JERICHO PROJECT
LONG LAKE DIVIDER DYKE A
CONSTRUCTION SPECIFICATIONS

Project No. 1100060.004

JUNE 2005

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Submitted To:

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LIST OF DRAWINGS

1.0 GENERAL

The Divider Dykes are zoned rockfill dykes used to retain tailings within cells of the Jericho Processed Kimberlite Tailings Facility. Two divider dykes (Dyke A and Dyke B) may eventually be constructed.

The structural body of all of the intermediate dykes is a rockfill shell. The upstream slopes of the rockfill slopes are overlain with crushed gravel filters bedded on transition materials. Where required, rip-rap and transition materials are provided for erosion protection on top of the upstream filters.

The divider dykes are to be constructed in stages. Construction of Dyke A to minimum elevation of 521 m will take place in 2005. The final lift of Dyke A and Dyke B will be constructed throughout mine operation as an ongoing activity.

2.0 MATERIALS

The material zones referenced in these specifications are designated on the Construction Drawings. Total material quantities have been estimated as follows:

Dyke	Zone	Material Type	Quantity
A	Filter	Crushed Granite – 20 mm maximum	4,800
	Transition	Rockfill – 200 mm maximum	4,800
	Shell	Mine Run Rockfill – 1000 mm maximum	24,000
	Rip-rap	Rockfill – 300 mm maximum	3,700

Material quantities for preliminary staged construction in 2005 have been estimated as follows:

Dyke	Zone	Material Type	Quantity
A	Filter	Crushed Granite – 20 mm maximum	1,800
Elevation	Transition	Rockfill – 200 mm maximum	1,800
521	Shell	Mine Run Rockfill – 1000 mm maximum	13,000
	Rip-rap	Rockfill – 300 mm maximum	1,000

Notes: (for Sections 2.1 and 2.2)

1. Volumes have been calculated based on 1.0 m bathymetry and topographic data provided by Tahera Surveys and Services Ltd., and 5.0 m interval contour data prepared by Eagle Mapping.
2. Site topography should be verified before construction by specific ground level surveys.
3. The volumes reported do not include contingency for bulking and waste.
4. The depth and volume of key trench excavation is dependent on the conditions encountered. The required depth will be determined during construction by the Geotechnical Engineer.

3.0 SITE CLEANUP

The Contractor shall remove all temporary structures and shall clean up the construction areas, borrow areas, and stockpile areas.

1.0 GENERAL

This section describes foundation preparation for the Intermediate Dykes.

2.0 GENERAL FOUNDATIONS

All lake ice must be removed below the dyke footprint.

Open graded boulders must be removed as determined by the Geotechnical Engineer.

2.1 Where organic soil and other unsuitable material occurs within the foundation area, such materials shall be removed. The prepared foundation surface must be approved by the Geotechnical Engineer.

2.2 All snow, ice or other debris shall be removed.

3.0 KEY TRENCH

3.1 The base of the filter and transition materials must be solidly keyed into the foundation.

3.2 In areas where the foundation consists of open graded boulders, encountered during the geotechnical investigations at shoreline areas, the key trench must be excavated to competent rock, till or lacustrine deposits.

3.3 Loose material, snow, ice or other debris shall be removed.

3.4 All material beyond immediate excavation limits, as determined by the Geotechnical Engineer shall be preserved in an undisturbed condition. When required by the Geotechnical Engineer, any overexcavated areas shall be backfilled by the Contractor using materials approved by the Geotechnical Engineer.

4.0 FOUNDATION APPROVAL

The foundation must be inspected and approved by the Geotechnical Engineer before any fill is placed. The contractor shall give reasonable notice to the Engineer and list which foundation areas require inspection and approval.

1.0 GENERAL

1.1 This section describes the material specifications for the fill materials of the Intermediate Dykes.

2.0 MATERIAL SOURCES

2.1 No material of any type shall be borrowed or excavated without the Owner's prior approval.

2.2 Pits and quarries shall be maintained and managed in accordance with stipulations set out in the Owner's land use and quarry permits.

2.3 Crushed Granite Filter material, shall be processed from material obtained from mine stripping operations or from other pits approved by the Owner providing it meets the specified requirements herein.

2.4 Transition Rockfill material, shall be obtained from mine stripping operations or from other pits approved by the Owner providing it meets the specified requirements herein. Processing will be required to achieve the specified gradation.

2.5 Mine Run Shell Rockfill material, shall be obtained from mine operation or from other pits approved by the Owner providing it meets the specified requirements herein. Particular quarrying and/or processing procedures may be required to achieve the specified top size.

2.6 Rip-rap Rockfill material, shall be obtained from mine stripping operations or from other pits approved by the Owner providing it meets the specified requirements herein. Particular quarrying and/or processing procedures may be required to achieve the specified top gradation.

3.0 MATERIAL SPECIFICATIONS

3.1 Crushed Granite Filter

The Crushed Granite used for the filter material shall consist of hard durable particles, shall be free of roots, topsoil and other deleterious material and shall have a particle size distribution as presented in Table 3.1. Processing will be required to achieve the specified paraticl size distribution.

TABLE 3.1
PARTICLE SIZE DISTRIBUTION FOR CRUSHED GRANITE FILTER

Particle Size (mm)	% Passing
20	100
12.5	85-100
5	65-80
1.25	43-55
0.63	32-45
0.315	23-33
0.16	16-26
0.08	10-18

3.2 Transition Rockfill

Transition Rockfill material, shall be used as a transition material between the Crushed Gravel Filter and the Mine Run Shell material. It will also be used, as required for erosion protection and rip-rap bedding. The material shall be free of roots, topsoil and other deleterious material and shall have a particle size distribution within the limits presented in Table 3.2. Processing will be required to achieve the specified gradation.

TABLE 3.2
PARTICLE SIZE DISTRIBUTION FOR TRANSITION ROCKFILL MATERIAL

Particle Size (mm)	% Passing
200	100
100	50-100
50	25-65
25	12-40
5	0-15

3.3 Mine Run Shell Rockfill

Mine Run Rockfill shall be used for the construction of the dam shell. The rockfill can have a wide variation in gradation, with maximum particle size of 1000 mm. Rockfill particles shall be angular and shall be derived from hard, durable rock.

The depth, spacing of drillholes, weight and delay of charges shall be selected so as to produce rockfill of specified size and quality. Any significant concentration of unsatisfactory materials shall be removed and directed to the waste disposal area or, with the Owner's approval, mixed with other materials to produce a material meeting specifications.

3.4 Rip-rap Rockfill

Rip-rap Rockfill material, shall be used as erosion protection for Dyke D. The material shall be free of topsoil, roots and other deleterious material and shall have a particle size distribution within the limits presented in Table 3.3. Particular quarrying and/or processing procedures may be required to achieve the specified gradation.

TABLE 3.3
PARTICLE SIZE DISTRIBUTION FOR RIP-RAP ROCKFILL MATERIAL

Particle Size (mm)	% Passing
300	100
150	60 - 100
50	25 - 55
25	12 - 35
5	0 - 15

1.0 GENERAL

1.1 This section describes the placement methods for fill materials for the Divider Dykes.

1.2 Construction shall be performed in accordance with the best modern practice and with equipment best adapted to the work to be performed. Embankment materials shall be placed so that each zone is homogenous, free of stratifications, ice chunks, lenses, pockets, ruts and layers of material of different texture grading not conforming to the requirements specified herein.

1.3 No embankment material shall be placed on any part of the foundation until it has been prepared as specified herein and approved by the Geotechnical Engineer. Placement of material shall conform to the lines, grades and elevations shown on the drawings or as specified herein and shall be performed so as to avoid the mixing of materials in adjacent zones. Variations to the lines, grades and elevations shown on the drawings due to the sub-aqueous placement can be tolerated but must be approved by the Geotechnical Engineer.

1.4 Embankment construction shall not proceed when the work cannot be performed in accordance with the requirements of the specifications. Any part of the embankment which has been damaged by the action of rain and snow or any other cause shall be removed and replaced with material conforming to the requirements specified herein before placement of succeeding layers.

1.5 Loading, transporting, dumping and spreading of all materials shall be carried out in such a manner as to minimize segregation. Filter and Transition materials should be spread in a direction perpendicular to the dyke axis.

1.6 During dumping and spreading, Contractor shall remove and dispose of, outside dyke areas, all debris, vegetation or any other material not conforming to the requirements specified herein.

2.0 MINE RUN SHELL ROCKFILL

2.1 The Shell Rockfill placed in open water can assume its natural angle of repose.

2.2 The Shell Rockfill placed in the dry must be placed in lifts not exceeding 1500 mm thickness. The rockfill shall be subjected to several passes with loaded and empty haul trucks by directing traffic accordingly. Blocks exceeding 1000 mm diameter shall be moved to the downstream face of the fill and can be left in place as downstream rip-rap.

2.3 The Shell Rockfill must be placed using techniques, which avoid segregation, and nesting of coarse particles.

3.0 TRANSITION ROCKFILL

3.1 The Transition Rockfill placed in open water must be placed so as to achieve the upstream design slopes shown on the drawings. Variations to the upstream slopes may be tolerated only with the approval by the Geotechnical Engineer.

3.2 The Transition Rockfill placed in open water must be placed by extended reach equipment or by an alternative methodology approved by the Geotechnical Engineer. The rockfill must be placed using techniques avoiding the mounding of material on the upstream dyke slopes.

3.3 The Transition Rockfill placed in the dry must be placed in lifts not exceeding 500 mm thickness. The material shall be densified by several passes with loaded and empty haul trucks by direction traffic accordingly.

3.4 The Transition Rockfill must be placed using techniques which avoid segregation and nesting of coarse particles.

4.0 CRUSHED GRANITE FILTER

4.1 The Crushed Granite Filter placed in open water must be placed so as to achieve the lines, grades and elevations shown on the drawings.

4.2 The Crushed Granite Filter placed in open water must be placed by extended reach equipment or by an alternative methodology approved by the Geotechnical Engineer. The Crushed Gravel Filter must be placed using techniques avoiding the mounding of material on the upstream slopes.

4.3 The Crushed Granite Filter placed in the dry must be placed in lifts not exceeding 300 mm thickness.

4.4 The Crushed Granite Filter must be placed using techniques which avoid segregation and nesting of coarse particles.

4.5 Compact the Crushed Granite Filter placed above lake level to 95% maximum dry density to ASTM D698-89, method C.

5.0 RIP-RAP ROCKFILL

3.1 The Rip-rap Rockfill placed in open water must be placed so as to achieve the upstream design slopes shown on the drawings. Variations to the upstream slopes may be tolerated only with the approval by the Geotechnical Engineer.

3.2 The Rip-rap Rockfill placed in open water must be placed by extended reach equipment or by an alternative methodology approved by the Geotechnical Engineer. The rockfill must be placed using techniques avoiding the mounding of material on the upstream dyke slopes.

3.3 The Rip-rap Rockfill placed in the dry must be placed in lifts not exceeding 500 mm thickness. The material shall be densified by several passes with loaded and empty haul trucks by direction traffic accordingly.

3.4 The Rip-rap Rockfill must be placed using techniques which avoid segregation and nesting of coarse particles.

1.0 GENERAL

1.1 This section describes the required quality assurance testing that shall be carried out.

1.2 The testing will be carried out by the Geotechnical Engineer or an independent testing firm engaged by the Owner.

2.0 TESTING REQUIREMENTS

2.1 Rockfill (Shell, Transition and Rip-rap) – Samples of the rockfill material shall be evaluated by the Geotechnical Engineer from time to time to determine if in his judgement it meets the gradation criteria of this specification.

2.2 Crushed Granite (Filter) – Samples of the crushed granite material shall be tested as follows to verify that they meet the specified requirements. Additional testing shall be carried out by the Geotechnical Engineer.

Test	Frequency
Particle Size	One per 1,000 m^3 or one per 4 hours of plant production, whichever is most frequent
Moisture-Density Relationship	One per 20,000 m^3 placed
In Situ Density	One per 100 m^3 placed