



December 21, 2005

Kennecott Greens Creek Mining Company
P.O. Box 32199
Juneau, Alaska
99803-2199

Mr. Eric Sundberg, P.E.
Surface Operations

Dear Mr. Sundberg:

Greens Creek Mine
Pond 7 Construction Summary Report

Attached are 3 (three) copies of the subject report. We understand it will be submitted to ADNR as a KGCMC report (not a KC report).

Yours truly,

KLOHN CRIPPEN CONSULTANTS LTD.

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Project Manager

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RWC/GL:dl

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EXECUTIVE SUMMARY

This report satisfies the State of Alaska Department of Natural Resources Dam Safety Certification program requirement for a construction report at a point of substantial dam completion. KGCMC has constructed a storm-water pond facility (Pond 7) to satisfy a State of Alaska Department of Environmental Conservation Waste Management Permit #0211-BA001 requirement in Section 3.4.3 to provide sufficient storage to contain and control the 24-hour/25-year design storm event.

The Tailings Facility expansion permit allows an ultimate tailings pile footprint of 67 acres. The current mine plan in “Stage 2 Tailings Facility Expansion Design Overview for Forest Service Submission” dated April 8, 2004, proposes to increase the tailings pile footprint from 23 acres to 38 acres by late 2007. Water handling facilities have been designed for a tailings pile footprint of 50 acres.

Incremental increases in the storm water handling capacity (storage plus treatment rate) were considered in the pond design to reflect phased expansion of the tailings pile. The design selected for Pond 7 provides storm water storage capacity of approximately 31.5 acre-feet. The storage capacity of Pond 7, in combination with existing water treatment capacity and projected storm flows influent to Pond 7 from the 920 Site (mill) and Hawk Inlet (port facility and camp), will accommodate the 25-year/24-hour design storm on a 53-acre area (50-acre tailings pile area plus 3-acre Pond 7 footprint).

The following report describes the construction process, QA/QC and the materials used in the Pond 7 construction. The report concludes that the pond is structurally acceptable and ready for use. Monitoring of the facility is also recommended.

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1. INTRODUCTION

Greens Creek Mine is a polymetallic mine located about 18 miles southwest of Juneau, Alaska on northern Admiralty Island (Drawing D-39001). The mine is owned and operated by Kennecott Greens Creek Mining Company (KGCMC).

Mine tailings are dewatered at the mill site. About one-half of the tailings are utilized as backfill in the mine, and the remainder is stored on the surface at the Tailings Storage Facility (TSF). A multiple-stage incremental expansion of the TSF began in 2004 and will continue until 2007. The expansion will accommodate the projected tailings storage requirements and increase the storm water handling capacity. The 2005 expansion activities included the construction of a lined tailings storage area (SE2) in the southeast region of the TSF, and the construction of a water retention pond (Pond 7).

This report is a summary of the 2005 construction of Pond 7. The 2005 tailings expansion construction is reported separately.

The 2005 civil work was designed by Klohn Crippen (KC) with input from KGCMC and Environmental Design Engineering Ltd. (EDE). The design was originally detailed in the report titled Stage 2 Tailings Facility Expansion – Design Overview for Forest Service Submission, April 8, 2004, and was updated in late 2004 and early 2005.

Design and construction of Pond 7 was as follows:

- EDE determined the water control and storage requirements and designed the gabion inlet structure;
- KC designed the earthworks and spillway (based on EDE sizing);
- KGCMC designed the wet well and related piping;
- Channel Construction constructed Pond 7 except for the lining system; and

- Northwest Linings and Geotextile Products Inc. (NLGP) designed and installed the lining system.

KGCMC was the overall construction and contract manager. KGCMC retained Klohn Crippen to monitor portions of the 2005 TSF civil construction. The work observed by Klohn Crippen is indicated on the construction schedule (see Section 5). EDE did not observe construction. KGCMC monitored construction when KC was not on site.

This construction summary report was compiled by Klohn Crippen on behalf of KGCMC, with input from KGCMC, EDE and NLGP.

Selected photographs of Pond 7, taken during construction, are attached in Appendix I. Construction record drawings were prepared by Klohn Crippen based on input from KGCMC, on observations made during construction and on survey data provided by KGCMC. EDE and KGCMC prepared Drawing GCM0203-1.

2. SCOPE OF WORK

The key elements of the 2005 Pond 7 construction included:

- Clearing, grubbing, and stripping of the pond footprint.
- Excavating peat, organic material, loose soil, oversize rock, stockpiled waste and any other deleterious material.
- Quarrying and blasting high spots in the pond area that remained from 2004 quarrying operations.
- Proof-rolling the approved soil foundation. Excavating and removing local soft or deleterious materials and replacing with compacted rock fill.
- Producing 6-inch minus rock fill for construction.
- Producing screened sand for bedding and service layers.
- Installing a groundwater collection and drainage system in the foundation.
- Installing a wet well for collection and pumping of stored water to the water treatment plant.
- Installing instrumentation beneath the liner with connection to a monitoring system (work done by KGCMC).
- Placing structural rock fill in the quarry bottom and slopes as required to form the pond basin and rock fill berms.
- Constructing a geomembrane-liner system for the pond including: a layer of bedding sand over the prepared foundation; a layer of non-woven geotextile; a layer of HDPE geomembrane; and a service layer of sand and rockfill.
- Constructing an access ramp of granular fill in the east corner down onto the pond invert.
- Constructing a rock fill pad foundation for Tank 7 and the pH Tank.
- Forming and pouring of reinforced concrete slab-on-grade foundations for Tank 7 and the electrical transformer pads.

- Installing Tank 7 and connection to associated pumping/piping systems.
- Excavating a conveyance channel from Pond 6 to Pond 7 and connection of the channel with the pond gabion inlet structure.
- Constructing a gabion inlet structure and concrete spillway channel.

3. PROJECT ORGANIZATION

The project organization chart is shown on Figure 3.1.

4. CONSTRUCTION EQUIPMENT

Table 4.1 Equipment Used in 2005 Construction Work

TYPE	MAKE/MODEL	OWNER	AREA OF WORK
Excavator	Caterpillar 315CL	KGCMC	- Foundation preparation and excavation - Rock crushing - Excavation of pipe trenches
	Hitachi 450LC		
	Caterpillar 330C		
	Hitachi 350		
Bulldozer	Caterpillar D6H XL	KGCMC	- Foundation preparation - Spreading and contouring of berm fill - Grading of pond surfaces
	Caterpillar D8K		
	Caterpillar D10R		
Front-End Loader	Caterpillar 988	Channel Construction	- Loading trucks - Placement of fill
	Volvo L220E		
Off-Road Rock Truck	Volvo A30C (2)	Channel Construction	- Hauling excavated material to stockpiles, and fill to berm
	Volvo A25C		
	Caterpillar 745		
Highway Dump Truck	Kenworth (2)	Channel Construction	- Hauling fill material
Vibratory Compactor	Caterpillar CS-563C	Channel Construction	- Proof rolling exposed foundation and compacting berm fill
Forklift	Caterpillar TH 83	Channel Construction	- Placing pipes and geofabrics
	Caterpillar IT 18C		
Backhoe	Caterpillar 416B	KGCMC	- Excavating ditches and instrumentation pits
Jaw Crusher	Extec	Channel Construction	- Producing 6 inch minus rockfill
Soil Screening Plant	Extec	Channel Construction	- Screening bedding and service layer sand at A-Road Pit
Crawler Rock Drill	Ingersoll-Rand ECM-370	Channel Construction	- Drilling rock in Pond 7 Quarry
Water Truck	Kenworth	Channel Construction	- Watering roads and rock fill prior to compaction
Pipe Welder		KGCMC	- Making connections for HDPE pipe

5. CONSTRUCTION SCHEDULE

The construction schedule for Pond 7 is shown on Figure 5.1.

6. WEATHER

Weather conditions in late May were generally clear, with infrequent overcast and light rain. Weather conditions in June alternated between overcast and light rain to clear and sunny. July was generally overcast, with frequent rain. August was somewhat drier than July, but had a couple of days towards the end of the month with heavy rain that coincided with installation of the Pond 7 instrumentation and placement of the bedding sand layer. September and October were cooler than the summer months, and had an average amount of rain compared to historical data.

7. MATERIALS

7.1 6-Inch Minus Rock Fill

Source and Production Method

Rock was quarried at Pond 7. The quarry bedrock is generally a talcy, sericitic phyllite or graphitic phyllite. The 6-inch minus rock fill was produced by crushing in the quarry, and was placed as it was produced. Excess material was used in construction of a berm at Tailings Expansion Southeast 2 area or stockpiled in Pit 5. See Drawings D-39025, D-39026, D-39028, and D-39029 for areas in which the 6-inch minus rock fill was placed.

QA/QC Summary

QC tests were not required for the 6 inch minus rock fill. Visual assessments were made to confirm suitability of the material for use.

7.2 Pit-Run Rock Fill

Source and Production Method

Rock was quarried at Pond 7. The quarry bedrock is generally a talcy, sericitic phyllite or graphitic phyllite. The pit-run rock fill was produced by conventional drill and blast methods and placed in designated berm areas without additional crushing. The maximum diameter specified for the pit-run rock fill was 3 ft. Pit-run rock fill with oversize boulders up to 6 ft diameter was used in the outer portion of the berm fill (see Drawing D-39026).

QA/QC Summary

QC tests were not required for the pit-run rock fill. Visual assessments were made to confirm suitability of the material for use.

7.3 Sand

Source and Production Method

Sand was borrowed from the pit developed by KGCMC at Mile 1.5 of the A-Road in 2004 and 2005. The sand was screened at the pit. Most of the sand was processed in a 2-deck (3 including a primary grizzly) Extec vibratory screening plant using both 1/2-inch square screens and 3/8 -inch slotted screens on the bottom deck.

QA/QC Summary

Samples were collected from the borrow area and as-placed in the Works. Gradation test results on samples collected by KC for the bedding sand are summarized in Appendix IV. Also included are two gradation test results submitted by Channel on samples collected from the A-Road Pit during sand production.

A Standard Proctor test by Klohn Crippen, at KGCMC's 920 Area laboratory in August 2005, gave a maximum dry density for the bedding sand of 132.5 pcf at optimum moisture content of 11%.

The specified quality control testing was for a minimum of 1 test per 500 yd³ placed for moisture content, in-situ density and gradation, and 1 test per 2000 yd³ placed for Standard Proctor. The actual testing was less than specified. However, the sand zones were rolled with the vibratory compactor under KGCMC/Klohn direction and the results were considered acceptable.

7.4 Drain Gravel

Source and Production Method

Drain gravel used in the foundation and liner system drains was imported by KGCMC to Greens Creek Mine by barge from the Jack Cewe Pit in B.C., Canada and provided for

Channel in stockpiles. The drain gravel consisted of sound particles and was uniformly graded, from 3/4-inch to 1/4-inch diameter, as specified.

QA/QC Summary

QC tests were not required for the drain gravel. Visual assessments were made to confirm suitability of the material for use.

7.5 Service Layer Rock Fill

Source and Production Method

The rock fill used as a cap on the service layer was a by-product of the sand production at Mile 1.5 on the A-road. The rock fill is generally rounded 4-inch minus or 5-inch minus. This rock fill was also used as backfill overlying the drain rock in the French drains at the southwest corner of the Pond and where the French drain passes beneath the southwest berm.

QA/QC Summary

QC tests were not required for the rock fill. Visual assessments were made to confirm suitability of the material for use. The filter compatibility criteria between the rock fill and the drain gravel is satisfied. In addition, the drain gravel in the foundation French drains is surrounded by geotextile, which provides additional protection for the French drains.

7.6 Geofabrics

Source

KGCMC purchased geofabrics from Northwest Linings and Geotextile Products Inc. (NLGP) of Kent, Washington, and provided them for Channel. Summary information for

the geofabrics used in the 2005 construction is given in Table 7.1. Material specification sheets are given in Appendix III.

Table 7.1 Geofabrics

GEOFABRIC	MANUFACTURER / DESCRIPTION	LOCATION / USAGE	INSTALLER
100-mil Non-Woven Geotextile	SI Geosolutions GEOTEX 1001 nonwoven needle punched polypropylene	Liner System	NLGP/Channel
80-mil Textured HDPE Geomembrane	Huitex HX200 Textured HDPE Geomembrane	Liner System	NLGP/Channel
Geocomposite	Poly Flex 10oz/6oz HDPE Geocomposite	Liner System	NLGP/Channel
100-mil Non-Woven Geotextile	SI Geosolutions GEOTEX 1001 nonwoven needle punched polypropylene	Foundation Drains	Channel

QA/QC Summary

Field quality control testing of the liner system components was carried out by NLGP. Results are given in Appendix IV.

7.7 Drain Pipe

Source and Production Method

KGCMC provided HDPE drain pipe for Channel. Summary information for the drain pipe is given in Table 7.2. Material specification sheets are given in Appendix III.

Table 7.2 HDPE Drain Pipe

PIPE TYPE	MANUFACTURER/ DESCRIPTION	LOCATION/ USAGE	INSTALLER
6-Inch Perforated (SDR 9)	PolyPipe	Foundation Drains	Channel
6-Inch Perforated (SDR 11)	PolyPipe	Foundation Drains	Channel
8-Inch Perforated (SDR 11)	PolyPipe	Foundation Drains	Channel
12-Inch Solid	PolyPipe	Pipeline Wet Well 7 to Water Treatment Pad	Channel
8-Inch Solid	PolyPipe	Wet Well to Environment	Channel
24-Inch Solid	PolyPipe	Wet Well 7 Intake	Channel

QA/QC Summary

QA/QC testing was not required for the HDPE pipes.

7.8 Concrete

Source and Production Method

Concrete was batched by KGCMC at the plant located near the 920 Mill Site. The concrete was a standard Greens Creek mix comprising:

- 3150 lb aggregate (45:55 sand to coarse (¾-inch) aggregate ratio);
- 564 lb Portland cement; and
- 30 gallons of water per cubic yard (0.44 water/cement ratio).

The specifications called for 4500 psi 28-day unconfined compressive strength (UCS), maximum 0.43 water/cement ratio and 6% air content.

QA/QC Summary

QA/QC testing was not reported on the concrete placed in the inlet structure or the spillway.

Based on the literature a concrete with 564 lbs cement per cubic yard, ¾-inch aggregate, 0.44 water/cement ratio and air-entrainment should have a nominal 28-day UCS of 30 MPa (4350 psi), which is acceptable.

7.9 Quantities

The material quantities provided by KGCMC are included in Appendix VI.

8. DESIGN CHANGES BY DESIGN ENGINEER

No design changes were initiated by the design engineer. Changes made as a result of requests from the Owner are documented in Section 9.

9. MODIFICATIONS BY OWNER

Modifications initiated by the Owner to make use of available materials, to expedite construction, or at the request of the Contractor are listed in the following sub-sections.

The modifications are divided into two categories:

- changes which are likely to have a beneficial to minor adverse effect on the long-term performance of the facility; and
- changes which could have an adverse effect on the long-term performance of the facility.

All changes initiated by the Owner during construction are, in our opinion, such that monitoring should provide sufficient warning for planning remedial measures, if required.

9.1 Minor Effects

Construction modifications that are likely to have a beneficial to minor adverse effect on the long-term performance of the facility are listed in Appendix II and are provided for completeness of the construction record. The modifications listed in Appendix II should not significantly affect performance of the facility, and in some cases have enhanced the construction.

9.2 Potential Adverse Effects

The construction modifications described below could cause some settlement related problems. The amount of settlement is difficult to predict and is expected to be minor. Monitoring of the affected areas is recommended later in this report, as a precaution, to confirm performance.

- 3/4-inch to 1/4-inch drain gravel was used as a foundation for the Pond 7 wet well riser in place of pouring a concrete leveling pad. The grading fill was about 2 ft thick and received only surficial compaction in the riser footprint with a Makasa Vibratory Plate compactor (about 120 lb mass). The well riser and connecting pipes were also embedded in an annular ring of un-compacted drain gravel.

Over time, consolidation settlement of the fill will drag the well casing down relative to the floor and connecting pipes; during flood events (i.e., when the riser is full of water) there will be a tendency for the weight of water to push the well floor down relative to the walls. The net effect should be minor to no distress on the well walls and floor. However, any vertical movement of the casing could distress the pipe connections.

An earthquake could also induce settlement of the un-compacted fill. Therefore, as a precaution, settlement should be monitored and the floor and pipe connections should be inspected and repaired, if necessary.

- Shot rock was pushed up against the quarry walls with a bulldozer to form the inner slopes of the pond basin in the quarried area. Along the northeast side of the pond basin, shot rock underlying the pushed-up material was not excavated, and the shot rock was pushed up in a single wedge-shaped lift up to about 12 ft high. On the north half of the west side of the basin, the shot rock was pushed up in several layers.

The rock was unwetted and compacted by tracking from a Caterpillar D10R bulldozer. As a result the fill in these areas is not as dense as it would be if the fill had been placed in compacted lifts. Statically this should not present a problem, however following an earthquake there could be minor settlement or slumping of the fill locally below the liner. The liner however is capable of handling significant deformation and existing instrumentation will detect any leakage.

The affected areas are mainly above the service layer and can easily be inspected visually. As a precaution these areas of the exposed lining should be inspected periodically for signs of settlement.

10. INSTRUMENTATION

Instrumentation installed in Pond 7 is summarized in Table 10.1. The locations of the instruments are plotted on Drawing D-39025. Piezometer readings to date (provided by KGCMC) are in Appendix VII. The suction lysimeters have been tested by KGCMC for ability to hold a vacuum but no samples have been extracted.

Table 10.1 Pond 7 Instrumentation

INSTRUMENT ID	INSTRUMENT TYPE	COORDINATES		TIP ELEVATION (ft)	LOCATION IN POND 7 ¹
		N (ft)	E (ft)		
PZ-P7-05-01	Piezometer	51887	39727	121.32	SE corner
SL-P7-05-01A/B	Lysimeter	51887	39727	121.32	NW corner
PZ-P7-05-02	Piezometer	52160	39534	122.50	Middle of pond
SL-P7-05-01A/B	Lysimeter	52160	39534	122.50	SW corner
PZ-P7-05-03	Piezometer	51967	39589	120.03	SE corner
SL-P7-05-03A/B	Lysimeter	51967	39589	120.03	NW corner
PZ-P7-05-04	Piezometer	51868	39488	119.18	Middle of pond
SL-P7-05-04A/B	Lysimeter	51868	39488	119.18	SW corner

¹All instruments are at base of sand bedding layer beneath liner.

11. **WORK NOT COMPLETED**

As of December 21, 2005, work to be completed at Pond 7 includes:

- Wet Well 7:
 - Make connections to utility pipes and install caisson pumps,
 - Install protective cover on inlet pipe,
 - Install guardrail around top of well, and
 - Install pump at WW7 (scheduled for late winter 2005, or spring 2006).
- Install electrical systems, MCC (motor control center) and lights.
- Guard entrance ramp to the pond.

12. FOLLOW UP WORK

12.1 Monitoring

The monitoring frequencies given below are the minimum recommended for the first year following construction. After year one, the monitoring frequency should be reviewed by a qualified engineer. However, at any time, the reading frequency should be increased where potential problems are identified.

- Piezometers installed under the liner should be read monthly to confirm that the French drains in the foundation are functioning properly and that there is no pore pressure build-up under the liner.
- Lysimeters installed under the liner and water from the French drain outfall should be sampled monthly when Pond 7 is in operation as a check for leakage through the liner.
- Monthly visual inspection should be carried out to check for deformation of the berm crest and slopes.
- Survey monuments should be placed on the berm crest and measured semi-annually so that any settlements can be tracked and additional fill can be added to ensure that adequate freeboard is maintained.
- Semi-annual settlement and integrity checks should be carried out on the inside of the wet well riser, the well floor area and the pipe connections.
- Annual inspection and dam safety reviews as required by the Alaska Department of Natural Resources Dam Safety Division should be carried out.

12.2 Analyses

- If regular monitoring and inspection of the berm indicate signs of compromised stability, appropriate site investigations and slope stability analyses should be undertaken to help determine mitigative measures.

13. CONCLUSIONS

Based on field observations and tests Klohn Crippen has performed, as documented in this report, Klohn Crippen's opinion is that the geotechnical aspects of the construction of the foundation and embankment for Pond 7 and the quality of the concrete, achieve the design intent. Construction modifications noted in Section 9 are not significant enough to cause structural integrity issues and overall risk of embankment failure or settlement related problems are considered to be very low. Accordingly, from a geotechnical viewpoint, Pond 7 may be used for the intended purpose of storing and routing the design 24-hour/25-year storm water flows.

FIGURES

Figure 3.1 – Project Organization Chart

Figure 5.1 – Construction Schedule

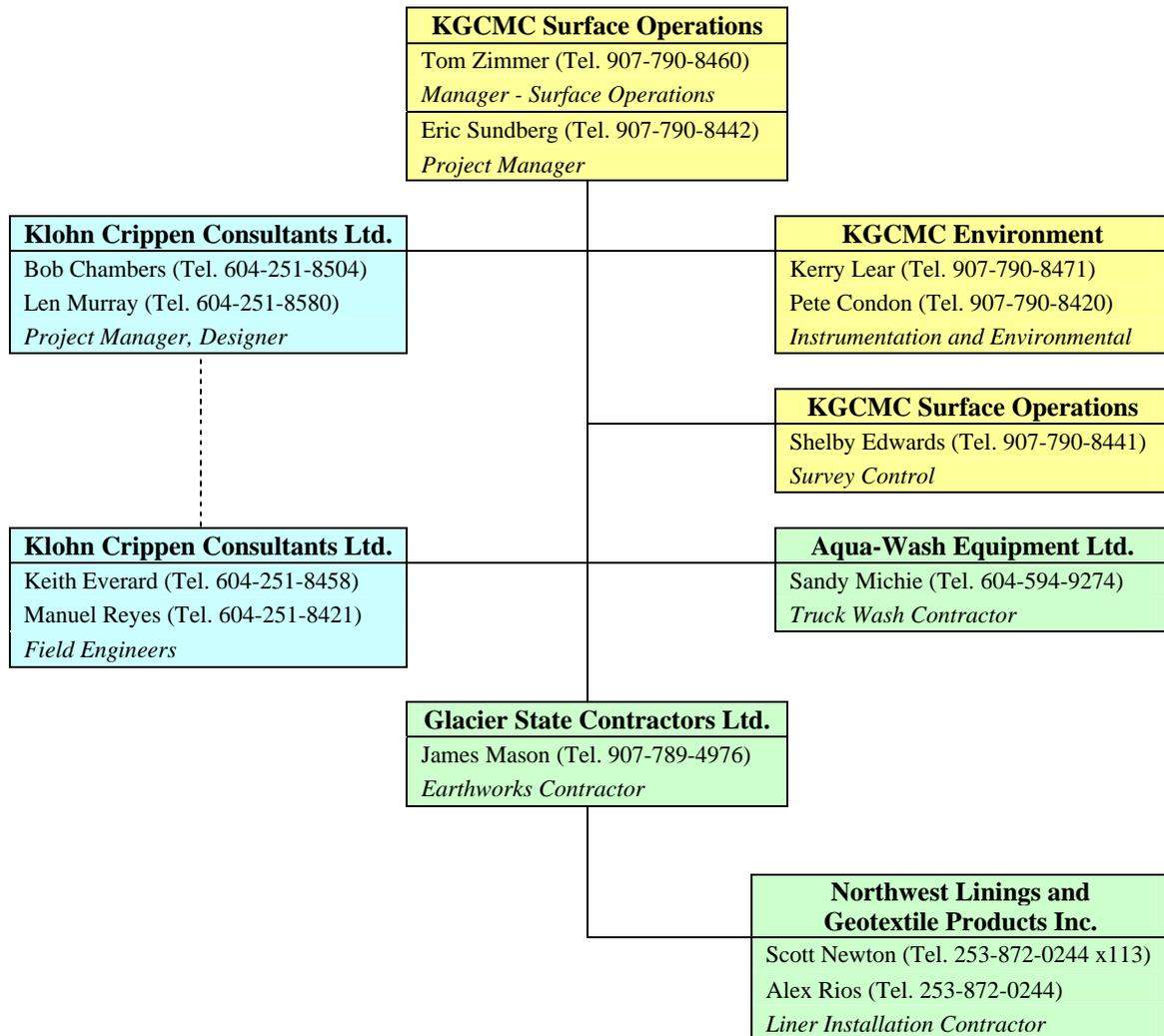


Figure 3.1 2004 Construction Organization Chart

APPENDIX I

Selected Photographs

Foundation Preparation



Photo 1. Excavation to foundation stratum in southwest corner of pond (June 17, 2005).



Photo 2. Excavation to foundation stratum in southwest corner of pond - overview (June 18, 2005).



Photo 3. Prepared foundation in southwest area of pond excavation (June 18, 2005).



Photo 4. Prepared foundation on northwest corner of pond. Peat, sand and soft, wet clay remained in foundation (August 3, 2005).

Excavation



Photo 5. Excavation of overburden to expose intact bedrock along interior south pond slope (July 18, 2005).



Photo 6. Excavation of crushed 6 inch minus rock fill from Pond 7 quarry (July 20, 2005).

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Photo 7. Excavation of crushed 6 inch minus rock fill from Pond 7 quarry (Aug. 20, 2005).

French Drains



Photo 8. Excavation of French drain trench (July 7, 2005).



Photo 9. Placement of drain gravel and perforated pipe in French drain (July 7, 2005).



Photo 10. Placement of instrumentation conduit on top of completed French drain (July 8, 2005).



Photo 11. View from downstream of completed French drain and instrumentation conduits (July 9, 2005).



Photo 12. Excavation of trenches for French drains in pond floor (August 23, 2005).



Photo 13. Placement of geotextile and perforated pipe in pond floor French drains (August 23, 2005).

Wet Well



Photo 14. Installation of Wet Well 7 riser (July 5, 2005).



Photo 15. Pipe connections and trench from inlet pipe to Wet Well 7 (July 6, 2005).



Photo 16. Concrete poured around pipe joints (July 25, 2005).



Photo 17. Concrete poured around pipe inlet (July 25, 2005).



Photo 18. Pipe inlet to Wet Well 7 with instrumentation pipe (July 26, 2005).



Photo 19. Drain gravel backfill around Wet Well 7 riser (July 26, 2005).



Photo 20. Installation of reclaim pipes along Pond 7 berm crest (August 19, 2005).

Berm Fill



Photo 21. Placement of first lift of berm fill in southwest corner (June 20, 2005).



Photo 22. Foundation preparation and placement of first lift of berm fill on west side of pond (June 22, 2005)



Photo 23. Placement of oversize boulders in the outer apron of berm (June 28, 2005).



Photo 24. Placement of berm fill on east side of pond (July 16, 2005).



Photo 25. Placement of berm fill on west side of pond (July 21, 2005).



Photo 26. Over view of berm fill placement (July 23, 2005).



Photo 27. Placement of rock fill on interior pond slopes (July 26, 2005).



Photo 28. Placement of first lift of rock fill over soft, wet, non-proofrolled foundation on northwest side of pond (August 2, 2005).



Photo 29. Advancement of first lift of rock fill over soft, wet, non-proofrolled foundation on northwest side of pond (August 4, 2005).



Photo 30. Compaction of interior pond slopes in preparation for placement of bedding sand (August 22, 2005).

Bedding Sand



Photo 31. Placement of bedding sand (August 24, 2005).



Photo 32. Placement of bedding sand and installation of instrumentation (August 26, 2005).

Liner Installation



Photo 33. Anchor Trench on crest of pond (August 27, 2005).



Photo 34. Liner installation by Northwest Linings (August 30, 2005).



Photo 35. Anchorage of liner in anchor trench (August 31, 2005).



Photo 36. Liner installation by Northwest Linings (September 1, 2005).

Service Layer



Photo 37. Placement of access road into pond (September 6, 2005).



Photo 38. Advancement of service layer sand onto pond floor (September 7, 2005).



Photo 39. Placement of sand service layer (September 8, 2005).



Photo 40. Placement of protective rock fill over sand service layer (September 12, 2005).

Gabion Inlet Structure



Photo 41. Excavation for gabion inlet structure (August 31, 2005).



Photo 42. Gabion inlet structure (November 1, 2005).



Photo 43. Concrete sidewalls at crest of gabion inlet structure (November 1, 2005)

Spillway



Photo 44. Concrete spillway inlet structure side view (November 1, 2005).



Photo 45. Concrete spillway inlet structure front view (October 31, 2005).

APPENDIX II
Modifications by Owner

APPENDIX II

Modifications by Owner – Minor Effects

The construction modifications described below should not significantly affect performance of the facility, and in some cases have enhanced the construction. These modifications are identified to provide completeness of the construction record.

- Concrete collars were placed around the pipe stub connections for Wet Well 7 after water was observed leaking from the joint.
- Drain gravel placed in the foundation French drains and used as backfill around the wet well riser was not compacted. This could result in minor localized settlement.
- An initial thick lift (up to 10 ft to 12 ft) of coarse rock was placed on the west side of the rock ridge (160 ft south of WP3 to between WP3 and WP8). This could result in minor localized settlement but since the area is downstream of a bedrock knob, there will be no impact on stability.
- Rock fill compaction was not consistent and was not consistently carried out with the addition of water. This could result in minor additional long term settlement.
- The 6-inch minus rock fill was generally placed in 2 ft to 3 ft thick lifts (2 ft lifts were specified), and was compacted typically with 3 to 4 passes of a 12-ton vibratory compactor. Minimum 6 passes of a 12-ton vibratory compactor was specified. Minor additional settlement could result.
- The pit-run rock fill in the berm was occasionally placed in lifts thicker than the specified 3 ft (e.g., up to 6 to 8 ft thick, mainly along the west side). The rock fill generally received 2 or 3 passes of a D8 bulldozer with some haul truck traffic. The specification was a minimum 4 passes of a D8 bulldozer or equivalent and haul truck traffic with a final pass with a 12-ton vibratory roller. Minor additional settlement of the berm structure could result, but is not expected to cause structural problems.
- Some portions of the foundation were not approved before fill was placed. Peat and sand (up to 3 ft thick) were left in some foundation areas

(generally localized and discontinuous) where the coarse rock apron was placed (west of the rock ridge). Settlement of the berm structure in these areas could result, but is not expected to cause structural problems.

- Trench backfill over the French drain between WP 11 and the west side of the work area consists of a 1 ft to 1.5 ft thick layer of ½-inch to 3-inch crushed gravel and cobbles, and a 1 ft to 2 ft thick layer of 8-inch minus sand screening reject material. This material was pre-approved as back fill.
- The rock fill placed in the first lift of the outer 15 ft of berm in the southwest corner contained boulders up to 6 ft diameter. KC agreed that the oversize pit-run rock fill could be placed in the outer portion of the downstream shell to a maximum width of 35 ft at the foundation level, less wide with increased height.
- Limited vibratory compaction was used on the rock fill placed directly above the foundation layer to avoid "pumping" of the underlying clay/till material. Compaction of the rock fill (2 ft lifts for 6-inch minus, and 3 ft lifts for pit-run rock fill) was carried out by routing construction equipment (i.e., Caterpillar D8 bulldozer and haul truck) over the fill surface. The compactor ran over the lift (without vibration) prior to placement of the next lift to compact any areas that may not have been trafficked. Vibratory compaction resumed after 5 ft to 6 ft of fill was placed over the foundation.
- The bedrock/till on the interior pond slopes was over-excavated, and a 1 ft to 2 ft layer of compacted 6 inch minus rock fill was placed to create a working surface for final grading and placement of bedding sand. This change was requested by Channel.
- The pond liner consists of 100 mil non-woven geotextile overlain with 80 mil HDPE geomembrane. Geocomposite material was used when the supply of non-woven geotextile ran out. This was a beneficial modification.
- The access road was built by pushing sand from the pond crest downwards. The specifications stated that "fill placement from the top down will not be allowed". Light weight equipment was used for this construction and may not have caused significant shearing of the liner as none is indicated along the edges of the ramp fill.

- The spillway design was modified because bedrock was not present in the spillway excavation. A layer of 6-inch minus rock fill overlain with a 6-inch thick leveling layer of bedding sand was placed before the concrete floor of the spillway was poured.
- Quality control tests (i.e., moisture content, in situ density, gradation, and Standard Proctor) were not carried out on the bedding sand layer as specified. If there are areas of un-compacted bedding sand, settlement could occur. The settlement in such areas is expected to be minor and should not affect the performance of the liner. Also the liner is capable of handling significant deformation and existing instrumentation will detect any leakage.
- The gabion inlet structure was modified by KGCMC and EDE as shown on the construction record drawing.

APPENDIX III

Manufacturer's Specifications and Data Sheets

DOUBLE-SIDED GEOCOMPOSITES ENGLISH UNITS



GEOCOMPOSITE PROPERTIES

Minimum Average Values

Property	Test Method	GC-06D-2.0	GC-08D-2.0	GC-06D-2.5	GC-08D-2.5
Transmissivity, (MD), gal/min-ft metal plate/geocomposite/metal plate hydraulic gradient, $i = 1$ normal pressure = 10,000 lb/ft ²	ASTM D 4716	0.4 ($0.8 \times 10^{-4} \text{ m}^2/\text{sec}$)	0.2 ($4.0 \times 10^{-5} \text{ m}^2/\text{sec}$)	1.0 ($2.0 \times 10^{-4} \text{ m}^2/\text{sec}$)	0.5 ($1.0 \times 10^{-4} \text{ m}^2/\text{sec}$)
Ply Adhesion, lb/in	ASTM D 7005	1	1	1	1
Roll Dimensions					
1. Roll Width, ft		13.5	13.5	13.5	13.5
2. Roll Length, ft		250	200	175	150

COMPONENT PROPERTIES

Geonet

Thickness, mil	ASTM D 5199	200	200	250	250
Density, min., g/cc	ASTM D 1505	0.940	0.940	0.940	0.940
Carbon Black Content, %	ASTM D 1603	1.5 - 3.0	1.5 - 3.0	1.5 - 3.0	1.5 - 3.0
Tensile Strength, (Peak, MD), lb/in	ASTM D 5035	45	45	60	60
Transmissivity, (MD), gal/min-ft metal plate/net/metal plate hydraulic gradient, $i = 1$ normal pressure = 10,000 lb/ft ² seat time = 15 minutes	ASTM D 4716	5.0 ($1.0 \times 10^{-3} \text{ m}^2/\text{sec}$)	5.0 ($1.0 \times 10^{-3} \text{ m}^2/\text{sec}$)	7.2 ($1.5 \times 10^{-3} \text{ m}^2/\text{sec}$)	7.2 ($1.5 \times 10^{-3} \text{ m}^2/\text{sec}$)

Geotextile

Unit Weight, oz/yd ²	ASTM D 5261	6	8	6	8
Grab Strength, lb	ASTM D 4632	160	200	160	200
Grab Elongation, %	ASTM D 4632	50	50	50	50
Tear Strength, lb	ASTM D 4533	65	80	65	80
Puncture Strength, lb	ASTM D 4833	90	120	90	120
Permittivity, sec ⁻¹	ASTM D 4491	1.3	1.3	1.3	1.3
AOS, MaxARV	ASTM D 4751	70 sieve	80 sieve	70 sieve	80 sieve
UV Stability, % ret. (500 hr.)	ASTM D 4355	70	70	70	70

The above property values, unless otherwise specified, are the minimum acceptable average test results for any roll based on the specified test methods and do not refer to an individual test specimen. Geotextile property values are Minimum Average Roll values, except for AOS, which is Maximum Average Roll Value. Geonet and Geotextile properties are tested prior to lamination. This data is provided for informational purposes only and is not intended as a warranty or guarantee. Poly-Flex, Inc. assumes no responsibility in connection with the use of this data. These values are subject to change without notice. REV. 03/05



DOUBLE-SIDED GEOCOMPOSITES METRIC UNITS

GEOCOMPOSITE PROPERTIES

Minimum Average Values

Property	Test Method	GC-06D-2.0	GC-08D-2.0	GC-06D-2.5	GC-08D-2.5
Transmissivity, (MD), m ² /sec metal plate/geocomposite/metal plate hydraulic gradient, i = 1 normal pressure = 480 kPa	ASTM D 4716	0.8 x 10 ⁻⁴ (5.0 l/min-m)	4.0 x 10 ⁻⁵ (2.5 l/min-m)	2.0 x 10 ⁻⁴ (12 l/min-m)	1.0 x 10 ⁻⁴ (6.2 l/min-m)
Ply Adhesion, kN/m	ASTM D 7005	0.17	0.17	0.17	0.17
Roll Dimensions					
1. Roll Width, m		4.1	4.1	4.1	4.1
2. Roll Length, m		76.2	61	53.4	45.7

COMPONENT PROPERTIES

Geonet

Thickness, mm	ASTM D 5199	5.1	5.1	6.3	6.3
Density, min., g/cc	ASTM D 1505	0.940	0.940	0.940	0.940
Carbon Black Content, %	ASTM D 1603	1.5 - 3.0	1.5 - 3.0	1.5 - 3.0	1.5 - 3.0
Tensile Strength, (Peak, MD), kN/m	ASTM D 5035	7.9	7.9	10.5	10.5
Transmissivity, (MD), m ² /sec metal plate/net/metal plate hydraulic gradient, i = 1 normal pressure = 480 kPa seat time = 15 minutes	ASTM D 4716	1.0 x 10 ⁻³ (62 l/min-m)	1.0 x 10 ⁻³ (62 l/min-m)	1.5 x 10 ⁻³ (89 l/min-m)	1.5 x 10 ⁻³ (89 l/min-m)

Geotextile

Unit Weight, g/m ²	ASTM D 5261	203	271	203	271
Grab Strength, N	ASTM D 4632	712	890	712	890
Grab Elongation, %	ASTM D 4632	50	50	50	50
Tear Strength, lb	ASTM D 4533	289	356	289	356
Puncture Strength, N	ASTM D 4833	400	534	400	534
Permittivity, sec ⁻¹	ASTM D 4491	1.3	1.3	1.3	1.3
AOS, MaxARV, mm	ASTM D 4751	0.212	0.180	0.212	0.180
UV Stability, % ret. (500 hr.)	ASTM D 4355	70	70	70	70

The above property values, unless otherwise specified, are the minimum acceptable average test results for any roll based on the specified test methods and do not refer to an individual test specimen. Geotextile property values are Minimum Average Roll values, except for AOS, which is Maximum Average Roll Value. Geonet and Geotextile properties are tested prior to lamination. This data is provided for informational purposes only and is not intended as a warranty or guarantee. Poly-Flex, Inc. assumes no responsibility in connection with the use of this data. These values are subject to change without notice. REV. 03/05

GEOTEX® 1001

GEOTEX 1001 is a polypropylene, staple fiber, needlepunched nonwoven geotextile manufactured at one of SI Geosolutions' facilities that has achieved ISO-9002 certification for its systematic approach to quality. The fibers are needled to form a stable network that retains dimensional stability relative to each other. The geotextile is resistant to ultraviolet degradation and to biological and chemical environments normally found in soils. **GEOTEX 1001** conforms to the property values listed below¹ which have been derived from quality control testing performed by one of SI Geosolutions' GAI-LAP accredited laboratories:

MARV²

PROPERTY	TEST METHOD	ENGLISH	METRIC
Physical			
Mass/Unit Area	ASTM D5261	8.5 oz/yd ²	288 g/m ²
Thickness	ASTM D5199	100 mils	2.5 mm
Mechanical			
Grab Tensile Strength	ASTM D4632	250 lbs	1112 N
Grab Elongation	ASTM D4632	50%	50%
Puncture Strength	ASTM D4833	150 lbs	668 N
Mullen Burst	ASTM D3786	460 psi	3171 kPa
Trapezoidal Tear	ASTM D4533	100 lbs	445 N
Wide Width Tensile	ASTM D4595	1200 lbs/ft	17.5 kN/m
Endurance			
UV Resistance @ 500 hrs	ASTM D4355	70%	70%
Hydraulic			
Apparent Opening Size (AOS) ³	ASTM D4751	100 US Std. Sieve	0.150 mm
Permittivity	ASTM D4491	1.20 sec ⁻¹	1.20 sec ⁻¹
Permeability	ASTM D4491	0.30 cm/sec	0.30 cm/sec
Water Flow Rate	ASTM D4491	85 gpm/ft ²	3463 l/min/m ²
Roll Sizes		180 in x 100 yds	4.57 m x 91.5 m

NOTES:

¹ The property values listed below are effective 12/2003 are subject to change without notice.

² Values shown are in weaker principal direction. Minimum average roll values are calculated as the typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any samples taken from quality assurance testing will exceed the value reported.

³ Maximum average roll value. Statistically, it yields a 97.7% degree of confidence that samples taken from quality assurance testing will be below the value reported.

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT FURNISHED HEREUNDER OTHER THAN AT THE TIME OF DELIVERY IT SHALL BE OF THE QUALITY AND SPECIFICATION STATED HEREIN. ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED, AND, TO THE EXTENT THAT IT IS CONTRARY TO THE FOREGOING SENTENCE, ANY IMPLIED WARRANTY OF MERCHANTABILITY IS EXPRESSLY EXCLUDED. ANY RECOMMENDATIONS MADE BY SELLER CONCERNING THE USES OR APPLICATIONS OF SAID PRODUCT ARE BELIEVED RELIABLE AND SELLER MAKES NO WARRANTY OF RESULTS TO BE OBTAINED. IF THE PRODUCT DOES NOT MEET SI GEOSOLUTIONS' CURRENT PUBLISHED SPECIFICATIONS, AND THE CUSTOMER GIVES NOTICE TO SI GEOSOLUTIONS BEFORE INSTALLING THE PRODUCT, THEN SI GEOSOLUTIONS WILL REPLACE THE PRODUCT WITHOUT CHARGE OR REFUND THE PURCHASE PRICE.



Huikwang Corporation

HUITEX HX Series – Textured High Density Polyethylene Geomembrane Data sheet

HUITEX HX Series geomembrane is made of premium virgin HDPE resin with either one or two sides textured surfaces, the high quality resin used is designed specifically for geomembrane production along with adequate carbon black, antioxidant, and stabilizers to have superior mechanical properties and outstanding long-term resistance to aggressive chemical, environmental stress crack, and UV radiation.

HUITEX HX series geomembrane provide an excellent frictional characteristics than the smooth products and retain most of the properties of HD series geomembrane.

		Minimum Values				
Property	Test Method	HX075	HX100	HX150	HX200	HX250
Thickness, mm	ASTM D5199					
Minimum Average Values		0.75	1.00	1.50	2.00	2.50
Lowest Individual Reading		0.64	0.85	1.28	1.70	2.30
Asperity Height, mm	GRI GM12	0.25	0.25	0.25	0.25	0.25
Density, g/cm ³	ASTM 1505/D792	0.94	0.94	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D6693 Type IV specimen					
1.Strength at Yield, kN/m width	@ 50 mm/min	11	15	23	30	38
2.Strength at Break, kN/m width		8	13	16	21	26
3.Elongation at Yield, %	G.L. 33 mm	13	13	13	13	13
4.Elongation at Break, %	G.L. 51 mm	100	100	100	100	100
Tear Resistance, N	ASTM D1004	98	135	200	250	312
Puncture Resistance, N	ASTM D4833	240	270	410	534	800
Carbon Black Content, %	ASTM D1603	2.0	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D5596	Cat.2	Cat.2	Cat.2	Cat.2	Cat.2
Oxidative Induction Time, min	ASTM D 3895 (200°C; O ₂ , 1 atm)	100	100	100	100	100
		Nominal Values				
Melt Flow Index, g/10 min	ASTM D1238 (190°C, 2.16kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Dimensional Stability, %	ASTM D1204 (100°C; 1 hour)	±	±	±	±	±
Low Temperature Brittleness, °C	ASTM D746	<-77	<-77	<-77	<-77	<-77
Stress Crack Resistance, hrs	ASTM 5397 (Appendix)	>400	>400	>400	>400	>400
		Roll Dimensions				
Width, m		7	7	7	7	7
Length, m		198	152	128	98	80
Area, m ²		1386	1064	896	686	532
Net Weight, kg (Approx.)		1040	1064	1344	1372	1400
40' container, rolls		12	12	12	12	12

This information is provided for reference purposes only and is not intended as a warranty or guarantee. Huikwang Corporation (HKC) assumes no liability in connection with the use of this information. HKC reserves the right to change the specifications contained herein without notice. Please contact HKC for the latest version of specifications.

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HUITEX[®]
GEOSYNTHETICS

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Extra High Molecular Weight (EHMW) High Density Polyethylene for use in industrial applications such as underground fire mains, mining, landfill, water reclamation or sewer.

Other dimensional standards or custom requirements available.

TYPICAL PHYSICAL PROPERTIES			
PROPERTY	ASTM TEST METHOD	*NOMINAL VALUES	
		SI UNITS	ENGLISH UNITS
Density, Natural	D1505	0.946 gm/cc	--
Density, Black	D1505	0.955 gm/cc	--
Melt Index (190°C/2.16 kg)	D1238	0.07 gm/10 min.	--
Flow Rate (190°C/21.6 kg)	D1238	8.5 gm/10 min.	--
Tensile Strength @ Ultimate	D638	34.5 MPa	5,000 psi
Tensile Strength @ Yield	D638	24.1 MPa	3,500 psi
Ultimate Elongation	D638	>800%	>800%
Flexural Modulus	D790	938 MPa	136,000 psi
2% Secant			
Environmental Stress Crack Resistance (ESCR)			
F ₀ , Condition C	D1693	>10,000 hrs.	>10,000 hrs.
PENT	F1473	>100 hrs.	>100 hrs.
Brittleness Temperature	D746	<-117°C	<-180°F
Hardness, Shore D	D2240	64	64
Vicat Softening Temperature	D1525	124°C	255°F
Izod Impact Strength (Notched)	D256	0.37 KJ/m	7 ft - lb _f /in
Volume Resistivity	D991	>10 ¹⁵ ohm-cm	--
Thermal Expansion Coefficient		2x10 ⁻⁴ cm/cm/°C	1.0x10 ⁻⁴ in/in/°F
CELL CLASSIFICATION:	D3350	345464C	Grade PE34
MATERIAL CLASSIFICATION:	D1248	Type III Category 5	Class C
PPI HYDROSTATIC DESIGN BASIS:	D2837	11.0 MPa @ 23°C	1,600 psi @ 73.4°F
(As listed in PPI TR-4)		5.5 MPa @ 60°C	800 psi @ 140°F

*Nominal values are intended to be guides only, and not as specification limit.

PolyPipe, Inc.

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 Phone 940.665.1721 | 800.433.5632 | Facsimile 940.668.8612
 Sales Facsimile 940.668.2704 | www.polypipeinc.com

Pressure Rating	Class 265 DR7		Class 200 DR9		Class 160 DR11		Class 130 DR13.5		Class 100 DR17		Class 80 DR21		Class 65 DR26		Class 50 DR32.5		
	Nominal Pipe Size	OD Size, inches	Min. Wall, inches	Weight, lbs/ft	Min. Wall, inches												
1/2"	0.840	0.120	0.093	0.10	0.076	0.08	---	---	---	---	---	---	---	---	---	---	---
3/4"	1.050	0.150	0.117	0.15	0.095	0.13	---	---	---	---	---	---	---	---	---	---	---
1"	1.315	0.188	0.146	0.23	0.120	0.20	---	---	---	---	---	---	---	---	---	---	---
1 1/4"	1.660	0.237	0.184	0.37	0.151	0.31	0.123	0.26	---	---	---	---	---	---	---	---	---
1 1/2"	1.900	0.271	0.211	0.49	0.173	0.41	0.141	0.34	---	---	---	---	---	---	---	---	---
2"	2.375	0.339	0.264	0.76	0.216	0.64	0.176	0.53	0.140	0.43	---	---	---	---	---	---	---
3"	3.500	0.500	0.389	1.66	0.318	1.39	0.259	1.15	0.206	0.93	0.167	0.76	---	---	---	---	---
4"	4.500	0.643	0.500	2.74	0.409	2.29	0.333	1.91	0.265	1.54	0.214	1.26	0.135	0.62	---	---	---
5"	5.375	0.768	0.597	3.91	0.489	3.27	0.398	2.72	0.316	2.20	0.256	1.80	0.173	1.03	0.138	0.83	---
5 1/2"	5.563	0.795	0.618	4.18	0.506	3.51	0.412	2.91	0.327	2.35	0.265	1.93	0.207	1.47	0.165	1.19	---
6"	6.625	0.946	0.736	5.93	0.602	4.97	0.491	4.13	0.390	3.34	0.315	2.74	0.214	1.57	0.171	1.27	---
7"	7.125	1.018	0.792	6.86	0.648	5.75	0.528	4.78	0.419	3.86	0.339	3.17	0.255	2.23	0.204	1.80	---
8"	8.625	1.232	0.958	10.05	0.784	8.43	0.639	7.00	0.507	5.66	0.411	4.64	0.274	2.58	0.219	2.08	---
10"	10.750	1.536	1.194	15.62	0.977	13.09	0.796	10.88	0.632	8.79	0.512	7.20	0.332	3.78	0.265	3.05	---
12"	12.750	1.821	1.417	21.97	1.159	18.41	0.944	15.30	0.750	12.36	0.607	10.13	0.413	5.88	0.331	4.74	---
14"	14.00	2.000	1.556	26.49	1.273	22.20	1.037	18.45	0.824	14.91	0.667	12.22	0.490	8.27	0.392	6.67	---
16"	16.00	2.286	1.778	34.60	1.455	28.99	1.185	24.09	0.941	19.47	0.762	15.96	0.538	9.97	0.431	8.04	---
18"	18.00	2.571	2.000	43.79	1.636	36.70	1.333	30.49	1.059	24.64	0.857	20.20	0.615	13.02	0.492	10.51	---
20"	20.00	2.857	2.222	54.06	1.818	45.30	1.481	37.64	1.176	30.42	0.952	24.94	0.692	16.48	0.554	13.30	---
22"	22.00	---	2.444	65.41	2.000	54.82	1.630	45.55	1.294	36.81	1.048	30.17	0.769	20.35	0.615	16.42	---
24"	24.00	---	2.667	77.85	2.182	65.24	1.778	54.21	1.412	43.80	1.143	35.99	0.846	24.62	0.677	19.86	---
28"	28.00	---	---	---	2.545	88.80	2.074	73.78	0.647	59.62	1.333	48.87	1.077	39.88	0.862	32.17	---
30"	30.00	---	---	---	2.727	101.93	2.222	84.70	1.765	68.44	1.429	56.11	1.154	45.78	0.923	36.93	---
32"	32.00	---	---	---	---	---	2.370	96.37	1.882	77.87	1.524	63.84	1.231	52.09	0.985	42.02	---
36"	36.00	---	---	---	3.273	146.78	2.667	121.96	2.118	98.55	1.714	80.79	1.385	65.92	1.108	53.19	---
42"	42.00	---	---	---	---	---	---	---	2.471	134.14	2.000	109.97	1.615	89.73	1.292	72.39	---
48"	48.00	---	---	---	---	---	---	---	---	---	2.286	143.63	1.846	117.19	1.477	94.55	---
54"	54.00	---	---	---	---	---	---	---	---	---	2.571	181.78	2.077	148.32	1.662	119.67	---

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Pressure Rating	Class 265 DR7		Class 200 DR9		Class 160 DR11		Class 130 DR13.5		Class 100 DR17		Class 80 DR21		Class 65 DR26		Class 50 DR32.5	
	Nominal Pipe Size	OD Size, inches	Min. Wall, inches	Weight, lbs/ft												
3"	3.96	0.566	2.62	2.12	0.440	1.78	0.293	1.48	0.233	1.19	0.189	0.98	0.152	0.80	0.122	0.64
4"	4.80	0.686	3.85	3.11	0.533	2.61	0.356	2.17	0.282	1.75	0.229	1.44	0.185	1.17	0.148	0.95
6"	6.90	0.986	7.96	6.43	0.767	5.39	0.511	4.48	0.406	3.62	0.329	2.97	0.265	2.42	0.212	1.95
8"	9.05	1.293	13.69	11.07	1.006	9.28	0.670	7.71	0.532	6.23	0.431	5.11	0.348	4.17	0.278	3.36
10"	11.10	1.586	20.59	16.65	1.233	13.95	0.822	11.60	0.653	9.37	0.529	7.81	0.427	6.27	0.342	5.06
12"	13.20	1.886	29.12	23.55	1.467	19.73	0.978	16.40	0.776	13.25	0.629	10.86	0.508	8.86	0.406	7.15
14"	15.30	2.186	39.12	31.64	1.700	26.51	1.133	22.03	0.900	17.80	0.729	14.59	0.588	11.91	0.471	9.61
16"	17.40	2.486	50.60	40.92	1.933	34.29	1.289	28.49	1.024	23.02	0.829	18.87	0.669	15.40	0.535	12.43
18"	19.50	2.786	63.55	51.39	2.167	43.07	1.444	35.79	1.147	28.92	0.929	23.70	0.750	19.34	0.600	15.61
20"	21.60	3.086	77.98	63.06	2.400	52.84	1.600	43.91	1.271	35.48	1.029	29.09	0.831	23.73	0.665	19.15
24"	25.80	---	---	89.96	2.867	75.39	1.911	62.64	1.518	50.62	1.229	41.50	0.992	33.86	0.794	27.32
30"	32.00	---	---	---	---	---	2.370	96.37	1.882	77.87	1.524	63.84	1.231	52.09	0.985	42.02
36"	38.30	---	---	---	---	---	---	---	2.253	111.55	1.824	91.45	1.473	74.61	1.178	60.20
42"	44.50	---	---	---	---	---	---	---	2.618	150.59	2.119	123.45	1.712	100.73	1.369	81.27
48"	50.80	---	---	---	---	---	---	---	---	---	2.419	160.88	1.954	131.27	1.563	105.91

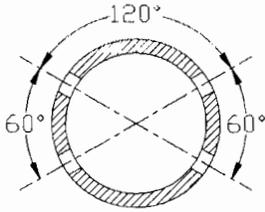
- NOTES
- PolyPipe® EHMW Pipe is manufactured in accordance with the following standards:
 - ◆ ½" IPS through 3" IPS, products are manufactured in accordance with ASTM D3035.
 - ◆ 4" IPS through 63" IPS, products are manufactured in accordance with ASTM F714.
 - ◆ Metric sizes also available.
 - ◆ Coiled pipe available through 6" OD and straight lengths available in 40' and 50' lengths.
 - ◆ Products tested and certified to NSF Standard 61 are available upon request.
 - ◆ Factory Mutual (FM) pipe available upon request (*Refer to B-1007 for approved sizes*).
 - Pressures are based on using water at 23°C (73.4°F) and are determined per ASTM D3035 or F714.
 - Service factors should be utilized to compensate for the effect of substances other than water and for higher temperatures.
 - The above weights for IPS and DIPS sizes are calculated in accordance with Plastics Pipe Institute (PPI) TR-7, using a value of 0.955 for density.
 - Available with color-coded striping.
 - Some sizes are special order. Call for availability on sizes or DR's not shown.

PolyPipe, Inc.

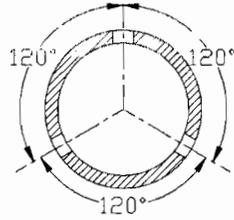
2406 N. I-35 | P.O. Box 390 | Gainesville, TX 76241
 Phone 940.665.1721 | 800.433.5632 | Facsimile 940.668.8612
 Sales Facsimile 940.668.2704 | www.polypipeinc.com

POLYPIPE® PERFORATED PIPE

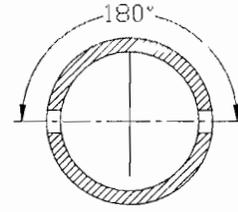
PolyPipe®



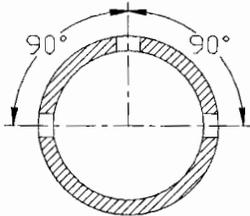
STYLE A



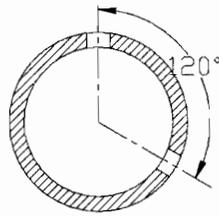
STYLE B



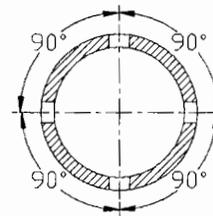
STYLE C



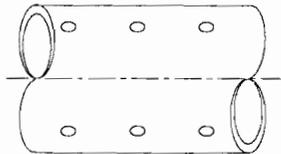
STYLE D



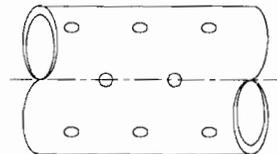
STYLE E



STYLE F



NON STAGGERED



STAGGERED

PIPE SIZE AND DR PERFORATION CAPABILITIES*

OD Nominal	Dimension Ratio							
	7	9	11	13.5	17	21	26	32.5
4								
5								
6								
7								
8								
10								
12								

★ *Shaded sizes are available. Hole sizes may vary from 1/4" to 5/8" diameter. Plant capabilities should be verified prior to ordering. Contact us if your perforation pattern is not shown.*

PolyPipe, Inc.

2406 N. I-35 | P.O. Box 390 | Gainesville, TX 76241
 Phone 940.665.1721 | 800.433.5632 | Facsimile 940.668.8612
 Sales Facsimile 940.668.2704 | www.polypipeinc.com



Gainesville Plant

P.O. Box 390
 2406 N. I-35
 Gainesville, TX 76241-0390
 (940) 665-1721
 (800) 433-5632
 Fax: (940) 668-8612
 Sales Fax: (940) 668-2704

Erwin Plant

P.O. Box 199
 1050 Industrial Drive South
 Erwin, TN 37650
 (423) 743-9116
 Fax: (423) 743-8419

Roaring Springs Plant

P.O. Box 298
 11000 Hwy. 70 South
 Roaring Springs, TX 79256
 (806) 348-7551
 (877) 771-8330
 Fax: (806) 348-7905

Fernley Plant

230 Lyon Drive
 Fernley, NV 89408
 (775) 575-5454
 Fax: (775) 575-6960

Sandersville Plant

P.O. Box 784
 995 Waco Mill Road
 Sandersville, GA 31082
 (478) 553-0576

Kimball Plant

3405 PolyPipe Road
 Kimball, NE 69145
 (308) 235-4828
 Fax: (308) 235-2938



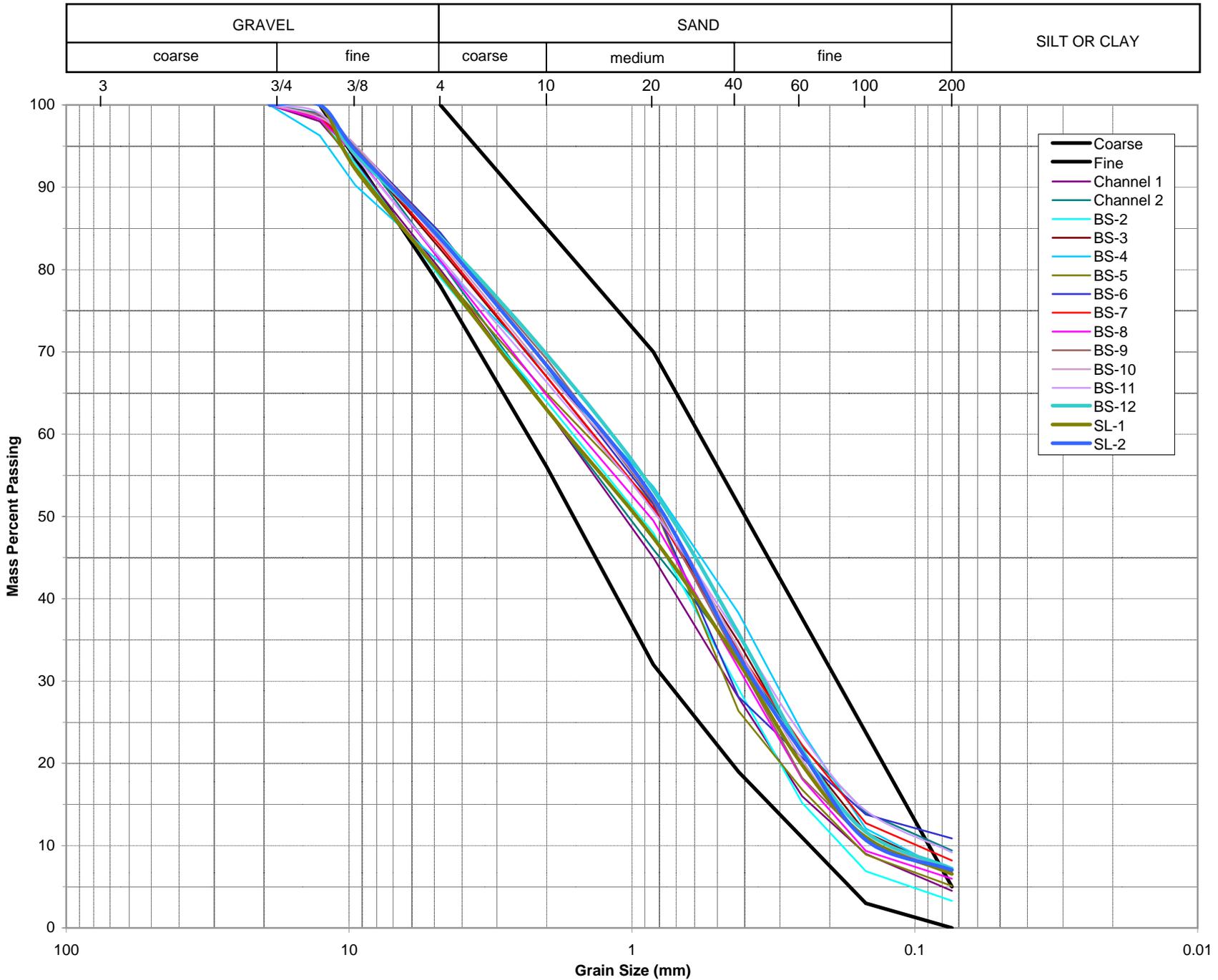
PolyPipe® is an active member of the Plastics Pipe Institute, AWWA, AGA and ASTM.

ISO 9001:2000



PolyPipe, Inc.
 2406 N. I-35 | P.O. Box 390 | Gainesville, TX 76241
 Phone 940.665.1721 | 800.433.5632 | Facsimile 940.668.8612
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APPENDIX IV
QC and QA Data



2005 Bedding Sand / Service Layer Sand Gradation



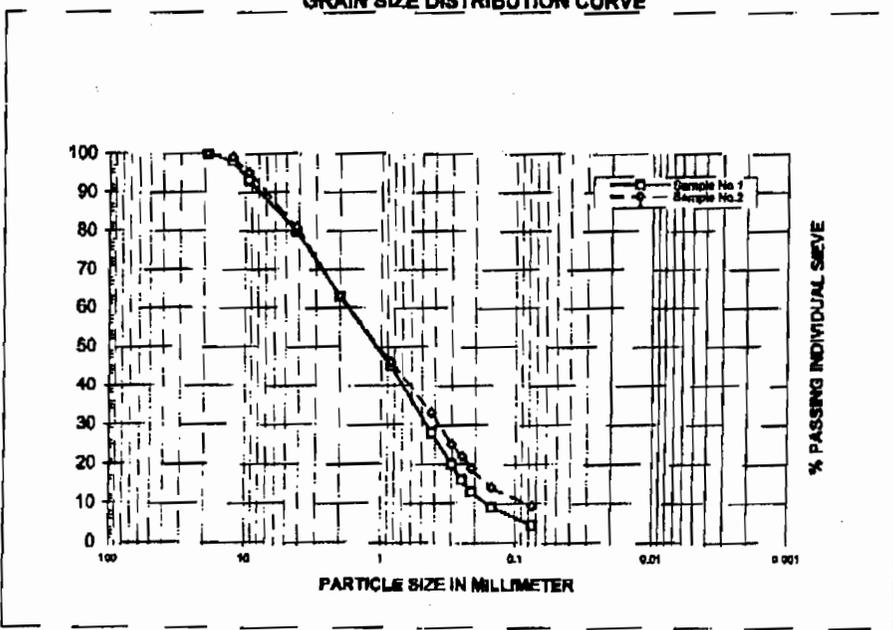
R & M ENGINEERING, INC.
CHARTERS OF RECORDS SURVEYORS
 8205 Clever Highway, P.O. Box 34278, Juneau, Alaska 99901

R&M PROJECT NUMBER: 051128

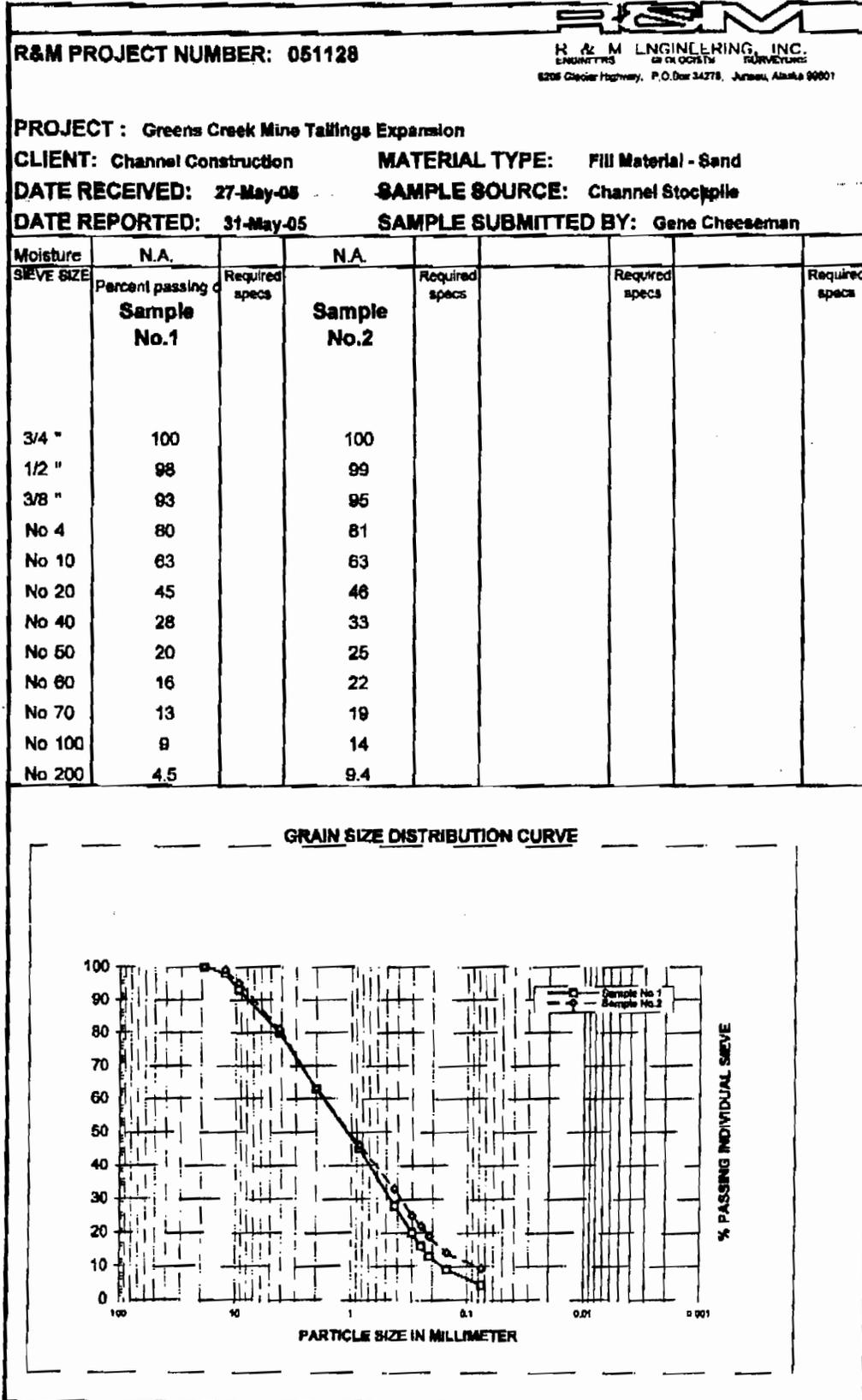
PROJECT : Greens Creek Mine Tailings Expansion
CLIENT: Channel Construction **MATERIAL TYPE:** Fill Material - Sand
DATE RECEIVED: 27-May-05 **SAMPLE SOURCE:** Channel Stockpile
DATE REPORTED: 31-May-05 **SAMPLE SUBMITTED BY:** Gene Cheeseman

Moisture	N.A.	Required specs	N.A.	Required specs	Required specs	Required specs
SIEVE SIZE	Percent passing		Sample No.2			
	Sample No.1		Sample No.2			
3/4 "	100		100			
1/2 "	98		99			
3/8 "	93		95			
No 4	80		81			
No 10	63		63			
No 20	45		46			
No 40	28		33			
No 60	20		25			
No 80	16		22			
No 100	9		14			
No 200	4.5		9.4			

GRAIN SIZE DISTRIBUTION CURVE



The graph plots the percentage of material passing through various sieve sizes. Sample No. 1 (solid line with circles) and Sample No. 2 (dashed line with squares) show very similar distributions. Both samples are 100% passing a 3/4 inch sieve and approximately 4.5% passing a 200 mesh sieve. The curves are nearly identical, indicating consistent material characteristics between the two samples.



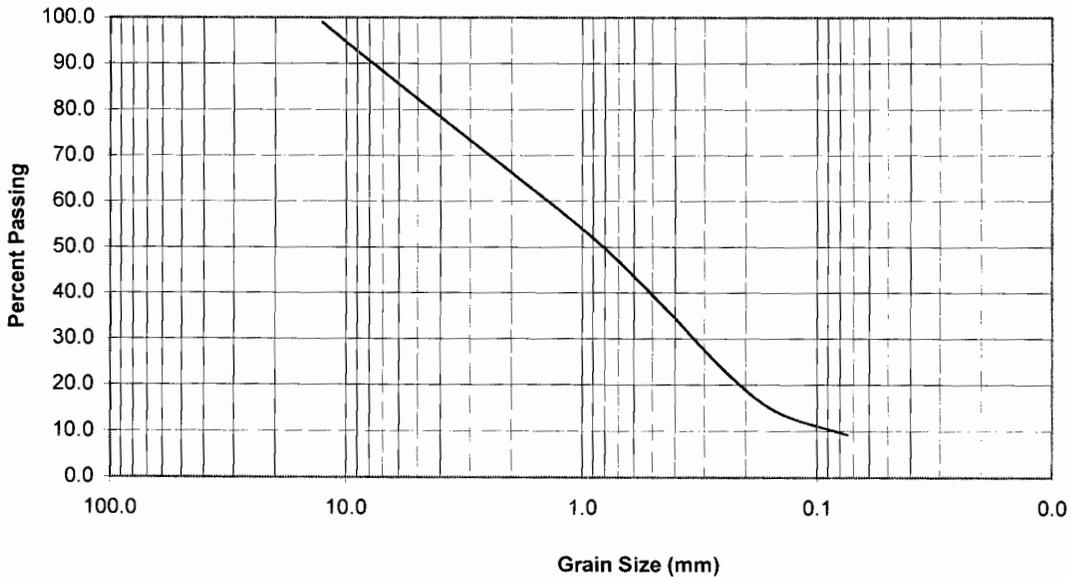
Grainsize Distribution Curve Information

Material	Bedding Sand			
Date	24-Jun-05			
Location	A-Road Pit			
Sample No	BS-11			
Elevation	n/a			
Tare Wt. (Plate)	627	Tare Wt.	2470	(g)
Dry Wt. + Tare	2345	Ttl Smple+Tare (Wet)	20832	(g)
Washed Dry Wt+Tare	2198	Ttl Smple+Tare (Dry)	19380	
Dry Wt	1571	Ttl Smple (Dry)	16910	(g)
Fines Removed	147.0	Water Content	8.6	(%)

Mertric Size (mm)	(inches)	Wt Retained (grams)	Wt Finer Than (grams)	% Passing
		0	1720.0	100.0
12.7	1/2	17.0	1703.0	99.0
9.5	3/8	90.0	1613.0	93.8
4.8	4	213.0	1400.0	81.4
2.0	10	260.0	1140.0	66.3
0.84	20	269.0	871.0	50.6
0.42	40	261.0	610.0	35.5
0.25	60	208.0	402.0	23.4
0.149	100	157.0	245.0	14.2
0.074	200	87.0	158.0	9.2
PAN	PAN	11.0		

Total Dry (g): 1573.0 From sieve
 Total Dry (g): 1571.0 From initial weighting
 Net Diff. (g): 2.0
 Net Diff. (%): 0.1%

GRAIN SIZE CURVE





R&M PROJECT NUMBER: 051128

R & M ENGINEERING, INC.
ENGINEERS OF COURTESY SURVEYORS

PROJECT : Greens Creek Mine Tailings

SUBMITTED BY: Gene Cheeseman

CLIENT: Channel Construction

DATE RECEIVED: June 23, 2005

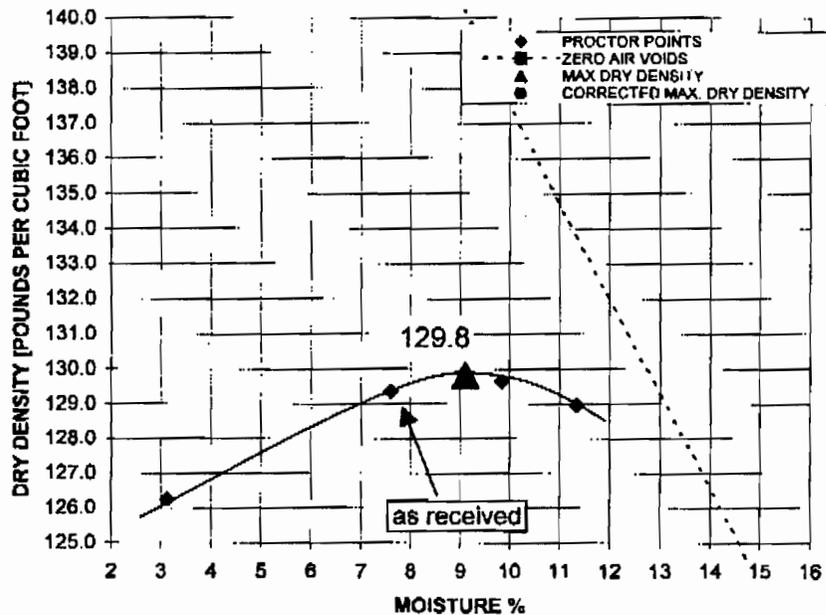
SOURCE: Greens Creek

DATE FINISHED: June 25, 2005

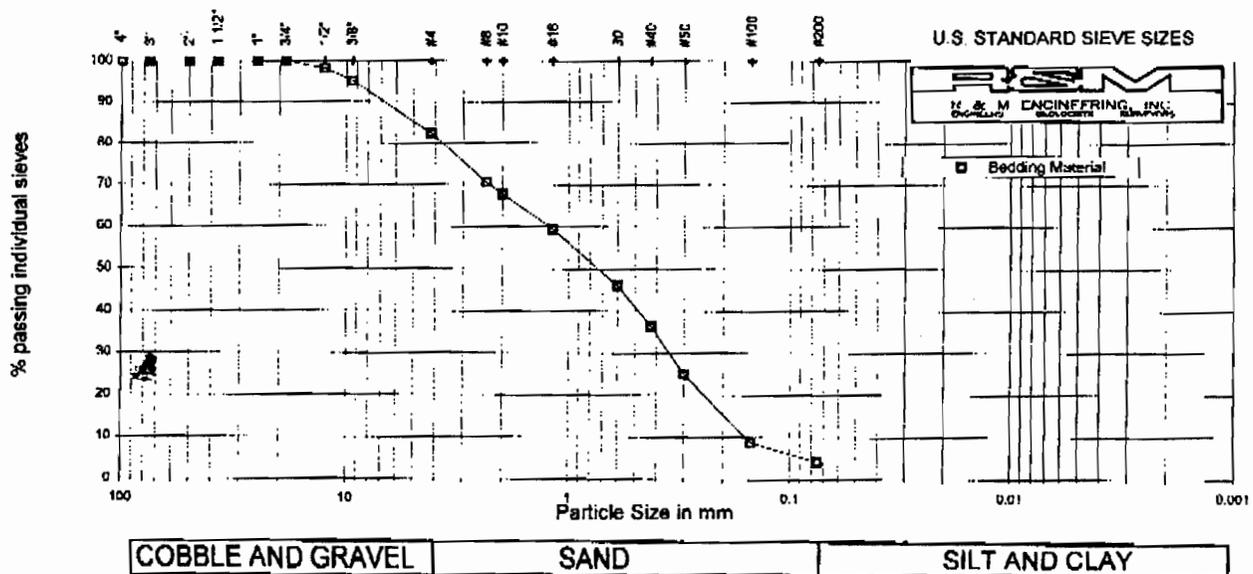
Optimum moisture: 9.1 % | Max. dry density 129.8 lbs/cu. foot | Corr. max. dry density N.A. lbs/cu. foot | Spc. Grav. 2.86

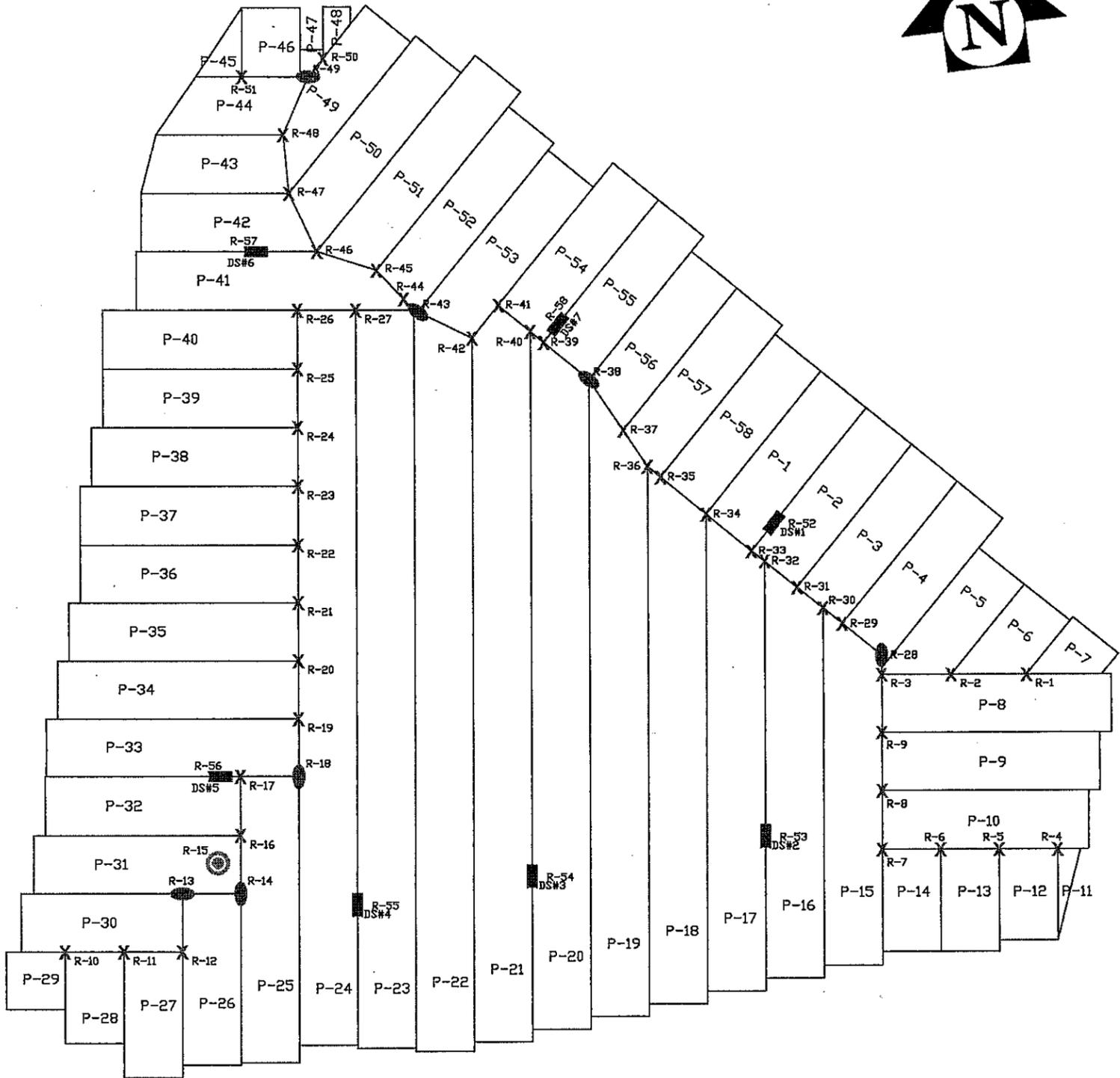
SIEVE SIZE	Percent passing of Bedding Material	Required specs
3/4 "	100	
1/2 "	98	
3/8 "	95	
No 4	82	
No 8	71	
No 10	68	
No 16	59	
No 30	46	
No 40	36	
No 50	25	
No 100	9	
No 200	4.2	

MODIFIED PROCTOR DENSITY



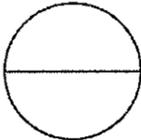
Grain size distribution for soils of the Greens Creek Mine Tailings





X BEAD REPAIR ■ DESTRUCTIVE TEST
 ● PATCH REPAIR ⊗ PIPE BOOT

AS-BUILT 80-MIL TEXTURED HDPE LINER PANEL LAYOUT
POND # 7

SHEET NO.	DETAIL 	NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc. www.northwestlinings.com 21000 77TH AVE. SOUTH KENT, WA. 98032 (253) 872-0244 (253) 872-0245 FAX		JOB NAME: GREENSCREEK MINE TAILINGS EXPANSION	
				JOB NO. N 0 0 0 4 9	
		DATE: 11 4 05	CHECKED: KL		
		BY: SG	SCALE: 1" = 100'		

Geosynthetic Installation Certificate of Acceptance

Project Name: Greens Creek Mine Tailing Expansion Date: 9-02-05
Project Location: Juncos AK.
Type of Project: Pond

Geosynthetic Products Installed By Northwest Linings Personnel

Geomembranes: HDPE LLDPE PVC Polypropylene Other _____
Thickness: 20 Mil 30 Mil 36 Mil 40 Mil 45 Mil 60 Mil 80 Mil
Surface: Smooth Textured Reinforced Non-Reinforced
Geotextiles: Non-Woven Woven Type: 10 oz 20 Rolls / 90,000
 Geocomposite Product: 10 and 6 oz 70,700
 GCL Product: _____

Owners Project Information:

Owner Representative: Gene Cheeseman
General Contractor: Channel Construction
Contractors Representative: Gene Cheeseman
Project Authorized Representative: _____

I, the undersigned a duly authorized representative of: _____
do hereby takeover and accept the work described above from the date hereof, subject to the exceptions below, and confirm that the installation of the subject geosynthetic products has been completed in accordance with the specifications and the terms and conditions and conditions of the contract. There is no apparent damage to the installed geosynthetic products, nor is there any interference within or without the surrounding works.

Exceptions: _____

Project Authorized Representative:	<u>Gene Cheeseman</u> Print Name	<u>V. President</u> Title
	<u>[Signature]</u> Signature	<u>9-2-05</u> Date
Northwest Linings Representative:	<u>Alex Nio's</u> Print Name	<u>Supervisor</u> Title
	<u>Alejandro Nio's</u> Signature	<u>9-02-05</u> Date

Northwest Linings

PROJECT COMPLETION CHECKLIST

Project Name: Brown Creek Mine Tailing Completion Date: 7-07-09

When is contractor Leaving Site? _____

Contractor Contact: _____ Phone Number: _____

Site Address / Directions: _____

Did you pick up the Garbage? YES NO
If not please explain: _____

Did you have a final Inspection walk through? YES NO
If not please explain: _____

Are there any materials left over? YES NO
What type and quantity: 6 boxes of Welded Rod

Was all Rental Equipment Returned? YES NO
Rental Contact: _____ Phone: _____
Date of Return: _____

Is there any work left to complete? YES NO
res, please explain: part attached, concrete wasn't ready
Contractor will do it

Do you have a completed and signed sign-off sheet? YES NO
If not please explain: _____

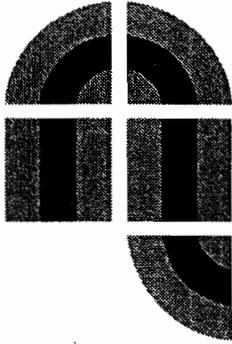
Did you have all change orders signed? YES NO
If not please explain: _____

Do you have all Diaries completed and sent? YES NO
If not please explain: _____

QA/QC Reports Complete? YES NO
If not please explain: _____

Panel Layout Report Complete? YES NO
If not please explain: _____

NOTES/COMMENTS: _____



**NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, Inc.**

"Helping to Protect the Environment"

21000 77th Avenue South

Kent, WA 98032

(253) 872-0244 • (800) 729-6954

FAX: (253) 872-0245

www.northwestlinings.com

CERTIFICATE OF ACCEPTANCE OF SOIL SUB GRADE SURFACE

PROJECT: Greens Creek Mine Tailing Expansion
LINER TYPE/QTY: 80 mil HDPE texture 155,000
OWNER: Greens Creek Mine
LOCATION: Juncosak Pit

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products, Inc. have visually observed the soil sub grade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the sight, including, but not limited to, those arising out of improper compaction, use of improper soil materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed sub grade preparation.

This acceptance is based upon the present condition of the sub grade preparation and Northwest Linings & Geotextile Products, Inc. accepts no responsibility for restoration of the sub grade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal, or machinery. Neither does Northwest Linings & Geotextile Products, Inc. accept responsibility for restoration of the sub grade preparation upon the occurrence of any Act of God, including but not limited to, rain, wind, hail, snow, flood, or earthquake.

Area Being Accepted: Pond 7

NORTHWEST LININGS REPRESENTATIVE:

Date: 9-07-05
Signature: Mejandro S. Riós
Name/Title: Mejandro Riós 1 SUPERVISOR

OWNERS REPRESENTATIVE:

Date: 9-2-05
Company: Channel Const.
Signature: [Signature]
Name/Title: Gene Cheesman 1st. President



NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc. / PANEL PLACEMENT FORM • 253-872-0244

PROJECT NAME: Greens Creek Mine Tailing Expansion PROJECT NUMBER: N00049

MATERIAL DESCRIPTION: 80 mil HDPE Texture

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
8-29-05	1	0511	80'	26'	N. E. Slope.
8-29-05	2	0511	80'	26'	N. E. Slope.
8-29-05	3	0511	80'	26'	N. E. Slope.
8-29-05	4	0511	80'	26'	N. E. Slope.
8-29-05	5	0702	70'	26'	N. E. Slope.
8-29-05	6	0702	45'	26'	N. E. Slope.
8-29-05	7	0702	35'	21'	N. E. Slope.
8-29-05	8	0508	100'	26'	E. S. Slope.
8-29-05	9	0507	95'	26'	E. S. Slope.
8-29-05	10	0507	90'	26'	E. S. Slope.
8-29-05	11	0507	40'	10'	E. S. Corner beam.
8-29-05	12	0701	40'	26'	S. Slope
8-29-05	13	0507	45'	26'	S. Slope



NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc. / PANEL PLACEMENT FORM • 253-872-0244

PROJECT NAME: Greens Creek Mine Tailings Texture
 MATERIAL DESCRIPTION: 80 mil HDPE

PROJECT NUMBER: N60049

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
8-30-05	14	0507	45'	26'	S. Slope
8-30-05	15	0510	145'	26'	S. Side
8-30-05	16	0510	170'	26'	S. Side
8-30-05	17	0508	195'	26'	S. Side
8-30-05	18	0701	220'	26'	S. Side
8-31-05	19	0509	250'	26'	S. Side
8-31-05	20	0609	275'	26'	S. Side
8-31-05	21	0601	300'	26'	S. Side
8-31-05	22	0503	320'	26'	S. Side
8-31-05	23	0603	320'	26'	S. Side
8-31-05	24	0604	320'	26'	S. Side
8-31-05	25	0608	125'	26'	S. Side
8-31-05	26	0606	75'	26'	S. Side



NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc. / PANEL PLACEMENT FORM • 253-872-0244

PROJECT NAME: Greens Creek Mine Tailing Texture

PROJECT NUMBER: N00049

MATERIAL DESCRIPTION: 80 mil HDPE

DATE/TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
8-31-05	27	0606	55'	26'	S. Slope corner (S.E)
8-31-05	28	0606	40'	26'	S. Slope corner (S.E)
8-31-05	29	0606	25'	26'	S.W. corner
8-31-05	30	0606	70'	26'	W. Slope
8-31-05	31	0608	90'	26'	W. Slope
8-31-05	32	0608	85°	26'	W. Slope
9-01-05	33	0610	110'	26'	W. Slope
9-01-05	34	0610	105'	26'	W. Slope
9-01-05	35	0610	100'	26'	W. Slope
9-01-05	36	0605	95'	26'	W. Slope
9-01-05	37	0605	95'	26'	W. Slope
9-01-05	38	0605	90'	26'	W. Slope
9-01-05	39	0607	85'	26'	W. Slope



NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc. / PANEL PLACEMENT FORM • 253-872-0244

PROJECT NAME: Greens Creek Mine Tailing Texture

PROJECT NUMBER: W00079

MATERIAL DESCRIPTION: 80 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
9-01-05	40	0607	85'	26'	W. Slope
9-01-05	41	0607	120'	26'	W. Slope
9-01-05	42	0513	95'	26'	W. Slope
9-01-05	43	0513	75'	26'	W. Slope
9-01-05	44	0513	60'	26'	W. N. Corner
9-01-05	45	0513	25'	10'	W. N. Corner
9-01-05	46	0804	30'	26	N. berm (spill way)
9-01-05	47	0513	10'	10'	N. berm (spill way)
9-01-05	48	0513	30'	12'	N. berm (spill way)
9-01-05	49	0513	70'	96'	E. N. Slope.
9-01-05	50	0804	85'	26'	E. N. Slope.
9-01-05	51	0804	100'	26'	E. N. Slope.
9-01-05	52	0804	95'	26'	E. N. Slope

TRIA WELD FORM

DATE: 8/31/05

SHEET 1 OF 1

PROJECT NAME: 5000 sq ft of new office building
 NWLG PROJECT # 00000000
 NWLG SUPERINTENDANT: John Doe
 MATERIAL DESCRIPTION: 305 pipe Tee/bite

DATE/TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS		FUSION WELDS			PASS / FAIL	COMMENTS
					BARREL TEMP	PREHEAT TEMP	PEEL / TENSILE	WEDGE TEMP	SET SPEED FT/MIN		
8/30/05 7:00 AM	M.C.	03	85°	Raining							
8/30/05 7:10 AM	FL	94	85°	Raining							
8/30/05 7:20 AM	M.C.	03	85°	Raining							
8/30/05 7:30 AM	FL	94	85°	Raining							
8/31/05 7:00 AM	M.C.	03	85°	Raining							260-760
8/31/05 7:15 AM	FL	94	85°	Raining							261-259
8/31/05 7:30 AM	M.C.	03	85°	Raining							258-756
8/31/05 7:45 AM	FL	94	85°	Raining							257-259
9/10/05 7:00 AM	M.C.	03	85°	Raining							260-258
9/10/05 7:15 AM	FL	94	85°	Raining							259-258
9/10/05 7:30 AM	M.C.	03	85°	Raining							250-252
9/10/05 7:45 AM	FL	94	85°	Raining							249-251
9/10/05 8:00 AM	M.C.	305	85°	Cloudy	520°	500°	130-133	140			250-219
9/10/05 8:15 AM	FL	94	85°	Cloudy			135-140	136			260-761
9/10/05 8:30 AM	M.C.	305	85°	Cloudy	520°	500°	135-140	136			260-259

PANEL SEAMING FORM

PROJECT NAME: Greens Creek Mine Tailing DATE: 8 130105

NWLG PROJECT # N00049 SHEET 1 of 9

NWLG SUPERINTENDANT: Alx Bios

MATERIAL DESCRIPTION: 80 mil HDPE texture

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8 1301	1	1/2	80'	FL	94	850°	Raining	0	Cold	
8 1301	2	2/3	80'	FL	94	850°				
8 1301	3	3/4	75'	MC	03	850°				
8 1301	4	4/5	75'	FL	94	850°				
8 1301	5	5/6	60'	M.C.	63	850°				
8 1301	6	6/7	35'	M.C.	03	850°				
8 1301	7	7/8	35'	M.C.	03	850°				
8 1301	8	6/8	40'	M.C.	03	850°				
8 1301	9	5/8	25'	M.C.	03	850°				
8 1301	10	8/9	95'	M.C.	03	850°				
8 1301	11	9/10	90'	FL	94	850°				
8 1301	12	10/11	10'	M.C.	03	850°				
8 1301	13	11/12	35'	M.C.	03	850°	Raining	0	Cold	

PANEL SEAMING FORM

PROJECT NAME: Greens Creek Mine Tailing Expansion

NWLG PROJECT # N00049

DATE: 8/30/05

NWLG SUPERINTENDANT: Alex Bo's

SHEET 2 of 9

MATERIAL DESCRIPTION: 80 mil HDPE Texture

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/30/05	14	12/13	45'	M.C.	03	850°	Raining	0	Cold	
8/30/05	15	13/14	45'	M.C.	03	850°				
8/30/05	16	14/15	45'	M.C.	03	850°				
8/30/05	17	10/12	26'	M.C.	03	850°				
8/30/05	18	10/13	26'	M.C.	03	850°				
8/30/05	19	10/14	25'	M.C.	03	850°				
8/30/05	20	10/15	26'	M.C.	03	850°				
8/30/05	21	9/15	26'	M.C.	03	850°				
8/30/05	22	8/15	26'	M.C.	03	850°				
8/30/05	23	5/15	10'	M.C.	03	850°				
8/30/05	24	15/51	155'	FL	94	850°				
8/30/05	25	16/91	180'	FL	94	850°				
8/30/05	26	17/18	210'	FL	94	850°	Raining	0	Cold	

PANEL SEAMING FORM

PROJECT NAME: Greens Creek Mine Tailing Expansion

NWLG PROJECT # 00009

NWLG SUPERINTENDANT: Alx Rids

MATERIAL DESCRIPTION: 80 mil HDPE Texture

DATE: 8/13/08

SHEET 3 of 9

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/13/08	27	18/19/31	235'	FL	94	850°	Raining	0	Cold	
8/13/08	28	19/20/31	260'	FL	94	850°				
8/13/08	29	20/21/32	285'	FL	94	850°				
8/13/08	30	21/22/32	310'	FL	94	850°				
8/13/08	31	22/23/32	320'	FL	94	850°				
8/13/08	32	23/24/32	320'	FL	94	850°				
8/13/08	33	24/25/32	125'	FL	94	850°				
8/13/08	34	25/26/32	55'	FL	94	850°				
8/13/08	35	26/27/32	55'	FL	94	850°				
8/13/08	36	27/28/32	50'	FL	94	850°				
8/13/08	37	28/29/32	32'	FL	94	850°				
8/13/08	38	29/30/32	20'	FL	94	850°				
8/13/08	39	30/31/32	90'	FL	94	850°	Raining	0	Cold	

PANEL SEAMING FORM

PROJECT NAME: Greens Creek Mine Tailing Expansion

NWLG PROJECT # 100049

NWLG SUPERINTENDANT: Alex Rios

DATE: 8/13/10

MATERIAL DESCRIPTION: 80 mil HDPE

SHEET 4 of 9

Texture

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/13/10	40	29 30	26'	FL	94	850°	Raining	0	Cold	
8/13/10	41	27 30	26'	FL	94	850°				
8/13/10	42	26 30	26'	FL	94	850°				
8/13/10	43	28 31	26'	M.C.	03	850°				
9/10/10	44	25 30	26'	M.C.	03	850°				
9/10/10	45	25 32	26'	M.C.	03	850°				
9/10/10	46	31 32	87'	M.C.	03	850°				
9/10/10	47	32 33	85'	M.C.	03	850°				
9/10/10	48	25 33	26'	M.C.	03	850°				
9/10/10	49	33 34	107'	M.C.	03	850°				
9/10/10	50	34 35	102'	M.C.	03	850°				
9/10/10	51	35 36	97'	M.C.	03	850°				
9/10/10	52	36 37	95'	M.C.	03	850°	Raining	0	Cold	

PANEL SEAMING FORM

PROJECT NAME: Greens Creek Mine Tailing Expansion

DATE: 9/10/10

NWLG PROJECT # 100049

NWLG SUPERINTENDANT: Alex Pios

SHEET 5 of 9

MATERIAL DESCRIPTION: 80 mil Hops Texture

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
9/10/10	53	37/38	92'	M.C.	03	850°	Raining	0	Cold	
9/10/10	54	38/39	87'	M.C.	03	850°	Raining	1		
9/10/10	55	39/40	85'	M.C.	03	850°	Raining	1		
9/10/10	56	40/41	85'	M.C.	03	850°		1		
9/10/10	57	41/42	100'	M.C.	03	850°		1		
9/10/10	58	42/43	85'	FL	94	850°		1		
9/10/10	59	43/44	60'	FL	94	850°		1		
9/10/10	60	44/45	10'	FL	94	850°		1		
9/10/10	61	44/46	40'	FL	94	850°		1		
9/10/10	62	46/47	20'	FL	94	850°		1		
9/10/10	63	47/48	10'	FL	94	850°		1		
9/10/10	64	48/49	35'	FL	94	850°		1		
9/10/10	65	49/50	20'	FL	94	850°		1		
9-01-05	66	45/46	30'	FL	94	850°	Raining	0	Cold	

PANEL SEAMING FORM

PROJECT NAME: Greens Creek Mine Tailing Expansion

DATE: 9 10/105

NWLG PROJECT # N00049

SHEET 6 of 9

NWLG SUPERINTENDANT: Alex Riös

MATERIAL DESCRIPTION: 80 mil HDPE Texture

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
9/10/05	67	49/50	20'	FL	94	850°	Raining	0	cold	
9/10/05	68	50/51	25'	FL	94	850°				
9/10/05	69	51/52	25'	FL	94	850°				
9/10/05	70	52/53	25'	FL	94	850°				
9/10/05	71	53/54	20'	FL	94	850°				
9/10/05	72	54/55	20'	FL	94	850°				
9/10/05	73	55/56	20'	FL	94	850°				
9/10/05	74	56/57	25'	FL	94	850°				
9/10/05	75	57/58	20'	FL	94	750°				
9/10/05	76	58/59	20'	FL	94	850°				
9/10/05	77	24/33	26'	M.C.	03	850°				
9/10/05	78	24/34	26'	M.C.	03	850°				
9/10/05	79	24/35	26'	M.C.	03	850°	Raining	0	cold	

PANEL SEAMING FORM

DATE: 9 10 2015
 SHEET 7 of 9

PROJECT NAME: Green Creek Mine Tailing Expansion
 NWLG PROJECT # N00049
 NWLG SUPERINTENDANT: Alex Kios
 MATERIAL DESCRIPTION: 80 mil HPE Texture

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
9/10/15	80	24/36	26'	M.C.	03	850°	Raining	0	Cold	
9/10/15	81	24/37	26'	M.C.	03	850°				
9/10/15	82	24/38	26'	M.C.	03	850°				
9/10/15	83	24/39	26'	M.C.	03	850°				
9/10/15	84	24/40	26'	M.C.	03	850°				
9/10/15	85	24/41	26'	M.C.	03	850°				
9/10/15	86	23/41	26'	M.C.	03	850°				
9/10/15	87	15/41	26'	FL	94	850°				
9/10/15	88	15/41	5'	FL	94	850°				
9/10/15	89	16/41	21'	FL	94	850°				
9/10/15	90	16/41	14'	FL	94	850°				
9/10/15	91	17/41	15'	FL	94	850°				
9/10/15	92	17/41	26'	FL	94	850°	Raining	0	Cold	

PANEL SEAMING FORM

PROJECT NAME: Greenscreek Mine Tailing Expansion DATE: 9/10/2015
 NWLG PROJECT # N00049 SHEET 8 of 9
 NWLG SUPERINTENDANT: Alex RioS
 MATERIAL DESCRIPTION: 80 mil HDPE Texture

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
9/10/15	93	18/58	26'	FL	94	850°	Raining	0	cold	N.E. Tie-in
9/10/15	94	18/57	10'	FL	94	850°				
9/10/15	95	19/57	15'	FL	94	850°				
9/10/15	96	19/56	26'	FL	94	850°				
9/10/15	97	20/55	26'	FL	94	850°				
9/10/15	98	20/54	5'	FL	94	850°				
9/10/15	99	21/54	20'	FL	94	850°				
9/10/15	100	21/53	15'	FL	94	850°				
9/10/15	101	22/53	10'	FL	94	850°				
9/10/15	102	22/52	15'	FL	94	850°				
9/10/15	103	41/52	10'	FL	94	850°				
9/10/15	104	41/51	26'	FL	94	850°				
9/10/15	105	42/50	30'	FL	94	850°	Raining	0	cold	N.E. Tie-in

PANEL SEAMING FORM

PROJECT NAME: Greens Creek Mine

NWLG PROJECT # 10064

NWLG SUPERINTENDANT: Alex Rio's

DATE: 9 10 2010

MATERIAL DESCRIPTION: To fill hole

Texture

SHEET 9 of 9

DATE/TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
9/10/2010	106	42-49	30'	FL	94	850°	Rain	0	cold.	
9/10/2010	107	44-49	10'	FL	94	850°	Rainy	0	cold.	
9/10/2010	108									
9/10/2010	109									
9/10/2010	110									
1 1										
1 1										
1 1										
1 1										
1 1										
1 1										
1 1										
1 1										

NORTHWEST LININGS / NON DESTRUCTIVE TEST LOG

PROJECT NAME: Lynns Creek Mill Tailing Expansion

NWLG PROJECT # 9102105

NWLG SUPERINTENDANT: John Ross

MATERIAL DESCRIPTION: 20 mil 4000 Teflon

DATE: 9/10/05

SHEET 1 of 7

DATE/TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING						VACUUM BOX PASS/FAIL	COMMENTS / LOCATION
			START PRESSURE	START TIME	ENDING PRESSURE	ENDING TIME	PRESSURE LOSS	PASS/FAIL		
9/10/05	1/2	FL	30	7:00	30	7:05	0		P	
9/10/05	2/3	FL	30	7:05	30	7:10			P	
9/10/05	3/4	FL	30	7:10	30	7:15			P	
9/10/05	4/5	FL	30	7:15	30	7:20			P	
9/10/05	5/6	FL	30	7:20	30	7:25			P	
9/10/05	6/7	FL	30	7:25	30	7:30			P	
9/10/05	7/8	FL	30	7:30	30	7:35			P	
9/10/05	8/9	FL	30	7:35	30	7:40			P	
9/10/05	9/10	FL	30	7:40	30	7:45			P	
9/10/05	10/11	FL	30	7:45	30	7:50			P	
9/10/05	11/12	FL	30	7:50	30	7:55			P	
9/10/05	12/13	FL	30	7:55	30	8:00			P	
9/10/05	13/14	FL	30	8:00	30	8:05			P	
9/10/05	14/15	FL	30	8:05	30	8:10			P	
9/10/05	15/16	FL	30	8:10	30	8:15			P	
9/10/05	16/17	FL	30	8:15	30	8:20			P	
9/10/05	17/18	FL	30	8:20	30	8:25			P	

NORTHWEST LININGS / NON DESTRUCTIVE TEST LOG

PROJECT NAME: Excelsior Mine Tailing Expansion

NWLG PROJECT #: 110049

NWLG SUPERINTENDANT: Alex Pico

MATERIAL DESCRIPTION: 30 MPa WPPC Texture

DATE: 9/1/2015

SHEET 2 of 7

DATE / TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING						VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
			START PRESSURE	START TIME	ENDING PRESSURE	ENDING TIME	PRESSURE LOSS	PASS / FAIL		
9/1/15	18/19	PL	30	8:28	30	8:30	-0	P		
9/1/15	19/20	PL	30	8:30	30	8:35				
9/1/15	20/21	PL	30	8:30	30	8:40				
9/1/15	21/22	PL	30	8:40	30	8:45				
9/1/15	22/23	PL	30	8:45	30	8:50				
9/1/15	23/24	PL	30	8:50	30	8:55				
9/1/15	24/25	PL	30	8:55	30	9:00				
9/1/15	25/26	PL	30	9:00	30	9:05				
9/1/15	26/27	PL	30	9:05	30	9:10				
9/1/15	27/28	PL	30	9:10	30	9:15				
9/1/15	28/29	PL	30	9:15	30	9:20				
9/1/15	29/30	PL	30	9:20	30	9:25				
9/1/15	30/31	PL	30	9:25	30	9:30				
9/1/15	31/32	PL	30	9:30	30	9:35				
9/1/15	32/33	PL	30	9:35	30	9:40				
9/1/15	33/34	PL	30	9:40	30	9:45				
9/1/15	34/35	PL	30	9:45	30	9:50				
9/1/15	35/36	PL	30	9:50	30	9:55				

NORTHWEST LININGS / NON DESTRUCTIVE TEST LOG

PROJECT NAME:

NWLG PROJECT #

NWLG SUPERINTENDANT:

MATERIAL DESCRIPTION:

Greens Creek Mine Tailing Expansion

Mooring

Alber Piers

20 mil HDPE Texture

DATE: 9/10/05

SHEET 3 of 7

DATE / TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING						VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
			START PRESSURE	START TIME	ENDING PRESSURE	ENDING TIME	PRESSURE LOSS	PASS / FAIL		
9/10/05	35/36	FL	30	10:00	30	10:05	-0	P		
9/10/05	36/37	FL	30	10:05	30	10:10				
9/10/05	37/38	FL	30	10:10	30	10:15				
9/10/05	38/39	FL	30	10:15	30	10:20				
9/10/05	39/40	FL	30	10:20	30	10:25				
9/10/05	40/41	FL	30	10:25	30	10:30				
9/10/05	41/42	FL	30	10:30	30	10:35				
9/10/05	42/43	FL	30	10:35	30	10:40				
9/10/05	43/44	FL	30	10:40	30	10:45				
9/10/05	44/45	FL	30	10:45	30	10:50				
9/10/05	45/46	FL	30	10:50	30	10:55				
9/10/05	46/47	FL	30	10:55	30	11:00				
9/10/05	47/48	FL	30	11:00	30	11:05				
9/10/05	48/49	FL	30	11:05	30	11:10				
9/10/05	49/50	FL	30	11:10	30	11:15				
9/10/05	50/51	FL	30	11:15	30	11:20				
9/10/05	51/52	FL	30	11:20	30	11:25				
9/10/05	52/53	FL	30	11:25	30	11:30				
9/10/05	53/54	FL	30	11:30	30	11:35				
9/10/05	54/55	FL	30	11:35	30	11:40				
9/10/05	55/56	FL	30	11:40	30	11:45				
9/10/05	56/57	FL	30	11:45	30	11:50				
9/10/05	57/58	FL	30	11:50	30	11:55				
9/10/05	58/59	FL	30	11:55	30	12:00				
9/10/05	59/60	FL	30	12:00	30	12:05				
9/10/05	60/61	FL	30	12:05	30	12:10				
9/10/05	61/62	FL	30	12:10	30	12:15				
9/10/05	62/63	FL	30	12:15	30	12:20				
9/10/05	63/64	FL	30	12:20	30	12:25				
9/10/05	64/65	FL	30	12:25	30	12:30				
9/10/05	65/66	FL	30	12:30	30	12:35				
9/10/05	66/67	FL	30	12:35	30	12:40				
9/10/05	67/68	FL	30	12:40	30	12:45				
9/10/05	68/69	FL	30	12:45	30	12:50				
9/10/05	69/70	FL	30	12:50	30	12:55				
9/10/05	70/71	FL	30	12:55	30	1:00				

NORTHWEST LININGS / NON DESTRUCTIVE TEST LOG

PROJECT NAME: Breens Creek Mine Tailing Storage

NWLG PROJECT # 100019

NWLG SUPERINTENDANT: Abi Rios

MATERIAL DESCRIPTION: 90 mil HDPE texture

DATE: 9/10/19

SHEET 4 of 7

DATE / TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING						VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
			START PRESSURE	START TIME	ENDING PRESSURE	ENDING TIME	PRESSURE LOSS	PASS / FAIL		
9/10/19	19/50	FL	30	11:25	30	11:50	-0	P		
9/10/19	20/51	FL	30	11:30	30	11:55		P		
9/10/19	21/52	FL	30	11:35	30	12:00		P		
9/10/19	22/53	FL	30	11:40	30	12:05		P		
9/10/19	23/54	FL	30	11:45	30	12:10		P		
9/10/19	24/55	FL	30	11:50	30	12:15		P		
9/10/19	25/56	FL	30	11:55	30	12:20		P		
9/10/19	26/57	FL	30	12:00	30	12:25		P		
9/10/19	27/58	FL	30	12:05	30	12:30		P		
9/10/19	28/59	FL	30	12:10	30	12:35		P		
9/10/19	29/60	FL	30	12:15	30	12:40		P		
9/10/19	30/61	FL	30	12:20	30	12:45		P		
9/10/19	31/62	FL	30	12:25	30	12:50		P		
9/10/19	32/63	FL	30	12:30	30	12:55		P		
9/10/19	33/64	FL	30	12:35	30	13:00		P		
9/10/19	34/65	FL	30	12:40	30	13:05		P		
9/10/19	35/66	FL	30	12:45	30	13:10		P		
9/10/19	36/67	FL	30	12:50	30	13:15		P		
9/10/19	37/68	FL	30	12:55	30	13:20		P		
9/10/19	38/69	FL	30	13:00	30	13:25		P		
9/10/19	39/70	FL	30	13:05	30	13:30		P		
9/10/19	40/71	FL	30	13:10	30	13:35		P		
9/10/19	41/72	FL	30	13:15	30	13:40		P		
9/10/19	42/73	FL	30	13:20	30	13:45		P		
9/10/19	43/74	FL	30	13:25	30	13:50		P		
9/10/19	44/75	FL	30	13:30	30	13:55		P		
9/10/19	45/76	FL	30	13:35	30	14:00		P		
9/10/19	46/77	FL	30	13:40	30	14:05		P		
9/10/19	47/78	FL	30	13:45	30	14:10		P		
9/10/19	48/79	FL	30	13:50	30	14:15		P		
9/10/19	49/80	FL	30	13:55	30	14:20		P		
9/10/19	50/81	FL	30	14:00	30	14:25		P		
9/10/19	51/82	FL	30	14:05	30	14:30		P		
9/10/19	52/83	FL	30	14:10	30	14:35		P		
9/10/19	53/84	FL	30	14:15	30	14:40		P		
9/10/19	54/85	FL	30	14:20	30	14:45		P		
9/10/19	55/86	FL	30	14:25	30	14:50		P		
9/10/19	56/87	FL	30	14:30	30	14:55		P		
9/10/19	57/88	FL	30	14:35	30	15:00		P		
9/10/19	58/89	FL	30	14:40	30	15:05		P		
9/10/19	59/90	FL	30	14:45	30	15:10		P		
9/10/19	60/91	FL	30	14:50	30	15:15		P		
9/10/19	61/92	FL	30	14:55	30	15:20		P		
9/10/19	62/93	FL	30	15:00	30	15:25		P		
9/10/19	63/94	FL	30	15:05	30	15:30		P		
9/10/19	64/95	FL	30	15:10	30	15:35		P		
9/10/19	65/96	FL	30	15:15	30	15:40		P		
9/10/19	66/97	FL	30	15:20	30	15:45		P		
9/10/19	67/98	FL	30	15:25	30	15:50		P		
9/10/19	68/99	FL	30	15:30	30	15:55		P		
9/10/19	69/100	FL	30	15:35	30	16:00		P		

NORTHWEST LININGS / NON DESTRUCTIVE TEST LOG

PROJECT NAME: Grants Creek

NWLG PROJECT # 100049

NWLG SUPERINTENDANT: Bob Ross

MATERIAL DESCRIPTION: 20 mil 4000 ft² pipe

DATE: 9 10 2010

SHEET 5 of 7

DATE / TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING						VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
			START PRESSURE	START TIME	ENDING PRESSURE	ENDING TIME	PRESSURE LOSS	PASS / FAIL		
9/10/10	6/5	FL	30	1:30	30	1:35	0		E.S. Tie-in	
9/10/10	5/5	FL	30	1:30	30	1:35			" "	
9/10/10	4/5	FL	30	1:35	30	1:40			N.E. Tie-in	
9/10/10	3/5	FL	30	1:35	30	1:40				
9/10/10	3/6	FL	30	1:40	30	1:45				
9/10/10	2/6	FL	30	1:40	30	1:45				
9/10/10	2/7	FL	30	1:45	30	1:50				
9/10/10	1/7	FL	30	1:45	30	1:50				
9/10/10	4/6	FL	30	1:50	30	1:55				
9/10/10	3/7	FL	30	1:50	30	1:55				
9/10/10	2/8	FL	30	2:00	30	2:05				
9/10/10	5/6	FL	30	2:00	30	2:05				
9/10/10	4/6	FL	30	2:05	30	2:10				
9/10/10	3/8	FL	30	2:05	30	2:10				
9/10/10	2/8	FL	30	2:10	30	2:15				
9/10/10	5/7	FL	30	2:15	30	2:20	0		N.E. Tie-in	

NORTHWEST LININGS / NON DESTRUCTIVE TEST LOG

PROJECT NAME: Wapens Creek Mine Tailing Reposition

NWLG PROJECT # 10000

NWLG SUPERINTENDANT: John King

MATERIAL DESCRIPTION: 300 1000 1000 1000

DATE: 7/22/05

SHEET 6 of 7

DATE/TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING						VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
			START PRESSURE	START TIME	ENDING PRESSURE	ENDING TIME	PRESSURE LOSS	PASS/FAIL		
7/10/05	50/41	FL	30	2:20	30	2:25	0			N. Tie-in
7/10/05	51/41	FL	30	2:20	30	2:25				" "
7/10/05	50/42	FL	30	2:25	30	2:30				" "
7/10/05	49/43	FL	30	2:25	30	2:30				" "
7/10/05	28/30	FL	30	2:30	30	2:35				N. S. Corner Tie-in
7/10/05	27/30	FL	30	2:30	30	2:35				" "
7/10/05	26/30	FL	30	2:35	30	2:40				" "
7/10/05	25/31	FL	30	2:35	30	2:40				N. S. Corner Tie-in
7/10/05	22/32	FL	30	2:40	30	2:45				W. Tie-in
7/10/05	27/32	FL	30	2:40	30	2:45				" "
7/10/05	24/33	FL	30	2:45	30	2:50				" "
7/10/05	24/34	FL	30	2:45	30	2:50				" "
7/10/05	24/35	FL	30	2:50	30	2:55				" "
7/10/05	24/36	FL	30	2:50	30	2:55				" "
7/10/05	24/37	FL	30	2:55	30	3:00				" "
7/10/05	24/38	FL	30	2:55	30	3:00	✓			W. Tie-in
7/10/05	24/39	FL	30	3:00	30	3:05	✓			W. Tie-in

DESTRUCTIVE TEST LOG

PROJECT NAME: Frees Creek Mine Tailing Expansion DATE: 9 10 21 05
 NWLG PROJECT # N0004
 NWLG SUPERINTENDANT: Don Pios
 MATERIAL DESCRIPTION: 60 mil HDPE Texture SHEET 1 of 1

DATE / TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS	PEEL VALUES LBS/IN			TENSILE VALUE		LAB PASS / FAIL PEEL / TENSILE	
					INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	LBS / IN	PASS / FAIL		
9 10 20 1 6	1	1 / 2	3096	A.R.	1	146	150	P	260	P	/
					2	151	150	P	258	P	
					3	148	148				
					4						
					5						
9 10 20 1 6	2	11 / 91	3096	A.R.	1	150	151	P	259	P	/
					2	149	149	P	260	P	
					3	150	149	P			
					4						
					5						
9 10 20 1 6	3	10 / 02	3096	A.R.	1	148	145	P	255	P	/
					2	150	148	P	252	P	
					3	150	150	P			
					4						
					5						
9 10 20 1 6	4	12 / 02	3096	A.R.	1	146	150	P	255	P	/
					2	148	147	P	258	P	
					3	149	148	P			
					4						
					5						
9 10 20 1 6	5	22 / 33	3096	A.R.	1	144	148	P	258	P	/
					2	146	149	P	260	P	
					3	147	146	P			
					4						
					5						
9 10 20 1 6	6	11 / 40	3096	A.R.	1	143	146	P	252	P	/
					2	147	145	P	256	P	
					3	150	142	P			
					4						
					5						

DESTRUCT. : TEST LOG

PROJECT NAME: Greens Creek Mine Tailing Expansion

DATE: 9 10 2005

NWLG PROJECT # ND0049

SHEET 2 of 2

NWLG SUPERINTENDANT: Alex Rios

MATERIAL DESCRIPTION: 30 mil Hape Texture

DATE / TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS	PEEL VALUES		LBS/IN	PASS / FAIL	TENSILE VALUE		LAB PASS / FAIL PEEL / TENSILE
					INSIDE TRACK	OUTSIDE TRACK			LBS / IN	PASS / FAIL	
9 0205	7	54/55	3096	AR	1	143	145	P	259	P	/
					2	145	143	P	249	P	
					3	144	144	P			
					4						
					5						
/ /					1						/
					2						
					3						
					4						
					5						
/ /					1						/
					2						
					3						
					4						
					5						
/ /					1						/
					2						
					3						
					4						
					5						
/ /					1						/
					2						
					3						
					4						
					5						

Northwest Linii Repair Report

Green Creek Mine Tailings Expansion

Project Name:

NWL Project #:

NWL Superintendent:

Material Description:

DATE: 9/10/10

SHEET 1 of 2

Repair Date/Time	Repair ID # Locate ID # on as built	Panel/Seam #	Extruder #	Operator	TYPE OF REPAIR/DETAILS/LOCATION (i.e., DT Patch, Rock Hole, Burn Out, Failed Seam, Etc.)	Repair VBOX Date	Repair Passed VBOX
9/10/10	1	P-6, 7, 8	305	M.C.	T. Bead. 30' from N.E. Berm	9.02.05	P
9/10/10	2	P-5, 6, 8	305	M.C.	T. Bead. 55' from N.E. Berm		
9/10/10	3	P-5, 8, 15	305	M.C.	T. Bead. 90' from E.S. Corner Berm		
9/10/10	4	P-10, 11, 12	305	M.C.	T. Bead. E. Berm		
9/10/10	5	P-10, 13, 14	305	M.C.	T. Bead. 30' from S. Berm		
9/10/10	6	P-10, 13, 14	305	M.C.	T. Bead. 40' from S. Berm		
9/10/10	7	P-10, 14, 15	305	M.C.	T. Bead. 40' from S. Berm		
9/10/10	8	P-10, 9, 15	305	M.C.	T. Bead. 90' from E. Berm		
9/10/10	9	P-8, 9, 15	305	M.C.	T. Bead. 45' from E. Berm		
9/10/10	10	P-24, 28, 30	305	M.C.	T. Bead. 20' from W. Berm		
9/10/10	11	P-27, 28, 30	305	M.C.	T. Bead. 50' from S. Berm		
9/10/10	12	P-26, 27, 30	305	M.C.	T. Bead. 50' from S. Berm		
9/10/10	13	P-26, 30, 31	305	M.C.	DT Patch over T. Int. 65' from W. Berm		
9/10/10	14	P-25, 26, 31	305	M.C.	DT Patch over T. Int. 50' from E. Berm		
9/10/10	15	P-31	305	M.C.	DT Patch over T. Int. 40' from E. Berm		
9/10/10	16	P-31, 32, 25	305	M.C.	DT Patch over T. Int. 30' from W. Berm	9.02.05	P

Northwest Linir Repair Report

Project Name: Wage Road 4000' Tunnel
 NWL Project #: 10000
 NWL Superintendent: Bob Bies
 Material Description: 80 mil HDPE Texture
 DATE: 9 10 21 05
 SHEET 3 of 4

Repair Date/Time	Repair ID # Locate ID # on as built	Panel/Seam #	Extruder #	Operator	TYPE OF REPAIR/DETAILS/LOCATION (i.e., DT Patch, Rock Hole, Burn Out, Failed Seam, Etc.)	Repair VBOX Date	Repair Passed VBOX
9 10 21 05	33	0-1, 2, 17	305	NLC	T. Bead 75' from N.E. Corner	9-02-05	P
9 10 21 05	34	0-58, 1, 17, 18	305	NLC	X. Bead 75' from N.E. Corner		
9 10 21 05	35	0-57, 58, 19	305	NLC	T. Bead 75' from N.E. Corner		
9 10 21 05	36	0-18, 19, 57	305	NLC	T. Bead 75' from N.E. Corner		
9 10 21 05	37	0-56, 57, 19	305	NLC	T. Bead 80' from N.E. Corner		
9 10 21 05	38	0-19, 20, 25, 56	305	NLC	1 X 2' patch over X joint 75' from N.E. Corner		
9 10 21 05	39	0-54, 55, 20	305	NLC	T. Bead 75' from N.E. Corner		
9 10 21 05	40	0-20, 21, 57	305	NLC	T. Bead 75' from N.E. Corner		
9 10 21 05	41	0-53, 54, 21	305	NLC	T. Bead 75' from N.E. Corner		
9 10 21 05	42	0-53, 21, 22	305	NLC	T. Bead 75' from N.E. Corner		
9 10 21 05	43	0-52, 53, 22	305	NLC	2 X 6' patch over T. joint 80' from N.E. Corner		
9 10 21 05	44	0-52, 41, 22, 23	305	NLC	X. Bead 75' from N.E. Corner		
9 10 21 05	45	0-51, 22, 41	305	NLC	T. Bead 75' from N.E. Corner		
9 10 21 05	46	0-50, 51, 41, 42	305	NLC	X. Bead 75' from N.E. Corner		
9 10 21 05	47	0-49, 50, 42, 43	305	NLC	X. Bead 80' from N.E. Corner		
9 10 21 05	48	0-45, 44, 49	305	NLC	T. Bead 60' from N.E. Corner	9-02-05	P

POLY-FLEX, INC.

2000 W. Marshall Drive Grand Prairie, Texas 75061 USA

888-765-9359 972-337-7113 FAX 972-337-7233

CERTIFICATION DOCUMENTS

To: Northwest Linings
21000 77th Avenue South
Kent, WA. 98032

Date: 8/11/2005
Poly-Flex Proj #: 250272
Customer PO: 2023
Project Name: Renton Closure
Order #: 670073
670304

Attn: Julie McKinney

Number of pages including cover: 15

Departure Date: 4/15/2005
Destination: Kent, WA
Carrier:

Trip No: 219793
219794
Freight: PPD

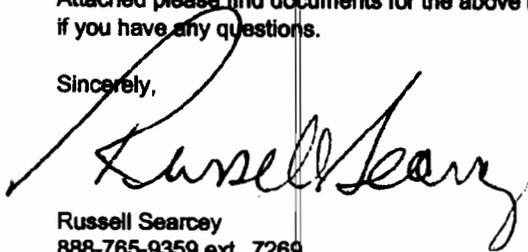
Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet: 2
Roll Certification: 12
Resin Certification:
Other:

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,



Russell Searcey
888-765-9359 ext. 7269

CERTIFICATION SHEET

POLY-FLEX, INC.

2000 W. Marshall Drive
Grand Prairie, Texas 75051

DATE: April 18, 2005

PROJECT NO: 250272

ORDER NO: 670073

TRIP NO: 219793

CERTIFIED BY: 

TEST DESCRIPTION						TRANSMISSIVITY		PEEL	
ASTM METHOD						D4716		D7005	
(modifications)								TOP	
UNITS								ppi	
SPECIFICATION								1.0	
								1.0	
								1.0	
								1.0	
COMPOSITE ROLL NUMBER		GEO-NET ROLL NUMBER	GEOTEXTILE TOP	GEOTEXTILE BOTTOM					
C1006-2-05	1-200	GNC-200-05	5249492	5225562			0.50	2.6	6.8
C1006-2-05	2-200	GNC-200-05	5249483	5225562					
C1006-2-05	3-200	GNC-200-05	5249483	5225563					
C1006-2-05	4-200	GNC-200-05	5249483	5225558					
C1006-2-05	5-200	GNC-200-05	5249483	5223628					
C1006-2-05	6-200	GNC-200-05	5249536	5223628					
C1006-2-05	7-200	GNC-200-05	5249536	5223659					
C1006-2-05	8-200	GNC-200-05	5249536	5245557					
C1006-2-05	9-200	GNC-200-05	5249498	5223631					
C1006-2-05	10-200	GNC-200-05	5249498	5223636			0.33	4.6	3.5
C1006-2-05	11-200	GNC-200-05	5249498	5223624					
C1006-2-05	12-200	GNC-200-05	5249498	5223624					
C1006-2-05	13-200	GNC-200-05	5249564	5223638					
C1006-2-05	14-200	GNC-200-05	5249564	5223660					
C1006-2-05	15-200	GNC-200-05	5249564	5223640					
C1006-2-05	16-200	GNC-200-05	5249564	5223640					
C1006-2-05	17-200	GNC-200-05	5249480	5223647					

*Transmissivity test is performed at gradient of 1.0, normal pressure of 10,000 pef, between metal plates for a seal time of 15 minutes.

CERTIFICATION SHEET

POLY-FLEX, INC.

2000 W. Marshall Drive
Grand Prairie, Texas 75051

DATE: April 18, 2005

PROJECT NO: 250272

ORDER NO: 670073

TRIP NO: 219793

CERTIFIED BY: 

TEST DESCRIPTION	Product	Unit Weight	Grab Tensile	Puncture	AOS	Flow Rate
ASTM METHOD (modifications)		D5261	D4632	D4833	D4751	D4491
UNITS		oz/yd ²	lb	lb		gal/min/ft ²
SPECIFICATION		10	265	165	100 sieve	75
Textile Roll Number						
SI10 5223624	GTS-10-0300	11.80	320	187	100	85
SI10 5223625	GTS-10-0300	11.80	320	187	100	85
SI10 5223626	GTS-10-0300	11.80	320	187	100	85
SI10 5223628	GTS-10-0300	11.80	320	187	100	85
SI10 5223629	GTS-10-0300	11.80	320	187	100	85
SI10 5223631	GTS-10-0300	11.80	320	187	100	85
SI10 5223633	GTS-10-0300	11.80	320	187	100	85
SI10 5223636	GTS-10-0300	11.80	320	187	100	85
SI10 5223638	GTS-10-0300	11.20	314	204	100	85
SI10 5223640	GTS-10-0300	11.20	314	204	100	85
SI10 5223647	GTS-10-0300	11.20	314	204	100	85
SI10 5223656	GTS-10-0300	11.20	314	204	100	85
SI10 5223659	GTS-10-0300	11.20	314	204	100	85
SI10 5223660	GTS-10-0300	10.90	308	198	100	85
SI10 5225558	GTS-10-0300	11.00	323	184	100	85
SI10 5225560	GTS-10-0300	11.00	323	184	100	85
SI10 5225562	GTS-10-0300	13.20	363	199	100	85

Poly-Flex

Material Shipment Roll List

Tractor # _____	Trailer # _____	Date: <u>15-Apr-05</u>	TRIP	<u>219793</u>
Drop # <u>1</u>	Drop # _____	Drop # _____	Drop # _____	
Poly-Flex # <u>250272(670073)</u>	Poly-Flex # _____	Poly-Flex # _____	Poly-Flex # _____	
Customer: <u>Northwest linings</u>	Customer: _____	Customer: _____	Customer: _____	
Destination: <u>Kent, wa</u>	Destination: _____	Destination: _____	Destination: _____	
Carrier: <u>American</u>	Carrier: _____	Carrier: _____	Carrier: _____	

	Net	Roll Number	Weight	Roll Description
1	200 MIL	C1006-2-05- 0001- 200	950	13.5' X 200' X 10/06oz Dbl Cust
2	200 MIL	C1006-2-05- 0002- 200	960	13.5' X 200' X 10/06oz Dbl Cust
3	200 MIL	C1006-2-05- 0003- 200	970	13.5' X 200' X 10/06oz Dbl Cust
4	200 MIL	C1006-2-05- 0004- 200	982	13.5' X 200' X 10/06oz Dbl Cust
5	200 MIL	C1006-2-05- 0005- 200	976	13.5' X 200' X 10/06oz Dbl Cust
6	200 MIL	C1006-2-05- 0006- 200	970	13.5' X 200' X 10/06oz Dbl Cust
7	200 MIL	C1006-2-05- 0007- 200	1,018	13.5' X 200' X 10/06oz Dbl Cust
8	200 MIL	C1006-2-05- 0008- 200	1,016	13.5' X 200' X 10/06oz Dbl Cust
9	200 MIL	C1006-2-05- 0009- 200	989	13.5' X 200' X 10/06oz Dbl Cust
10	200 MIL	C1006-2-05- 0010- 200	989	13.5' X 200' X 10/06oz Dbl Cust
11	200 MIL	C1006-2-05- 0011- 200	970	13.5' X 200' X 10/06oz Dbl Cust
12	200 MIL	C1006-2-05- 0012- 200	990	13.5' X 200' X 10/06oz Dbl Cust
13	200 MIL	C1006-2-05- 0013- 200	958	13.5' X 200' X 10/06oz Dbl Cust
14	200 MIL	C1006-2-05- 0014- 200	1,000	13.5' X 200' X 10/06oz Dbl Cust
15	200 MIL	C1006-2-05- 0015- 200	995	13.5' X 200' X 10/06oz Dbl Cust
16	200 MIL	C1006-2-05- 0016- 200	990	13.5' X 200' X 10/06oz Dbl Cust
17	200 MIL	C1006-2-05- 0017- 200	910	13.5' X 200' X 10/06oz Dbl Cust
18	200 MIL	C1006-2-05- 0018- 200	979	13.5' X 200' X 10/06oz Dbl Cust
19	200 MIL	C1006-2-05- 0019- 200	1,000	13.5' X 200' X 10/06oz Dbl Cust
20	200 MIL	C1006-2-05- 0021- 200	925	13.5' X 200' X 10/06oz Dbl Cust
21	200 MIL	C1006-2-05- 0023- 200	940	13.5' X 200' X 10/06oz Dbl Cust
22	200 MIL	C1006-2-05- 0024- 200	920	13.5' X 200' X 10/06oz Dbl Cust
23	200 MIL	C1006-2-05- 0026- 200	930	13.5' X 200' X 10/06oz Dbl Cust
24	200 MIL	C1006-2-05- 0029- 200	930	13.5' X 200' X 10/06oz Dbl Cust
25				
26				
27			23,257	
28				

I certify that all loading requirements and roll conditions were inspected and approved.

C.E.M.
Truck Loader

CERTIFICATION SHEET

POLY-FLEX, INC.

2000 W. Marshall Drive
Grand Prairie, Texas 75051

DATE: April 18, 2005

PROJECT NO: 250272

ORDER NO: 670304

TRIP NO: 219794

CERTIFIED BY: 

TEST DESCRIPTION						*TRANSMISSIVITY		PEEL	
ASTM METHOD (modifications)						D4716		D7005	
UNITS									
SPECIFICATION									
COMPOSITE ROLL NUMBER	GEO-NET ROLL NUMBER	GEOTEXTILE TOP	GEOTEXTILE BOTTOM					TOP	BOTTOM
C1006-2-05 20-200	GNC-200-05 28	5249480	5225560					ppi	ppi
C1006-2-05 22-200	GNC-200-05 33	5249489	5223629					1.0	1.0
C1006-2-05 25-200	GNC-200-05 25	5249487	5223652						
C1006-2-05 27-200	GNC-200-05 26	5249534	5223649						
C1006-2-05 28-200	GNC-200-05 27	5249534	5223626						
C1006-2-05 30-200	GNC-200-05 27	5249534	5223637			0.38		6.1	3.1
C1006-2-05 31-200	GNC-200-05 22	5249491	5223635						
C1006-2-05 32-200	GNC-200-05 22	5249491	5223630						
C1006-2-05 33-200	GNC-200-05 23	5249491	5223630						
C1006-2-05 34-200	GNC-200-05 23	5249491	5223655						
C1006-2-05 35-200	GNC-200-05 23	5249490	5223632						
C1006-2-05 36-200	GNC-200-05 24	5249490	5223634						
C1006-2-05 37-200	GNC-200-05 24	5249490	5223634						
C1006-2-05 38-200	GNC-200-05 24	5249490	5223646						
C1006-2-05 39-200	GNC-200-05 698	5249490	5223639						
C1006-2-05 40-200	GNC-200-05 698	5249539	5223639			0.47		6.0	2.9
C1006-2-05 41-200	GNC-200-05 698	5249539	5225561						

*Transmissivity test is performed at gradient of 1.0, normal pressure of 10,000 perf, between metal plates for a seat time of 15 minutes.

CERTIFICATION SHEET

POLY-FLEX, INC.

2000 W. Marshall Drive
Grand Prairie, Texas 75051

DATE: April 18, 2005

PROJECT NO: 250272

ORDER NO: 670304

TRIP NO: 219794

CERTIFIED BY: 

TEST DESCRIPTION	THICKNESS	MASS/AREA	CARBON-BLACK	ULTIMATE TENSILE STRENGTH	*TRANSMISSIVITY	DENSITY
ASTM METHOD	D5199	D5261	D1603	D5035	D4716	D1505
(modifications)	avg		min			
UNITS	mils	lbs / sq. ft.	%	ppi	x10 ⁻³ sq. m / s	gm/cc
SPECIFICATION	200	0.162	2	45	1	0.940
ROLL NUMBER						
GNC-200-05 19-620	200	0.187	2.3	57		0.949
GNC-200-05 22-620	200	0.187	2.5	61	1.5	0.949
GNC-200-05 23-620	200	0.187	2.5	61		0.949
GNC-200-05 24-620	200	0.187	2.5	61		0.949
GNC-200-05 25-620	200	0.187	2.5	61		0.949
GNC-200-05 26-620	200	0.187	2.5	61		0.949
GNC-200-05 27-620	200	0.187	2.5	61		0.949
GNC-200-05 28-620	200	0.187	2.5	61		0.949
GNC-200-05 33-620	200	0.186	2.4	57		0.947
GNC-200-05 352-520	200	0.178	2.9	61		0.950
GNC-200-05 355-520	200	0.178	2.9	61		0.950
GNC-200-05 698-620	200	0.173	2.6	56		0.954
GN-200-05 271-350	200	0.182	2.6	57		0.953
GN-200-05 272-350	200	0.184	2.6	57		0.953
GN-200-05 273-350	200	0.184	2.6	57		0.953

*Transmissivity test is performed at gradient of 1.0, normal pressure of 10,000 psf, between metal plates for a seat time of 15 minutes.

CERTIFICATION SHEET

POLY-FLEX, INC.

2000 W. Marshall Drive
Grand Prairie, Texas 75051

DATE: April 18, 2005

PROJECT NO: 250272

ORDER NO: 670304

TRIP NO: 219794

CERTIFIED BY: 

TEST DESCRIPTION	Product	Unit Weight	Grab Tensile	Puncture	AOS	Flow Rate
ASTM METHOD		D5261	D4632	D4833	D4751	D4491
(modifications)						
UNITS		oz/yd ²	lb	lb		gal/min/ft ²
SPECIFICATION		10	265	165	100 sieve	75
Textile Roll Number						
SI10 5223626	GTS-10-0300	11.80	320	187	100	85
SI10 5223627	GTS-10-0300	11.80	320	187	100	85
SI10 5223629	GTS-10-0300	11.80	320	187	100	85
SI10 5223630	GTS-10-0300	11.80	320	187	100	85
SI10 5223632	GTS-10-0300	11.80	320	187	100	85
SI10 5223634	GTS-10-0300	11.80	320	187	100	85
SI10 5223635	GTS-10-0300	11.80	320	187	100	85
SI10 5223637	GTS-10-0300	11.80	320	187	100	85
SI10 5223639	GTS-10-0300	11.80	320	187	100	85
SI10 5223646	GTS-10-0300	11.20	314	204	100	85
SI10 5223649	GTS-10-0300	11.20	314	204	100	85
SI10 5223652	GTS-10-0300	11.20	314	204	100	85
SI10 5223655	GTS-10-0300	11.20	314	204	100	85
SI10 5225560	GTS-10-0300	11.30	345	212	100	85
SI10 5225561	GTS-10-0300	11.30	345	212	100	85

Poly-Flex

Material Shipment Roll List

Tractor # _____	Trailer # _____	Date: <u>15-Apr-05</u>	TRIP <u>219794</u>
Drop # <u>1</u>	Drop # _____	Drop # _____	Drop # _____
Poly-Flex # <u>250272(670304)</u>	Poly-Flex # _____	Poly-Flex # _____	Poly-Flex # _____
Customer: <u>Northwest Linnings</u>	Customer: _____	Customer: _____	Customer: _____
Destination: <u>Kent, wa</u>	Destination: _____	Destination: _____	Destination: _____
Carrier: <u>American</u>	Carrier: _____	Carrier: _____	Carrier: _____

	Net	Roll Number	Weight	Roll Description
1	200 MIL	C1006-2-05- 0020- 200	985	13.5' X 200' X 10/06oz Dbl Cust
2	200 MIL	C1006-2-05- 0022- 200	975	13.5' X 200' X 10/06oz Dbl Cust
3	200 MIL	C1006-2-05- 0025- 200	940	13.5' X 200' X 10/06oz Dbl Cust
4	200 MIL	C1006-2-05- 0027- 200	930	13.5' X 200' X 10/06oz Dbl Cust
5	200 MIL	C1006-2-05- 0028- 200	925	13.5' X 200' X 10/06oz Dbl Cust
6	200 MIL	C1006-2-05- 0030- 200	925	13.5' X 200' X 10/06oz Dbl Cust
7	200 MIL	C1006-2-05- 0031- 200	920	13.5' X 200' X 10/06oz Dbl Cust
8	200 MIL	C1006-2-05- 0032- 200	920	13.5' X 200' X 10/06oz Dbl Cust
9	200 MIL	C1006-2-05- 0033- 200	950	13.5' X 200' X 10/06oz Dbl Cust
10	200 MIL	C1006-2-05- 0034- 200	925	13.5' X 200' X 10/06oz Dbl Cust
11	200 MIL	C1006-2-05- 0035- 200	915	13.5' X 200' X 10/06oz Dbl Cust
12	200 MIL	C1006-2-05- 0036- 200	910	13.5' X 200' X 10/06oz Dbl Cust
13	200 MIL	C1006-2-05- 0037- 200	925	13.5' X 200' X 10/06oz Dbl Cust
14	200 MIL	C1006-2-05- 0038- 200	930	13.5' X 200' X 10/06oz Dbl Cust
15	200 MIL	C1006-2-05- 0039- 200	940	13.5' X 200' X 10/06oz Dbl Cust
16	200 MIL	C1006-2-05- 0040- 200	925	13.5' X 200' X 10/06oz Dbl Cust
17	200 MIL	C1006-2-05- 0041- 200	910	13.5' X 200' X 10/06oz Dbl Cust
18	200 MIL	C1006-2-05- 0042- 200	935	13.5' X 200' X 10/06oz Dbl Cust
19	200 MIL	C1006-2-05- 0043- 200	920	13.5' X 200' X 10/06oz Dbl Cust
20	200 MIL	C2-6-2-05- 0315- 250	1,030	13.5' X 250' X 06oz Dbl
21	200 MIL	C2-6-2-05- 0319- 250	1,030	13.5' X 250' X 06oz Dbl
22	200 MIL	GN-200-05- 0271- 350	915	14' X 350' X Net
23	200 MIL	GN-200-05- 0272- 350	920	14' X 350' X Net
24	200 MIL	GN-200-05- 0273- 350	910	14' X 350' X Net
25				
26				
27			22,510	
28				

I certify that all loading requirements and roll conditions were inspected and approved.

C.E.M.
Truck Loader

APPENDIX V

Specifications

KENNECOTT GREENS CREEK MINING COMPANY (KGCMC)
Stage 2 Construction - 2005
Section 4.0 - Technical Section
Contract No. P05001-CW1 Civil Works

TECHNICAL SPECIFICATIONS

for

2005 Stage 2 Construction

Prepared by:

Klohn Crippen Consultants Ltd.
Suite 500 – 2955 Virtual Way
Vancouver, BC Canada V6M 4X6

Approved for Construction, 13 April 2005

Len Murray, P.E. (AK)

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SECTION 4.1 – GENERAL

1. BACKGROUND

1. Greens Creek Mine is jointly owned by Kennecott Minerals and Hecla Mining Company. The mine is operated by Kennecott Greens Creek Mining Company (Owner). The mine is located within Admiralty Island National Monument about 18 miles southwest of Juneau, Alaska.
2. Tailings generated at the mine are dewatered. A portion of the dewatered tailings are used for underground backfill and the rest are placed on surface in a “dry” tailings disposal facility (TDF) near the port facilities at Hawk Inlet.
3. An expansion of the TDF is required to accommodate the continued dry tailings placement. The planned expansion work incorporates five separate areas around the perimeter of the TDF, which will be commissioned over a period of several years starting in 2004. The work planned for 2005 includes construction of the Southeast Expansion – Area 2 and the Pond 7 Storm Water Facility.
4. The Southeast Expansion – Area 2 will include the demolition and salvage/disposal of two structures (Tank 6 and Wheel Wash) and associated surface equipment, underground utilities, placement of a geofabric liner on prepared grade (with associated granular bedding and service layers), connection of the new liner to existing liner(s), installation of drainage collection and monitoring systems, and the construction of surface water and groundwater management structures.
5. The Pond 7 Storm Water Facility will include excavation in soil and rock, processing of rock fill (blasted by others), construction of a compacted rock fill berm, placement of a geofabric liner on prepared grade (with associated granular bedding and service layers), construction of an inlet structure, a pump housing, an emergency spillway and installation of water routing pipes, monitoring systems and associated utilities. Some blasting or rock breaking may be required, as well as oversize boulder haulage.
6. Other work related to the TDF expansion will be done concurrently, including construction of a temporary drainage ditch from Pond 6 to Pond 7 and utility relocations.
7. The Owner will require the Contractor to use established on-site work permitting and isolation procedures for the Work.

2. SCOPE OF WORK

1. Mobilization and Demobilization.
2. Develop the sand borrow site, including: clear, grub and strip the borrow area; deck salvageable timber; haul overburden to Pit 7; provide water and sediment control; quarry, screen and haul (about 3 miles) bedding sand from the 1.5 Mile A-Road Borrow and stockpile the screened product as directed.
3. Re-route and commission all required operating utilities (water lines), including trenching, bedding, pipe placement, HDPE pipe welding and trench-backfilling, as directed. Decommission out-of-service

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utility stubs or ends as directed. The work shall include a significant amount of utility and equipment relocation and decommissioning and shall be done in consultation with the Owner and/or Sub-contractors. The location and elevation of all re-routed utilities must be surveyed by the Contractor.

4. Contractor will provide trenching and install pipe chases for electrical cable routes. Electrical cables and communication lines will be installed by Others. Upon completion of electrical cable pulls, some minor contouring completion will be required at the utility outlets.
5. Demolish (dismantle and salvage re-usable materials where feasible) the Old Truck Wash Facility and Tank 6, including electrical and pump equipment, doors, reinforced concrete foundations and foundation grout. All demolished or salvaged equipment or parts (other than soil, rock or concrete) must be decontaminated (spray-washed) before removal from the Site. Salvage and/or dispose of materials to designated sites, within 1.5 miles distance. Decommission out-of-service utility stubs or ends as directed.
6. Crush blasted or fragmented rock in the Pond 7 quarry to the required size(s) and stockpile within 1 mile from site, as directed. Fragment bedrock and oversize rock as directed to a size that can be crushed or hauled.
7. Receive, organize and provide storage for all pipe materials and geosynthetic products. Limited products supplies will dictate efficient material usage by the Contractor.
8. The scope of work for the Pond 7 Storm Water Facility is as follows:
 - a) Prepare the pond basin and foundation.
 - i. As required, clear, grub, strip and remove oversize, organics and other deleterious materials identified by the Owner from the Work footprint. Organic materials and peat shall each be segregated during excavation for separate removal and disposal.
 - ii. Blast and excavate high spots in the quarry bottom remaining from the drill/blast operations. Install foundation drains as directed. Excavate the emergency spillway and inlet structure as directed (will require drilling and blasting).
 - iii. Construct the compacted rock fill berms as required to form the pond basin. Pour a concrete footing (mud slab), assemble and install the embedded pump caisson and inlet pipe in the berm.
 - iv. Place compacted structural rock fill in the quarry bottom and slopes as required to form the pond basin.
 - v. Contour the basin invert to slope uniformly to the southwest.
 - vi. Place a layer of bedding material (and graded soil filters where required) over the prepared basin grade for the liner installation.
 - vii. Assist with installation of the Owner-supplied leakage detection system and instrumentation within or below the bedding layer, as directed. Allow up to 2 full days to complete.

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- b) Prepare the bedrock foundation for the future outfall tank and water treatment plant. Form and pour reinforced concrete slab-on-grade foundations for Owner-provided Tank 7 and pH Tank. Install Tank 7 and the pH Tank and connect them to associated piping.
 - c) Construct forms and pour concrete for the pond emergency spillway. Install cement-grouted rock dowels, each not longer than 5 lineal feet, as directed. The Owner will supply cement for grout and concrete at the work site.
 - d) Install the pond basin liner, including:
 - i. Install geotextile or geocomposite drain over the bedding layer, as required.
 - ii. Install HDPE geomembrane over the geotextile or geocomposite.
 - iii. Connect the liner to the pond inlet structure, spillway and pump inlet.
 - iv. Construct an access ramp of granular fill down onto the pond invert, and place a service layer of sand and 6-inch minus rockfill over the geomembrane. Low ground pressure vehicles will be required over all lined areas.
 - e) Build and grade road access, install culverts and drainage ditches and finalize road grades after construction is completed. Install safety guards along the access roads.
 - f) Install gabion baskets, armoring and liner protection in the pond inlet structure. Install the pond water reclaim intake and all other associated hardware for the water reclaim system.
 - g) Install pumps, pipes, casings, utilities and all other appurtenances as required to operate the pond.
 - h) Excavate the drainage ditch from Pond 6 to Pond 7 and connect it to the Pond 7 inlet structure. Place armor in the ditch as directed.
 - i) Place specified fill in the spillway channel (could require geofabric installation) as directed.
9. The scope of work for the Southeast Expansion – Area 2 is as follows:
- a) Excavate and backfill test pits as directed to investigate foundation conditions in conjunction with the Geotechnical Engineer. Allow two full days for foundation investigations.
 - b) Prepare foundation including the following:
 - i. As required: clear, grub, and strip; fragment and remove oversize boulders and bedrock; and, excavate organic materials, mineral soil, tailings and other deleterious materials identified by the Owner from the Work footprint. All materials in this area will be considered contaminated.
 - ii. Remove settling pond and salvage road materials for re-use; provide alternative drainage for ditch water flowing into the Site or pumping systems as required to keep all work areas from flooding.

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- iii. Relocate and/or decommission service lines as directed (generally water), including trench excavation, decontamination, bedding of utilities, backfilling and survey of installations.
 - iv. Install foundation drainage including pipe collection system, including tie-in to existing foundation drains. Repair and rehabilitate existing drains as required.
 - v. Contour all soil, bedrock and fill surfaces in the area to achieve specified grades.
 - vi. Place a layer of bedding sand over the prepared grade for the liner installation.
 - vii. Install new or extend existing instrumentation and leads in conduits within or over the bedding layer and service layer, and connect to a monitoring system, all as directed. Allow two days for this item.
- c) Install new liner including the following:
- i. Install geotextile over the bedding layer.
 - ii. Install HDPE geomembrane over the geotextile.
 - iii. Install geocomposite drain over the HDPE geomembrane.
 - iv. Connect new liner system to old liner system on the northeast side of the expansion area.
 - v. Construct seepage collection drains and connect to the geocomposite drain layer of the new liner.
 - vi. Connect the new seepage collection drains to the existing TDF seepage collection system or other specified collection points.
 - vii. Place a service layer of sand/tailings over the geocomposite drain.
- d) Connect the new seepage collection system to the existing drainage system.
- e) Extend the new lined perimeter ditch along the margin of SE Area 2.
- f) Place "guard rail" boulders or other safety berm along the shoulder of the access road, as directed. Boulders shall be obtained from stockpiles within the tailings area, as directed by Owner.
10. Re-establish haulage and maintenance access along the south perimeter of the tailings area, or any other areas disturbed during the Work, as directed.
11. The remaining Pond 7 quarry development will be carried out in early 2005 under contract by Others, and will provide some of the fill materials for the 2005 construction work.

3. LIST OF TECHNICAL SPECIFICATIONS AND CONSTRUCTION DRAWINGS FOR 2005 WORK

3.1 TECHNICAL SPECIFICATIONS

Section 4.1	General
Section 4.2	Measurement and Payment
Section 4.3	Mobilization and Demobilization
Section 4.4	Demolition
Section 4.5	Clearing and Excavation
Section 4.6	Foundation Preparation and Fill
Section 4.7	Foundation Liner
Section 4.8	Drainage System

3.2 DRAWINGS

D-39001	Location Plan
D-39002	General Arrangement
D-39010	Southeast 2 Existing Conditions
D-39011	Southeast 2 Final Grading - Plan
D-39012	Southeast 2 Sections and Details Sheet 1 of 2
D-39013	Southeast 2 Sections and Details Sheet 2 of 2
D-39020	Pond 7 Existing Condition - Plan
D-39021	Pond 7 Excavation Section Lines 1, 2 and 3
D-39022	Pond 7 Excavation Section Lines 4 and 5
D-39023	Pond 7 Excavation Section Lines 6, 7 and 8
D-39024	Pond 7 Excavation Section Lines 9 and 10
D-39025	Pond 7 Grading Surface – Plan and Berm Layout
D-39026	Pond 7 Section and Details
D-39027	Pond 7 Spillway Channel Plan
D-39028	Pond 7 Spillway Sections A, D, E and Detail
D-39029	Pond 7 Spillway Sections B, C and Details
D-39031	Utilities - Step 1 (Pre-Construction)
D-39032	Utilities - Step 2 (Excavation)
D-39033	Utilities - Step 3 (Final Arrangement)
GCM0203-1	Pond 7 Inlet Gabion Structure (by EDE)
350-19-220	Tailing Area Power Distrib. + Control Electrical Details (This Drawing shows transformer pad details)

4. DEFINITIONS AND INTERPRETATIONS

The following definitions and interpretations shall apply to the Technical Specifications:

1. The Project means the total construction contemplated of which the Work may be the whole or part.

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2. The Work means the total construction and related services required by the Contract Documents.
3. Owner means Kennecott Greens Creek Mining Company (KGCMC) and any person duly authorized to act on its behalf.
4. Words importing the singular shall include the plural and vice versa and words importing the masculine gender shall include the feminine and words importing persons, shall include bodies corporate.
5. Plant means, as distinguished from work, anything and everything, except persons, used by the Contractor in the performance of the Work.
6. Site means the place where the work is being performed and the immediate vicinity thereof.
7. Where the words shown, indicated, detailed, specified, or words of a similar import are used, such words shall refer to the Specifications and/or Drawings unless expressly stated otherwise.
8. Drawing, means all drawings, plans, sketches and maps issued with the Specifications or subsequently as provided for in the Contract and includes any drawings submitted by the Contractor if signed as approved by the Owner.
9. Where the words directed, permitted, approved, accepted, required, satisfactory, rejected, or words of similar import are used such words shall refer to the direction, permission, approval, acceptance, requirements, satisfaction or rejection in writing by the Owner unless expressly stated otherwise.
10. Environmental Management System (EMS) means the Owner's ISO 14001 environmental standards and procedures for management, reporting and compliance with applicable environmental regulations.

5. CONSTRUCTION MANAGEMENT

1. Construction management functions will be established and directed by the Owner through the Manager. Without limiting the role of the Manager described elsewhere in the Contract Documents, the Manager will work with the Contractor to:
 - a) Achieve the required results for the Owner.
 - b) Assess that the constructed facilities meet the design criteria.
 - c) Periodically review progress against the approved construction schedule.
 - d) Monitor project costs against established budgets.
 - e) Observe and collect all reporting requirements from Contractor operations for compliance with the Owner's safety, production, and environmental programs.
 - f) Adhere to the approved construction schedule.

2. The Contractor shall attend Project Coordination and Safety meetings with the Owner and other Contractors weekly, or more frequently if required.

6. SITE POLICIES

Without limiting Contractor responsibilities described elsewhere in the Contract Documents, the Contractor agrees to comply with and pay all costs associated with the following Environmental Management System (EMS) requirements and Site procedures (also see Sections 2 and 3 of the Contract Documents):

1. The Contractor shall have an established Safety, Health, and Environment Action Plan (SHEAP).
2. Any spills are to be dealt with immediately utilizing appropriate containment and clean up procedures. Any release to the environment is to be reported immediately to the Owner. The Owner may be required to make notification to Government environmental authorities. No mixing of spilled materials is permitted. The Contractor's shop area will be maintained and kept free of waste build up and have covered waste barrels to limit accumulating rain water in any containers.
3. Any equipment coming into contact with tailings must be washed prior to exiting the impoundment area (particularly the tires, fenders and undercarriage). The Owner's truck wash may be used provided it does not interfere with mining operations. All wash effluent shall be contained and disposed of in an approved manner, in accordance with the EMS. The Contractor shall clean the Truck Wash floor and pads of excessive amounts of material build-up from his equipment.
4. The Contractor shall be responsible for implementing sediment control measures, to the satisfaction of the Owner. Run-off from upstream slopes and all areas in the Work is to be managed or collected for settling/screening-out of any solids before release of discharges from the Site. Discharges of any kind outside of the tailings area containment system will not be allowed under any circumstances.
5. Natural conditions such as extreme storm events should be anticipated and corrective measures taken to mitigate the effects on the Work area drainage systems. Additional monitoring for safety and the environment may be required. Loss of production time as a direct result of wind, precipitation, freezing, or other adverse weather conditions (as determined by the Owner) and the related costs are the Contractor's responsibility and deemed to be included in the unit prices for the Work.
6. The Owner will have a representative/designate on Site during the period of the project who will oversee environmental monitoring as required under the relevant permits and Project specific sediment control measures. The Owner will schedule any necessary sample collection and provide regular assessments of the performance of sediment control measures. The Contractor is responsible for compliance with all KGCMC standards and regulatory requirements.
7. The removal of trees is prohibited on the Project. No live or dead trees are to be removed outside of the Project boundaries without prior authorization from the Owner.
8. Drip pans shall be used whenever oil, diesel fuel, gasoline, hydraulic fluid and other such items may leak or spill, and are to be emptied on a regular basis into designated waste disposal containers only.
9. All oil or liquid fuel will be kept in tightly closed labeled containers designated for that use at all times to eliminate spillage. The Contractor is responsible for transporting fuel and oil from the Owner's

supply depot at Hawk Inlet to the Work area. All fuel and oil storage will have an impervious natural or man-made containment berm/sump to enable storage of 110% of the capacity of the containers stored within. Construction or purchase of such equipment will be the responsibility and expense of the Contractor.

10. The Owner will provide waste oil totes and several empty drums for oil filters, oily rags, etc. These are to be maintained and kept closed during the Project by the Contractor. At completion, or as required, the totes and drums will be removed from the Work site by the Owner for disposal. Different waste types (i.e., fuel, oil, glycol) must be stored in separate containers – mixing is not permitted.
11. The Contractor will provide equipment for and satisfactorily carry out the approved dust abatement program.
12. The Contractor's shop, lay-down and office areas shall be kept clean and tidy. On-going garbage generated by the Project is to be disposed of in the appropriate locations as directed by the Owner, including:
 - a) Clean non-hazardous debris and putrescible (food) garbage is to be disposed of daily in a location specified by the Owner;
 - b) Sanitary discharge shall not be allowed to flow onto the ground or into a fresh watercourse. Portable Toilets shall be supplied by the Owner. The Owner, as per the normal schedule presently being used on Site, will empty the unit(s).
13. All Work sites shall be kept clean and cleaned-up prior to completing the job. Normal cleanup will include:
 - a) Cleanup of all work areas, haulage routes, lay-down areas, etc.
 - b) Removal of all garbage, cans, drums, hose, pipe, used oil filters and other such items to approved locations.
 - c) Emptying, removal and cleanup of any contaminated run-off control systems and surrounding areas into approved disposal areas.
14. If extra precautions beyond those agreed upon, prior to the start of Work, are required to prevent environmental damage the actual and reasonable cost of providing such precautions will be at the Owner's expense.
15. In the case of an emergency condition, the Owner reserves the right to enter the Work area and perform the necessary cleanup at the Owner's expense. If the said emergency condition occurs as a result of the negligence or willful misconduct of the Contractor, the Contractor will bear the cost of the cleanup and all fines or penalties levied by Government agencies for the condition.
16. Construction vehicles shall not have priority status on the mine roads at any time, particularly during scheduled times for bus traffic, as per the Owner road rules policy. This will occur at the beginning and end of each daily Owner shift. The construction schedule shall not have priority over any Owner operation for site facilities such as haulage, port or water facilities. Further, the Contractor shall ensure

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sufficient time for loading and off-loading of equipment and supplies to absolutely ensure no departure delays of the barge or other transport vessels.

17. All safety policies of the Owner outlined elsewhere in the Contract Document shall be followed, including the use of personal protective equipment (steel toed boots/shoes, hard hats and safety glasses and others as required). The Contractor will receive training for KGCMC's "STOP" program to assess risks and avoid workplace injuries.
18. KGCMC is ISO 14001 certified and maintains high environmental and safety standards. The Contractor will receive KGCMC training on the Environmental Management System and site specific safety aspects at the Site. The Contractor is responsible to have all personnel trained in the environmental and safety standards before commencement of the Work.
19. From time to time the Work will require the coordination of activities between the Contractor and the Owner or Others. Notwithstanding any policies, contracts, agreements or the like, the Contractor shall cooperate fully with the Owner or Others, as directed by the Owner, to execute cooperative work in a timely manner and achieve the desired result for the Owner.

7. SUBMITTALS

Without in any way limiting submittal requirements contained elsewhere in the Contract Documents, the Contractor shall submit the following information for the Owner's approval. Work shall not start until applicable approvals are obtained in writing.

7.1 BEFORE WORK STARTUP

1. Construction Schedule showing the critical path per Article 3.14 of the Special Conditions. The Contractor should assume at least 5% weather delay downtime when planning and scheduling the work.
2. Certification of hazard communication training.
3. List of all employees proposed for the work, including name, age, and number of years working experience, social security number and position (title).
4. List of all plant, equipment, and materials proposed for the Work and requiring off-loading at Hawk Inlet, including size, weight, and axle loads for barge transport.
5. Copy of site specific safety plan, JSA's (Job Safety Analysis) and SHEAP.
6. Signed MSHA 5000-23 forms for all employees. Contractor must have an MSHA number.
7. Signed certification of substance testing.

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8. Documentation indicating that all construction equipment meets the MSHA minimum operating standards.
9. Contractor's predicted fuel and oil consumption requirements.
10. Survey methodology, equipment list, and qualifications of surveyor. Owner will confirm software compatibility with the Contractor to produce Owner formatted as-built drawings. Survey information will be electronically collected and backed up, to ensure efficiency, accuracy and compatibility with Owner's survey software.
11. A dust abatement plan for Owner approval.
12. The Owner will supply the Contractor with AutoCAD format electronic drawing files of the grading plan. The Contractor shall produce shop drawings that include layout points for use during construction. The construction layout produced by the Contractor shall conform to the final grading plan in the Drawings, except where prior written approval of any change is received from the Owner.
13. List of personnel or sub-contractors providing the HDPE liner installation services. The liner manufacturer must approve the personnel installing the liner to satisfy all manufacturer warranties.
14. Layout of access roads for construction of the Work.

7.2 DURING THE WORK

1. Copies of Daily Contractor Tool Box Safety meeting minutes and Daily Equipment Pre-shift cards.
2. Copies of employee's incident reports of injury or property damage. Notification to the Owner is required immediately following any incident, with a written incident report submitted to the Owner as soon as practical, but no later than the end of shift.
3. Updates of medical reports for incident status as received.
4. Written property damage reports (by end of shift) with immediate notification to the Owner.
5. Written near miss incident reports (by end of shift) with immediate notification to the Owner.
6. Copies of completed required work permits, including excavation, hot work, confined space entry, etc.
7. Copies of completed spill reports as per Owner spill policies with immediate notification to Owner and initiation of spill cleanup as a priority over the Work.
8. Copies of Daily load counts reports and equipment used. Monthly reports of total manhours on site (due on the first of every month).
9. Timely Change Order requests.

10. Daily Contractor completion / manpower sheets, showing labor and equipment hours worked on each task as well as details on any delays or breakdowns, signed and submitted to the Owner by noon the following work day.
11. Baseline surveys before starting and upon completing each component of the Work, in a timely fashion, to demonstrate compliance with design requirements and for payment and record purposes.
12. Weekly Report submitted with the weekly Construction Schedule update showing Work Completed, Work Planned, Problems Encountered, and Plan for Resolution.
13. Manufacturer construction approvals.
14. Timely submission of invoices.

7.3 AT COMPLETION OF THE WORK

1. As-built survey information of all aspects of the completed Work.
2. Timely submission of Final Invoice.
3. Manufacturer liner installation approval signoff.
4. Request for release for site cleanup.

8. SURVEY LAYOUTS

Layout surveys shall be accurate to +/- 1 inch for plan locations and +/- 1 inch for elevations.

9. PRIORITY USE OF FACILITIES

The Contractor is advised that Owner operations have priority for all site facilities and barge deliveries at Hawk Inlet.

10. HAZARDOUS MATERIALS

The importation of all hazardous materials to the Site must have prior approval of the Owner. The Contractor shall minimize the use of these materials to the greatest extent possible. All hazardous wastes shall be handled in accordance with the Owner's Environmental Management System and shall be removed from the Site at Project completion at no cost to the Owner, unless indicated otherwise by the Owner. MSDS sheets must be kept in the Contractors site office for all chemical products used in the Work.

END OF SECTION 4.1

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SECTION 4.2 – MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.1 SCOPE

1. Measurement and payment for all items in Schedule 1 - Quantities and Prices are covered hereunder.
2. Any work called for in the Specifications, or shown on the Drawings, or which is necessary for the completion of the Work, which is not specifically listed as a separate pay item in Schedule 1 shall be deemed incidental to the Work and no separate measurement or payment will be made for such work, but the cost of all such incidental work shall be included in the prices entered for the various pay items appearing in Schedule 1.
3. Measurement and payment applies only to final approved construction. Temporary works will not be measured for payment.
4. The amount of work to be done with respect to each pay item has been estimated as set out in Schedule 1. Notwithstanding, the Owner reserves the right to increase or decrease the amount of any work item as required and the Contractor shall make no claim for anticipated profit, for loss of profit, for damages, or for any extra payment whatsoever, except as provided for in the Contract.

1.2 MEASUREMENT

1. If quantities are stated on the Drawings, they are provided as information only.
2. Where an item has been measured as a lump sum, the Contractor is responsible for determining all related costs necessary to complete the lump sum item including that of labor, material, equipment and Plant.
3. Where an item has been measured as a unit quantity, the quantity is subject to measurement after the item under consideration has been satisfactorily completed. Work measured under a given pay item shall not be measured again under the same pay item or a different pay item. The final quantity for the item shall be the installed quantity as agreed with the Owner.
4. The Contractor shall be responsible for all aspects of measurement for payment. The methods of measurement shall be in accordance with standards normally accepted by the construction industry for the respective types of work.
5. The Contractor shall obtain prior approval of his quantity survey methods including presentation format and details. This approval may require that the Owner participate in, or direct, the carrying out of the surveys. The Owner will conduct such check surveys as it considers necessary. If errors and omissions are found in the Contractor surveys, the Contractor shall rectify them forthwith.
6. A given type of work shall not proceed until relevant initial surveys are completed by the Contractor and have been approved in writing.

7. No work shall be undertaken that would preclude verification of any initial condition surveys or inspections.
8. The Contractor shall prepare all monthly estimates and a final statement of work performed together with such supporting data and computations as are deemed necessary by the Owner to determine the accuracy of the estimates, all of which shall be submitted in an approved format.
9. All original field notes, electronic files, quantity computations, cross sections and other records taken by the Contractor, or required by the Owner for the purpose of quantity surveys, shall be furnished promptly to the Owner and shall become the property of the Owner.
10. In addition to the aforementioned surveys, the Contractor shall submit a Daily Report (as described in Section 4.1) containing a complete and accurate account of the previous day's progress to help support quantity estimates for interim payments and schedule progress.

1.3 PAYMENT

1. Payment for the Work will be made at the respective lump sums, provisional sums and unit rates stated in Schedule 1- Quantities and Prices.
2. Except as otherwise specifically provided, the prices entered in Schedule 1 for the various items of work shall constitute full compensation for supplying, operating and maintaining all temporary works, equipment, material, labor, supervision and all other costs for performing all the work required by the Contract. Payment under the various pay items will only be made for work satisfactorily completed in accordance with the Contract requirements. Survey based quantities will be confirmed by the Owner.
3. No separate measurement or payment will be made for any items not specifically stated in Schedule 1 including:
 - a) travel time, under any circumstance;
 - b) pollution prevention or control, spill cleanup and waste disposal except as otherwise provided under Section 4.1;
 - c) survey control;
 - d) Contractor's security;
 - e) delays due to weather or Owner's operations except if provided by the General Conditions;
 - f) delays due to equipment servicing and breakdown, or material availability;
 - g) consumables;
 - h) attending safety meetings, safety or environmental training, inspections or audits; and,
 - i) obtaining permits.

1.4 PAYMENT FOR EXTRA WORK

1. "Extra Work" means the furnishing of materials and/or equipment and/or the doing of work not directly or by implication called for by the Contract.
2. The Owner, without invalidating the Contract, may order extra work, or make changes by altering or adding to the Work, and the Contract Sum shall be adjusted accordingly. All such work shall be executed under the conditions of the Contract, except that any claim for extension of time caused thereby shall be adjusted at the time the Change Order for Extra Work is prepared.
3. In giving instructions, the Owner shall have authority to make minor changes to the Work not involving extra costs, and not inconsistent with the purposes of the construction, and such changes shall not be considered as Extra Work.
4. The price to be paid for any Extra Work shall be determined by the Owner, using one or more of the methods specified in the General Conditions of Contract.
5. It is expressly agreed and understood that no claim for an addition to the Contract Sum shall be valid except by agreement of a written Change Order, signed by the Owner.
6. If the conditions under which the Contract is to be performed should be substantially changed, and the Contractor should feel that he is entitled to extra compensation, he shall make written claim to the Owner for such extra compensation within 48 hours of such change; otherwise, such claim need not be considered by the Owner.

1.5 PROVISIONAL SUMS

Use of provisional sums requires approval in writing from the Owner. The method of payment for work on Provisional Sum items will be on a time and materials basis as set out in the Special Conditions or as otherwise agreed in writing between Contractor and Owner. Some, all or none of the allowances may be used and the Contractor shall have no claim on any allowance not used.

1.6 CONTRACTOR'S PAYMENT TO OWNER

1. The Contractor shall reimburse the Owner, for any costs incurred due to:
 - a) Overtime work (beyond the agreed work schedule for this contract) performed by the Owner's site staff to suit the convenience of the Contractor.
 - b) Employment of site staff by the Owner after the stipulated time for completion if such employment is rendered necessary by failure of the Contractor to complete the Work by the stipulated time.
 - c) Redesign of any portion of the Work made necessary by a Contractor's error.
 - d) Rental rates on equipment borrowed from the Owner.

- e) Materials purchased from the Owner.
- f) \$200 per cubic yard for concrete quantities in excess of 110% of neat line requirements.
- g) Up to \$10,000 per key employee transferred from site without Owner approval, if, in the Owner's opinion, the change of personnel has a significant delay or cost impact to the Work.
- h) \$2,000 per day or portion thereof penalty for late completion of the a) Step 1 bypasses, b) demolition, c) Liner installations, or d) Project completion date. See Contract Schedule Milestones in Section 3.0 Special Conditions, Section 3.14 – Schedule.
- i) \$10,000 per day or portion thereof for any uncontrolled fuel or petroleum by-product spill.

1.7 STANDBY

1. Any paid standby time will require approval and will apply only during delays caused by or requested by the Owner. The sum of work hours and standby hours due to approved delays shall not exceed eight hours per day or 40 hours per week.
2. During standby time the Contractor shall clean the work site and engage in any other work as approved or directed.

PART 2 – PAY ITEMS

2.1 MOBILIZATION AND DEMOBILIZATION

1. Mobilization shall be estimated to the Juneau AML dock site and shall include the costs of: insurance; permits; moving personnel, supplies and equipment; providing temporary roads and facilities; setup, and all other preparation for performing the Work. Owner will cover expenses from AML in Juneau to the Hawk Inlet port by barge only. Mobilization costs shall also include time for personnel to be indoctrinated into the Owner's safety and environmental management system program (allow for 2 days of training at the site) at start up and during the Work as new personnel arrive on Site.

The Owner will provide, free of charge: fuel for project equipment only at the Hawk Inlet fuel farm, room and board as available at the KGCMC camp (dorm-room style accommodations), and passenger ferry service between Auke Bay and Young Bay.

2. Mobilization will not be considered complete and will not be paid until all completed MSHA employee training documentation has been provided to the Owner. Time is of the essence. The liner crew shall receive MSHA training before arriving on site.
3. Demobilization will be considered complete when all labor, equipment, Plant, temporary facilities and surplus and waste materials have been removed from Site and the work areas have been cleaned and graded, all to the satisfaction of the Owner. The limits of cleanup, final grading and drainage include the areas of borrow, stockpiles, permanent work, temporary work, and lay-down and adjacent grounds

thereof, that have been disturbed by the Contractor. Owner will cover expenses for AML freight barge from Hawk Inlet to the AML Juneau dock.

4. The lump sum tendered shall be relative to the costs involved but shall not exceed 10% of the Total Bid Amount.
5. Mobilization will be 60% of the lump sum price for this pay item. Demobilization will be paid at 40% of the lump sum price.
6. Progress payments will be made against the lump sum price in proportion to the completed mobilization activities making adjustments for any advanced monies.

2.2 DEMOLITION

1. Demolition of specified structures and facilities shown on the Drawings and disposal of related demolition materials, carried out in accordance with the submitted and approved demolition plan, will be measured as a lump sum item.
2. All preparation work, demolition and decontamination activities and disposal of the demolition debris or salvage materials shall be included in the bid price.
3. Approved excavation and fill for the demolition work will be measured and paid under the appropriate unit rates in Schedule 1.

2.3 EXCAVATION

1. Measurement of excavation, by machine or by hand, will be made to the nearest cubic yard of the bank volume. Bank volume shall mean material volume in-place before excavation including natural ground, stockpiles and waste piles.
2. Measurement will be made to the lines and levels shown on the Drawings or approved by the Owner.
3. Clearing, grubbing and stripping are considered incidental to the Work and will not be measured, except that required for developing the 1.5 Mile A-Road Borrow Area. Measurement will be made of the approved plan area of 1.5 Mile A-Road Borrow Area, that is satisfactorily cleared, grubbed, stripped, logs decked, stumps and woody debris piled and burned or otherwise disposed of; all in an approved manner.
4. Temporary measures to control groundwater and surface water, and compliance with the environmental management system are considered incidental to the work and will not be measured.

2.4 ROCK FRAGMENTATION

1. Measurement of rock fragmentation by drilling, blasting, barring, wedging or other quarrying techniques will be made to the nearest cubic yard of bank volume. Bank volume shall mean material

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volume in-place before fragmentation including intact bedrock formations, or any rock-block or boulder greater than 3 ft average diameter.

2. Measurement will be made to the lines and levels shown on the Drawings or approved by the Owner.
3. Fragmentation includes the execution of controlled blasting, line drilling, smooth blasting or pre-shearing in areas where rock damage due to blasting is to be minimized.
4. Controlled perimeter blasting is required in the Pond 7 permanent spillway and the liner system anchors in bedrock.

2.5 FILLS

1. The Owner will provide the following materials for the Work only:
 - a) drain gravel of the specified gradation, in stockpiles at Hawk Inlet; and,
 - b) an estimated 9,790 stockpiled cubic yards of 6-inch minus rockfill in 3 separate stockpiles in the Pond 7 area. The Contractor shall assume that 7,500 compacted cubic yards of the final volume of 6-inch minus rockfill in the permanent Work is obtained from these existing stockpiles in the Pond 7 area.

The Contractor shall process and/or supply all other fill materials.

2. Use of the stockpiled fill shall require prior approval. Due to limited available space fill stockpiles may impinge onto the Work area. No measurement will be made of stockpiled materials that require removal from the Work area, during or at completion of the Work.
3. Measurement will be made to the nearest cubic yard of approved fills satisfactorily placed and compacted to the lines and levels shown on the Drawings or approved by the Owner. The measurement will reflect in-place volumes after compaction.
4. Fills placed beyond the approved or specified lines and levels will not be measured for payment.
5. Temporary measures to control groundwater and surface water, quality control and quality assurance testing and compliance with the environmental management system are considered incidental to the work and will not be measured. Contractor will be responsible to prevent any damage to fill areas from runoff and provide sediment controls.

2.6 PERMANENT STOCKPILES

1. Measurement will be made to the nearest cubic yard of material (by survey) meeting the specified gradation, stockpiled in an approved manner at an Owner-designated location not more than 1 mile from Pond 7.
2. Measurement will be made of the stockpiled material that is not used for the permanent work.

2.7 OVERHAUL

1. Measurement will be made to the nearest cubic yard-mile for overhaul in excess of 1.5 miles one-way, of excavated and fill materials. Measurement will be based on bank volume for excavated materials and on the volume of materials placed and compacted to specified requirements for fill materials.
2. The Contractor shall obtain prior approval for each piece of work that will require overhaul.

2.8 GEOFABRICS

1. The Owner will supply geofabrics for the Work only. Geofabric shall mean all geosynthetics, including geomembrane, geotextile, geogrid and geocomposite products only. The Contractor is responsible for all other consumables related to supporting the liner installations.
2. Measurement will be made to the nearest square yard of approved geofabrics satisfactorily placed and projected to the lines and levels shown on the Drawings or approved by the Owner. Measurement will be to the weld line where new and existing geofabrics are joined.
3. Measurement will be based on true surface area excluding folds, overlaps and anchoring trenches.
4. Supply and installation of fabric to concrete fasteners will not be measured but considered incidental to the Work.
5. Geofabric used in permanent pipe installation will not be measured separately for payment and will be considered incidental to the Work.

2.9 PIPE

1. The Owner will supply all pipe and conduit (including culverts), HDPE pipe fusion machine, fittings and culvert inlet boxes for the permanent Work only.
2. Measurement will be made to the nearest foot of the installed length of approved pipe, satisfactorily installed and protected from damage by subsequent construction.
3. Separate measurement will be made to the neat lines or approved lines, for trench excavation and fills.
4. Measurement of culverts will not include inlet and outlet works.
5. Contractor shall provide a qualified HDPE pipe welder, to be approved by Owner.

2.10 CONCRETE

1. Concrete will be provided by the Owner without cost to the Contractor, delivered to the work site for the permanent Work only.

2. Measurement for payment of Concrete will be in cubic yards calculated from neat dimensions indicated on the Drawings or authorized in writing by the Owner. Concrete placed beyond dimensions indicated or authorized will not be measured.
3. No deductions will be made for volume of concrete displaced by reinforcing steel.
4. Formwork will not be measured for payment.
5. Supply and installation of concrete reinforcement and bedrock anchor bolts, and bolt grouting will not be measured but considered incidental to the Work.
6. No separate measurement will be made for areas requiring concrete repair as a result of damage caused by Contractor during his construction activity.

2.11 PROVISIONAL SUMS

1. Measurement for work on Provisional Sum items will be made on a time and material basis, with labor and equipment hours spent directly on the work measured to the nearest 15 minutes.
2. Payment for work on Provisional Sum items will be made out of the applicable Provisional Sums in Schedule 1, on a time and materials basis as set out in the Special Conditions. Any impact costs on other Contractor operations due to work on Provisional Sum items will be considered incidental to the Work.
3. Owner will provide instruments, tubing, conduit, membrane and the like for the Leak Detection System.

2.12 LUMP SUMS

1. Payment for each Lump Sum item in Schedule 1 will be made only upon satisfactory completion of the work prescribed in that item.
2. The installation of reinforced concrete or mass concrete associated with the Work in each Lump Sum item will be measured and paid separately.
3. Owner will provide pipes, gaskets, seals, battens and the like for installation of the Water Reclaim System.
4. Owner will provide gabion baskets (empty) for installation in the Pond 7 inlet structure.
5. Owner will provide Tank 7 and the pH Tank, and associated fittings, valves and the like for connection to the associated pipes.

END OF SECTION 4.2

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SECTION 4.3 – MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

(not applicable)

PART 2 - PRODUCTS

(not applicable)

PART 3 – EXECUTION

3.1 MOBILIZATION

Mobilization shall be to the Juneau AML Dock Site (Owner will cover the AML barge only transport from Juneau to Hawk Inlet) and shall include all costs required to:

1. Mobilize all Plant, labor, tools, supplies, materials, equipment, supervision, technical personnel, and other services required for completion of the Work;
2. Furnish or construct on Site additional or temporary access, facilities or utilities which are not shown on the Drawings or are not provided by the Owner but which are deemed necessary for the Work, including but not limited to:
 - a) Access roads, yards, and work areas (including upgrades to existing infrastructure).
 - b) Temporary buildings for administration, storage or workshops.
 - c) Power generation and distribution systems.
 - d) Temporary lighting, as required.
3. Transport equipment from Hawk Inlet, setup, assemble, and have ready for work at the first scheduled work location.

3.2 COMMENCEMENT AND COORDINATION

Mobilization shall commence as established in the approved construction schedule and proceed expeditiously thereafter. The Contractor shall co-ordinate the scope, scheduling and execution of mobilization activities with the Owner and AML in Juneau.

3.3 DESIGNATED AREAS

Temporary access roads, yards, work areas and all the facilities and utilities installed therein shall be located in the designated areas shown in Schedule F of the Form of Proposal and approved by the Owner. Lay-down and stockpile areas will be identified at the pre-bid site visit.

3.4 EMPLOYEE TRAINING

The Contractor shall perform all MSHA training of its employees before arrival on Site and shall not use scheduled construction time for these purposes. The Contractor shall obtain an MSHA number before mobilizing. The Owner will give additional and specific on-site training for safety (MSHA requirements) and for the Owner's Environmental Management System (EMS) ISO 14001 program. Allow for 1 full day of site specific training for all personnel prior to work.

3.5 DEMOBILIZATION

Demobilization shall be from the last scheduled work location on Site and shall include all costs required to:

1. Demobilize all Plant, labor, tools, supplies, materials, equipment, supervision, technical personnel and other services used in the Work. Owner will cover AML barge only transport of equipment back to Juneau.
2. Unless otherwise specified or approved, remove temporary access, facilities and utilities not required by the Owner to remain on Site.
3. Remove any surplus consumables and waste materials stockpiled on Site during performance of the Work to an area designated by the Owner, including but not limited to debris from clearing and grubbing operations, and geofabric liner materials. All materials (consumables) brought to site shall be demobilized from site.

3.6 END OF WORK CONDITION

Restoration shall be to the satisfaction of the Owner, but at a minimum will include cleanup and grading of spoil dumps, lay-down areas, stockpile and process areas, haul routes and the like, as well as disturbed areas immediately adjacent to the Work. Seeding, if required, will be done using the Owner's equipment and supplies, and is considered incidental to the Demobilization work.

PART 4 – MEASUREMENT AND PAYMENT

For Measurement and Payment see Section 4.2.

END OF SECTION 4.3

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SECTION 4.4 - DEMOLITION

PART 1 – GENERAL

1.1 DESCRIPTION

1. The work covered in this section consists of supplying all labour, materials and equipment for:
 - a) Removal of approximately 700 cy of contaminated sludge/sediment from inside of Tank 6 and disposal within the tailings disposal facility in coordination with the Owner.
 - b) Removal and salvage of equipment and materials of the Old Truck Wash, truck wash sediment tank and Tank 6. Removal and salvage of utility pipes and conduits, valves and similar items located above ground or above the base level of concrete foundations, as applicable. Salvaged items shall be decontaminated by pressure washing at an approved location on site. Cleaned items shall be placed in an approved disposal/storage site.
 - c) Removal of approximately half of Tank 6 concrete foundation and the complete concrete foundations of the Truck Wash and all other local concrete pads. The portion of Tank 6 foundation concrete remaining in place shall be at least 1-ft below liner foundation level. Reinforcing steel shall be trimmed flush with the surfaces of all demolished pieces of concrete. The concrete shall be placed within the tailings disposal facility where directed. The reinforcing steel shall be decontaminated by pressure washing and placed in an approved disposal site.
 - d) Local excavations and fills as required and approved.
 - e) Materials to be salvaged shall be identified by the Owner at the pre-bid site meeting - attendance is mandatory.
 - f) Removal and salvage of all electrical and plant equipment to storage at Pit 5 in coordination with Owner and Others (flowmeters, pumps, MCC room components, transformer...)
2. The Owner will identify known hazardous materials. Nonetheless, the Contractor shall pay special attention during its inspection and during the work to identify hazardous materials and shall obtain Owner's direction for demolition and disposal, including but not limited to insulation.
3. The Contractor shall:
 - a) Isolate, with the Owner, any pipe works or electrical utilities that connect to the Demolition area;
 - b) Undertake a detailed pre-demolition inventory to verify existing conditions;
 - c) Design demolition techniques and sequences;

- d) Co-operate with the Owner in preventing damage to all buried utilities and repair if damaged;
 - e) Remove all demolition materials to approved disposal or salvage areas, within 1.5 miles of the site, including contaminated soils, as designated by the Owner;
 - f) Decontaminate, by pressure washing, all materials to be removed from within containment;
 - g) Take care not to damage remaining utilities; and
 - h) Provide and install barricades, safety fencing and erosion controls at the work site as required.
3. All demolition materials are the property of the Owner.

1.2 DEFINITIONS

Not required.

1.3 STANDARDS

- 1. MSHA Regulations;
- 2. Alaska Building Code; and
- 3. All other applicable Local, State or Federal Regulations, Codes or Standards.

1.4 RECORDS AND SUBMITTALS

- 1. Submissions with the Bid
 - a) The Contractor shall undertake its own detailed inspection of the facilities to be demolished and decontaminated and shall submit the results of that inspection with the bid.
 - b) The Contractor shall submit with the bid a plan and schedule for demolition of the specified structures.
- 2. Submission Before Performing the Work
 - a) Fourteen days prior to commencing any demolition, the Contractor shall verify with the Owner the total extent of demolition, decontamination, removal and disposal. The

Contractor shall submit a detailed plan and schedule for demolition and disposal/salvage of materials.

- b) Should demolition procedures require the use of temporary structural support, 7 days prior to implementation, submit engineering details of such support.

1.5 PROTECTION

1. Protect existing utilities, objects and structures not requiring demolition and, in the event of damage, immediately notify the Owner and make all repairs and/or replacements necessary to the satisfaction of Owner at no additional cost to the Owner.
2. Take precautions to support affected structures and if safety of adjacent structures appears to be endangered, cease operations and notify the Owner.

PART 2 – PRODUCTS

(not applicable)

PART 3 - EXECUTION

3.1 GENERAL

1. The Contractor shall undertake work in accordance with approved plans.
2. All demolition materials shall be removed to Owner approved disposal or salvage sites. Items leaving containment shall be decontaminated by pressure washing.
3. All equipment to be approved by the Owner before the commencement of the Work.

3.2 DEMOLITION OF STEEL STRUCTURES

1. Execute all demolition in a manner approved by the Owner. Salvage in good order all designated equipment to storage and ensure electrical isolation prior to work.
2. Remove all sheathing, roofing, walls, plates, fasteners and all other items identified in the approved work plan.
3. Take all necessary steps and precautions not to damage any salvageable materials identified by the Owner.
4. Execute the Work in a manner consistent with safety regulations, including the provision of fall protection, scaffolding, shoring and braces as required.

3.3 DEMOLITION OF CONCRETE STRUCTURES

1. Execute all demolition by means other than blasting, except as permitted by the Owner.
2. Remove all concrete and reinforcing steel as indicated in the approved plan. The edge of the cavity or excavation shall be trimmed to a stable angle in accordance with applicable safety regulations. All adjoining pipes/wires/utilities shall be neatly trimmed at the edge of the excavation. Pipes with flowing water shall be capped in an approved manner.
3. Take all necessary preventative measures to avoid spilling materials by using suitable transportation vehicles, avoiding overloading and otherwise exercise due care. In the event of spillage, clean the affected areas to the satisfaction of the Owner at no additional cost to the Owner.
4. Break concrete within the demolition limits by mechanical means, such as drilling, wedging, jackhammer, hydraulic splitter and any other means approved by the Owner, and trim the reinforcing steel from the concrete pieces. Keep the reinforcing steel separate from other materials.
5. At the end of each day's work, leave the structures in safe condition so that no part is in danger of toppling or falling. Provide a safety barrier which meets the requirements of MSHA.
6. Demolish to minimize dusting. Keep materials wetted to the satisfaction of the Owner.
7. Provide protection from flying materials during demolition for all area personnel.

3.4 SAFETY

1. Unless otherwise specified, carry out demolition work in accordance with MSHA Regulations and the Owner's safety procedures.

3.5 CLEAN UP

1. At the end of each day's activity or completion of a work area, remove all debris, waste, construction materials and equipment from the work area. Leave the work area clean and dust free to avoid polluting the environment.
2. Remove all demolished materials, equipment, rubble and debris from the Site and maintain the Site in a neat and orderly condition to the approval of Owner.

3.6 EXCAVATION AND BACKFILL

1. Excavation and backfill shall be performed in accordance with the requirements of MSHA regulations.
2. Excavation procedures shall be adopted which will not, at any time, adversely affect the stability of any slope.

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3. The Contractor shall use special care and attention while working near the edge of the Southeast Expansion – Area 1 tailings storage area so as to not undermine, de-stabilize or damage the liner foundation or drainage system, except as directed.
4. Remove grout in the foundation underneath the south side of Tank 6, as directed to attain grade and drainage. Grouting records are not available.
5. The Contractor shall provide stable excavation slopes at the end of demolition. Temporary backfill may be required to satisfy applicable regulations or the use of trench boxes.

PART 4 - MEASUREMENT AND PAYMENT

For Measurement and Payment see Section 4.2.

END OF SECTION 4.4

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SECTION 4.5 – CLEARING AND EXCAVATION

PART 1 - GENERAL

1.1 DESCRIPTION

1. Clearing and Excavation includes the following:
 - a) Clear, grub and strip the footprint area, where required.
 - b) Relocate existing piping, utilities and services.
 - c) Fragmentation of bedrock and oversize rock.
 - d) Remove soil, peat, and loose or fragmented rock to specified or approved grade lines.
 - e) Sub-excavate to competent ground as directed.
 - f) Dispose of materials.

1.2 DEFINITIONS

1. Common Excavation: excavation of all materials including peat, clay, silt, sand, gravel, boulders or loose rock smaller than 3-ft average diameter and friable or weathered rocks that can be ripped with a 300 horsepower crawler tractor equipped with a single shank, short tip ripper. Common Excavation also includes contaminated materials, existing stockpiles, waste piles, sub-excavation of localized soft or permeable zones in foundation areas as directed by the Owner.
2. Rock Fragmentation: loosening and fragmentation of bedrock formations, detached rock blocks or boulders greater than 3-ft average diameter by drilling, blasting, barring, wedging and other quarrying techniques.
3. Contaminated Materials: rock, mineral soil, peat or any other material that is not satisfactory for construction or out-of-containment disposal or storage, in accordance with KGCMC's Environmental Management System. A material may be considered contaminated because of its initial composition (i.e., pyritic bedrock or boulders) or because of subsequent contamination with a foreign substance (i.e., tailings contamination of natural soil).
4. Excavation Line: the line within which no unexcavated material shall be permitted to remain.
5. Over Excavation: excavation beyond the excavation line.
6. Dental Excavation: the removal of loose, friable or weak materials encountered after the exposure of Rock Excavation faces.
7. Perimeter Holes: a row of neatly and uniformly drilled holes along the excavation line.

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8. Controlled Blasting: blasting techniques in which hole dimensions and patterns, and the size, distribution, detonation delay and type of explosives are designed to break rock neatly to the excavation line and to prevent fracturing and loosening of rock beyond the excavation line. Examples of techniques used in controlled blasting are:
 - a) Line Drilling: the Perimeter Holes are closely spaced and left uncharged to provide a plane of weakness toward which the blast can break.
 - b) Smooth Blasting (post-splitting): the Perimeter Holes are lightly charged and simultaneously detonated as the last delay of a blasting set.
 - c) Pre-Splitting (pre-shearing): the Perimeter Holes are lightly charged and simultaneously detonated in advance of burden holes. The perimeter holes shall be detonated at least several milliseconds in advance of the burden holes if they are detonated in the same set as the burden holes.
9. Clearing: work involving cutting of trees, brush or vegetative growth to not more than 1 ft above ground surface, dealing with previously uprooted trees and stumps, slash left from previous filling or excavation activities, bucking and trimming of all timber, and collecting these materials for mulching, burning or disposal in an area designated by the Owner. Any salvaged timber shall be decked in 24' lengths and shall become the property of the Owner.
10. Grubbing: work involving excavation and removal of stumps and roots to not less than 1 ft below ground level and collecting these materials for mulching or disposal in an area designated by the Owner.
11. Stripping: work involving excavation and removal of top soil (not including peat) down to the top of the underlying mineral soil or rock, collecting the materials and hauling them to an area designated by the Owner.

1.3 CODES AND STANDARDS

1. The Contractor shall comply with all applicable MSHA regulations and local, state or federal regulations, and notwithstanding these regulations, the Contractor shall also comply with the Owner's blasting standards.
2. The Contractor shall maintain explosives and detonator magazine logs registering the receipt and consumption of explosives, detonators and accessories.
3. Daily work permits and equipment pre-shift cards will be completed by Contractor.

1.4 SUBMITTALS

1. The Contractor shall submit the information requested in Section 4.1 – General and the following information for approval. Work shall not start until applicable approvals are obtained in writing from the Owner.

2. Excavation

The Contractor shall submit plans and descriptions of methods and sequences for common, peat and rock excavation of the work areas.

3. Blasting

At least 14 days before the start of blasting on the site, the Contractor shall submit the following:

- a) copies of valid Blaster's Certificates for the Contractor's blasting supervisor and blasters;
- b) a blasting safety plan;
- c) a commercial description and technical information of the proposed blasting products (explosives, detonator, fuses, etc.);
- d) location, design and capacity of explosives and detonator magazines, along with procedures for the handling of explosives on and off site; and,
- e) a copy of all required permits.
- f) After the blasting program begins, the Contractor shall maintain and make available at the magazine or other location as required to the Owner:
 - i. explosives and detonator magazine logs registering the receipts and consumption of explosives, detonators, and accessories; and,
 - ii. daily shift records showing drilling patterns, detonation delay sequences, and the type and quantity of explosives per hole, per delay, and per blast.

1.5 BLASTING SUPERVISOR

The Contractor shall provide and nominate a Blasting Supervisor responsible for the implementation of the methods and procedures designated in the rock excavation plan. The Blasting Supervisor shall:

- a) have a valid blaster's certificate;
- b) have at least 5 years experience in the use of explosives on surface rock excavation projects of a similar nature; and,
- c) direct the activities of all blasting operations and other blasters on site.

PART 2 – PRODUCTS

(not applicable)

PART 3 – EXECUTION

3.1 METHODS

1. The Contractor shall conform to the following general guidelines for all excavation activities:
 - a) Develop excavation methods, techniques, and procedures with due consideration for safety, environmental hazards and the nature of materials to be excavated.
 - b) Take precautions to preserve in an undisturbed condition all materials outside the Excavation Lines.
 - c) Avoid excavation beyond the Excavation Lines shown on the Drawings unless otherwise approved.
 - d) Dispose of all excavated material in the areas designated and approved by the Owner. Under no circumstance shall water, tailings or deemed contaminated material from within the Tailings Facility be discharged, ponded, or stockpiled outside of the Facility.
 - e) The tailings, waste or contaminated materials and water, as well as any of the demolished structures or equipment within the Tailings Facility could be acidic or contain hazardous substances from the native rock or from any subsequent milling or processing. The Contractor shall provide all necessary safety equipment for their staff, and shall comply with all applicable health and safety regulations.
 - f) The construction of temporary roads, ramps, or fills to allow equipment access to certain areas could be required, and shall be identified by the Contractor before the start of excavation. The Contractor shall be responsible for construction, deconstruction and safe disposal of all such temporary structures in approved areas, all at no extra cost to the Owner.
 - g) Spill response and cleanup materials will be kept at the site for emergency response to spills from equipment, particularly outside of containment.

3.2 UTILITIES

1. Most utility installation, relocation, or tie-in work is expected to be performed by the Contractor, as directed by the Owner. Utility installations will utilize standard industry bedding and compaction practices and all underground utilities installed will be demarcated with hazard tape 2 feet above the fill bedding and be located by survey for record drawings.
2. An approved “dig permit” from the Owner is required for any excavation. The Contractor shall request dig permits from the Owner, in writing, not less than 72 hours before commencing any excavation. The Owner will work with the Contractor to establish the location and extent of any buried utilities. The Contractor shall immediately cease work and inform the Owner when unknown utilities are encountered, or if utilities are not located as indicated in the dig permit, and perform repairs as directed. Owner-approved isolation/lock-out procedures (energy isolation) shall be used

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around live systems, and must be coordinated with the Owner. Excavation scheduling will be paramount to the successful construction schedule.

3. Damage caused by Contractor negligence shall be satisfactorily repaired at no cost to the Owner.
4. The Contractor shall obtain an approved dig permit from the Owner where work involves breaking into or connecting to existing services or working in close proximity to utility locations. All utility tie-ins will utilize the Owner's isolation standards and lockout procedures to protect personnel and property.
5. All utilities removed from the work area shall be pressure washed, cut into appropriate lengths and placed into Owner-provided rubbish bins at the Site. Owner will deliver and remove the rubbish bins.
6. All abandoned utilities that will remain in the Work area shall be neatly terminated at the margin of the Work and capped or plugged as directed.
7. The Contractor shall record the position and elevation by survey of all existing, re-routed and abandoned service lines encountered in the Work.
8. Hand excavation will be required within 2 ft of any known or suspected live utilities or utilities to be salvaged or modified. Live electrical utilities will be isolated before excavations if within 10 ft of the Work.

3.3 CLEARING, GRUBBING AND STRIPPING

1. The Contractor shall confirm the clearing limits by having its surveyor lay out and flag the clearing lines. The Owner will inspect and confirm the clearing limits with the Contractor before the start of Work. Clearing outside the specified or approved areas shall not be carried out without the Owner's prior written approval.
2. After clearing is completed, Contractor shall identify hazard trees outside the clearing area that pose a safety concern, and submit a plan showing the location of the hazard trees to the Owner within 24 hours of clearing completion. No further work will be permitted in the cleared area until the hazard trees have been dealt with in an approved manner.
3. All cutting and clearing activities shall be performed in strict accordance with the Timber Settlement Contract in force at the Site. All recoverable timber shall be decked in 24' lengths.
4. Top soil shall be excavated from the Work area to the approved depths and limits and hauled for disposal in designated disposal areas. Trucks shall have sealed boxes to avoid leakage and spillage during transport.
5. All necessary water control and sediment control measures within and around the excavations are considered incidental to the Work. Pumps may be required to control runoff during storms. It will be the responsibility of the Contractor to provide personnel throughout the work to maintain drainage and sediment controls, even on off days, if needed.
6. Woody debris shall be piled and burned in an approved manner.

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7. Woody debris and waste that is not designated for burning shall be disposed of in stable piles with lifts not more than 3 ft thick, and compacted with a minimum of 3 passes of loaded construction equipment. Organics shall be spread or crushed to avoid nesting and void formation.
8. After excavations, the Contractor shall notify the Owner, so quantity confirmation can be made by Owner survey, prior to work proceeding.

3.4 COMMON EXCAVATION

1. Common materials (including peat) shall be excavated from the Work area to the approved depths and limits and hauled to the designated disposal areas less than one mile away. Peat shall be segregated during excavation and stockpiled separately from other materials. Trucks shall have sealed boxes to avoid leakage and spillage during transport.
2. All necessary water control and sediment control measures within and around the excavation are considered incidental to the Work. Pumps may be needed for runoff control at times.
3. Areas with unacceptable soil or material shall be sub-excavated as directed by the Owner.
4. The entire foundation area shall be excavated to the approved lines or as directed before commencement of fill placement, except in the case of sub-excavations that could pose a safety hazard.
5. Excavation tolerances shall be +0 inches to -6 inches of specified or approved lines and levels.
6. After excavations, the Contractor shall notify the Owner, so quantity confirmation can be made by Owner survey, prior to work proceeding.

3.5 ROCK FRAGMENTATION

1. Rock fragmentation shall be carried out as necessary to remove bedrock (or to fragment boulders or rock-blocks) and to shape the bedrock surface to the lines and levels shown on the Drawings. All rock fragmentation will be subject to review and approval by the Owner before and during the excavation.
2. The rock is described as graphitic phyllite, sericite/chlorite phyllite, or argillite. The phyllite is moderately hard and is dissected by steeply-dipping folia. The argillite is very hard. Both rock types could be jointed, fractured or locally sheared. Dilation of folia or joints, or fracturing from previous blasting could be encountered in the spillway channel of Pond 7 or other areas. The distribution of rock types within the Work area is available from the Owner. The removal of intact rock is expected to require drilling and blasting. Ripping with heavy equipment is not considered a practical fragmentation technique, unless localized. Large boulders or oversize rock may be fragmented by drill and blast techniques or by an excavator-mounted pneumatic rock breaker.
3. Blasting Safety

The Contractor shall provide, adopt and implement safety measures to satisfy the Owner's blasting standards and established regulatory policy, such as:

- a) Signaling and warning systems for labour and equipment prior to blasting.
- b) Blasting mats, screens, fences or barriers for protection against flying rock during blasting.
- c) Specific temporary support required on all exposed rock faces. Measures may include scaling, meshing, bolting, shotcreting and/or other techniques. No other work shall take place until the support measures are in place.

4. Blasting Procedures

The following procedures shall apply to all blasting operations:

- a) The production blast design shall be submitted to the Owner at least 24 hours before the planned blast.
- b) The blast design shall include sketches and comments showing the physical location and dimensions of the planned blast as well as all relevant drilling, charging, and delay data.
- c) The blast shall not proceed without:
 - i. the Owner's approval; and,
 - ii. the presence of the Blasting Supervisor.
- d) The accuracy and control of blasting operations shall be evaluated by the evidence of perimeter hole traces and regularity of the excavation planes. The Contractor shall be prepared to alter any aspects of the blasting cycle to improve the blast control.
- e) The maximum allowable Overbreak shall be 6 inches on final edges and surfaces. Fractured rock due to Overbreak may require removal from the excavation, as directed by the Owner.
- f) Excavation tolerances shall be +0 inches to -6 inches of specified or approved lines and levels.
- g) All excavation surfaces shall be scaled and barred to remove loose, shattered, and "drummy" materials. All overhangs shall be removed. After the installation of temporary rock support (if required), the Owner may inspect the exposed faces and, as required, instruct the Contractor to perform additional work.
- h) Rock fragmentation shall not be done outside the excavation lines shown on the Drawings unless otherwise approved. Should the Contractor require excavation beyond the lines and levels shown on the Drawings, then the additional excavation:
 - i. Shall be subject to the Owner's approval.
 - ii. Shall be subject to the same controls and restrictions applicable to the required excavations.
 - iii. Shall be performed at the Contractor's cost.

- iv. May require to be replaced with structural fills or concrete as determined by the Owner and at no cost to the Owner.

3.6 CONTAMINATED MATERIALS EXCAVATION

1. Contaminated materials shall be excavated from the Work as directed and hauled to the designated disposal areas less than one mile away. Trucks shall have sealed boxes to avoid leakage and spillage during transport. Daily haulage logs will be required and surveys approved by the Owner to confirm volumes
2. All necessary water control and sediment control measures within and around the excavation are considered incidental to the Work.

PART 4 – MEASUREMENT AND PAYMENT

For Measurement and Payment see Section 4.2.

END OF SECTION 4.5

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SECTION 4.6 – FOUNDATION PREPARATION AND FILL

PART 1 – GENERAL

1.1 DESCRIPTION

1. Proof-roll soil and fractured bedrock foundations.
2. Backfill sub-excavations using specified rockfill or other approved materials.
3. Placement of specified fill materials.
4. Additional foundation preparation and fill placement in the Southeast Expansion – Area 2 (SE 2) includes the following:
 - a) Expose and prepare the edge of the existing liner system for connection to the new liner system.
 - b) Install and extend French drains to provide underdrainage for the liner foundation.
 - c) Install or extend instrumentation as directed.
 - d) Initial shaping of the perimeter collection ditches and maintain operational surface ditches to avoid flooding or operational delays during construction.
5. Installation of Pond 7 leak detection system.
6. Install/assist with instrument installation under and above SE 2 liner.

1.2 CODES AND STANDARDS

The latest version of the following Codes and Standards shall apply.

TEST METHOD	DESCRIPTION
ASTM D422	Standard Test Method for Particle-Size Analysis of Soil
ASTM D1140	Standard Test Method for Amount of Material in Soils Finer Than the No. 200 (75 µm) Sieve
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by Rubber Balloon Method.
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

PART 2 – PRODUCTS

2.1 GENERAL

1. Fill materials shall consist of hard durable rock or soil particles that are not subject to deterioration during handling or in the long-term due to freeze-thaw conditions.
2. Fill materials shall be free of organic matter or other deleterious materials.
3. Materials from required excavations, which are suitable for construction, either directly or by selective excavation, shall be used for construction.
4. The specified gradations apply to materials placed in the Work following compaction.
5. Drain Gravel and all monitoring instruments, leads, conduits, and the like, including the Pond 7 leak detection system, will be provided by the Owner.

2.2 FILL MATERIALS

1. Fill gradations shall be as follows:

PARTICLE SIZE	FILL TYPE AND % FINER THAN (BY WEIGHT)				
	6-inch Minus Rockfill		Sand		Tailings – Supplied by Owner
	coarse	fine	coarse	fine	
<i>U.S. Sieve Size (inches/No.)</i>					
<i>6 inch</i>	100				
<i>3 inch</i>	87				
<i>1.5 inch</i>	77				
<i>1 inch</i>	70				
<i>3/4 inch</i>	65				
<i>1/2 inch</i>					
<i>3/8 inch</i>	53	100	100		
<i>1/4 inch</i>					
<i># 4</i>	39	90	78	100	
<i># 10</i>	25	75	56	85	
<i># 20</i>	13	51	32	70	
<i># 40</i>	5	31	19		
<i>#60</i>	0	20	11		100
<i># 100</i>		10	6		90 - 100
<i># 200</i>		5	3	5	80 - 90

- (1) The fill materials shall be well-graded within the specified gradation limits.
- (2) "Well graded" means good representation of all sizes of particles from the coarsest to the finest.

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2. Pit-run rockfill shall be clean well graded material, free of organics, with not more than 5% by weight of the particles passing the No. 200 sieve. Maximum particle size shall not be greater than 80% of the lift thickness at any given location. Approved over-sized boulders, of average diameter not exceeding specified lift thickness, may be placed in designated and approved areas, provided they are adequately embedded in the surrounding compacted fill, to the Owner's satisfaction.
3. Select rockfill shall be clean well graded material, free of organics, with 16-inch maximum particle size, a D50 of 6-inches and not more than 5% by weight of the particles passing the 1-inch sieve. Maximum particle size shall not be greater than 80% of the lift thickness at any given location. Approved over-sized boulders, of average diameter not exceeding specified lift thickness, may be placed in designated and approved areas, provided they are adequately embedded in the surrounding compacted fill, to the Owner's satisfaction.
4. Drain gravel shall be hard, durable, ¾-inch to ¼-inch clean, crushed rock.
5. Pyritic rock will not be allowed in construction of the Work, including drains, roads, berms or foundations.

2.3 WATER

1. Uncontaminated water shall be used for construction. At no time shall process water or storm water be used for construction.

PART 3 - EXECUTION

3.1 EXISTING 6-INCH MINUS ROCKFILL STOCKPILES

1. There is an estimated 9,790 cubic yards (s. cy.) of 6-inch minus rockfill available in existing stockpiles in the Pond 7 area. The Contractor shall assume that the recoverable 6-inch minus rockfill will comprise 7,500 compacted cubic yards (c. cy.) of the permanent Work
2. The Contractor shall use all of the stockpiled material in the permanent Work, with the exception of material that is deemed by the Owner to be contaminated.
3. Incidental handling and temporary stockpiling of the material from existing stockpiles will not be measured separately for payment.

3.2 GRADE PREPARATION

1. Grade shall be prepared to the lines shown on the Drawings. With prior approval, grade lines may be adjusted in the field to suit local topography or ground conditions or to minimize the use of backfill material, provided final grades fall between 2% and 33%, and are free of abrupt or sharp changes unless otherwise specified. In general, adjustments to grade lines which increase the tailings or water storage capacity of the area will be acceptable provided there are no additional costs to the Owner.

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2. All exposed excavation surfaces shall be smooth, firm, unyielding, proof-rolled and compacted with a minimum of 6 overlapping passes of a 12-ton vibratory compactor. The Contractor shall adjust the number of passes and moisture condition the soil as necessary to achieve the required compaction. The prepared surface shall be approved before the placement of fill to bring the area back up to specified grade levels.
3. Loose, friable, or weak materials encountered after exposure of rock surfaces shall be removed to the satisfaction of the Owner
4. Fill used to raise excavation surfaces to required grades shall consist of pit run rockfill, except for the final 1.5 ft which shall be 6-inch minus rockfill, placed in the specified manner unless otherwise directed.
5. On the northeast edge of the Southeast Expansion area, hand excavation will be required within 2 ft of the existing liner and cleaning by water jetting or the like, to expose the edge of the existing liner and make it suitable for connection to the new liner system. The liner shall be exposed a minimum width of 5 ft beyond the approved weld line where the new liner will join the existing liner. Damaged liner shall be repaired.
6. In areas where road fill will be placed over soft soil, the Contractor shall place Owner-provided woven geotextile on the foundation, in an approved manner, before placing the road fill.

3.3 GRADE LINES

1. The prepared surfaces at the required grade lines, whether on original ground or on structural fill, shall be free of ruts formed by vehicular traffic, shall have no sharp protruding rocks or foreign objects, and shall be protected from flooding, standing water, erosion and freezing prior to the placement of the bedding layer.
2. All finished surfaces shall be within the specified tolerances and shall have gradual and smooth grade transitions as required for the installation of the liner system.

3.4 INSTRUMENTATION

1. Prior to or during installation of the bedding sand layer, the Contractor shall assist the Owner with installation of new monitoring wells, lysimeters and piezometers within the liner footprint, and extension of the associated ducts and cabling from new and existing instruments to an area outside the limits of the liner, as directed. In addition, the Contractor shall relocate the existing instrument monitoring hut, or place a new hut, provided by the Owner.
2. The Contractor shall excavate trenches, install ducts and cabling, and backfill trenches back to the required grade lines as directed by the Owner.
3. The Owner will provide all instruments and associated hardware.
4. The Contractor shall coordinate its other operations around the instrumentation work. The Work shall be carried out with care and caution for the protection of the instruments.

3.5 FRENCH DRAINS

1. Groundwater collection drains, also known as French drains, may be required in areas where seepage is uncovered during the foundation preparation work. The French drains consist of filter-sock wrapped, perforated HDPE pipe installed in a trench backfilled with drain gravel, and with the pipe and drain gravel enclosed in prescribed non-woven geotextile filter. The layout and total length of the French drains may differ from that indicated on the Drawings depending on ground conditions.
2. In the SE2 Area, the pipe shall consist of 8-inch diameter SDR9 perforated HDPE pipe.
3. In the Pond 7 Area, the pipe shall consist of 6-inch diameter SDR9 perforated HDPE pipe.

3.6 FILL PLACEMENT

1. Drain gravel will be supplied free of charge (for use in the Work only) to the Contractor in a stockpile at Hawk Inlet and/or other locations closer to the Work site. The Contractor shall be responsible for loading from the stockpile(s) and hauling to the placement areas. In addition, haulage operations from the camp area will be restricted to between 5 a.m. and 7:30 p.m. due to camp operations and sleeping personnel and shall follow all applicable Owner road rules. Contractor shall use all materials efficiently and reduce any waste of the products.
2. All fills shall be placed incrementally in horizontal lifts starting from the lowest ground levels, unless otherwise approved.
3. All fills are susceptible to particle segregation during placing and spreading, especially the 6-inch minus and pit run rockfills. The Contractor shall use placing and spreading methods that prevent segregation from occurring, or provide an approved method of repairing segregation prior to compacting the materials.
4. The bedding layer shall be placed in one lift and compacted as described in the table below. The Contractor shall adjust the number of passes and moisture condition the soil as required to achieve the specified compaction. Moisture conditioning shall be carried out during or immediately before compacting each lift, with the water content of the placed material being as uniform as practicable throughout the layer. Compaction testing shall be carried out by the Contractor for acceptance of the work, with the Owner confirming with duplicate testing as needed.
5. Hand operated compactors shall be used within 2 ft of buried conduits, utilities, existing liner or similar sensitive structures.
6. At least 4 hours notice shall be provided to the Owner before placing bedding material in any area and the Work shall not start until approval has been obtained.
7. Due to the cost of production, bedding material thickness shall not exceed 1 inch more than the specified layer thickness at any location, and then only if the occurrence is localized in nature as determined by the Owner. Excess material in the bedding layer shall be salvaged and reused elsewhere in the Work or stockpiled for future use by Others at no additional cost to the Owner.

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8. The Contractor shall prevent surface water runoff or water from any other source from eroding fill materials placed for the Work, and shall immediately repair any damage resulting from such erosion, at no cost to the Owner.
9. All materials whether in permanent works or in stockpiles shall have a smooth final contour that sheds runoff and shall be stable. Secondary earthwork will be required to leave the storage sites, as well as any sediment control structures needed for the piles, in good order to the Owner's satisfaction. This work will not be measured.
10. The fills shall be placed as follows:

FILL DESCRIPTION	AS PLACED MOISTURE CONTENT	LIFT THICKNESS (IN) ⁽²⁾	MINIMUM DENSITY STANDARD PROCTOR % ⁽¹⁾	MINIMUM PASSES/LIFT & COMPACTOR TYPE
Sand (bedding)	as required	6	98	4, 12t vibratory roller
Sand (service layer – initial lift)	moist	12	method spec →	2, approved low ground pressure equipment, and 4, 12t roller (no vibration)
Sand or Tailings ⁽³⁾ (service layer – second lift)	moist ⁽³⁾	12	method spec →	4, 12t vibratory roller
Sand (service layer in single lift – Pond 7 only)	moist	18	method spec →	2, approved low ground pressure equipment, and 4, 12t roller (no vibration)
Drain Gravel (pipe bedding)	moist	6	method spec →	locally, if directed
Drain Gravel (bedding)	moist	12	95	4, hand operated compactor
Sand (trench backfill and pipe bedding)	moist	6	95	4, hand operated compactor
6-in. Minus Rockfill (foundations and roads)	wet	12	method spec →	4, 12t vibratory roller
6-in. Minus Rockfill (service layer)	wet	6	method spec →	4, 12t vibratory roller
6-in. Minus Rockfill (service layer – Pond 7 only)	wet	6	method spec →	4, 12t roller (no vibration)
Pit-run Rockfill (berm)	wet	36	method spec →	6, 12t vibratory roller
Pit-run Rockfill (roads)	moist	18	method spec →	4, 12t vibratory roller

(1) At optimum Standard Proctor moisture content.

(2) Fills within 2 ft of sensitive structures, as determined by the Owner, shall be hand compacted with lift thickness varied accordingly.

(3) Tailings to be ±2% of optimum moisture content.

3.7 COMPACTION EQUIPMENT

1. Smaller hand operated compactors shall be used in restricted areas (such as small depressions in the ground surface) and adjacent to instruments, pipes, wells, existing liner or as directed.
2. Notwithstanding the above requirements, the equipment and compaction procedures employed by the Contractor shall be subject to Owner's approval.

3.8 WATERING EQUIPMENT

1. Equipment used to apply water to granular fill materials shall be designed to apply water uniformly. Water tank trucks shall be equipped with positive shutoff valves such that leakage from the nozzles will not occur when the equipment is not operating. In the event that leaks do occur, they shall be repaired immediately.
2. Watering equipment shall be capable of continuously delivering sufficient water immediately in front of the compaction equipment to saturate the lift or foundation being compacted but not allow uncontrolled surface water runoff. A fresh water source will be made available at Hawk Inlet.

3.9 RESTRICTIONS DUE TO WEATHER AND SUSPENSION OF OPERATIONS

1. The Contractor shall not place any fill when conditions for such operations are unsatisfactory due to rainfall, snow, freezing temperatures, fire hazard, or any other reason.
2. Where operations have been discontinued by the Contractor or suspended by the Owner, the effects of snow, rain, low temperatures, desiccation, or other adverse conditions shall be assessed by the Owner and the surficial layers of fill or foundation treated or replaced to the satisfaction of the Owner before resumption of fill placement.
3. In freezing conditions, the Contractor shall:
 - a) Not commence placing fill in air temperatures below 32°F;
 - b) Cease placing fill if air temperature drops below 28°F;
 - c) Not place frozen fill, incorporate snow or place fill on frozen surfaces; and
 - d) Remove frozen fill and scarify the fill or foundation surface and recompact the surface prior to placing additional material.
4. No payment will be made for any remedial work necessary for the resumption of fill operations.

3.10 SEDIMENT AND DRAINAGE CONTROL

1. The Contractor shall provide equipment and facilities such as silt fences, pumps and settling ponds as required to control drainage around the work site and to prevent the discharge of sediment from construction and precipitation run-off from entering any natural water course downstream of the Site.

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2. Sediment and drainage controls shall be to the satisfaction of the Owner.

3.11 QUALITY CONTROL

1. The Contractor shall be responsible for the quality of placed fill. The Owner may undertake quality assurance testing of in-place fill, including laboratory and field tests.
2. The Contractor shall give the Owner every opportunity to make such tests and shall render such assistance as is necessary to enable sampling and testing to be carried out expeditiously. The making of such tests by the Owner or the time taken to interpret the results shall not constitute grounds for a claim by the Contractor.
3. Testing shall be performed in accordance with the principles and methods prescribed by the American Society for Testing and Materials (ASTM) and other such recognized authorities.
4. Notwithstanding any quality assurance testing carried out by the Owner, the Contractor shall be responsible for performing such field tests as are necessary to control the quality of the fill in accordance with the Contract Documents.
5. As a minimum, the Contractor shall conduct the following quality control testing program on the compacted bedding material.

FILL DESCRIPTION	TESTS AND FREQUENCY (1 Test Per Vol. In yd ³)			
	MOISTURE CONTENT	IN-SITU DENSITY	GRADATION	STANDARD PROCTOR
Bedding Sand	500	500	500	2000

6. Testing shall be carried out across the full length, width and depth of the various fill zones so as to fully represent the overall quality of the structure.
7. The Contractor shall submit test results promptly, complete with measurements and calculations while earthworks are being constructed. Test results shall be referenced as to date, fill type, location, and elevation. Where in-place density and moisture content are determined by nuclear density gauge, periodic calibrations of the equipment shall be provided by volumetric density measurements and oven dry moisture contents as directed. Test results shall be reported to the Owner within 24 hours of the completion of each test.
8. The Contractor shall conduct regular topographic surveys to demonstrate the placement of fill to the specified lines, levels and tolerances. The Owner may from time to time conduct check surveys. Survey results shall be reported to the Owner within 24 hours of the completion of each survey.
9. If on the basis of the sampling and testing or if in the opinion of the Owner an area of the fill does not meet the specified requirements, such fill shall be removed and replaced with conforming material at no cost to the Owner. Rejection of fill material by the Owner may be made at source, on transporting vehicles, or in place.

10. Final acceptance of earthworks will be made only after materials have been dumped, spread, moisture conditioned, compacted and quality control tests and surveys have demonstrated compliance with the specified requirements.
11. Initial stockpile surveys/quantities will be supplied to the Contractor, and confirmation of volumes will be the Contractor's responsibility to avoid any material shortages. The Contractor shall be responsible for maintaining and efficiently utilizing the stockpiled materials for Work related use only to avoid any material shortages. The Contractor shall always use the closest available materials and disposal sites unless otherwise directed. The Contractor shall promptly inform the Owner of any potential material shortages. A material shortage will not be a basis for claiming additional compensation on account of a delay due to the material shortage.

PART 4 - MEASUREMENT AND PAYMENT

For Measurement and Payment see Section 4.2.

END OF SECTION 4.6

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SECTION 4.7 – FOUNDATION LINER

PART 1 – GENERAL

1.1 DESCRIPTION

1. The foundation geofabric liner system will be installed over a bedding layer Southeast Expansion – Area 2, and in Pond 7, as follows:
 - a) In Southeast Expansion –Area 2 the liner system consists of the following components, from bottom to top: non-woven geotextile; textured HDPE geomembrane; geocomposite drain; and, a lower service layer of specified sand. An upper service layer consisting of sand or “dry” tailings will be placed in the Southeast Expansion – Area 2.
 - b) In Pond 7, the liner system consists of the following components, from bottom to top: non-woven geotextile; textured HDPE geomembrane; and, a service layer of specified sand and rockfill. A layer of geocomposite drain shall be substituted with the non-woven geotextile underneath the geomembrane in instances where the bedding layer ultimately overlays bedrock on the pond slopes, or as directed. A service layer of sand will be placed on the invert and lower slopes of the pond. A layer of 6-inch minus rockfill armor will be placed over the service layer sand.

1.2 CODES AND STANDARDS

The latest version of the following Codes and Standards shall apply for the installation and field testing of the geofabric materials. The Standards applicable to the service layer are listed in Technical Section 4.6.

TEST TYPE	TEST METHOD	DESCRIPTION
Field Seam Test	ASTM D4437	Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
Field Seam Test	ASTM D4884	Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles
Field Seam Test	ASTM D5641	Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber
Field Seam Test	ASTM D6365	Standard Practice for the Non-Destructive Testing of Geomembrane Seams using the Spark Test
Field Seam Test	ASTM D6392	Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
Installation Damage	ASTM D5818	Standard Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage

1.3 SUBMITTALS

1. In preparing submittals, the Contractor shall recognize the need to be totally self-sufficient with regard to supply of labor, equipment and materials (other than the geofabrics and fills, which are provided by the Owner), for installing the liners within the approved schedule. Late completion of this work is subject to penalty.
2. The Contractor shall submit, with the bid, a list of personnel who will install the liner system. The Contractor shall obtain approval from the liner manufacturer to use the designated personnel, as required to satisfy manufacturer warranties. The Contractor shall submit construction methods in accordance with Section 4.1 and progress reports from the manufacturer's representative confirming proper installation. KGCMC strongly recommends the use of the material supplier (Northwest Lining and Geotextile Products) as the liner installation firm. Preferred consideration will be given for the use of the material supplier in bid evaluations, due to the historical use and specific material knowledge of the supplier.
3. The Contractor shall submit, with the bid, a list of equipment that will be used to place the liner and the service layer materials. In this submittal the Contractor shall provide commentary that demonstrates that the liner equipment is adequate to handle the load of placing the liners and that the service layer spreading and compacting equipment will not damage the liner.
4. The Contractor shall submit, with the bid, its method of connecting the new liner to the existing liner.
5. The Contractor shall submit, with the bid, a program of quality control testing to ensure that the existing liner along the connecting seam meets the tensile strength and strain properties as specified by the manufacturer for the existing liner (or approved equivalent) when it was originally supplied as new. The Contractor will supply all portable power generation units needed to perform the liner installation, as well as all required leads, extensions cords, ties, visquine and repair materials as required.
6. At least 14 days prior to starting geomembrane installation, the Contractor shall submit, for approval, a panel layout drawing which indicates at minimum the configuration of the liner panels and the general location of field seams.

PART 2 – PRODUCTS

2.1 GEOFABRICS

1. The Owner will provide the following geofabrics from Northwest Linings and Geotextile Products Inc., Kent, WA, or approved equivalent:
 - a) 100-mil SI Geosolutions Geotex 1001 non-woven geotextile,
 - b) 60-mil SI Geosolutions Geotex 601 non-woven geotextile,
 - c) 80-mil HDPE textured geomembrane, textured both sides, and,
 - d) 200-mil PermeaTex GC200-2-4080 geocomposite.

2.2 SERVICE LAYER

For specifications regarding the sand, tailings, or other materials that are required for the service layer and bedding layer, refer to Technical Section 4.6.

PART 3 – EXECUTION

3.1 GENERAL

1. The geotextile fabric, geomembrane liner, and geocomposite drain will be supplied and warehoused by the Owner and will be provided to the Contractor free of charge for the Work only. The Contractor shall supply and warehouse all other materials required to install the geofabric products. The Owner supplied liner will be kept in storage at Hawk Inlet or another location closer to the Work. The Contractor shall be responsible for material pick up from storage, transport to the placement location and protection of all materials once moved to the work site.
2. The Contractor shall accept responsibility of the liner supplies in storage and confirm quantities prior to the installation to avoid any delays or material shortages. The Contractor shall utilize the material supplies effectively to minimize waste and handle the materials to protect the liner integrity during transportation, installation and after installation and service layer installation.
3. The Contractor shall protect the geofabrics from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents during transport and storage.
4. The Contractor shall engage the services of an experienced technician/crew from the geofabric materials supplier who will directly supervise or perform the installation of its company's products. The supplier representative shall be on site at least one full day prior to the placement of any geofabric materials for safety training and shall remain on site until 100% of the liner system geofabrics have been installed and approved by the Owner.
5. The Contractor shall maintain in good repair and condition the equipment necessary to complete all liner installations, including power supplies and welding machines and accessories to avoid schedule delays or unnecessary repair work.
6. The Contractor shall provide spare welders and generators sufficient to prevent lost time due to equipment breakdown.
7. All geofabric materials shall be installed and quality assurance field tested in strict accordance with the manufacturer's recommended procedures. In instances of conflicts between these technical specifications and the manufacturer's procedures, the more onerous requirements shall prevail unless otherwise directed by the Owner.
8. Soft-soled safety footwear is required for all personnel who walk on the liner components to protect the liner from damage.
9. The Contractor shall exercise due caution to prevent injury to personnel, due to slipping on the liner, particularly when it is wet.

10. The Contractor shall arrive on site prepared to handle rain water collecting on the liner and have pre-made sand bags to hold the liner down during windy conditions. The Contractor is responsible to protect the liner from all weather damage, particularly from wind. The Contractor will be back charged for time and materials, if damage occurs from weather related incidents.
11. The Contractor shall remove construction debris from the Site and dispose of it in an environmentally responsible and legal manner.
12. Vehicular traffic shall not be permitted directly on the geofabrics.
13. The Contractor will supply sufficient personnel to facilitate liner installation while on site.

3.2 GEOFABRIC INSTALLATION

1. The Contractor shall excavate and expose the existing liner system and, in consultation with the Owner, shall determine the appropriate location along which to weld the new liner system to the existing liner system. In Southeast Expansion – Area 2, the non-woven geotextile of the new liner system that underlies the geomembrane shall be lapped not less than 4 feet over the non-woven geotextile of the existing liner system.
2. Seams shall be welded in accordance with manufacturer's recommendations. If resin is used for seam welding, the physical properties of the resin shall be the same as, or better than, those used in the manufacture of the geofabric.
3. Do not proceed with geomembrane panel placement and seaming when ambient temperatures are below 23°F, or above 104°F, during precipitation, in the presence of excessive moisture (e.g. fog, dew), nor in the presence of high winds.
4. Protect installed geofabrics from displacement, damage, or deterioration before, during and after placement of material layers.
5. Replace damaged, torn, or permanently twisted panels to approved condition. Remove rejected damaged panels from the site.
6. Keep seaming to a minimum. Orient seams up and down slopes. Horizontal seams must be more than 5 ft down slope from the toe of any slope.
7. Keep seam areas clean and free of moisture, dust, dirt, debris and foreign material.
8. Repair minor tears and pinholes in the geomembrane by patching until non-destructive testing is successful. Patches shall be round or oval in shape, made of the same geomembrane material, and extend a minimum of 3 inches beyond the edge of the defect.

3.3 GEOMEMBRANE QUALITY CONTROL

1. Test and document geomembrane seams as the seaming work progresses by non-destructive methods over their full length. Repair seams which do not pass non-destructive testing. Reconstruct seam between failed location and any passed test location, until non-destructive testing is successful.
2. Test and document seams in strength and peel at beginning of each seaming period, and at least once every 4 hours if the welding operation is interrupted, for each seaming apparatus and seamer used that day. Also test at least two samples from each panel, with samples taken from extra material, such that the panel is not damaged and the blanket geometry is not altered.
3. If the seam test specimen fails in seam, repeat on new specimen. If the new specimen fails in seam, material shall not be used for seaming until deficiencies are corrected and two consecutive successful test seams are achieved.
4. Test the seams by non-destructive methods over their full length, using vacuum test unit or air pressure test (ASTM D 4437 and ASTM D 5641).
5. Provide the test results to the Owner for each shift's production, including documentation of non-destructive testing and repairs at the end of each shift.

3.4 SERVICE LAYER

1. Conditions contained in Section 4.6 for the bedding layer shall also apply to the service layer.
2. The sand is susceptible to particle segregation during placing and spreading. The Contractor shall use placing and spreading methods that prevent segregation from occurring, or provide an approved method of repairing segregation prior to compacting the material.
3. Service Layer Arrangement
 - a) In areas to be overlain by tailings and where prepared grade is less than 10%, the first 1 ft of sand service layer shall be overlain by compacted "dry" tailings.
 - b) In areas to be overlain by tailings and where grade is 10% or steeper, the first 1 ft of sand service layer shall be overlain by a second 1 ft layer of service layer sand (for a total of 2 ft of sand).
 - c) In SE 2 area where the service layer sand will be overlain by 6-inch minus rockfill, the first 1-ft of sand service layer shall be overlain by a second 1 ft layer of service layer sand (for a total of 2 ft of sand), measured perpendicular to the liner.
 - d) In SE 2 area where the service layer sand will be overlain by 6-inch minus rockfill and the area is underneath a future road or haulage corridor, the first 1 ft of sand service layer shall be overlain by a second 1 ft layer of service layer sand (for a total of 2 ft of sand), and then a Geogrid and non-woven geotextile before placement of rockfill.
 - e) In Pond 7 invert the total service layer thickness is 2 ft, consisting of 1.5 ft of prescribed sand covered with a layer of 6-inch minus rockfill. The service layer sand shall be placed in a single

1.5 ft thick lift and compacted as prescribed in Section 4.6. The 0.5 ft thick layer of 6-inch minus rockfill on top of the service layer shall be compacted as prescribed in Section 4.6. The prescribed rockfill layer shall not be placed or compacted until the sand layer is compacted in accordance with the specification.

- f) In Pond 7, the service layer sand and rockfill shall be placed without compaction on the pond slopes as shown on the Drawings.
4. The Owner will provide a stockpile of “dry” tailings within 0.5 miles of the site. The Contractor shall be responsible for protecting the “dry” tailings supply pile from rainfall and runoff by tarping, ditching and similar measures. The Contractor shall dispose of any unsuitably wet tailings from the stockpile and replace it with “dry” tailings, at no cost to the Owner, provided the wet condition was due to Contractor’s negligence. Tarping materials shall be readily available and maintained during the project period over the tailings stockpile (account for wind and rain).
5. The Contractor will not be allowed access over the tailings service layer after placement is completed. Erosion and sediment controls will be a priority to maintain the surface integrity of the service layer and tailings. Perimeter surface runoff controls during liner tie-ins and construction shall be maintained to avoid flooding or unplanned spills.
6. The service layer sand, 6-inch minus rockfill, tailings, and other materials shall be placed as specified in Section 4.6. No equipment larger than a Caterpillar D5 wide track (low ground pressure) dozer or equivalent shall be used for placing the service layer. Compaction of the first lift above the geocomposite shall be done with a dozer initially and then with a smooth drum roller, with the vibrator turned off.
7. No placement or compaction of service layer material shall be carried out unless the Owner’s Representative is present.

PART 4 - MEASUREMENT AND PAYMENT

For Measurement and Payment see Section 4.2.

END OF SECTION 4.7

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SECTION 4.8 – DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

1. In Southeast – Area 2 only, the liner and tailings pile drainage system shall comprise pipe drains and lined surface ditches at the perimeter of the new liner installation, except where the new liner is connected to the old liner along the northeast edge.
2. The pipe drains consist of perforated HDPE pipe embedded in drain gravel covered with geotextile. The pipe drains will collect seepage water from the geocomposite and service layer of the liner and direct it to Pond 6.
3. Ditches shall be lined with reinforced polypropylene geomembrane. Velocity breaks consisting of small piles of clean rock shall be placed at intervals along the ditches, as directed.

PART 2 – PRODUCTS

2.1 GENERAL

1. The drain gravel, the drain pipe, the geomembrane liner, and ancillaries will be supplied by the Owner to the Contractor free of charge for the Work only. The materials will be stored at Hawk Inlet.

2.2 DRAIN GRAVEL

1. The drain gravel shall be clean, durable rock as described in Section 4.6 - Foundation Preparation and Fill.

2.3 DRAIN PIPE

1. In the SE2 area, perforated drain pipe for the collection drains shall consist of 8-inch diameter SDR9 HDPE pipe wrapped in a filter sock.
2. In the Pond 7 area only, perforated drain pipe for the French drains shall consist of 6-inch diameter SDR9 HDPE pipe wrapped in filter sock.
3. The drain pipe between Pond 7 invert and the wet well shall consist of 24-inch diameter SDR11 solid HDPE pipe.

2.4 SURFACE DITCH LINER BEDDING

1. Sand bedding (see Section 4.6) or non-woven geotextile (see Section 4.7) shall be used as required.

2.5 SURFACE DITCH LINER

1. The surface ditch liner shall consist of 36-mil reinforced polypropylene (RPP36) geomembrane from Northwest Linings and Geotextile Products Inc., Kent, WA, or approved equivalent.

2.6 VELOCITY BREAKS

1. Clean rock pieces, nominal 3-inch to 6-inch size, shall be used to construct velocity breaks, as directed.

PART 3 - EXECUTION

3.1 GENERAL

1. The Contractor shall be responsible for pick up of Owner supplied materials from storage and transport to the placement location.
2. Support of open trenches and excavations shall be in accordance with applicable laws and regulations.
3. The Contractor shall exercise due caution to prevent injury to personnel, particularly due to slipping on the liner when it is wet.
4. High winds and rain can occur at the site. The Contractor shall secure and protect all materials and installations of liner during construction to prevent wind-lifting, tearing or water damage to in-place bedding materials.

3.2 DRAIN GRAVEL

1. Drain gravel shall be placed as described in Section 4.6.

3.3 DRAIN PIPE

1. A pipe fusion machine will be made available to the Contractor at no charge. The Contractor shall be responsible for operating and maintaining the machine while in its possession. Pipe fusion and installation shall be in accordance with the manufacturer's requirements and to the Owner's satisfaction. Fusion welding shall be carried out by an experienced qualified welder, approved by the Owner. The Contractor will not receive extra compensation for any delays caused by Owner supplied equipment, if malfunctions occur. It remains the Contractor's responsibility to complete the work and keep the schedule.
2. Install temporary anchorage as required until permanent anchorage is constructed by Others.
3. The Contractor shall ensure that at least one set of pipe perforations coincide with the pipe invert when buried.

4. Molded connections shall be used to connect secondary pipe drains into the perimeter pipe drain.

3.4 SURFACE DITCH LINER BEDDING

1. Sand bedding or geotextile shall be placed as required to provide protection for the surface ditch liner from underlying rockfill.

3.5 SURFACE DITCH LINER

1. The geomembrane shall be installed in general accordance with Section 4.7. The use of scrap HDPE pieces from the main liner installation may be acceptable but requires Owner approval.

3.6 VELOCITY BREAKS

1. Small piles of clean rock shall be placed across the width of the ditch invert at regular intervals as directed.

PART 4 - MEASUREMENT AND PAYMENT

For Measurement and Payment see Section 4.2.

END OF SECTION 4.8

APPENDIX VI
QUANTITIES

SCHEDULE 1 – QUANTITIES AND PRICES (2005)

Sheet 1

ITEM	DESCRIPTION	UNIT	QUANTITY	POND 7	SE2
GENERAL (Common to SE2 and Pond 7)					
1.	<u>Mobilization and Demobilization</u>	LS	1		
<u>Site Development at 1.5-Mile A-Road Borrow Area</u>					
2.	Clear, Grub, Deck Logs, Pile/Burn Stumps and Woody Debris	acre	3.95		
3.	Strip Overburden (to sand) and Dispose (1 mile or less round trip)	b. cy	10,505		
<u>Excavation and Fill</u>					
	Produce 1" Minus Sand and Gravel (screened) for Utilities - Steps 1 and 3 Trench Backfill	cy			
	Produce 3" to 6" Gabion Rockfill (by-product of sand production)	cy	332		
<u>Excavate and Dispose:</u>					
4.	Common Material (Contaminated)	b. cy	11,939		
5.	Common Material (Uncontaminated)	b. cy	36,369		
6.	<u>Rock Fragmentation</u>	b. cy	19,541		
<u>Excavate, Process, Load, Haul and Place in Permanent Stockpiles:</u>					
7.	6-Inch Minus Rockfill - Stockpiled in Pit 5	s. cy	1,481		
8.	Processed Sand - Stockpiled at 1.5-Mile A-Road Borrow Site	s. cy	2,366		
<u>Excavate, Process, Load, Haul, Place and Compact:</u>					
9.	Sand - Bedding Layer	c. cy	6,224	3724	2464
10.	Sand - Service Layer	c. cy	11,970	4684	7286
11.	Sand - Trench Backfill	c. cy	2,437	2500	2157
<u>6-Inch Minus Rockfill for Permanent Works (~85% of total is required for Pond 7 work)</u>					
12.	Load, Haul, Place and Compact from Existing Stockpiles	c. cy			
13.	Excavate, Process, Load, Haul, Place and Compact	c. cy	15,423	15423	5922
<u>Load, Haul, Place and Compact Owner-supplied Drain Gravel:</u>					
14.	Drain Gravel - Trench Backfill	c. cy	1,005		
<u>Miscellaneous</u>					
15.	Instrumentation Assistance	PS	1		

Note: Quantities provided by KGCMC

Legend:

- b. cy means bank volume in cy
- s. cy means stockpiled volume in cy
- c. cy means compacted in place volume in cy

Continued on Sheet 2

SCHEDULE 1 – QUANTITIES AND PRICES

Sheet 2

ITEM	DESCRIPTION	UNIT	QUANTITY
POND 7			
<u>Excavation and Fill</u>			
32.	Pit Run Rock (Surplus, Uncontaminated) - Excavate, Load, Haul, and Place in Stockpiles (within 1.5-mile round trip)	s. cy	20,150
	<u>Excavate, Process, Load, Haul, Place and Compact:</u>		
33.	Sand - Road Fill	c. cy	
	<u>Excavate, Load, Haul, Place and Compact:</u>		
34.	Pit Run and Pit Run with Oversize - Rockfill	c. cy	34,347
35.	Access Road (15 ft. wide, 1 ft. thick, pit run rockfill over Owner-supplied woven geotextile)	ft	1,060
<u>Geofabrics (Install Owner Supplied Geofabrics)</u>			
36.	95-mil Non-Woven Geotextile for Liner Bedding	yd ²	10,067
37.	Geocomposite for Drainage (only over bedrock)	yd ²	6,711
38.	80-mil HDPE Geomembrane	yd ²	16,778
<u>Pipe (Install Owner Supplied Pipe)</u>			
39.	6-inch SDR-9 HDPE Pipe, Perforated, Wrapped in Filter Sock	Lineal ft	1,448
<u>Concrete Structures (Concrete and Reinforcing Supplied by Owner)</u>			
40.	Install Reinforced Concrete (Spillway and Pads)	cy	82
41.	Install Mass Concrete	cy	
<u>Miscellaneous</u>			
42.	Install Water Reclaim System	LS	1
43.	Install Gabion Inlet Structure	LS	1
44.	Leak Detection System Assistance	PS	1
45.	Install pH Tank and Tank 7	LS	1

Note: Quantities provided by KGCMC

Provisional Rates:

Item	Unit	
1. Overhaul of Excavated and Fill Materials (>1.5 miles one way)	cy-miles	8334

Legend:

- b. cy means bank volume in cy
- s. cy means stockpiled volume in cy
- c. cy means compacted in place volume in cy

APPENDIX VII
Piezometer Measurements
(by KGCMC)

Well #	Serial #	80222
PZ-P7-05-01	A(psi)	-1.329E-05
	B(psi)	-2.245E-02
	C(psi)	188.93
=AF ² +BF+C	T Offset (° C)	-0.2

Temperature Coefficients	
m (psi/°C)	0.0125
b (psi)	-0.308

LSE	Easting	Northing
123.00	39726.81	51886.75

Instrument(depth) 1.68 below pond liner
Instrument(elev) 121.32

Cable(ft) 500

Date	Hz	T (°C)	Temp Correction (psi)	Corrected T (°C)	Pressure Reading (psi)	Head (ft H ₂ O)	DTW	GW Level (ft)
09/07/05	3018.50	11.2	-0.166	11.0	-0.07	-0.17		NA
11/02/05	3019.7	5.3	-0.239	5.1	-0.27	-0.62		NA
11/22/05	3018.5	3.8	-0.258	3.6	-0.16	-0.38		NA
11/23/05	3018.0	4.0	-0.256	3.8	-0.11	-0.26		NA
12/07/05	3016.6	3.4	-0.263	3.2	0.03	0.06		121.37

Installed 8/26/05 in SE corner of Pond 7. Instrument is at the base of the sand bedding layer beneath liner.

Well #	Serial #	80216
PZ-P7-05-02	A(psi)	-9.391E-06
	B(psi)	-5.925E-02
	C(psi)	277.48
=AF ² +BF+C	T Offset (° C)	-0.3

Temperature Coefficients	
m (psi/°C)	0.0167
b (psi)	-0.377

LSE	Easting	Northing
124.25	39534.09	52160.24

Instrument(depth) 1.75 below pond liner
Instrument(elev) 122.50

Cable(ft) 500

Date	Hz	T (°C)	Temp Correction (psi)	Corrected T (°C)	Pressure Reading (psi)	Head (ft H ₂ O)	DTW	GW Level (ft)
09/07/05	3129.7	12.2	-0.168	11.9	-0.10	-0.24		NA
11/02/05	3130.7	6.5	-0.263	6.2	-0.32	-0.73		NA
11/22/05	3130.0	4.9	-0.290	4.6	-0.26	-0.60		NA
11/23/05	3129.2	5.0	-0.288	4.7	-0.17	-0.38		NA
12/07/05	3128.2	4.3	-0.300	4.0	-0.06	-0.14		NA

Installed 8/26/05 in NW corner of Pond 7. Instrument is at the base of the sand bedding layer beneath liner.

Well #	Serial #	80217
PZ-P7-05-03	A(psi)	-1.120E-05
	B(psi)	-4.363E-02
	C(psi)	239.12
=AF ² +BF+C	T Offset (° C)	-0.2

Temperature Coefficients	
m (psi/°C)	0.0136
b (psi)	-0.334

LSE	Easting	Northing
122.50	39588.63	51967.10

Instrument(depth) 2.47 below pond liner
Instrument(elev) 120.03

Cable(ft) 500

Date	Hz	T (°C)	Temp Correction (psi)	Corrected T (°C)	Pressure Reading (psi)	Head (ft H ₂ O)	DTW	GW Level (ft)
09/07/05	3067.2	12.0	-0.168	11.8	-0.21	-0.48		NA
11/02/05	3071.8	5.8	-0.252	5.6	-0.81	-1.87		NA
11/22/05	3069.9	4.1	-0.276	3.9	-0.62	-1.43		NA
11/23/05	3069.1	4.2	-0.274	4.0	-0.53	-1.22		NA
12/07/05	3069.4	4.0	-0.277	3.8	-0.56	-1.30		NA

Installed 8/26/05 in middle of Pond 7. Instrument is at the base of the sand bedding layer beneath liner.

Well #	Serial #	80213
PZ-P7-05-04	A(psi)	-1.589E-05
	B(psi)	-7.952E-03
	C(psi)	180.91
=AF ² +BF+C	T Offset (° C)	-0.1

Temperature Coefficients	
m (psi/°C)	0.0324
b (psi)	-0.753

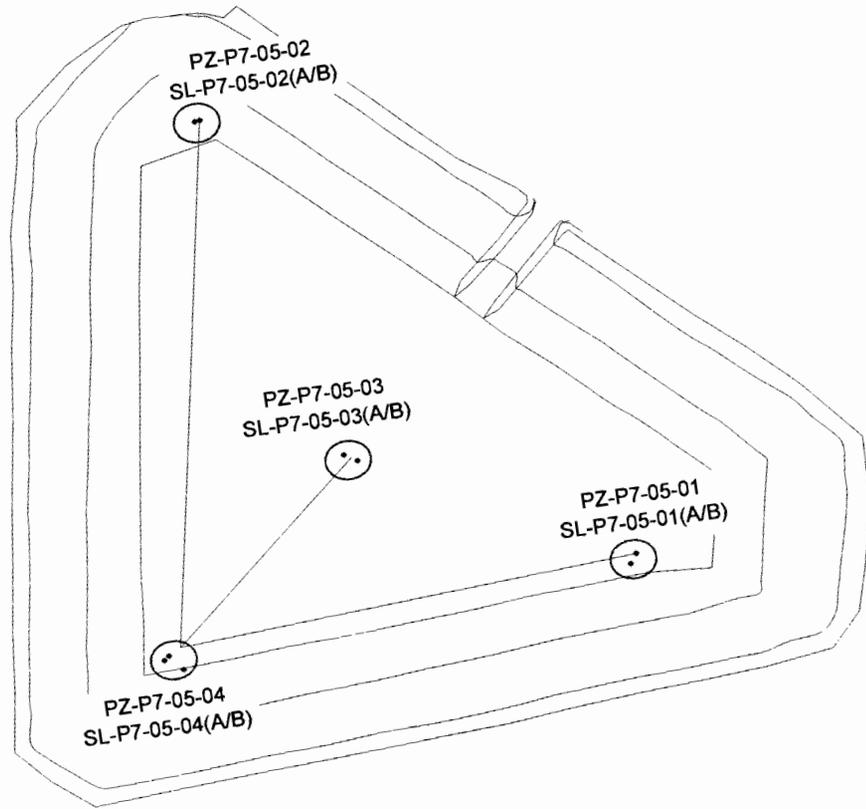
LSE	Easting	Northing
121.25	39488.02	51867.97

Instrument(depth) 2.07 below pond liner
Instrument(elev) 119.18

Cable(ft) 500

Date	Hz	T (°C)	Temp Correction (psi)	Corrected T (°C)	Pressure Reading (psi)	Head (ft H ₂ O)	DTW	GW Level (ft)
09/07/05	3137.4	11.7	-0.371	11.6	-0.86	-1.98		NA
11/02/05	#N/A	-52.2	-2.441	-52.3	#N/A	#N/A		#N/A
11/22/05	#N/A	-52.2	-2.441	-52.3	#N/A	#N/A		#N/A
11/23/05	3135.8	5.1	-0.585	5.0	-0.90	-2.08		NA
12/07/05	3134.8	4.4	-0.607	4.3	-0.82	-1.88		NA

Installed 8/27/05 in SW corner of Pond 7. Instrument is at the base of the sand bedding layer beneath liner.

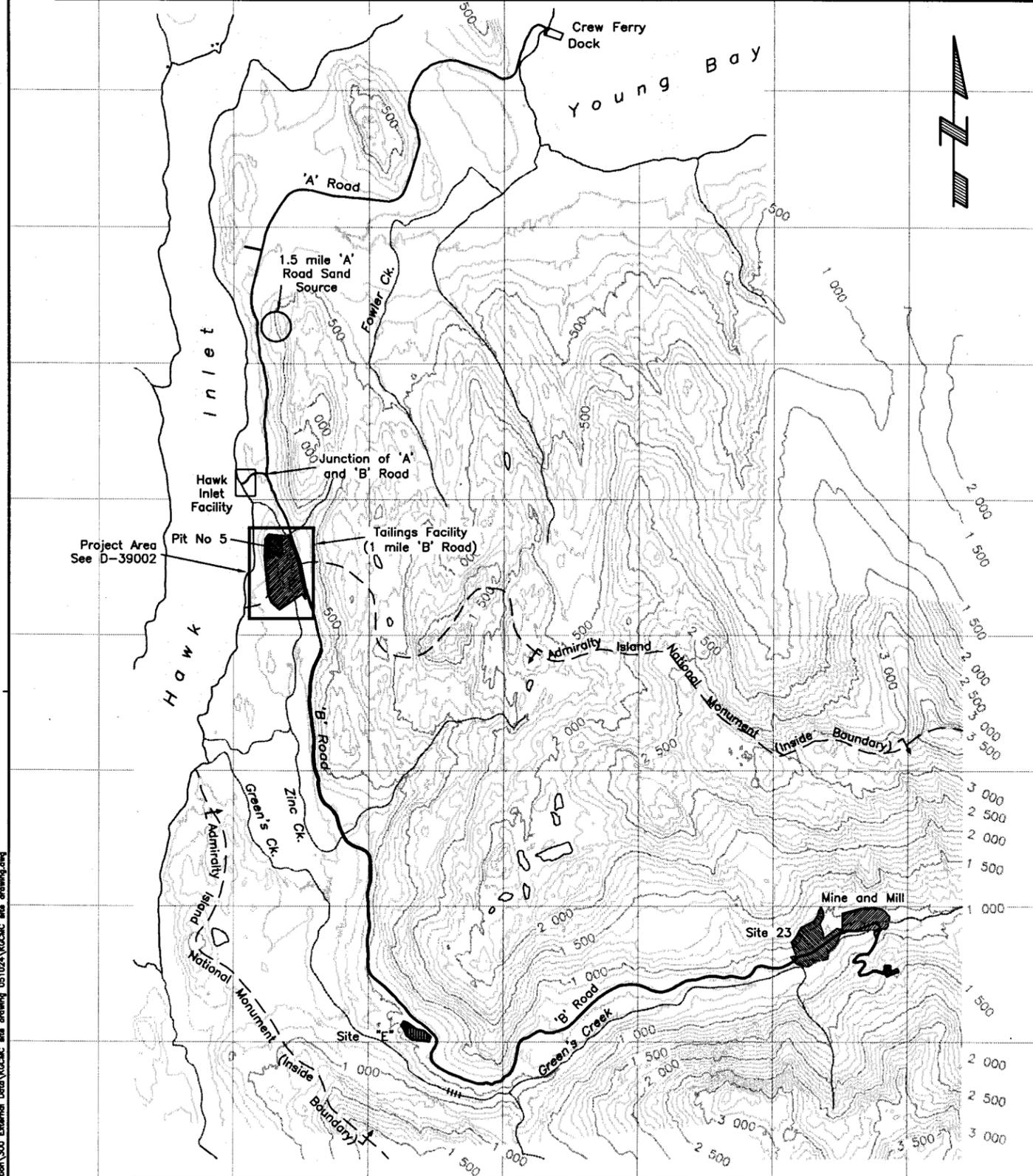


Measurement of Flow from Pond 7 French Drains (below liner)

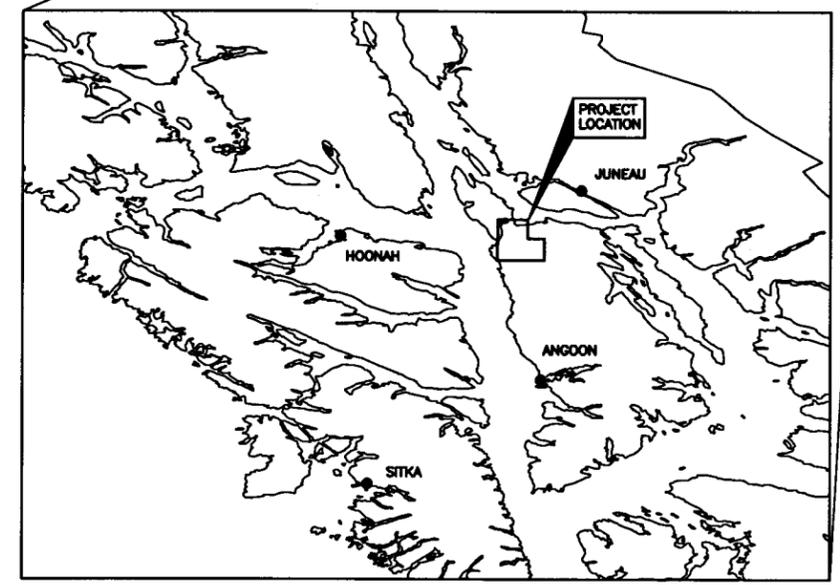
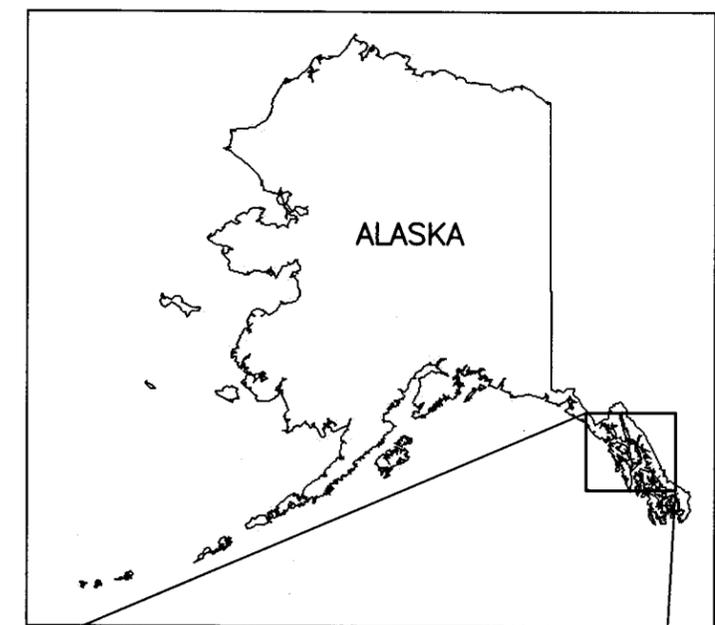
Date	Time	T (°C)	SC (umhos)	pH (su)	Flow (gpm)	Notes
11/22/05	12:30				3	
11/23/05	13:35	9.6	741	7.29	15	NTU 4.62
11/25/05	14:38	6.5	741	7.69	3.5	NTU 1.75
12/07/05	10:50				0	

DRAWINGS

- D-39001 Location Plan**
- D-39002 General Arrangement**
- D-39019 Pond 7 Excavated Surface Plan**
- D-39025 Pond 7 Liner Surface – Plan and Berm Layout**
- D-39026 Pond 7 Section and Details**
- D-39027 Pond 7 Spillway Channel – Plan**
- D-39028 Pond 7 Spillway Sections A, D, E, and Detail**
- D-39029 Pond 7 Spillway Sections B, C, and Details**
- GCM0203-1 Gabion Inlet Structure**



PLAN
SCALE A



KEY PLAN
SCALE: NTS

NOTES:

1. BASE PLAN PROVIDED BY KGCMC, OCTOBER 2005.
2. CONTOUR INTERVAL IS 100 FT.
3. ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE. COORDINATES AND ELEVATIONS ARE REFERENCED TO MINE DATUM.



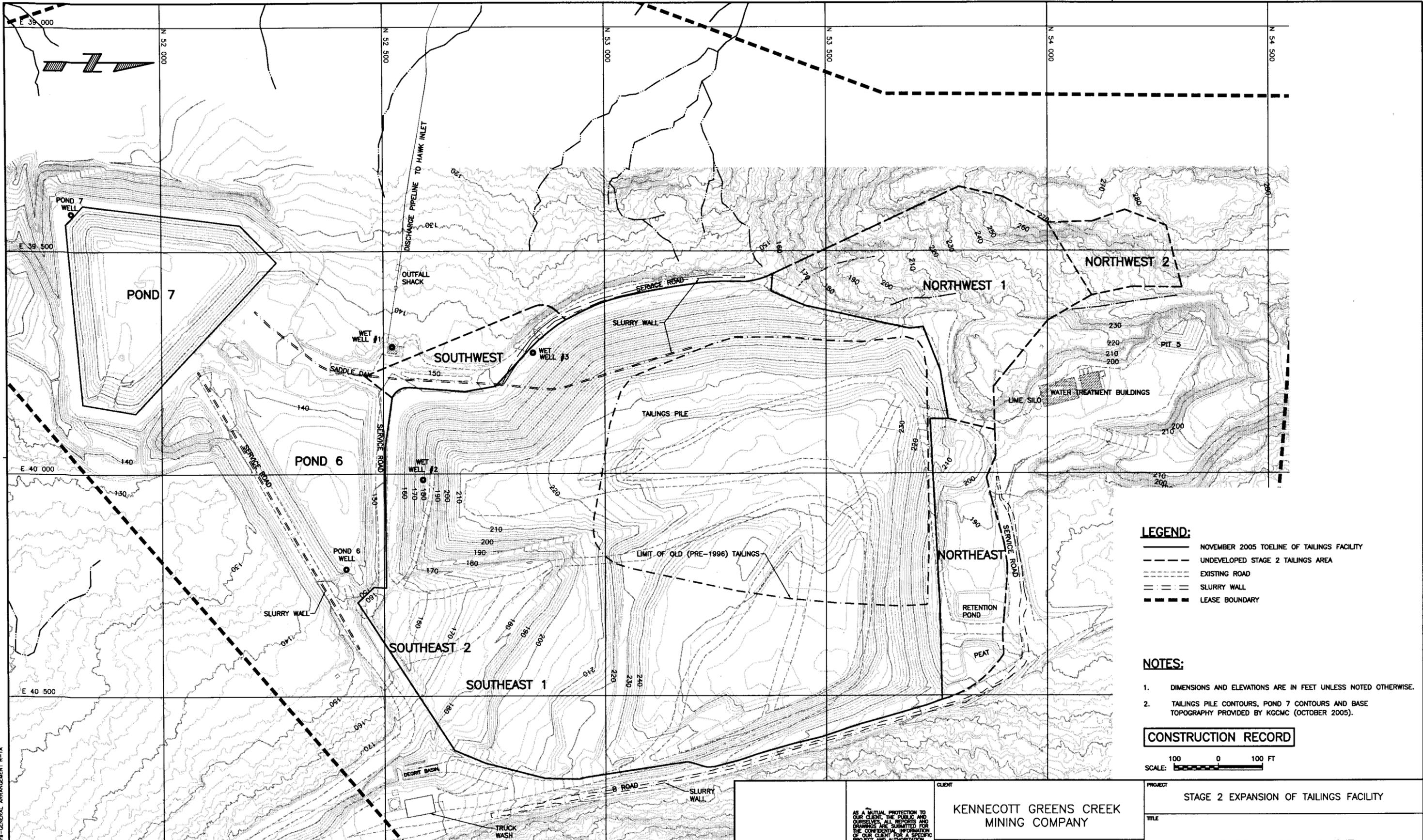
CONSTRUCTION RECORD

<small>AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.</small>	CLIENT	KENNECOTT GREENS CREEK MINING COMPANY	
	PROJECT	STAGE 2 EXPANSION OF TAILINGS FACILITY	
	TITLE	LOCATION PLAN	
	SCALE	PROJECT No.	DWG. No.
	AS SHOWN	M07802A39	D-39001
			REV. 1



NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
1	DEC. 21, 2005	CONSTRUCTION RECORD				
0	APR 13, 2005	APPROVED FOR CONSTRUCTION				

Time 10:11:59
 Date: 11/21/2005
 Source: H:\M07802A39 - 2005 Tailings Facility Design & Specifications\00 Drawings\110 As Built\0-39001-PL.dwg (plm)
 Source: H:\M07802A39 - 2005 Construction\00 External Data\KGCMC - 2005 Construction\00 External Data\KGCMC site drawing.dwg



- LEGEND:**
- NOVEMBER 2005 TOELINE OF TAILINGS FACILITY
 - - - UNDEVELOPED STAGE 2 TAILINGS AREA
 - EXISTING ROAD
 - == SLURRY WALL
 - LEASE BOUNDARY

- NOTES:**
1. DIMENSIONS AND ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE.
 2. TAILINGS PILE CONTOURS, POND 7 CONTOURS AND BASE TOPOGRAPHY PROVIDED BY KCCMC (OCTOBER 2005).

CONSTRUCTION RECORD

SCALE: 100 0 100 FT

Date: 12/2/2005
 Scale: 1"=200'
 Drawing by: M07802A39 - 2005 Tailings Facility Design & Specifications\00 Design\112 As Built\0-39002-R1.dwg (Hutton)
 Title: Pond Footprint - GENERAL ARRANGEMENT R-1A

NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
1	DEC. 21, 2005	CONSTRUCTION RECORD				
0	APR 13, 2005	APPROVED FOR CONSTRUCTION				

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CLIENT
 KENNECOTT GREENS CREEK
 MINING COMPANY



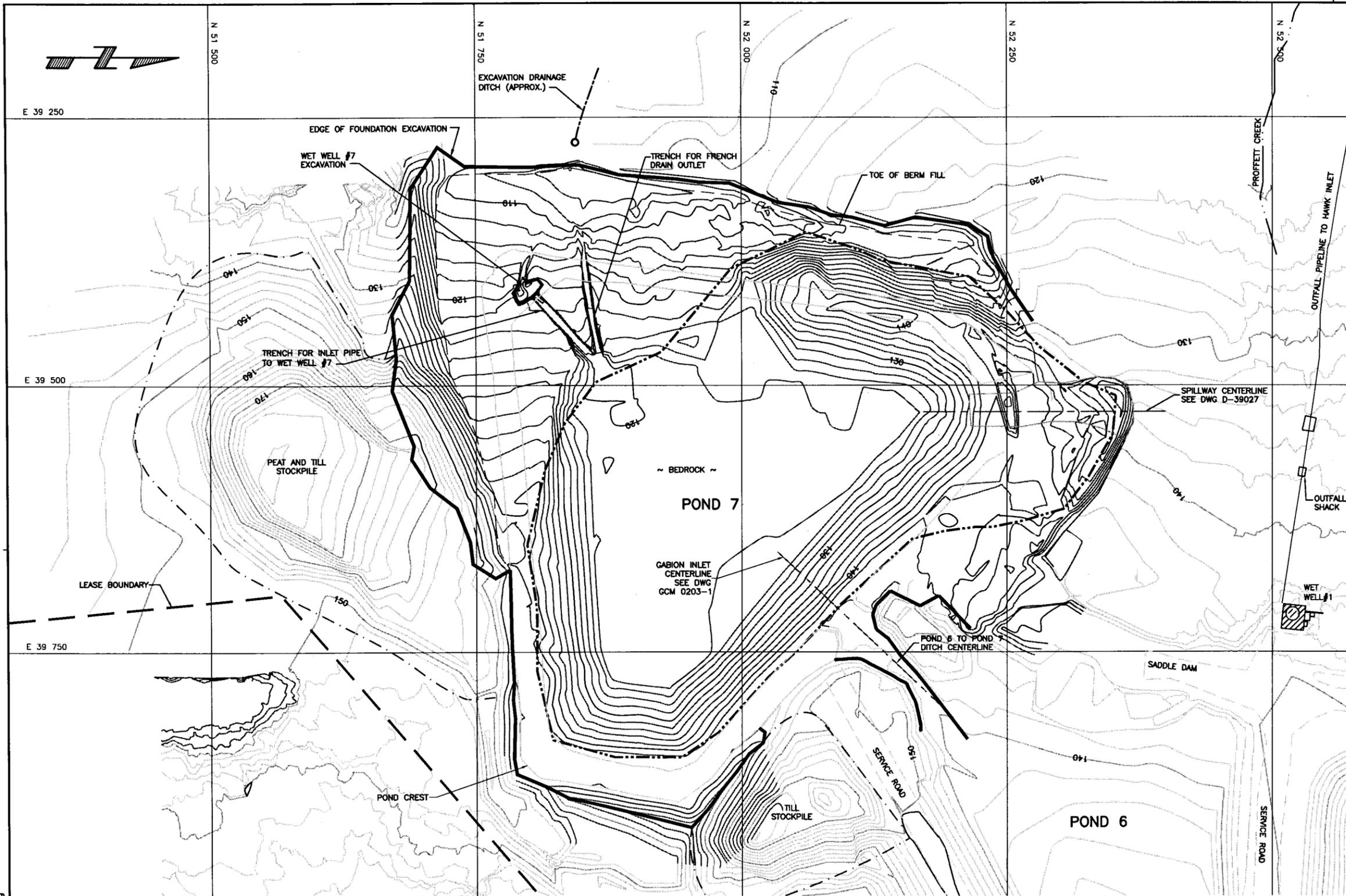
PROJECT
 STAGE 2 EXPANSION OF TAILINGS FACILITY

TITLE
 GENERAL ARRANGEMENT

SCALE	PROJECT No.	DWG. No.	REV.
AS SHOWN	M07802A39	D-39002	1

CANCEL PRINTS BEARING PREVIOUS REVISION

Scale: 1"=1'(PS)
 Drawing File: M:\M07802\A39 - 2005 Tailings Facility Design & Specifications\400 Design\412 As Built\A39-39019-RAcy.DWG (cwong)
 Xrefs: Contours 7802.pond 7.mssng

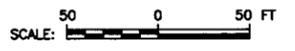


LEGEND:

- STOCKPILE BOUNDARY
- ROAD/ACCESS ROAD
- - - - - BEDROCK CONTACT

NOTES:

- POND 7 AREA EXCAVATION WAS SURVEYED AS WORK PROCEEDED. EXCAVATION CONTOURS AND OUTLYING AREA TOPOGRAPHY WERE PROVIDED BY KGCMC IN OCTOBER 2005.



CONSTRUCTION RECORD

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CLIENT
KENNECOTT GREENS CREEK MINING COMPANY

KLOHN CRIPPEN

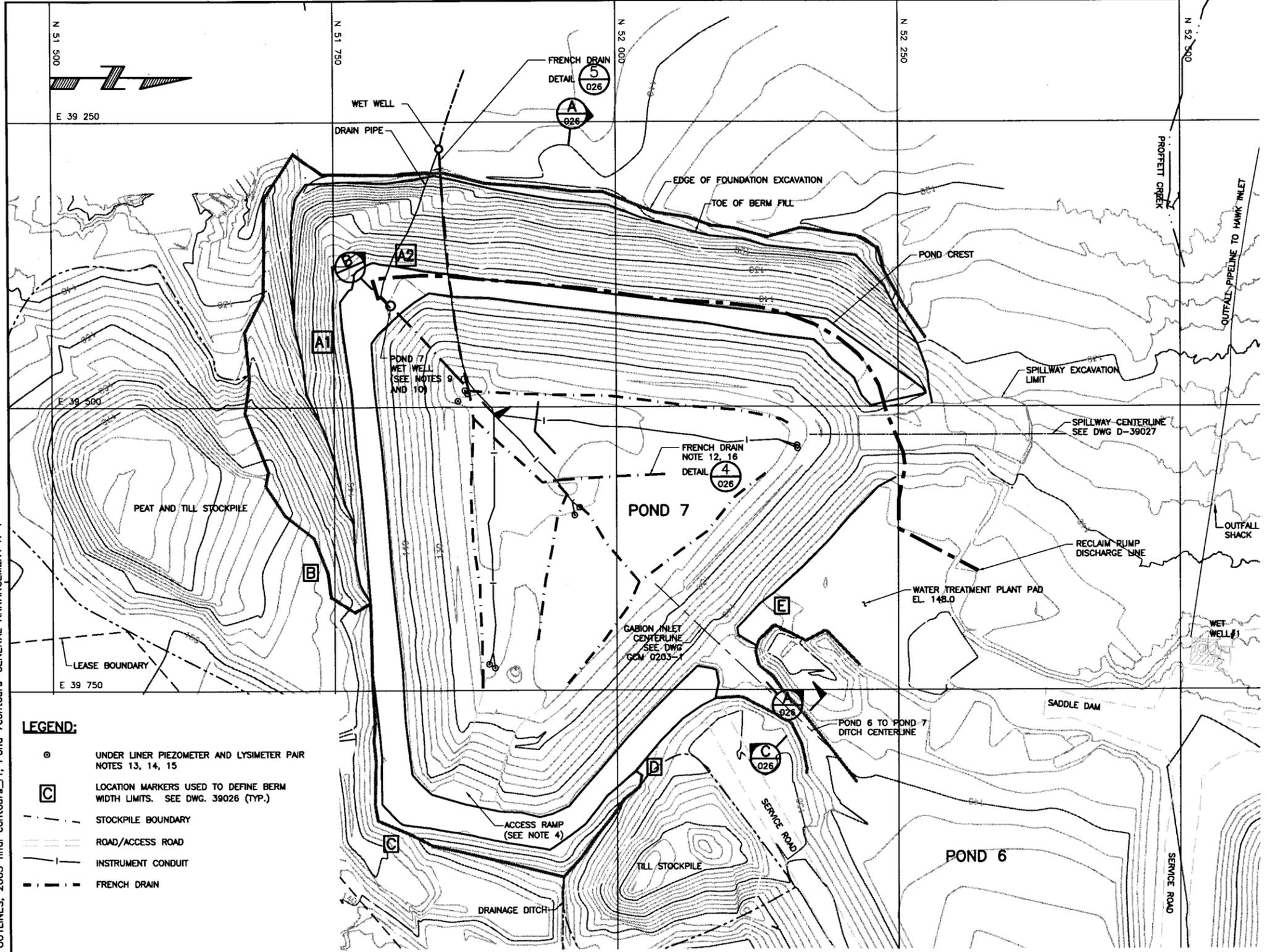
PROJECT STAGE 2 EXPANSION OF TAILINGS FACILITY	
TITLE POND 7 PLAN EXCAVATED SURFACE	
SCALE AS SHOWN	PROJECT No. M07802A39
DWG. No. D-39019	REV. A

NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
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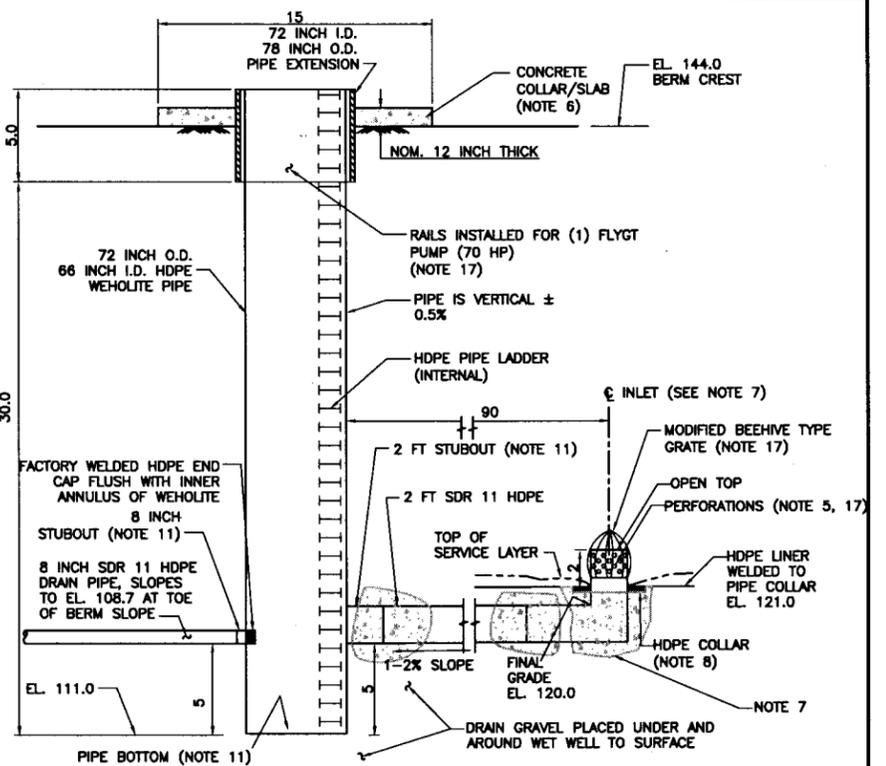
DRAWING NO.	REFERENCE DRAWING
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CANCEL PRINTS BEARING PREVIOUS REVISION

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 Drawing File: M:\M07802\A39 - 2005 Tailings Facility Design & Specifications\400 Design\412 As Built\A-D-39025-R1.dwg (LHutton)
 Xrefs: Pond 7 utility.r1, Pond 7 3 OUTLINES, 2005 final contours_r1, Pond 7 contours-GENERAL ARRANGEMENT R-1



- LEGEND:**
- UNDER LINER PIEZOMETER AND LYSIMETER PAIR NOTES 13, 14, 15
 - LOCATION MARKERS USED TO DEFINE BERM WIDTH LIMITS. SEE DWG. 39026 (TYP.)
 - - - STOCKPILE BOUNDARY
 - ROAD/ACCESS ROAD
 - - - INSTRUMENT CONDUIT
 - - - FRENCH DRAIN



- NOTES:**
1. POND 7 CONTOURS ARE THE FINAL SURFACE INCLUDING LINER AND SERVICE LAYER.
 2. POND 7 AREA AND OUTLYING AREA TOPOGRAPHY SURVEY WAS TAKEN OCTOBER 2005. TOPOGRAPHY WAS PROVIDED BY KGC/MC.
 3. DIMENSIONS AND ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE. COORDINATES AND ELEVATIONS ARE REFERENCED TO MINE DATUM.
 4. A 4H:1V SLOPE ACCESS RAMP WAS CONSTRUCTED OF 6 INCH MINUS ROCKFILL WITH MIN 1.5 FT BEDDING SAND USED TO PROTECT LINER SURFACE. MIN. 3 FT DEPTH OF ROAD FILL WAS PLACED. FILL WAS PLACED FROM THE TOP DOWN.
 5. PERFORATIONS ARE 1 INCH HOLES AT 4 INCH CENTERS ON EACH ROW. ROWS ARE AT 4 INCH CENTERS. STAGGER HOLE PATTERN ON ADJACENT ROWS.
 6. CONCRETE STRENGTH = 4500 PSI, COLLAR SHALL BE REINFORCED WITH A GRID OF #5 REBAR ON 12 INCH CENTERS PLACED 3 INCHES BELOW SLAB SURFACE AND WITH A GRID OF #5 REBAR ON 12 INCH CENTERS PLACED 8 INCHES BELOW SLAB SURFACE.
 7. JOINTS WERE LOCATED AT 4 FT., 46.5 FT., AND 88.5 FT. FROM ϵ OF THE INLET. CONCRETE WAS PLACED AROUND JOINTS.
 8. CONCRETE WAS PLACED TO PROVIDE CONTINUOUS SUPPORT FOR THE HDPE COLLAR.
 9. PUMP WELL AND OUTLET PIPE WAS EMBEDDED IN APPROXIMATELY 1.5 - 2 FT. OF DRAIN GRAVEL. INLET PIPE WAS EMBEDDED IN 3.5 - 4 FT. OF DRAIN GRAVEL. THE REMAINDER OF THE TRENCH WAS BACKFILLED WITH SERVICE LAYER ROCK FILL.
 10. PLACEMENT OF ALL FILL MATERIALS WITHIN A 3 FT RADIUS OF THE PUMP WELL WAS CARRIED OUT USING AN EXCAVATOR.
 11. WELDED HDPE PIPE BOTTOM AND STUBOUTS WERE FABRICATED BY MANUFACTURER.
 12. FRENCH DRAINS UNDER THE BERM AND IN THE POND WERE FIELD FIT AS SHOWN.
 13. DRAINS AND INSTRUMENTATION LEADS WERE EXTENDED TO THE TOE OF THE BERM AS SHOWN.
 14. INSTALLED 8 SUCTION LYSIMETERS BELOW THE WATER TABLE IN THE BASE OF THE POND (~75-100 FOOT SPACING). PLASTIC TUBING FROM THE LYSIMETERS WAS ROUTED THROUGH 3 INCH HDPE CONDUIT AS SHOWN. INSTALLED 4 VIBRATING WIRE PIEZOMETERS. CABLE LEADS WERE ROUTED THROUGH 3 INCH HDPE CONDUIT AS SHOWN. UNDER BERM INSTRUMENTATION WAS ROUTED THROUGH 8 INCH SDR17 HDPE CONDUIT.
 15. LOCATION OF INSTRUMENTS WERE FIELD FIT AS SHOWN.
 16. FRENCH DRAIN PIPING IS PERFORATED.
 17. NOT CONSTRUCTED AS OF DECEMBER 2005.

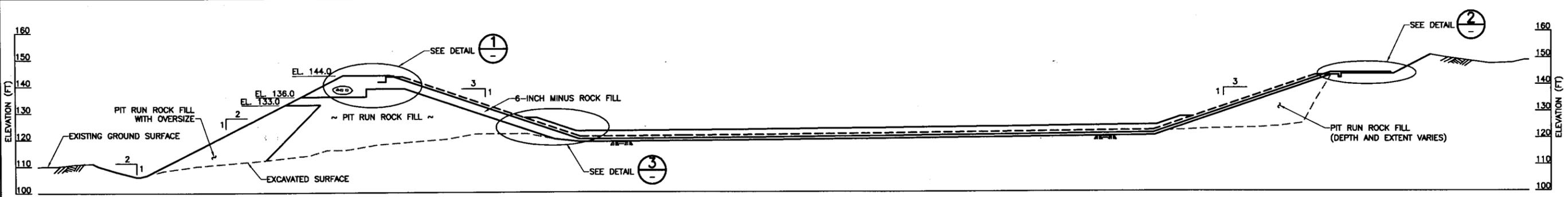
CONSTRUCTION RECORD

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0	APR 13, 2005	APPROVED FOR CONSTRUCTION				

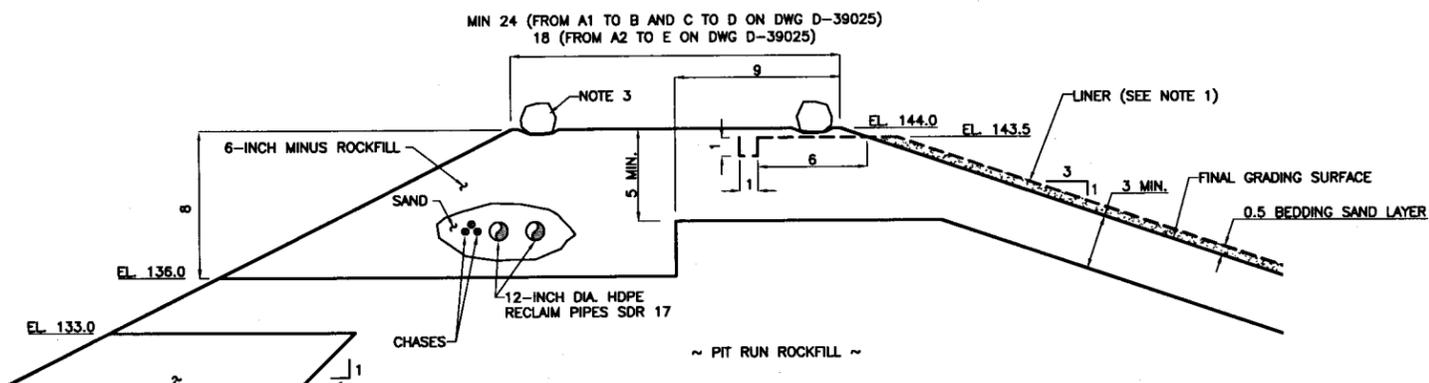
AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.	CLIENT	KENNECOTT GREENS CREEK MINING COMPANY		
	PROJECT	STAGE 2 EXPANSION OF TAILINGS FACILITY		
	TITLE	POND 7 FINAL SURFACE PLAN AND BERM LAYOUT		
SCALE	PROJECT No.	DWG. No.	REV.	
AS SHOWN	M07802A39	D-39025	1	



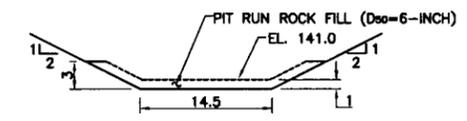
CANCEL PRINTS BEARING PREVIOUS REVISION



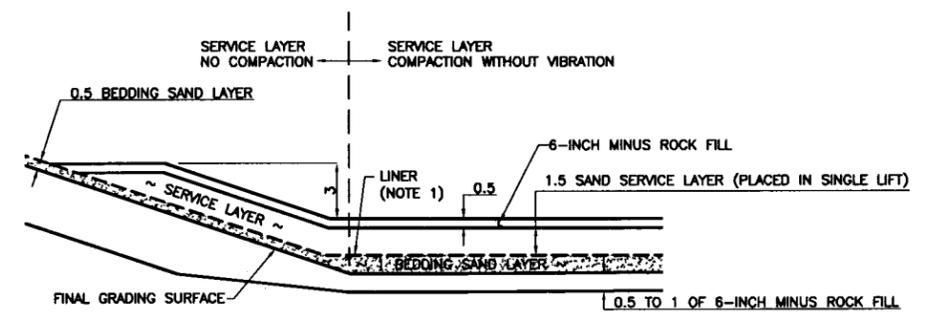
SECTION A
SCALE A



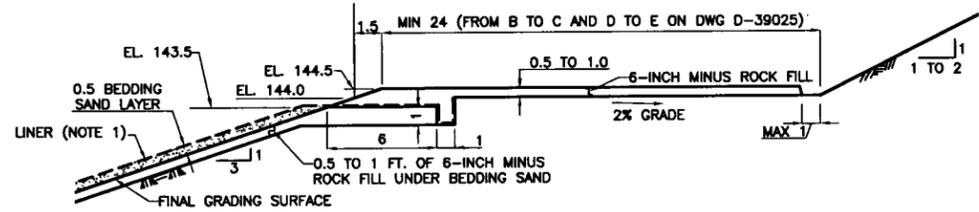
DETAIL 1 EMBANKMENT CREST AND GEOMEMBRANE DETAIL (TYP)
SCALE B



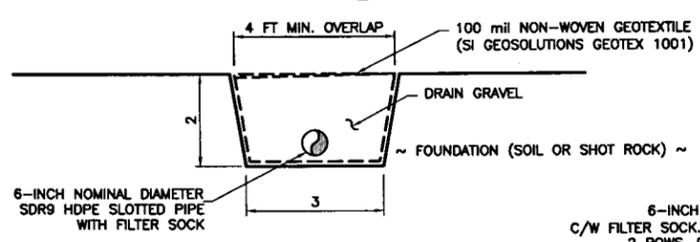
SECTION C CROSS SECTION OF POND 6 TO POND 7 DITCH IN OVERBURDEN (NOTE 6)
NTS



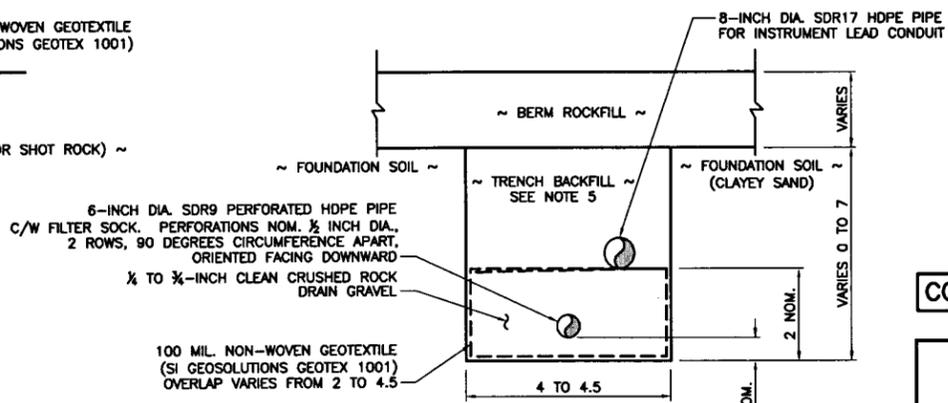
DETAIL 3 BEDDING LAYER AND SERVICE LAYER DETAIL (TYPICAL)
SCALE B



DETAIL 2 GEOMEMBRANE TIE-IN DETAIL ON BEDROCK OR TILL (TYPICAL)
SCALE B



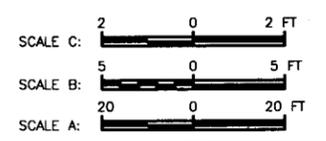
DETAIL 4 FRENCH DRAIN (TYP)
SCALE C



DETAIL 5 FRENCH DRAIN (TYP)
SCALE C

NOTES:

1. LINER CONSISTS OF GEOCOMPOSITE OR NON-WOVEN GEOTEXTILE OVERLAIN WITH 80 MIL HDPE GEOMEMBRANE. SEE SPECIFICATION FOR MATERIAL DETAILS.
2. DIMENSIONS AND ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE. COORDINATES AND ELEVATIONS ARE REFERENCED TO MINE DATUM.
3. BOULDERS WERE PLACED AS DIRECTED IN 6 INCH SWALE ALONG ROAD SHOULDER.
4. OWNER'S REPRESENTATIVE WAS NOT PRESENT DURING PLACEMENT OF SERVICE LAYER.
5. POND 7 FRENCH DRAIN TRENCH BACKFILL CONSISTS OF (BOTTOM TO TOP):
-1 TO 1.5 FT. OF 1/2 TO 3-INCH CRUSHED PEBBLES AND COBBLES
-1 TO 2 FT. MINUS 8-INCH PEBBLE/COBBLE/SAND SCREEN REJECT
-PIT RUN ROCK FILL
6. NOT COMPLETED AS OF DECEMBER 2005.



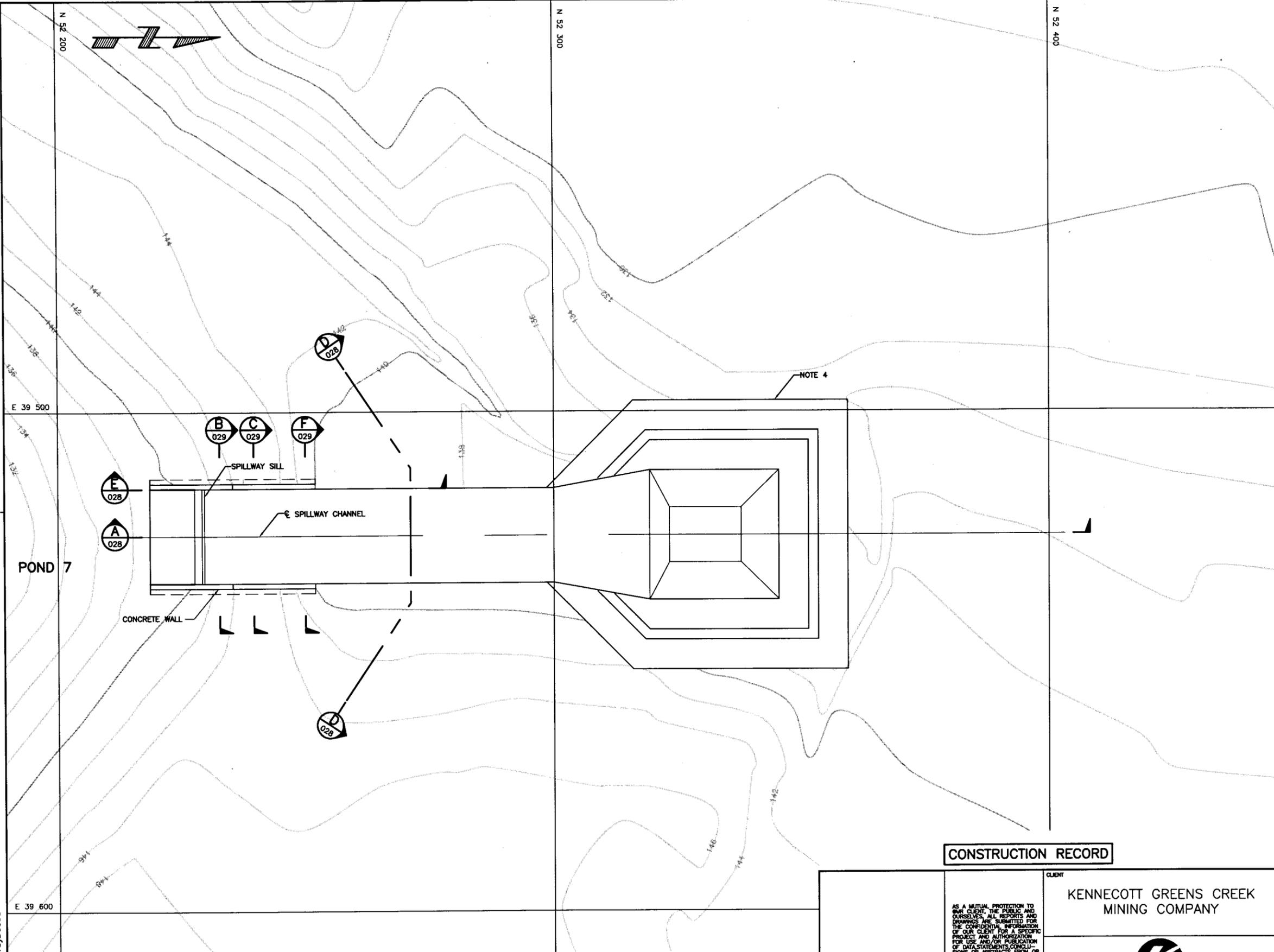
CONSTRUCTION RECORD

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1	DEC. 21, 2005	CONSTRUCTION RECORD				
0	APR 13, 2005	APPROVED FOR CONSTRUCTION				

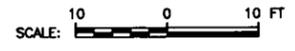
AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.	CLIENT KENNECOTT GREENS CREEK MINING COMPANY	PROJECT STAGE 2 EXPANSION OF TAILINGS FACILITY
		TITLE POND 7 SECTION AND DETAILS
	SCALE AS SHOWN	PROJECT No. M07802A39
		DWG. No. D-39026
		REV. 1

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 Xrefs: SpillwayDec05



- NOTES:**
1. POND 7 AREA TOPOGRAPHY WAS PROVIDED BY KCCMC NOVEMBER 2005.
 2. DIMENSIONS AND ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE.
 3. ACCESS ROAD WAS BUILT ACROSS SPILLWAY. (SEE SECTION D).
 4. DESIGN DETAILS ARE SHOWN FOR THE STILLING BASIN AND SPILLWAY CHANNEL. AS-CONSTRUCTED DIMENSIONS HAVE NOT BEEN MEASURED BUT APPEAR SIMILAR TO THE DESIGN, BASED ON THE OWNER'S OBSERVATION.

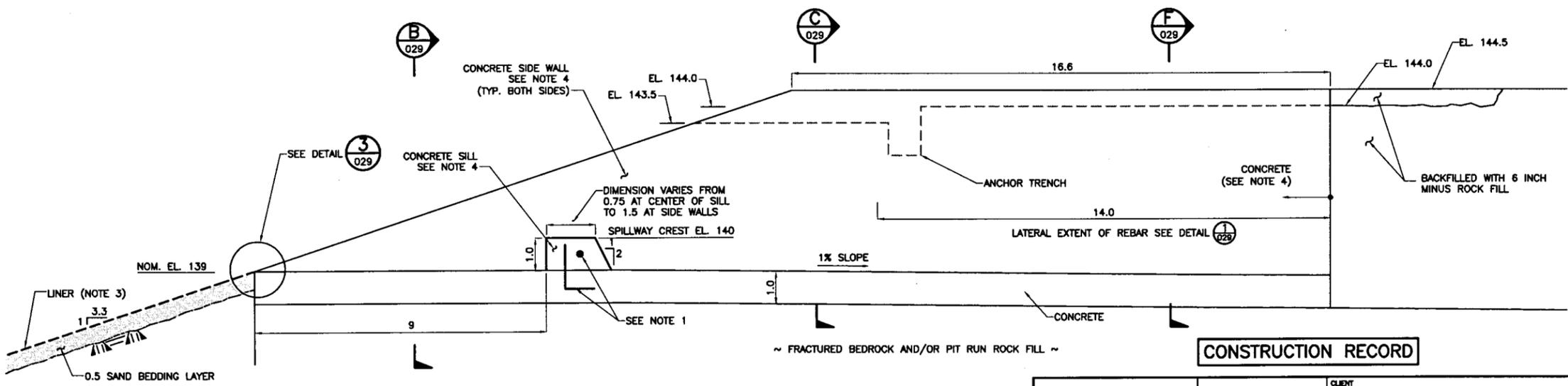
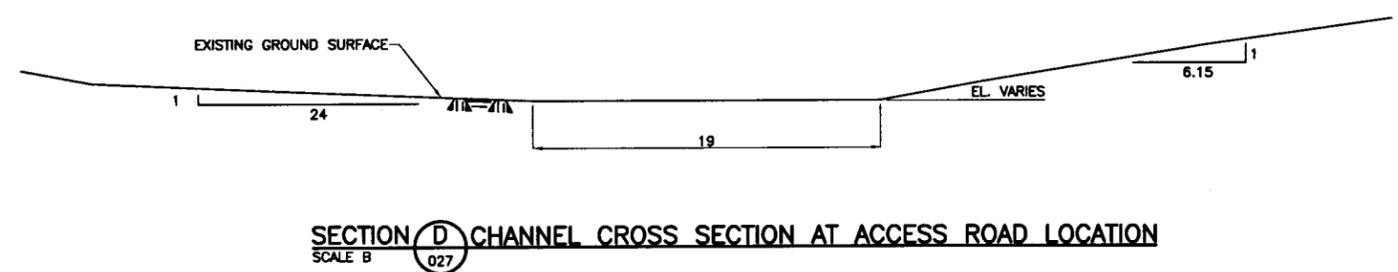
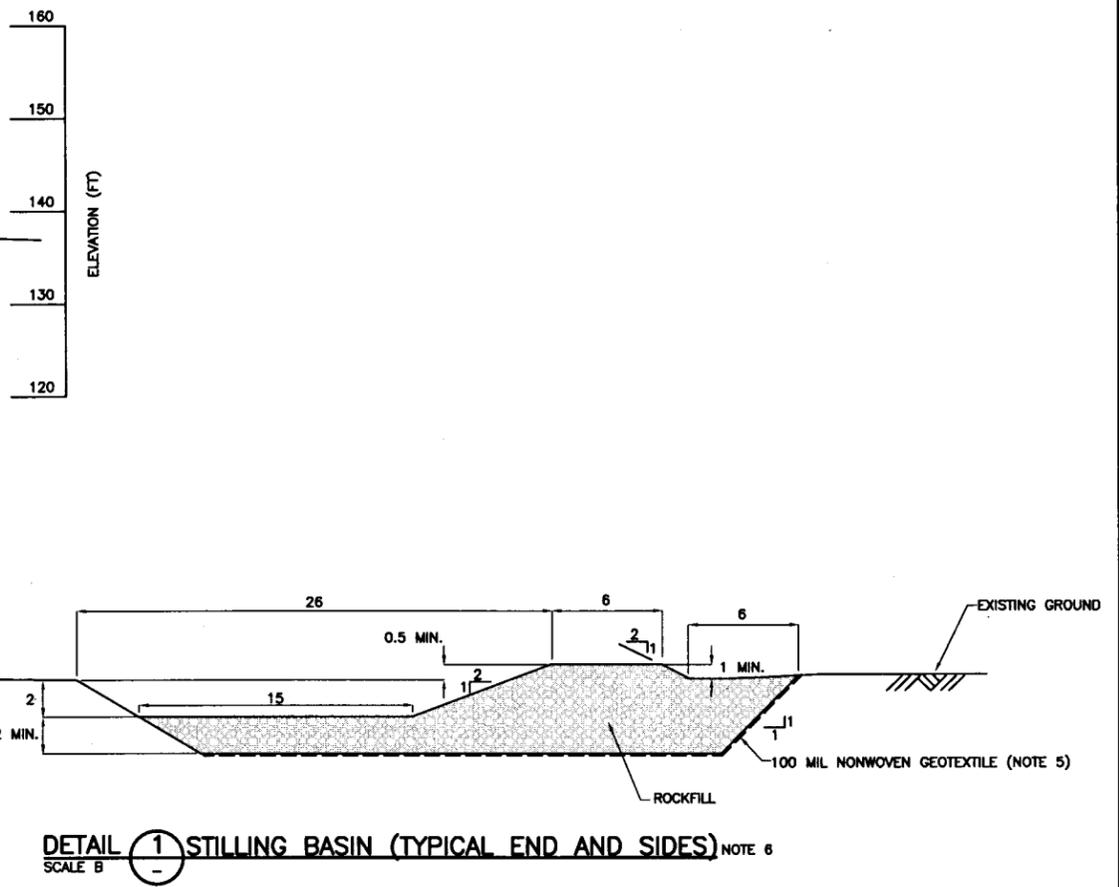
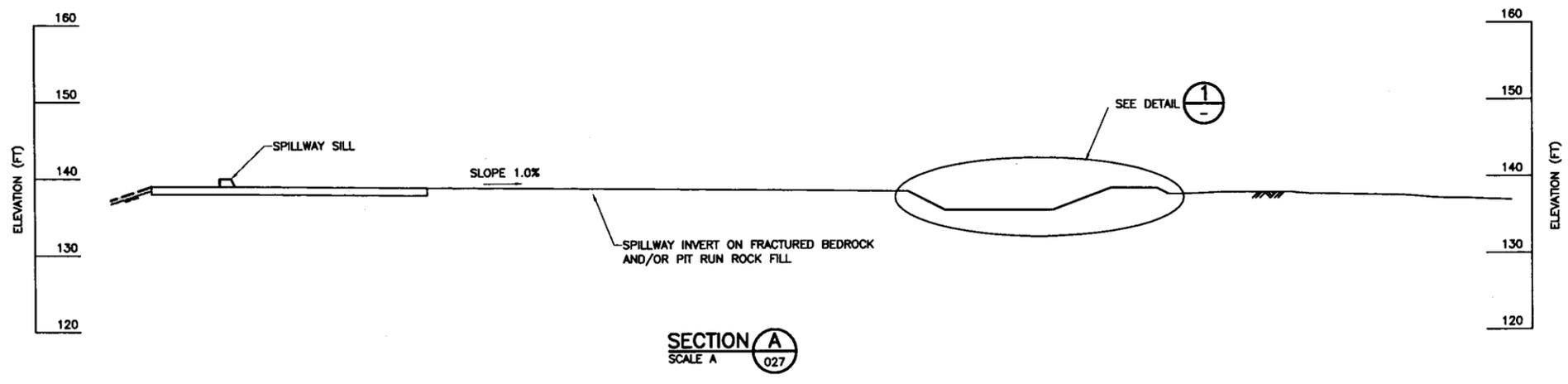


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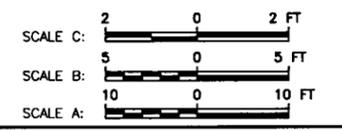
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1	DEC. 21, 2005	CONSTRUCTION RECORD				
0	APR 13, 2005	APPROVED FOR CONSTRUCTION				

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		TITLE POND 7 SPILLWAY CHANNEL PLAN
SCALE AS SHOWN	PROJECT No. M07802A39	DWG. No. D-39027
		REV. 1

CANCEL PRINTS BEARING PREVIOUS REVISION



- LEGEND:**
- SAND BEDDING LAYER
 - SELECT ROCK FILL ($Q_u = 6$ INCH)
 - ASSUMED BEDROCK
- NOTES:**
1. ANCHORS WERE #4 BARS AT MAXIMUM 3 FT SPACING. ONE HORIZONTAL #4 BAR WAS PLACED IN SILL.
 2. DIMENSIONS AND ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE. COORDINATES AND ELEVATIONS ARE REFERENCED TO MINE DATUM.
 3. LINER CONSISTS OF GEOCOMPOSITE OVERLAIN WITH 80 MIL HDPE GEOMEMBRANE.
 4. CONCRETE HAS WATER/CEMENT RATIO = 0.44 (SHOULD PROVIDE APPROX. 4350 PSI UCS).
 5. 100 MIL NON-WOVEN GEOTEXTILE WAS SI GEOSOLUTIONS GEOTEX 1001.
 6. DESIGN DETAILS ARE SHOWN FOR THE STILLING BASIN. AS-CONSTRUCTED DIMENSIONS HAVE NOT BEEN MEASURED BUT APPEAR SIMILAR TO THE DESIGN, BASED ON THE OWNER'S OBSERVATION.



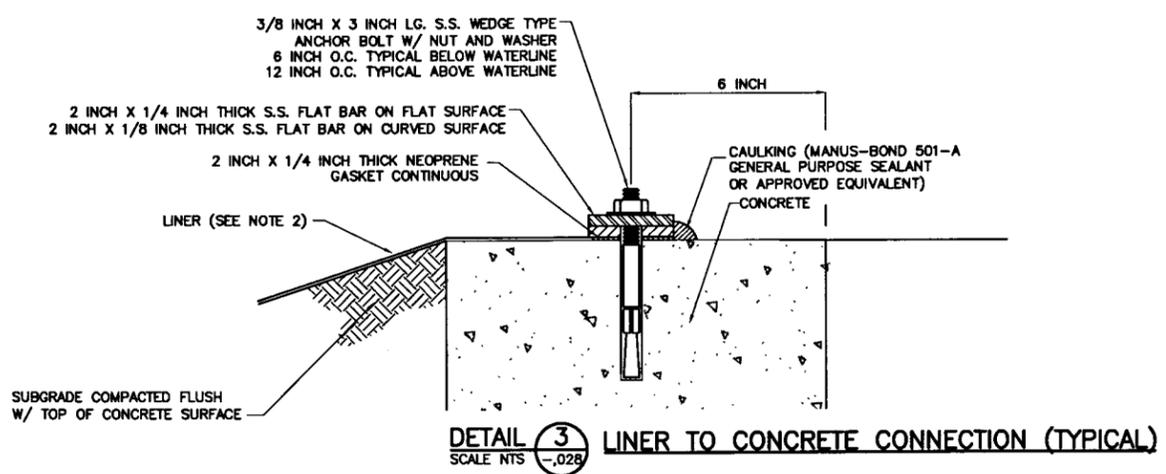
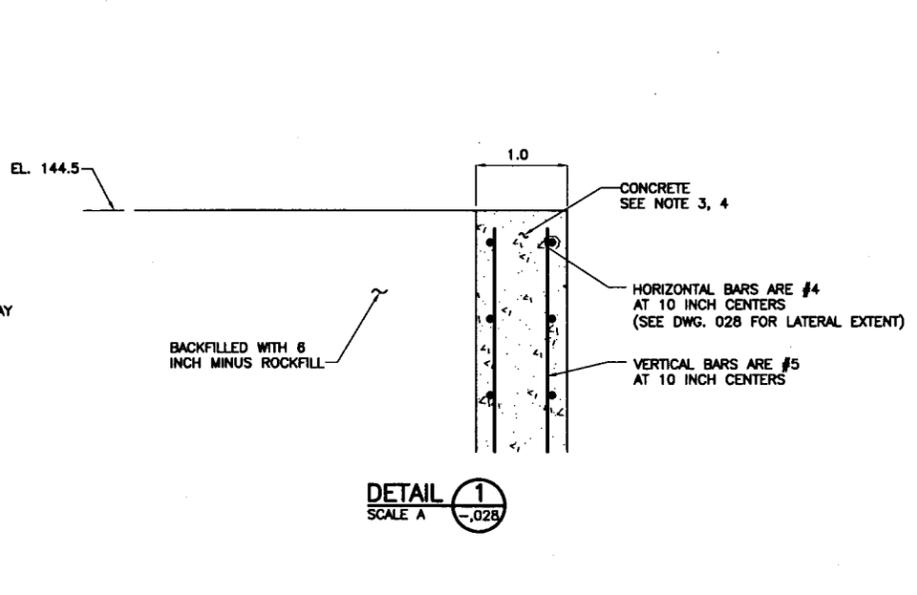
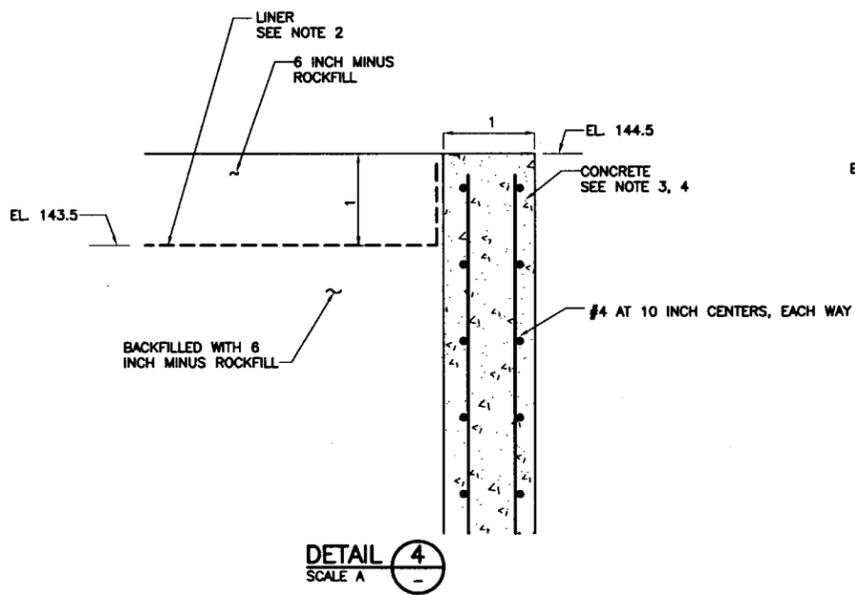
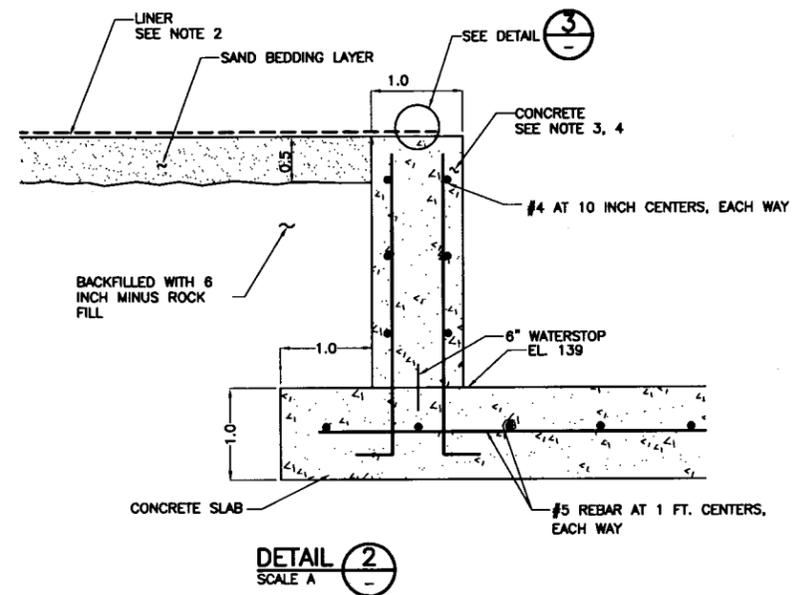
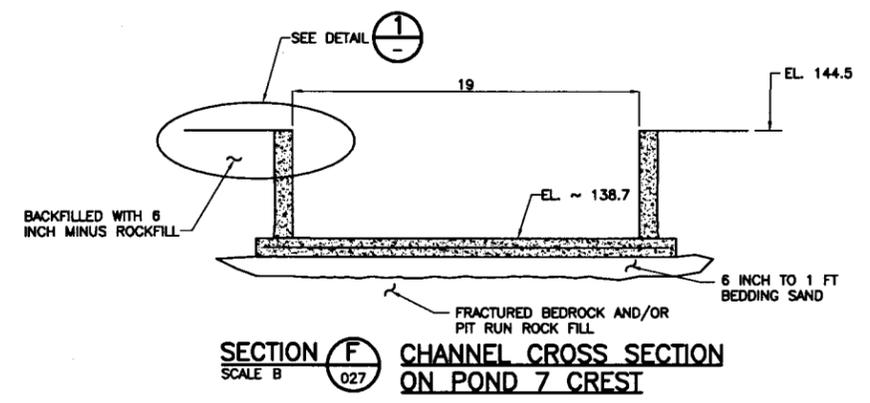
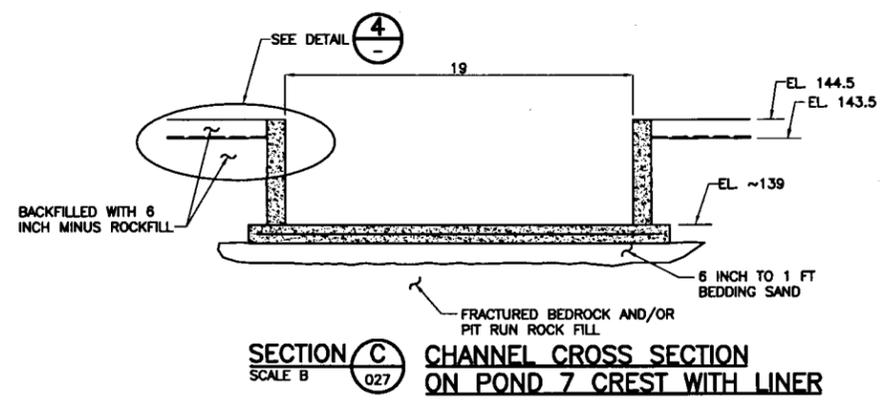
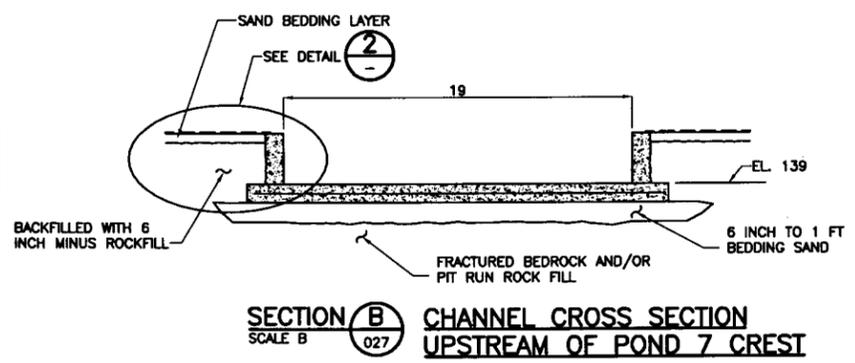
CONSTRUCTION RECORD

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		TITLE POND 7 SPILLWAY SECTIONS A, D, E AND DETAIL
DRAWING NO. AS SHOWN	PROJECT No. M07802A39	DWG. No. D-39028
		REV. 1

Time: 14:28:10 Date: 11/5/2005 Scale: 1"=0'(PS) Drawing File: M:\07802\A39 - 2005 Tailings Facility Design & Specifications\A00 Design\A12 As Built\A-39028-Rty.dwg (new)

Time: 14:11:53
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 Scale: 1"=0'(PS)
 Drawing File: M:\07602\A39 - 2005 Tailings Facility Design & Specifications\400 Design\412 As Built\A-39028-R1cyl.dwg (swong)



- NOTES:**
- DIMENSIONS AND ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE. COORDINATES AND ELEVATIONS ARE REFERENCED TO MINE DATUM.
 - LINER CONSISTS OF GEOCOMPOSITE OVERLAIN WITH 80 MIL HDPE GEOMEMBRANE. FROM EL. 139 FT. TO EL. 143.5 FT. LINER WAS ATTACHED TO CONCRETE WITH A WATERTIGHT CONNECTION (SEE DETAIL 3). ABOVE EL. 143.5, LINER TERMINATES AT WALL WITHOUT A WATER TIGHT CONNECTION (SEE DETAIL 4).
 - CONCRETE HAS WATER/CEMENT RATIO = 0.44 (SHOULD PROVIDE APPROX. 4350 PSI UCS).
 - CONCRETE COVER ON REINFORCING BARS WAS MINIMUM 2.5 INCHES.



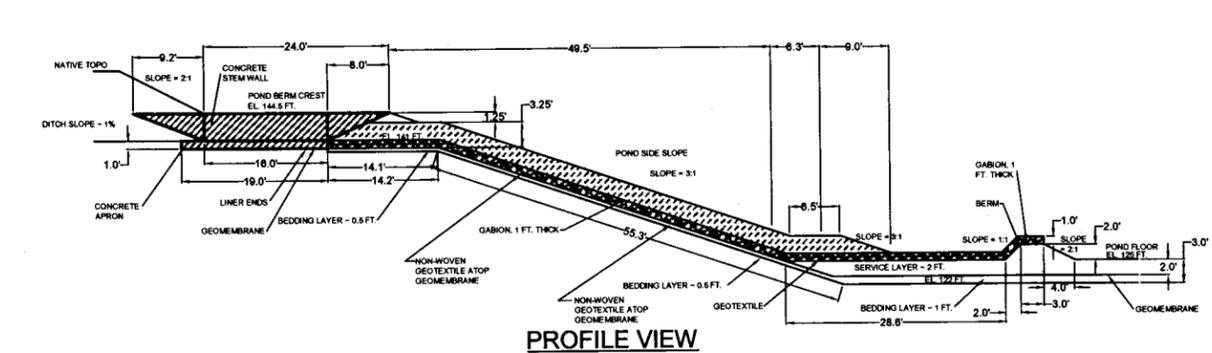
CONSTRUCTION RECORD

AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.	CLIENT	KENNECOTT GREENS CREEK MINING COMPANY	
	PROJECT	STAGE 2 EXPANSION OF TAILINGS FACILITY	
 KLOHN CRIPPEN	TITLE	POND 7 SPILLWAY SECTIONS B, C AND DETAILS	
	SCALE	PROJECT No.	REV.
	AS SHOWN	M07802A39	D-39029 1

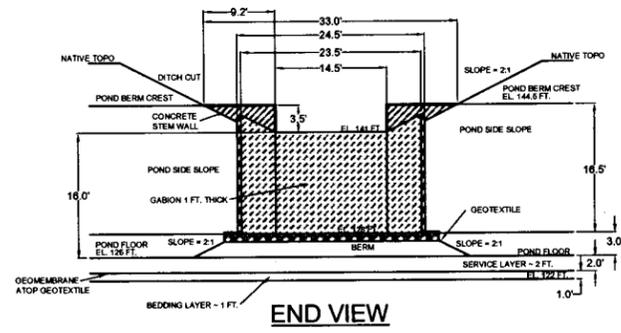
NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
1	DEC. 21, 2005	CONSTRUCTION RECORD				
0	APR 13, 2005	APPROVED FOR CONSTRUCTION				

CANCEL PRINTS BEARING PREVIOUS REVISION

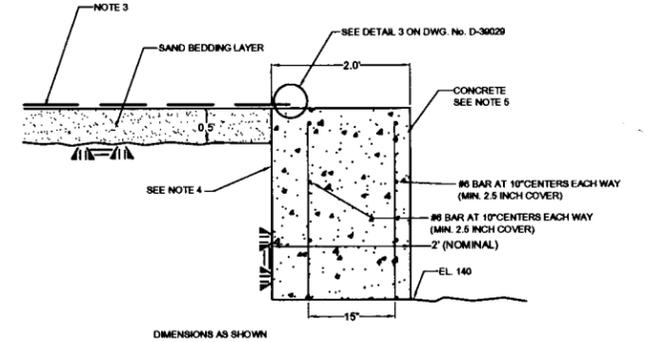
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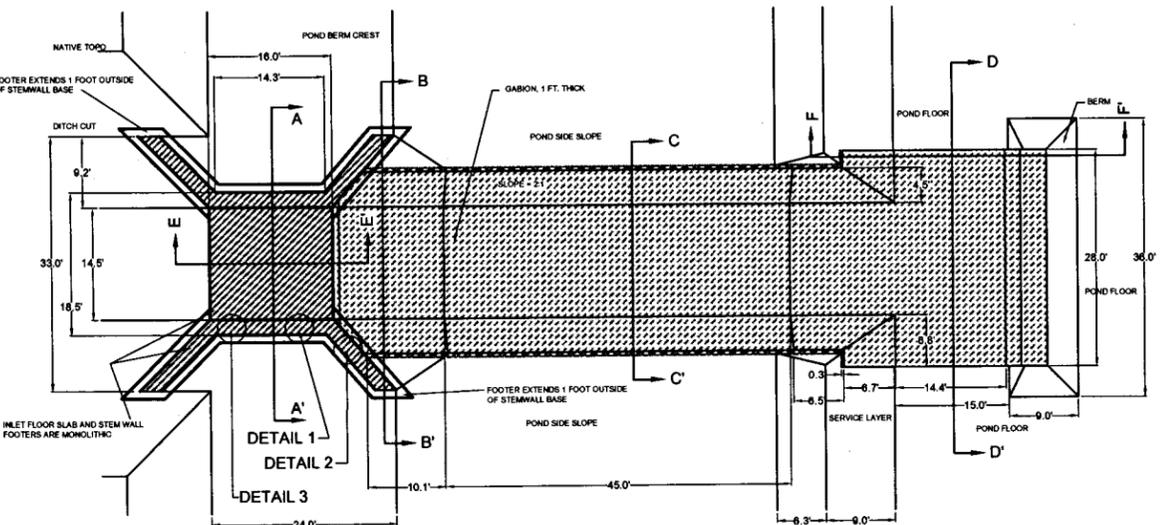
PROFILE VIEW



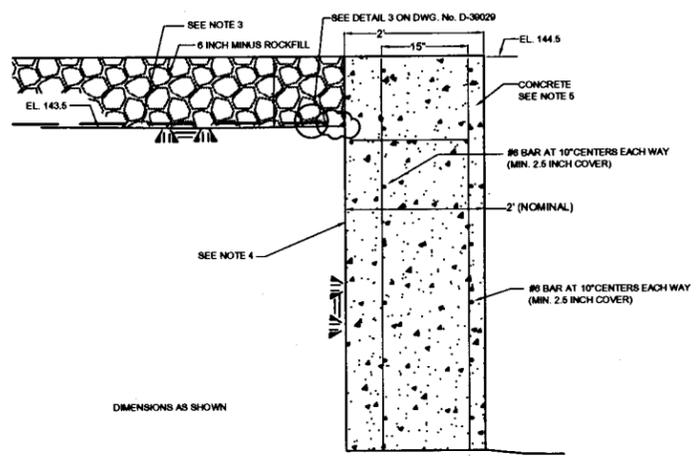
END VIEW



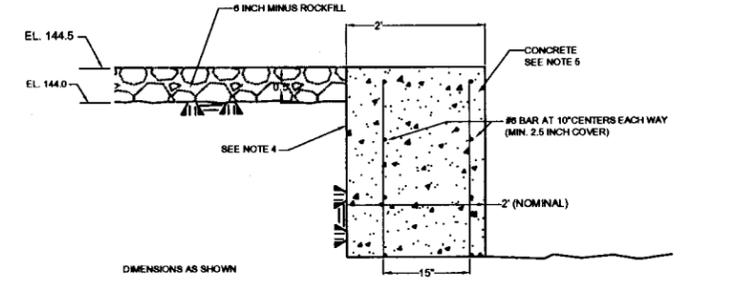
**DETAIL 2 - STEM WALL DETAIL
DOWNSTREAM OF LINER TIE-IN**



PLAN VIEW



**DETAIL 1 - STEM WALL DETAIL ON
POND 7 CREST WITH LINER**



**DETAIL 3 - STEM WALL DETAIL ON
POND 7 CREST BEYOND LINER**

GABION DESIGN SPECIFICATIONS

CHARACTERISTICS FOR POND FACE SLOPE		CHARACTERISTICS FOR CREST CHANNEL	
CHANNEL SLOPE	33.3%	CHANNEL SLOPE	1%
CHANNEL BOTTOM WIDTH	15 FEET	CHANNEL BOTTOM WIDTH	15 FEET
TOP OF GABION WIDTH	14.6 FEET	TOP OF GABION WIDTH	14.6 FEET
CHANNEL SIDE SLOPE	2:1	CHANNEL SIDE SLOPE	2:1
GABION MANNING	0.028	GABION MANNING	0.028
GABION THICKNESS	1 FOOT	GABION THICKNESS	1 FOOT
GABION FILL D60	4.5 INCHES	GABION FILL D60	4.5 INCHES
GABION FILL D85	3.0 INCHES	GABION FILL D85	3.0 INCHES
GABION FILL D100	2.0 INCHES	GABION FILL D100	2.0 INCHES
GABION FILL D150	1.5 INCHES	GABION FILL D150	1.5 INCHES
GABION FILL D200	1.0 INCHES	GABION FILL D200	1.0 INCHES
GABION FILL D250	0.75 INCHES	GABION FILL D250	0.75 INCHES
GABION FILL D300	0.5 INCHES	GABION FILL D300	0.5 INCHES
GABION FILL D375	0.375 INCHES	GABION FILL D375	0.375 INCHES
GABION FILL D450	0.25 INCHES	GABION FILL D450	0.25 INCHES
GABION FILL D525	0.1875 INCHES	GABION FILL D525	0.1875 INCHES
GABION FILL D600	0.15 INCHES	GABION FILL D600	0.15 INCHES
GABION FILL D675	0.1125 INCHES	GABION FILL D675	0.1125 INCHES
GABION FILL D750	0.0875 INCHES	GABION FILL D750	0.0875 INCHES
GABION FILL D825	0.075 INCHES	GABION FILL D825	0.075 INCHES
GABION FILL D900	0.0625 INCHES	GABION FILL D900	0.0625 INCHES
GABION FILL D975	0.05625 INCHES	GABION FILL D975	0.05625 INCHES
GABION FILL D1050	0.05 INCHES	GABION FILL D1050	0.05 INCHES
GABION FILL D1125	0.045 INCHES	GABION FILL D1125	0.045 INCHES
GABION FILL D1200	0.04 INCHES	GABION FILL D1200	0.04 INCHES
GABION FILL D1275	0.0375 INCHES	GABION FILL D1275	0.0375 INCHES
GABION FILL D1350	0.035 INCHES	GABION FILL D1350	0.035 INCHES
GABION FILL D1425	0.0325 INCHES	GABION FILL D1425	0.0325 INCHES
GABION FILL D1500	0.03 INCHES	GABION FILL D1500	0.03 INCHES
GABION FILL D1575	0.0275 INCHES	GABION FILL D1575	0.0275 INCHES
GABION FILL D1650	0.025 INCHES	GABION FILL D1650	0.025 INCHES
GABION FILL D1725	0.0225 INCHES	GABION FILL D1725	0.0225 INCHES
GABION FILL D1800	0.02 INCHES	GABION FILL D1800	0.02 INCHES
GABION FILL D1875	0.01875 INCHES	GABION FILL D1875	0.01875 INCHES
GABION FILL D1950	0.0175 INCHES	GABION FILL D1950	0.0175 INCHES
GABION FILL D2025	0.01625 INCHES	GABION FILL D2025	0.01625 INCHES
GABION FILL D2100	0.015 INCHES	GABION FILL D2100	0.015 INCHES
GABION FILL D2175	0.01375 INCHES	GABION FILL D2175	0.01375 INCHES
GABION FILL D2250	0.0125 INCHES	GABION FILL D2250	0.0125 INCHES
GABION FILL D2325	0.01125 INCHES	GABION FILL D2325	0.01125 INCHES
GABION FILL D2400	0.01 INCHES	GABION FILL D2400	0.01 INCHES
GABION FILL D2475	0.009375 INCHES	GABION FILL D2475	0.009375 INCHES
GABION FILL D2550	0.00875 INCHES	GABION FILL D2550	0.00875 INCHES
GABION FILL D2625	0.008125 INCHES	GABION FILL D2625	0.008125 INCHES
GABION FILL D2700	0.0075 INCHES	GABION FILL D2700	0.0075 INCHES
GABION FILL D2775	0.006875 INCHES	GABION FILL D2775	0.006875 INCHES
GABION FILL D2850	0.00625 INCHES	GABION FILL D2850	0.00625 INCHES
GABION FILL D2925	0.005625 INCHES	GABION FILL D2925	0.005625 INCHES
GABION FILL D3000	0.005 INCHES	GABION FILL D3000	0.005 INCHES
GABION FILL D3075	0.004375 INCHES	GABION FILL D3075	0.004375 INCHES
GABION FILL D3150	0.00375 INCHES	GABION FILL D3150	0.00375 INCHES
GABION FILL D3225	0.003125 INCHES	GABION FILL D3225	0.003125 INCHES
GABION FILL D3300	0.0025 INCHES	GABION FILL D3300	0.0025 INCHES
GABION FILL D3375	0.001875 INCHES	GABION FILL D3375	0.001875 INCHES
GABION FILL D3450	0.0015 INCHES	GABION FILL D3450	0.0015 INCHES
GABION FILL D3525	0.001125 INCHES	GABION FILL D3525	0.001125 INCHES
GABION FILL D3600	0.000875 INCHES	GABION FILL D3600	0.000875 INCHES
GABION FILL D3675	0.00075 INCHES	GABION FILL D3675	0.00075 INCHES
GABION FILL D3750	0.000625 INCHES	GABION FILL D3750	0.000625 INCHES
GABION FILL D3825	0.0005625 INCHES	GABION FILL D3825	0.0005625 INCHES
GABION FILL D3900	0.0005 INCHES	GABION FILL D3900	0.0005 INCHES
GABION FILL D3975	0.00045 INCHES	GABION FILL D3975	0.00045 INCHES
GABION FILL D4050	0.0004 INCHES	GABION FILL D4050	0.0004 INCHES
GABION FILL D4125	0.000375 INCHES	GABION FILL D4125	0.000375 INCHES
GABION FILL D4200	0.00035 INCHES	GABION FILL D4200	0.00035 INCHES
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GABION FILL D4350	0.0003 INCHES	GABION FILL D4350	0.0003 INCHES
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GABION FILL D4500	0.00025 INCHES	GABION FILL D4500	0.00025 INCHES
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GABION FILL D4725	0.0001875 INCHES	GABION FILL D4725	0.0001875 INCHES
GABION FILL D4800	0.000175 INCHES	GABION FILL D4800	0.000175 INCHES
GABION FILL D4875	0.0001625 INCHES	GABION FILL D4875	0.0001625 INCHES
GABION FILL D4950	0.00015 INCHES	GABION FILL D4950	0.00015 INCHES
GABION FILL D5025	0.0001375 INCHES	GABION FILL D5025	0.0001375 INCHES
GABION FILL D5100	0.000125 INCHES	GABION FILL D5100	0.000125 INCHES
GABION FILL D5175	0.0001125 INCHES	GABION FILL D5175	0.0001125 INCHES
GABION FILL D5250	0.0001 INCHES	GABION FILL D5250	0.0001 INCHES
GABION FILL D5325	0.00009375 INCHES	GABION FILL D5325	0.00009375 INCHES
GABION FILL D5400	0.0000875 INCHES	GABION FILL D5400	0.0000875 INCHES
GABION FILL D5475	0.00008125 INCHES	GABION FILL D5475	0.00008125 INCHES
GABION FILL D5550	0.000075 INCHES	GABION FILL D5550	0.000075 INCHES
GABION FILL D5625	0.00006875 INCHES	GABION FILL D5625	0.00006875 INCHES
GABION FILL D5700	0.0000625 INCHES	GABION FILL D5700	0.0000625 INCHES
GABION FILL D5775	0.00005625 INCHES	GABION FILL D5775	0.00005625 INCHES
GABION FILL D5850	0.00005 INCHES	GABION FILL D5850	0.00005 INCHES
GABION FILL D5925	0.00004375 INCHES	GABION FILL D5925	0.00004375 INCHES
GABION FILL D6000	0.00004 INCHES	GABION FILL D6000	0.00004 INCHES
GABION FILL D6075	0.0000375 INCHES	GABION FILL D6075	0.0000375 INCHES
GABION FILL D6150	0.000035 INCHES	GABION FILL D6150	0.000035 INCHES
GABION FILL D6225	0.0000325 INCHES	GABION FILL D6225	0.0000325 INCHES
GABION FILL D6300	0.00003 INCHES	GABION FILL D6300	0.00003 INCHES
GABION FILL D6375	0.0000275 INCHES	GABION FILL D6375	0.0000275 INCHES
GABION FILL D6450	0.000025 INCHES	GABION FILL D6450	0.000025 INCHES
GABION FILL D6525	0.0000225 INCHES	GABION FILL D6525	0.0000225 INCHES
GABION FILL D6600	0.00002 INCHES	GABION FILL D6600	0.00002 INCHES
GABION FILL D6675	0.00001875 INCHES	GABION FILL D6675	0.00001875 INCHES
GABION FILL D6750	0.0000175 INCHES	GABION FILL D6750	0.0000175 INCHES
GABION FILL D6825	0.00001625 INCHES	GABION FILL D6825	0.00001625 INCHES
GABION FILL D6900	0.000015 INCHES	GABION FILL D6900	0.000015 INCHES
GABION FILL D6975	0.00001375 INCHES	GABION FILL D6975	0.00001375 INCHES
GABION FILL D7050	0.0000125 INCHES	GABION FILL D7050	0.0000125 INCHES
GABION FILL D7125	0.00001125 INCHES	GABION FILL D7125	0.00001125 INCHES
GABION FILL D7200	0.00001 INCHES	GABION FILL D7200	0.00001 INCHES
GABION FILL D7275	0.000009375 INCHES	GABION FILL D7275	0.000009375 INCHES
GABION FILL D7350	0.00000875 INCHES	GABION FILL D7350	0.00000875 INCHES
GABION FILL D7425	0.000008125 INCHES	GABION FILL D7425	0.000008125 INCHES
GABION FILL D7500	0.0000075 INCHES	GABION FILL D7500	0.0000075 INCHES
GABION FILL D7575	0.000006875 INCHES	GABION FILL D7575	0.000006875 INCHES
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GABION FILL D7725	0.000005625 INCHES	GABION FILL D7725	0.000005625 INCHES
GABION FILL D7800	0.000005 INCHES	GABION FILL D7800	0.000005 INCHES
GABION FILL D7875	0.000004375 INCHES	GABION FILL D7875	0.000004375 INCHES
GABION FILL D7950	0.000004 INCHES	GABION FILL D7950	0.000004 INCHES
GABION FILL D8025	0.00000375 INCHES	GABION FILL D8025	0.00000375 INCHES
GABION FILL D8100	0.0000035 INCHES	GABION FILL D8100	0.0000035 INCHES
GABION FILL D8175	0.00000325 INCHES	GABION FILL D8175	0.00000325 INCHES
GABION FILL D8250	0.000003 INCHES	GABION FILL D8250	0.000003 INCHES
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GABION FILL D8475	0.00000225 INCHES	GABION FILL D8475	0.00000225 INCHES
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GABION FILL D10425	0.000000225 INCHES	GABION FILL D10425	0.000000225 INCHES
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GABION FILL D10650	0.000000175 INCHES	GABION FILL D10650	0.000000175 INCHES
GABION FILL D10725	0.0000001625 INCHES	GABION FILL D10725	0.0000001625 INCHES
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GABION FILL D10950	0.000000125 INCHES	GABION FILL D10950	0.000000125 INCHES
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GABION FILL D11100	0.0000001 INCHES	GABION FILL D11100	0.0000001 INCHES
GABION FILL D11175	0.00000009375 INCHES	GABION FILL D11175	0.00000009375 INCHES
GABION FILL D11250	0.0000000875 INCHES	GABION FILL D11250	0.0000000875 INCHES
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