GOVERNMENT OF YUKON

CLINTON CREEK CHANNEL STABILIZATION (STAGE II) CONSTRUCTION REPORT

Prepared for:
Government of Yukon

Prepared by:
UMA Engineering Ltd.
1479 Buffalo Place
Winnipeg, Manitoba, R3T 1L7

UMA Job No. 6029 004 00

December 2003

December 9, 2003

File: 6029-004-00

Government of Yukon
Energy, Mines and Resources
Box 2703 (K-419)
Whitehorse, Yukon
Y1A 2C6

Attention: **Mr. Hugh Copland**

Reference: **Clinton Creek Asbestos Mine – Clinton Creek Channel Stabilization (Stage II) - Construction Report**

Enclosed are six copies of our construction report summarizing the channel stabilization works completed between July and September of 2003 at the abandoned Clinton Creek Asbestos Mine. These repairs constitute the second stage of the channel stabilization work described in our Environmental Liability Report (UMA 2003).

The work undertaken between July 5 and September 26, 2003 includes constructing the second drop structures downstream of the outlet from Hudgeon Lake. Some maintenance to Drop Structure 1, which was constructed in 2002, was required to repair a scour hole at the downstream end which developed during the spring 2003 freshet. These repairs involved placing an additional row of gabion baskets at the downstream end of Drop Structure 1. This modification to the design was also included on Drop Structure 2. The channel stabilization work completed in 2003 has further helped to mitigate the concern related to a catastrophic breach of the waste rock blockage forming the Hudgeon Lake outlet.

If we can be of further assistance, please contact Gil Robinson.

Yours truly,

UMA ENGINEERING LTD.

Tom Wingrove, P.Eng.
Vice President
GR/dh

Larry Bielus
Manager, Manitoba
Earth & Environmental

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1 INTRODUCTION

This report summarizes the second stage of the Clinton Creek channel stabilization work completed at the abandoned Clinton Creek Asbestos Mine in the Yukon Territory. The work was undertaken to stabilize the first 180 metres of the Clinton Creek channel across the waste rock dump to help mitigate the downstream hazards associated with a sudden breach of the Hudgeon Lake outlet. In September 2002, the first stage of the work was completed which included construction of the first drop structure and re-grading of the Hudgeon Lake outlet.

The intent of the second stage of the channel stabilization work was to complete all of the channel stabilization works during the 2003 construction season. The original design for Stage II assumed that six drop structures would be required. However, upon further investigation of channel stability in early August it was recommended that the last two drop structures be eliminated. The second drop structure was built and site preparation for the remaining two structures was completed by the end of August 2003. Due to weather conditions experienced in September construction of Drop Structures 3 and 4 has been deferred to 2004.

2 BACKGROUND

In 2002, the channel stabilization work was completed for Indian and Northern Affairs Canada, Waste Management and Northern Contaminants Programs. In 2003, the work was completed for the Government of Yukon, Energy Mines and Resources who is now responsible for the Clinton Creek mine following the devolution process between the Federal Government and the Yukon Territorial Government.

A pre-construction meeting was held in late May 2003 to discuss the work with the Contractor (Hän Construction Ltd.), the Government of Yukon, Department of Fisheries and Oceans and UMA Engineering Ltd. The available work window for 2003 was estimated to extend from June to the end of September or possibly the first week of October. Work was initiated in the last week of June and continued to the end of August. Inclement weather conditions in September precluded any further channel stabilization work and the completion date for the overall channel stabilization work is now expected to be September 2004.

3 CHANNEL STABILIZATION WORK

3.1 Introduction

The work was completed under a Contribution Agreement between the Government of Yukon and the Tr'ondëk Hwëch'in First Nation. Construction was undertaken by Hän Construction Ltd. from Dawson City, Yukon, which is owned by Chief Isaac Inc., a business unit of the Tr'ondëk Hwëch'in First Nation. Site supervision was provided by the Government of Yukon and UMA Engineering.

The construction activities were completed according of the Letter of Advice provided by the Department of Fisheries and Oceans (DFO) approving the proposed channel stabilization work and the Land Use Permit which was obtained by the Government of Yukon. Copies of both are included in Appendix A. The Letter of Advice required that the work be conducted in a manner to minimize the release of sediment to downstream waters and that deleterious substances, and specifically lubricants, coolants and fuels be used, transferred and stored in such a manner that they are not and do not become deposited in fish bearing waters. In addition, the work had to be conducted in a manner to prevent harmful alteration, disruption or destruction of fish habitat.

3.2 Health and Safety

The main health risk for the channel stabilization work is the inhalation of airborne asbestos fibres. The air monitoring results from the Stage I repairs indicated that the activities associated with the channel repairs did not result in a concentration of airborne fibres that exceeded permissible asbestos exposure limits of 0.5 fibres per ml in an 8-hour period as outlined in the Occupational Health and Safety Handbook prepared by the Yukon Workers Compensation Board. The air monitoring results from 2002 were at least an order of magnitude lower than the permissible exposure limits (UMA 2003a). Similar results were obtained in 2003 from samples taken during construction and also during a separate site inspection. The health and safety plan for the Stage II construction work (Appendix B) was modified from the plan developed for the

Stage I repairs to require the Contractor to have the necessary protective gear on hand for use as required.

3.3 Construction Activities

Construction activities included:

- Maintenance to the mine access road included resurfacing soft areas and cleaning out ditches and culverts. Thirteen existing culverts were located along the access road. These locations are identified in Appendix C.
- Production of gabion rock fill, 75mm down gravel and 200mm oversize material from the bedrock outcrop at Wolverine Creek (Photograph 3-1),
- Construction of a cofferdam across the outlet from Hudgeon Lake (Photograph 3-2),
- Backfilling and shaping the creek channel to the design grades for Drop Structure 2 (Photograph 3-3 & 3-4),
- Construction of Drop Structure 2 (Photograph 3-5 and 3-6),
- Repairs to Drop Structure 1 (Photograph 3-7 and 3-8),
- Restoring flow from Hudgeon Lake into Clinton Creek (Photograph 3-9)
- Site preparation for Drop Structures 3 and 4 (Photograph 3-10).

The work completed is briefly described below, additional details can be found on the Weekly Project Reports in Appendix D. Table 3-1 summarizes the approximate number of working days for each of the main construction tasks. Selected photographs have been included in this report and a complete set of digital photographs has been provided separately on Compact Disc. Record drawings of the channel stabilization work are included in Appendix E. The waste rock side slope grading outlined in the specifications (Appendix B) was not completed because the top edge of the waste rock pile within reach of the excavator is typically at a slope of 1H:1V, and in any case the top portions of the slope already have some established vegetation that would have been destroyed by completing this work.

Table 3-1) Approximate Construction Days For Major Work Tasks

Work Task	Equipment (days)	Labour (days)
Mobilization / Camp Set-up	4	4
Site Access / Road Maintenance	4	5
Granular material production	20	0
Gabion Basket Pre-Assembly	0	20
Drop Structure 2	13	10
Site preparation for Drop Structures 3 and 4	6	0
Stand-by Time (September)	18	0
Site Cleanup / Demob	5	2
Total Days	**70**	**41**

Week 1 (ending July 5)

Work completed during the first week to 10 days of work included mobilization of equipment, construction camp set-up, and delivery of materials leftover from 2002 (Table 3-2). The construction equipment mobilized included a D7 Caterpillar bulldozer, a 966C Caterpillar loader, a 320L Caterpillar excavator, a tandem dump truck and the screen decks required for production of granular materials. Some maintenance to the mine access road and the ford crossing to the waste rock pile was completed.

Week 2 (ending July 12)

Production of the gabion fill material and pre-assembly of individual gabion baskets was started. All the gabion baskets, geotextile were delivered to site along with the staple guns purchased for assembly of the baskets.

Weeks 3 and 4 (ending July 19 & 26)

Production of gabion fill material and gabion basket assembly continued. Granular materials were stockpiled at the lake outlet.

Table 3-2) Materials

Item	Quantity Delivered		Quantity Used	*Quantity Remaining
	2002 Stock	New		
Gabion Baskets 3m x 1m x 0.5m – PVC coated	370	530	217	683
Gabion Baskets 3m x 1m x 0.3m – PVC coated	n/a	40	0	40
Non-Woven Geotextile (ARMTEC 350) 418 m^2 per roll	4 rolls	16 rolls	6	14
Pneumatic Staple Guns (used for assembling baskets)	0	2	2	2
Manual Staple Gun	0	1	1	1
Stainless Steel Rings	28 boxes	43	41	30 boxes
HDPE culvert pipe (6m x 0.2m)	n/a	8	2	6
HDPE culvert pipe couplers	n/a	5	1	4
Gabion Fill (m^3)				1500
75mm down gravel fill (m^3)				1000
200mm over rip rap (m^3)				200

*Note: The geotextile, culverts and gabion staples have been stored at Gillespie Equipment Rentals located in the Callison Industrial Area at Dawson City, YT. The staple guns are stored at Hän Construction Ltd. The gabion baskets were left at the mine site work area.

Week 5 (ending August 2)

Maintenance work to the mine access road was largely completed. Preliminary preparation (i.e. site access) for the construction of Drop Structure 2 (DS-2) was completed, the cofferdam was installed and the fish salvage was completed.

Week 6 (ending August 9)

Preparation of creek channel and foundation for DS-2. Install Tiers 1 and 2 of DS-2.

Week 7 (ending August 16)

Finish construction of DS-2 and backfilling of the channel between DS-1 and DS-2. Removal of the cofferdam to re-instate flow into Clinton Creek from Hudgeon Lake.

Week 8 (ending August 23)

No construction work completed, Contactor off for a week before continuing with work.

Week 9 (ending August 30)

Preliminary preparation of creek channel side slopes and access roads needed for construction of DS-3 and DS-4.

Weeks 10 and 11 (ending September 6 and 13)

No channel stabilization work completed due to heavy rains that occurred between August 29 and September 2, which resulted in high flows in Clinton Creek. These high flows precluded installation of the cofferdam at the Hudgeon lake outlet.

Two days were spent working on the mine access road filling in low spots and locating and clearing out the existing culverts.

Week 12 (ending September 20)

No construction work completed, however two-200mm diameter siphons were installed over DS-1 to assist in drawing down Hudgeon Lake with the anticipation of resuming work on September 22.

Week 13 (ending September 27)

On September 22, a decision was made to defer further construction until 2004. This decision was made based on the cool weather experienced over the last 3 weeks and the snowfall that occurred on the previous weekend. Continued construction was deemed to be un-safe due to the icy conditions at the work site. In addition, a 10 to 14 day work window with fair weather was required to complete the work which was unlikely to happen at this time of the year.

3.4 Fish Salvage and Habitat

In accordance with the work plan and Letter of Advice provided by DFO in 2002 (Appendix A), a fish salvage operation was completed between the Hudgeon Lake outlet and Wolverine Creek. Removal of the cofferdam was undertaken in a manner to reduce sediment load. All bulk fuel storage tanks were located in a pit lined with a geomembrane.

Following installation of the cofferdam, a fish salvage operation was undertaken by INAC to recover fish trapped in the creek channel between the cofferdam and the beaver dams just upstream from Wolverine Creek. Approximately 1,500 fish were salvaged and placed into Hudgeon Lake or Clinton Creek downstream of the confluence with Wolverine Creek. Fish passage back into creek channel upstream of the beaver dams was blocked both by the beaver dams and natural creek channel features. A report on the fish salvage operation has been prepared by Pat Roach (INAC) and has been included in Appendix F.

The sediment load generated during removal of the cofferdam was minimal because of the low lake level (400mm deep behind the dam) that allowed the vast majority of the cofferdam to be removed under zero flow conditions (Photograph 3-9). Water flowing through the new outlet from Hudgeon Lake began to run clear within 20 to 30 minutes of restoring the flow. The sediment load in the creek channel was also reduced by the presence of beaver dams and marsh areas downstream of the waste rock pile.

3.5 Control of Water

Water flowing from Hudgeon Lake was controlled during the construction period by i) allowing water levels in Hudgeon Lake to drop naturally to increase upstream storage, ii) constructing a cofferdam across the lake outlet.

Low precipitation amounts in June and July allowed Hudgeon Lake to drain naturally down to elevation 411.2m before installing the cofferdam. The cofferdam was constructed across the lake outlet using waste rock material (mainly argillite). Water levels in the lake only increased to an elevation of 411.45m between August 2 and August 14. A graph of the lake levels is included in Appendix C.

4 PERFORMANCE AND MAINTENANCE

4.1 Performance Of Drop Structure No. 1

Drop Structure 1 (DS-1) performed well following the removal of the cofferdam in the fall of 2002 and there were no signs of frost heaving or ice damage during a site visit in March 2003. The higher flows experienced during the spring freshet of 2003 resulted in the formation of a scour hole in the channel riprap at the downstream end of the drop structure. Other relatively minor issues were also noted including the loss of material in some of the gabion baskets and a slight upstream rotation of the top tier of baskets.

Photograph 4-1 shows the turbulence at the downstream end of DS-1 that caused the scour hole and resulted in some erosion of foundation material under the left-hand (i.e. when facing downstream) side slope. Four baskets at the bottom of this side slope experienced some settlement (ranging from 50mm to 250mm) but the flexible nature of the baskets helped mitigate any further loss of material under the side slope (Photograph 4-2). Formation of the scour hole was a consequence of not having downstream water level control, which is now provided by DS-2. The downstream water level control provided by DS-2 is illustrated on Photograph 4-3, which was taken during the high flows in early September 2003. Note the lack of turbulence at the downstream end of DS-1. Repairs to DS-1 included the installation of an extra row of baskets at the downstream end where most of the turbulence took place (Photograph 3-7). The record drawing for DS-1 was updated to reflect this change and is included in Appendix E. This same detail was added to DS-2 as well. No signs of high turbulence or loss of material were observed at the downstream end of DS-2 during the high flows in September 2003 (Photograph 4-4).

Some loss of material from the gabion baskets in DS-1 was noticed following the 2003 spring freshet. This mainly occurred on the horizontal baskets forming the floor of each tier where much of the energy from the water spilling over the drawdown weir was dissipated. This resulted in the loss of some of the smaller material (< 75mm diameter) and also some re-adjustment of the fill within the basket. Under the higher flows the force of the water spilling down on to the

baskets appears to have rolled some of the fill upward into the end of some cells (each basket is subdivided into three cells). This effect can be seen in Photograph 4-5 where there is a small scour hole in upstream end of a given cell and upward bulging of the wire mesh at the downstream end of the cell. Approximately 15 baskets, including the end sill, were opened and topped up with 100mm to 200mm diameter gabion fill. Similar observations were made in DS-2 after the high flows in September 2003 subsided, but not to the extent that warranted opening the baskets and topping them up with rock.

It was also noticed that the top most tier of baskets (Tier 4) in DS-1 has rotated upstream due to the settlement at the upstream edge of the baskets. This is likely due to the loss of some material under the baskets and may be a secondary impact due to the scour hole that developed at the downstream end of DS-1 in the spring of 2003. This tier of baskets should be monitored to determine if the movements are on-going.

A survey of DS-1 was completed in August 2003 and compared to that from October 2002. The survey shows that there is typically less than 50mm of settlement. Approximately 100mm of settlement appears to have occurred at the top of the right-hand slope (i.e. when facing downstream). Given that the uneven surface of the baskets could easily result in an error of +/- 50mm the comparison of the two surveys suggests that no significant settlement has taken place. The gabion baskets are flexible enough to accommodate this magnitude of settlement.

4.2 Long Term Maintenance

The frequency of maintenance to the drop structures as a result of the environmental conditions that the gabions and the rock fill are exposed to and / or the potential movements of the waste rock pile across the stabilized portion of Clinton Creek has yet to be determined. The gabion baskets are coated with PVC to provide an additional layer of protection against damage to the galvanized wire during construction and also to provide additional protection against corrosion of the galvanized wire. Although there is no published information, the manufacturer of the baskets (Maccaferri Canada) indicated that they use a conservative design life of 35 years for the PVC coated galvanized wire baskets. They suggested that the baskets below the water line are at a lower risk to corrosion. Their experience has shown that the baskets do not undergo

widespread corrosion, dependent on the environmental conditions of course, but they have localized corrosion problems that can be repaired by placing a patch over the affected area. The patch is made up of the same material as the baskets with edges of the patch fastened to the existing baskets that are not showing signs of corrosion.

The rock for the gabion fill was selected because it was the best available material within the local area. However, over the long term the gabion fill material may be affected by freeze-thaw cycles that can break down the rock. It is not certain how resistant this rock will be to freeze-thaw cycles. There is also a possibility that ice wedges (referred to locally as 'glaciers') may form under the gabion baskets due to water seeping out from the waste rock pile. There were no signs of this effect observed at Drop Structure 1 in the winter of 2002/2003, although the structures could undergo heaving if the water seeping from these points begin to freeze under the gabions. Because the gabion baskets are flexible, it is not know if these effects would be detrimental to the integrity of the structure but it is anticipated that they can accommodate the movements.

Movement of the waste rock pile across the stabilized portion of the channel will be monitored using steel pins driven into the ground at the top of the channel bank on either side and in-line with the drawdown weir of each drop structure. These monitor points will allow measurement across the drop structure to determine if the structure is being squeezed by creep movements of the waste rock pile. The initial measurements for Drop Structure 1 are provided in a table, which is included in Appendix C. Movements of the waste rock pile can be confirmed by surveying the movement monitors located across the waste rock pile. These measurements should indicate whether or not the waste rock pile is moving across the Clinton Creek channel and if the movements are affecting the drop structures. Based on the waste rock monitoring to date it is believed that the waste rock movements are on the order of about 10cm per year and may be decreasing with time (UMA 2003).

5 STAGE III CONSTRUCTION

Because the inclement weather in September 2003 prevented completion of the Stage II work a third stage will be required in 2004 to construct the final two drop structures (DS-3 and DS-4). We estimate that about 21 working days will be required to complete the work. The work completed to date includes the pre-assembly of all the gabion baskets required to construct DS-3 and DS-4, preliminary channel grading for DS-3 and DS-4 and the production of the granular materials required. The volume of gabion fill produced should be sufficient to finish the work. However, if more material is required, it may be necessary to drill and blast material from the bedrock outcrop at Wolverine Creek. Work can resume once the levels in Hudgeon Lake drop to about 411.30 m. There are two siphon pipes (200mm diameter) stored at the site that can be used to help draw down the lake. Timing for the work will be dependent on the amount of precipitation in the spring and summer of 2004.

Respectfully Submitted,
UMA Engineering

PROFESSIONAL ENGINEER
YUKON TERRITORY
K. M. SKAFTFELD
09/12/03.

Gil Robinson
Earth and Environmental

Ken Skaftfeld, P.Eng.
Senior Geotechnical Engineer
Earth and Environmental

PERMIT TO PRACTICE
Signature
Date December 09/03.
PERMIT NUMBER: PP066
Association of Professional Engineers of Yukon

REFERENCES

UMA Engineering Ltd., 2003. "Indian and Northern Affairs Canada, Abandoned Clinton Creek Asbestos Mine, Environmental Liability Report."

UMA Engineering Ltd., 2003a. "Indian and Northern Affairs Canada, Clinton Creek Channel Stabilization (Stage I), Construction Report."

Photographs

Photograph 3-1) Quarry site at Wolverine Creek.

Photograph 3-2) Compacting cofferdam at lake outlet.

Photograph 3-3) Initial placement and compaction of foundation material.

Photograph 3-4) Placement and compaction of foundation material –final stages.

Photograph 3-5) Drop Structure 2 - Placement of gabion baskets for tier 1.

Photograph 3-6) Drop Structure 2 completed, 2.5 m tall.

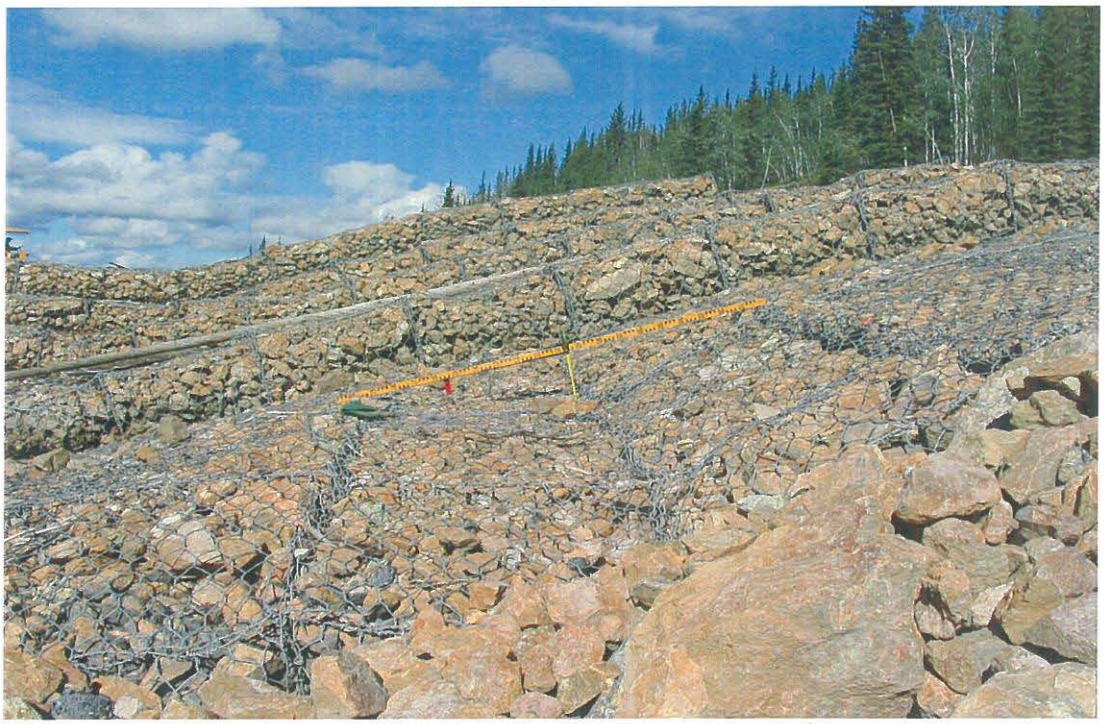
Photograph 3-7) Placing additional row of baskets at end of Drop Structure 1.

Photograph 3-8) Additional row of baskets installed at end Drop Structure 1.

Photograph 3-9) Restoring flow from Hudgeon Lake.

Photograph 3-10) Site preparation for Drop Structures 3 and 4.

Photograph 4-1) Turbulent flow over Drop Structure 1 on April 28, 2003.



Photograph 4-2) Settlement (250mm max.) of baskets on LHS of Drop Structure 1.

Photograph 4-3) Drop Structure 1: Turbulence confined to the gabion baskets (September 2003).

Photograph 4-4) Drop Structure 2: minimal turbulence just downstream of baskets.

Photograph 4-5) Gabion fill rolled ahead and upward, note bulged wire mesh.

Appendix A -
Letter of Advice From Department of Fisheries and Oceans
& Land Use Permit

Fisheries and Oceans | Pêches et Océans

Habitat and Enhancement Branch
Fisheries and Oceans Canada
100-419 Range Road
Whitehorse Yukon
Y1A 3V1
Fax 867-393-6737

Your file Votre référence

Our file Notre référence

Sept 6, 2002

Waste Management Program
345-300 Main Street
Whitehorse YT
Y1A 2B5
Attn Brett Hartshorne

Re: **Clinton Creek Channel Stabilisation Project – Amendment to August 16 Letter of Advice**

A template used to prepare the August 16, 2002 letter of advice provided to you had an error. One of my colleagues with a sharper eye than mine found it and brought it to my attention.

The error is found in the second-to-last paragraph, which reads:

"Please also note that this letter of advice does allow the deposit of a deleterious substance into waters frequented by fish and does not release you from the responsibility for obtaining any approvals that may be required under other federal legislation, or the legislation of any other relevant government."

Please accept the following paragraph as being valid as advice pursuant to the *Fisheries Act* and consider it to be an amendment to the original Letter of Advice:

"Please also note that this letter of advice does **not** allow the deposit of a deleterious substance into waters frequented by fish and does not release you from the responsibility for obtaining any approvals that may be required under other federal legislation, or the legislation of any other relevant government."

My apologies for any difficulty that this oversight on my part may have caused you.

Sincerely,

Al von Finster
Resource Restoration Biologist

Canada

4440-041-01

Fisheries and Oceans / Pêches et Océans

Habitat and Enhancement Branch
Fisheries and Oceans Canada
100-419 Range Road
Whitehorse Yukon
Y1A 3V1
Fax 867-393-6737

cc: G. Robinson
Orig: Gen. File

August 16, 2002

Waste Management Program
345-300 Main Street
Whitehorse YT
Y1A 2B5
Attn Brett Hartshorne

TO:
Gil Robinson
UMA Engineering Ltd.
Winnipeg, Manitoba
Fax: 204-453-9167

FROM:
Brett Hartshorne
DIAND - Waste Management
Whitehorse, Yukon

P.1 of 2

Gil:
For your information.

Regards,

Brett

Re: **Clinton Creek Channel Stabilisation Project**

Fisheries and Oceans Canada (DFO) has received your proposal to stabilize the channel of Clinton Creek below Hudgeon Lake. The project is described in the May 2002 INAC Abandoned Clinton Creek Asbestos Mine Environmental Liability Report, the August 2002 Project Description for Abandoned Clinton Creek Asbestos Mine Creek Channel Stabilization and in your letter of August 16, 2002 to myself providing clarification on components of the project. Where there is any difference between any of these documents, the most recent document is considered to be the proposal for the work or undertaking concerned.

Provided you implement your proposal, as set out in the documents noted above and in accordance with the advice given below, it is our opinion that the plan as proposed is adequate to protect fish and fish habitat.

Our advice is:

- That the closing of the existing channel of Clinton Creek, construction of the stabilized channel, and the opening of the stabilized channel be done in such a manner as to minimize the release of sediment to downstream waters;
- That all deleterious substances and specifically lubricants, coolants and fuels be used, transferred and stored in such a manner that they are not and do not become deposited in fish bearing waters;
- That DFO is immediately contacted should there be any unexpected circumstances which may result in the harmful alteration of fish habitat as a result or consequence of the project. Contact is to be myself at ph. 393-6721, email vonfinstera@pac.dfo-mpo.gc.ca

If the harmful alteration, disruption or destruction of fish habitat occurs as a result of a change in the project plans, or because of a failure to properly implement the measures outlined in your plans and this letter, contravention of section 35(1) of the Fisheries Act could occur. Section 35(1) the states:

> "No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat."

This Letter of Advice is intended to provide recommendations to ensure that the proposed works are conducted and completed in manner that avoids adverse impacts to fish and fish habitat. It is not an authorization pursuant to s. 35(2) to conduct works that will result in a HADD.

Please also note that this letter of advice does allow the deposit of a deleterious substance into waters frequented by fish and does not release you from the responsibility for obtaining any approvals that may be required under other federal legislation, or the legislation of any other relevant government.

We would request that you notify us when work will commence and that a copy of this letter be kept on site while works are in progress. If you have any questions concerning the measures listed, or should there be any changes to the proposed work, please contact me directly at 393-6721, email vonfinstera@pac.dfo-mpo.gc.ca

Sincerely,

Al von Finster
Resource Restoration Biologist

Copy: J. Duncan, YSC;
B. van Dijken, YSC;
Dawson RRC;
Vince Fraser, TdHFN;
GY Fisheries;
DFO C&P

4440- 041-01

Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

Waste Management Program
345 - 300 Main Street
Whitehorse, Yukon
Y1A 2B5
Phone: 867-667-3268
Fax: 867-667-3271
e-mail: hartshorneb@inac.gc.ca

August 16, 2002

Department of Fisheries and Oceans
100 - 419 Range Road
Whitehorse, Yukon
Y1A 3V1
Attn: Mr. Al Von Finster

TO:
Mr. Gil Robinson
UMA Engineering Ltd.
Winnipeg
FAX: 204-453-9167

FROM:
Brett Hartshorne
DIAND - Waste Management
Whitehorse

Gil:
Copy for your records.

Regards,

VIA FAX: 867-393-6737

Page ONE of THREE

cc: G. Robinson
Doug - Ken Fehr

Dear Mr. Von Finster:

Re: Clinton Creek Asbestos Mine - Clinton Creek Channel Stabilization Project

DIAND - Waste Management Program is planning to undertake a channel stabilization project on Clinton Creek at the outlet of Hudgeon Lake. We wish to provide, for your review, the following information in addition to the Project Description.

As discussed with you in Dawson City, Yukon on July 24, 2002 the following changes to the design of the short-term channel stabilization works for Clinton Creek will be incorporated:

1. Draw-Down Reduction Weir:
The draw-down reduction weir has been shifted in the upstream direction to provide a 1.0 metre horizontal run between the drawdown reduction weir and the first 0.5 metre step. (A drawing of a typical gabion drop structure is attached.) The end sill of each structure will be relocated during construction such that it is at least 1.0 metre upstream of the downstream end of the gabion structure. This will help to reduce the erosion potential of the channel rip rap placed immediately downstream of each drop structure.

2. Flow During Construction:
We also discussed how the flow from Hudgeon Lake will be handled during construction. Construction of the drop structures will require that the flow be diverted around the work site for a distance of up to 150 metres. This will require that the outlet be dammed off and the flow maintained using a siphon pipe. The objective will be to start the siphon prior to damming off the outlet in order to maintain continuous flow in the channel.

../2

The siphon will consist of one or more pipes ranging in diameter from 200 to 300 mm, what ever may be required to maintain an adequate flow in the channel. A spillpad will be constructed at the downstream end of the siphon to prevent any erosion of the channel bed. The spill pad will be constructed using gabion baskets, clean rock and geotextile. This spill pad will be maintained as required during construction. Upon completion of the work, natural flow will be introduced into the stabilized channel by maintaining the siphon flow until the dam at the outlet is removed. If the level of the lake is below the invert of the outlet at this time the siphon will be allowed to flow into the new channel until the lake recovers sufficiently to begin flowing over the outlet.

3. Increasing Final Lake Elevation:
We also discussed the potential for increasing the elevation of the outlet from Hudgeon Lake by about 300 millimetres. The only concern from a geotechnical view is that the increased water elevation may increase the potential for piping conditions to develop in the channel bed and channel side slopes. All efforts will be made to raise the outlet by approximately 300 millimetres, provided that the stability of the outlet is not compromised.

4. Fish Salvage:
A fish salvage operation will be conducted to retrieve any fish in the creek construction area prior to adjustments to the flow. This will be accomplished by anesthetizing fish in an area approximately 200 metres downstream from the outlet of Hudgeon Lake. (Electrofishing techniques will be implemented if the anesthetizing operation is not successful.) The fish will be appropriately transported to an area downstream of the construction. An experienced team, lead by Mr. Pat Roach of DIAND, will be conducting this operation.

Please review this information. If you have any further questions, or require any clarification, please contact me directly.

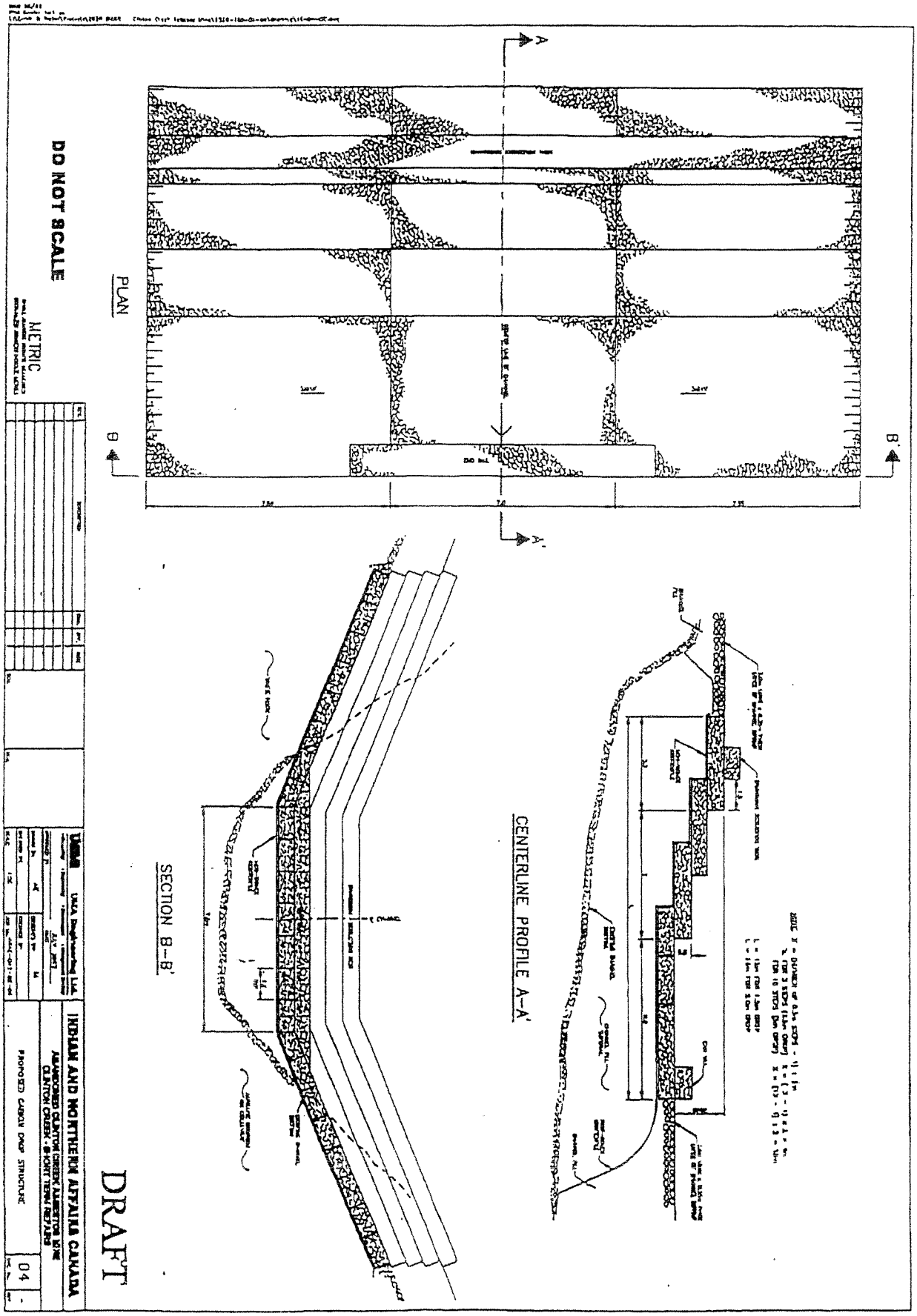
Thank you for your input and continuing efforts on this project.

Sincerely,

Brett Hartshorne, Manager

attached: UMA Drawing 4

cc: Pat Roach - DIAND
Gil Robinson - UMA Engineering Ltd.


DO NOT SCALE
METRIC
PLAN
A
A'
B
B'
CENTERLINE PROFILE A-A'
SECTION B-B'
DRAFT
INDIAN AND NORTHERN AFFAIRS CANADA
ABANDONED CLINTON CREEK, YUKON TERRITORY
CLINTON CREEK - SHORT TERM REPAIRS
PROPOSED CARBON DROP STRUCTURE
04

Yukon
ENERGY, MINES & RESOURCES
Box 2703, Whitehorse, Yukon Y1A 2C6
Lands Branch, Land Use Section (K-16)
Phone (867) 667-3173 Fax (867) 667-3214
1-800-661-0408

30 June 2003

YA3E005

YG, EM&R, Abandoned Mines and Assessment
Box 2703 (K-419)
Whitehorse, Yukon
Y1A 2C6

Attn: Hugh Copland

LAND USE PERMIT YA3E005
ROAD REPAIR
CLINTON CREEK MINE

Your Land Use Permit with associated terms and conditions is available to be picked up at the Klondike District Office.

Please make an appointment with Marc Dionne, SNRO Klondike at (867) 993-5468 to pick up your permit and review the operating conditions.

Should you have any questions, please contact me at 667-3173.

Yours truly,

Marg White
Manager, Land Use

/bs

c. SNRO, Klondike
Tr'ondek Hwech'in First Nation
YG, Environment

COPY

LAND USE PERMIT
PERMIS D'UTILISATION DES TERRES

ENERGY, MINES & RESOURCES
Box 2703, Whitehorse, Yukon Y1A 2C6
Lands Branch, (K-320)
Phone 667-3173 Fax 667-3214

Permit Class - Permis categorié	Permit No. – No de permis
A	YA3E005

Subject to the Land Use Regulation and the terms and conditions in this permit, authority is hereby granted to:

Sous réserve du Règlement sur l'utilisations des terres territoriales et des conditions de ce permis:

YUKON GOVERNMENT
ENERGY, MINES AND RESOURCES
ABANDONED MINES & ASSESSMENT

Permittee – Détenteur de permis

COPY

To proceed with the land use operation described in the Application of:

Est autorisé à entreprendre les travaux d'exploitation des terres décrits dans la demande de permis du:

Signature	Date
HUGH COPLAND	5 JUNE 2003

Type of Land Use Operation – Genre de travaux d'exploitation des terres

ROAD REPAIR

Location – Emplacement

BETWEEN FORTY MILE BRIDGE AND CLINTON CREEK MINE

This permit may be assigned, extended, discontinued, suspended or cancelled pursuant to the Territorial Land Use Regulations.

Ce permis puet faire l'objet d'une cession, d'une prolongation, d'une cessation, d'une suspension ou d'une annulation, en vertu du Règlement sur l'utilisation des terres territoriales.

Dated at / Daté à: WHITEHORSE, YUKON

Engineer / Ingénieur: _____

This / Ce: 30TH Day of / jour de: JUNE 2003

Commencement Date / Date du début des travaux: 30 JUNE 2003

Expiry Date / Date d'achèvement: 29 JUNE 2005

NOTE

IT IS A CONDITION OF THIS PERMIT THAT THE PERMITTEE WITH ANY OTHER APPLIABLE ACT, REGULATION,ORDINANCE, BY-LAW OR ORDER, DEFAULT HEREOF MAY RESULT IN SUSPENSION OR CANCELLATION OF THIS PERMIT.

REMARQUE

LE DÉTENTEUR DU PRÉSENT PERMIS DOIT COMPLY SE CONFORMER À TOUT AUTRE REGLEMENT, LOI, DÉCRET, REGLEMENT MUNICIPAL OU ARRETÉ APPLICABLE. LE MANQUEMENT À CETTE OBLIGATION POURRAIT DONNOR LIEU À LA SUSPENSION OU À L'ANNULATION DU PERMIS.

COPY

LAND USE PERMIT TERMS AND CONDITIONS

**NAME OF PERMITTEE: YUKON GOVERNMENT
ENERGY, MINES & RESOURCES**

The following terms and conditions are made pursuant to Section 31 (1) of the Territorial Land Use Regulations and are hereby annexed to and form part of Permit **YA3E005.**

3.0 PLANS

1.	The Permittee's field supervisor shall contact or meet with the Land Use Inspector at the Dawson District office of Client Services and Inspections. Phone 867- 993-5468at least 48 hours prior to the commencement of this Land Use Operation.	**CONTACT INSPECTOR**
2.	The Permittee shall not conduct this Land Use Operation on any lands not designated in the accepted application, unless otherwise authorized in writing by the Engineer.	**PLANS**
3.	The Permittee shall, in accordance with Section 32 of the Land Use Regulation submit a Final Plan.	**FINAL PLAN**
4.	The Permittee shall at all times conform to all applicable Federal, Territorial or local regulations, ordinances or by-laws.	**CONFORM TO APPLICABLE LAWS**

4.0 NOTICES / REPORTS

1.	The Permittee shall provide in writing to the Land Use Inspector the following information at least 10 days prior to completion of the Land Use Operation:	**REPORTS BEFORE REMOVAL**
	(a) the plan for removal or storage of equipment and materials; and	
	(b) when final clean-up and restoration of the lands used will be completed.	

OR

The Permittee shall, at least 10 days prior to the completion of the Land Use operation, provide the information of when final clean-up and restoration of the lands used will be completed in writing to the Land Use Officer. **REPORTS BEFORE REMOVAL**

2. The Permittee shall provide in writing to the Engineer, at least 48 hours prior to commencement of this Land Use Operation, the following information: **IDENTIFY AGENT**

   (a) person, or persons, in charge of the field operation to whom notices, orders, and reports may be served; and

   b) alternates; and

   c) all the methods for contacting the above person(s).

3. The Permittee shall contact the Land Use Inspector not less than 5 days prior to start-up during each season during which work will be undertaken; including changes to equipment, contractors or method of operation. **SEASONAL START-UP**

5.0 DISPLAY PERMIT / INSTRUCT EMPLOYEES AND CONTRACTORS

1. The Permittee shall display a copy of this permit on the permit site. **DISPLAY PERMIT**

2. The Permittee shall ensure that a copy of this Permit, operating conditions and definitions is provided to and understood by all contractors and sub-contractors prior to the start-up of this Land Use Operation. **PERMIT CONTRACTORS & SUB-CONTRACTORS**

6.0 EQUIPMENT

The Permittee shall not use any equipment except of the type, size and number that is listed in the accepted application unless **ONLY APPROVED**

otherwise authorized in writing by the Land Use Inspector or the Engineer. **EQUIPMENT**

7.0 PETROLEUM

1. The Permittee shall clearly mark with stakes or flags the location of any spill of any petroleum and forthwith report the time, manner, location, amount and type of spill to the Engineer and Environmental Protection Service. (Environmental Protection Service can be contacted by Phone (867)-667-7244, or Fax (867) 667-7962 in Whitehorse, Yukon). **REPORT PETROLEUM SPILLS**

2. The Permittee shall not allow petroleum products to spread to surrounding lands or into water bodies. **FUEL CONTAINMENT**

3. The Permittee shall dispose of all combustible waste petroleum products as per the Special Waste Regulations of the Yukon Environment Act. **WASTE PETROLEUM DISPOSAL**

4. The Permittee shall at all times have on site sufficient oil spill clean-up equipment and material in readiness to clean-up all petroleum which may be spilled. **OIL SPILL CLEAN-UP EQUIPMENT**

9.0 WILDLIFE HABITAT

1. The Permittee shall take every precaution to ensure that wildlife habitat is not damaged. **HABITAT DAMAGE**

2. The Permittee shall not unnecessarily interfere with critical wildlife activity as specified below: **CRITICAL WILDLIFE ACTIVITY**

3. The Permittee shall, while preparing the access road, make every effort to avoid covering or destroying traps or snares that may be found along these routes. **TRAPS PROTECTION**

4. The Permittee shall restore any trails used by trappers or hunters along access routes by slashing any and all trees that may fall across these paths or trails and by removing any other obstructions such as snow piles or debris that may be pushed across the trails. **TRAILS RESTORATION**

5.	Encounters with wildlife are to be reported to Torrie Hunter, the Conservation Officer in Dawson City at (867) 993-5492.	**ENCOUNTERS WITH WILDLIFE**

12.0 FOREST FIRE PROTECTION

1.	Where burning permits are required for Land Use Operations, the Permittee shall maintain an inventory of fire-fighting equipment as stipulated by the Forest Officer.	**FIRE FIGHTING EQUIPMENT**
2.	The Permittee shall obtain a Burning Permit from the District Office in Dawson City, prior to the commencement of any burning operations.	**BURNING PERMIT**
3.	The Permittee shall ensure all fires associated with this operation are extinguished prior to the completion of the project.	**EXTINGUISH FIRES**
4.	The Permittee is liable for any costs as a result of escape fire associated with this operation.	**SUPPRESSION COSTS**
5.	Where burning has taken place outside of the legislated Fire Seasons all burn piles must be worked either by hand or machinery to ensure complete extinguishment prior to the start of the appropriate Fire Season.	**EXTINGUISH FIRES**
6.	The Permittee shall ensure all fires associated with this operation are extinguished prior to the start of the appropriate legislated Fire Seasons in any year of operation.	**EXTINGUISH FIRES**

13.0 DISPOSAL - BRUSH AND TREES

1.	The Permittee shall totally dispose of all debris and brush by burning.	**BURN BRUSH**
2.	The Permittee shall progressively complete disposal of all debris and brush.	**PROGRESSIVE DISPOSAL**
3.	The Permittee, when burning debris and brush, shall not utilize tires in the burning process.	**TIRES PROHIBITED**

14.0 DISPOSAL - GARBAGE AND SOLID WASTE

1.	The Permittee shall remove all garbage and debris from the area of the Land Use Operation to a disposal site approved in writing by the Land Use Inspector.	**REMOVE GARBAGE**
2.	The Permittee shall ensure that the Land Use area is kept clean and tidy at all times.	**CLEAN WORK AREA**

16.0 DISPOSAL - CHEMICAL AND TOXIC WASTE

1.	The Permittee shall ensure that all special wastes are disposed of in accordance with the Yukon Special Waste Regulations	**SPECIAL WASTES**

17.0 WATER COURSES AND FISH HABITAT

1.	The Permittee shall install culverts or bridges as construction of the road progresses, unless authorized in writing by the Land Use Inspector.	**INSTALLATION CULVERTS/ BRIDGES**

18.0 EROSION CONTROL / PREVENTION

1.	The Permittee shall prepare the site in such a manner as to prevent rutting of the ground surface.	**PREVENTION OF RUTTING**

19.0 RESTORATION

1.	The Permittee shall complete all clean-up and restoration of the lands used prior to the expiry date of this Permit.	**CLEAN-UP**
2.	The Permittee shall remove any obstruction to natural drainage caused by any part of this Land Use Operation.	**NATURAL DRAINAGE**
3.	The Permittee shall complete all clean-up and restoration of lands used, prior to the expiry date of this permit and/or any corrective action date given by a Land Use Inspector, whichever comes first.	**CLEAN-UP PRIOR TO EXPIRY**

21.0 OTHER MATTERS

1.	The Engineer reserves the right to close any area to the Permittee during periods when dangers to natural resources are severe.	**CLOSURE**
2.	The Permittee shall be liable for any costs of clean-up resulting from this Land Use operation.	**CLEAN-UP LIABILITY**

M. White
Manager, Land Use

Appendix B -
Construction Specifications
and
Health and Safety Plan

SET NO.

GOVERNMENT OF YUKON
ENERGY, MINES AND RESOURCES

SPECIFICATIONS FOR
CLINTON CREEK CHANNEL STABILIZATION (STAGE 2)
AT THE
ABANDONED CLINTON CREEK MINE SITE, YUKON TERRITORY

May, 2003

UMA Job No. 6029 004 00

GOVERNMENT OF YUKON
ENERGY, MINES AND RESOURCES

SPECIFICATIONS

FOR

CLINTON CREEK CHANNEL STABILIZATION (Stage 2)

AT THE

ABANDONED CLINTON CREEK MINE SITE,
YUKON TERRITORY

May, 2003

UMA ENGINEERING LTD.
ENGINEERS AND PLANNERS
1479 Buffalo Place
Winnipeg, Manitoba
R3T 1L7

TABLE OF CONTENTS

Material Suppliers

The list of material suppliers we intend to use on the Work is as follows:

Material	Supplier
Geotextile	
Gabion Baskets	
Cofferdam	
Diversion Pipe	
Culverts for main road	

Other:

Labour and Equipment Rate Schedule

The rates for the labour and equipment we intend to use on the Work is as follows:

Labour/Equipment	Hourly Rate ($ per hour)	Standby Rate (if applicable) ($ per day)

Schedule of Work

FOR: CLINTON CREEK CHANNEL STABILIZATION (Stage 2),

ABANDONED CLINTON CREEK MINE SITE, YUKON TERRITORY

Items of Work	Percentage of Work Completed				
	Start Date 0%	25%	50%	75%	Completion 100%
1) Mob / Site Preparation					
2) Material Processing					
3) Lake Diversion/Siphon					
4) Channel Grading					
5) Gabion Drop Structure #2					
6) Gabion Drop Structure #3					
7) Gabion Drop Structure #4					
8) Gabion Drop Structure #5					
9) Gabion Drop Structure #6					
10) Waste rock side slope grading					
11) Site Cleanup / demob					

CONTRACTOR'S PROPOSED COMMENCEMENT DATE _____ 20

Estimated Material Quantities

Item	Description	Quantity			Unit
		Total Required	Leftover from 2002	New	
1.	Gabion baskets (0.5m x 1.0m x 3.0m)	900	370	530	# of baskets
2.	Gabion baskets (0.3m x 1.0m x 3.0m)	40	0	40	# of baskets
3.	Non-woven geotextile	4180	1672	2508	square metres
4.	Gabion fill	1600	0	1600	cubic metres
5.	Channel rip rap	1000	0	1000	cubic metres
6.	Channel fill	1600	0	1600	cubic metres
7.	Waste rock pile - side slope grading	9000	0	9000	cubic metres
8.	Spenax Pneumatic Staple guns (purchased)	2	0	2	Per gun
9.	Culvert pipe (600mm ID)	+/- 250	0	+/- 250	Lineal metres
10.	Culvert pipe (200mm ID)	60	0	60	Lineal metres

SP:1 CLINTON CREEK CHANNEL STABILIZATION

This Specification covers all aspects of the channel stabilization work.

1.1 General Information

The purpose of the work is to mitigate the potential for a breach of the outlet from Hudgeon lake which could result in flash flooding in the Clinton Creek Valley downstream of the mine site. The work involves stabilization of the Hudgeon Lake outlet (completed in 2002) and the Clinton Creek channel downstream of the lake outlet.

1.2 Description of Work

The intent of the work is to stabilize up to 350 lineal metres of the Clinton Creek channel downstream of the Hudgeon lake outlet. Downstream of the lake outlet, approximately six gabion drop structures will be constructed (Drop Structure No. 1 was built in 2002) to flatten the grade of the channel, which will reduce the erosion potential. The drop structures will serve as grade control points and will be constructed using PVC coated gabion baskets filled with clean rock. The existing channel will be filled and shaped as required to construct the drop structures. Downstream of the stabilized area of the channel. the waste rock side slopes will be flattened to reduce sloughing.

The work in the channel shall be constructed under zero flow conditions. A minimum flow of 0.2 m^3/second from Hudgeon Lake shall be diverted around the work area. The work should proceed in a manner that flow can be temporarily increased or re-instated into the channel to account for increased flows from the lake resulting from precipitation events. The water elevation in Hudgeon Lake must be maintained between elevation 411.0 and 412.2 metres.

1.3 Laws and Regulations, Health and Safety Plan

All activities shall be conducted in accordance with all applicable Federal, Territorial, and local laws and regulations. The Government of Yukon (GY) – Energy, Mines and Resources - Abandoned Mines Project Office, is identified as the Project Authority, and is conducting this work under the authority of the Waters Act. GY authorizes its designated agents, contractors, employees etc. to access the site and implement the described construction works and other activities directly associated with this project. The Contractor shall be responsible for conducting the work in accordance with all labour laws, Workers Compensation and any and all other applicable regulations.

A Health and Safety Plan for the Work has been developed and is included in Appendix A for the Contractors use.

1.4 Materials and Specialty Tools

The Contractor shall be responsible for supplying all materials and specialty tools. It is expected that delivery of the gabion baskets and geotextile will likely take about 10 to 14 days.

Any diversion pipe/siphon materials, cofferdam materials and any un-used geotextile, gabions and specialty tools (i.e. Spenax staple guns) purchased for this work shall remain the property of the Owner and between construction seasons the materials and tools shall be stored in Dawson City at a location defined by the Owner (GY).

1.4.1 Handling and Storage of Materials

All material shall be handled, stored, and/or stockpiled in a careful and workmanlike manner.

1.4.2 Approval

Materials supplied under this Specification shall be subject to inspection by the Engineer. A representative sample of all granular materials will be submitted to the Engineer prior to placement.

1.4.3 Geotextile

The geotextile shall be a non-woven ARMTEC 350 or an approved equal.

1.4.4 Gabion Baskets

The gabion baskets shall be manufactured by Maccaferri Canada Ltd. and shall be made of PVC coated, galvanized wire. The size of the gabion baskets for the drop structures shall be 0.5m x 1.0m x 3.0m. The size of the gabion baskets used at the transition section at the downstream end of Drop Structure No. 6 shall be 0.3m x 1.0m x 3.0m. Stainless steel SPENAX rings shall be used to assemble the baskets and drop structures. Technical data for the gabion baskets and the stainless steel rings has been included in Appendix B.

1.4.5 Specialty Tools For Gabion Assembly

Two new SPENAX SC-50T pneumatic guns and one new manual SPENAX tool shall be purchased for use on the job. These guns can only be purchased directly from Maccaferri Canada. Technical data for the SPENAX guns has been included in Appendix B.

Each pneumatic SPENAX gun shall have a dedicated air compressor capable of producing 15 CFM and maintaining a constant operating pressure between 90 and 100 psi.

1.4.6 Diversion Pipe

If used, the diversion pipe shall have a minimum 600mm ID and equivalent to the BOSS 2000 HDPE pipe with bell and spigot water tight ends manufactured by the Big 'O' Pipe Company, or approved equal. Technical data for the HDPE pipe has been included in Appendix B.

1.4.7 Culverts

Culverts used for cross-drainage at various locations (approximately 10 locations) along the mine access road shall be 200mm ID and equivalent to the BOSS 2000 HDPE pipe with regular ends manufactured by the Big 'O' Pipe Company, or approved equal.

1.4.8 Sand bags

A minimum of 100 burlap sandbags (approx. 50 pounds when filled) will be on-hand for use as needed.

1.4.9 Channel Fill

Channel fill material shall be unfrozen, well graded with a maximum size of 150mm and free of asbestos and deleterious material (i.e. wood, organics). Locally available materials such as the argillite waste rock and/or a combination of argillite and colluvium will be acceptable. The undersize material from the production of gabion fill shall be used as select channel fill where directed by the Engineer.

1.4.10 Channel Rip Rap and Gabion Fill

The channel rip-rap and gabion fill materials shall consist of hard, dense, durable rock fragments free from cracks, seams, or other defects that would tend to increase their susceptibility to destruction by water and frost.

The channel rip rap and gabion fill shall conform to the following gradation:

Equivalent Stone Diameter		**Gradation Limits Percent Passing by Weight**
Metric Sieve (mm)	U.S. Standard	
200	8 inch	100
150	6 inch	60
75	3 inch	0-10

1.5 Construction Requirements

1.5.1 Construction Sequencing

The work shall be completed in a sequence mutually agreed upon by the Contractor, the Engineer and the Owner, except that a minimum flow rate of 0.2 m^3/sec from Hudgeon Lake must be diverted around the work area before the cofferdam is installed and any earth work in the channel is initiated. Immediately following installation of the cofferdam, a fish salvage operation will be conducted in the creek channel between the cofferdam and the diversion pipe outlet. No work in the channel will be permitted until the fish salvage operation is complete.

The timing for installation of the cofferdam will determined on-site based on the level of Hudgeon Lake. The cofferdam shall not be installed unless the Contractor is ready to begin working in the channel immediately following the fish salvage operation.

1.5.2 Preparation of Work Areas

The Contractor shall prepare the work areas as necessary to complete the specified work. Work platforms or benches may be prepared on the south side and north side of the Clinton Creek channel, if required. Spoil material from this operation that meets the specifications for channel fill may be used as channel fill.

1.5.3 Hudgeon Lake Cofferdam and Flow Diversion

The Contractor shall be responsible for the design and construction of a cofferdam and flow diversion. The flow diversion system shall be capable of handling a minimum flow of 0.2 m^3/sec from Hudgeon Lake which shall be diverted around the work area. The cofferdam and diversion pipe construction shall be reviewed at the pre-construction meeting. Charts showing diversion pipe capacities, Clinton Creek hydrographs are included in Appendix D

The cofferdam shall have a minimum freeboard of 600mm and be suitable to hold back the water in Hudgeon Lake up to a maximum elevation of 412.2m (the elevation of the lake outlet is 411.0m). Sediment generation shall be minimized during installation and removal of the cofferdam.

The level of Hudgeon Lake will be monitored daily. It is expected that a work window of 14 to 21 days can be achieved by allowing the lake level to naturally drain down to about 200mm above the lake outlet, (Elevation 411.2m) before installing the cofferdam. The work window available will depend on the number and intensity of precipitation events in the drainage basin upstream of the lake outlet. Should the lake level reach an elevation of 412.2m before the channel stabilization works are completed, it may be necessary to temporarily re-instate flow in the channel to draw the lake down.

1.5.4 Channel Excavation, Backfilling and Grading

Prior to initiating excavation or backfill activities clear the channel of any debris including trees and other deleterious material. Large boulders shall be moved aside for later use as channel armouring.

Within the channel stabilization area, excavate and backfill the channel as directed by the Engineer. Channel side slopes shall be re-graded as shown on the Drawings.

Excavated waste rock material can be used as channel fill provided the material meets the requirements of SP:1.4.9.

The backfill shall be placed in lifts not exceeding 300mm and then compacted. The required level of compactive effort based on the number of passes of the compaction equipment will be determined in the field.

Downstream of the channel stabilization area, the waste rock side slopes shall be flattened to approximately 1H:1V or as directed by the Engineer.

1.5.5 Gabion Drop Structure Construction

The location of the gabion drop structures on the Drawings is approximate. Final locations will be determined in the field based on survey data and constructability issues. In general, the drop structures will be constructed in a rectangular/straight shape however, some of the structures may need to be constructed with a curve. Details for both straight and curved structures are shown on the Drawings.

(1) Preparation of Drop Structure Base

Where the gabions are placed in a cut area, level any ridges left from excavation and fill in the low spots. Compact the surface until the finished surface is smooth, level and conforms to the design grades.

Where the gabions are placed in a fill area, place the channel fill material in lifts not exceeding 300mm. Compact the fill in accordance with SP: 1.5.4. The finished grade shall be smooth, level and conform to the design grades.

Where seepage is encountered from the base or sides of the existing creek channel, construct a granular drainage blanket below the base of the gabions as directed by the Engineer. A detail of a granular drainage blanket is shown on the Drawings.

Place the geotextile on the finished base as shown on the Drawings and in the manner described under SP:1.5.6 Geotextile Placement.

(2) Drop Structure Assembly

Assembly of the gabion baskets shall be done in accordance with the manufacturer's installation instructions (Appendix B). The gabion baskets shall

be assembled, connected and closed using stainless steel rings. The stainless steel rings shall be installed at 100 to 150mm spacing. Where the stainless steel rings can not be used the baskets shall be tied together using the PVC coated assembly wire provided with the baskets.

For each tier of the drop structure, start by assembling and placing the gabion baskets on the completed base. Install the lowest row of gabion baskets on the side slopes before starting the placement of gabion fill in the baskets on the base. Complete filling and closing of the gabion baskets on the structure floor before placing the remaining baskets on the side slopes. Fill and close the gabions on the side slopes. Before placing the baskets for the next highest tier, pull the geotextile up so it covers the vertical upstream side of the gabion baskets.

(3) Transition From Stabilized Channel to Existing Channel

A transition from the stabilized channel to the existing channel will be required at the downstream end of Drop Structure No. 6. The channel bottom and part of the side slopes will be lined with 0.3metre high gabion baskets over a length of 6 metres, as shown on the Drawings.

1.5.6 Geotextile Placement

Geotextile placement shall be as follows:

(i) Place the geotextile by unrolling onto the prepared surface and retain in position with weights or pins.
(ii) Place geotextile smooth and free of folds, wrinkles, and creases.
(iii) Place geotextile perpendicular to the channel alignment (seams perpendicular to flow).
(iv) Overlap seams a minimum of 1m wide. The geotextile panels shall be placed in an upstream direction so that the upstream panel overlaps the downstream panel at the location of the seam.
(v) Protect installed geotextile from displacement and damage until, during, and after placement of the overlying gabion baskets or rip-rap.
(vi) Repair rips or tears with a patch to cover a minimum of 1 metre on each side of the rip or tear.
(vii) The geotextile shall be anchored at the upstream and downstream ends of the drop structures as shown on the Drawings. The geotextile at the top of the channel slopes shall be laid flat on the side slope for a distance of approximately 1m past the gabions and covered with channel rip rap, as shown on the Drawings.

1.5.7 Placement of Channel Rip-Rap

Channel rip-rap material shall be placed at the upstream and downstream ends of each drop structure as shown on the Drawings and in a manner that the

underlying geotextile is not disturbed or damaged. Place additional channel rip rap as directed by the Engineer.

1.5.8 Cofferdam Removal

Remove cofferdam to restore natural creek flow once the channel stabilization work has been completed. The cofferdam shall be removed such that the water is released slowly to minimize erosion and sediment load. The diversion pipe shall remain in operation during removal of the cofferdam.

1.6 Quality Control

1.6.1 Inspection

Workmanship and materials furnished under this Specification are subject to inspection by the Engineer including all operations from the selection and production of materials through to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Engineer reserves the right to reject any materials or works which are not in accordance with the requirements of this Specification.

1.6.2 Access

The Engineer shall be afforded full access for the inspection of materials, both at the site of Work and any borrow site used for the supply of materials, to determine whether the material is being supplied in accordance with this Specification.

1.6.3 Materials

Materials supplied under this Specification shall be subject to approval by the Engineer in accordance with SP:1.4.2 – Approval.

1.6.4 Corrective Action

The Contractor shall at his own expense, correct such work or replace such materials found to be defective under this Specification.

1.7 Method of Measurement and Basis of Payment

1.7.1 Method of Measurement

All labour and equipment work shall be measured on an hourly basis. Time shall commence when equipment and/or labour begins working each day and cease when work is stopped for the day. Time taken during this period for lunch and/or supper breaks will not be counted.

Standby time shall only be paid for equipment that is in regular use on the job site at the standby rate provided by the Contractor. Where equipment is not required for extended periods of time, the equipment may be de-mobilized from the site and re-mobilized at a later date alternatively, the equipment may be left on site but not receive any standby payment. Payment of standby time shall be approved by the Engineer.

Verification of the materials and specialty tools delivered to site will be made prior to payment.

1.7.2 Basis of Payment

All labour and equipment work shall be paid for at the hourly rates provided by the Contractor, measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

The rates for equipment shall include but not be limited to all costs incurred for operation, supervision, maintenance, overhead, wages, accommodation, Worker's Compensation, fuel, lubricants, repairs, insurance, permits and profit.

The rates for labour shall include but not be limited to wages, supervision, accommodation, overhead, Worker's Compensation, fuel, lubricants, repairs, insurance, permits and profit.

Material costs shall be paid for at the invoiced cost, including transportation. Any additional charges added to cover overhead and all other indirect costs shall be pre-approved by the Owner.

Specialty tools purchased shall be paid for at the invoiced cost. Any additional charges added to cover overhead and all other indirect costs shall be pre-approved by the Owner.

APPENDIX A

HEALTH AND SAFETY PLAN

CLINTON CREEK PROJECT
OCCUPATIONAL AND ENVIRONMENTAL HEALTH AND SAFETY ISSUES AND EMERGENCY RESPONSE PLAN

Introduction

The purpose of the work is to mitigate the potential for a breach of the outlet from Hudgeon lake which could result in flash flooding in the Clinton Creek Valley downstream of the mine site. The work involves stabilization of the outlet and the Clinton Creek channel downstream of the outlet. The outlet and a short portion of the channel was stabilized in 2002. The material forming the channel may contain some asbestos fibres that could become airborne during construction activities.

The Health and Safety Program is designed to anticipate, recognize, evaluate, and control adverse environmental conditions and physical hazards that may result in injury, impairment, or the exposure to toxic substances. The Emergency Response Plan provides a response to minimise the impact of an accidental release of substances that may affect the well-being of workers, and the local environment.

Location

The Clinton Creek Asbestos Mine is located 100 km northwest of Dawson City in the Yukon Territory. The location is at 64° 22' 23" N and 140° 42' 50" W adjacent to Clinton Creek approximately 9 km upstream of its confluence with the Forty Mile River. Porcupine and Wolverine Creeks are local tributaries of Clinton Creek. The project site is located at a failed waste rock deposit on the north-facing slope of the Clinton Creek valley. The failure created a landslide dam now referred to as Hudgeon Lake. The waste rock channel stabilization work will occur along Clinton Creek for a distance of approximately 350 metres downstream from the outlet of Hudgeon Lake.

Abbreviations

The following abbreviations and definitions are used in this document:

1. ANSI American National Standards Institute. Publishes consensus standards on a wide variety of subjects, including safety equipment, procedures, etc.
2. CEPA Canadian Environmental Protection Act
3. CSA Canadian Standards Association, the national consensus standards association for Canada is roughly the Canadian equivalent of ANSI in the US

4. DIAND Department of Indian Affairs and Northern Development
5. ERP Emergency Response Plan
6. GY Government of Yukon
7. HEPA High Efficiency Particulate Air filter. At least 99.97% efficient in the filtration of air borne particles 0.3 microns in diameter or greater
8. MSDS Material Safety Data Sheet provided by chemical manufacturers
9. MSHA Mine Safety and Health Administration, an agency of the US Department of Labour
10. NIOSH National Institute for Occupational Safety & Health. An arm of the US Centres for Disease Control, it does research and suggests guidelines for exposure control, but is not a regulatory agency
11. OSHA Occupational Safety & Health Administration, a part of the US Department of Labour, it regulates many job safety issues, including chemical handling and storage; also Occupational Safety & Health Act, the US Federal legislation which created OSHA (the Administration) and NIOSH
12. RMO Resource Management Officer
13. TDGA Transport of Dangerous Goods Act
14. WHMIS Workplace Hazardous Materials Information System. This program is legislated by the Canadian government, which requires, among other things, the creation and availability of material safety data sheets

Time Table (tentative)

June 1 to October 4, 2003.

Communication

A satellite phone will be available on site for communication and emergency calls.

Hazard Identification

1. Asbestos Hazards - inhalation of asbestos fibres by workers resulting from disturbance of the waste rock during excavation and backfilling activities.
2. Chemical Hazards - fuels used on site

3. Explosion or Fire - ignition of explosive or flammable liquids
4. Physical Hazards - mechanical equipment, sharp objects
   - increased risk of injury to personnel when wearing protective gear (if required) that may impair agility, stamina, hearing, and vision
   - electric shock when using power equipment in wet location or using poorly grounded tools
5. Wildlife - moderate risk (bears)

General Health and Safety Measures

1. All work will be conducted, as a minimum, in strict compliance to all applicable laws, ordinances, rules, regulations and orders and general practices for the safety of persons or property. The applicable requirements include any general safety rules and regulations of Yukon Workers' Compensation Health and Safety Board, WHMIS and Occupational Health and Safety legislation.
2. The Environmental Monitor / Safety Training Supervisor will be responsible for the Health and Safety legislation.
3. If deemed necessary, the Contractor shall provide wildlife monitors, acceptable to the Engineer, equipped with firearms to protect the safety of all workers including the Engineer, and Engineer's support staff during site operations.
4. Prior to the start of the work, all team members will participate in a mandatory safety briefing session to become familiar with all aspects of the Safety Program and Emergency Response Plan. Specific instructions on actions to be taken in case of safety violations, accidents, personal injury and emergencies will be provided.
5. Prior to commencement of specific work activities, all team members will be briefed on the following safety issues:
   a. safety equipment and use
   b. clearing, excavation and backfilling operations
   c. contaminants on site
   d. emergency measures in case of an accident or fire
6. A "buddy system" will also be used as a protective measure in particularly hazardous situations so that team members can keep watch on one another to provide quick aid if needed.

7. Contacts for emergency will include the GY project authority, the RCMP detachment and the nursing station in Dawson City, Yukon, and the Yukon Fuel and Oil Spills Report Line.

Waste Rock Excavation and Backfilling

1. The potential consequences of planned construction activities, such as excavating and backfilling, at the site will be considered prior to each action. Personnel assigned to work around the operating equipment will have the appropriate safety training.
2. Any persons within 800 metres of the work site while waste rock is being handled shall take necessary precautions to prevent exposure to airborne asbestos fibres.

Site Safety Meetings and Inspections

To ensure that the Site Safety Plan is being followed, the Safety Officer will conduct a safety meeting prior to initiating each site activity and at the beginning of each workday.

The purpose of the meetings is to:

- describe assigned tasks and their potential hazards;
- co-ordinate activities;
- identify methods and precautions to prevent injuries;
- plan for emergencies;
- describe any changes to the Site Safety Plan;
- get worker feedback on conditions affecting safety and health;
- get worker feedback on how well the Site Safety Plan is working.

The Site Safety Officer will also conduct frequent inspections of site conditions, facilities, equipment and activities. The Site Safety Officer and personnel will be responsible for inspecting the condition of their personal protective equipment and ensuring its operational condition.

First Aid

First Aid will be administered on site by the Environmental Monitor / Safety and Training Supervisor. According to the Yukon Workers' Compensation Health and Safety Board (1992), Class "A" hazards were identified for the Clinton Creek Channel Stabilization Project. The requirements for First Aid made available on site are met by an attendant with a Standard First Aid certificate, a # 2 Unit First Aid Kit (St. Johns Standard), a stretcher, and three emergency blankets. In addition to the basic requirements, a spinal board, cervical collars and a Scott Air Pack will also be on site. In case of an accident, a casualty will be transported to Dawson City, Yukon or depending on weather conditions, to the nearest nursing station via rotor wing. Emergency phone numbers are provided in the ERP. Every incident requiring First Aid will be recorded in an accident report.

Fires

The fire safety program includes fire prevention, fire protection and fire fighting.

1. As a preventative measure there will be no fires or burning of rubbish at the work site.
2. A person discovering a fire will report the incident to the Project Superintendent.
3. Fire extinguishers will be located on site and in each supervisor's vehicle.
4. Smoking will not be permitted in hazardous areas and care will be exercised in the use of smoking materials in non-restricted areas.
5. The current National Fire Code of Canada shall govern the handling, storage and use of flammable liquids such as gasoline. Flammable liquids such as gasoline will be stored in approved safety cans.
6. Disposal of flammable liquids will be in accordance with all applicable environmental regulations.

Personal Protective Equipment

1. Workers will use protection appropriate to the potential type and level of exposure. The protective equipment will meet CSA, ANSI, and NIOSH standards and guidelines.
2. Team members will be made aware that the equipment alone does not eliminate the hazard. If the equipment fails, exposure will occur, as such, hazard awareness will be a paramount component of the field program.
3. All equipment will be properly fitted and maintained in a clean and serviceable condition.
4. If at any time during the project the protective equipment is damaged, then the team member will remove, dispose and replace the damaged item.

5. Before entering asbestos work area, instruct workers and visitors in use of respirators, dress, and all aspects of work procedures and protective measures. Instruction shall be provided by Competent Person as defined by Occupational Health and Safety Act.
6. **Respirators:** When working in areas where asbestos fibres are present, workers shall wear non-powered half-face respirators with high efficiency (HEPA) cartridge filters. Provide approved respirators to visitors. Replace filters daily or test according to manufacturer's specifications and replace as indicated. Respirators shall be acceptable to Occupational Health Branch of Ministry of Labour. Provide instruction to users in use of respirators, including qualitative fit testing. No user shall wear facial hair, which affects seal between respirator and face. Maintain respirators in proper functioning and clean condition, or remove from Site.
7. **Protective Clothing:** Provide workers and visitors with full body disposable coveralls with integral hoods. Once coveralls are worn in asbestos work area, treat as asbestos contaminated waste and dispose of appropriately. Workers and visitors shall also wear other protective apparel as required by construction regulations (e.g. safety boots, hard hats, gloves, etc.).
8. Persons leaving asbestos work area(s) shall remove gross contamination from clothing. Clean respirator to ensure that visible contamination is removed.

Environmental Monitoring/Sampling

1. The employer shall ensure any required medical examinations are completed in accordance with the Yukon Health and Safety Act.
2. Air samples may be taken from commencement of work until completion in asbestos work area(s) with NIOSH 7400 procedures, or with Fibrous Aerosol Monitor.
3. Co-operate in collection of air samples, including requiring workers to wear sampling pumps for up to half shift periods. Workers shall exercise care not to damage air sampling equipment.
4. An MSA Escort Elf portable sampling pump is used to draw air through a 25 mm, 0.8 um pore size, cellulose ester filter at a constant flow rate for a sufficient period of time to collect a representative sample of air for personnel in the work area. The air sample(s) are then retrieved and sent to a qualified laboratory for analysis by Phase Contrast Microscopy (PCM).
5. If air monitoring shows airborne fibre levels exceed 10X the time-weighted average exposure criteria (TWAEC) of 0.1 fibres per cubic metre of air (f/cc) for personal exposure, then workers will be required to use powered air purifying respirators (PAPRs) with full-face piece and HEPA filters.

6. All sampling results will be kept on site and made available to workers for their review.

Head Protection

Head protection against impact blows will be provided when required in the form of a protective hat with a liner, which will be able to resist penetration and absorb the shock of a blow. The hat will meet CSA standard Z94.1.

Foot Protection

For protection against falling or rolling objects, sharp objects, wet, slippery surfaces workers will use appropriate insulated safety shoes or boots. Safety shoes will be sturdy, have an impact-resistant toe and meet CSA Standard Z195 or ANSI standards. In case of an emergency spill, team members responding will wear protective boot covers.

Eye and Face Protection

When required, protection will be based on the kind and degree of hazard present. Available equipment will include goggles, safety glasses, and face shield. The eye protectors will meet the requirements of CSA Z94.3 or ANSI standards.

Ear Protection

To avoid exposure to high noise levels disposable phone earplugs or earmuffs will be made available.

Respiratory Protection

It is anticipated that exposure to harmful concentrations of air contaminants may result from temporary or emergency conditions. In such a scenario, the exposed team members will wear protective respiratory equipment to prevent breathing air contaminated with harmful dusts (including asbestos), fumes, gases and vapours. The selection of protective respirators equipment will be made according to the guidance of NIOSH or MSHA or ANSI Practices for Respiratory Protection and will include Air Purifying Respirator with HEPA cartridge and chemical cartridge.

Arm and Hand Protection

Absorption of chemicals, cuts and burns are examples of hazards associated with arm and hand injuries. Insulated rubber gloves and leather gloves will be provided for protection from these hazards. These gloves will conform to CSA and ANSI standards.

EMERGENCY RESPONSE PLAN

This Emergency Response Plan (ERP) includes actions to be taken to reduce the impact of spillage for release of, or substantial threats of release of hazardous materials and non-aqueous phase liquids from barrels and other containers encountered during drilling and test pit excavation. A list of emergency contacts, including those for medical emergencies and emergency reporting are given below.

Project Management:

Hugh Copland (GY)	(867) 667-3208
Brett Hartshorne (INAC)	(867) 667-3268
HAN Construction Ltd.	(867) 993-5520
Gil Robinson (UMA Engineering)	on-site
Yukon Fuel and oil Spills Report Line:	(867) 667-7244
Dawson City, Community Nursing Station:	(867) 993-4444
Ambulance: Dawson City, Yukon	(867) 993-4444 or 1-800-661-0408
Trans North Helicopters	(867) 993-5494 or 668-2177
Fireweed Helicopters	(867) 993-5700
Resource Management Officer (RMO):	
Todd Pilgrim	(867) 993-5468
RCMP Dawson City, Yukon:	(867) 993-5555 or 667-5555

INCIDENT: HAZARDOUS MATERIAL OR NONAQUEOUS PHASE LIQUID SPILL

The response measures include:

1. Contain spill source and prevent from spreading.
2. Air monitor for explosive or toxic gases. If a hazardous condition is found, the appropriate protective equipment will be used.
3. Mobilize spill control kit. The kit will include:
    - Personal protective equipment
    - Recovery drum
    - Absorbent material
    - Hand shovel
    - Small pail for scooping up liquid
    - Plastic sheeting
4. Recover spill and contaminated material and place in recovery drum.
5. Ensure spill is secure.
6. Implement a decontamination procedure before any employee or equipment leaves the area of potential hazardous exposure.
7. Transport recovery drum to temporary storage area. A polyethylene drop sheet will be secured to the ground at the temporary storage area
8. The sorting, packaging, transportation and disposal of all hazardous materials and waste encountered will be in accordance to all applicable regulations including the TDGA and CEPA.
9. Prepare spill report.
10. Call the Yukon Fuel and Oil Spill Report Line.

INCIDENT: SERIOUS INJURY

1. Call for help.
2. Assess hazards at the site; if necessary make area safe.
3. Initial First Aid.
4. Evacuate casualty to the nursing station in Dawson City, Yukon
5. Prepare report.

INCIDENT: FIRES

1. A person discovering a fire will report the incident to the Project Manger.
2. Fire suppression equipment will be made available. If a fire is not promptly extinguished, the RMO in Dawson City, Yukon will be notified immediately.

APPENDIX B

MATERIALS AND SPECIALTY TOOLS INFORMATION

MACCAFERRI

ENVIRONMENTAL SOLUTIONS

Update: 01/2002

Maccaferri Canada Ltd. reserves the right to amend product specifications without notice and specifiers are requested to check as to the validity of the specifications they are using.

PRODUCT TECHNICAL DATA SHEET

Gabions – PVC Coating

PVC COATED GABIONS

Gabions are baskets made of 8x10 hexagonal double twisted woven wire mesh, as per ASTM A975-97 (Figures 1 and 2). Gabions are filled with stones at the project site to form flexible, permeable, monolithic structures such as retaining walls, channel linings, and weirs for erosion control projects.

The wire used in the manufacture of the gabion is heavily zinc coated soft temper steel. A PVC coating is then applied to provide added protection for use in polluted environments where soils or water are acidic; in salt or fresh water, or wherever the risk of corrosion is present. The PVC coating has a nominal thickness of 0.50 mm. The standard specifications of mesh-wire are shown in Table 1.

The gabion is divided into cells by means of diaphragms positioned at approximately 1 metre centres (Figure 1). In order to reinforce the structure, all mesh panel edges are selvedged with a wire having a greater diameter.

Dimensions and sizes of PVC coated gabions are shown in Table 2.

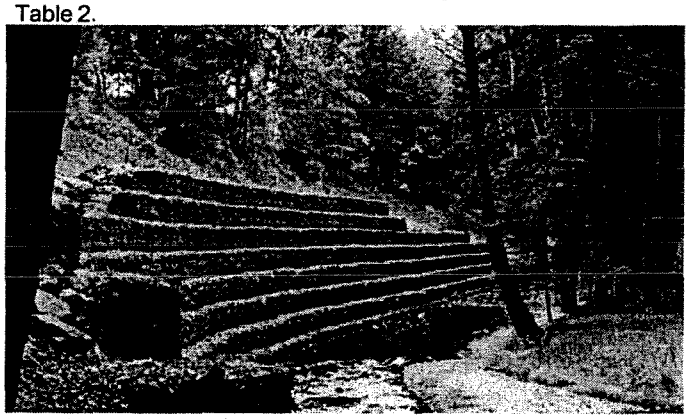


Figure 1

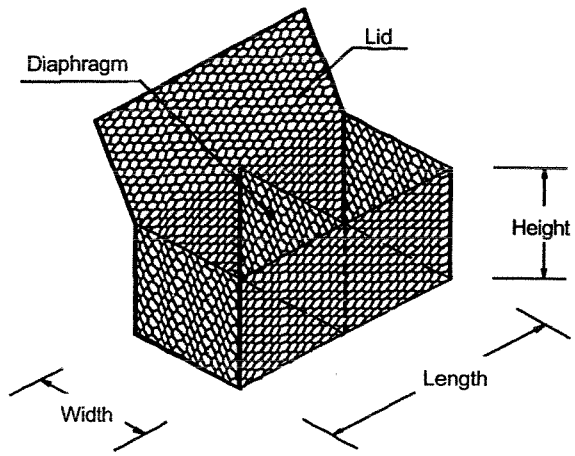


Figure 2

MESH TOLERANCE
The tolerance on the opening of mesh "D" being the distance between the axis of twist, is according to ASTM A975-97

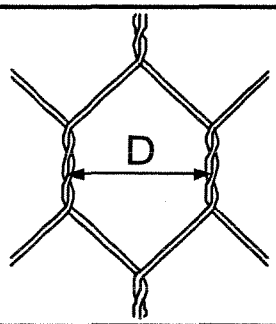


TABLE 1—STANDARD MESH-WIRE

Type	D (mm)	Tolerance	Internal Wire Diameter (mm)	External Wire Diameter (mm)
8x10/Zn + PVC	83	+/- 10%	2.70	3.70

WIRE

All tests on wire must be performed prior to manufacturing the mesh. Wire tolerances (shown in Table 3) are in accordance with ASTM A641-97.

1. Tensile strength: both the wire used for the manufacture of gabions and the lacing wire shall have a tensile strength of 38-48 kg/mm^2 according to ASTM A641-97.
2. Elongation: shall not be less than 12%, in accordance with ASTM A370-92. The test must be carried out on a sample at least 30 cm long.
3. Zinc coating: minimum quantities of zinc shown in Table 3 meet the requirements of ASTM A641-97, Class III soft temper coating.
4. Adhesion of zinc: the adhesion of the zinc coating to the wire shall be such that, when the wire is wrapped six turns around a mandrel having four times the diameter of the wire, it does not flake or crack when rubbing it with the bare fingers, in accordance with ASTM A641-97.

PVC COATING CHARACTERISTICS

The technical characteristics and the resistance of the PVC to aging meet the relevant standards. The main values for the PVC material are as follows:

Specific gravity: 1.30-1.35 kg/dm^3, in accordance with ASTM D792 Table 1;
Hardness: between 50 and 60 Shore D, according to ASTM D 2240;
Tensile strength: not less than 20.6 MPa, according to ASTM D412-92;
Modulus of elasticity: not less than 18.6 MPa, in accordance with ASTM D412-92;
Abrasion resistance: the percentage of the weight loss shall be less than 12%, according to ASTM D1242-92.

...continued on page 2

PVC COATING CHARACTERISTICS, Continued

Creeping corrosion: maximum penetration of corrosion of the wire from a square cut end shall be 25 mm when the specimen has been immersed for 2,000 hrs in a 5% solution HCl (hydrochloric acid 12 Be).

The accelerated aging tests are:

Salt spray test: test period 3,000 hours, test method ASTM B117-94;

Exposure to UV rays: test period 3,000 hours at 63°C, test method ASTM D1499-92a and ASTM G23-93 apparatus Type E;

Brittleness temperature: no higher than - 9°C, or lower temperature when specified by the purchaser, when tested in accordance with ASTM D746.

The properties after aging tests shall be as follows:

Appearance of coated mesh: no cracking, stripping or air bubbles, and no appreciable variation in color;

Specific Gravity: variations shall not exceed 6%;

Hardness: variations shall not exceed 10%;

Tensile strength: variations shall not exceed 25%;

Modulus of elasticity: variations shall not exceed 25%;

Abrasion resistance: variations shall not exceed 10%;

Brittleness temperature: shall not exceed +18°C.

TABLE 2—GABION SIZES (8x10 mesh)

Length (m)	Width (m)	Height (m)	Number of Cells	Capacity (m^3)
2	1	1	2	2
3	1	1	3	3
4	1	1	4	4
2	1	0.5	2	1
3	1	0.5	3	1.5
4	1	0.5	4	2
2	1	0.3	2	0.6
3	1	0.3	3	0.9
4	1	0.3	4	1.2

Tolerances of +/- 5% of the length, width and height of the gabions shall be permitted.
All sizes and dimensions are nominal.

TABLE 3—WIRE		Lacing Wire*	Mesh Wire	Selvedge Wire
PVC Mesh Diameter	Φ (mm)	2.20	2.70	3.40
Wire Tolerance	(+/-) Φ (mm)	0.10	0.10	0.10
Minimum Quantity of Zinc	(g/m^2)	213	244	260

* Lacing wire is supplied at a percentage of the gabion weight.

ASSEMBLY AND INSTALLATION

Gabions are delivered on site unassembled in a collapsed form. Once the units are unfolded, the corners and diaphragms are bound together using either lacing wire (see Figure 3) or stainless steel rings (see Figure 4) that are provided with the units. The lacing must be performed as described in the Product Installation Guide to insure proper strength and function of the gabions. Rings must be closed (see Figure 5) and there must be one ring in every mesh opening, the spacing should not exceed 150 mm as shown in Figure 4.

Upon proper lacing of the gabions, they are filled with stone that is between 100 and 200 mm in diameter. The stones shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. The placement of stone on all visible faces shall be hand placed for appearance purposes. Before binding the lids down it is important to check the stone filling at the corners to insure proper shape.

For further information on the assembly and installation of gabions, please consult the Products Installation Guide.

Figure 3— Lacing

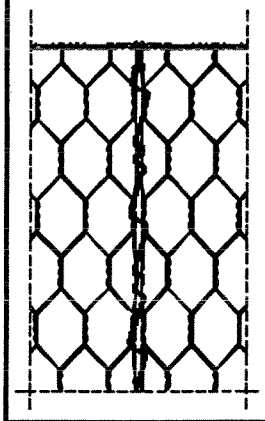


Figure 4—Rings

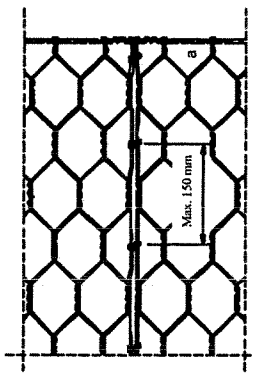


Figure 5—Rings

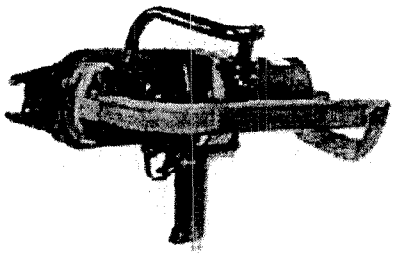
Quantity Request: When requesting a quote, please specify:
- size of units (length x width x height, see Figure 1)
- type of mesh,
- type of coating

Example: 100 gabions, 2m x 1m x 1m - 8x10 mesh - PVC coated

MACCAFERRI
ENVIRONMENTAL SOLUTIONS
Website : www.maccaferri-canada.com

MACCAFERRI CANADA LTD.
515 Waydom Drive, R.R. #1
Ayr, Ontario, N0B 1E0
Tel: (519) 623-9990 Fax: (519) 623-1309
Email: hq@maccaferri-canada.com

SC50T - 125-Rings Magazine 9/16" Closure Very Large Bag Closure C Ring Closing Tool



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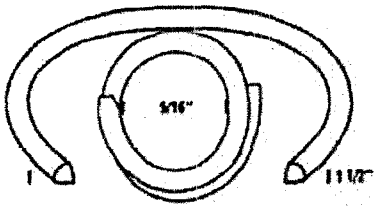


Features and Benefits

- Air driven
- Large 1-1/2" opening
- MTCKA3 touch trip, bag guide kit
- MTCKA50 foot valve, bag guide kit

Product Details

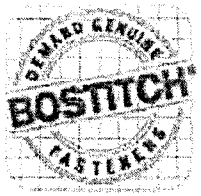
Weight	14.3 lbs, 6.49 kilos
Magazine Capacity	125

Approx Purchase Price = $2,500 + taxes + freight

Warranty

Work Safely with Tools, Wear Safety Glasses.

RING11SS40 - 1,600-Pack 1-1/2" Sharp Point 11-Gauge Stainless Steel C-Ring



SPENAX™

Click to Enlarge

Features and Benefits

Product Details

Fastener Gauge	11
Fits Bostitch Tools	SC50T, SC50HP
Point Style	Sharp Point
Quantity Per Item Pack	1,600
Closure Size	9/16" to 5/8", 14.3mm to 15.9mm
Material	Stainless Steel
Qty Case Per Skid	96
Qty Pack Per Case	1
Ring Size	1-1/2"
Ring Type	C

Warranty

Work Safely with Tools, Wear Safety Glasses.

BOSS HDPE PIPE

Design and Performance Advantages for Engineers

Product Description

High density polyethylene (HDPE) BOSS pipe is a proven performer in the municipal, industrial and forestry pipe markets. Engineered for gravity flow systems, a wide range of BOSS pipe designs are available to meet specific standard and project requirements:

BOSS POLY-TITE, CSA certified leak-tight sanitary and storm sewer pipe, intended for the most demanding municipal applications.

BOSS 2000, CSA certified storm sewer system, used as storm sewers, perforated stormwater management systems, landfill leachate collection, and industrial liquid collection systems.

BOSS 1000, corrugated culvert/storm sewer has a single wall corrugated interior which offers excellent flexibility and economy.

Subdrain Tubing, provides a highly cost effective and efficient solution to the management of subsurface ground water.

Strength

The corrugated exterior provides this product with its inherent minimum pipe stiffness of 320 kPa or 210 kPa. The smooth inner wall provides longitudinal stiffness which enables alignment and grade to be maintained in the trench during installation.

Impact Resistance

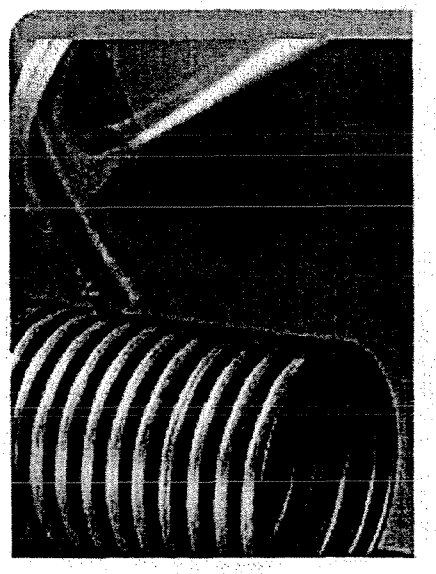
BOSS pipes take the knocks and bumps of handling, moving and installation with ease. The combination of non-brittle HDPE and its unique corrugated exterior makes BOSS pipe capable of sustaining impact in both warm weather usage and cold weather installations.

Weather Resistance

BOSS pipe contains a minimum of 2% carbon black additive to protect the product from ultraviolet light. This gives BOSS pipe maximum weather resistance in applications where continuous exposure to the elements is expected.

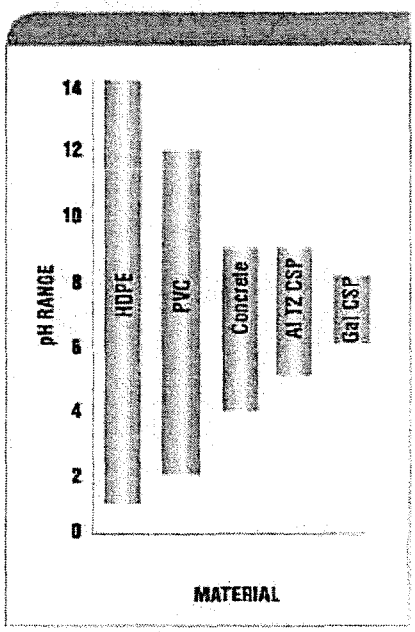
Chemical, pH and Abrasion Resistance

HDPE material provides excellent resistance to both acidic and alkaline environments. The high density polyethylene used in the manufacture of BOSS product performs well under extreme chemical, acidic and abrasive conditions. BOSS pipe brings the gravity flow sewer market the same exceptional performance that HDPE has exhibited in other applications, remaining tough and resistant under conditions that would seriously damage pipe made of traditional materials.



Pipe Material and Recommended pH Range

The chemical resistance characteristics of HDPE give BOSS pipe excellent ratings from strong acids through all bases, pH 1.25 to 14.



Abrasion Resistance

Abrasion is the wearing away of a pipe material surface, caused by an abrasive bed load (gravel, rock or sharp stones) being carried by the flow. Tests indicate that HDPE pipe is highly resistant to abrasion. Although experiencing a slight increase in abrasive wear when installed in extreme acidic conditions, BOSS pipe provides significant advantages over traditional sewer pipe materials. The resistance of HDPE pipe to wear under abrasive conditions gives it a significant advantage over traditional pipe materials in both acidic and abrasive environments.

BOSS® 2000

Storm Sewer and Culvert Pipe

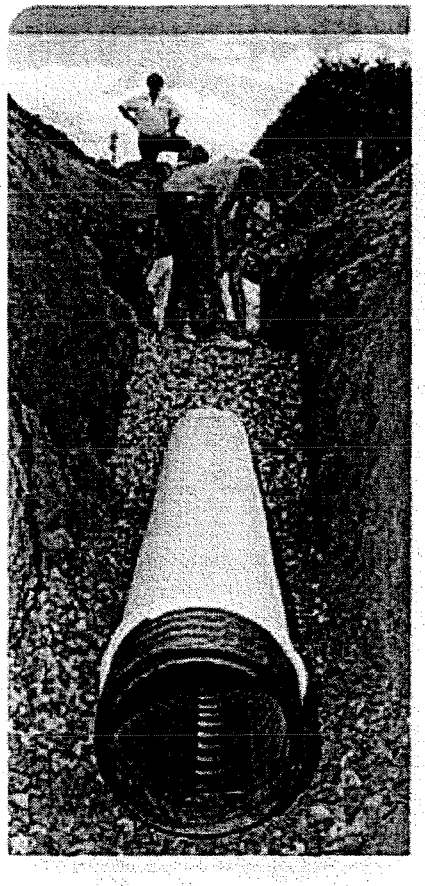
Application
BOSS 2000 incorporates the strength of a corrugated outer shell with a smooth inner wall to optimize hydraulics. BOSS 2000 is designed for general purpose storm drainage applications where the project requires a pipe with high crack resistance and is CSA certified to CSA B182.8. Typical applications include: municipal storm sewers, highway median drainage, perforated stormwater management systems, culverts and greenhouse applications.

Optimum Hydraulics
The smooth interior ensures optimum flow capacity for storm sewer applications. While test values for Manning's 'n' have been as low as 0.010, Engineers typically use 0.012 for design. As well, longer lengths and in-line fittings cause less disturbance to the flow than traditional pipe products.

Fittings and Accessories
BOSS 2000 storm sewer pipes come complete with a full range of available fittings. Both moulded fittings and adapters are available, as well as an extensive selection of made-to-order fabricated fittings to suit special project needs. Contact your local sales representative for a copy of the BOSS fittings catalogue.

Raw Material
High Molecular Weight High Density Polyethylene virgin resin compound certified by CSA will meet a minimum cell class of 324420C as defined in ASTM D3350. Additionally, BOSS 2000 will meet the more stringent requirements of a minimum crack resistance of 15% tensile yield stress for 24 hours as defined by CSA B182.8-02.

CSA Specification
CSA B182.8-02 Profile Polyethylene Storm Sewer and Drainage Pipe and Fittings.



Stocked lengths:	6 m
Custom lengths:	Available on special order
Stocked Stiffness:	320 kPa (100 mm to 900 mm) 210 kPa (250 mm to 900 mm)
Joining Systems:	*Soil tight* - External double bell "snap" coupler (100 mm - 200 mm), External "split" coupler (250 mm - 900 mm), *Water tight* - Ultra Stab 75® (100 mm - 900 mm)
Fitting Availability:	All BOSS 2000 fittings
Nominal Inside Diameter (mm):	100, 150, 200, 250, 300, 375, 450, 525, 600, 750, 900
Outside Diameter (mm):	120, 177, 234, 292, 361, 444, 540, 627, 726, 895, 1087
Applicable Standards:	CSA B182.8-02, BNQ 3624-120
Third Party Certification:	BNQ available where required Pipe, joining system and fittings are certified by CSA to CSA B182.8-02

INSTALLATION GUIDELINES

The key to successful installation of BOSS pipe is the achievement of stable and permanent support through the selection and compaction of proper embedment materials. Complete guidelines and procedures can be found in CSA B182.11 "Recommended Practice for Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings."

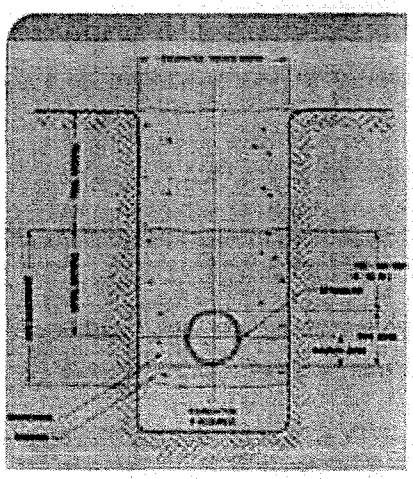
Foundation
The pipe must rest on a smooth, stable foundation, free of rocks and clumps.

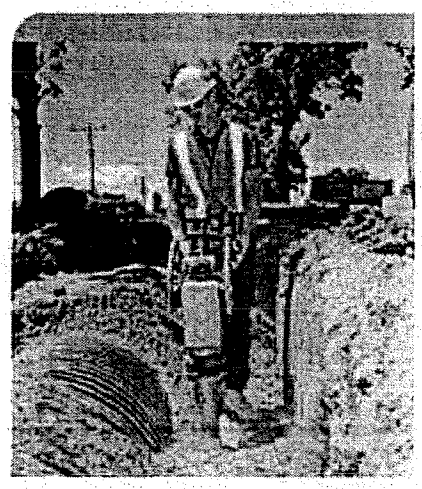
Bedding
Bedding should consist of compacted well graded granular material, levelled to the proper grade.

Haunching
Haunching should be the same material as bedding, placed and compacted in successive lifts of 150 mm, up to the springline of the pipe. Compact to 95% Standard Proctor Density.

Initial Backfill
Backfill should be the same material as for haunching, extending from the springline to 300 mm above crown of pipe. For pipe diameters less than 300 mm, this dimension may be reduced to one pipe diameter, but not less than 150 mm. Compact to 95% Standard Proctor Density.

Final Backfill
Select native materials may be used depending on the application. Do not place large rocks or clumps within 600 mm of pipe.





Minimum/Maximum Height of Cover

Nominal Diameter (mm)	Minimum Cover (m) CS-600[1] or HS-25[2]	Minimum Cover (m) E-80[3]	Maximum Cover (m) 320 kPa Pipe Stiffness[4]	Maximum Cover (m) 210 kPa Pipe Stiffness[4]
100	0.30	0.60	11.9	9.0
150	0.30	0.60	11.9	9.0
200	0.30	0.60	11.9	9.0
250	0.30	0.60	11.6	9.0
300	0.30	0.60	10.6	9.5
375	0.30	0.60	10.6	9.5
450	0.30	0.60	11.9	9.1
525	0.30	0.60	11.0	9.5
600	0.30	0.60	11.3	10.7
750	0.30	0.60	14.1	10.7
900	0.30	0.60	14.1	10.7

1. CS-600 is CSA CS-600 truck loading
2. HS-25 is AASHTO HS-25 truck loading
3. Cooper E-80 Railway Loading
4. Empirical evidence suggests that maximum cover shown above may be very conservative. Reference: "Performance of High Density Polyethylene Pipe Under High Fill" by Daniel Adams, Tennyson Munch and Ernest Selig. Dep. of Civil Engineering, University of Massachusetts. April 1988

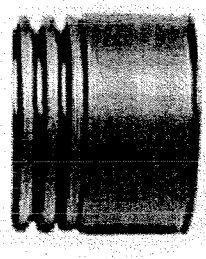
JOINING SYSTEMS

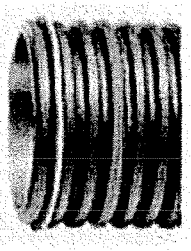
Water Tight – Ultra Stab 100® (CSA B182.6-02)

The joining systems incorporate a Styrene-Butadiene Rubber (SBR) gasket and are intended for watertight applications in which the system will keep the water in or out under normal gravity flow operating pressures. The joints are CSA certified to CSA B182.6-02 and have been laboratory tested to 100 kPa in accordance with ASTM Standard D3212. In special applications where hydro carbon contamination or other aggressive effluents are expected, resistant gaskets made from other rubber compounds can be specially ordered.

Ultra Stab 100® Coupler:
BOSS POLY-TITE
(100mm – 750mm)

The gasket is lubricated and the pipe is pushed in to the belled end to the orange seating mark. (Lubricant is supplied by Armtec.)



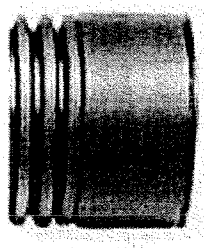


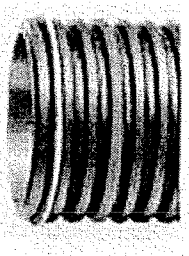
Water Tight – Ultra Stab 75® (CSA B182.8-02)

The couplers incorporate a SBR gasket and offer water tight joint integrity. They are intended for water tight applications in which the system will keep the water in or out under normal gravity flow operating pressures. The joints are CSA certified to CSA B182.8-02 and have been lab tested to 75 kPa in accordance with ASTM standard D3212.

Ultra-Stab 75® Coupler:
BOSS 2000
(100mm – 900mm),

The gasket is lubricated and the pipe is pushed in to the belled end to the orange seating mark. (Lubricant is supplied by Armtec.)





Soil Tight

Nongasketed joining systems are soil tight and intended for backfill conditions that are not saturated with flowable fines. In these conditions, the pipe joints can simply be wrapped in a "SOCK" of geotextile. They offer a superior mechanical pull-a-part to that provided by bell and gasket systems.

A: External Split Coupler:
BOSS 2000 (250mm – 900mm),

(Annular) BOSS 1000
(750 - 900 mm)

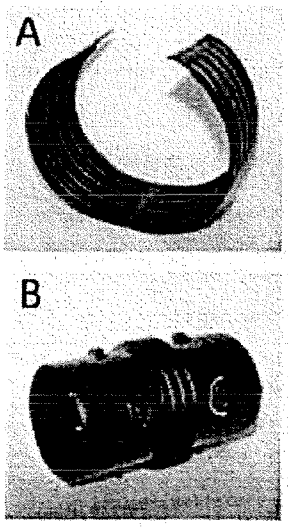
Subdrain tubing (50mm – 75mm, 200mm – 400mm)

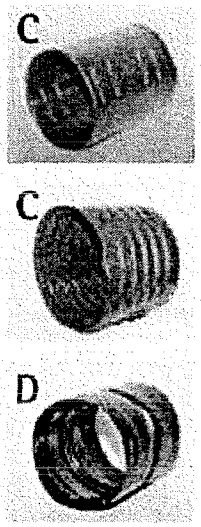
B: Insert Coupling:
(Annular) BOSS 1000
(100mm),

Subdrain tubing
(100mm – 200mm)

C: Screw on Coupler:
(Helical) BOSS 1000
(150mm – 600mm)

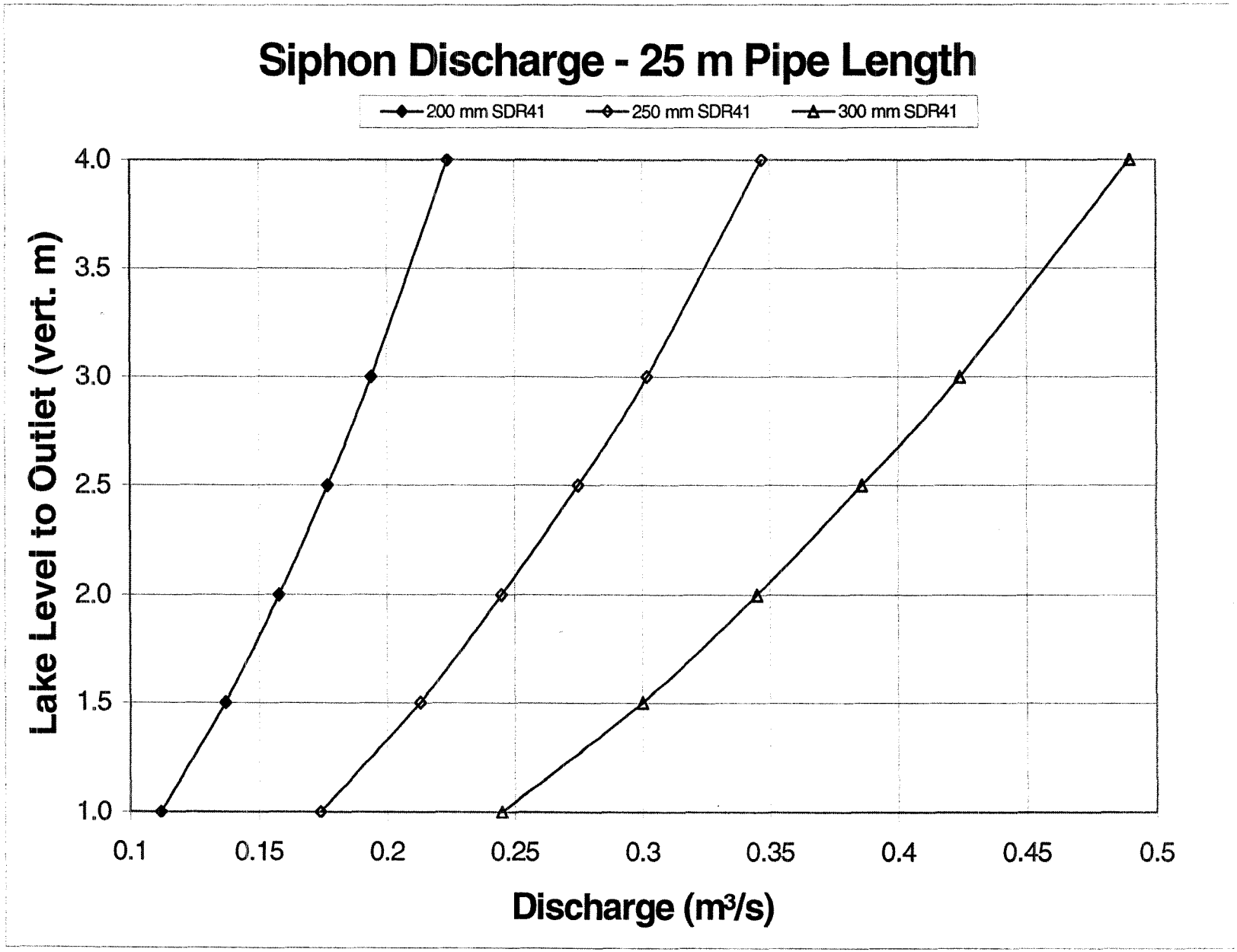
D: External Double Bell Snap:
BOSS 2000
(100mm – 200mm),

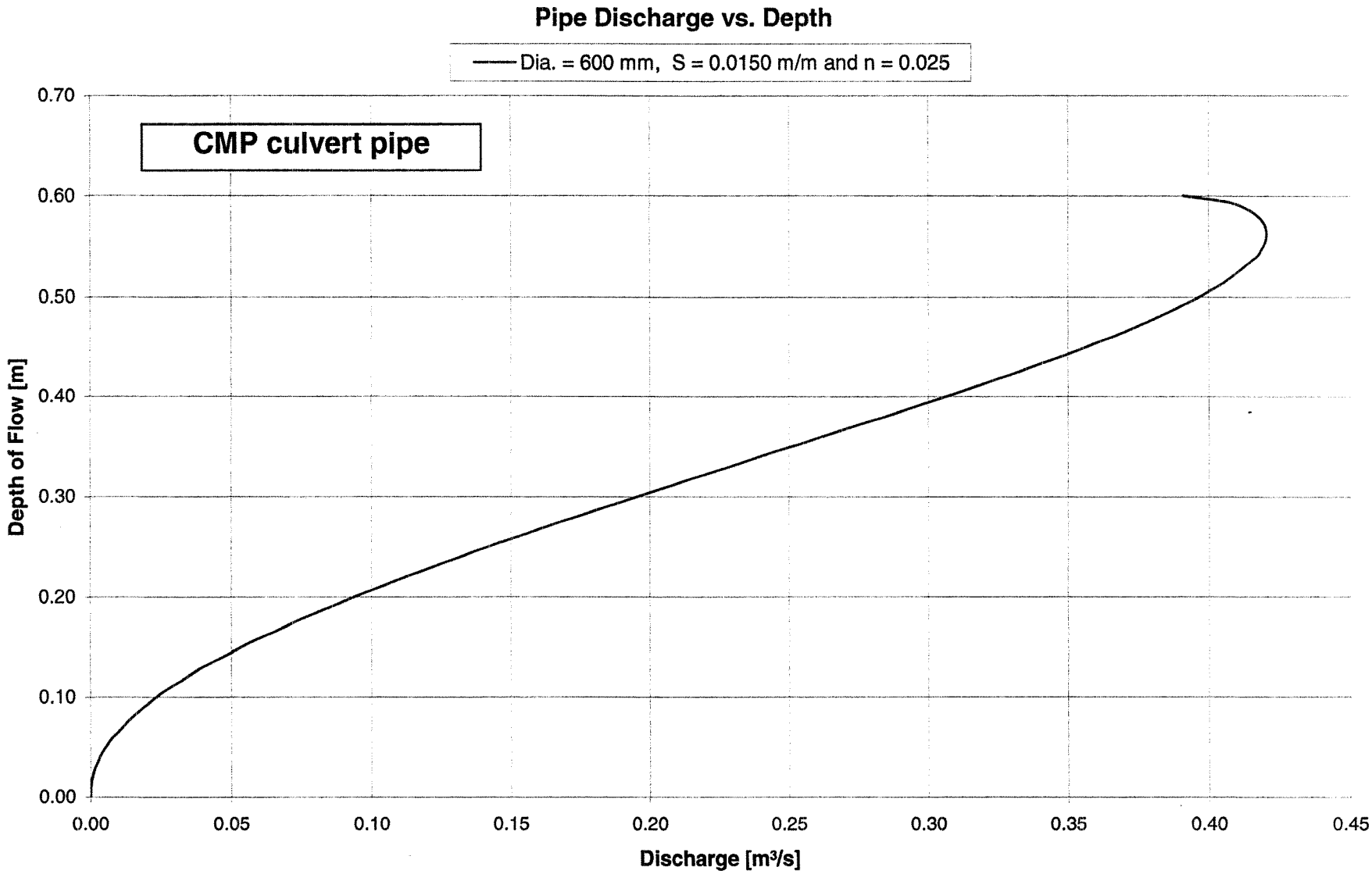


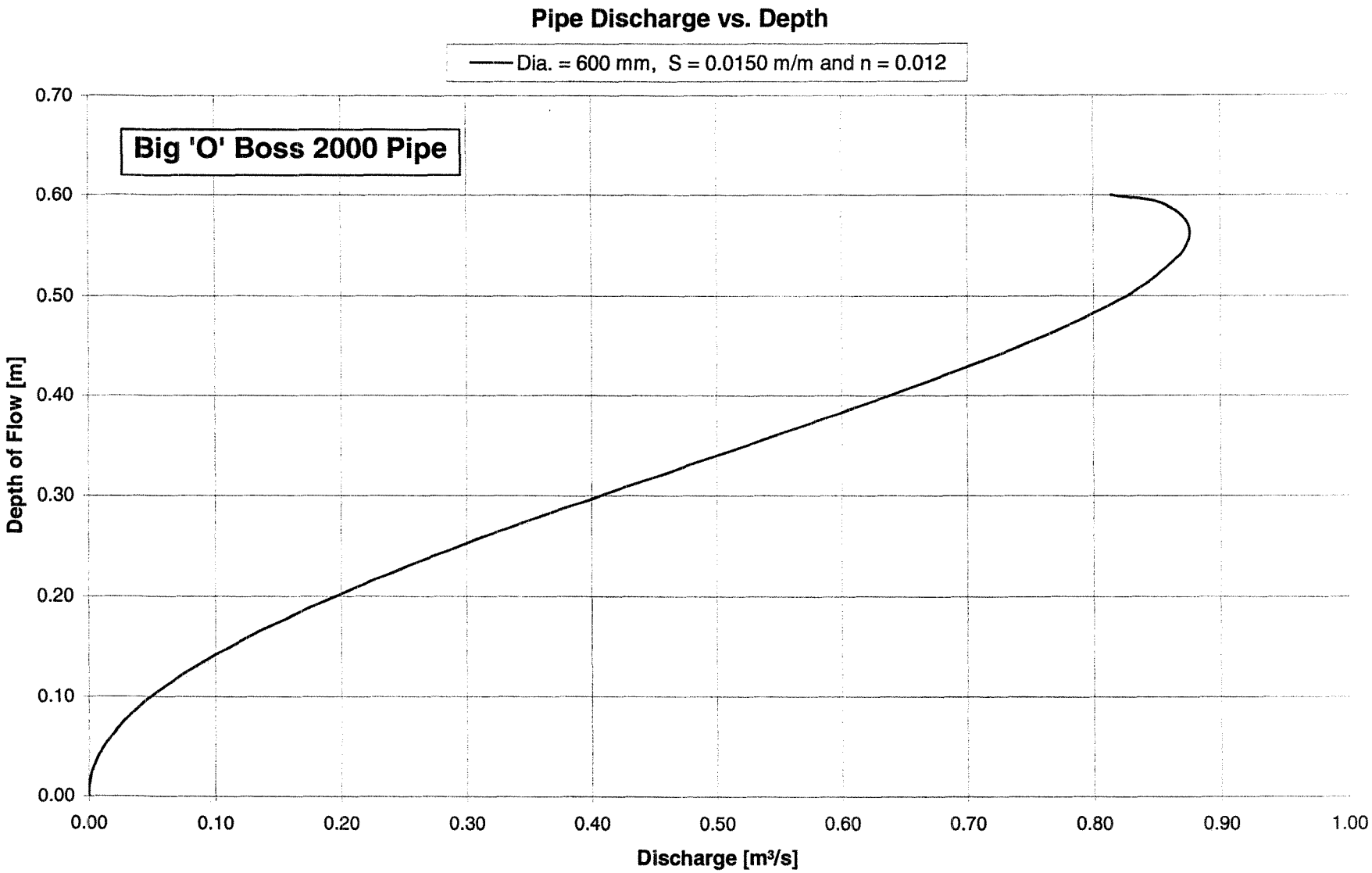


APPENDIX C

SIPHON AND GRAVITY PIPE FLOW CAPACITIES

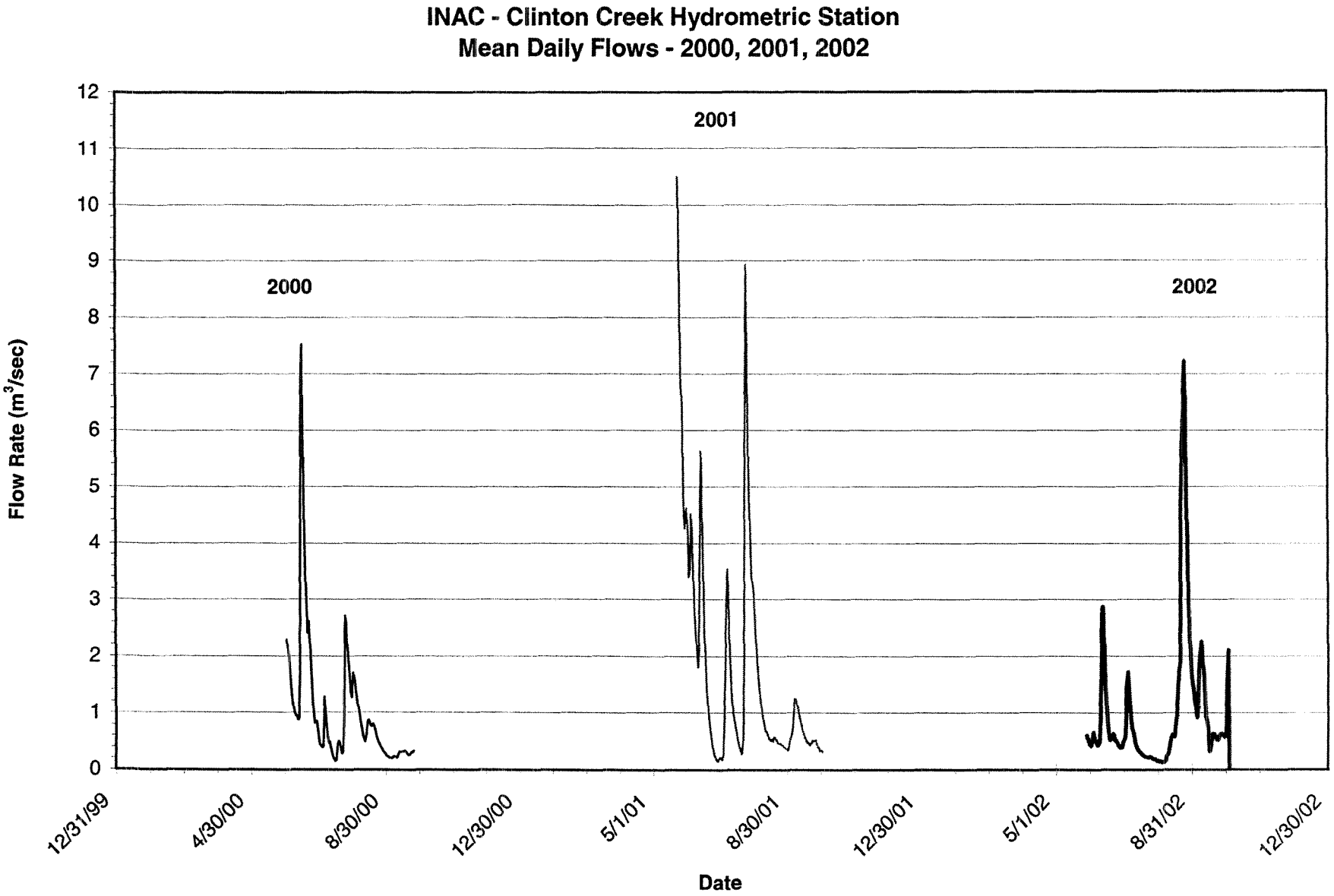

Siphon Discharge - 25 m Pipe Length
200 mm SDR41
250 mm SDR41
300 mm SDR41
Lake Level to Outlet (vert. m)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Discharge (m³/s)

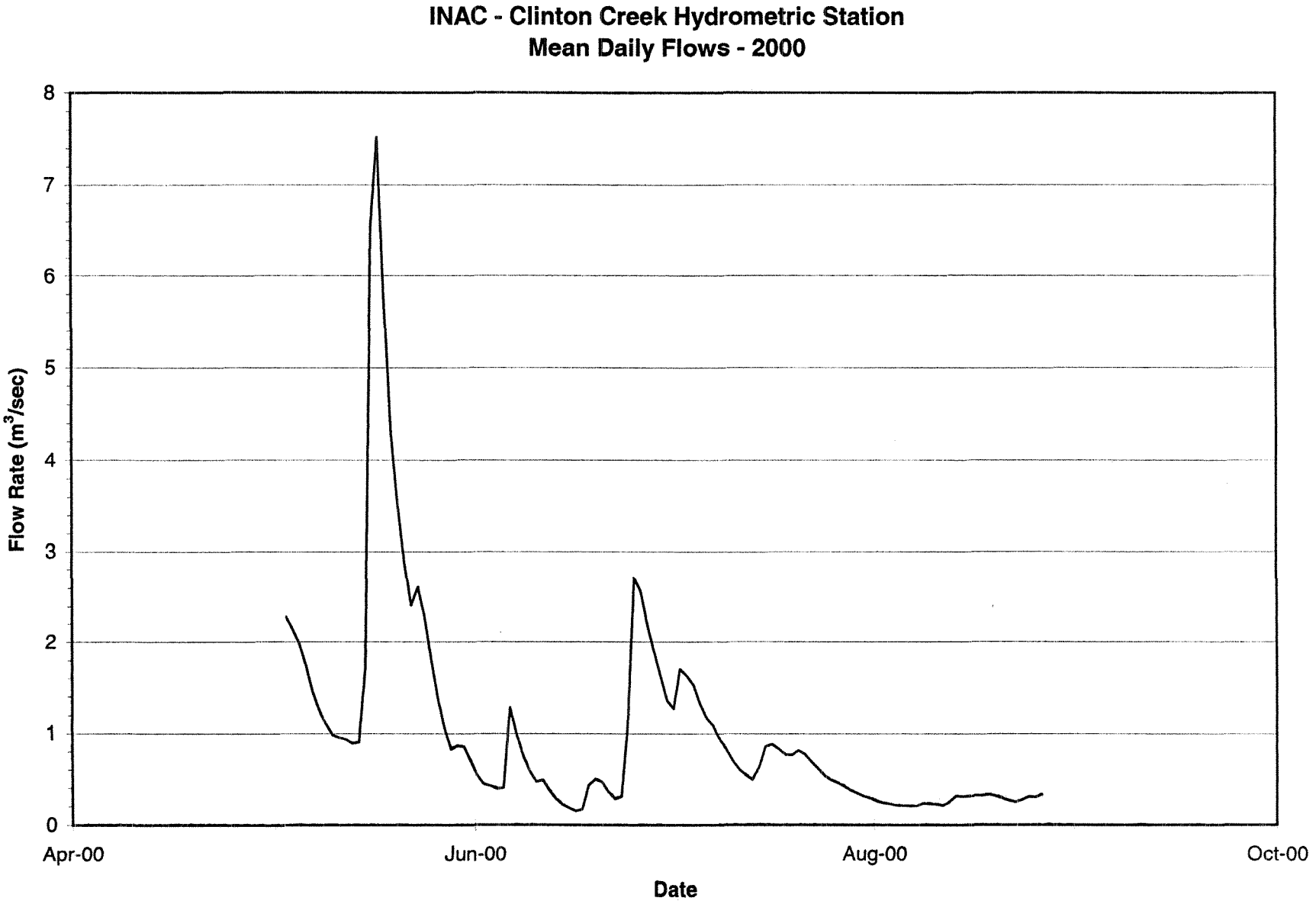

Pipe Discharge vs. Depth
Dia. = 600 mm, S = 0.0150 m/m and n = 0.025
CMP culvert pipe
Depth of Flow [m]
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
Discharge [m³/s]

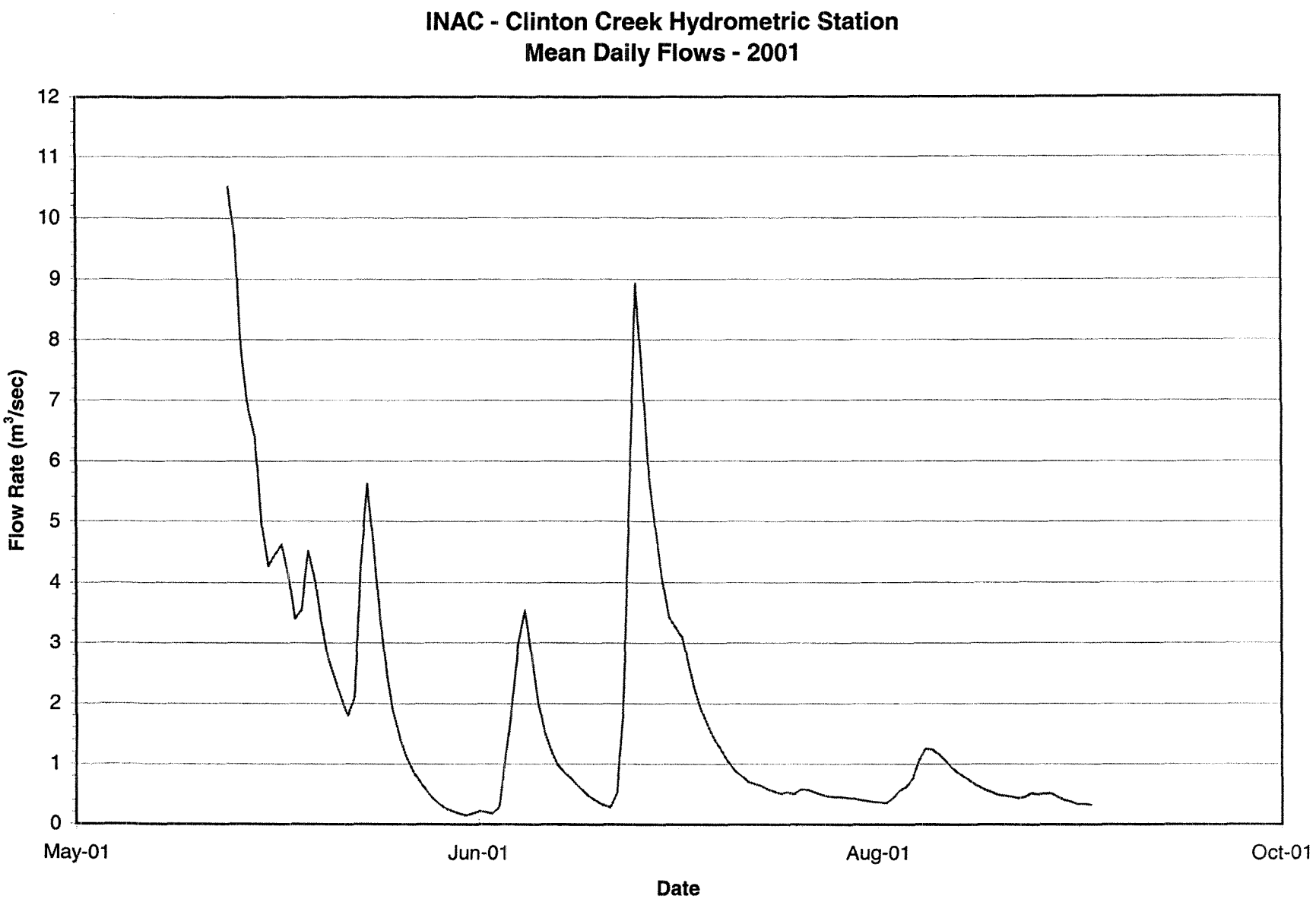

Pipe Discharge vs. Depth
Dia. = 600 mm, S = 0.0150 m/m and n = 0.012
Big 'O' Boss 2000 Pipe
Depth of Flow [m]
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
0.90
1.00
Discharge [m³/s]

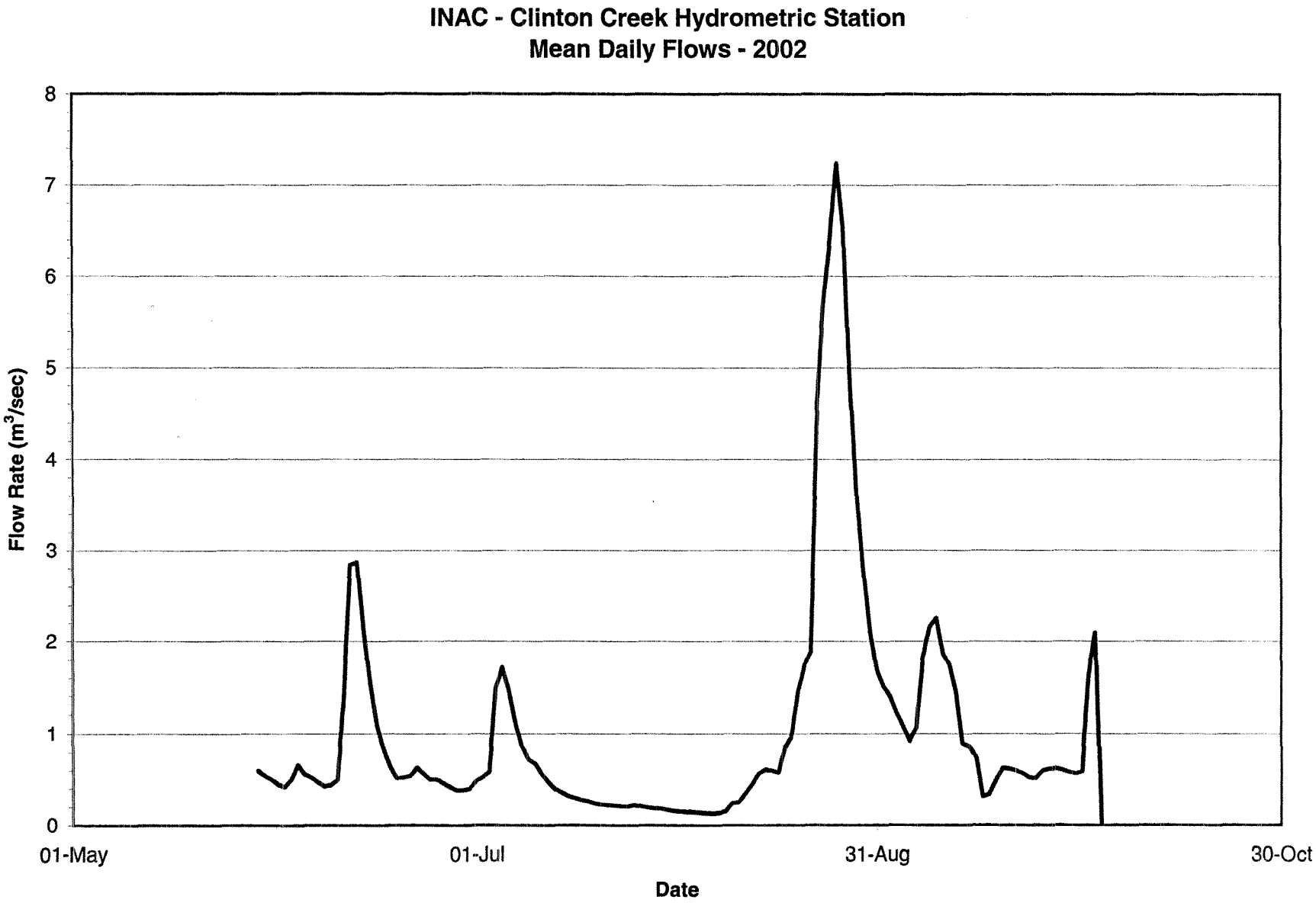
APPENDIX D

CLINTON CREEK HYDROGRAPHS


INAC - Clinton Creek Hydrometric Station
Mean Daily Flows - 2000, 2001, 2002
Flow Rate (m3/sec)
12
11
10
9
8
7
6
5
4
3
2
1
0
2000
2001
2002
12/31/99
4/30/00
8/30/00
12/30/00
5/1/01
8/30/01
12/30/01
5/1/02
8/31/02
12/30/02
Date

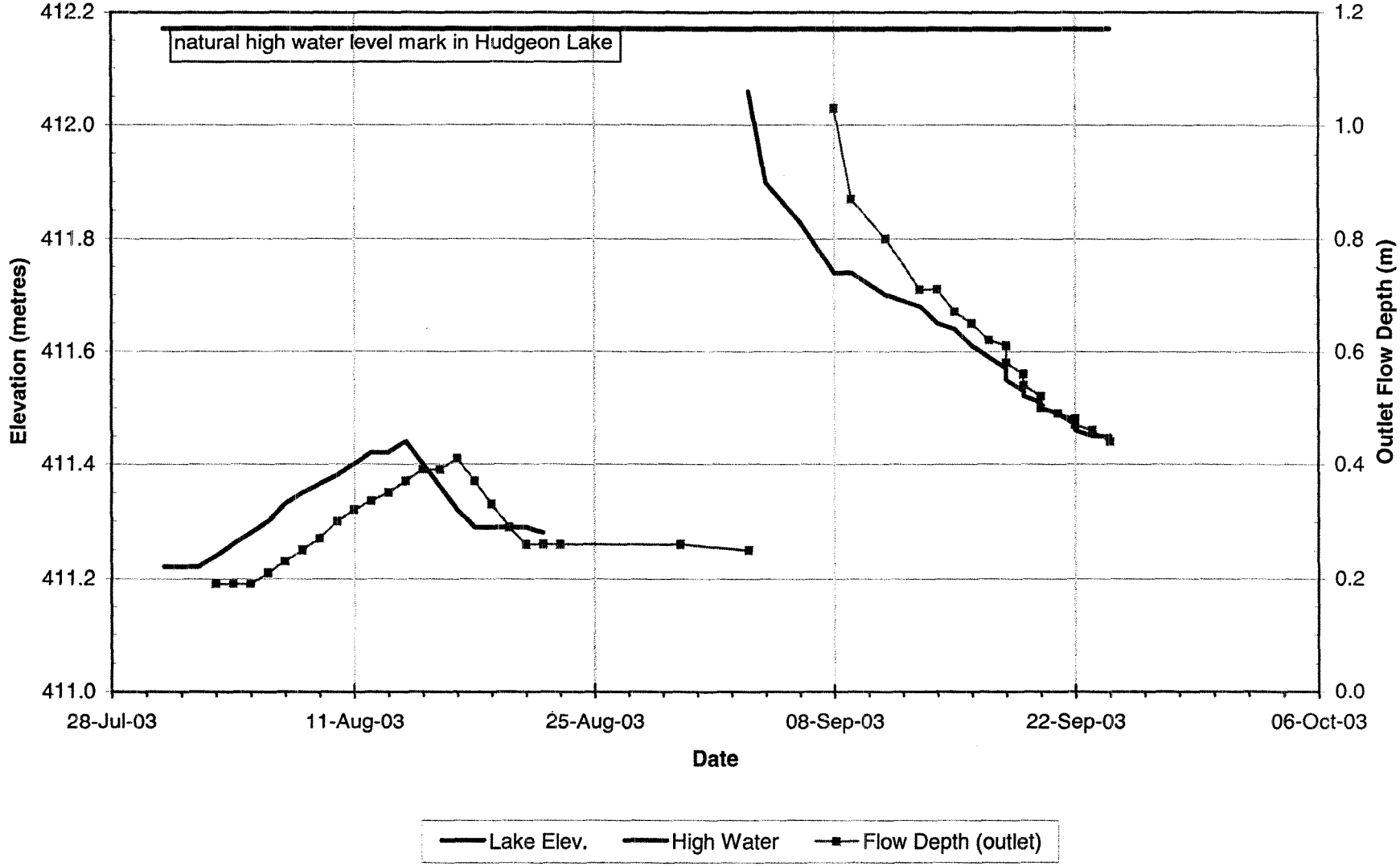

INAC - Clinton Creek Hydrometric Station
Mean Daily Flows - 2000
Flow Rate (m3/sec)
0
1
2
3
4
5
6
7
8
Apr-00
Jun-00
Aug-00
Oct-00
Date


INAC - Clinton Creek Hydrometric Station
Mean Daily Flows - 2001
Flow Rate (m3/sec)
0
1
2
3
4
5
6
7
8
9
10
11
12
May-01
Jun-01
Aug-01
Oct-01
Date


INAC - Clinton Creek Hydrometric Station
Mean Daily Flows - 2002
Flow Rate (m3/sec)
0
1
2
3
4
5
6
7
8
01-May
01-Jul
31-Aug
30-Oct
Date

Appendix C -
Mine Road Culvert Locations,
Hudgeon Lake Levels and
Drop Structure 1 Monitoring Pins

Clinton Creek Channel Stabilization Project - July / August / September 2003
Water Levels in Hudgeon Lake



Client: Government of Yukon
Project: Clinton Creek Asbestos Mine - Channel Stabilization (Stage 2)
Job No.: 6029-004-00-05
Date: 30-Nov-03

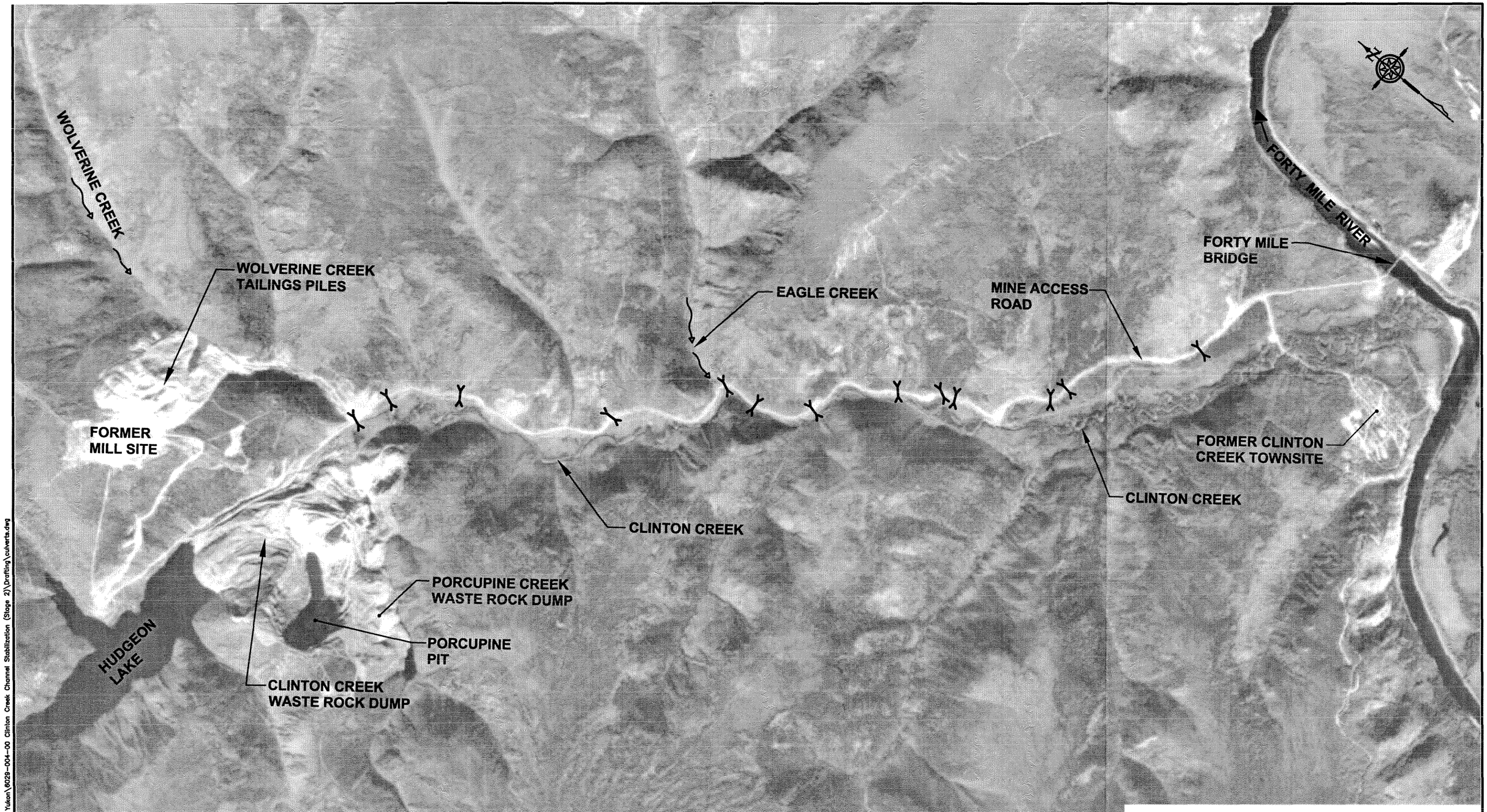
Clinton Creek Asbestos Mine - Clinton Creek Drop Structure Monitoring

Drop Structure	Date	Monitor Point ID	Elevation (m)	Northing (m)	Easting (m)	Horizontal Distance Across DS		Comment
						From Survey	From Cloth Tape Measurement	
1	Aug-03	1840	413.460	7,147,439.14	512,889.00	23.62	23.50	Pins located across from drawdown weir.
		1841	413.710	7,147,415.58	512,887.32			Cloth tape reading affected by strong wind.
2								DS-2: pins to be installed in 2004

Client: Government of Yukon
Project: Clinton Creek Asbestos Mine - Channel Stabilization
Job No.: 6029-004-00-05
Date: 06-Dec-03

Clinton Creek Asbestos Mine - Access Road Culverts

Station (km)	Northing (m)	Easting (m)	Hand Held GPS ID	Comment
	UTM Co-ordinates			
0.00	7,147,091	514,195	CLV01	Wolverine Creek
0.20	7,147,008	514,448	CLV02	
0.70	7,146,658	514,777	CLV03	
1.80	7,145,771	515,313	CLV04	
2.75	7,145,314	515,981	CLV05	Eagle Creek
3.00	7,145,057	516,014	CLV06	
3.40	7,144,740	516,223	CLV07	
4.10	7,144,369	516,692	CLV08	
4.13	7,144,340	516,710	n/a	Clinton Creek hydrometric station
4.40	7,144,118	516,860	CLV09	New 200mm culvert installed in 2003
4.50	7,144,029	516,891	CLV10	
5.20	7,143,521	517,289	CLV11	
5.30	7,143,483	517,416	CLV12	
6.30	7,142,932	518,199	CLV13	



LEGEND

CULVERT LOCATION

Date of Photography: September 1999

REV.	DESCRIPTION	DWN.	APP.	DATE

SEAL

SEAL

UMA Engineering Ltd.
Consulting · Engineering · Construction · Management Services

APPROVED BY	DATE OCTOBER, 2003
DRAWN BY: LJV	DESIGNED BY:
CHECKED BY: GR	CHECKED BY:
SCALE: APPROX. 1:25,000	JOB No. 6029-004-00-05

GOVERNMENT OF YUKON

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 2

CULVERT LOCATIONS ON MINE ACCESS ROAD

DWG. No. —

REV. —

OCT 8/03
Plot Scale: 1=2 (11"x17")
L:\Earth & Water\Projects\6029 Government of Yukon\6029-004-00 Clinton Creek Channel Stabilization (Stage 2)\Drafting\culverts.dwg

Appendix D -
Weekly Project Reports

• Consulting • Engineering • Construction • Management Services

UMA Engineering Ltd.
1479 Buffalo Place, Winnipeg, MB R3T 1L7 Canada
tel (204) 284-0580 fax (204) 475-3646 web www.umagroup.com

Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	01
Client:	Government of Yukon (GY)	**Week Ending:**	July 5, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	n/a	n/a	n/a	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	n/a	n/a	n/a				
TUES.	n/a	n/a	n/a	EQUIPMENT:		DAYS THIS WEEK:	4
WED.	n/a	n/a	n/a	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
THURS.	n/a	n/a	n/a	Caterpillar 320L excavator		DAYS TO DATE:	4
FRI.	n/a	n/a	n/a	Caterpillar 966C loader			
SAT.	n/a	n/a	n/a	Kenworth tandem truck			

1. PROGRESS

Mobilize equipment and camp out to site, starting June 27.
Camp setup as of July 4, cook started on July 5.
Re-grade ford crossing across Clinton Creek for access to the work site.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

None to report.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Produce gabion fill material and haul to the work site.

5. INSPECTION AND PHOTOGRAPHS:

None.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

Leftover materials from 2002 (Stage 1) construction:

Gabion baskets (0.5m high): 370 baskets
Staples for baskets: 28 boxes
Geotextile (non-woven): 4 rolls (1672 m^2)

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
Geotechnical Engineer

• Consulting • Engineering • Construction • Management Services

UMA Engineering Ltd.
1479 Buffalo Place, Winnipeg, MB R3T 1L7 Canada
tel (204) 284-0580 fax (204) 475-3646 web www.umagroup.com

Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	02
Client:	Government of Yukon (GY)	**Week Ending:**	July 12, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	n/a	n/a	n/a	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	n/a	n/a	n/a	1	3 labourers		
TUES.	n/a	n/a	n/a	EQUIPMENT:		DAYS THIS WEEK:	6
WED.	n/a	n/a	n/a	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
THURS.	n/a	n/a	yes	Caterpillar 320L excavator		DAYS TO DATE:	10
FRI.	n/a	n/a	yes	Caterpillar 966C loader			
SAT.	n/a	n/a	yes	Kenworth tandem truck			

1. PROGRESS

Producing gabion fill and hauling gabion fill and 75mm down material to the work site. Approximately 1000 m^3 of gabion fill screened and hauled to the work site.

Start assembling gabion baskets on Thursday and Friday.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

There is some concern that the quarry may not yield the required quantities of gabion fill material without blasting. This is to be evaluated as the work continues.
Rain in latter part of the week prevented hauling gabion fill to the work site.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Produce gabion fill material and haul to the work site.

5. INSPECTION AND PHOTOGRAPHS:

None.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

New materials for 2003 (Stage 2) construction:

Gabion baskets (0.5m high): 530 (Total = 900 baskets)
Gabion baskets (0.3m high): 40 (Total = 40 baskets)
Staples for baskets: 43 boxes (Total = 71 boxes)
Geotextile (non-woven): 6 rolls (2514 m^2) (Total = 10 rolls or 4190 m^2)
One pneumatic staple gun for gabion basket assembly (purchased for job)
One manual staple gun for gabion basket assembly (purchased for job)

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
Geotechnical Engineer

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UMA Engineering Ltd.
1479 Buffalo Place, Winnipeg, MB R3T 1L7 Canada
tel (204) 284-0580 fax (204) 475-3646 web www.umagroup.com

Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	03
Client:	Government of Yukon (GY)	**Week Ending:**	July 19, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	n/a	n/a	n/a	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	n/a	n/a	n/a	1	3 labourers		
TUES.	n/a	n/a	n/a	EQUIPMENT:		DAYS THIS WEEK:	6
WED.	n/a	n/a	<5mm	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
THURS.	n/a	n/a	n/a	Caterpillar 320L excavator		DAYS TO DATE:	16
FRI.	n/a	n/a	n/a	Caterpillar 966C loader			
SAT.	n/a	n/a	n/a	Kenworth tandem truck			

1. PROGRESS

Producing gabion fill and hauling gabion fill and 75mm down material to the work site.

Assembling gabion baskets. 120 baskets completed as of July 17.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

There is some concern that the quarry may not yield the required quantities of gabion fill material without blasting. This is to be evaluated as the work continues.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Produce gabion fill material and haul to the work site. Assemble gabion baskets.

5. INSPECTION AND PHOTOGRAPHS:

None.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

None.

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
Geotechnical Engineer

• Consulting • Engineering • Construction • Management Services

UMA Engineering Ltd.
1479 Buffalo Place, Winnipeg, MB R3T 1L7 Canada
tel (204) 284-0580 fax (204) 475-3646 web www.umagroup.com

Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	04
Client:	Government of Yukon (GY)	**Week Ending:**	July 26, 2003
Contractor:	Hän Construction Ltd.	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	n/a	n/a	n/a	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	n/a	n/a	n/a	1	3 labourers		
TUES.	n/a	n/a	n/a	EQUIPMENT:		DAYS THIS WEEK:	4
WED.	n/a	n/a	n/a	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
THURS.	n/a	n/a	n/a	Caterpillar 320L excavator		DAYS TO DATE:	20
FRI.	n/a	n/a	n/a	Caterpillar 966C loader			
SAT.	n/a	n/a	n/a	Kenworth tandem truck			

1. PROGRESS

Producing gabion fill and hauling gabion fill and 75mm down material to the work site. 2600 m^3 of gabion fill and 1500 m^3 of 75mm down material hauled to the work site.

Assembling gabion baskets: 455 baskets completed as of July 22.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

There is some concern that the quarry may not yield the required quantities of gabion fill material without blasting. This is to be evaluated as the work continues.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Produce gabion fill material and haul to the work site. Assemble gabion baskets.

5. INSPECTION AND PHOTOGRAPHS:

None.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

One pneumatic staple gun for gabion basket assembly (purchased for job). Total number of guns = 2.

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
Geotechnical Engineer

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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	05
Client:	Government of Yukon (GY)	**Week Ending:**	August 2, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	n/a	n/a	n/a	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	n/a	n/a	n/a	1	3 labourers		
TUES.	n/a	n/a	n/a	EQUIPMENT:		DAYS THIS WEEK:	6
WED.	n/a	n/a	n/a	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
THURS.	n/a	n/a	n/a	Caterpillar 320L excavator		DAYS TO DATE:	26
FRI.	n/a	n/a	n/a	Caterpillar 966C loader			
SAT.	n/a	n/a	n/a	Kenworth tandem truck	Liebherr 60 inch drum roller/compactor		

1. PROGRESS

Work on road surface and drainage ditch (three days of time for the equipment).
Clean up creek channel (logs etc.) at location of Drop Structure # 2, stockpile material for cofferdam.
Prepare access road on RHS of creek for construction of drop structures.
Install cofferdam on Aug 2.

Assembling gabion baskets, cut geotextile pieces for use under the drop structure. Miscellaneous brushing out along mine access road.

Fish salvage completed by INAC on August 2 following installation of the cofferdam.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

There is some concern that the quarry may not yield the required quantities of gabion fill material without blasting. This is to be evaluated as the work continues.

Compressor being used for gabion assembly broke down (August 1). No spare compressor on-site.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Assemble gabion baskets. Work on mine access road to improve drainage, driveability. Prepare access to location of Drop Structure # 2. Install cofferdam (Aug 2). Place gabion fill rock on RHS of existing channel to act as a blanket drain for the seepage water coming from the waste rock pile. Clean up channel at location of Drop Structure # 2 (remove boulders, trim side slopes for backfill).

Bring new compressor and a spare to the site for use with the pneumatic staple guns.

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record conditions of work site, work progress and construction practices.

6. TESTS PERFORMED:

Visual inspections of the gabion fill and gabion basket assembly.

7. MATERIAL RECEIVED ON SITE:

60 inch drum roller/compactor mobilized to site (July 31).

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	06
Client:	Government of Yukon (GY)	**Week Ending:**	August 9, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	n/a	n/a	<1mm	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	20	n/a	<1mm	1	3 labourers		
TUES.	n/a	n/a	<1mm	EQUIPMENT:		DAYS THIS WEEK:	7
WED.	18	n/a	n/a	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
THURS.	n/a	n/a	n/a	Caterpillar 320L excavator		DAYS TO DATE:	33
FRI.	23	n/a	n/a	Caterpillar 966C loader			
SAT.	25	n/a	n/a	Kenworth tandem truck	Liebherr 60 inch drum roller/compactor		

1. PROGRESS

Finish preliminary gabion basket assembly for Drop Structure # 2 (DS-2).
Brush clearing on mine access road.
Prepare base for Tier 1 of DS-2.
Remove boulders from channel work area.
Finish access roads to the upstream and downstream ends of DS-2.
Excavate channel to make room for compacted fill (75mm down) below the drop structure.
Place and compact 75mm down granular fill for drop structure base.
Install gabion baskets for Tier 1. (August 7, 8)
Prepare base and side slopes for Tier 2 of DS-2. (August 9)
Excavate rock (cobble sized) at the downstream end of DS-1 to facilitate installation of an extra row of gabion baskets on the downstream end of DS-1. Install and fill additional row of baskets on DS-1.
Filling and shaping of channel between DS-1 and DS-2.
Install Tier 2 baskets and begin filling. (August 9, 10)
Haul oversize rock (200mm and over) for use as channel armouring between DS-1 and DS-2.
Start preparing access to DS-3 and DS-4.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

New compressor broke down, no spare on -site. Replacement compressor and a backup requested.
Bull dozer broken down for 4 hours on August 5 and 3 hours on August 6.

There is some concern that the quarry may not yield the required quantities of gabion fill material without blasting. This is to be evaluated as the work continues. Pelly Construction from Whitehorse quoted $16/m^3$ to blast

8,000 m^3 of in-place rock. The decision to blast will be made at the end of August as it appears that there may be enough gabion fill to complete the work.

Construction of the two proposed drop structures downstream of DS-4 would be very difficult given the narrowness of the creek channel and height of the waste rock slopes downstream of DS-4. DS-6 can be eliminated because it is located in the area of the channel, which has down cut into the argillite bedrock (i.e. the channel bottom is relatively stable compared to that upstream of this point). DS-5 is to be located in the channel just at the bedrock contact in the channel bottom. Access to this proposed structure is difficult. Given the fairly short distance between DS-4 and the bedrock contact in the channel, it is reasonable to eliminate DS-5 provided that the channel downstream of DS-4 is protected using a layer of rock to stabilize the channel.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Order 10 rolls of ARMTEC 350 geotextile.
Place +/- 600mm diameter boulders in bottom of channel between DS-1 and DS-2 in an attempt to save on the volume of gabion fill used to armour the channel (see photos from August 8).

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record conditions of work site, work progress and construction practices.

6. TESTS PERFORMED:

Visual inspection of the gabion basket installation.

7. MATERIAL RECEIVED ON SITE:

Spare air compressor received on-site (August 6).

DISTRIBUTION:
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Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	07
Client:	Government of Yukon (GY)	**Week Ending:**	August 16, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	**6029 004 00 05**
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	27	2	n/a	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	27	6	n/a	1	3 labourers		
TUES.	21	10	n/a	EQUIPMENT:		DAYS THIS WEEK:	5
WED.	23	8	n/a	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
THURS.	23	6	n/a	Caterpillar 320L excavator		DAYS TO DATE:	38
FRI.	23	10	n/a	Caterpillar 966C loader			
SAT.	27	8	<1mm	Kenworth tandem truck	Liebherr 60 inch drum roller/compactor		

1. PROGRESS

Complete installation of gabion baskets for DS-2: Tier 2 (Aug 10), Tier 3 (Aug 11), Tier 4 (Aug 12), Tier 5 (Aug 13) and Tier 6 (Aug 14) of DS-2.
Haul 200mm oversize rock from quarry to work site for use as channel armouring (440m^3).
Haul 75mm down gravel from quarry site to work site (100m^3).
Haul gabion fill from quarry site to work site (120m^3).
Finish backfilling and armouring the channel between DS-1 and DS-2.
Remove cofferdam on August 14 at 16:23 hrs.

Contractor off at end of August 14 for a break (approx 1 week).

2. CONSTRUCTION PROBLEMS AND CONCERNS:

There is some concern that the quarry may not yield the required quantities of gabion fill material without blasting. This is to be evaluated as the work continues. Given that only two more drop structures will be constructed (DS-3 and DS-4) to complete the channel stabilization work it appears that there will be enough gabion fill to complete the job.

The volume of fill (75mm down) required to complete the compacted base for DS-2 was significant. There will not be enough 75mm down material available to construct the compacted fill for DS-3 and DS-4. Another source of fill will be required (argillite from the waste rock pile) to ensure a minimum 500 mm thick layer of the 75mm down material can be placed directly below the gabion baskets.

Compactor broken down from 2PM on August 11 to 9AM on August 12.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Place boulders at the downstream end of DS-2 to minimize the risk of the gabions being undermined during a high flow event.

Dig anchor trench (2m deep) for geotextile at the upstream end of DS-2.

Complete final shaping of the area on the LHS of the channel.

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record conditions of work site, work progress and construction practices.

6. TESTS PERFORMED:

Visual inspection of the gabion basket installation.

7. MATERIAL RECEIVED ON SITE:

None.

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	08
Client:	Government of Yukon (GY)	**Week Ending:**	August 23, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip
SUN.	17		n/a
MON.	19	8	<5mm
TUES.	19	6	<2mm
WED.	19	1	n/a
THURS.	17	6	<5mm
FRI.		2	n/a
SAT.			n/a

WORK FORCE:	
CREWS:	PERSONS:
1	0 labourers
EQUIPMENT:	
Caterpillar D7 dozer	Operators = 3
Caterpillar 320L excavator	
Caterpillar 966C loader	
Kenworth tandem truck	

WORK SCHEDULE:	
TOTAL DAYS	n/a
DAYS THIS WEEK:	1
STANDBY DAYS:	0
DAYS TO DATE:	39

1. PROGRESS

Contractor off at end of August 14 for a break (approx 1 week). Contractor back on August 23 to start preparing for construction of Drop Structures 3 and 4. (see next weekly report for site instructions).

2. CONSTRUCTION PROBLEMS AND CONCERNS:

None.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

None.

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record condition and performance of the newly completed channel work.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

None.

DISTRIBUTION:
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Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

Gil Robin

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	09
Client:	Government of Yukon (GY)	**Week Ending:**	August 30, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip
SUN.			n/a
MON.			n/a
TUES.			n/a
WED.			n/a
THURS.			n/a
FRI.			n/a
SAT.			n/a

WORK FORCE:		WORK SCHEDULE:	
CREWS:	PERSONS:	TOTAL DAYS	n/a
1	3 labourers		
EQUIPMENT:		DAYS THIS WEEK:	6
Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	0
Caterpillar 320L excavator		DAYS TO DATE:	45
Caterpillar 966C loader			
Kenworth tandem truck			

1. PROGRESS

Screened material suitable for gabion fill. Hauled all remaining 75mm down (640m^3) and gabion fill (110m^3) from the quarry to the work site.
Prepared access to Drop Structures 3 and 4 (DS-3 and 4).
Graded area along the LHS of the channel between DS-1 and 2.
Assembled an additional 100 single baskets (0.5m x 1.0m x 3m) and 70 sets of 3 baskets joined together.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

None.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Following instructions left with Contractor while UMA site engineer was off.

- Screen any material suitable for gabion fill. Haul all remaining 75mm down, gabion fill and oversize rock from the quarry to the work site.
- Excavate and fill as required to gain access to Drop Structures 3 and 4 (DS-3 and 4).
- Grade area along the LHS of the channel between DS-1 and 2.
- Assemble gabions baskets required for construction of DS-3 and 4. Require an additional 100 single baskets

and 90 sets of 3 baskets joined together.

5. INSPECTION AND PHOTOGRAPHS:

None.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

None.

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	10
Client:	Government of Yukon (GY)	**Week Ending:**	September 6, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.			>25mm	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.			>25mm	1	0 labourers		
TUES.			>25mm	EQUIPMENT:		DAYS THIS WEEK:	0
WED.	15	1	n/a	Caterpillar D7 dozer	Operators = 3 (STANDBY)	STANDBY DAYS:	5
THURS.	17	1	<1mm	Caterpillar 320L excavator		DAYS TO DATE:	50
FRI.	17	2	n/a	Caterpillar 966C loader			
SAT.	14	2	<1mm	Kenworth tandem truck			

1. PROGRESS

No work undertaken due to high water level in Hudgeon Lake and high flows in Clinton Creek. Heavy rains started around August 30 and continued for 4 days. Equipment on standby until further notice.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

High water level in Hudgeon Lake and high flows in Clinton Creek preclude installing the cofferdam. Work won't resume until the lake level is less than about elevation 411.30 metres.

The work site is very wet and slippery due to the rain and is not ready for construction traffic.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Sent crew home until further notice due to high lake level and creek flows. Equipment on standby.

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record site conditions and performance of the drop structures.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

None.

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	11
Client:	Government of Yukon (GY)	**Week Ending:**	September 13, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:		WORK SCHEDULE:	
SUN.	14	2	<1mm	CREWS:	PERSONS:	TOTAL DAYS	n/a
MON.	10	2	5mm	1	3 labourers		
TUES.	18	1	n/a	EQUIPMENT:		DAYS THIS WEEK:	2
WED.	17	2	n/a	Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	5
THURS.	12	0	<5mm	Caterpillar 320L excavator		DAYS TO DATE:	57
FRI.	8	5	5mm	Caterpillar 966C loader			
SAT.	9	-5	n/a	Kenworth tandem truck			

1. PROGRESS

September 11 & 12: Locate and clean out existing culverts (13 culverts) along mine access road. Install 1 new culvert to replace an existing culvert that was plugged.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

High water level in Hudgeon Lake and high flows in Clinton Creek preclude installing the cofferdam. Work won't resume until the lake level is less than about elevation 411.30 metres.

The work site is still wet and slippery due to the heavy rain earlier this month and the more recent showers and is not ready for construction traffic.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Loader and backhoe operators and labourers (3) to come out to site on September 11 to work on the mine access road (culverts and drainage). Rick Gillespie to bring out the geotextile and culvert pipe.

Sent crew home on September 12 until further notice due to high lake level and creek flows. Equipment on standby rates.

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record site conditions and performance of the drop structures.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

8 – 6 metre lengths of HDPE culvert pipe (200mm diameter).
5 – HDPE culvert pipe snap connectors
10 – rolls of ARMTEC 350 non-woven geotextile

DISTRIBUTION:
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Ken Skaftfeld, UMA

Gil Robin —

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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	12
Client:	Government of Yukon (GY)	**Week Ending:**	September 20, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip
SUN.	10	-10	n/a
MON.	6	-10	n/a
TUES.	6	-7	n/a
WED.	8	-3	n/a
THURS.	4	-7	n/a
FRI.	5	-12	n/a
SAT.	4	-7	snow

WORK FORCE:		WORK SCHEDULE:	
CREWS:	PERSONS:	TOTAL DAYS	n/a
1	3 labourers		
EQUIPMENT:		DAYS THIS WEEK:	0
Caterpillar D7 dozer	Operators = 3	STANDBY DAYS:	7
Caterpillar 320L excavator		DAYS TO DATE:	64
Caterpillar 966C loader			
Kenworth tandem truck			

1. PROGRESS

September 17: Install 2 - 200mm diameter siphons over Drop Structure # 1, each having a suction head of approximately 1.5 metres.

September 18: Re-prime one of the siphon pipes and reduce flow to prevent it from sucking air at the intake.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

High water level in Hudgeon Lake and high flows in Clinton Creek preclude installing the cofferdam. Work won't resume until the lake level is less than about elevation 411.30 metres.

The work site is starting to dry up after the heavy rain earlier this month and the recent showers.

Siphons will work well until the lake level drops to within a few inches of the top of the siphon. At this point, it is expected that the siphons will begin to suck in air and lose their prime.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

Install siphon(s) or rent a pump to help draw down the lake.
Cofferdam will go in on Monday Sept 22 regardless of lake level (unless there is a heavy rainfall in the mean time).

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record site conditions and performance of the drop structures.

6. TESTS PERFORMED:

None.

7. MATERIAL RECEIVED ON SITE:

Sept 16: Insulated sewer pipe (200mm diameter, 2@12m long, 1@6m long) for use as siphons. Pipe purchased from the City of Dawson.

DISTRIBUTION:
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Weekly Project Report

Project:	Clinton Creek Asbestos Mine Clinton Creek Channel Stabilization (Stage 2)	**Report No.**	13
Client:	Government of Yukon (GY)	**Week Ending:**	September 27, 2003
Contractor:	**Hän Construction Ltd.**	**Job No.**	6029 004 00 05
Location:	Clinton Creek Mine Site, Yukon Territory	**Client Ref.**	GY

WEATHER	Hi.	Low	Precip	WORK FORCE:			WORK SCHEDULE:	
SUN.	3	-2	30mm snow	CREWS:	1	PERSONS:	TOTAL DAYS	n/a
MON.	4	-4	n/a			3 labourers		
TUES.			n/a	EQUIPMENT:			DAYS THIS WEEK:	5
WED.			n/a	Caterpillar D7 dozer		Operators = 3	STANDBY DAYS:	1
THURS.			n/a	Caterpillar 320L excavator			DAYS TO DATE:	70
FRI.			n/a	Caterpillar 966C loader				
SAT.			n/a	Kenworth tandem truck				

1. PROGRESS

Clean up work site, place additional boulders in creek channel at downstream end of Drop Structure # 2 to provide additional protection against higher flows expected in the spring freshet. Two siphon pipes removed from Drop Structure # 1 and stored on-site. Geotextile and culvert pipe hauled to Dawson City and stored at Gillespie Equipment Rentals. Access to the waste rock pile was blocked using boulders.

2. CONSTRUCTION PROBLEMS AND CONCERNS:

Colder than normal weather conditions, including about 30mm of snow at the work site have raised safety concerns about working in the creek channel. Rubber tired equipment (tandem & loader) cannot be used safely on slopes due to the potential for sliding. The colder than normal temperatures over the last 10 or more days do not appear to be improving in the short term and these cooler temperatures may affect construction of the next drop structure and may ultimately result in a shorter work window than expected. Ten days of reasonably good weather is required to build the next drop structure. The cold weather has also resulted in ice forming on many of the rocks and boulders in the creek channel, which would make the fish salvage effort dangerous.

3. ACCIDENTS AND PROPERTY DAMAGE:

None to report.

4. SITE INSTRUCTIONS PROVIDED AND EXTRA WORK ORDERS:

After discussing the weather and site conditions with the Contractors, a final decision to stop work for the 2003 season was made by Hugh Copland from the Government of Yukon on Monday, September 22. Work halted due to poor weather conditions over the last 10 days and the risk of not having enough good weather over the next 10 days to finish building Drop Structure # 3. As noted in **2.** above, the poor weather has resulted in potentially unsafe working conditions at the site.

5. INSPECTION AND PHOTOGRAPHS:

Digital photographs taken to record site conditions and performance of the drop structures.

6. TESTS PERFORMED:

None.

7. MATERIAL INVENTORY:

Granular Materials (stockpiled on-site):

75mm down gravel:	+/- 1000 m^3
Gabion fill:	+/- 1500 m^3
200mm over rip rap:	+/- 200 m^3

Gabion Baskets (Stored on-site):

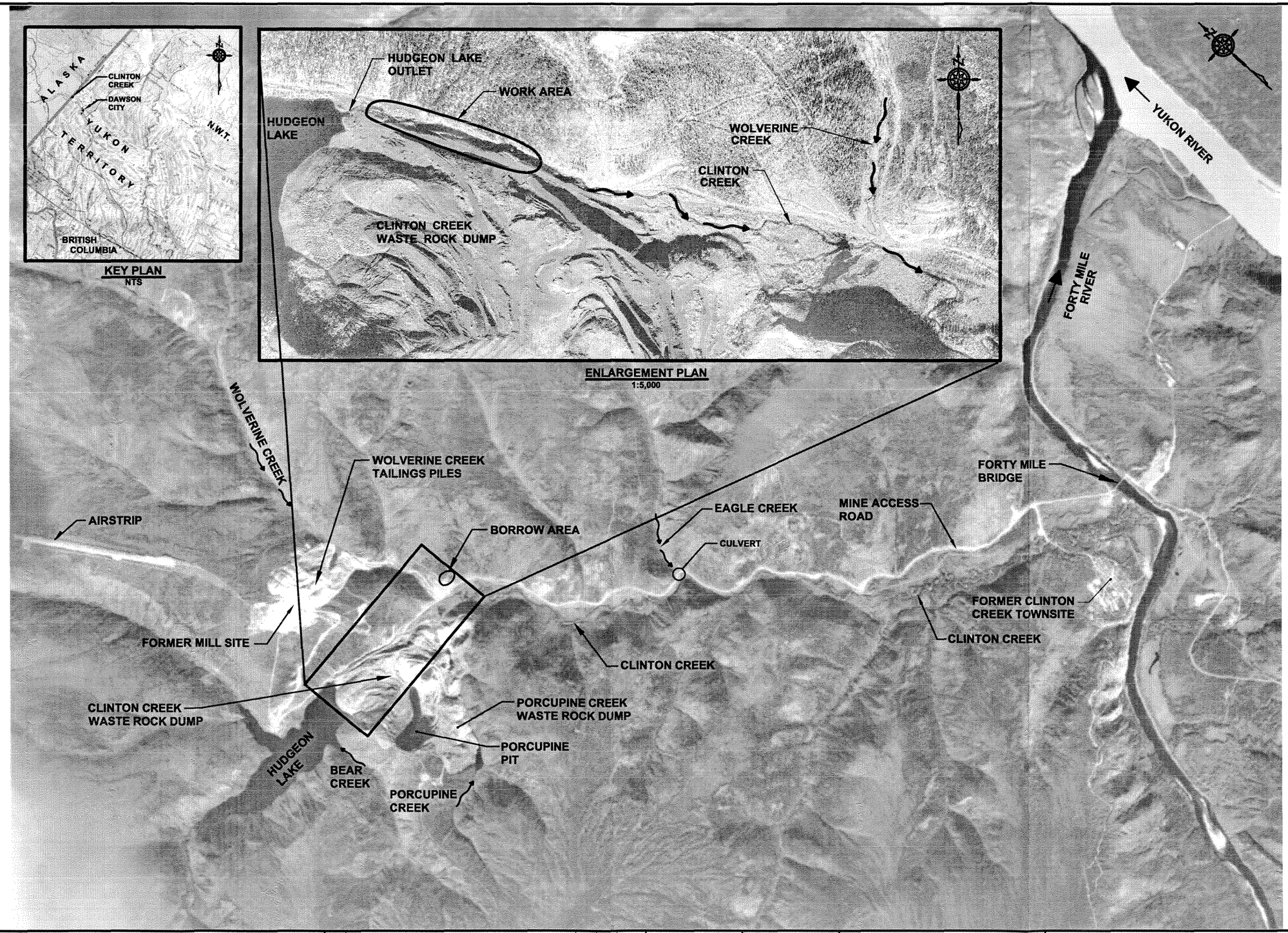
0.3m x 1m x 3m: Total 40 – all assembled
0.5m x 1m x 3m: Total 804 – 480 unassembled, 155 single baskets assembled, 70 groups of three baskets assembled

Staples for basket assembly: - 30 boxes (stored at Gillespie Equipment Rentals)
Geotextile (Armtec 350 non-woven): - 14 rolls (stored at Gillespie Equipment Rentals)
Culvert pipe: 6 - 8m lengths of 200mm diameter HDPE pipe (stored at Gillespie Equipment Rentals)
4 - snap couplers for HDPE pipe (stored at Gillespie Equipment Rentals)

DISTRIBUTION:
Hugh Copland, GY
Brett Hartshorne, DIAND
Ken Skaftfeld, UMA

REPORTED BY: Gil Robinson, M.Sc., P.Eng.
Geotechnical Engineer

Appendix E -
Record Drawings



OCT 16/03
Plot Scale: 1=1 (22"x34") pp
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HALF SIZE REDUCTION

Date of Photography: September 1999

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		17Oct03

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OCTOBER 2003
APPROVED BY — DATE

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CHECKED BY:	GR	CHECKED BY:	
SCALE:	APPROX. 1:20,000	JOB No.	6029-004-00-05

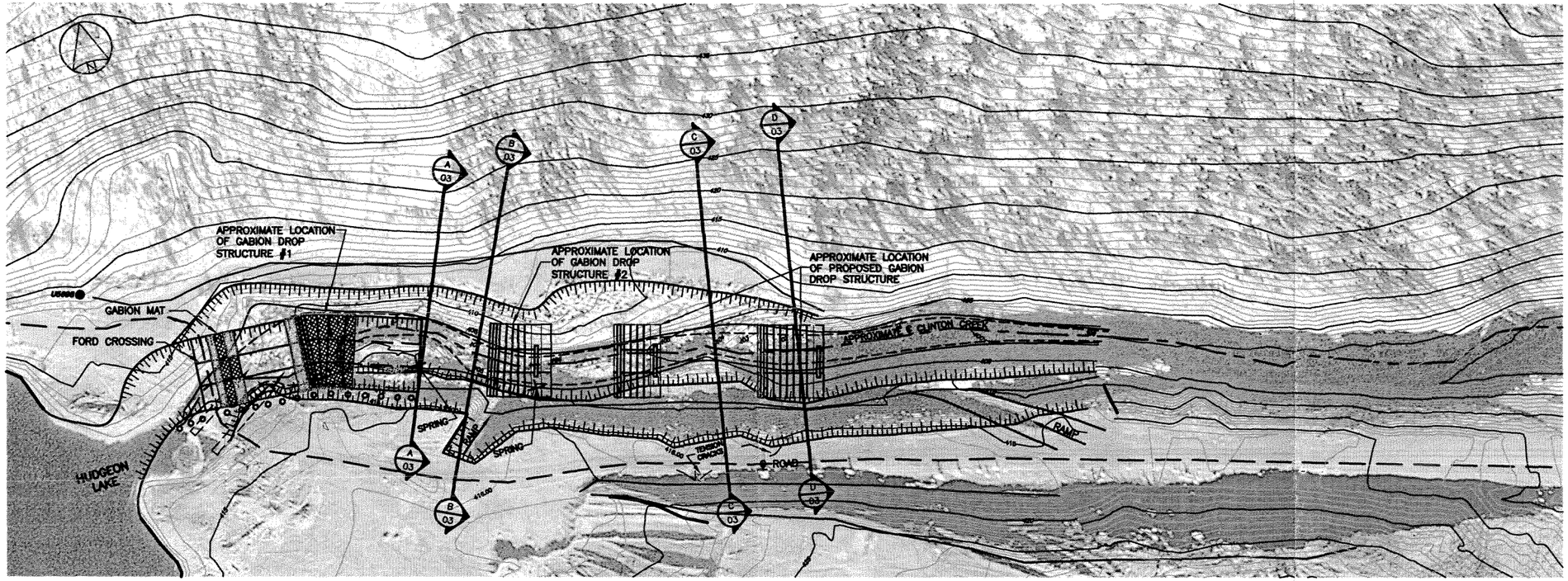
GOVERNMENT OF YUKON

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 2

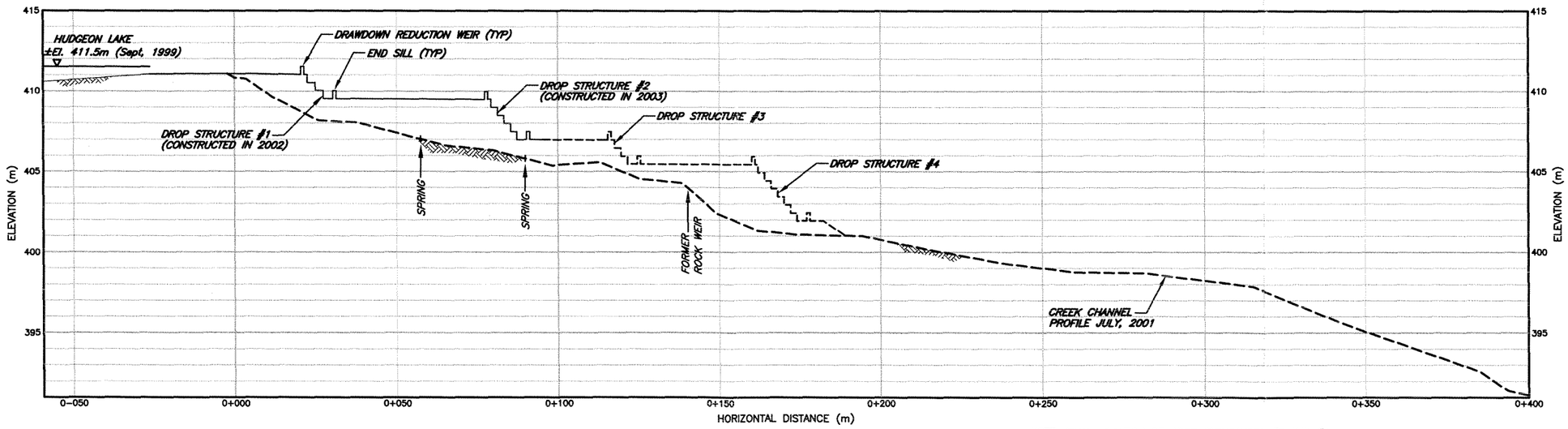
LOCATION PLAN

DWG. No. 01

REV. A



CLINTON CREEK CHANNEL
SCALE 1:750



CLINTON CREEK CHANNEL PROFILE
VER. SCALE 1:150
HOR. SCALE 1:750

NOTE: FINAL LOCATION OF DROP STRUCTURES #3 AND #4 WILL BE DETERMINED DURING CONSTRUCTION.

HALF SIZE REDUCTION

NAD 83 UTM Zone 7
Date of Photography: September 1999

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		17Oct03

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CHECKED BY:	GR	CHECKED BY:	KMS
SCALE:	AS NOTED	JOB No.	6029-004-00-05

GOVERNMENT OF YUKON

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 2

PLAN AND PROFILE

DWG. No. 02 REV. A

APR 28/03
Plot Scale: 1=1
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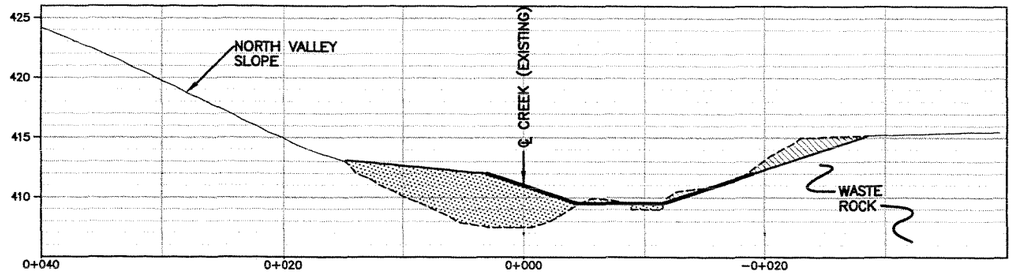
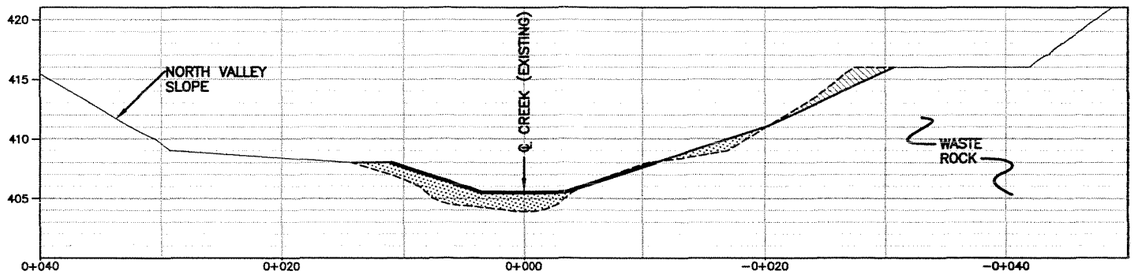


CROSS SECTION A
1:250
02



CROSS SECTION C
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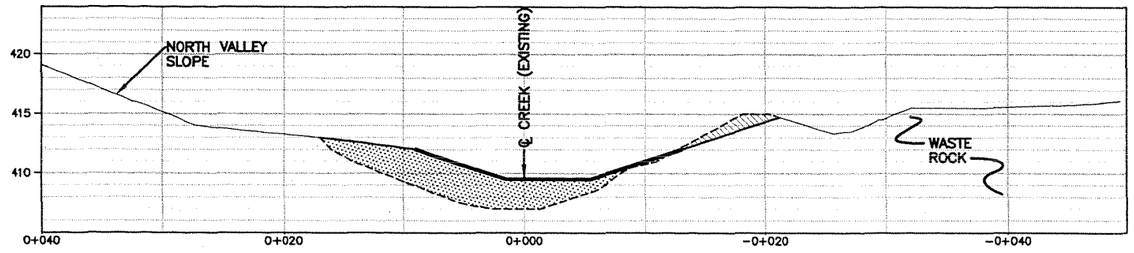
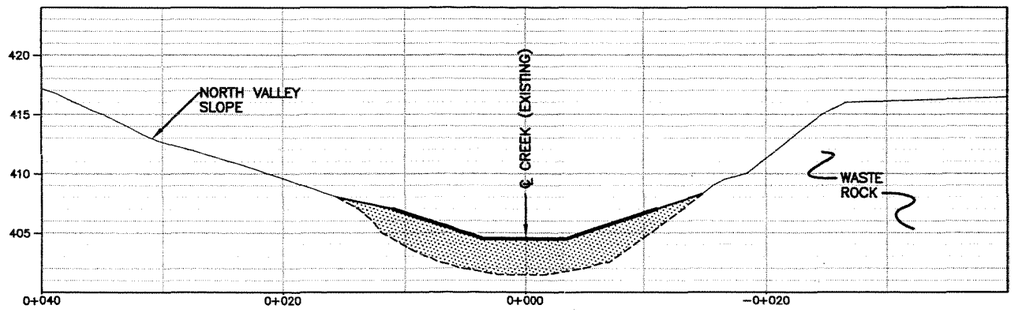


CROSS SECTION B
1:250
02



CROSS SECTION D
1:250
02

NOTE:
CROSS-SECTIONS C & D TO BE CONSTRUCTED IN 2004

LEGEND

- CUT MATERIAL
- COMPACTED FILL
- STABILIZED CHANNEL SECTION

HALF SIZE REDUCTION

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		17Oct03

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SCALE:	AS NOTED	JOB No.	6029-004-00-05

GOVERNMENT OF YUKON

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 2

CROSS SECTIONS

DWG. No. 03 REV. A

OCT 17/03
Plot Scale: 1=2 pa
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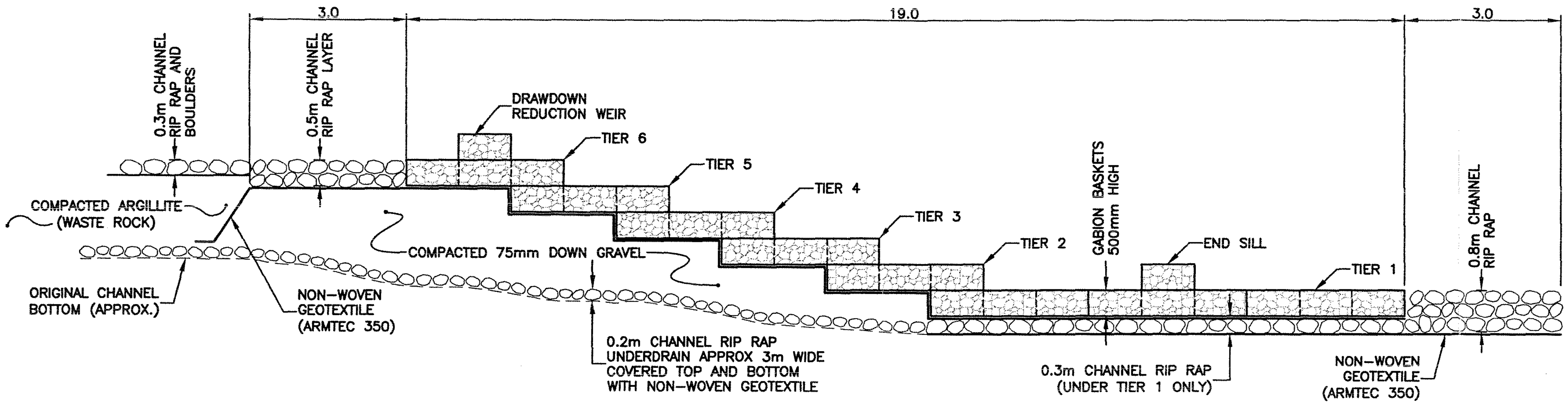
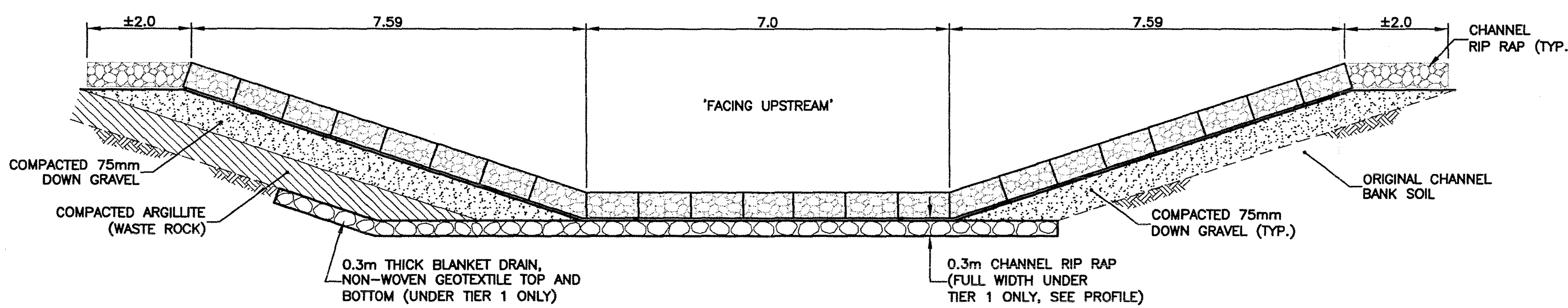


TIER	TOP OF BASKET ON ℄
1	406.84
2	407.48
3	408.03
4	408.52
5	409.03
6	409.60
END SILL	407.45
DRAWDOWN WEIR	410.10

CENTERLINE PROFILE A–A'
1:50 05



SECTION B–B'
1:50 05

OCT 17/03
Plot Scale: 1=2 ps
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METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

HALF SIZE REDUCTION

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		17Oct03

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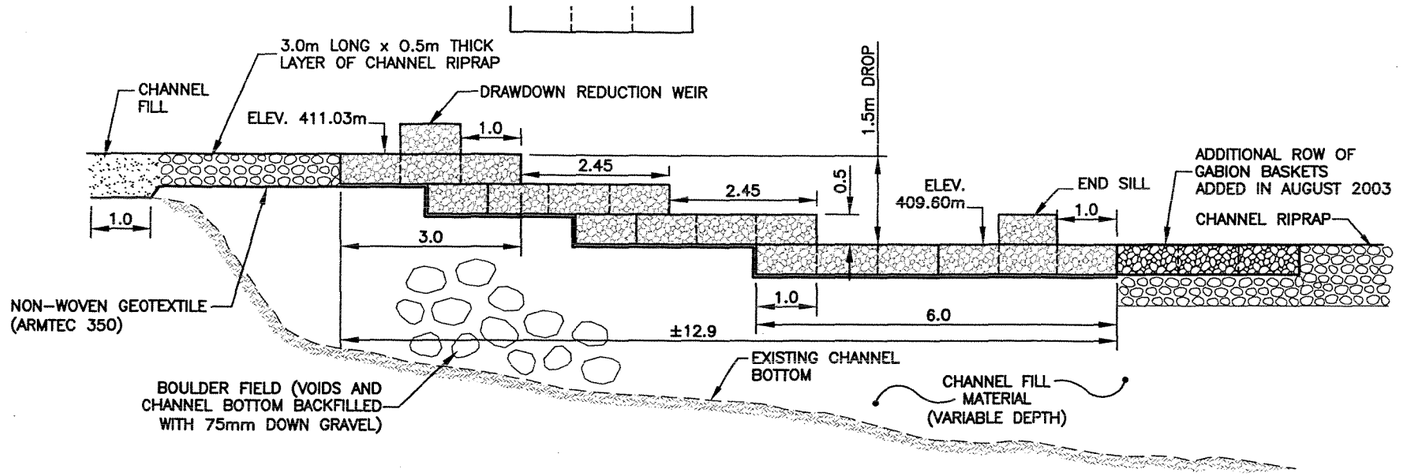
DRAWN BY: LJV | DESIGNED BY: GR/RA
CHECKED BY: GR | CHECKED BY: KMS
SCALE: AS NOTED | JOB No. 6029-004-00-05

GOVERNMENT OF YUKON

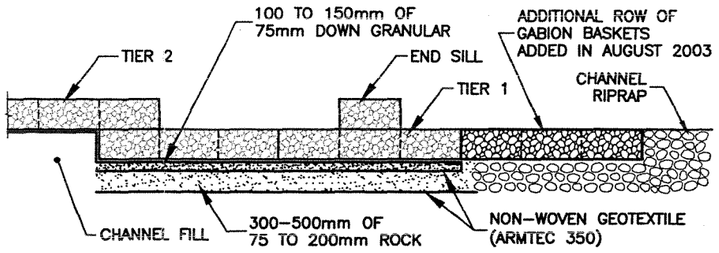
ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 2

DROP STRUCTURE #2 – DETAILS

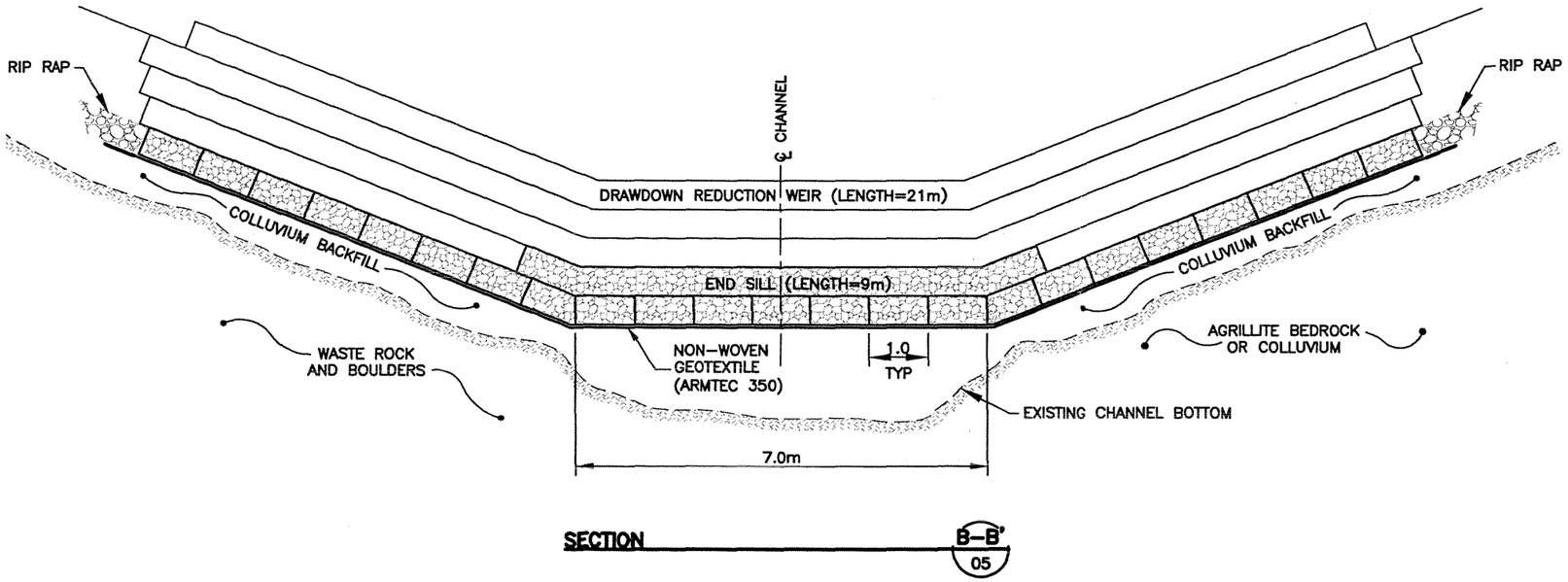
DWG. No. 04 REV. A



CENTERLINE PROFILE A–A' 05



DETAIL OF BLANKET DRAIN CONSTRUCTED UNDER THE FLOOR OF TIER #1



SECTION B–B' 05

OCT 17/03
Plot Scale: 1=2 pt
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METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

HALF SIZE REDUCTION

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		28Apr03
B	RECORD DRAWING / REPLOTTED	LJV		17Oct03

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OCTOBER 2003
APPROVED BY DATE

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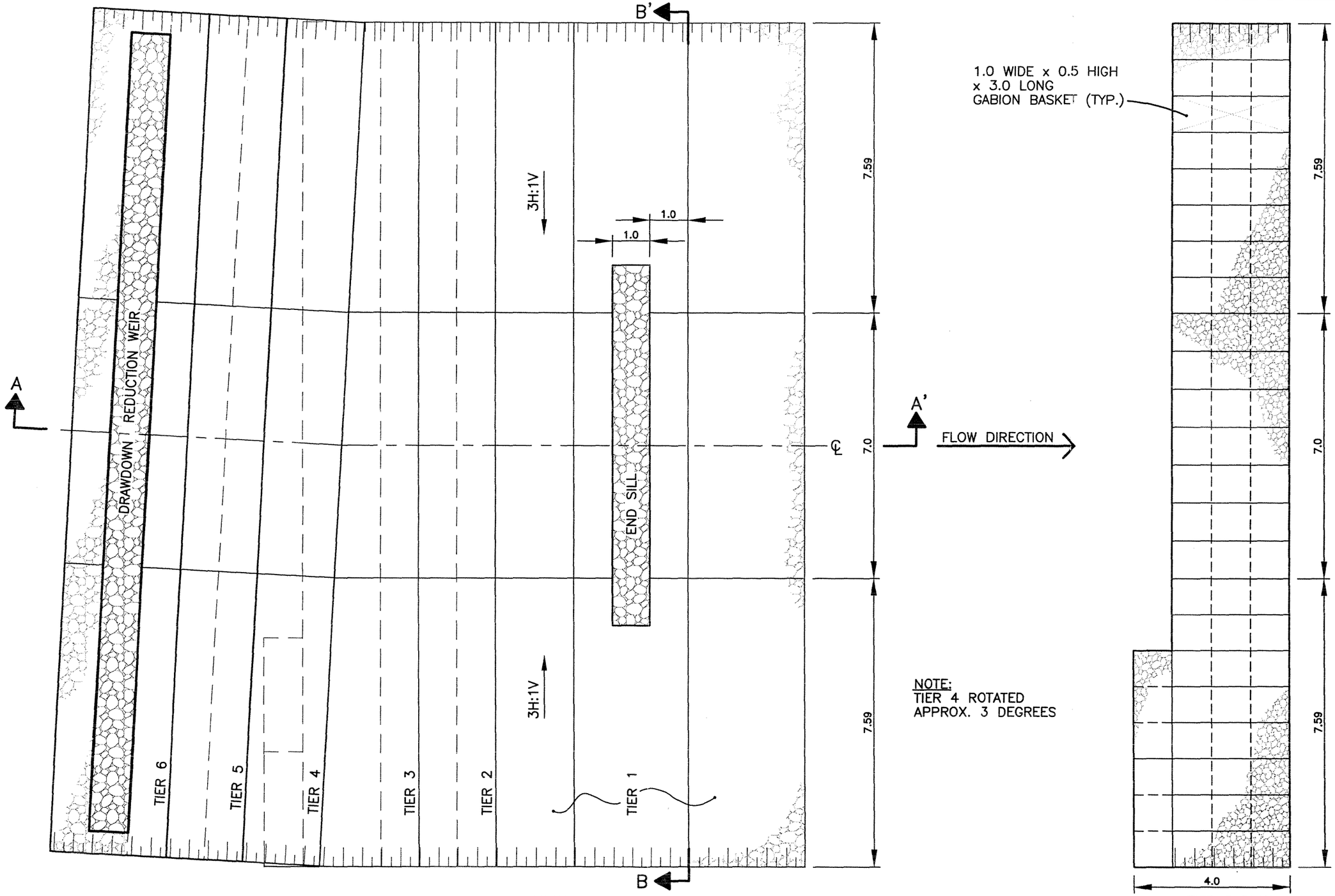
CHECKED BY:		CHECKED BY:	GR
SCALE:	1:50	JOB No.	4440-042-02-01

INDIAN AND NORTHERN AFFAIRS CANADA

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 1

DROP STRUCTURE #1
DETAILS

DWG. No. 04 REV. B



PLAN

TIER 3 PLAN

HALF SIZE REDUCTION

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		31Oct03

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APPROVED BY		DATE	OCTOBER 2003
DRAWN BY:	LJV	DESIGNED BY:	GR/RA
CHECKED BY:	GR	CHECKED BY:	KMS
SCALE:	1:50	JOB No.	6029-004-00-05

GOVERNMENT OF YUKON

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 2

DROP STRUCTURE #2 – DETAILS

DWG. No. 05

REV. A

OCT 31/03
PAN Scale: 1=1
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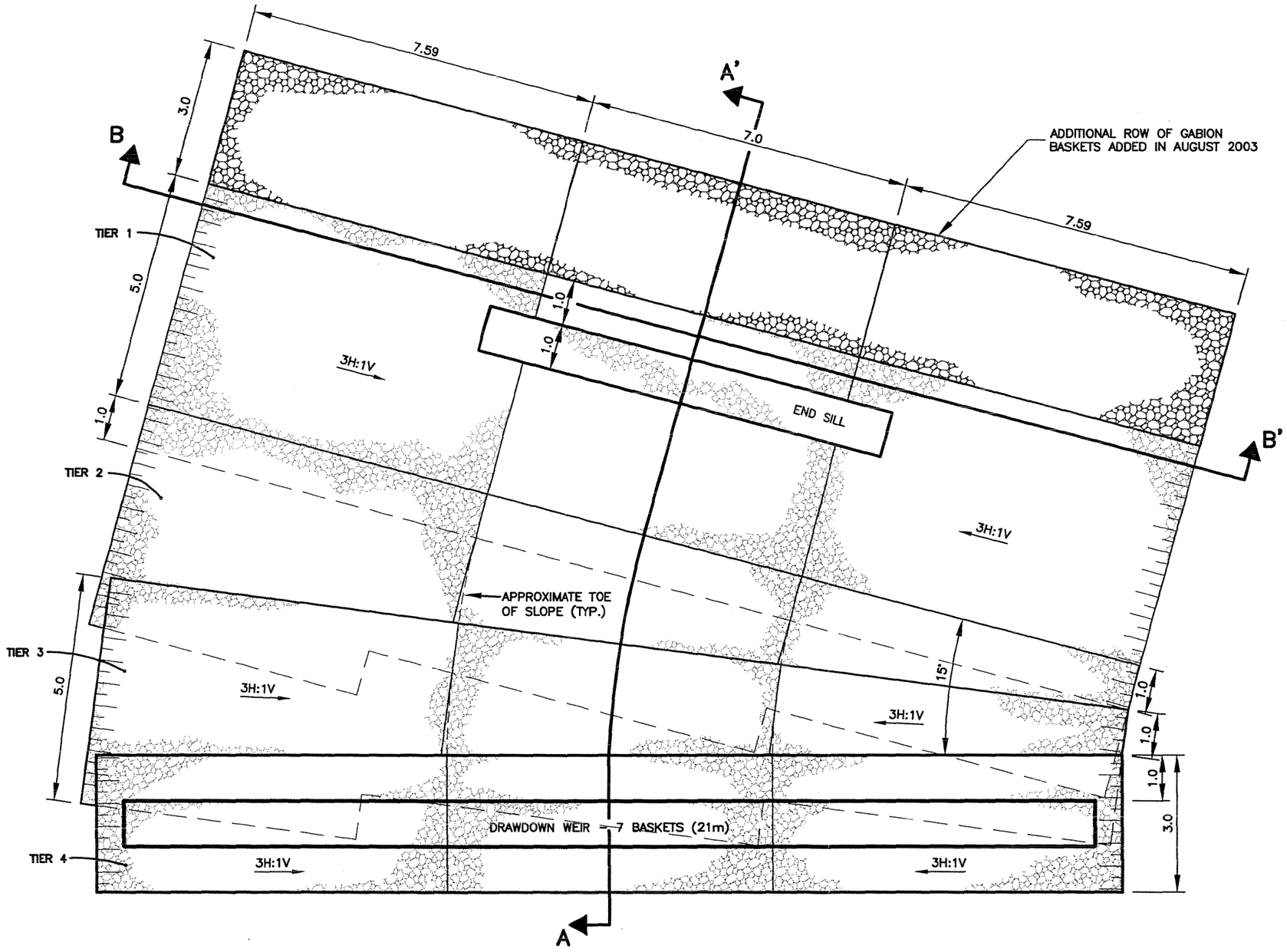
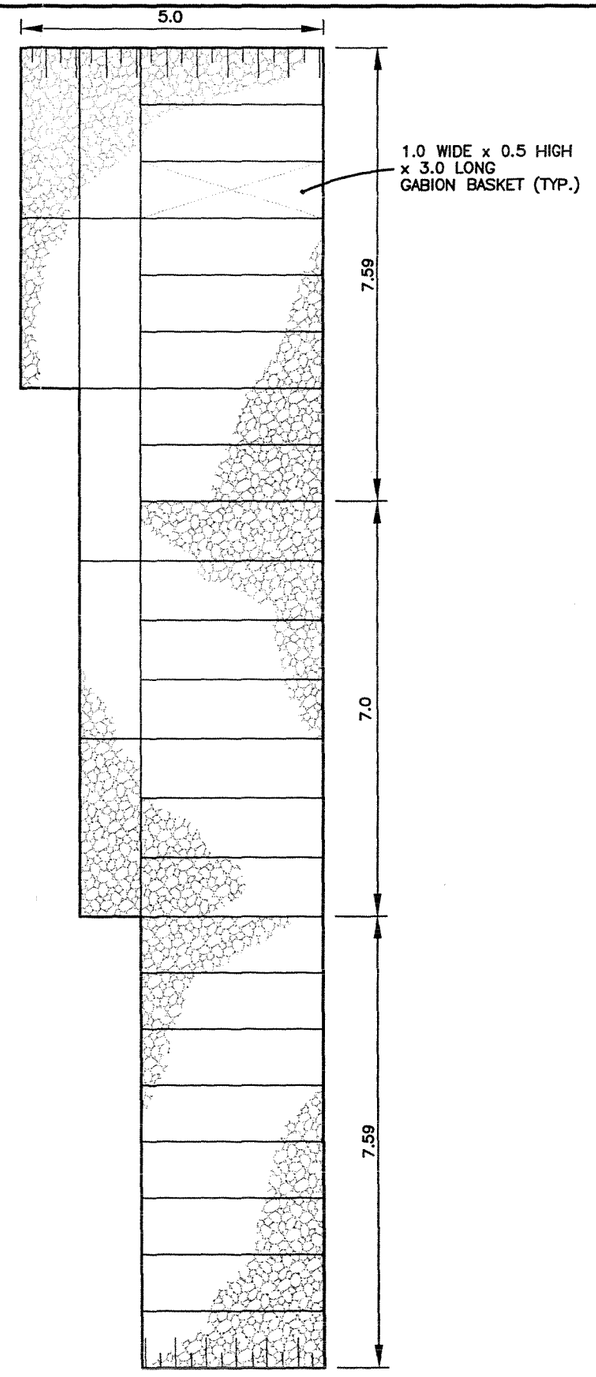


PLAN



TIERS 2 & 3 PLAN

HALF SIZE REDUCTION

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		28Apr03
B	RECORD DRAWING / REPLOTTED	LJV		17Oct03

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OCTOBER 2003

APPROVED BY		DATE	
DRAWN BY:	JV	DESIGNED BY:	RA
CHECKED BY:	GR	CHECKED BY:	GR
SCALE:	1:50	JOB No.	4440-042-02-01

INDIAN AND NORTHERN AFFAIRS CANADA

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 1

DROP STRUCTURE NO. 1 – PLAN VIEW

DWG. No. 05 REV. B

OCT 17/03
Plot Scale: 1=2 PS
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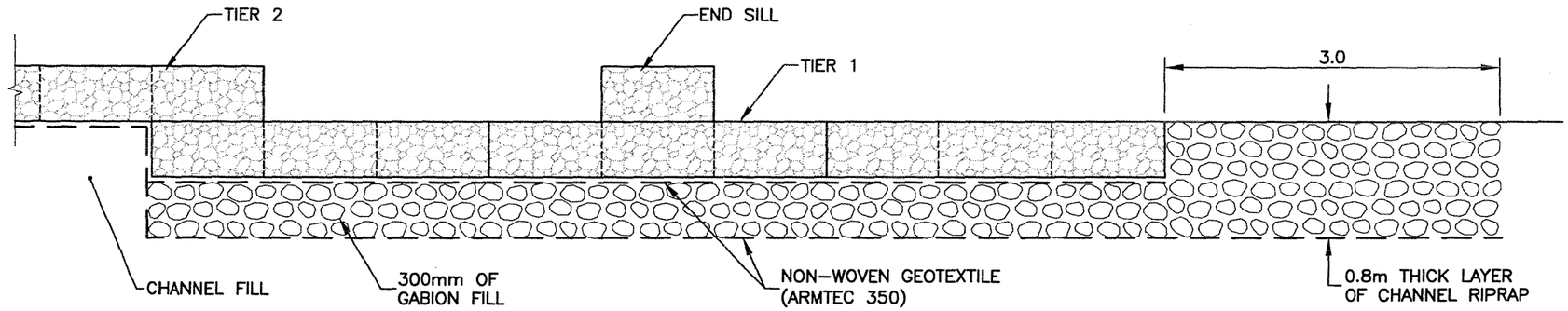

DETAIL OF BLANKET DRAIN

HALF SIZE REDUCTION

REV.	DESCRIPTION	DWN.	APP.	DATE
A	RECORD DRAWING / REPLOTTED	LJV		30oct03

SEAL

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APPROVED BY — DATE: OCTOBER 2003

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CHECKED BY:	GR	CHECKED BY:	KMS
SCALE:	1:25	JOB No.	6029-004-00-05

GOVERNMENT OF YUKON

ABANDONED CLINTON CREEK ASBESTOS MINE
CLINTON CREEK CHANNEL STABILIZATION - STAGE 2

DETAILS — DWG. No. 06 — REV. A

OCT 29/03 - 1:42 pm
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Appendix F -
Fish Salvage Report

ABANDONED CLINTON CREEK ASBESTOS MINE

Fish Salvage July 31-August 02, 2003
under Licence No. 03-19
by

Patrick Roach (report author DIAND)
Rem Ricks (W.R. Ricks Consulting)
Clayton Dyck (DIAND)
Tracy Aldridge (DIAND)
Hugh Copland (YTG EMR)

Northern Affairs Program
300 - 300 Main St.
Whitehorse, Yukon Y1A 2B5

SUMMARY

A salvage of fish from the Clinton Creek channel, downstream of the impoundment known as Hudgeon Lake, was conducted in late July through early August, 2003. The construction of gabion structures in the Creek, require that the flow from the Lake to the upper portion of Clinton Creek, be interrupted for as long as two weeks. In order to prevent a loss of fish in the Creek they were collected and moved either to the Lake or the reach of Clinton Creek below the intersection of Wolverine Creek, depending on which was the shorter distance to transport. A backpack electro-fishing unit was employed with limited success as the conductance of the water is high at 391 mS. While Slimy Sculpin and Longnose suckers succumbed readily to the unit, the majority of the Arctic graying were only subdued for a an extremely brief period of time, if at all. Consequently most of the fish were collected by hand with dip nets, with assistance of seines to assist in grouping the fish. The use of a "home made" Bromo Seltzer™ type product to induce bicarbonate narcosis was planned, but not used, owing to the size of the residual ponds.

The salvage was conducted from the area immediately downstream of the coffer dam inserted to stop the flow, through the gabion structure, and downstream through the "canyon" portion of Clinton Creek to the ford on the mine road. Springs enter the Creek immediately below the "canyon" area and provide a substantial flow of fresh, estimated 6 degree Celsius, water. The flows were of sufficient quantity to provide adequate habitat from this location, past the ford, and downstream as far as Wolverine Creek. Two additional springs were observed entering the Clinton Creek channel, below the ford and above the Wolverine Creek input. It was decided that the fish in the lower reach were in good habitat and moving them below the Wolverine Creek input, which was the original concept, would only stress them to no good purpose.

Owing to the speed required to move the fish, as a combined consequence of the distance to be moved and a warm day, an exact count of their numbers was lost, but sufficient records exist to present an approximate number that we are confident is close to an exact count. The total number of fish relocated from all points of the Creek are: Arctic grayling: 1,345, Slimy sculpin: 264, Longnose sucker: 101, Chinook Salmon: 3 (young of year). In consultation we find that these numbers are probably a bit conservative, but are sufficient to convey the volume encountered in the Creek. Mortalities of grayling were light at an observed 30. The sculpins, owing to their nature of hiding in the gravels and frequenting shallower portions of the Creek channel experienced a much higher mortality. Observed mortalities for the Sculpin were in the range of 100. The suckers proved amazingly durable and only two were observed as mortalities. There were no observed salmon mortalities, which is probably related to their extremely limited presence in this section of the drainage.

Introduction

The Cassiar Asbestos mine at Clinton Creek experienced unstable waste rock conditions in the early years of operation. The waste rock slid down-slope and blocked the passage of Clinton Creek, which formed an impoundment in the Creek valley over time. This impoundment is known as Hudgeon Lake, so named after a mine employee. The Creek channel below the waste rock plug has become incised over the years, to the point at which erosion is threatening to fail the plug and allow the Lake to drain suddenly. In order to prevent the erosion from continuing, a series of rock filled wire baskets are being constructed in the channel below the Lake. It is the placement of these gabion structures that necessitates the temporary elimination of flow in this area of the Creek. The initial structures were placed in 2002 with the aid of a diversion pipe to limit the amount of dry channel required. The work in 2003 does not allow for the use of a diversion and consequently a larger portion of the Creek was required to be dry for the period of construction. It was originally intended that the portion of Clinton Creek, above the confluence of Wolverine Creek, would be allowed to drain and this required that the fish in this section were removed.

Site Overview

Hudgeon Lake drains through a constructed decant channel into the gabion structures placed in 2002. The gabions drain into a boulder garden and plunge pool, prior to entering a narrow portion of the Creek channel. This area is composed of an incised channel with steep walls and a boulder field bottom, known conventionally as the "canyon". Below the reach of the canyon, the channel enters an open rock plain before it reaches the old mine road. This area is a ford, as the original bridge has been unusable for some years. After the ford, Clinton Creek adopts a braided nature and these channels now terminate in two recently constructed beaver dams, prior to the confluence of Wolverine Creek. This is the section of Creek in which the collection program focussed.

Methods

The original design for the collection program involved a barrier net placed immediately above the confluence of Wolverine and Clinton Creeks and one located at the ford. These would be installed prior to the blockage of Creek flow, in order that a majority of the fish could be removed without the pressures of rapidly diminishing flows. A backpack electro-shocker was intended for use in collecting as many fish as possible in the two days preceding the blockage of flow, after which hand collection methods would be employed.

On 31 July, 2003, the barrier nets were placed and a two person team employed the shocker, while other team members moved collected fish in buckets downstream of the barrier net. While the shocker was effective on sculpin and suckers, the success with grayling was muted. The water leaving the Lake has a conductivity of 391mS and was apparently more conductive than the fish themselves. The primary usefulness of the shocker was limited to "driving" the fish. After working this method for several hours, with limited success (see Table 1), the attempt was abandoned and a new plan devised. It was decided that successful fish collection would only be possible with reduced flow, causing the formation of pools, which could then be netted by hand.

As a follow up to the lower channel work, an effort to remove fish from portions of the gabion structure was undertaken. This met with somewhat greater success, in that the fish were in a confined area and more amenable to netting than in an open channel. The shocker had some increased success through the suspected aid of metal clips in the structures. These staples, while grounding the current, occasionally provided improved performance of the shocker by allowing the current to ground through the fish if they were unfortunate enough to be adjacent to a staple when the current was applied. A number of fish (Table 1) were removed from the structure, but the fish in one portion could evade into the spaces in the rock baskets, which make up the gabions, and were difficult to secure. Again, the primary success with the shocker was obtained by using the fright zone to drive the fish into a barrier net where they could be hand picked. Several passes reduced the numbers in the structure to a small extent, but the overall results were as dismal as in the lower channel. The plunge pool below the structure was investigated and the shocker/net/pick method again proved to be the most productive.

Construction requirements delayed the installation of the coffer dam until the morning of 02 August. After the placing of the coffer dam and the expenditure of a suitable period for the channel to drain, a collection in the canyon portion of the Creek was undertaken. The gabion structure was hand picked of fish immediately after installation of the dam and a surprising number of fish collected (see Table 2). Again the open nature of the rock baskets allowed some grayling to "escape" into the matrix of the baskets and these were lost.

The salvage in the canyon portion was accomplished primarily through hand netting. All fish were collected in buckets and then transferred to a lift bucket which had a rope attached. A lid was closed on the bucket and team members would pull the bucket up the face of the canyon cliffs. At the top they were transferred to coolers in the back of a truck and transported to the nearest body of water. The fish suffered this rather extensive handling with good grace and no mortalities were observed for any fish alive when placed in the lift bucket. A note should be forthcoming to the manufacturers of Milk Bones™ for the excellent quality of their buckets, especially the lids and handles.

Results

Table 1.

31 July SITES

Site	Description	FISH	Co-ordinates
Gabion structure	In gabions	AG 70 LNS 1	64°27.13 140°43.91
Plunge pool	Immediately below gabion structure	AG 30 CS 1	64°27.13 140°43.90
Clinton channel	Immediately below ford	AG 15 SS 4	64°26.97 140°42.93
Clinton channel	Above Beaver Ponds	AG 60 SS 20 LNS 50	64°26.97 140°42.58

SS = slimy sculpin
AG = arctic grayling
CS = chinook salmon
LNS = long nose sucker

Table 2.

02 August SITES

Site	Description	FISH	Co-ordinates
Below dam	Above gabion structure in channel	0	64°27.13 140°43.93
Gabion structure	In gabions	AG 70	64°27.13 140°43.91
Plunge pool	Immediately below gabion structure	AG 80	64°27.13 140°43.90
Above canyon	Downstream of gabion structure	AG 60	64°27.13 140°43.87
In canyon	Canyon area	AG 900 SS 200 LNS 50	From above to: 64°27.03 140°43.25
Above ford	Spring area above the ford in Clinton Creek	AG 60 CS 2 SS 40	64°27.01 140°42.98

SS = slimy sculpin
AG = arctic grayling
CS = chinook salmon
LNS = long nose sucker

Conclusions

The large numbers of fish removed and the range of species indicate that Clinton Creek in its entirety is a significantly productive body of water. The number of fish was impressive, but the quality and size need to be conveyed. While grayling observed in many locations were svelte, these grayling were distinctly round in shape. The range of sizes was predictable, but not the quantity of truly large grayling encountered. We lost track of the number of large (30 to 50 centimetre) fish encountered. These large and decidedly plump fish are obviously well fed, which again speaks to the productivity of the system. The suckers ranged in size from 5 cm to 40 cm, with the average in the middle to lower end of the scale. As this was not considered to be "prime" sucker habitat, the volume present was surprising. They were also observed in the Lake, prior to our movement of fish, which indicates that they must somehow be surviving in the littoral zone around the edges, owing to the toxic nature of the majority of the Lake bottom. The limited number of salmon fry was in keeping with past experience in the canyon area, but the one captured in the plunge pool area of the gabion structure is exceptional to our prior experience. This one fish opens up new speculation on the availability of passage to fish in the canyon and their opportunities for reaching Hudgeon Lake.

Errata

A few short notes of observation by the author are in order. It is clear that the volume of seepage water that constitutes the overall flow in Clinton Creek is significant. This clean, cold, flow might explain the invitation to fish to explore the Creek below the canyon. It certainly explains the desire of young of year salmon to over winter in the Creek. The quality of the fish moved in the exercise indicates a tremendous productivity in a system that I had once thought quite poor.

An observation in fish behaviour was available to me after we had altered the "demographics" of Clinton Creek below the Wolverine Creek confluence. Our addition of large numbers of Grayling to the area from the upper reach of the Creek produced an odd effect. While standing on the shore of Clinton Creek I could observe possibly 200 fish, all lined up in rows and pointing upstream, immediately below the decant of Wolverine Creek. While it is supposition that they were trying to smell their home turf, the interesting behaviour aspect was that they were sorted by size. The largest fish composed the front row of those hovering in the channel and the trend continued down the line, with the smallest members of the group composing the final row.

The last comments go to the equipment performance. The shocker was largely useless in water of this conductivity, except for "herding" the fish. This proved to be the most productive method in the areas that leant themselves to the use of barrier nets. In order of susceptibility: Longnose suckers, then Slimy sculpin, then Arctic grayling, succumbed to the shocker. I am unsure how the salmon fit in, as we never did shock one. The dip net method is productive, but becomes

even more so when two or more are used in conjunction. The trapping of fish between the two nets as they come together was much more productive than flailing with a single dip net. We also highly recommend the use of Milk Bone™ buckets with the snap lids and extremely durable handles for anyone interested in moving fish, especially vertically.