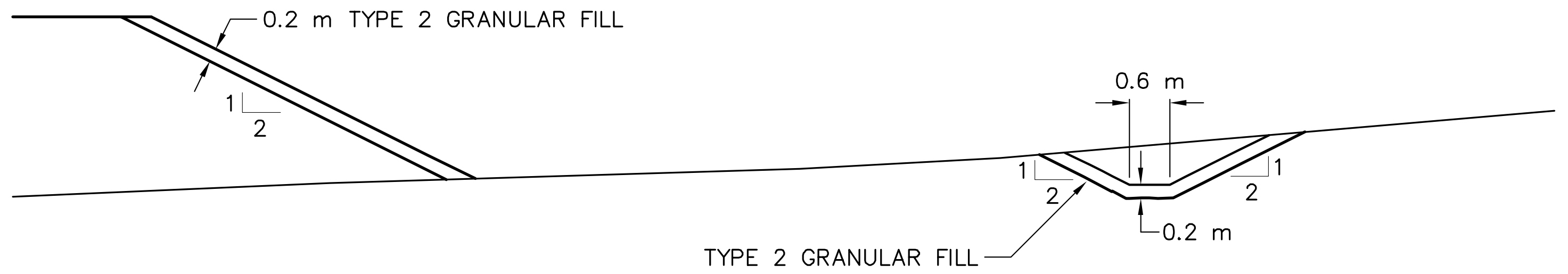


DETAIL 4/02

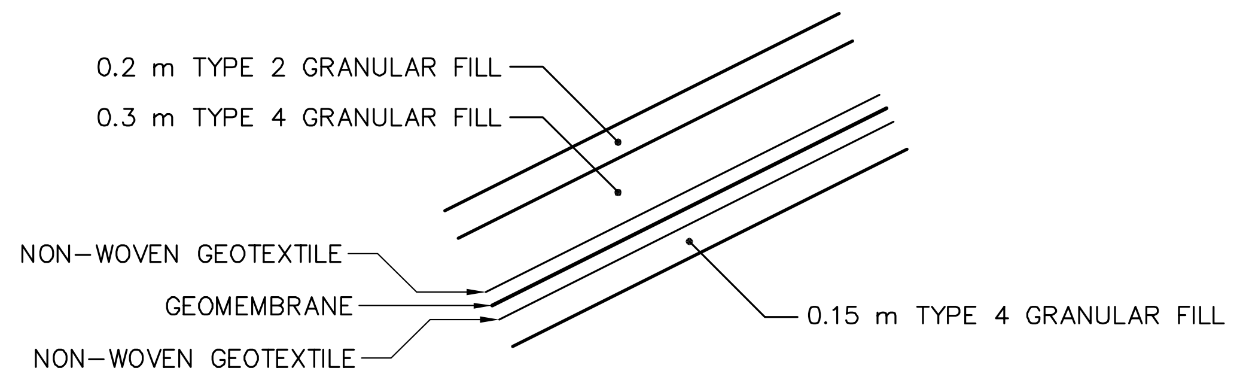


DETAIL 5/02

0 5
metres



DETAIL 6/02



DETAIL 7/02

DRAWING No.	DRAWING TITLE	DATE	REV
–	–	DD/MM/YY	

REFERENCE DRAWINGS

No.	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR CONSTRUCTION	AUG/05	MDW
A	ISSUED FOR REVIEW	AUG/05	MDW

REVISION

EBA ENGINEERING CONSULTANTS LTD.

DESIGNED BY: MDW
DRAWN BY: RGR
DATE: 28/07/05
SCALE: AS SHOWN
PROJECT No.: 1100060.006
ACAD FILENAME: 1100060006R02A.dwg

ORIGINAL
SIGNED AND SEALED

Seal: Mark Watson, P.Eng.
Date: August 29, 2005
Permit: Derek Cathro, P.Eng.
Date: August 29, 2005

The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

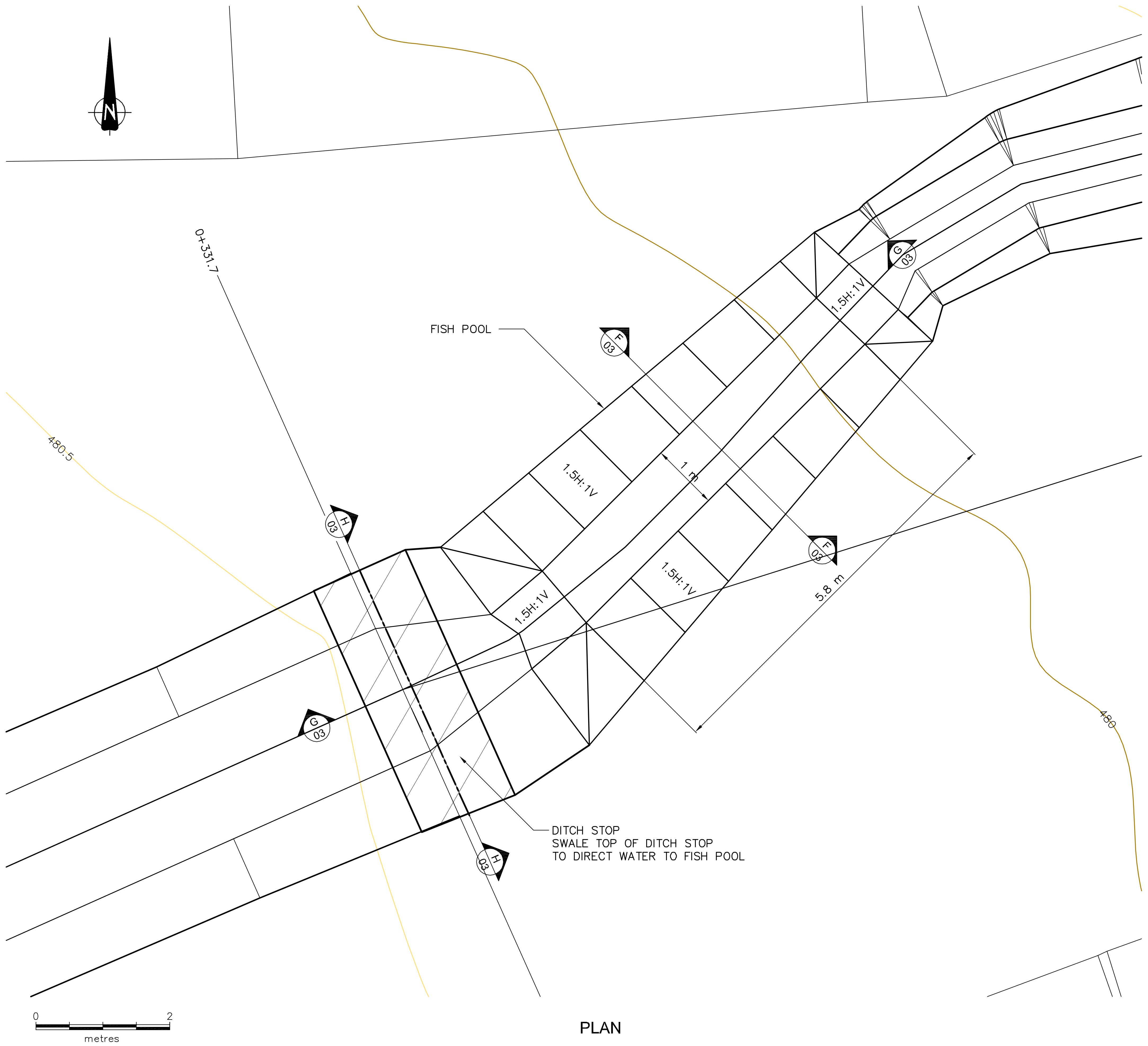
TAHERA
Diamond Corporation

JERICHO PROJECT

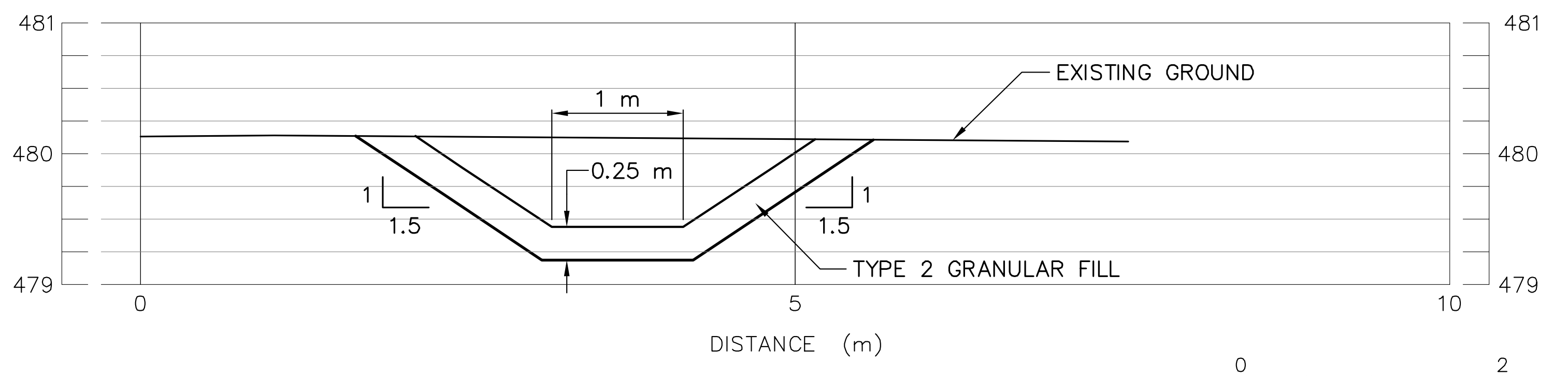
DIVERSION CHANNEL
PROFILE and SECTIONS

REVISION ISSUE
0

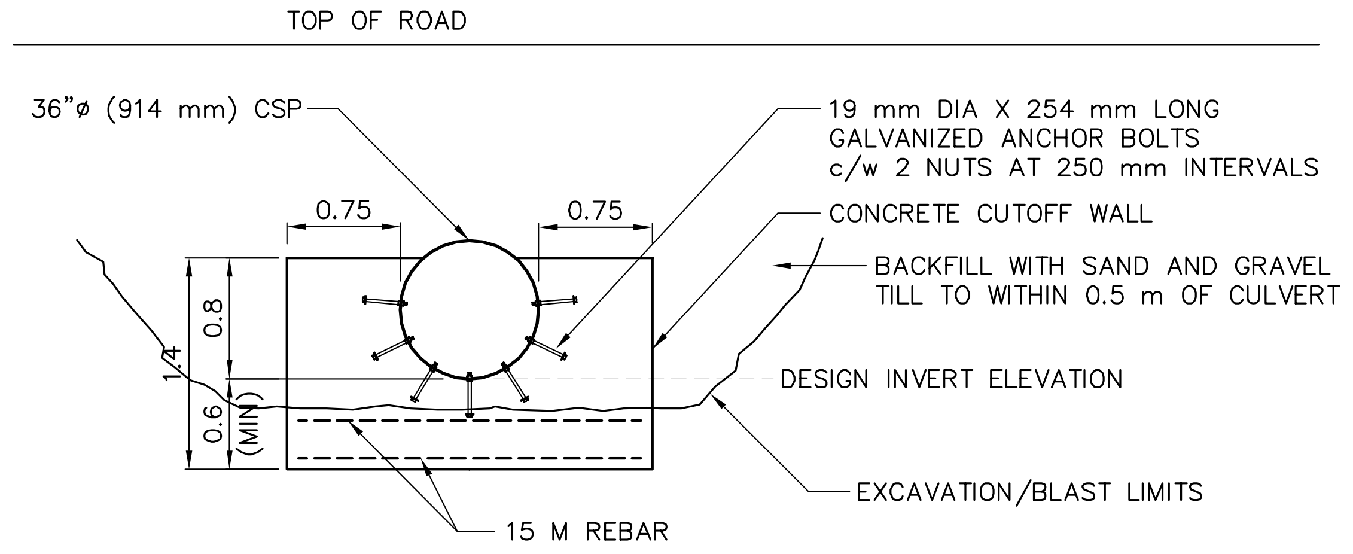
DRAWING No.
1100060006–02



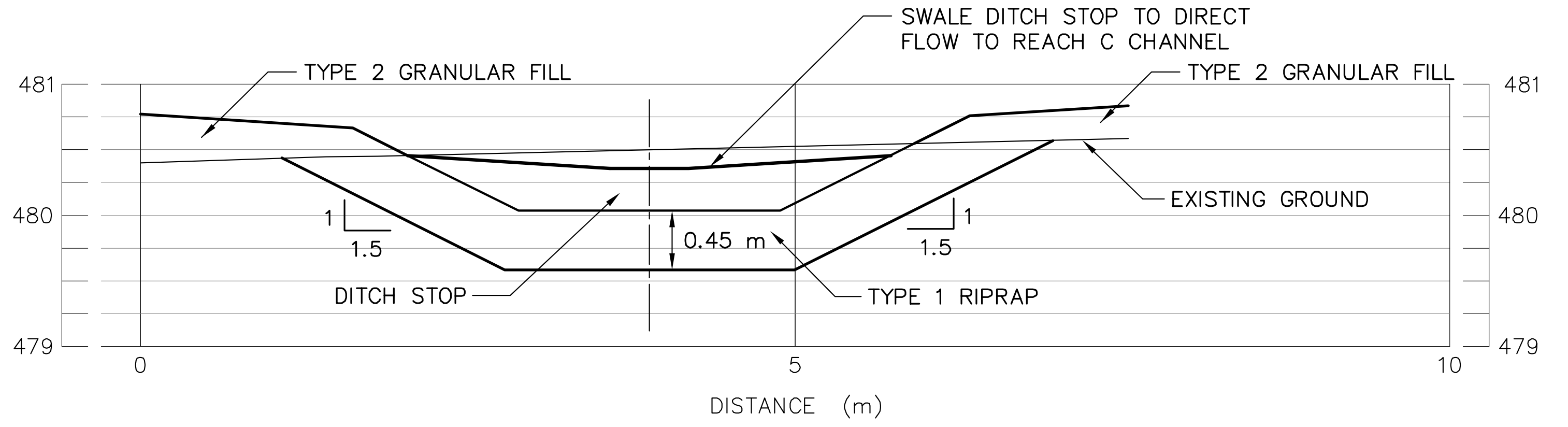
PLAN



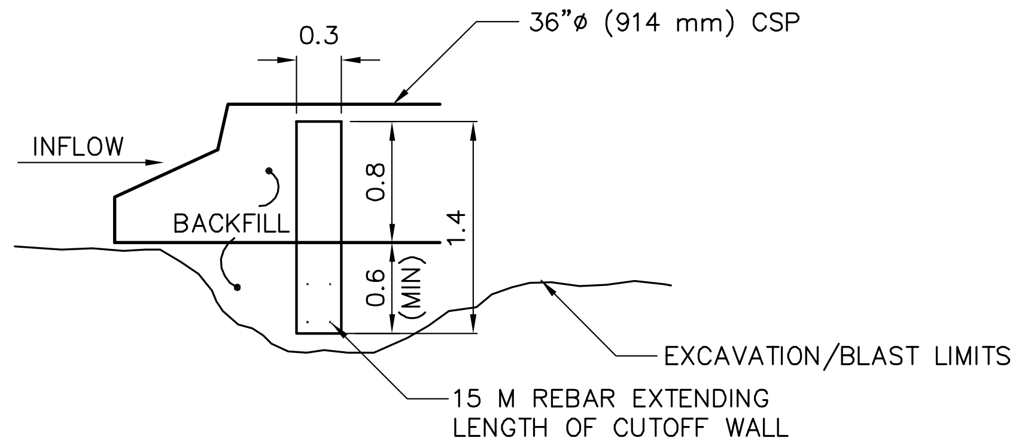
SECTION F/03



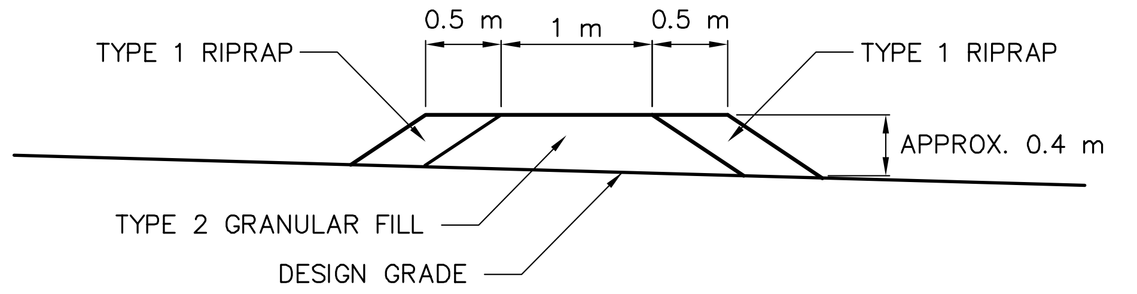
CONCRETE CUTOFF WALL AND BACKFILL DETAIL
N.T.S.



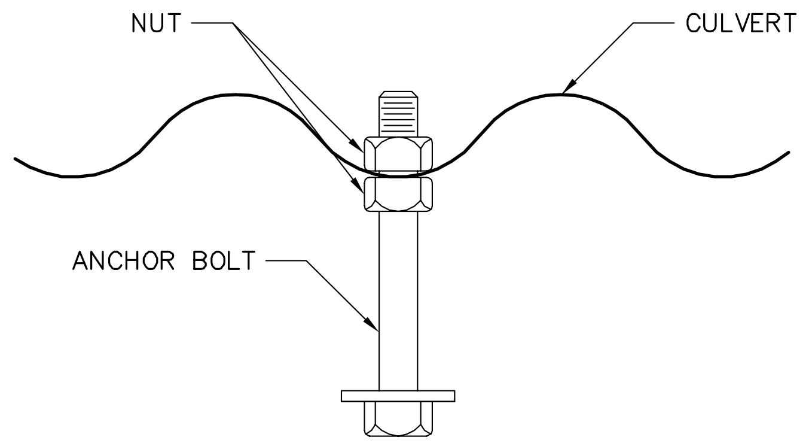
SECTION H/03



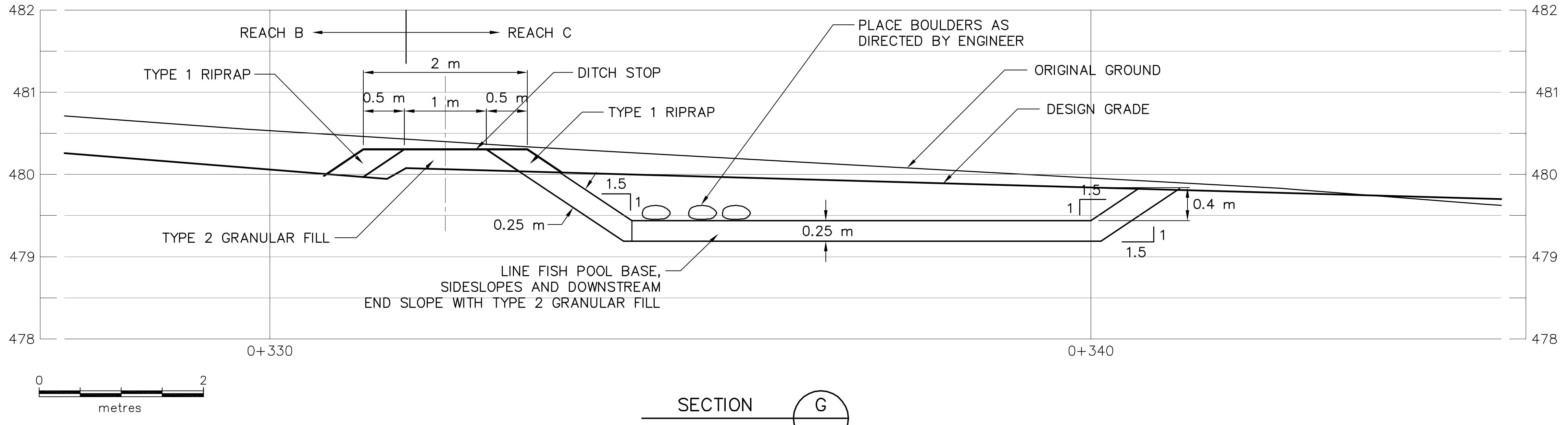
CONCRETE CUTOFF WALL DETAIL – PROFILE
N.T.S.



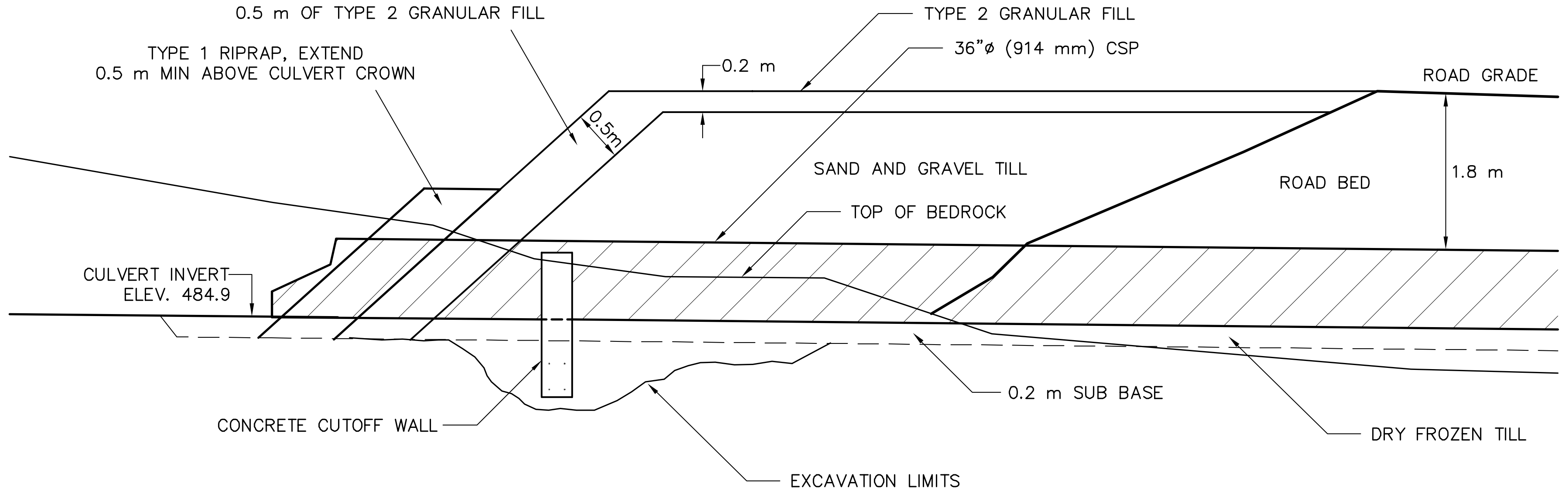
TYPICAL DITCH STOP – SECTION



TYPICAL ANCHOR BOLT DETAIL
N.T.S.



SECTION G/03



C1 DIVERSION CULVERT – INLET PROFILE
N.T.S.

NOTES:
1. ALL DIMENSIONS IN METRES.
2. LOCATE CONCRETE CUTOFF WALL AS CLOSE TO INLET AS POSSIBLE.
3. BACKFILL AROUND CONCRETE CUTOFF WALL TO BE 50 mm MINUS CRUSH.
4. BACKFILL WITHIN 0.5 m OF CULVERT TO BE 50 mm MINUS CRUSH.
5. ALL CONCRETE TO BE 20 MPa.
6. BOLT HOLES TO BE FIELD DRILLED.

DRAWING No.	DRAWING TITLE	DATE	REV
-	-	DD/MM/YY	

REFERENCE DRAWINGS

No.	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR CONSTRUCTION	AUG/05	MDW
A	ISSUED FOR REVIEW	AUG/05	MDW

REVISION

EBA ENGINEERING CONSULTANTS LTD.

DESIGNED BY: MDW
DRAWN BY: RGR
DATE: 26/08/05
SCALE: AS SHOWN
PROJECT No.: 1100060.006
ACAD FILENAME: 1100060006R05A.dwg

ORIGINAL
SIGNED AND SEALED
Seal: Mark Watson, P.Eng.
Date: August 29, 2005
Permit: Derek Cathro, P.Eng.
Date: August 29, 2005
The signed Professional Seal and Permit to Practice stamps reside on the executed drawing which is held and controlled by EBA Engineering Consultants Ltd.

TAHERA
Diamond Corporation

JERICHO PROJECT

DIVERSION CHANNEL FISH POOL PLAN AND DETAILS, AND C1 DIVERSION CULVERT DETAILS

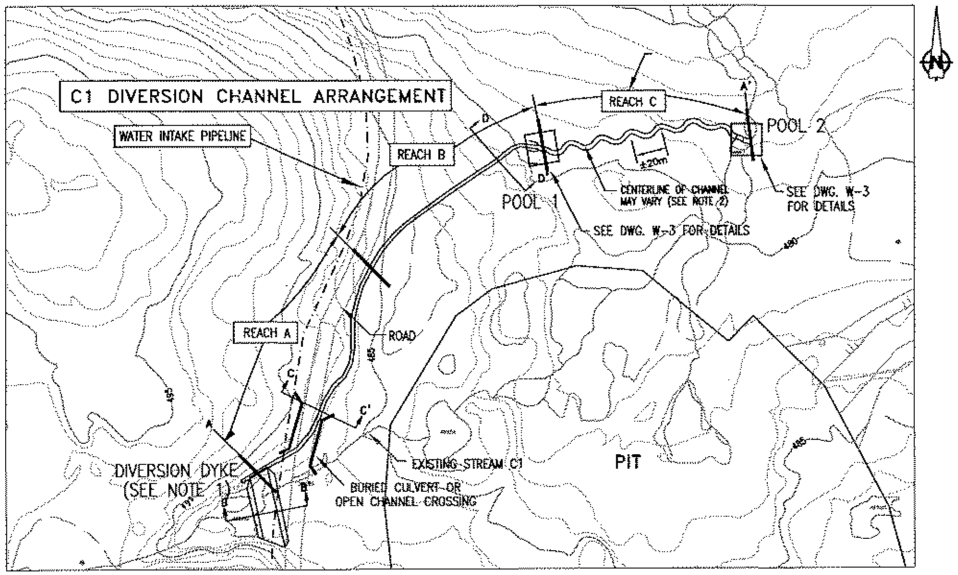
REVISION ISSUE
0

DRAWING No.
1100060006-03

APPENDIX

APPENDIX D

C1 DIVERSION CHANNEL DRAWINGS FROM 2003 SRK TECHNICAL MEMORANDUM G WATER MANAGEMENT FACILITIES DESIGN CRITERIA

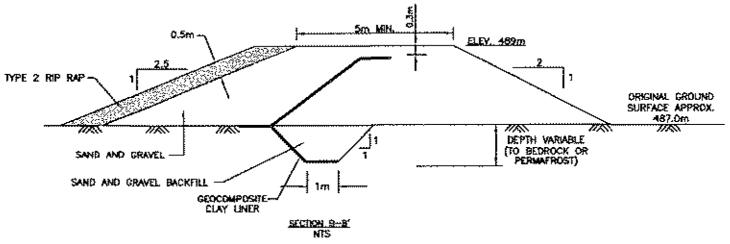


NOTE 1:
C1 DIVERSION TO BE
CONSTRUCTED PRE-STARTUP

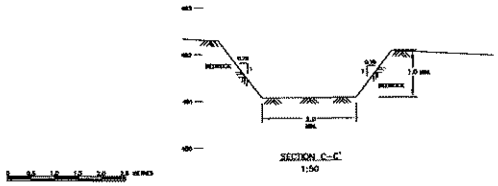
NOTE 2:
FINAL LAYOUT TO BE
FIELD-FIT BASED ON
SITE SPECIFIC CONDITIONS.

TAHERA CORPORATION
JERICHO LAKE SOUTHWEST EXTENSION
Plotted Scale 1:1,500
Date of Photography August 5, 1995.
Scale of Photography 1:10,000
Survey control supplied by Canamera Geological Ltd.
Survey control based on UTM Projection, NAD 27, Zone 12
Compiled by The RITEHOUSE, Calgary, October 1995.
MD 7485

0 25 50 75 100 125 METRES
1:1,500

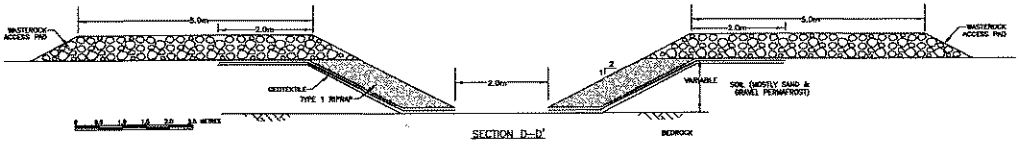


SECTION B–B'
NTS

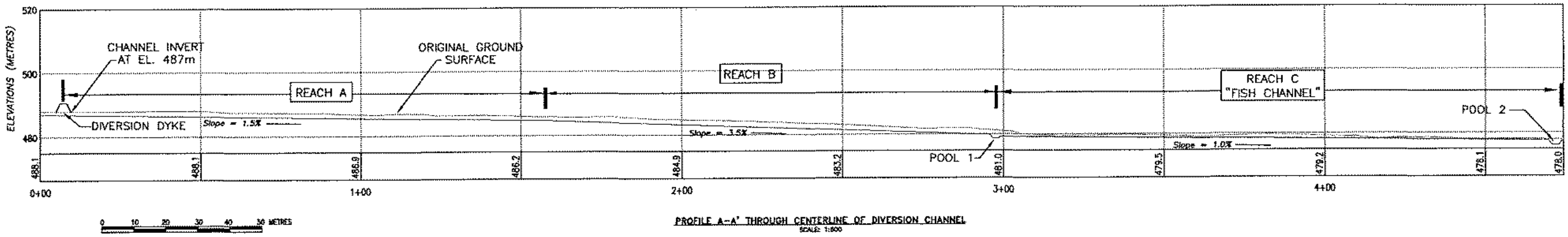


SECTION C–C'
1:50

NOTE 3:
ACTUAL DIMENSIONS AND
SLOPES WILL VARY DEPENDING
ON ACTUAL CONDITIONS
FOLLOWING DRILLING AND
BLASTING.



SECTION D–D'
1:50



PROFILE A–A' THROUGH CENTERLINE OF DIVERSION CHANNEL
SCALE: 1:500

DRAWING W-6	PRELIMINARY LAYOUT OF CAUSEWAY SECTIONS AND DETAILS
DRAWING W-5	PRELIMINARY LAYOUT OF PONDS B AND C CROSS SECTIONS AND DETAILS
DRAWING W-4	PRELIMINARY LAYOUT OF POND A CROSS SECTIONS AND DETAILS
DRAWING W-3	C1 DIVERSION DETAILS
DRAWING W-1	LAYOUT OF WATER MANAGEMENT FACILITIES
DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	DWN	APP'D	DATE

REVISIONS

REV.	ISSUE PURPOSE	AUTH. BY	DATE
A	WATER LICENSE APPLICATION	CSS	JULY 2004

ISSUE AUTHORIZATION

WATER LICENSE
APPLICATION

SRK Consulting

DESIGNED BY: CCS	DRAWN BY: JM
DATE: JULY 2004	DATE: JULY 2004
CHECKED BY: CCS	DISCIP. ENGR.
DATE: JULY 2004	DATE:
PROJ. MGR:	PROJ. ENGR.
DATE	DATE

SRK PROJECT NUMBER:
1CT004.06

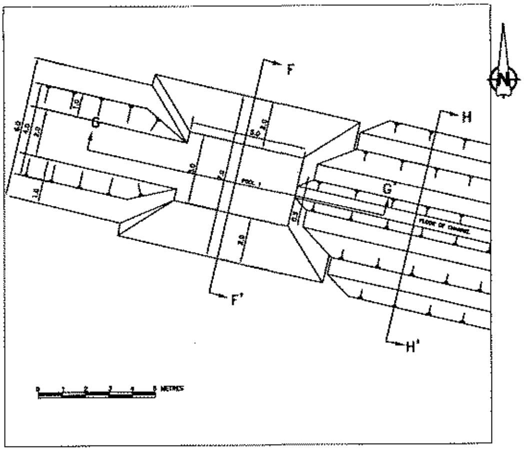
Tahera
Diamond Corporation

JERICHO PROJECT

C1 DIVERSION
PLAN AND CROSS SECTIONS

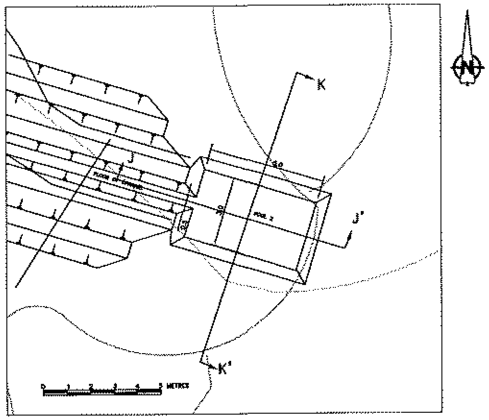
DRAWING NUMBER
1CT004.06 – W-2

REV.
A



POOL 1
1:100

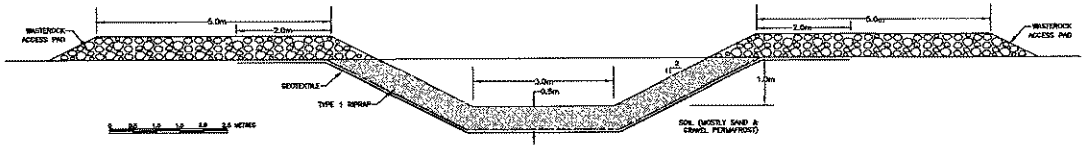
RIPRAP DETAILS		
TYPE	D_{50}	APPROXIMATE RANGE
1	250mm	100 – 300mm
2	60mm	25 – 100mm



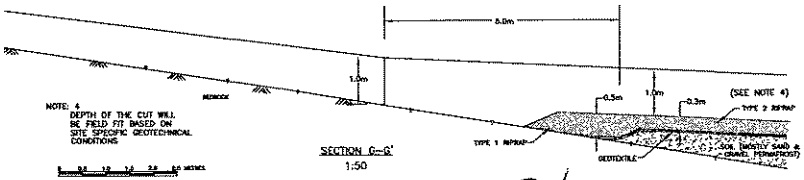
POOL 2
1:100

NOTE 1:
C1 DIVERSION TO BE
CONSTRUCTED PRE–STARTUP

NOTE 2:
FINAL LAYOUT TO BE
FIELD–FIT BASED ON
SITE SPECIFIC CONDITIONS.



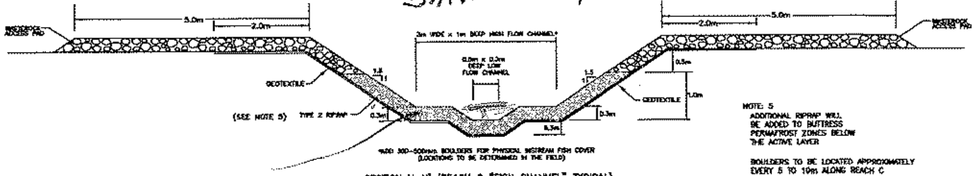
SECTION F–F'
1:50



NOTE: 4
DEPTH OF THE CUT WILL
BE FIELD FIT BASED ON
SITE SPECIFIC GEOTECHNICAL
CONDITIONS

SECTION G–G'
1:50

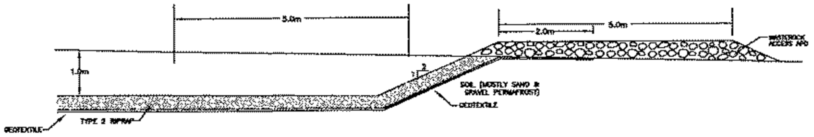
3m W – 1m Deep High Peak



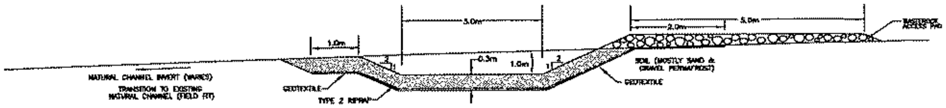
NOTE: 5
ADDITIONAL RIPRAP WILL
BE ADDED TO BUTTRESS
PERMAFROST ZONES BELOW
THE ACTIVE LAYER

BOULDERS TO BE LOCATED APPROXIMATELY
EVERY 5 TO 10m ALONG REACH C

SECTION H–H' (REACH C "FISH CHANNEL" TYPICAL)
NTS



SECTION J–J'
1:50



SECTION K–K'
1:50

DRAWING NO.	DRAWING TITLE
DRAWING W–6	PRELIMINARY LAYOUT OF CAUSEWAY SECTIONS AND DETAILS
DRAWING W–5	PRELIMINARY LAYOUT OF PONDS B AND C CROSS SECTIONS AND DETAILS
DRAWING W–4	PRELIMINARY LAYOUT OF POND A CROSS SECTIONS AND DETAILS
DRAWING W–2	C1 DIVERSION PLAN AND CROSS SECTIONS
DRAWING W–1	LAYOUT OF WATER MANAGEMENT FACILITIES

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE

REVISIONS

REV.	ISSUE PURPOSE	AUTH. BY	DATE
A	WATER LICENSE APPLICATION	CCS	JUNE 2004

ISSUE AUTHORIZATION

WATER LICENSE
APPLICATION

SRK Consulting

DESIGNED BY: DL	DRAWN BY: AM
DATE: JUNE 2004	DATE: MAR. 2004
CHECKED BY: CCS	DISCIP. ENGR.
DATE: JUNE 2004	DATE:
PROJ. MGR:	PROJ. ENGR.
DATE	DATE

SRK PROJECT NUMBER:
1CT004.06

Tahera
Diamond Corporation

JERICHO PROJECT

C1 DIVERSION CHANNEL
DETAILS

DRAWING NUMBER
1CT004.06 – W–3

REV.
A

APPENDIX

APPENDIX E LINER CONSTRUCTION SPECIFICATIONS

1.0 GENERAL

.1 The installation specifications for the non-woven geotextile, polypropylene geomembrane liner system to be used in the C1 Diversion Structure is presented in this section.

.2 The liner system consists of a minimum 150 mm thick bedding layer of –25 mm Type 4 Granular Material placed on a prepared subgrade. The subgrade preparation and –25 mm Type 4 granular bedding shall provide support for the geomembrane liner with protective underlay and overlay cover of non-woven geotextile. A minimum 300 mm thick layer of –25 mm Type 4 Granular Material is required above the upper non-woven geotextile to provide protection to the geotextile and geomembrane from Type 2 armour used to line the channel at the C1 Diversion Structure.

2.0 PRODUCT

.1 Materials

a. The non-woven geotextile must have a weight of 542 g/m2 geotextile. The manufacturer must provide to the Engineer, prior to shipment of materials, a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1007.1.

b. The polypropylene geomembrane must be a 40 mil thick unsupported polypropylene geomembrane or equivalent. The manufacturer must provide to the Engineer, prior to shipment of materials, a signed manufacturing certification that materials to be shipped to site have test values that meet or exceed the requirements listed in Table 1007.2.

TABLE 1007.1: NON-WOVEN GEOTEXTILE – MATERIAL PROPERTIES

Property	Test Method	Units	Value
Grab Tensile	ASTM D4632	N	1690
Elongation	ASTM D4632	%	50
Trapezoidal Tearing Strength	ASTM D4533	N	645
Puncture Strength	ASTM D4833	N	1070
Mass per unit area	ASTM D5261	g/m2	542

TABLE 1007.2: POLYPROPYLENE GEOMEMBRANE PROPERTIES

Property	Test Method	Units	Value
Thickness (Nominal)	ASTM D1593	mm	1.0
Tensile Strength at Break	ASTM D882	N	334
Elongation	ASTM D882	%	700
Tear Resistance	ASTM D1004	N	53
Puncture Resistance	ASTM D4833	N	169
Low Temperature Impact	ASTM D1790	DegC	-40
Polypropylene Minimum Shop Seam Strengths			
Heat Bonded Seam Strength	ASTM D3083	N/mm	9.1
Heat Bonded Peel Adhesion Strength	ASTM D413	N/mm	3.5
Polypropylene Minimum Field Seam Strengths			
Heat Bonded Seam Strength	ASTM D3083	N/mm	9.1
Heat Bonded Peel Adhesion Strength	ASTM D413	N/m	3.5

3.0 SHIPPING AND STORAGE

.1 Geotextile

a. Any visible damage to the shipment of geotextile must be noted on the freight receipt and project records.

b. Storage of geotextile rolls on site must be in a secure location that will minimize exposure to the elements and physical damage.

4.0 INSTALLATION

.1 Geotextile

a. Where applicable, any cracks or voids in the subgrade beneath the geotextile should be filled with –25 mm material. The area to be covered by the geotextile must be smooth and free of sharp objects that could pierce or tear the geotextile and damage the polypropylene geomembrane. When placed over the polypropylene geomembrane, placement of the geotextile must be conducted in a manner that will prevent damage to the polypropylene geomembrane. When placed over –25 mm material, the installation of the geotextile shall not begin until the sub-base has been approved by the Engineer.

b. Geotextile placement must not be conducted during periods of high wind.

c. The geotextile should be sewn to minimize the number of required overlaps. The sew strength efficiency must be a minimum of 60% as tested using the wide width strength test ASTM D4595-86.

d. The geotextile must be overlapped a minimum of 2.0 m where overlap joints are required.

e. Sufficient temporary anchorage must be used to hold the geotextile in place during placement of the other elements of the liner system or during backfilling.

.2 Polypropylene Geomembrane

a. The area to be lined should be smooth and free of sharp objects that could puncture the polypropylene gemembrane. Placement of the geomembrane must be conducted in a manner that will prevent damage to the underlying geotextile. The installation of the polypropylene geomembrane must not begin until the sub-base has been approved by the Engineer.

b. The panels should not be unfolded during periods of high wind. The panels must not be unfolded when air temperature is below –20 degC without first being warmed in a heated enclosure.

c. Care must be taken when the polypropylene geomembrane panels are deployed. Sharp objects, vehicles and equipment must not contact the material.

d. The polypropylene liner must be placed in a relaxed condition, free of stress or tension. The panels should be positioned so that there is a nominal six (6)-inch seam overlap. Any methods used to temporarily bond adjacent rolls together must not damage the geomembranes.

e. The contact surfaces of the two sheets should be wiped clean to remove all dirt, dust, moisture or other foreign materials.

f. Field seams must be made by hot wedge fusion welding. Trial seams must be made and tested to verify the welding temperature, speed of welding and the effects of ambient air temperature. The machine settings should be adjusted accordingly. Throughout the seaming operation occasional adjustments of welding temperature or speed as the result of changing ambient conditions may be necessary to maintain a consistent seam. A 1.5 inch nominal seam width is required for single-track welds. Dual track weld should have two 0.5-inch nominal seams separated by an air test channel.

g. A heated, portable shelter will be required to permit the polypropylene panels to be welded during the liner system placement. The minimum air temperature within the shelter must not drop below –7 degC.

h. All welders will be required to successfully complete a qualification weld, witnessed by the Engineer prior to starting any welding.

i. All welding must be performed under the supervision of a field supervisor who will remain on site and be responsible for all geomembrane installation. The supervisor must have installed or supervised a minimum of one hundred thousand (100,000) m2 of polypropylene liner involving the thickness and grade of liner and welding processes required for this project.

j. Sufficient temporary anchorage must be used to hold the polypropylene geomembrane in place during placement of the other elements of the liner system and during backfilling.

.4 Backfilling

a. The Contractor must take the necessary steps to ensure that the integrity of the liner system is not compromised during backfilling. Frozen fill material adhering to the liner system must not be removed unless repairs are required.

b. The liner system must be temporarily anchored so that movement downslope does not occur during backfilling at any stage of construction.

c. The Contractor must take the necessary steps to ensure that backfilling does not induce tensile stress in the liner system during backfilling. Care must be taken to avoid any damage to the liner system by making sharp turns, sudden stops or sudden starts adjacent to the liner system. Non-essential heavy equipment traffic in the immediate vicinity of the liner system must be minimized.

d. Stresses in the liner imposed by placing backfill on the sloping liner must be released at the top of the slope during cover soil placement.

e. The Contractor must discuss with the Engineer the schedule for liner system and backfill placement. The Engineer must approve all plans and schedules for backfilling the liner system.

.5 Damage

a. All areas of the liner system components requiring repair due to manufacturing flaws or damage during shipping, handling, or placement shall be recorded and surveyed. The Engineer shall prescribe the method of repair to be used for all liner system materials.

b. Damaged sections of geotextile must be repaired or replaced at the Engineer’s discretion.

c. The polypropylene geomembane is the primary water retention barrier for the C1 Diversion Structure. Polypropylene geomembrane integrity and quality of installation is absolutely essential to fulfill their design intent.

- Defects in the polypropylene panels will include roughness or striations, bubbles, blisters, any local variation in sheet thickness that exceeds +/- 20% or exceeds 6 inches in any direction, undispersed raw material or foreign matter present in either the surface or cross section of the sheet and pinholes, tears, gouges or any other through-thickness defect.

- Any of the defects listed above in the polypropylene geomembrane must be patched with a piece of the same membrane material. Patches must be cut with rounded corners and should overlap the damaged area a minimum of 3 inches. Polypropylene patches will be applied with a hand held heat gun and roller. The patch and damaged membrane area must be clean and dry. The heat gun will be inserted between the patch and the membrane liner, heating the surfaces of each to a molten state. Steel roller pressure over a hard surface must be applied during the heating process in such a way as to smooth out any wrinkles while mating both polypropylene membrane surfaces.

1.0 GENERAL

.1 The quality assurance testing required by the Engineer is described in this section.

.2 The quality testing will be conducted by the Engineer.

2.0 POLYPROPYLENE GEOMEMBRANE TESTING REQUIREMENTS

.1 General

a. The Contractor is responsible for obtaining mill certificates from the manufacturer and forwarding them to the Engineer.

b. The Contractor shall record all seam parameters (i.e. time, date, operator, welding speed and temperature) on the liner.

c. The Engineer will conduct a limited program of testing on seam welds.

d. The Contractor shall be responsible for completing the vacuum box testing and fusion seam pressure testing. The Contractor shall mark the test number and parameters on the liner.

e. The Contractor shall supply a field tensometer for testing liner seams for shear and peel strength. The tester shall be available for the Engineer's use.

f. Qualifying seams will be tested by the Engineer.

g. The Engineer is responsible for maintaining testing records.

h. All coupons and test specimens remain the property of the Owner

.2 Preliminary Qualification

a. Upon delivery of the material to the site, the Contractor shall remove a sample and submit it to the Engineer for audit testing if required. Samples shall consist of a strip 0.75 m wide cut across the full width of one roll, which was not sampled at the factory. If all rolls were sampled, then one roll shall be picked at random by the Engineer.

b. Immediately after delivery of material to the site, the Contractor shall submit to the Engineer a 1 m long sample of each type of seam to be used in the installation. The test seams will be fabricated from a sheet used in the installation by a welder working on the installation. Test seams will be used to evaluate the welding procedures used by the Contractor. Evaluation of welding procedures will involve destructive testing, as described in this specification, for each type of weld. Test values obtained during this procedure will not be considered as "bench mark" values for any subsequent evaluations.

.3 Qualifying Welds

a. Qualifying seams shall be conducted on fragment pieces of sheet at the following times:

- At the start of each shift of production seaming, and at 4 hour intervals during production seaming,
- When a new operator or new machine starts welding,
- When a machine is restarted after repairs,
- When welding is stopped for sixty (60) minutes or more,
- When there is a change in the ambient conditions, and
- At the discretion of the Engineer.

b. Qualifying seams shall be 1 m long, and shall be subject to shear and peel testing. The test seam shall meet the minimum requirements stated herein for seam strength, when tested on a field tensiometer. If a qualifying seam fails, the seaming procedure must be reviewed and the test must be repeated.

.4 Non Destructive Testing

a. Test all welded seams over their full length using a vacuum unit or air pressure test (for split-wedge fusion process).

- Seam intersections will also be subject to vacuum box testing, regardless of seaming method employed.
- The Contractor shall supply all apparatus and personnel for this type of test.
- The tests shall be witnessed and documented by the Engineer.

b. Clean all seams to permit proper inspection.

c. Repair any seams which fail non-destructive testing in accordance with this Specification. Repairs shall be fully documented by the Contractor.

.5 Destructive Testing for Production Seams

a. Cut-out coupons shall be taken at a minimum frequency of one (1) per 150 m of seam, or once per seam. Coupons shall be cut by the contractor at the location directed by the Engineer. Coupons should generally be taken form a location that does not affect the performance of the liner. All cut-outs must have rounded corners. Care shall be taken to ensure that no slits penetrate the parent liner.

b. All holes left by cut outs must be patched immediately.

.6 Testing of Repairs

a. All repairs shall be tested using the Air Lance or Vacuum Box methods as laid out in ASTM 4437-84 or CGSB 148.1 Method 111, respectively.

.7 Seam Acceptance Criteria

a. Seam and adhesion tests will be performed according to ASTM D3083 NSF54 and ATSM D413 NSF54.

b. Seam and adhesion strength acceptance will be based on five (5) samples in each coupon, which must meet or exceed the minimum value specified. No individual sample may have a seam shear strength less than the minimum value specified in Table 1007.2.

c. If a coupon does not meet the acceptance criteria, two (2) additional coupons shall be cut from the seam within three (3) meters to each side of the failed coupon, and tested. This shall continue until the extent of the unsatisfactory seam has been defined.

.8 Seam Strength Acceptance

a. All seams shall meet or exceed the seam strength and adhesion criteria presented in Table 1007.2

.9 Vacuum Box Testing and Fusion Seam Pressure Testing

a. No leaks shall be permitted. Leak testing shall be conducted using vacuum box testing and fusion seam pressure testing.

b. If a vacuum box test cannot be carried out on a particular area a pick test and air lance test must be performed on the area.

.10 Air Pressure Testing

a. Air pressure tests must be conducted for seams made with split wedge welding. The split wedge welder prepares welds with two bonded areas separated by an unbonded channel. This channel can then be sealed at each end and air pressure applied to determine the integrity of the seams. Air pressure testing shall be carried out according to GRI Test Method GM6, Pressurized Air Channel Test for Dual Seamed Geomembranes.

APPENDIX

APPENDIX F EBA GEOTECHNICAL GENERAL CONDITIONS

GEOTECHNICAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

2.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

3.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

4.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

5.0 SURFACE WATER AND GROUNDWATER CONDITIONS

Surface and groundwater conditions mentioned in this report are those observed at the times recorded in the report. These conditions vary with geological detail between observation sites; annual, seasonal and special meteorologic conditions; and with development activity. Interpretation of water conditions from observations and records is judgmental and constitutes an evaluation of circumstances as influenced by geology, meteorology and development activity. Deviations from these observations may occur during the course of development activities.

6.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

7.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

8.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

9.0 OBSERVATIONS DURING CONSTRUCTION

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

10.0 DRAINAGE SYSTEMS

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

11.0 BEARING CAPACITY

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

12.0 SAMPLES

EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the client's expense upon written request, otherwise samples will be discarded.

13.0 STANDARD OF CARE

Services performed by EBA for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practising under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

14.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

15.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by EBA shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by EBA shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

The Client recognizes and agrees that electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.