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MOUNT POLLEY MINE
TAILINGS STORAGE FACILITY – STAGE 9
2013 CONSTRUCTION MONITORING MANUAL

Submitted to:

Mount Polley Mining Corporation
Likely, BC

Submitted by:

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IMPORTANT NOTICE

This report was prepared exclusively for Mount Polley Mining Corporation by AMEC Environment & Infrastructure, a wholly owned subsidiary of AMEC Americas Limited. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by Mount Polley Mining Corporation only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

1.0 INTRODUCTION

1.1 Project Overview

Mount Polley copper and gold mine is owned by Imperial Metals Corporation and operated by Mount Polley Mining Corporation (MPMC). The site is located 56 km northeast of Williams Lake, British Columbia. The Mount Polley mine began production in 1997 and operated until October 2001, when operations were suspended for economic reasons. In March 2005, the mine restarted production and has been in continuous operation since. Currently, mill throughput is approximately 20,000 tpd. Tailings are deposited as slurry into the tailings storage facility (TSF). The TSF is comprised of one overall embankment that is approximately 4.3 km in length. The embankment, based upon original separate embankments, is subdivided into three (3) sections; referred to as the Main Embankment, Perimeter Embankment and South Embankment. Heights vary along the embankment and are approximately 52 m, 34 m, and 25 m respectively (based upon the Main, Perimeter and South nomenclature). The design and construction monitoring of the TSF embankments through 2010 was completed under the direction of Knight Piésold Limited (KP). AMEC Earth and Environmental, now known as AMEC Environment & Infrastructure, a division AMEC Americas Limited (AMEC), assumed the role of engineer of record for the TSF embankment as of 28 January 2011. The overall embankment has incorporated a staged expansion design utilizing a modified centerline construction methodology up to El. 963.5 m. The latest design (Stage 8A) includes a modification, incorporating a centerline design above El. 963.5 m to an approved permitted elevation of 965.0 m. The most recent expansion of the TSF was completed in October 2012, which entailed an approximate 3.4 m embankment raise to a minimum Zone S (Till) crest elevation of 963.5 m.

The next expansion, to a crest elevation of 967.5 m, is planned for the 2013 construction season. AMEC understands that a new permit will be required for the raise above El. 965.0 m. As part of the Stage 9 design (El. 970.0 m), stability analysis of the embankment was carried out, the results are presented in Appendix A.

1.2 Construction Schedule

The optimal construction season for placement of moisture-sensitive till core material at the Mount Polley Project site typically falls between May and September. The Zone S (Till) portion of the 2013 Stage 9 embankment raise (4.0 m to crest El. 967.5 m) is targeted for completion by the end of October 2013.

For the 2013 construction season, as per the 2012 construction season, MPMC will use a contractor (Contractor) to carry out the majority of earthworks associated with the annual raise. Haulage of waste rock and cell construction using tailings will be performed by MPMC.

In addition, MPMC or the contractor will prepare abutment foundations and place the specified blanket materials to the full extent of the Stage 9 embankment design (El. 970.0 m).

1.3 Quality Assurance and Quality Control (QA/QC)

The level of construction monitoring and QA/QC performed in previous years is to be continued. In 2011, MPMC undertook a greater role and responsibility in this regard. Specifically, MPMC engaged its own engineers, technicians, and summer students to provide full-time construction monitoring and field inspection during the construction of the embankment. AMEC provided support as required, which included regular site visits, particularly during key phases of the construction. Overall, this arrangement was deemed to be successful; however, minor modifications to the 2012 construction monitoring program will be implemented for 2013 and are documented herein. Mr. Luke Moger of MPMC will oversee the overall construction monitoring and the day-to-day monitoring. The reporting and instrumentation reading tasks will be the responsibility of the MPMC Field Inspectors and Mine Technicians.

Upon the commencement of construction, AMEC will provide full-time supervision for approximately fourteen (14) days, to kick-off construction and to verify that proper construction methods are employed during dam construction, material specifications are adhered to and that the monitoring and testing requirements are satisfied. This time will also be used to make certain that daily technical/progress reports are being completed properly, and that MPMC and AMEC responsibilities are thoroughly understood by all parties.

Once AMEC is satisfied that the design intent is being met and that the MPMC Field Inspectors are fully trained and prepared to undertake the construction monitoring role, AMEC will reduce monitoring presence to roughly monthly visits. The monthly visits will be timed around key construction activities such as approval of foundation preparation and till core trench construction.

To be successful, this arrangement will require that the MPMC Field Inspectors are devoted full-time to the dam construction project, with continued support and co-operation from MPMC senior personnel and TSF construction team.

Laura Wiebe, P.Eng, (AMEC Project Manager) and/or Steve Rice, P.Eng (AMEC Principal Engineer), will visit the site during construction activities. The objective will be to conduct an annual site-visit, and get a “look-ahead” so that any future construction issues can be proactively identified and resolved. This visit will also be used to ensure that a good working relationship is being maintained between AMEC and MPMC project personnel, which will be critical to providing AMEC the requisite confidence to provide as-built report sign off.

1.4 Codes and Standards

Work shall be conducted in conformance with the following standards and codes that are part of this specification:

- ASTM C117-04 – Standard Test Method for Material Finer than 75-µm Sieve in Mineral Aggregates by Washing

- ASTM C136-06 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM D421-07 – Standard Test Method for Dry Preparation of Soil Samples
- ASTM D422-07 – Standard Test Method for Particle Size Analysis of Soils (Hydrometer test)
- ASTM D698-07 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
- ASTM D2216-10 – Standard Test Method for Water (Moisture) Content of Soil and Rock
- ASTM D4220-07– Standard Test Method for Standard Practices for Preserving and Transporting Soil Samples
- ASTM D4318-10 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D4718-07 – Standard Test Method for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
- ASTM D6780-05 – Standard Test Method for Water Content and Density of Soil in Place by Time Domain Reflectometry
- ASTM D6913-04 – Standard Test Method for Particle-Size Distribution (Gradation) of Soils using Sieve analysis
- ASTM D6938-10 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.5 Purpose of Manual

AMEC has prepared this manual for use by MPMC's on-site personnel and for AMEC's engineering support personnel, who will maintain close communication with the site throughout the construction season and carry out periodic site visits as required.

The objectives of this manual are as follows:

- Summarizing the annual construction activities;
- Defining the roles and responsibilities of MPMC and AMEC personnel associated with the 2013 embankment construction activities;
- Detailing the technical specifications for the construction of the TSF embankment as presented in the design drawings; and
- Outlining the requirements for monitoring, sampling, testing and reporting of the TSF embankment construction activities; and
- Outlining the requirements and performance procedures for instrumentation monitoring within the TSF.

2.0 CONSTRUCTION MONITORING

2.1 Construction Activities

The 2013 construction of the TSF embankment will include the following activities:

- Foundation preparation of the abutments to an elevation of 970.0 m, including excavation of the cutoff trench;
- Development of glacial till borrow areas;
- Production of sand and gravel from mine waste rock via processing; and
- Excavating, hauling, placing, and compacting acceptable structural fills and waste rock zones to raise the dam core and shell in accordance with design specifications.

The guidelines for quality control testing procedures outlined in this manual are to be observed during construction to satisfy and document that the embankment is constructed in accordance with the design intent.

2.2 Monitoring and Testing

The general monitoring and testing requirements for the 2013 construction of the TSF embankment correspond to the construction activities outlined in Section 2.1; these general requirements are:

- Review and confirm that the prepared foundation areas are acceptable for support of structural fills;
- Review and confirm that the borrow materials are acceptable for use as structural fill;
- Monitor and test (where required) the placement and compaction of accepted structural fill; and
- Monitor dam performance by recording instrumentation data from instruments located in the embankment(s) and preparing cumulative change and time plots of the results.

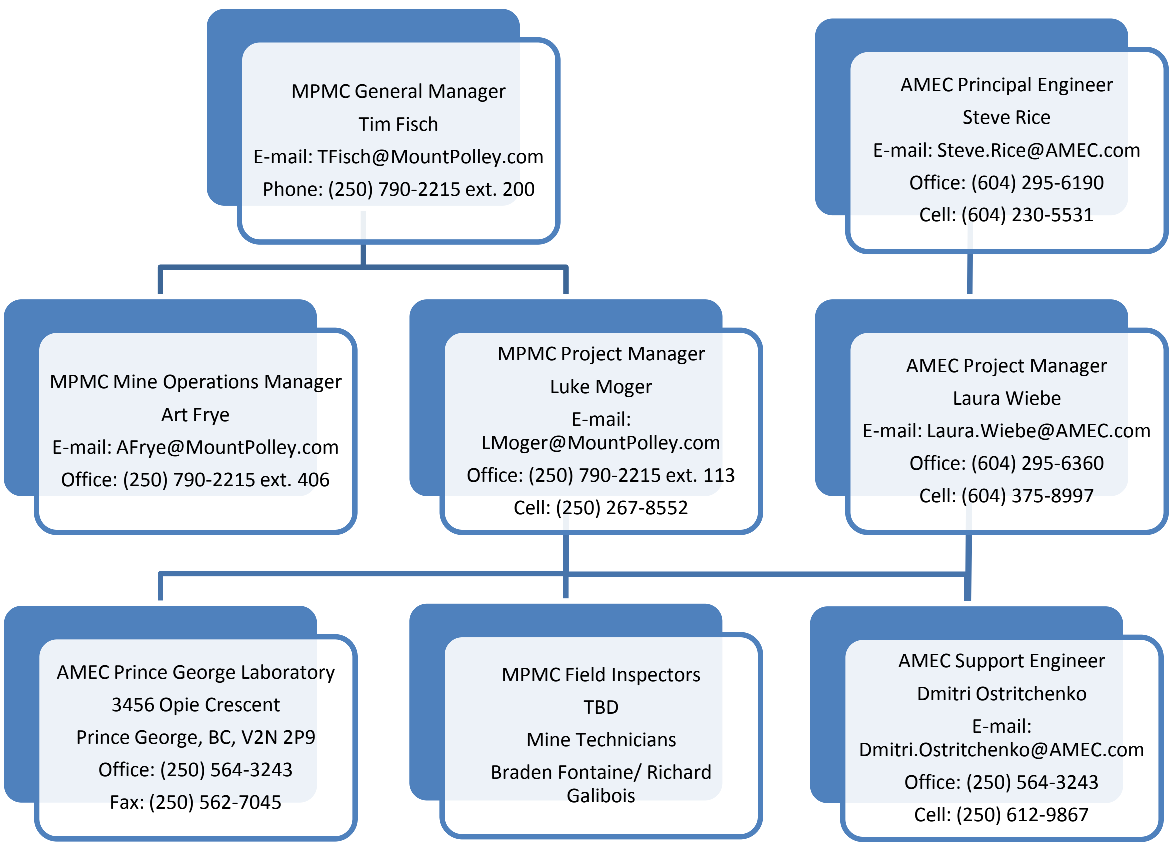
Construction monitoring of activities such as placement of structural fills and foundation preparation will take place on a continuous basis. Schedules based on minimum test frequencies per unit volume of compacted structural fill will be followed for the various field and laboratory tests, with additional tests to be performed as required to reassess out-of-compliance results or at the discretion of AMEC.

The results of the monitoring and testing program will be reported to the appropriate parties (outlined in the subsections below) as they are obtained.

2.3 Organization and Responsibilities

As presented below, Figure 2.1 outlines the overall organizational structure for 2013 TSF embankment construction. Responsibilities are summarized in Table 2.1.

Figure 2.1: 2013 Construction Organization Chart



2.3.1 MPMC Field Inspector

MPMC is to provide a full-time field inspector to monitor daily embankment expansion construction. The MPMC Field Inspector is to have support and co-operation from the senior MPMC personnel and construction team.

The responsibilities of MPMC's Field Inspector will be as follows:

- Monitor and maintain photographic record of ongoing construction activities related to the TSF;
- Review borrow pit material to verify material consistency;
- Verify as-placed zone lift thicknesses and widths;
- Perform QC compaction testing of placed Zone S material (as per material placement specifications);
- Collect material samples for QC laboratory testing;
- Prepare and submit daily construction reports (See Appendix B);
- Collect and submit instrumentation data; and
- Report out-of-compliance situations to AMEC's Support Engineer and MPMC project personnel.

Survey control for the embankment construction will be provided by MPMC. The MPMC Field Inspector, with support from Mine Technicians, will be responsible for the following tasks:

- Surveying compacted density test locations;
- Locating cutoff trench limits at the embankment abutments;
- Establishing and maintaining upstream and downstream Zone S slope stakes as required;
- Surveying upstream and downstream toe limits of as-placed Zone S and Zone F material;
- Providing general location and elevation data as required; and
- Collecting as-built survey data (i.e. cutoff trench, embankment crest, and downstream toe extents for Zone S and Zone F).

2.3.2 AMEC Support Engineer

The AMEC Support Engineer will provide full-time construction monitoring at the commencement of 2013 construction. After the MPMC Field Inspector has achieved sufficient confidence and commensurate approval, the AMEC Support Engineer will provide primarily remote assistance by reviewing daily reports and instrumentation data as required. The AMEC Support Engineer will also conduct monthly site visits (actual frequency to be determined by site performance) to verify construction methods and specifications are being followed.

While on site, the responsibilities of the AMEC Support Engineer are as follows:

- Monitor, train, and assist MPMC personnel with the requirements of construction monitoring;
- Monitor, sample, and requisition tests of the borrow areas, as required;
- Monitor and perform QA testing of compacted till core soils, as required;
- Review and approval of proposed borrow soils;
- Review and approval of transition and filter material, processing methodology and monitoring practices;
- Monitor and approve the drainage ditch excavation and preparation;
- Monitor and approve abutment preparation;
- Address any concerns or out-of-compliance situations observed and recorded during construction;
- Carry out the quality control field and laboratory testing;
- Direct the MPMC personnel to address the survey requirements, results, etc.; and
- Meet as required with MPMC to review the construction program.

While in the office, the responsibilities of AMEC's Support Engineer are as follows:

- Review daily construction reports submitted by MPMC personnel;
- Review compaction results submitted by MPMC personnel;
- Plot and review instrumentation readings submitted by MPMC personnel;
- Address any concerns or out-of-compliance situations noted by MPMC personnel;
- Coordinate with MPMC personnel and AMEC's Project Manager/Principal Engineer;
- Prepare monthly progress reports summarizing construction activities, test results, and milestone achievements; and
- Prepare site As-built/Annual Review Report.

2.3.3 AMEC Project Manager

AMEC's Project Manager will serve as the Engineer of Record and have overall responsibility for AMEC's role with upcoming and future dam raising projects. They will review all monthly construction progress reports and liaise with the AMEC Principal Engineer and MPMC's Project Manager to address any problems that may arise.

The AMEC Project Manager will also liaise with the AMEC Support Engineer and the MPMC's Field Inspector, and will make site visits as deemed necessary during construction. The exact timing and duration of the site visits will be determined in consultation with the MPMC Project Manager so that critical aspects of the construction can be viewed during these visits.

The responsibilities of AMEC's Project Manager will be as follows:

- Review instrumentation interpretations and communication of any concerns to MPMC's Project Manager and AMEC's Principal Engineer;
- Review monthly progress reports prepared by the AMEC Support Engineer and communicate any concerns arising from these reviews to MPMC's Project Manager and AMEC's Principal Engineer;
- Carry out periodic site visits as appropriate during the construction season, timed to coincide with critical aspects of the construction; and
- Identify, review, and approve any design changes determined to be required by AMEC and/or MPMC.

Table 2.1: Construction Monitoring Tasks

No.	Tasks Description	Responsibility
1.0	**Foundation Preparation**	
1.1	Abutment Extensions: Review of exposed soil and or rock conditions and confirmation that suitable dense, undisturbed, native soil, or sound bedrock conditions are exposed for dam construction.	AMEC
1.2	Core Trench Construction: Review of exposed soil and/or rock conditions, perform test pits as required to confirm the thickness of glacial till over bedrock along the core trench alignment. Review of core trench excavation and confirmation of proper excavation slopes. Direct rock excavation and cleaning work as deemed necessary.	AMEC
1.3	Approval: Review the provided photos of the foundation preparation and provide approval.	AMEC
2.0	**Review of Borrow Areas and Materials**	
2.1	Glacial Till Borrow Pit: • Review cut slopes. • Collect samples of borrow material for testing to assess both suitability of materials and to evaluate the Standard Proctor maximum dry density and optimum moisture content of the material. • Report test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.2	NAG Rock Source (Zone C): • Review the selective borrowing/classification of material for the coarse NAG rockfill. • Visual verification of the material for conformance to the gradation specifications. • Report observation to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.3	NAG Rock Source (Zone T): • Monitoring the selective borrowing/classification/processing of material for the fine NAG rock transition zone. • Collect periodic samples for conformance to the gradation specifications. • Report observation to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.4	NAG Crushing Operation (Zone F): • Monitoring the filter sand and gravel crushing and decking operation. • Collect periodic samples for conformance to the gradation specifications. • Report observation to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.5	Materials Approval: • Conduct tests on collected samples. • Approve the materials to be used during construction of the embankment.	AMEC
3.0	**Review of Structural Fill Placement**	
3.1	Zone S: • Review and confirm that the locations of zone interfaces are in their correct locations. • Confirm the width of the core zone is sufficient. • Test the placed and compacted Zone S structural fill for in-place density. • Collect samples for moisture content determinations and density (rock content) corrections. • Collect samples of fill for confirmation index testing. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
3.2	Zone C: • Review and confirm that the NAG rock is in conformance to the gradation specifications. • Observe and confirm the compaction specification is followed.	MPMC
3.3	Zone T: • Review and confirm that the NAG transition zone rock is in conformance to the gradation specifications. • Observe and confirm the compaction specification is followed. • Collect samples for gradation analysis. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
3.4	Zone F: • Review and confirm that the zone interfaces are in their correct locations. • Confirm the width of the filter zone is sufficient. • Collect samples for gradation analysis. • Review and confirm that the crushed fine filter material is in conformance to the gradation specifications. • Confirm via hand-excavated test pits that segregation of filter sand and gravel is not occurring. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
3.5	Zone U: • Review and confirm that the zone interface is in the correct location. • Monitor material reworking to ensure proper distribution within the cell. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
4.0	**Dam Performance Monitoring**	
4.1	Coordinate biweekly readings of vibrating wire piezometers and slope inclinometers during the construction. Submit the raw data collected to AMEC for review.	MPMC
4.2	Review submitted weekly readings, prepare associated graphs and analyze the collected data. Report monitoring results to AMEC and MPMC's Project Manager as they are obtained.	AMEC
5.0	**Construction Monitoring**	
5.1	Daily meetings between MPMC's Field Inspectors and Contractor to establish and review daily construction plan, identify concerns, and discuss other relevant issues.	MPMC
5.2	Monthly meeting between MPMC's Field Inspector, Project Manager, AMEC Support Engineer and Contractor.	MPMC/AMEC
5.3	Establish and confirm construction boundaries between various zones.	MPMC
5.4	Addressing any concerns or out-of-compliance situations observed and recorded during construction.	MPMC/AMEC
6.0	**Record Keeping**	
6.1	Maintain daily construction site photographic record of construction activities.	MPMC
6.2	Completing daily construction reports, and delivering a copy to MPMC's Project Manager and by email to AMEC's Support Engineer.	MPMC
6.3	Completing monthly construction reports, with copies to MPMC's Project Manager and AMEC's Project Manager and Senior Principal Engineer.	AMEC

2.3.4 AMEC Principal Engineer

AMEC's Principal Engineer will review monthly construction and instrumentation reports as required and review the As-built/Annual Review reports. AMEC's Principal Engineer will make site visits if deemed necessary by the AMEC Project Manager or MPMC Project Manager.

2.3.5 AMEC Soils Laboratory – Prince George

All off-site material testing will be carried out at the AMEC Prince George Laboratory. MPMC will be responsible for collection and shipment of samples as required. AMEC's laboratory technician will be responsible for carrying out the required testing and reporting of results to the AMEC Support Engineer who in turn will convey the results to MPMC's Project Manager.

2.3.6 MPMC Laboratory – Soils Testing

AMEC will conduct the majority of material testing required to support the construction, however the following tests are required to be carried out by Mount Polley personnel at the Mount Polley on-site lab:

- Wash sieve gradation for Zone T and Zone F during production (C136-06/C117-04); and
- Moisture content confirmatory testing of Zone S (D2216-10).

All test results will be compiled by the MPMC Field Inspector or the MPMC laboratory staff, and are to be submitted to AMEC's Support Engineer, along with the daily construction reports, for review and approval.

2.3.7 MPMC Project Manager

MPMC's Project Manager shall assume overall responsibility for MPMC construction management and MPMC supervision, monitoring, and quality control testing activities when AMEC is not on site. This person shall ensure that the design specifications and the QA/QC requirements as outlined in this manual are followed. In the absence of the MPMC Project Manager, the MPMC Mine Technicians dedicated to the TSF will take responsibility, under the supervision of the Mine Operations Manager.

MPMC's Project Manager shall liaise with AMEC's Support Engineer and AMEC's Project Manager to discuss construction progress, any problems encountered and their resolution, and the timing of site visits by AMEC personnel to view the construction.

The MPMC Project Manager will address any concerns raised by the MPMC Field Inspector/AMEC Support Engineer including, but not limited to:

- Placement of unacceptable dam fill material;
- Unacceptable construction procedures (excessive lift thickness, inadequate compaction, inadequate foundation preparation, inadequate material testing etc.); and
- Non-compliance issues identified by the AMEC Support Engineer and MPMC Field Inspector that are not immediately rectified by the construction forces, be they those of the contractors or MPMC.

2.3.8 MPMC Mine Operations Manager

The MPMC Mine Operations Manager will address any concerns raised by the MPMC Field Inspector and/or AMEC Support Engineer as related to any potential environmental issues or concerns.

3.0 CONSTRUCTION MATERIALS

3.1 General

All zones of the embankments described herein shall be constructed only with materials meeting the specified requirements for each zone, as listed below and as shown in the drawings. Materials for the various zones of the embankment shall be obtained from stockpiles and from borrow areas approved by the AMEC Support Engineer.

Approval of construction fill materials will generally be based on comparison with the gradation envelope curves presented on Drawing 2013.08. Section 3.3 through Section 3.7 provides a brief description of specified material zones.

3.2 Estimated Fill Volumes

Table 3.1 summarizes the estimated material quantities from the Stage 8A crest elevation of 965.0 m up to the Stage 9 expansion crest elevation of El. 970.0 m.

Table 3.1: Stage 9 Expansion (El. 970.0 m) Estimated Fill Volumes

SECTION	ESTIMATED FILL VOLUMES (m^3)			
	Zone C	Zone T	Zone F	Zone S
Main Embankment	83,000	9,000	9,000	30,000
Perimeter Embankment	189,300	16,700	16,700	55,600
South Embankment	137,100	9,300	9,300	34,600
Total	**409,400**	**35,000**	**35,000**	**120,200**

Notes:

1. *Estimated volumes are based on Drawings 2013.04 through 2013.06, and are rounded up to the nearest 100 m^3.*
2. *No settlement allowance has been considered.*
3. *Quantities are based on neat construction lines; with no contingency or allowance for overbuild or waste factors.*

3.3 Zone S (Core) – Glacial Till

Zone S comprises the low-permeability central core of the Main, Perimeter and South Embankments. Zone S shall be constructed with well graded, unprocessed, unfrozen glacial till obtained from the specified till borrow area that meets the material gradation and moisture content requirements as shown on the design drawings with a minimum fines content of 20% by weight.

3.4 Zone F (Filter) – Sand and Gravel

Zone F comprises the downstream filter between Zone S and Zone T fill of the Main, Perimeter and South Embankments. Zone F consists of 50 mm (2”) minus well-graded sand and gravel, obtained from mill crushed run-of-mine NAG waste rock.

3.5 Zone T (Transition) – Fine NAG Rock Transition

Zone T comprises the downstream transition between Zone F and Zone C fill of the Main, Perimeter and South Embankments. Zone T consists of 150 mm (6") minus material with a maximum fines content of 20% by weight, obtained from mill crushed and/or as-is run-of-mine NAG waste rock.

3.6 Zone C (General Rockfill) – Coarse NAG Rock Shell

Zone C comprises the downstream support to the Zone S core. Zone C consists of well graded material with a maximum diameter of 1 m (3'4"), obtained from run-of-mine NAG waste rock.

3.7 Zone U (Selected Upstream Fill) – Tailings/NAG

Zone U comprises the upstream support for the Zone S core. Zone U generally consists of end of pipe spigotted tailings, deposited in cells and reworked with a dozer. If required, Zone U may also consist of run-of-mine NAG waste rock with a maximum diameter of 0.5 m (1'8").

4.0 EXECUTION

4.1 Borrow Areas

Any proposed borrow pit material to be used as embankment fill will be subjected to sampling, laboratory testing, and approval by AMEC's Support Engineer. During the TSF embankment construction, detailed documentation will be maintained to ensure the source of the material being placed is known and material testing requirements are satisfied.

It is anticipated that the Zone S till volume requirement (refer to Section 3.2) will be obtainable from the area identified on Drawing 2013.02 as the Perimeter Till Borrow Pit. This same area has been used as the source for Zone S in previous construction seasons.

It should be noted that the Perimeter Till Borrow Pit is located directly downstream of the Perimeter Embankment downstream toe. Any further encroachment of the borrow pit towards the embankment is not permitted. Stability analysis of the Perimeter Embankment prior to any further excavation in the Perimeter Till Borrow Pit may be required, at the direction of the AMEC Principal Engineer.

AMEC has observed that the material within the Perimeter Till Borrow Pit is generally interbedded with a glaciolacustrine unit. The glaciolacustrine material typically meets the till core material specification, however due to its poor workability this material shall be wasted or, whenever possible, intermixed with approved till material in a ratio of one part glaciolacustrine to two parts till.

Prior to utilization of the Perimeter Till Borrow Pit, topsoil and other overburden judged to be unsuitable as structural till fill will be stripped from the borrow pit and hauled to an acceptable location, as directed by the MPMC Project Manager.

The Perimeter Till Borrow Pit shall be developed such that groundwater inflow and precipitation runoff are directed in a controlled manner to designated sump area(s) of the site, and then removed as required. External surface water runoff shall be prevented from flowing into the borrow area by the construction of diversion ditches as required.

The performance of the cut slopes in borrow areas will be inspected and recorded as required by the MPMC Field Inspector for documentation within the construction reports. AMEC's Support Engineer may request modifications to the excavation plan, including flattening of the slopes and altering water control measures, based on the observed performance of the cut slopes.

4.2 Excavation

4.2.1 General Foundation Preparation

Foundation preparation is to be conducted when AMEC's Support Engineer is on site. 2013 construction will consist of foundation preparation on the Perimeter and South abutments to the Stage 9 crest elevation of 970.0 m. Excavation limits and cutoff trench details are shown on Drawing 2013.07.

The foundation preparation will extend to 3.0 m beyond the upstream and downstream embankment toe limits, or as directed by the AMEC Support Engineer, providing a buffer zone for tie-in capabilities and any material placement inaccuracies.

Foundation excavation will be drained, where required, and will generally consist of clearing and grubbing, and removal of all soft, over wet, and organic bearing soils to expose suitably dense, inorganic native soils (dense to very dense glacial till) or competent bedrock, as defined by the AMEC Support Engineer. The prepared foundation surface is to be proof-rolled with a smooth drum vibratory roller (with vibration turned off if necessary to prevent pumping) prior to fill placement.

Prior to placing any fill materials on excavated surfaces, the surfaces shall be prepared as follows:

- Surfaces shall be kept clean of any loose debris;
- Excavated materials from the foundation shall be removed and hauled to waste areas designated by the MPMC Project Manager. Organic material and topsoil shall be stockpiled in appropriate locations, as directed by the MPMC Project Manager, for potential future use in reclamation activities;
- The exposed excavation and cleared embankment foundation shall be proof-rolled with a smooth drum vibratory roller (with vibration turned off if necessary to prevent pumping), scarified, and inspected and approved by the AMEC Support Engineer prior to any material placement; and
- Earth foundation surfaces shall be graded to remove surface irregularities, and test pits or other cavities shall be filled with compacted fill, unless otherwise directed by the AMEC Support Engineer.

4.2.2 Zone S Till Core Cutoff Trench Subgrade Preparation

General subgrade preparation for the abutment cutoff trench extensions shall be in accordance with Section 4.2.1 with typical excavation details shown in Drawing 2013.07.

Overburden within the trench excavation zone shall be excavated to a minimum 0.5 m depth into undisturbed native glacial till, as identified by the AMEC Support Engineer, in areas where the native glacial till thickness exceeds 2.0 m or as directed by the AMEC Support Engineer. In areas where the native glacial till is less than 2.0 m thickness, overburden shall be removed to competent bedrock, as identified and approved by the AMEC Support Engineer. The thickness of glacial till at the cutoff trench is to be confirmed by performing test pits at locations adjacent to the cutoff trench alignment as directed by the AMEC Support Engineer.

In glacial till, the cutoff trench excavation will have a base width of 2.0 m, while in bedrock, the cutoff trench base width may be excavated to the full 5.0 m width of the Zone S core, if directed by the AMEC Support Engineer. Excavation side slopes shall be a maximum of 1 horizontal to 1 vertical (1H:1V). Steeper slopes may be accepted in bedrock at the discretion of the AMEC Support Engineer.

Where bedrock is encountered beneath the embankment Zone S till core, special measures will be required to prepare the bedrock foundation prior to Zone S till fill placement. Loose and weathered rippable bedrock shall be removed to the point where an interlocking rock structure remains, at the discretion of the AMEC Support Engineer who will determine the point at which large-scale excavation will be halted and detailed cleaning commenced. Additional specifications related to bedrock encountered in the cutoff trench are provided in Section 4.2.3 below.

The cutoff trench excavation will be protected from moisture softening due to surface water inflow or excessive precipitation. Water seeping into the cutoff trench excavation will be removed by pumping, and will not be permitted to collect and remain in the excavation.

Prior to placement and compaction of structural fill in the cutoff trench excavation, AMEC's Support Engineer will approve the preparation of the trench. Inspections will occur as foundation areas are prepared and the approval will be documented in the monthly report. Photographic records will be maintained to identify foundation areas that have been inspected and approved, clearly indicating their date of inspection. Areas not approved for placement of structural fill by the AMEC Support Engineer are not to be covered with fill under any circumstances to avoid having to remove/replace materials.

The MPMC Field Inspector will verify that the cutoff trench is founded in the minimum specified depth of glacial till, conducting soil probing as required. Cutoff trench excavation inspections will be performed as required, and inspection dates and results will be tracked by the MPMC Field Inspector on copies of the construction drawings and/or by station number. MPMC Field Inspectors, with support from the Mine Technicians, will provide a survey pick-up of the cutoff trenches and maintain a project database for use in the as-built documentation.

4.2.3 Zone S Till Core Cutoff Trench Subgrade Preparation (to Bedrock)

If bedrock is encountered in the dam foundation cutoff trench, special considerations exist and special bedrock treatment measures may be required. Guidelines and procedures for dealing with bedrock exposed in the cutoff trenches are as follows.

Weathered or fractured bedrock is defined as bedrock that can be readily excavated by a dozer or a hoe excavator equipped with a digging bucket and that, based on visual assessment, is highly pervious to groundwater flow due to the presence of fractures/joints/faults. Sound (competent) bedrock, is defined as bedrock that can be excavated only with significant difficulty (or not at all) by a hoe excavator equipped with a digging bucket. When excavating in bedrock, the AMEC Support Engineer will send photographs documenting the excavation and be in frequent communication with AMEC's Project Manager/Principal Engineer.

If shear/fault zones are encountered within the bedrock exposed in the core to abutment contacts, the following information should be collected by the AMEC Support Engineer and passed on to AMEC's Project Manager/Principal Engineer:

- ***Photographs of the shear zone*** from a variety of vantage points (both close-ups and photos giving an overall perspective);
- ***Orientation*** (strike & dip) of the feature and its orientation relative to that of the core zone (i.e. does it provide a potential upstream-downstream seepage pathway?).
- ***Thickness and continuity***; and
- ***Infilling material*** (i.e. clayey gouge, granular material) The infilling material should be sampled and sent to the AMEC Prince George soils laboratory for grain size and Atterberg limits testing.

AMEC's Project Manager/Principal Engineer, upon analysis of the information provided, will determine what (if any) special treatment is required for the shear/fault zone. Such treatment may include hand excavation of a few centimeters into the shear zone, followed by placement of bentonite powder in advance of Zone S till placement.

Once sound bedrock is encountered, the surface should be cleaned of loose materials using an excavator equipped with a narrow cleaning bucket, followed by pressure washing using either air or water. Where the slope of the cleaned and approved sound bedrock surface, along the axis of the dam (i.e. up the abutment), is flatter than 1H:1V, then Zone S structural fill placement may proceed. Good compaction of the Zone S fill against the bedrock surface is required. If the undulations in the bedrock surface along the bottom of the trench are such that this cannot be achieved using dozers and the compactor, then such undulations (i.e. rock protrusions) should be removed. If removal is not possible, then compaction of thin till lifts with a walk-behind or plate-tamping compactor, or tamping with an excavator bucket, will be required to fill in the undulations. Once this is done, then normal spreading and compaction procedures can be undertaken.

Where the slope of the sound bedrock surface is steeper (overall) than 1H:1V, but flatter than 0.5H:1V, the AMEC Support Engineer will consult AMEC's Project Manager/Principal Engineer for a decision as to the need for any further treatment measures. Photographs illustrating the bedrock surface should be sent by the AMEC Support Engineer to the AMEC Project Manager/Principal Engineer. If the roughness of the rock surface is such that it is judged that effective compaction of till fill against the bedrock on the base of the trench cannot be achieved, then additional (small scale) bedrock excavation (removal of protrusions) should be attempted to attain a surface against which it is judged till fill can be effectively compacted. If the execution of this measure is unsuccessful, then one of the following additional measures will be required:

(a) Additional (large scale) bedrock excavation should be undertaken to achieve a maximum 1H:1V overall slope for the bedrock surface. This can be achieved by mechanical means (dozers, excavators), or by small scale, controlled drilling and blasting.
(b) Dental concrete or shotcrete application will be required to fill in the undulations in the bedrock surface, and yield a maximum slope of 0.5H:1V, against which till fill can be effectively compacted.

Where the bedrock surface is steeper than 0.5H:1V, the same two measures outlined above will apply.

Where dental concrete is required against steep bedrock faces, it will likely be necessary to use formwork. Dental concrete, if used, will conform to the following specifications:

- 28 day strength – minimum 25 MPa (if flyash included in mix), otherwise minimum 30 MPa.
- Water to cement ratio: 0.45:1 by mass.
- Air entrainment: to provide for 5% to 7% air entrainment.
- Cement to flyash ratio (if flyash used): 4:1 by mass, which would allow overall water:cement:flyash ratio of 0.45:0.8:0.2.

The dental concrete need not be of high strength. It does, however, need to be sufficiently fluid that it will fill in irregularities in the bedrock surface to a reasonable extent. Addition of flyash to the mix would achieve that objective, as well as reducing cement costs.

Should shotcrete be selected, MPMC will prepare a mix design for review and approval by AMEC.

Prior to placement and compaction of structural fill in the cutoff trench excavation, AMEC's Support Engineer will approve the preparation of the trench. Inspections will occur as foundation areas are prepared and the approval will be documented in the monthly report. Photographic records will be maintained to identify foundation areas that have been inspected and approved, clearly indicating their date of inspection. Areas not approved for placement of structural fill by the AMEC Support Engineer are not to be covered with fill under any circumstances to avoid having to remove/replace materials.

The MPMC Field Inspector will verify that the cutoff trench is founded on sound bedrock. Cutoff trench excavation inspections will be performed as required, and inspection dates and results will be tracked by the MPMC Field Inspector on copies of the construction drawings or by station number. MPMC Field Inspectors, with support from the Mine Technicians, will provide a survey pick-up of the cutoff trenches and maintain a project database for use in the as-built documentation.

4.2.4 Zone S Till Core Subgrade Preparation outside of Cutoff Trench

General subgrade preparation for the abutment areas outside of cutoff trench extensions shall be in accordance with Section 4.2.1. Outside of the cutoff trenches, the Zone S till core fills will traverse areas where subsoil generally comprises glacial till overlying bedrock. Following stripping of loose/organic soils, the AMEC Support Engineer will determine whether or not the subsoils for the portion of the core upstream of the cutoff trench are deemed to be pervious, directing additional excavation to remove such soils to reach less pervious soils if required.

Where bedrock is encountered beneath the Zone S till core, outside the limits of the cutoff trench, loose and weathered rippable bedrock shall be removed, as directed by the AMEC Support Engineer, who will determine the point at which large-scale excavation can be halted.
Detailed cleaning of the bedrock foundation will not be required unless specifically requested by the AMEC Support Engineer in localized areas where significant shear/fracture zones are indicated.

4.3 Placement, Compaction and Testing of Fill Materials

The following subsections provide a description of the placement, compaction and testing requirements for each of the fill materials. A detailed summary is also provided in Drawing 2013.08.

Requirements for placement of material within the embankment foundation drainage ditch and drainage blanket areas (Zone F) are outlined in Section 4.3.2.

4.3.1 Zone S (Core) – Glacial Till

The glacial till borrow materials approved for construction are to be well graded, organic-free, mineral soils, having moisture contents near their optimum for compaction. The optimum moisture content range of the borrow soils is to be determined by Standard Proctor moisture-density relationship testing. A general guideline for allowable moisture contents for the Zone S structural fill is ±1% of the optimum moisture content as determined by the Standard Proctor test.

The proposed till borrow soils are to be visually inspected for consistency on a daily basis by MPMC Field Inspectors. Any material not meeting specification shall not be placed within the embankment. The till borrow pit is to be sampled bi-weekly or every 10,000 m^3 removed, whichever is less, and shipped to the AMEC Prince George Laboratory for testing. Samples are to be collected and shipped according to ASTM standard: Standard Practices for Preserving and Transporting Soil Samples (D4220-07); and shall consist of two (2) three-quarter (3/4) full 5-gallon buckets, void of any oversized rocks (>75 mm in diameter). If the representative sample contains oversized rocks, they are to be collected, weighed, and noted as being removed from the collected sample.

Prior to placement of glacial till, the previous lift or prepared abutment is to be scarified. Scarification should only be carried out for the areas that will be immediately covered (during the work day). Moisture conditioning may be required between successive lifts in the event of significant drying to achieve adequate bonding between lifts.

A sample of as-placed glacial till is to be collected from the embankment bi-weekly (offset from the borrow pit sample) or every 6,500 linear meters, whichever is less, and shipped to the AMEC Prince George Laboratory for laboratory testing. The samples are to be collected and shipped as described above.

The approved glacial till is to be spread in loose 0.3 m thick lifts and compacted by uniform routing of haul trucks and spreading equipment as well as by a 10-ton vibratory smooth drum compactor. A minimum of 95% compaction of the Standard Proctor maximum dry density is to be achieved.

It is of utmost importance that the width of the compacted Zone S core be constructed to a minimum of 5.0 m. In order to achieve the 5.0 m width, each till lift (prior to compaction) must extend a minimum of 20 cm beyond the till core upstream and downstream limits. A survey of the till core upstream and downstream limits shall be completed prior to Zone F filter trench excavation, to verify the 5.0 m compacted till core width has been achieved. Any deviation from the minimum 5.0 m width should be immediately reported to the MPMC Project Manager and the AMEC Support Engineer.

Placed and compacted glacial till is to be tested for compaction at least once (1) per 100 linear meters per lift to confirm that specified compaction of 95% has been achieved. Compaction testing will be carried out with a nuclear densometer (ND). The compaction testing should be conducted in accordance with ASTM standards D6938-10. The compaction test locations are to be surveyed and identified by three dimensions (elevation, northing and easting), and submitted to AMEC Support Engineer on a daily basis.

In addition to the density tests, a confirmatory in-situ moisture content sample is to be collected once (1) per 1,000 linear meters per lift or once (1) per day per lift, whichever is less. The moisture content testing should be conducted in accordance with ASTM standards: Water (Moisture) Content of Soil and Rock (D2216-10) and Correction of Unit Weight and Water

Content for Soils Containing Oversize Particles (D4718-07). The confirmatory moisture test will identify the accuracy of ND density testing. If there is a greater than 10% difference between the ND and laboratory sample, a secondary test is to be conducted, and if the issue persists AMEC's Support Engineer is to be informed immediately.

Upon receiving collected samples, AMEC's Prince George Laboratory will perform the following tests utilizing ASTM standards: Particle Size Analysis of Soils (D422-07) and (D6913-09), Laboratory Compaction Characteristics of Soil Using Standard Effort (D698-07), Liquid Limit, Plastic Limit, and Plasticity Index of Soils (D4318-10).

4.3.2 Zone F (Filter) – Sand and Gravel

The filter material is to be well graded, sand and gravel. Routine testing of the crushed material is to be carried out prior to its transportation to the TSF. The test program will determine if the manufacturing process is consistent, and if the produced material is within the design specification. After transportation of the aggregate to the TSF, regular representative samples from the stockpiles are be collected. On-site testing of the collected samples will consist of a minimum of one (1) sample per 5,000 m^3 per stockpile or as deemed to be representative of the stockpile. Off-site testing of the collected samples will consist of a minimum of one (1) sample per stockpile.

Zone F material is to be placed in a trench excavated at the downstream limit of the Zone S till core zone (2.5 m downstream of the till core centerline), extending through the over-built Zone T transition rockfill and into the underlying sand and gravel filter layer. A minimum trench width of 1.5 m is required at the base of the trench in order to fully expose the previous lift of filter and allow for an adequate amount of tie-in with the previous lift. Drawing 2013.09 illustrates the steps recommended for vertical filter construction.

Experience gained from similar dam construction at other mine sites show that to minimize the width of the filter trench at the top and obtain the minimum 1.5 m width at the base, the optimum depth of the trench for each lift of Zone F filter material is a depth of 0.9 m, which in turn controls the lift thickness for the Zone T transition and Zone C material placed downstream of the Zone F. That lift thickness also enables identification of any oversize materials that can be removed from the Zone F/T interface and thus achieve the required filter compatibility at that interface.

Care will be taken during handling and placement of the material to minimize segregation and to avoid cross-contamination of the zones. If cross contamination of the zones occurs the contaminated material is to be removed. MPMC's Field Inspector is to visually inspect the as-placed Zone F material to ensure that the material is well graded and is placed to the specified widths.

There is no requirement for compaction of the Zone F material within the filter trench.

For placement within the Perimeter and South Embankment drainage ditches and drainage blankets, placement of Zone F will be spread in loose lifts of 0.3 m thickness. Zone F placed as a drainage blanket will be compacted flat by a 10-ton vibratory smooth drum compactor.

On-site testing of Zone F during placement will include visual determination of upper and lower bound grain sizes, suitability of rock hardness, and sieve analysis (C117-04/C136-06) once (1) per placement event or once (1) per 2,500 linear meter of placed material. Off-site testing of this material during placement will consist of sieve analysis (C117-04/C136-06) once (1) per 5,000 linear meters of placed material.

Samples are to be collected and shipped according to ASTM standard D4220-07; each sample consisting of one (1) three-quarter (3/4) full 5-gallon buckets, void of any oversized rocks (<75 mm in diameter). If the representative sample contains oversized rocks, they are to be collected, weighed, and noted as being removed from the collected sample.

4.3.3 Zone T (Transition) – Fine NAG Rock Transition

Fine NAG rock transition material shall be confirmed to be non acid generating by MPMC prior to use as fill on the embankments. On site testing of this material includes visual determination of upper and lower bound grain sizes, suitability of rock hardness, and sieve analysis (C117-04/C136-06) once (1) per 5,000 m^3. Off site testing of this material, will consist of sieve analysis (C117-04/C136-06) once (1) per 10,000 m^3. Special care shall be taken during sampling to ensure that representative samples are obtained. Photographs of this material when exposed in the excavated filter trenches are to be taken frequently, as the best means of assessing the ability of Zone T to serve as a filter for Zone F is through visual means. Samples are to be collected and shipped to the AMEC Prince George Laboratory according to ASTM D4220-07; each sample is to consist of three (3) three-quarter (3/4) full 5-gallon buckets.

The fine NAG rock transition zone serves as filter protection for the adjacent Zone F filter sand and gravel which in turn serves as filter protection for the Zone S core. The importance of conformance with gradation specifications for both of these filter zones cannot be over-emphasized. Photographs of this material are to be taken frequently during placement.

Zone T material is to be placed in maximum lift thicknesses of 0.9 m. Care will be taken during handling and placement of the material to minimize segregation. Zone T lifts will be compacted by uniform routing of haul trucks and spreading equipment. Visual inspection after compaction will be carried out and approved by the MPMC Field Inspector.

4.3.4 Zone C (General Rockfill) – Coarse NAG Rock Shell

Coarse NAG rockfill shall be confirmed to be non acid generating by MPMC prior to use as fill on the embankments. Routine visual inspections shall be completed in order to confirm the specified maximum particle size of 1.0 m.

The Zone C rockfill shell will be placed in maximum lift thicknesses of 1.2 m or less. Care should be taken when placing Zone C material adjacent to the Zone C/Zone T interface. The material is to be placed so as to minimize the possibility for openwork areas created by concentrations of larger size rocks. The lifts will be compacted by uniform routing of haul trucks and spreading equipment. Well graded NAG rockfill with a maximum particle size of 0.5 m will be placed adjacent to Zone T to reduce the potential for particle migration from the transition zone into large voids within the rockfill shell. Some degree of compaction of Zone C is required nearer Zone T, although excessive settlement of the rockfill could disrupt the continuity of the overlying transition and fine filter materials (Zones T and F respectively). If the Zone C material contains appreciable quantities of fines, and the compacted lift surfaces assume a smooth 'pavement' type appearance that might impede vertical drainage, lift surfaces will require scarification prior to placement of a subsequent lift.

Prior to reaching an embankment crest elevation of 970.0 m, the construction of a buttress will be required for the Main Embankment. (See Stability Analysis in Appendix A) The buttress shall be constructed along the toe of the Main Embankment, directly above the existing buttress, to a minimum elevation of 925.0 m. The buttress is to be constructed using Zone C rockfill and placed in maximum lift thicknesses of 1.2 m or less. The lifts will be compacted by uniform routing of haul trucks and spreading equipment.

4.3.5 Zone U (Selected Upstream Fill) – Tailings/NAG

Zone U fill will generally consist of end of pipe spigotted tailings, deposited in cells and reworked with a dozer. The cells are constructed by confining the discharged tailings with berms along four sides, creating a "cell". The confining berms are designed with a discharge structure running perpendicular through the upstream berm at the end of the cell to allow for the water and finer materials to drain into the TSF. The coarse tailings sand that settles out into the cells is to be reworked with the help of a dozer to achieve proper distribution within the cells, provide compaction and to expedite the excess water drainage. This construction method has been used and proven effective by MPMC in previous TSF embankment raises.

In areas of the embankment (along the Main Embankment) where there is not sufficient tailings line pressure to deposit tailings using the cell method, NAG run-of-mine waste rock will be used. Care will be taken during construction of the downstream berm (Zone U/Zone S interface) to ensure the NAG rock is well graded and free of boulders larger than 0.5 m in diameter.

4.4 Criteria for Suspension of Work

Construction work on the embankment may be temporarily suspended at any time, at the direction of the AMEC Support Engineer and/or MPMC Project Manager. Work suspension is based on the following criteria:

Saturated Till Borrow

The till borrow material is highly sensitive to moisture in terms of its compaction characteristics and workability. Consequently, during periods of wet weather, construction of the core zone will be suspended. Adequate slopes will be maintained on till fill surfaces, and they will be sealed with a smooth drum vibratory roller to promote surface water runoff and prevent excessive softening of compacted fill. Moisture-softened lifts must be removed or scarified, dried to acceptable moisture content and re-compacted.

Instrumentation Triggers

For construction above El. 965.0 m, embankment construction will be suspended if the inclinometers or piezometers fall under the yellow or red condition as described in Table 4.1, and/or if embankment foundation piezometer data indicates a significant increasing trend.

Table 4.1: Instrumentation Trigger Levels

Condition	Inclinometer Movement Rate		Main Embankment Foundation Piezometer	
	(mm/day)	(Bi-Weekly)	Elevation (m)	Above Original Ground (m)
RED	> 1 mm/day	>14mm	> 933 m	>21 m
YELLOW	0.5 mm/day to 1.0 mm/day	7 mm to 14 mm	916 m to 933 m	4 m to 21 m
GREEN	< 0.5 mm/day	7 mm	< 916 m	< 4 m

Freezing Temperatures

Embankment construction work will be halted for the season when freezing weather temperatures prevent acceptable fill placement and compaction.

5.0 TESTING AND SAMPLING PROCEDURES

5.1 General

Testing of embankment fill materials shall be completed as outlined in the previous section and in Drawing 2013.08.

Additional testing may be completed upon recommendations by the AMEC Support Engineer. Determinations of specific gravity (ASTM D854-10) for the approved glacial till and borrow soils may be required if significant material changes are observed. These tests will be conducted at the AMEC Prince George laboratory, following the sample collection procedures in Section 5.2. Typically, two or three specific gravity determinations are required for each soil type.

5.2 Sample Collection Procedures

Samples are to be transported to the AMEC Prince George laboratory for field laboratory verification testing will be sealed to minimize soil moisture losses, and shipped in an expedient manner. The shipping address is as follows:

Attn: Dmitri Ostritchenko (Mt. Polley)
AMEC Environment and Infrastructure
3456 Opie Crescent
Prince George, BC
V2N 2P9

The MPMC Field Inspector shall include transmittals with the samples outlining the tests to be carried out for each respective sample. These transmittals are to be emailed to AMEC's Support Engineer in advance of the shipment and are to be included in the daily construction report. The AMEC Prince George laboratory will check that the label information attached to each sample is incorporated onto the corresponding test sheets, and that copies of the test sheets and results are forwarded to AMEC's Support Engineer as the tests are completed. AMEC's Support Engineer will review the test results and submit them in the monthly report, or sooner if immediate actions are needed.

Samples collected by the Field Inspectors for the scheduled tests during the 2013 construction will be identified by a detailed labelling scheme. For example:

SAMPLE LABEL	
Project name :	Mt. Polley Mine Project
Construction :	Stage 9 Raise – 2013
Material :	*Glacial Till (Zone S)*
Source :	*Main Embankment*
Location :	*Elev. 965.0, 1.0 m d/s of CL, station 21+00*
Date :	*June 20, 2013*
Sample Number :	*ZS1-Jun6,2013*
Sample Destination:	AMEC Prince George Laboratory
Test Type(s):	*Standard Proctor, Gradation*

Sample locations, material descriptions, and other relevant notes will be recorded by the MPMC Field Inspectors. The sample label information, accompanying field notes, and test results will be included in the construction reports as part of the permanent record of the 2013 construction program.

Samples will be collected and preserved in a manner consistent with their scheduled tests, such as the placing and sealing of samples for natural moisture content determinations in plastic bags.

6.0 REPORTING

6.1 Construction Documentation

MPMC's Field Inspectors will document the 2013 embankment construction activities by means of daily construction reports, field and laboratory test sheets, survey reports, photographs and notes from relevant on-site meetings and discussions. Other documents, such as borrow area excavation diagrams or dam construction progress maps, may also be included within the construction documents. A photographic record will be maintained and illustrated with select photographs captioned, dated, and included in daily construction reports as well as the as-built report.

6.2 Daily Construction Reports

MPMC Field Inspectors will be responsible for submitting a daily construction report. A sample of a daily construction report is attached in Appendix B. The information to be provided in these reports includes but is not limited to the following:

- ***Construction Activities*** – Foundation preparation, preparation activities prior to fill placement, material placement (location, method, equipment) and compaction efforts;
- ***Material Laboratory Testing*** – Sample collection (date, material, location), testing required;
- ***Compaction Testing*** – Method of test, location (offset, Northing, Easting, elevation), comparative laboratory moisture content sampled (location, elevation);
- ***Instrumentation Readings*** – Piezometer or Inclinometer data collection;
- ***Non-compliance Issue****s* and ***Mitigating Actions*** to be taken; and
- ***Daily Activities Photographs*** – Photographs depicting various activities performed in relation to TSF embankment construction. A minimum of six (6) high quality photographs are generally appropriate per daily report.

Daily reports are to be signed and submitted via email by 10:00 am of the following day to AMEC's Support Engineer and MPMC's Project Manager for review.

6.3 Monthly Progress Reports

Monthly progress reports will be prepared by the AMEC Support Engineer for those periods when active construction is ongoing. The report will summarize the monthly construction activities, material testing results, instrumentation readings and compliance with the design specifications. These reports will be issued to the MPMC Project Manager, AMEC's Project Manager and AMEC's Principal Engineer.

In addition to the monthly reports, a formal monthly meeting during active construction is to be conducted between the AMEC Support Engineer, MPMC Project Manager and MPMC Field

Inspector\Mine Technicians. The purpose of this meeting is to address any concerns, and determine if the specifications and standards for construction and testing are followed.

6.4 As-Built Report/Annual Review

AMEC will prepare a report summarizing the construction methodology followed and documenting the as-built conditions for the 2013 construction season. This as-built report will be combined with the 2013 annual review report. The report will be confirmation that the embankment was raised in conformance with design intent, and will serve as a guide for construction of TSF embankment in subsequent years.

The as-built report will also outline any modifications made in the field to the initial methods of foundation preparation, borrow soils excavation, hauling, placement, compaction or other relevant work. Documentation of any such refinements made during construction will be of benefit for subsequent embankment raises. The as-built report will also include recommendations pertinent to the construction and QA/QC monitoring of future construction.

MPMC will mark-up the construction drawings based on as-built surveys of the raised dam. These marked-up drawings will be used by AMEC to produce CADD as-built drawings for the report.

7.0 INSTRUMENTATION & MONITORING

7.1 General

Instrumentation in the TSF consists of slope inclinometers (SI) and vibrating wire piezometers (VW). During 2012, two (2) SI's were installed within the TSF (SI13-01 and SI13-02). One (1) SI was installed to replace an existing defective instrument and the other, to enable monitoring in an additional location along the Perimeter Embankment. Currently, there is no additional instrumentation installation planned for 2013.

The locations of the instruments are illustrated in plan view on Drawing 2013.10.

7.2 Vibrating Wire Piezometers

A total of eighty (80) functioning VW's have been installed along the embankment. The VW's monitor pore pressures in the embankment fill and within the embankment foundation. The data collected provides the pore pressure parameters that are used for limit equilibrium stability analyses. This information will continue to be required for monitoring the short and long term performance of the structure and for design optimization of future raises.

During active construction, piezometers are to be read, recorded, and submitted to the AMEC Support Engineer bi-weekly. The MPMC Field Inspector shall carry out these readings and indicate on data plots (making reference to the setting out line (S.O.L)) when construction activities have taken place within 100 m of the piezometers. This is required so that changes in piezometric pressures and measured displacements can be correlated with construction activities. During non-active construction, the data should be read, recorded, and submitted monthly. The AMEC Support Engineer shall be responsible for interpreting and analyzing data collected. Based on embankment performance, the reading frequency may be increased or decreased at the sole discretion of the AMEC Principal Engineer.

7.3 Inclinometers

Overall, eight (8) inclinometers have been installed and are functioning in the TSF; six (6) along the Main Embankment and two (2) along the Perimeter Embankment. Slope inclinometers are installed to measure the displacement of the embankment.

During active construction, the slope inclinometers are to be read, downloaded and then submitted to the AMEC Support Engineer on a bi-weekly basis. During non-active construction the data should be read, downloaded and submitted on a monthly basis. The AMEC Support Engineer shall be responsible for interpreting and analyzing data collected. Based on embankment performance, the reading frequency may be increased or decreased at the sole discretion of the AMEC Principal Engineer.

8.0 CLOSURE

This report has been prepared for the exclusive use of MPMC for specific application to the area within this report. Any use which a third party makes of this report, or any reliance on, or decisions made based on it, are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. It has been prepared in accordance with generally accepted engineering geology and geotechnical engineering practices. No other warranty, expressed or implied, is made.

If you have any questions about the content of this manual, please do not hesitate to call.

Respectfully submitted,

AMEC Environmental & Infrastructure,
a Division of AMEC Americas Limited

Reviewed by:

Original copies signed and sealed by
Laura Wiebe, P.Eng.

Laura Wiebe, P.Eng.
Project Manager

Steve Rice, P.Eng.
Principal Engineer

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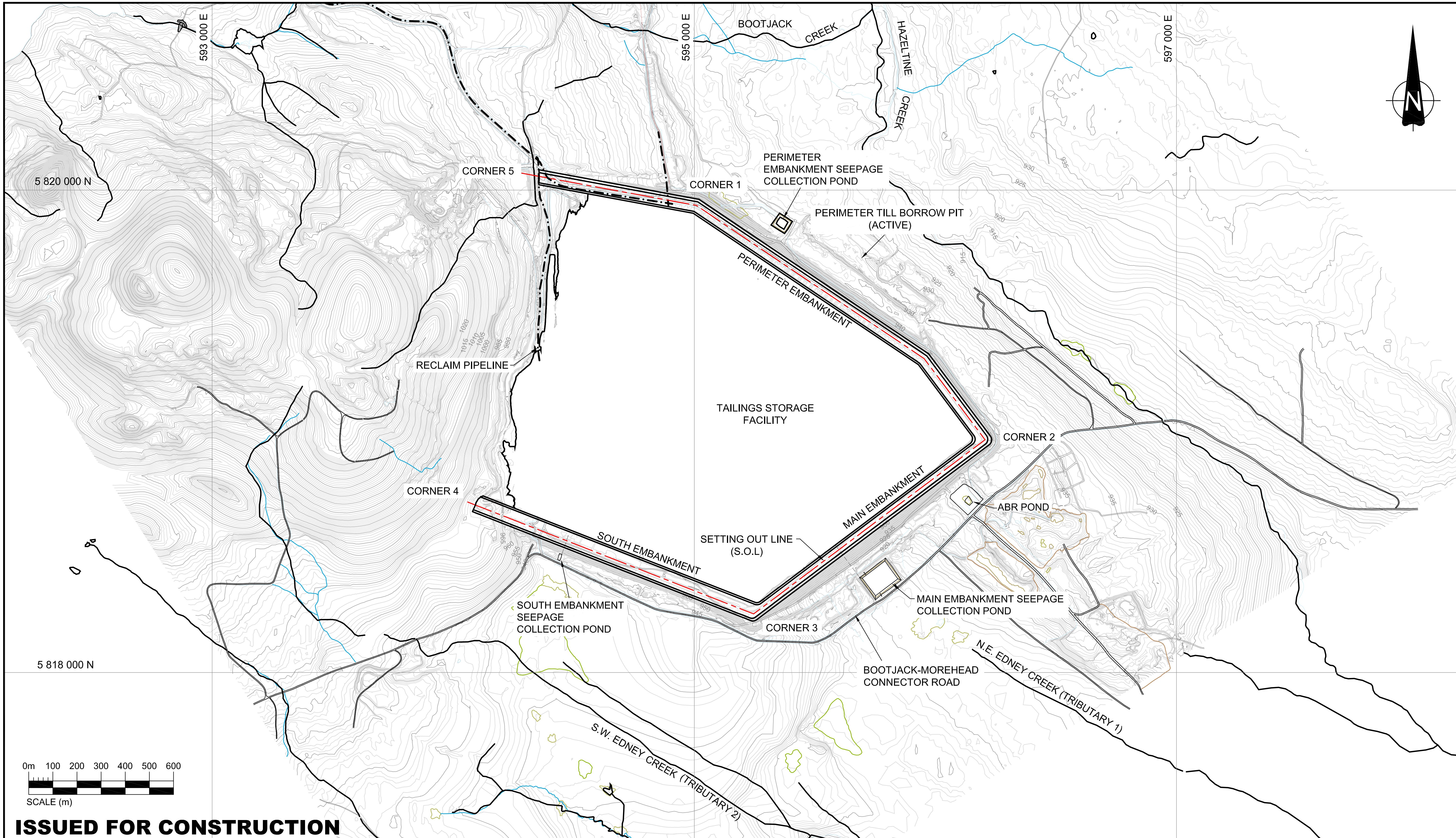
DRAWINGS



ISSUED FOR CONSTRUCTION

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.
2. TOPOGRAPHY BASED ON OCT 2012 FLYOVER DATA PROVIDED BY MPMC.

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	11	04	2013	ISSUED FOR CONSTRUCTION	LW	SR
0	08	03	2013	ISSUED FOR CLIENT REVIEW	LW	SR

Client Logo:

Client:

MOUNT POLLEY MINING CORPORATION

AMEC Environment & Infrastructure
4445 Lougheed Highway, Suite 600,
Burnaby, BC, V5C 0E4
Tel. 604-294-3811 Fax 604-294-4664

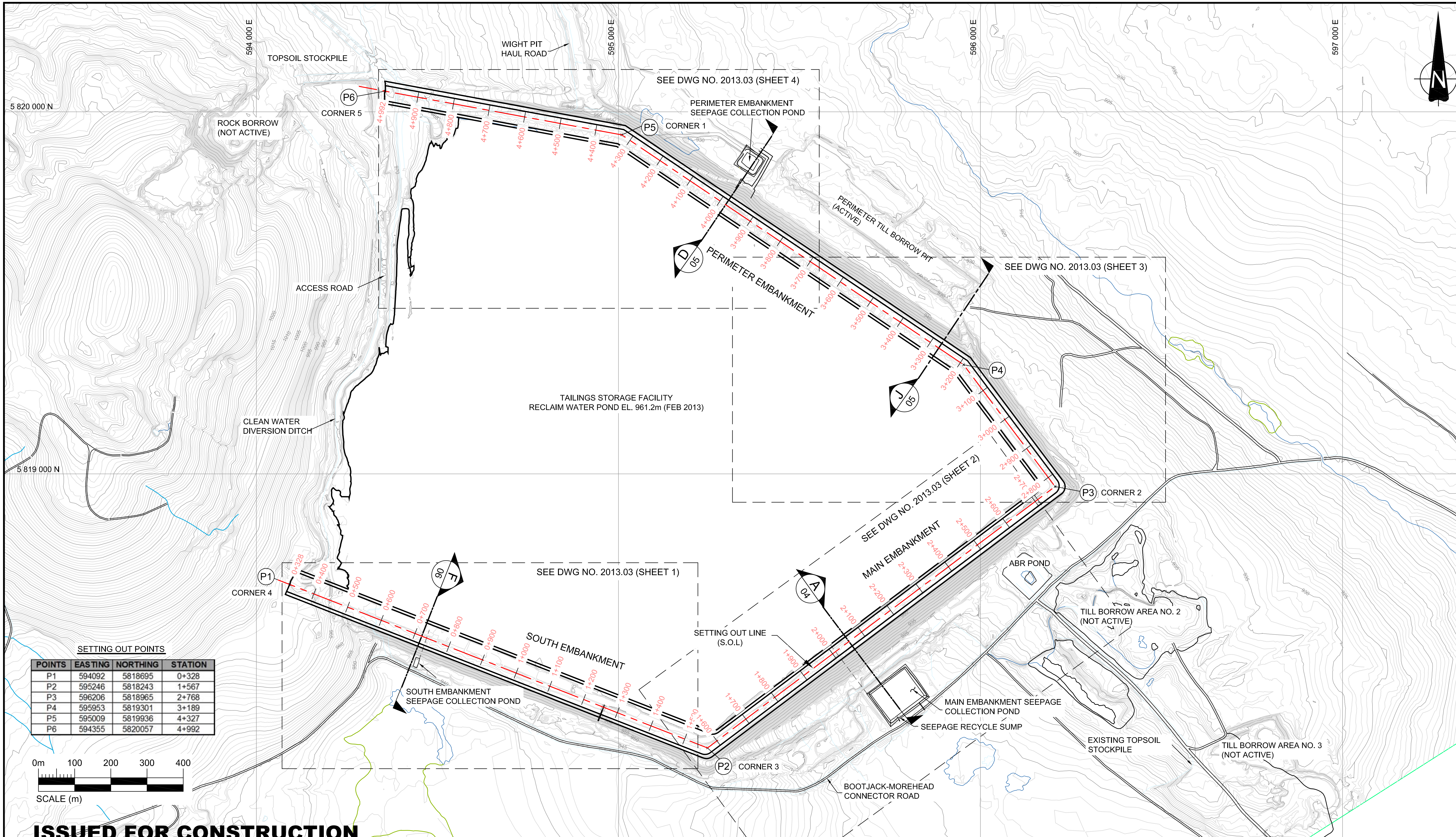
DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT GENERAL SITE PLAN

PROJECT NO.: VM00560C
REVISION NO.: 1
DATE: APRIL 2013
DRAWING NO.: 2013.01
SHEET NO.: 1 of 1

http://www.amec.com



SETTING OUT POINTS

POINTS	EASTING	NORTHING	STATION
P1	594092	5818695	0+328
P2	595246	5818243	1+567
P3	596206	5818965	2+768
P4	595953	5819301	3+189
P5	595009	5819936	4+327
P6	594355	5820057	4+992

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.
2. TOPOGRAPHY BASED ON OCT 2012 FLYOVER DATA PROVIDED BY MPMC.

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
6						
5						
4						
3						
2						
1	11	04	2013	ISSUED FOR CONSTRUCTION	LW	SR
0	08	03	2013	ISSUED FOR CLIENT REVIEW	LW	SR

Client Logo:

Client:

MOUNT POLLEY MINING CORPORATION

AMEC Environment & Infrastructure
4445 Lougheed Highway, Suite 600,
Burnaby, BC, V5C 0E4
Tel. 604-294-3811 Fax 604-294-4664

DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT CREST EL. 970m PLAN VIEW

PROJECT NO.: VM00560C
REVISION NO. 1
DATE: APRIL 2013
DRAWING NO.: 2013.02
SHEET NO.: 1 of 1

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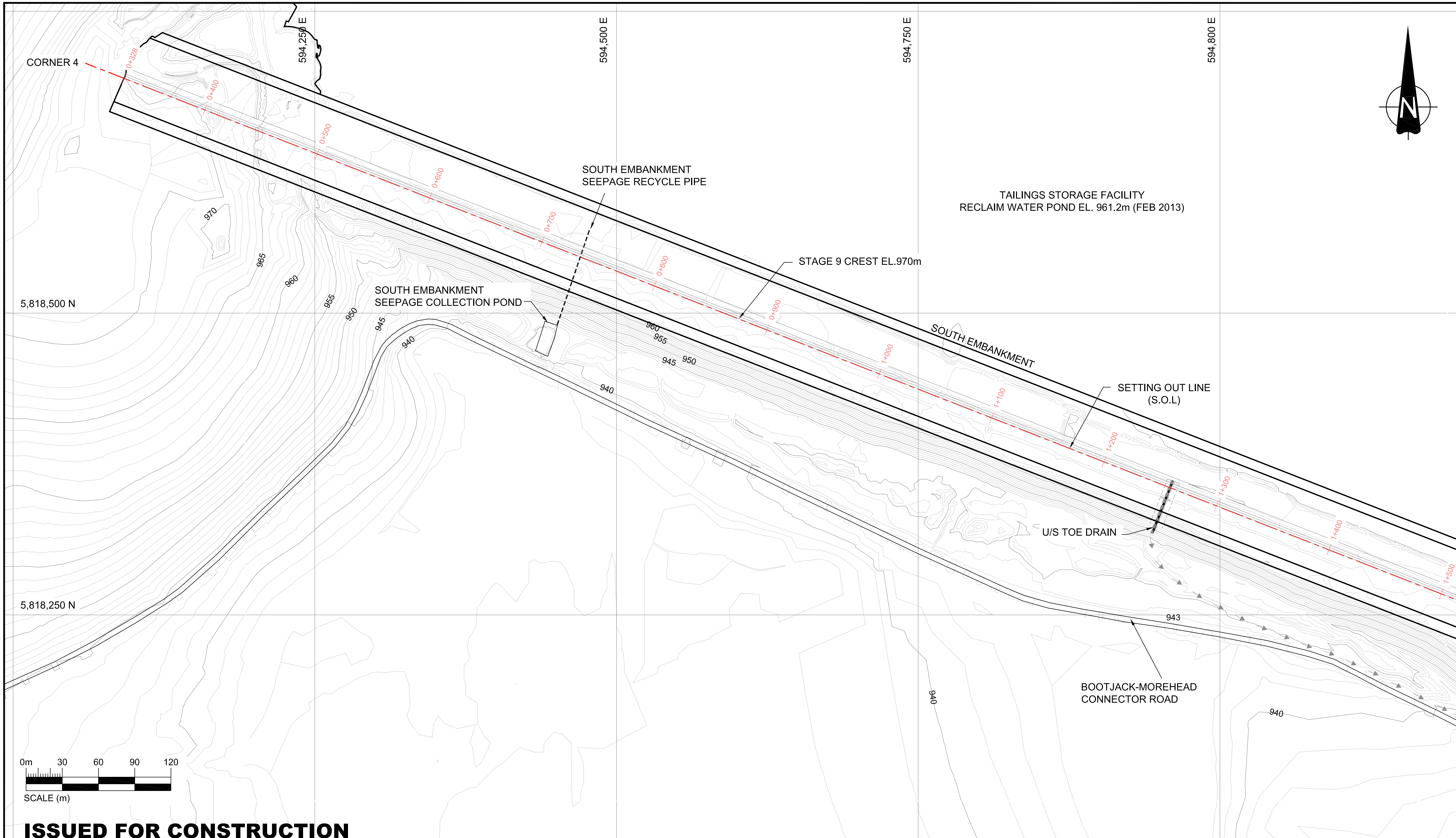

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NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.
2. TOPOGRAPHY BASED ON OCT 2012 FLYOVER DATA PROVIDED BY MPMC.

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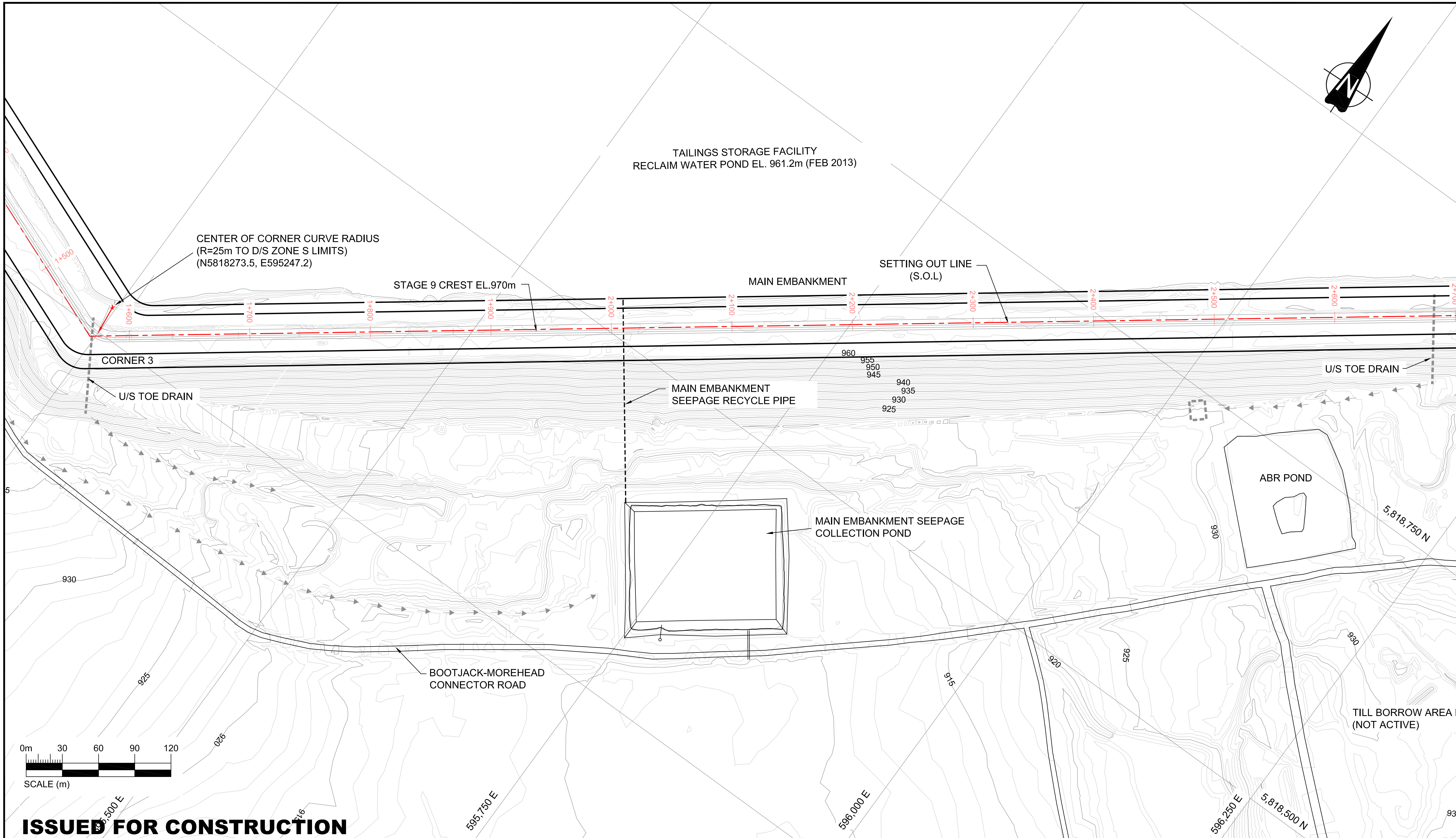
DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT CREST EL. 970m PLAN VIEW SHEET 1 OF 4

PROJECT NO.: VM00560C
REVISION NO.: 1
DATE: APRIL 2013
DRAWING NO.: 2013.03
SHEET NO.: 1 of 4



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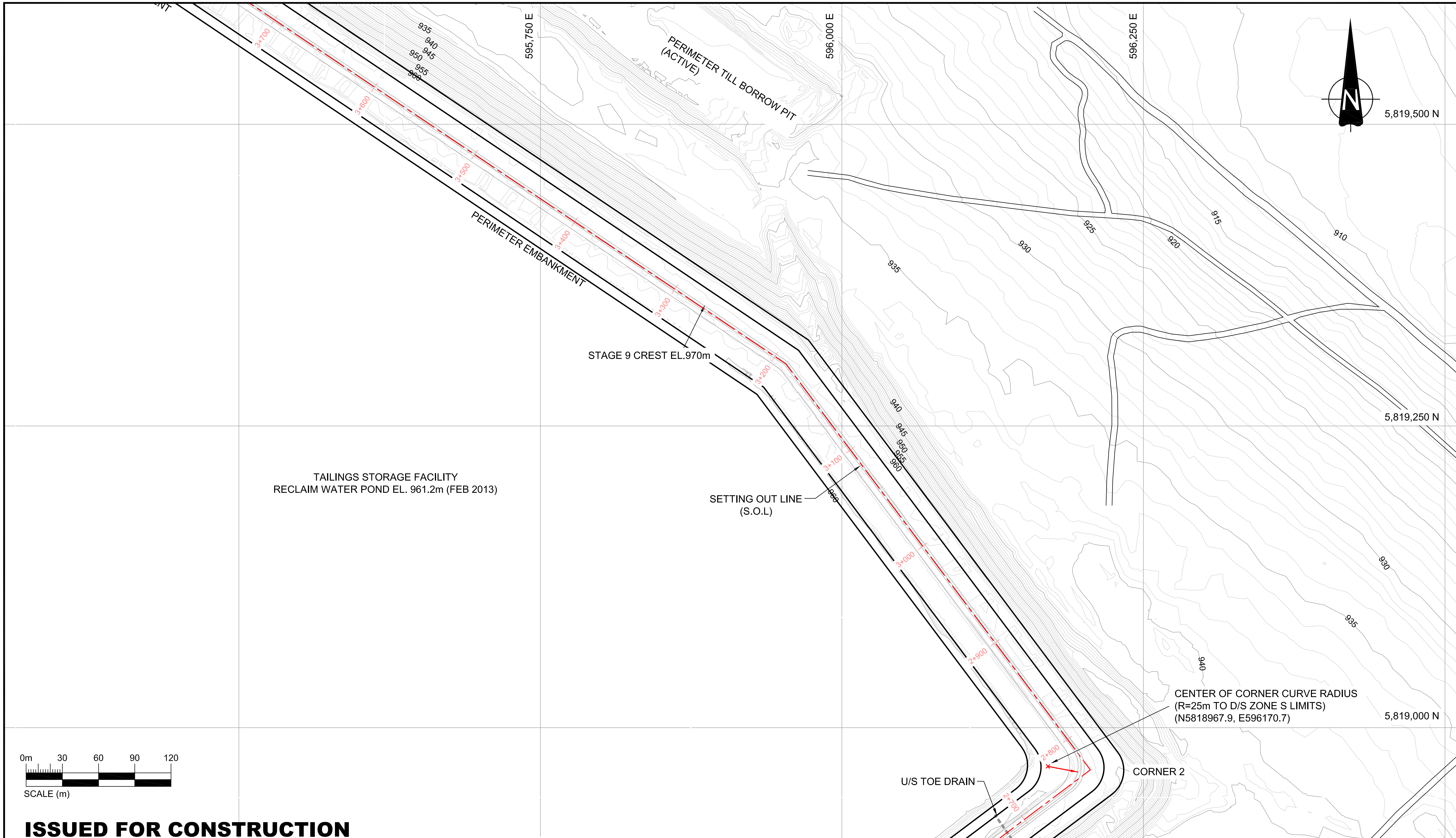
DATUM:	NAD 83
PROJECTION:	UTM ZONE 10
DRAWN BY:	YC
REVIEWED BY:	SR
ORIGINAL SCALE:	AS SHOWN

PROJECT:
MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE:
STAGE 9 TAILINGS EMBANKMENT
CREST EL. 970m PLAN VIEW
SHEET 2 OF 4

PROJECT NO.:	VM00560C
REVISION NO.	1
DATE:	APRIL 2013
DRAWING NO.:	2013.03
SHEET NO.:	2 of 4



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DATUM: NAD 83
PROJECTION: UTM ZONE 10
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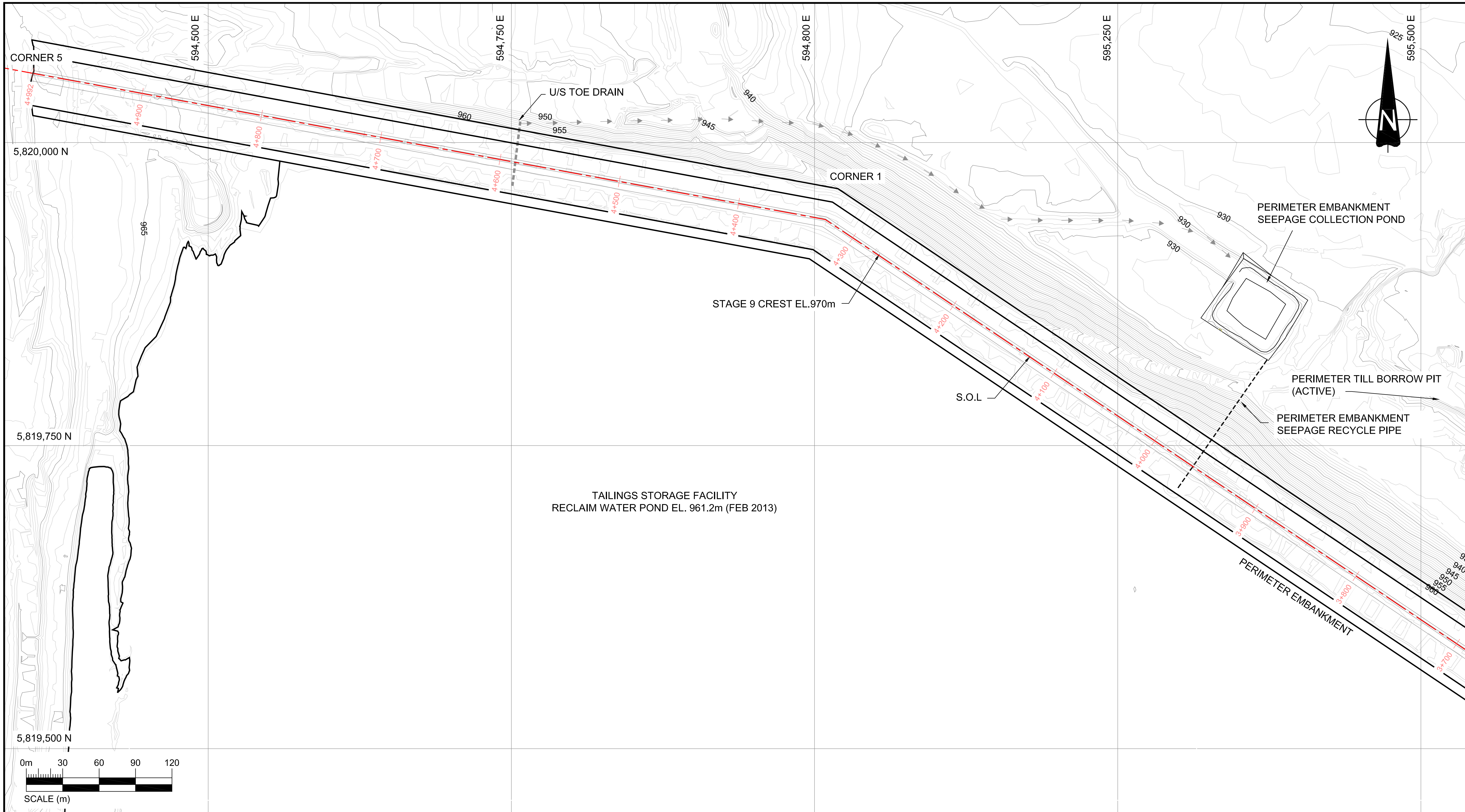
REVIEWED BY: LW
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT
CREST EL. 970m PLAN VIEW
SHEET 3 OF 4

PROJECT NO.: VM00560C
REVISION NO. 1
DATE: APRIL 2013
DRAWING NO.: 2013.03
SHEET NO.: 3 of 4



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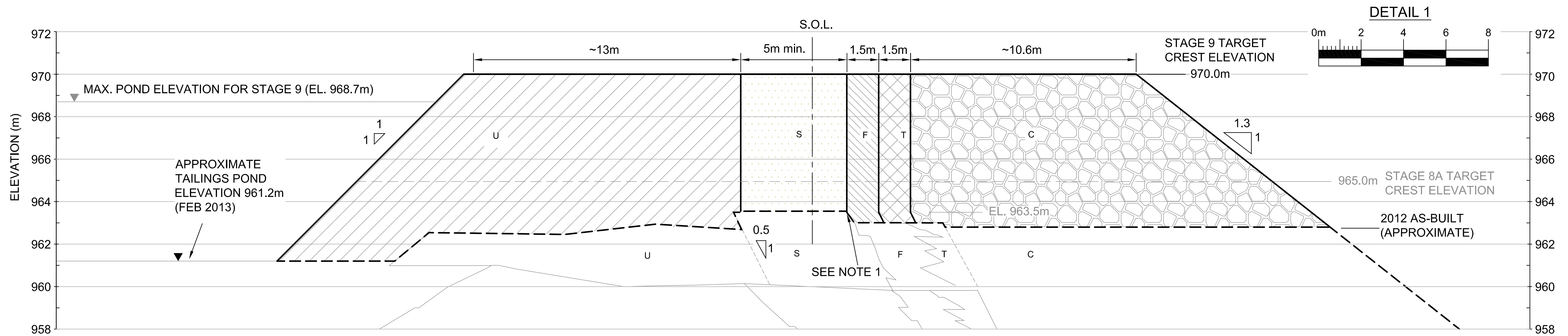
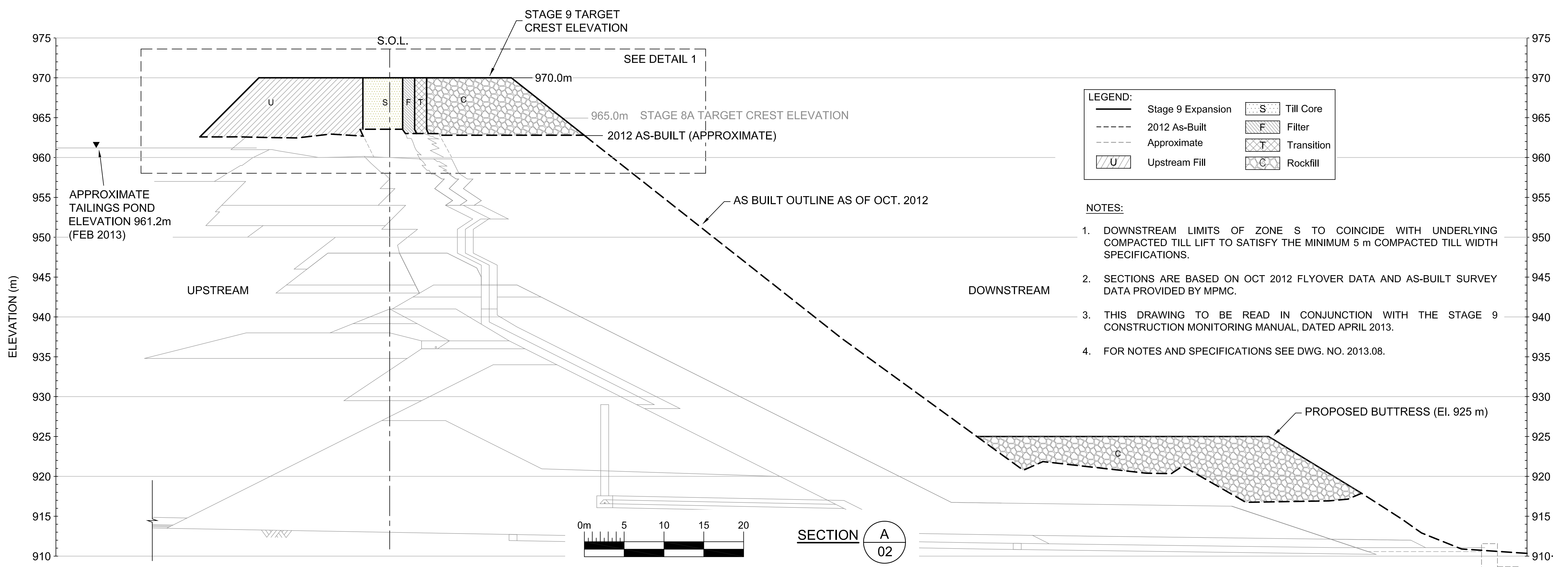
DATUM:	NAD 83
PROJECTION:	UTM ZONE 10
DRAWN BY:	YC
REVIEWED BY:	LW
ORIGINAL SCALE:	AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT CREST EL. 970m PLAN VIEW SHEET 4 OF 4

PROJECT NO.:	VM00560C
REVISION NO.	1
DATE:	APRIL 2013
DRAWING NO.:	2013.03
SHEET NO.:	4 of 4





NOTES:

1. DOWNSTREAM LIMITS OF ZONE S TO COINCIDE WITH UNDERLYING COMPACTED TILL LIFT TO SATISFY THE MINIMUM 5 m COMPACTED TILL WIDTH SPECIFICATIONS.
2. SECTIONS ARE BASED ON OCT 2012 FLYOVER DATA AND AS-BUILT SURVEY DATA PROVIDED BY MPMC.
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.
4. FOR NOTES AND SPECIFICATIONS SEE DWG. NO. 2013.08.

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REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
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DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 MAIN EMBANKMENT
SECTION A (2+060)

PROJECT NO.: VM00560C
REVISION NO.: 1
DATE: APRIL 2013
DRAWING NO.: 2013.04
SHEET NO.: 1 of 1

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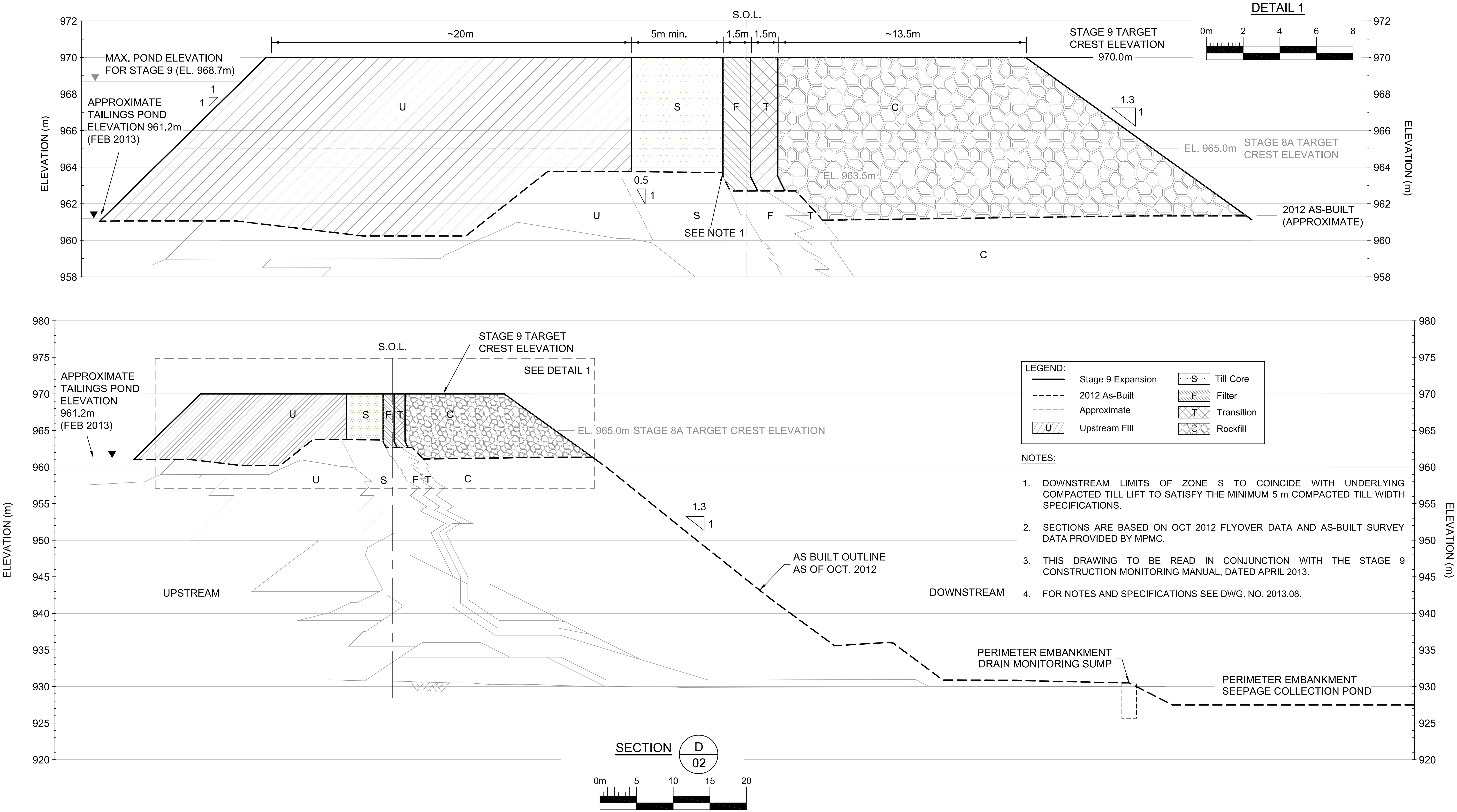

NOTES:

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ISSUED FOR CONSTRUCTION

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DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 PERIMETER EMBANKMENT SECTION D (3+990)

PROJECT NO.: VM00560C
REVISION NO.: 1
DATE: APRIL 2013
DRAWING NO.: 2013.05.1
SHEET NO.: 1 of 1

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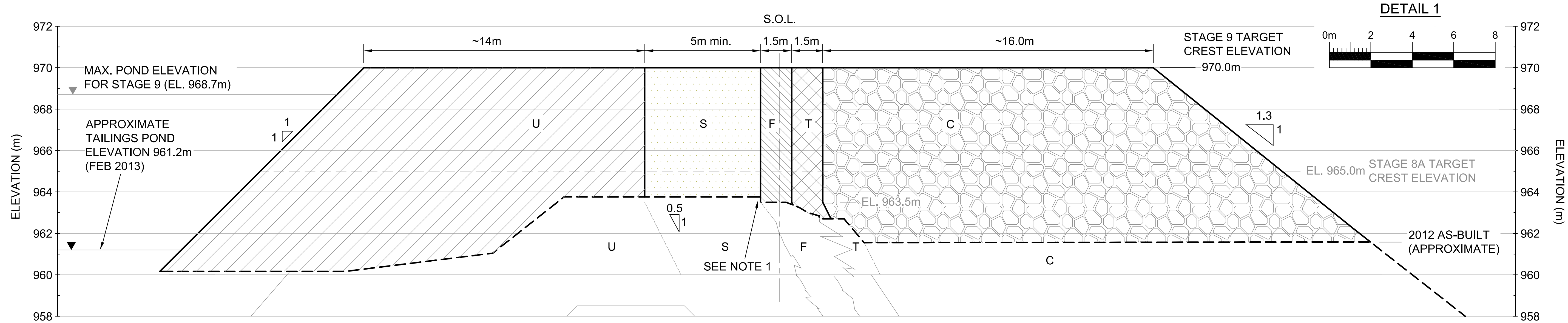
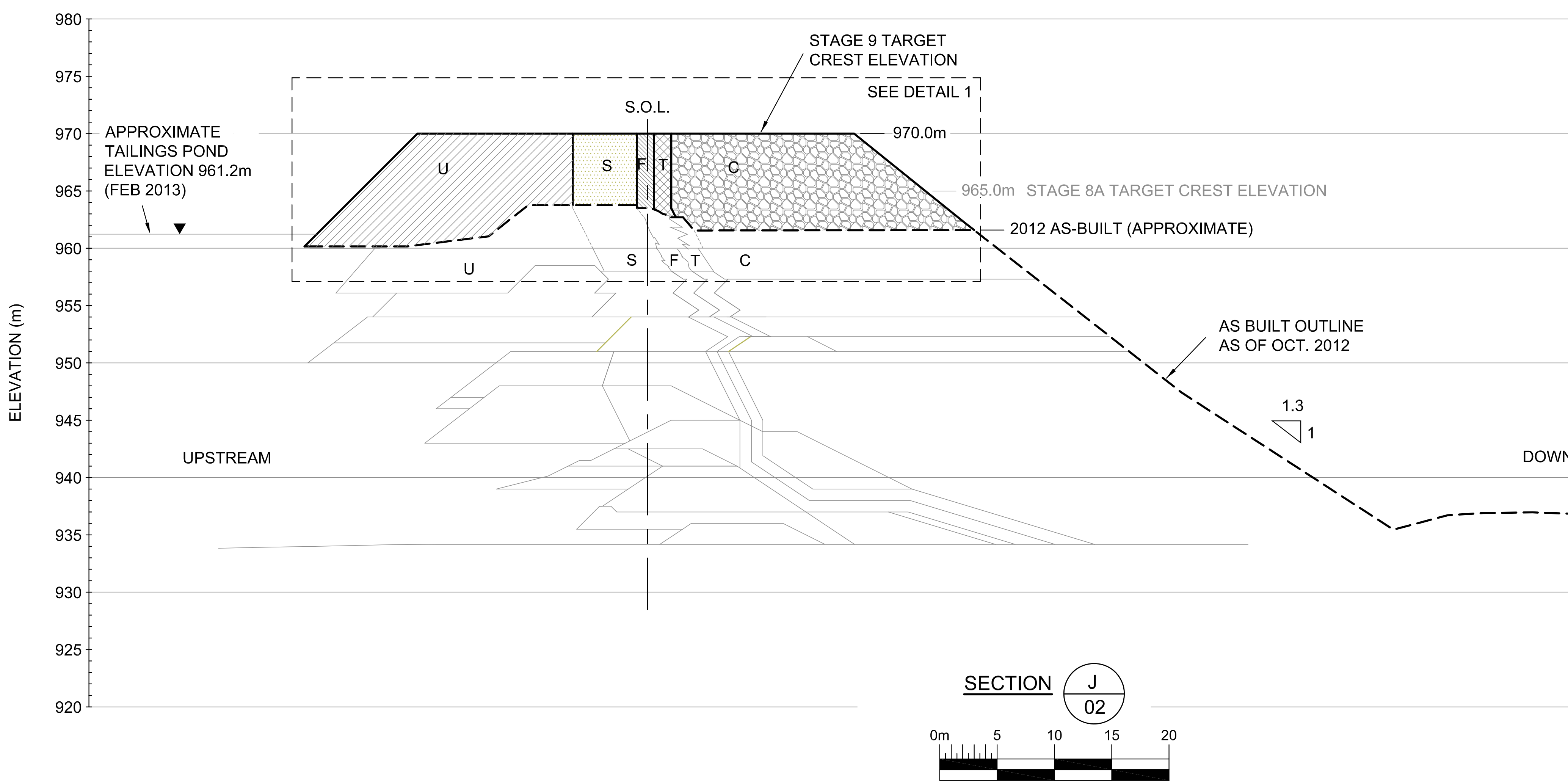
DETAIL 1





LEGEND:

Stage 9 Expansion	S Till Core
2012 As-Built	F Filter
Approximate	T Transition
U Upstream Fill	C Rockfill

NOTES:

1. DOWNSTREAM LIMITS OF ZONE S TO COINCIDE WITH UNDERLYING COMPACTED TILL LIFT TO SATISFY THE MINIMUM 5 m COMPACTED TILL WIDTH SPECIFICATIONS.
2. SECTIONS ARE BASED ON OCT 2012 FLYOVER DATA AND AS-BUILT SURVEY DATA PROVIDED BY MPMC.
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4. FOR NOTES AND SPECIFICATIONS SEE DWG. NO. 2013.08.

SECTION J / 02

0m 5 10 15 20

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DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 PERIMETER EMBANKMENT SECTION J (3+290)

PROJECT NO.: VM00560C
REVISION NO.: 1
DATE: APRIL 2013
DRAWING NO.: 2013.05.2
SHEET NO.: 1 of 1

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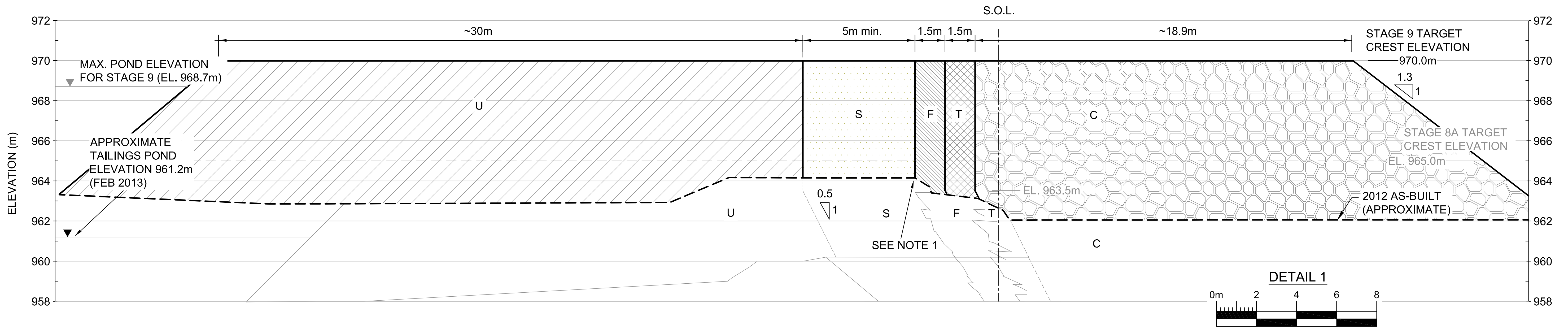

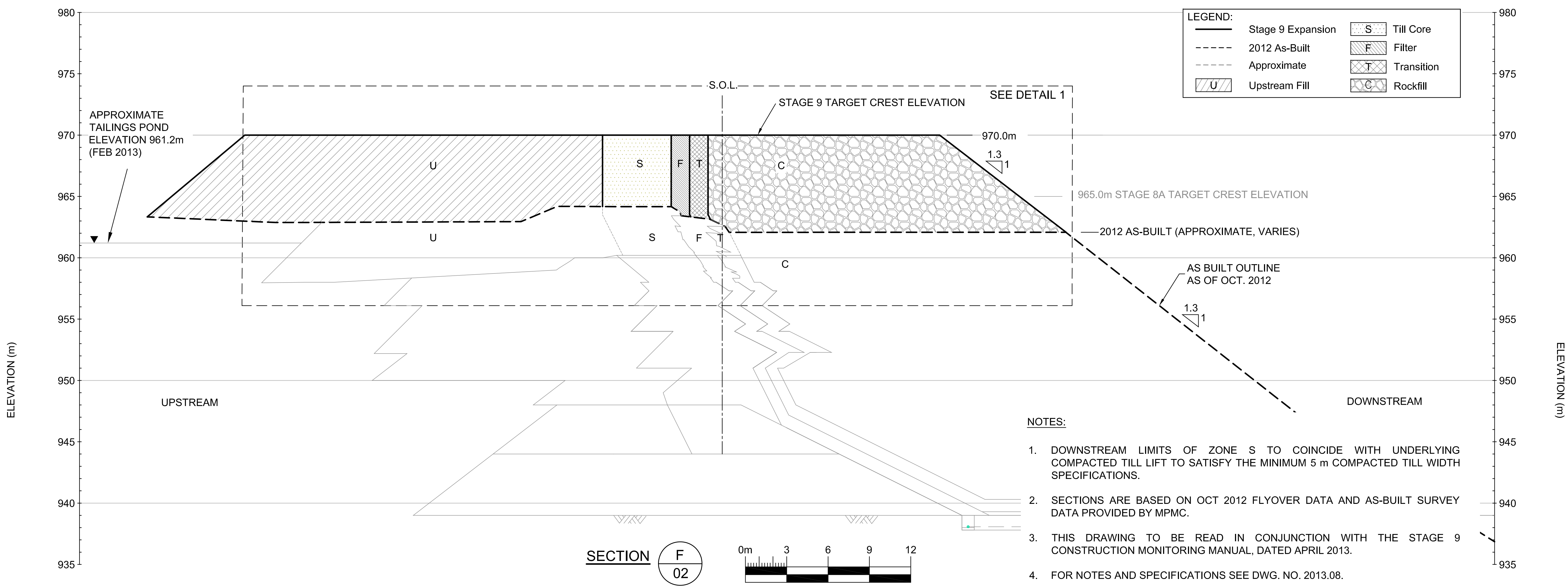

NOTES:

1. DOWNSTREAM LIMITS OF ZONE S TO COINCIDE WITH UNDERLYING COMPACTED TILL LIFT TO SATISFY THE MINIMUM 5 m COMPACTED TILL WIDTH SPECIFICATIONS.
2. SECTIONS ARE BASED ON OCT 2012 FLYOVER DATA AND AS-BUILT SURVEY DATA PROVIDED BY MPMC.
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.
4. FOR NOTES AND SPECIFICATIONS SEE DWG. NO. 2013.08.

ISSUED FOR CONSTRUCTION

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1	30	03	2013	ISSUED FOR CONSTRUCTION	LW	SR
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4445 Lougheed Highway, Suite 600,
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Tel. 604-294-3811 Fax 604-294-4664

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DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 SOUTH EMBANKMENT SECTION F (0+720)

PROJECT NO.: VM00560C
REVISION NO.: 1
DATE: APRIL 2013
DRAWING NO.: 2013.06
SHEET NO.: 1 of 1

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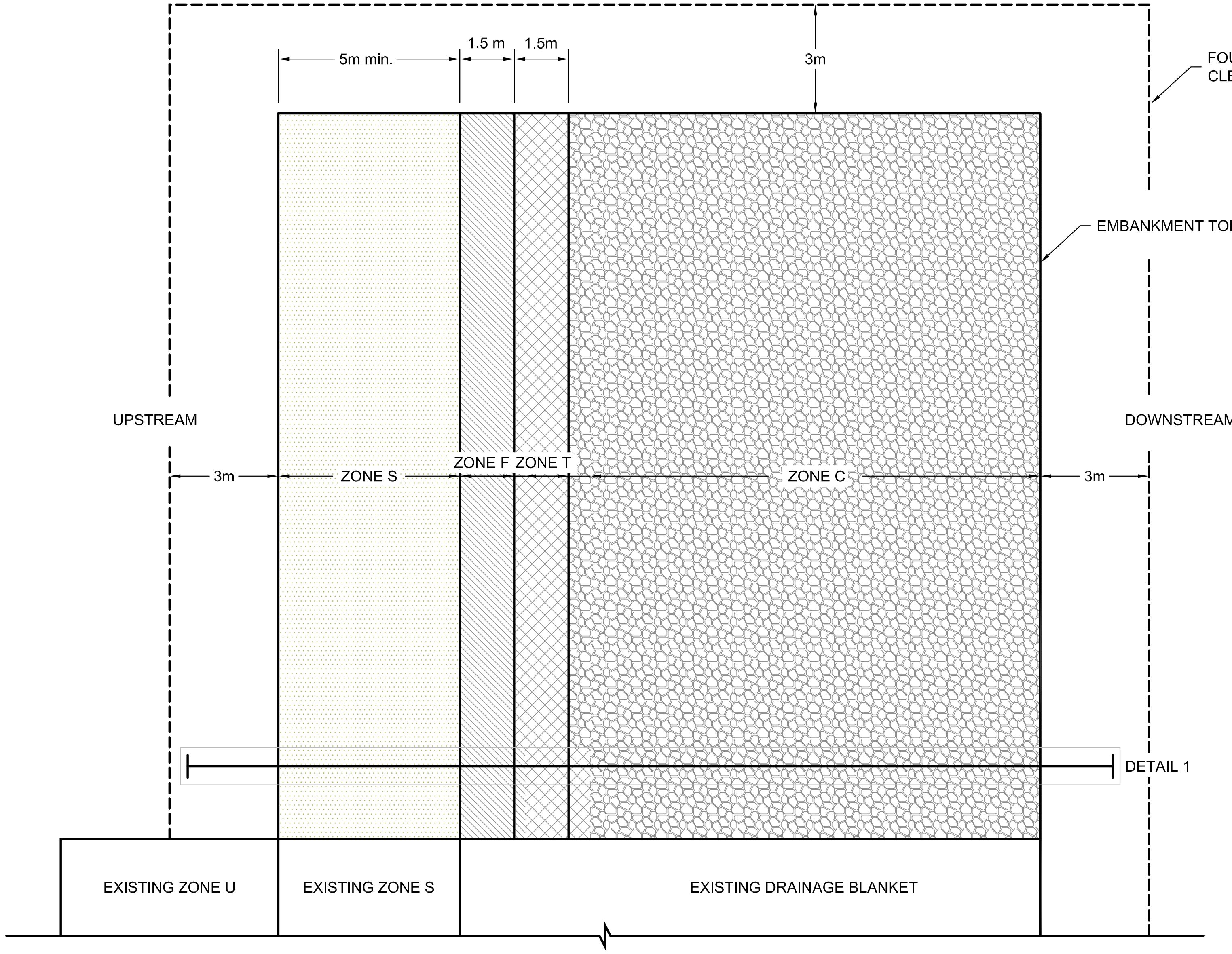
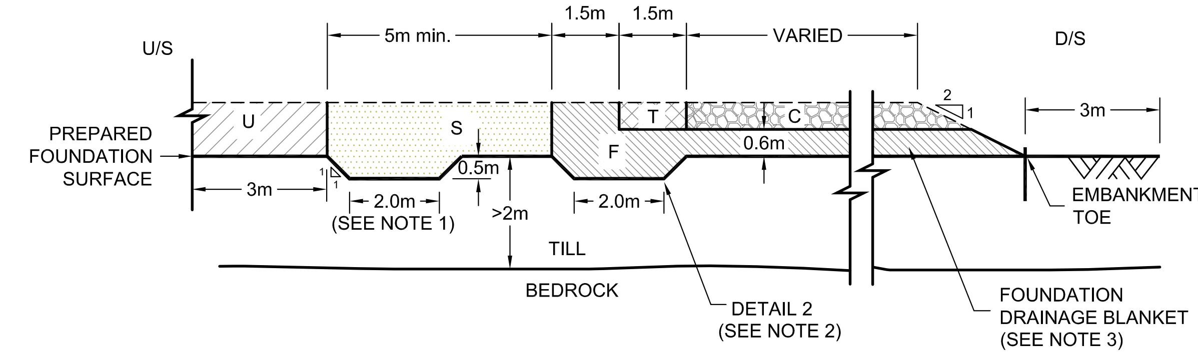
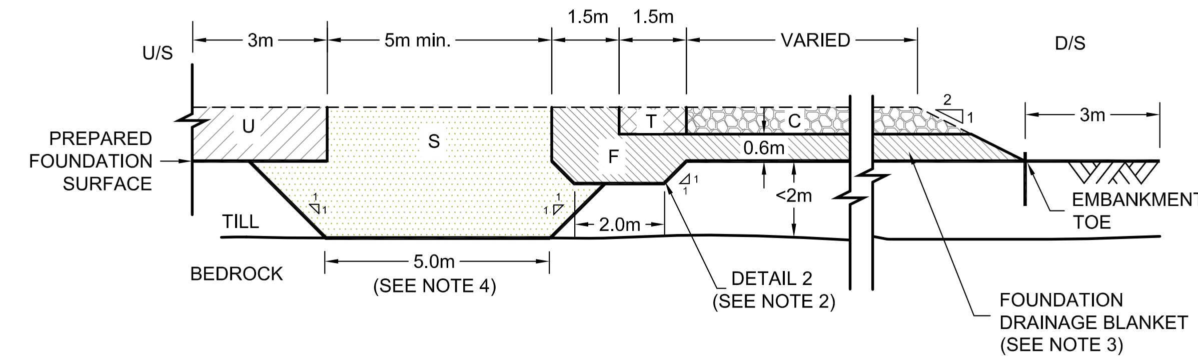


PLAN VIEW

DETAIL 1A: CUT OFF TRENCH TO TILL



DETAIL 1B: CUT OFF TRENCH TO BEDROCK



LEGEND:

- U Upstream Fill
- S Till Core
- F Filter
- T Transition
- C Rock Fill

NOTES:

1. CUTOFF TRENCH LOCATION MAY BE ALTERED BASED ON FIELD GEOMETRY AND IS SUBJECT TO APPROVAL OF THE AMEC SUPPORT ENGINEER.
2. FOUNDATION DRAINAGE DITCH TO EXTEND MINIMUM 0.5 m WITH SIDE SLOPES OF 1H:1V OR FLATTER. SOUTH EMBANKMENT UTILIZES 150 mm DIAMETER CPT OR AS SPECIFIED BY AMEC SUPPORT ENGINEER.
3. FOUNDATION DRAINAGE BLANKET TO EXTEND TO EMBANKMENT TOE LIMITS WITH A MINIMUM THICKNESS OF 0.6 m ABOVE THE PREPARED AND APPROVED FOUNDATION SURFACE.
4. CUTOFF TRENCH BASE WIDTH MAY EXTEND TO COVER THE FULL 5 m OF ZONE S LIMITS AT THE DISCRETION OF THE AMEC SUPPORT ENGINEER.
5. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.

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DATUM: NAD 83
PROJECTION: UTM ZONE 10
DRAWN BY: YC
REVIEWED BY: SR
ORIGINAL SCALE: AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT TYPICAL ABUTMENT DETAIL ABOVE 963.5m

PROJECT NO.: VM00560C
REVISION NO.: 1
DATE: APRIL 2013
DRAWING NO.: 2013.07
SHEET NO.: 1 of 1

CONSTRUCTION NOTES

1. SITE PREPARATION

i) The site preparation work shall be performed by experienced earthworks personnel, and shall be inspected by and completed to the approval of the field engineer. Proposed changes in the site preparation plan shall be discussed and agreed upon by the owner, contractor, AMEC Support Engineer, and AMEC's Principal Engineer prior to being undertaken.

ii) All topsoil, organic material, and other unsuitable materials are to be removed from the foundation area, to expose the native foundation subgrade of dense glacial till, or bedrock. The subgrade shall be further excavated or proofrolled where deemed necessary by the AMEC Support Engineer.

iii) Surface water shall be directed away from the foundation area of the dam prior to surficial soil stripping, to reduce the potential for water softening and weakening of the foundation materials by construction activity.

2. CUTOFF TRENCH CONSTRUCTION (SEE DWG. NO. 2013.07)

i) The cutoff trench shall extend a minimum of 500 mm into the native glacial till, where the foundation (subgrade) glacial till is at least 2000 mm thick. Confirmation of the minimum 1500 mm basal till thickness below the base of the cutoff trench shall be conducted by soil probing, to the approval of AMEC's Support Engineer. Where the foundation basal till is less than 2000 mm thick, the cutoff trench shall extend to sound bedrock. Removal of highly fractured and/or weathered bedrock overlying the sound bedrock shall be conducted to the approval of the AMEC Support Engineer.

ii) The cutoff trench shall have a minimum width of 2 m at its base, in the glacial till or in the sound bedrock. Where bedrock is encountered, the AMEC Support Engineer may direct that overburden be removed for the full 5 m width of the Zone S core.

iii) The cutoff trench walls shall slope up from the base elevation to the adjacent dam foundation level at a maximum slope of 1 H : 1 V (1 horizontal : 1 vertical) in the overlying foundation soils or weathered bedrock.

iv) Shallow groundwater seepage into the cutoff trench shall be controlled by temporary pumping or other measures, as required.

v) The cutoff trenches for the Stage 9 dam extensions shall be keyed into the trench at the abutments of the Stage 8A dams to ensure that the cutoff is continuous and free of gaps.

vi) Where bedrock is encountered on steep abutment slopes, special considerations exist and special bedrock treatment measures may be required. At a minimum this will include removal of all residual soil to fully expose bedrock, excavation of relatively loose, diggable bedrock, and cleaning of the rock surface via high air and/or water pressure jetting. Subsequent to such preparation, the AMEC Support Engineer may designate placement of bentonite, shotcrete and/or dental concrete prior to till fill placement against the approved abutment surface.

3. BORROW MATERIAL SPECIFICATIONS, PLACEMENT, AND COMPACTION

i) The cutoff trench key and Zone S shall be constructed of compacted, organic-free, well graded till.

ii) The till borrow material shall fall within the design grain size distribution envelope, and shall be placed at a moisture content between 1% dry of and 1% wet of Standard Proctor compaction optimum moisture content for the material.

iii) Stockpiled borrow material that is moisture-sensitive should be protected from excessive wetting by smoothrolling the borrow pile surface to enhance water runoff. In situ borrow material should not be excavated or worked during periods of heavy rainfall or snowfall. Overly wet material shall be set aside or placed in a general fill dump area, and shall not be used in its overwet condition for construction.

iv) The glacial till structural fill shall be compacted by a 10-ton vibratory smooth drum compactor and uniform routing of haul truck traffic to a minimum dry density of 95% of the Standard Proctor maximum dry density. Construction compaction densities shall be determined in the field by MPMC field inspectors, and must be reviewed and approved by the AMEC Support Engineer as part of overall approval of the dam construction.

v) The maximum allowable loose lift thickness for the glacial till fill shall be established by the AMEC Support Engineer from the results of the field density testing. In any case, the maximum allowable loose lift thickness shall not exceed 300 mm.

vi) The surface of the existing, compacted till lifts shall be scarified to make rough, immediately prior to placement and compaction of the next lift of glacial till structural fill. Scarification should only be carried out for the areas that will be immediately covered. Moisture conditioning may be required for areas of the scarified surface that have dried out.

vii) A granular wearing surface may be placed on the dam crest. Any such material placed on the dam crest shall be removed, and wasted over the upstream crest of the dam, and any underlying frost-softened and/or overwet till removed, prior to subsequent dam raises. Area to be inspected by AMEC Support Engineer prior to placement of additional till lifts.

4. MATERIALS AND CONSTRUCTION TESTING

i) Borrow materials testing shall be carried out by the AMEC Support Engineer and/or the AMEC soils laboratory in Prince George. Atypical or abnormal test results shall be reassessed by retesting of similar material (soil from the same general borrow soil source location).

ii) The intent of the borrow materials testing is to confirm that the proposed borrow soil is within the design material specifications for construction of the dam. Where the testing program identifies a zone or stockpile of proposed borrow soil that falls outside of one or more design specifications, that identified material shall not be used for construction of the dam without further review and approval by the AMEC Principal Engineer.

ii) The glacial till borrow material shall be tested for natural moisture content, and grain size at minimum frequency of one test suite per 10,000 m³ of soil.

iv) Moisture-density (Standard Proctor) reference tests shall be performed at a minimum frequency of 1 test per biweekly for glacial till borrow soil.

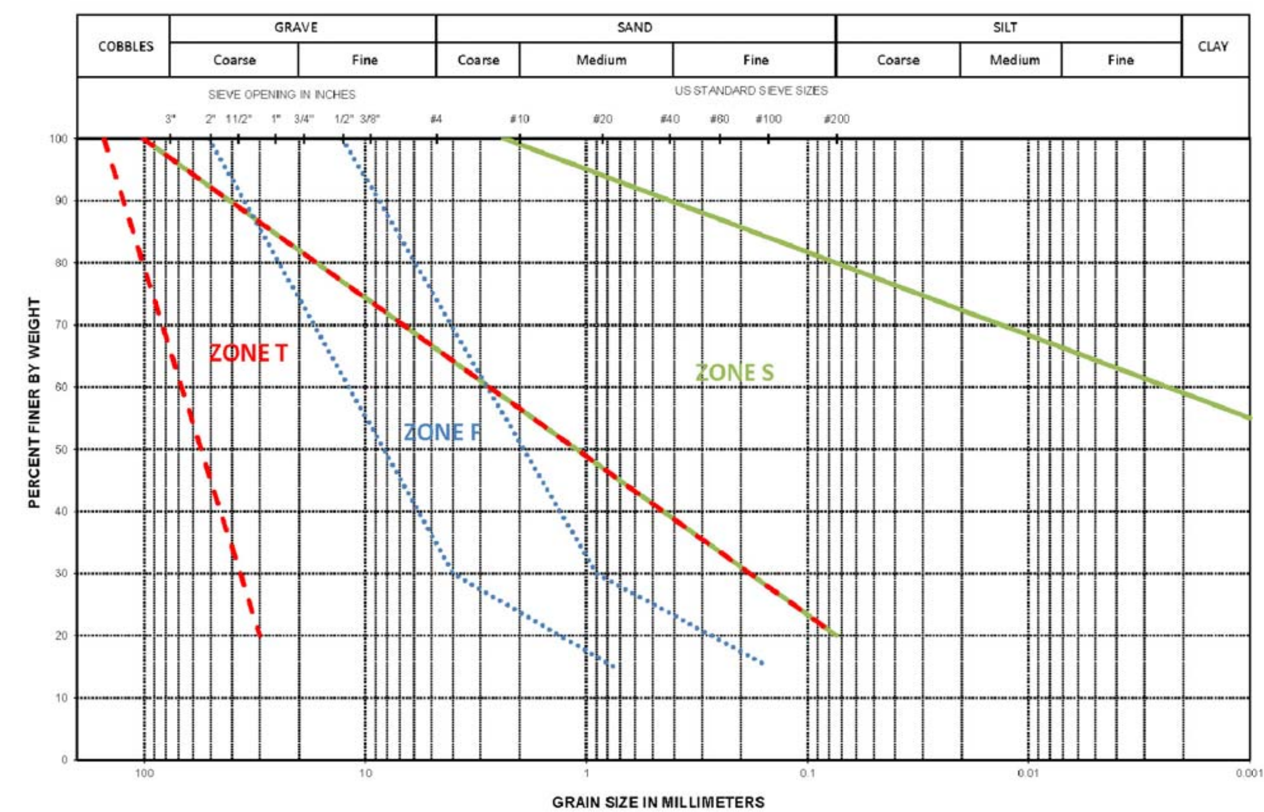
v) Compacted field density tests shall be performed on Zone S fill at a minimum frequency of 1 test per 100 linear m per compacted lift, throughout the thickness of the compacted lift being tested.

vi) Grain size analyses on sand and gravel filter material (Zone F) shall be conducted on samples obtained from the Zone F stockpile and from samples placed on the embankments. Test pits shall be excavated in Zone F by shovel to confirm that excessive segregation of Zone F material has not occurred.

EMBANKMENT ZONE MATERIAL GRADATION AND PLACEMENT SPECIFICATIONS

EMBANKMENT ZONE	DESCRIPTION	MATERIAL TYPE	SPECIFICATIONS	SUBGRADE BASE PREPARATION	PLACEMENT AND COMPACTION	ON-SITE TESTING	OFF-SITE TESTING	SAMPLE COLLECTION SCHEDULE	SAMPLE SIZE
S	TILL CORE	GLACIAL TILL	Well graded till moisture content at ±1% of optimum. (See Gradation Envelope below)	Strip all topsoil and organic material. Excavate cutoff trench as per detail. (see Detail 1) Strip all frost softened and weakened soils, proof roll then scarify base soils.	Place, moisture condition and spread in maximum 300mm loose lifts. Compaction with vibratory compactor and uniform routing of haul truck traffic to 95% of standard proctor maximum density. Density tested min. once (1) per 100 linear m per lift.	Source Classification: Visual inspection of borrow material. In-Place Testing: Visual inspection of zone dimension, and material. ND Density Testing (D6938-10) Moisture Content (D2216-10)	Source Classification and In-Place Testing : Proctor (D698-07 / D4718-07) Atterberg (D421-07 / D4318-10) Hydrometer Gradation (D421-07 / D422-07) Sieve Gradation (D6913-09)	Source Classification : One (1) per biweekly per source or one (1) per 10,000 m³ per source In-Place Testing: One (1) per offset biweekly per source or one (1) per 6,500 linear meters per source Moisture Content: One (1) per 1000 linear meters per lift per day	Source Classification: Two (2) three-quarter (3/4) full five (5) gallon bucket, void of oversized rocks In-Place Testing: Two (2) three-quarter (3/4) full five (5) gallon bucket, void of oversized rocks Moisture Content: Minimum sample 700g
F	FILTER	SAND AND GRAVEL (NAG)	Sand and gravel sized material. Gap-graded material not acceptable. (See Gradation Envelope below)	Strip all frost softened and weakened soils. Expose previously placed material.	Place, and spread in maximum 900mm loose lifts. Compaction not required.	During Production/Transportation: Wash Sieve Gradation (C117-04 / C136-06) During Placement: Frequent supervision and visual inspection to check that material gradation meets specification and that handling procedures do not result in excessive segregation. Wash Sieve Gradation (C117-04 / C136-06)	During Production/Transportation: Wash Sieve Gradation (C117-04 / C136-06) In-Place Testing: Wash Sieve Gradation (C117-04 / C136-06)	During Production/Transportation: One (1) per 5,000 m³ per stockpile A duplicate sample for off-site testing one (1) per stockpile In-Place Testing: One (1) per placement event or one (1) per 2,500 linear meters A duplicate sample for off-site testing one (1) per 4,500 linear meters	During Production/Transportation: One (1) three-quarter (3/4) full five (5) gallon bucket, void of oversized rocks In-Place Testing: One (1) three-quarter (3/4) full five (5) gallon bucket, void of oversized rocks
T	TRANSITION	FINE ROCKFILL (NAG)	Cobble and gravel sized material. (See Gradation Envelope below)	Strip all frost softened and weakened soils. Expose previously placed material.	Place, and spread in maximum 900mm loose lifts. Compaction by uniform routing of haul truck and spreading equipment.	In-Place Testing: Wash Sieve Gradation (C117-04 / C136-06) 1 per 5000 m³ material placed Confirmation of waste rock inertness, as required. Visual inspection of material size, compaction, preparation, and zone dimension.	In-Place Testing: Wash Sieve Gradation (C117-04 / C136-06)	In-Place Testing: one (1) per 5,000 m³ material placed. A duplicate sample for off-site testing one (1) per 10,000 m³	In-Place Testing: Three (3) three-quarter (3/4) full five (5) gallon bucket
C	ROCKFILL	GENERAL ROCKFILL (NAG)	Specified as nominal 1m maximum particle size.	Strip all frost softened and weakened soils. Scarify previously placed material.	Placed and spread in maximum 1200mm loose lifts. Boulder-rich rockfill not to be placed adjacent to fine rock transition zone.	Confirmation of waste rock inertness, as required. Visual in-place inspection of material size, preparation, and placement.	Not Applicable	Not Applicable	Not Applicable
U	UPSTREAM FILL	SELECT FILL	Cell construction is to be utilized. Constant reworking of the tailings is needed to ensure proper distribution within the cell. If NAG waste rock is used: To be well-graded and maximum 0.5m diameter.	Not Applicable	Placement and compaction requirements to be determined based on material selection. If NAG waste rock is used: Place, and spread in maximum 600mm loose lifts.	Not Applicable	Not Applicable	Not Applicable	Not Applicable

EMBANKMENT ZONE MATERIAL GRADATION LIMITS



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NOTE:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
1	11	04	2013	ISSUED FOR CONSTRUCTION	LW	SR
0	08	03	2013	ISSUED FOR CLIENT REVIEW	LW	SR

Client Logo:

Client:

MOUNT POLLEY MINING CORPORATION

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4445 Lougheed Highway, Suite 600,
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amec

DATUM:	NAD 83
PROJECTION:	UTM ZONE 10
DRAWN BY:	YC
REVIEWED BY:	SR
ORIGINAL SCALE:	AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT NOTES & SPECIFICATIONS

PROJECT NO.:	VM00560C
REVISION NO.:	1
DATE:	APRIL 2013
DRAWING NO.:	2013.08
SHEET NO.:	1 of 1

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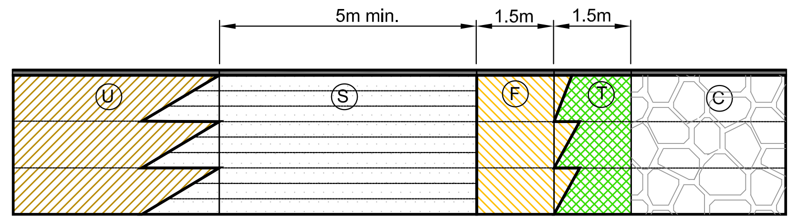

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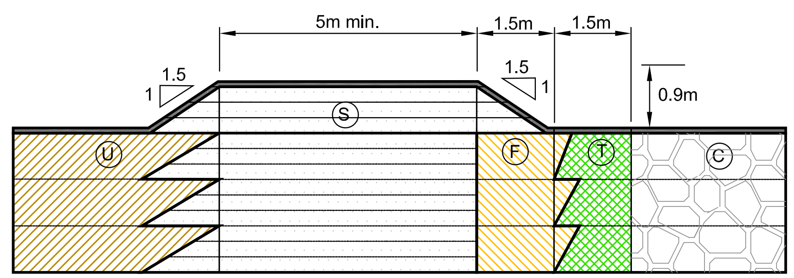

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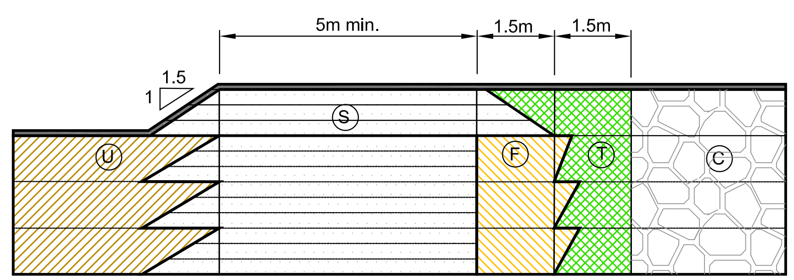

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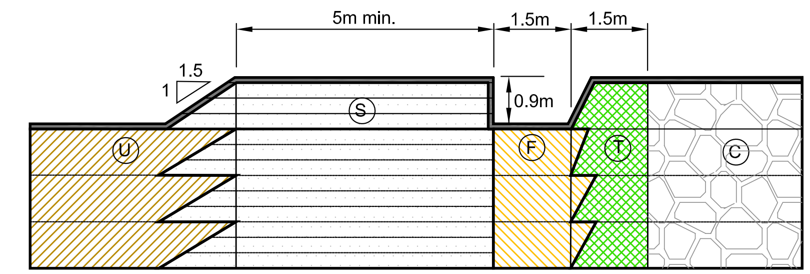

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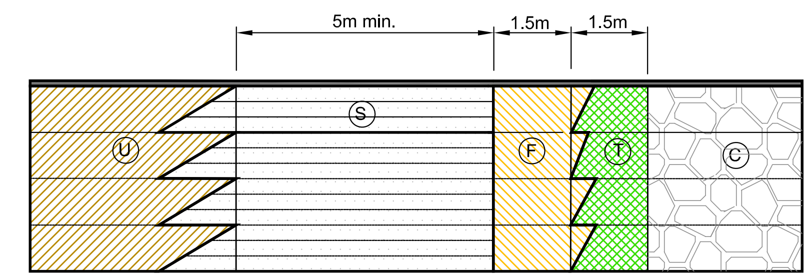

STEP 5

STEP 1
Zone U, S, F and C at similar elevations in preparation for continuing till placement.

STEP 2
Three 0.3 m lifts (maximum of 0.9-m total vertical thickness) of Zone S (compacted till) placed on embankment crest. Note: compacted till requires minimum crest width of 5-m centered on existing compacted till alignment.

STEP 3
Zone T (Transition NAG rockfill) placed adjacent to D/S till core with a maximum lift thickness of 0.9-m. Note: material adjacent to till crest should consist of fine NAG rockfill a minimum width of 3.0-m.

STEP 4
Remove Zone T and Zone S within the area designated as Zone F (sand and gravel filter). The till cut may be vertical with the transition NAG rockfill sloped at a minimum of 1:1.5 (H:V). The trench shall have a minimum width of 1.5-m at its base, with all overlying till and rockfill removed from the underlying sand and gravel filter. This will likely result in removal of some Zone F material from the previous lift.

STEP 5
The excavated trench shall be inspected by and completed to the approval of the MPMC Field Inspector before sand and gravel filter placement. Sand and gravel filter placement shall consist of a 0.9-m lift placed within the excavated trench and compacted with construction equipment. This will be monitored by the MPMC Field Inspector to check that segregation of the filter material is minimized. This will include hand-excavated test pits & sampling.

LEGEND:

- U Upstream Fill
- S Till Core
- F Filter
- T Transition
- C Rock Fill

0 2.5 5
SCALE (m)

NOTES:

1. PROPOSED CHANGES TO THE FOLLOWING CONSTRUCTION NOTES SHALL BE DISCUSSED AND AGREED UPON BY THE OWNER, CONTRACTOR, AMEC'S SUPPORT ENGINEER AND AMEC'S PRINCIPAL ENGINEER PRIOR TO BEING UNDERTAKEN.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.

ISSUED FOR CONSTRUCTION

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
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Client Logo:

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DATUM:	NAD 83
PROJECTION:	UTM ZONE 10
DRAWN BY:	YC
REVIEWED BY:	SR
ORIGINAL SCALE:	AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT NOTES & SPECIFICATIONS FOR VERTICAL FILTER CONSTRUCTION

PROJECT NO.:	VM00560C
REVISION NO.	0
DATE:	APRIL 2013
DRAWING NO.:	2013.09
SHEET NO.:	1 of 1

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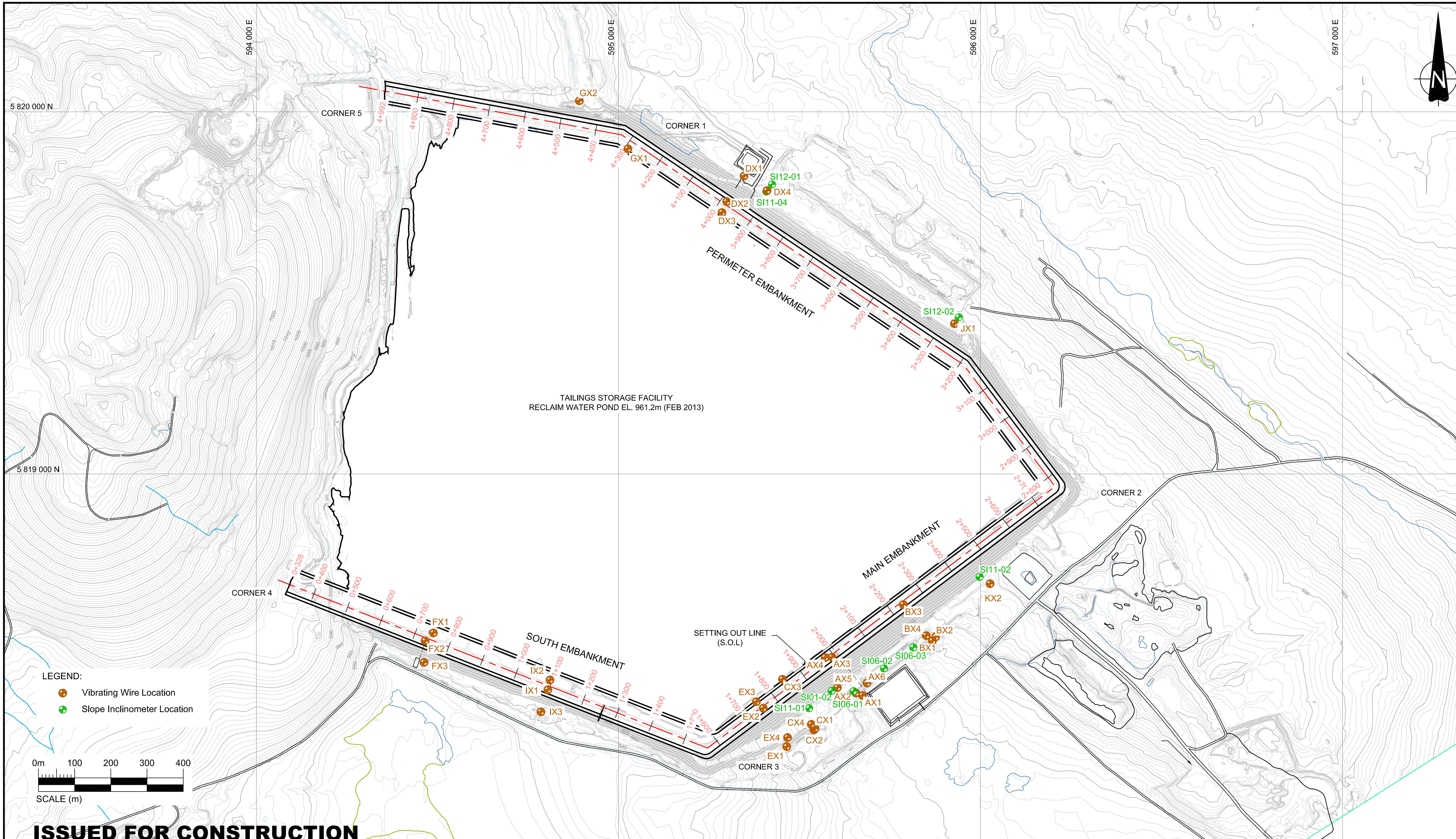

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NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE STAGE 9 CONSTRUCTION MONITORING MANUAL, DATED APRIL 2013.
2. TOPOGRAPHY BASED ON OCT 2012 FLYOVER DATA PROVIDED BY MPMC.

REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.
6						
5						
4						
3						
2						
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DATUM:	NAD 83
PROJECTION:	UTM ZONE 10
DRAWN BY:	YC
REVIEWED BY:	SR
ORIGINAL SCALE:	AS SHOWN

PROJECT: MOUNT POLLEY MINE TAILINGS STORAGE FACILITY

TITLE: STAGE 9 TAILINGS EMBANKMENT INSTRUMENTATION PLAN

PROJECT NO.:	VM00560C
REVISION NO.:	0
DATE:	APRIL 2013
DRAWING NO.:	2013.10
SHEET NO.:	1 of 1

APPENDIX A

Stability Analysis

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Mount Polley Mine
Tailing Storage Facility
Stage 9 (970m) Expansion Stability Analyses

Submitted to:

Mount Polley Mining Corporation
Likely, BC

Submitted by:

AMEC Environment & Infrastructure,
a Division of AMEC Americas Limited
Burnaby, BC

11 April 2013

AMEC File: VM00560A.A.2

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1.0 STABILITY ANALYSIS

1.1 Analysis Parameters and Methodology

Two-dimensional limit equilibrium stability analyses were carried out for representative sections of the proposed configuration of the Mt. Polley tailings embankment, raised to a target crest elevation of 970.0 m, 5 m higher than the Stage 8A dam design.

In order to perform these analyses, the three embankments were modelled at the following four locations; Main - Ch. 20+60 and 18+50, Perimeter – Ch. 39+90 and South – Ch. 7+20. The four dam sections were selected as representative for stability analyses based on their downstream rockfill shell configurations, range of dam heights, and foundation soil conditions.

The compacted till core is supported by the downstream rockfill shell and filter sequence, and does not significantly contribute to the stability of the embankments from a slope stability perspective. The centerline raise geometry of the dam is such that stability is not significantly affected by the shear strength assigned to the upstream impounded tailings.

The analyses were conducted using the computer code SLOPE/W (GeoStudio, 2007), incorporating the Morgenstern-Price method of slices solution. There are seven main materials incorporated into the analyzed sections, Zone S (compacted till fill), Zone C (rockfill), tailings, foundation tills (ablation, basal), glaciolacustrine and glaciofluvial sediments, and bedrock. The material properties used for the analyses are based on previously established parameters assumed by KP (2005) with minor modifications deemed appropriate by AMEC in more recent analyses and on the basis of recent geotechnical site investigations. The parameters used in the stability analyses presented herein are summarized in Table 1.1.

1.2 Material Parameters

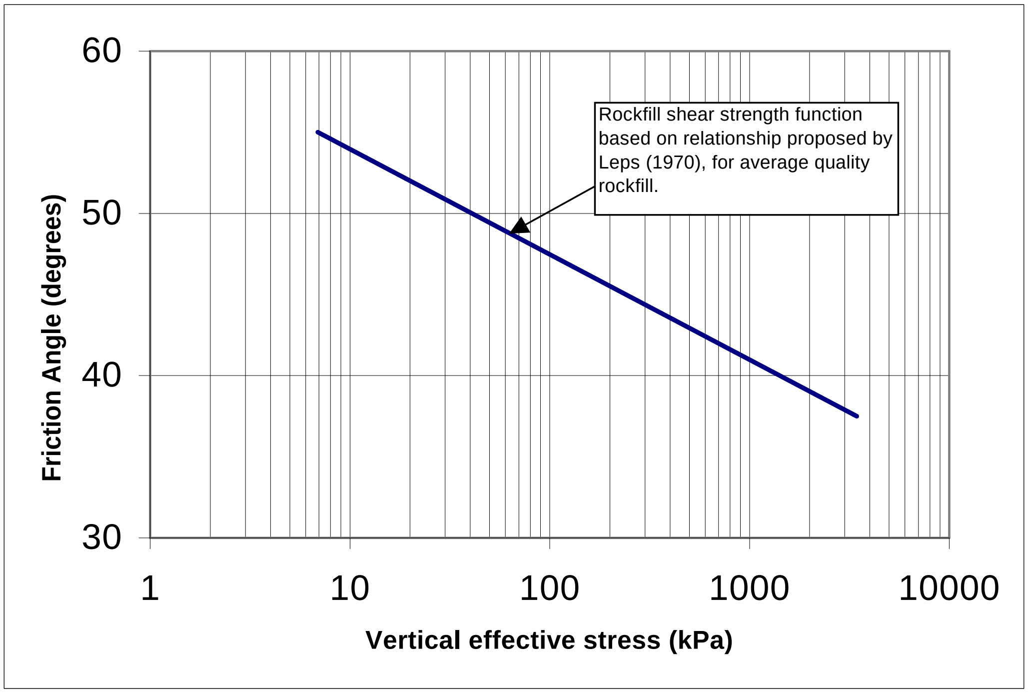
Material properties for the glaciolacustrine/glaciofluvial unit used in this analysis are consistent with those presented in the report, 2012 Stage 8a Expansion Stability Analyses (AMEC 2012-4). The shear strength assigned to this unit comprised an effective cohesion (c’) of 0 kPa, and an effective friction angle (ϕ’) of 28°.

The rockfill shear strength is taken as stress-level dependent as per Leps (1970), as illustrated in Figure 1.1. It is anticipated that the rockfill used for construction of the Stage 9 expansion will be comparable to that used for the previous dam raises and:

- is strong and durable with high compressive strength;
- is well-graded, and comprised of highly angular rock; and
- is placed with moderate compactive effort.

Therefore, the Leps (1970) trend for average quality rockfill was selected for the analysis.

Figure 1.1: Shear Strength Relationship Used for Rockfill



Based on field density test results during the 2012 construction season, AMEC determined the bulk unit weight of the till to average about 20.5 kN/m^3. This average value has been adopted for the purposes of the stability analyses presented herein.

The material strength parameters used in the stability analyses are as summarized in Table 1.1.

Table 1.1: Material Strength Parameters

Material	Bulk Unit Weight ¥$_b$ (kN/m^3)	Friction Angle ¤' (degrees)	Cohesion c' (kPa)
Rockfill (Zone C)	22	Defined by Lep's (1970) shear normal function for average quality rockfill (Note 1)	0
Compacted Till Fill (Zone S)	20.5	35	0
Glaciolacustrine/Glaciofluvial	20	28	0
Basal Till	21	33	0
Tailings	18	30 (drained) S_u/σ_v' = 0.1 (undrained)	0

Note 1: The shear normal function used for the rockfill accounts for the stress-level dependency of the normalized shear strength as expressed by the effective friction angle (¤') – see Figure 1.1.

1.3 Pore Pressure Assumptions

The current phreatic surfaces used for the stability analysis sections were inferred on the basis of data from vibrating wire piezometers installed in the embankment or into the embankment foundations. For those analysis sections lacking in piezometric data, the phreatic surface was estimated based on trends on monitored sections, interpolation of piezometer data, observed piezometric trends over the years at this facility, and experience from other tailings dams of similar design with similar foundation conditions.

The phreatic surface for the Stage 9 raise (crest El. 970.0 m) was estimated by increasing the phreatic surface on the upstream side to an elevation of 970.0 m, equivalent to the maximum Stage 9 raise, while maintaining the phreatic surface downstream of the core as indicated by interpolation of piezometric data. The historical piezometer data shows essentially zero foundation piezometer response to the rising tailings pond elevation or in response to increased embankment loading associated with the construction of the annual stage raises.

The rockfill was assigned zero pore pressure except where located below the inferred phreatic surface, below which pore pressures at any given point were assumed hydrostatic.

1.4 Minimum Factor of Safety Criteria

The minimum factor of safety criteria for design is 1.3 for short-term (during construction) and 1.5 for long-term (closure) steady state conditions. Currently, “during construction” conditions are applicable.

2.0 STABILITY ANALYSES RESULTS

2.1 Stability Results

The stability analyses of the Stage 9 expansion were carried out for four representative cross sections of the embankments (Main, Perimeter and South). Three of these are similar to those sections analysed in previous reports. To analyse the stability of the embankments, two shear strength cases were considered for each cross section: one considering drained shear strength within the tailings, and the other considering residual undrained shear strength (i.e. post-liquefaction conditions) within the tailings.

The stability analyses results for the most critical (lowest factor of safety) slip surface geometries are illustrated on Figure 2.1 to 2.4. A summary of the factors of safety obtained for Stage 9 are shown below in Table 2.1, alongside stability results from the 2012 Stage 8A analyses for the dam at crest El. 965.0 m (AMEC 2012-4).

Table 2.1: Factor of Safety Summary

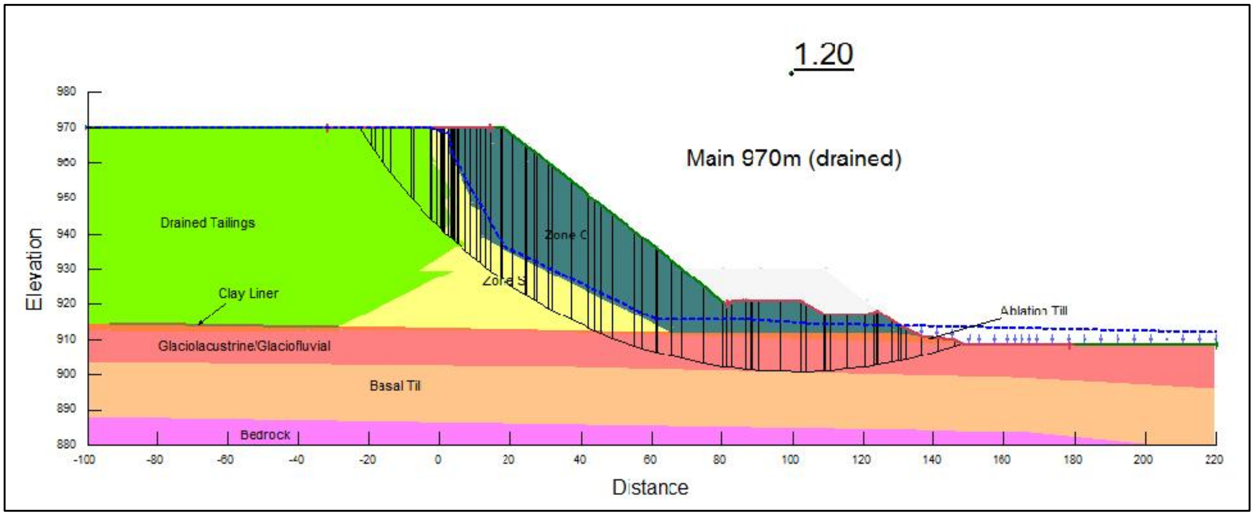
Embankment	Stage 8A (El. 965 m)	Stage 9 (El. 970 m)
Tailings shear strength: **Drained ($c' = 0$, $\sigma' = 30°$)*		
Main - Section A (Ch. 20+60)	1.31	1.20
Main - Section C (Ch. 18+50)	-	1.32
Perimeter (Ch. 39+90)	1.81	1.63
South (Ch. 7+20)	1.95	1.70
Tailings shear strength: **Undrained ($Su/\sigma_v' = 0.1$)*		
Main - Section A (Ch. 20+60)	1.27	1.16
Main - Section C (Ch. 18+50)	-	1.28
Perimeter (Ch. 39+90)	1.77	1.58
South (Ch. 7+20)	1.92	1.68

*Note: Minimum acceptable Factors of Safety for:
Drained = 1.3 (for “construction conditions”)
Undrained = 1.1

The critical section (i.e. yielding the lowest factor of safety) for the Stage 9 expansion remains the Main embankment. With the resulting factor of safety less than 1.3 at Ch. 20+60, the construction of a NAG waste rock toe buttress is recommended prior to any crest raising above El. 965.0 m. Stability analysis considering a buttress constructed on the Main embankment is presented in the following subsection.

Both Stage 8A and 9 analyses incorporate the embankment design change from modified centerline raising to centerline raising, beginning from El. 963.5 m.

Figure 2.1: Main Embankment Stability Analysis (*Section A – Ch. 20+60*)



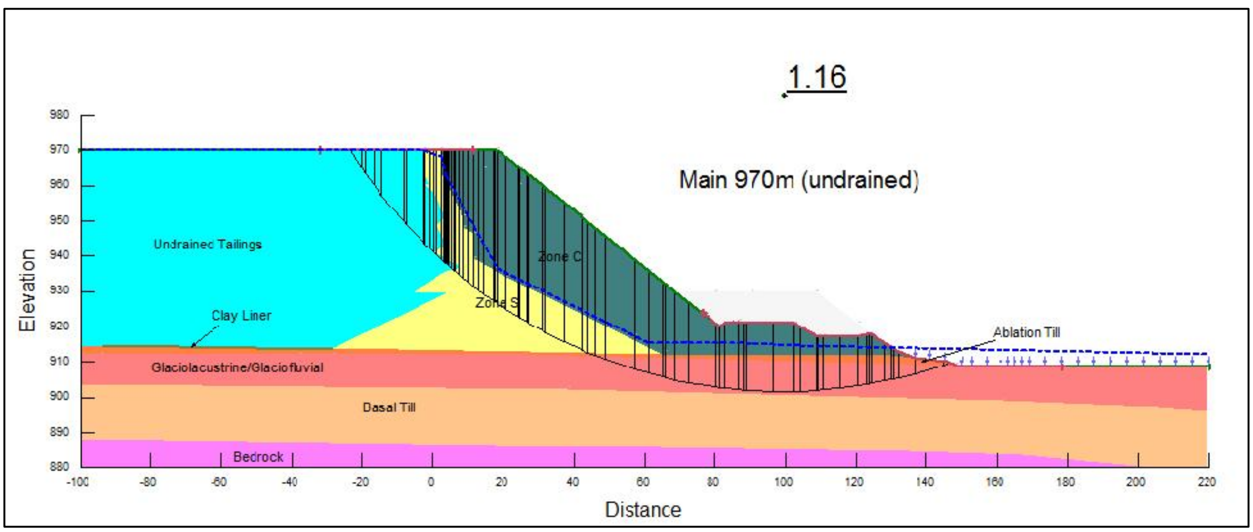
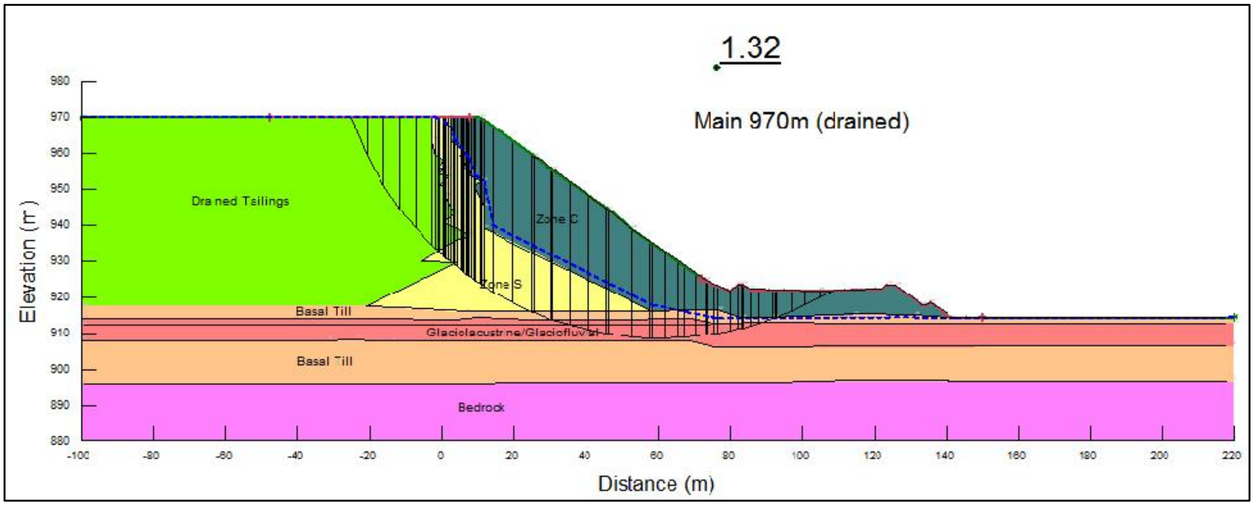


Figure 2.2: Main Embankment Stability Analysis (*Section C - Ch. 18+50*)



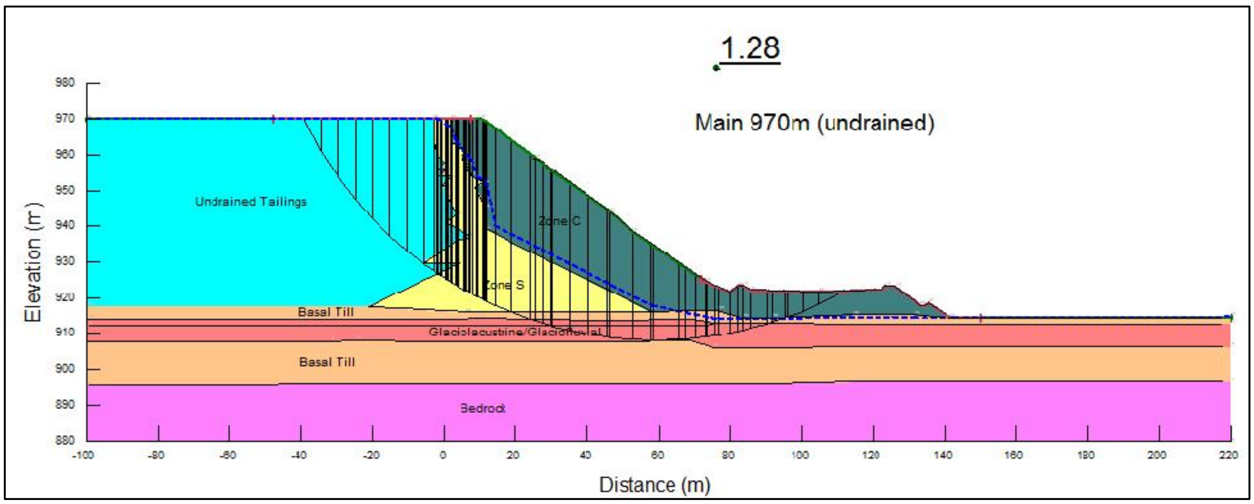
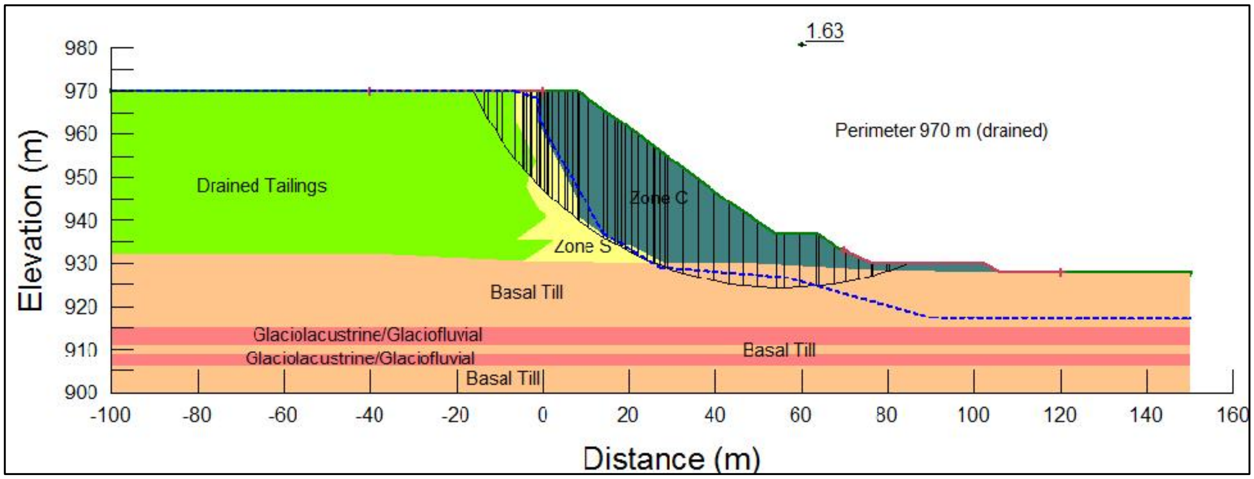


Figure 2.3: Perimeter Embankment Stability Analysis



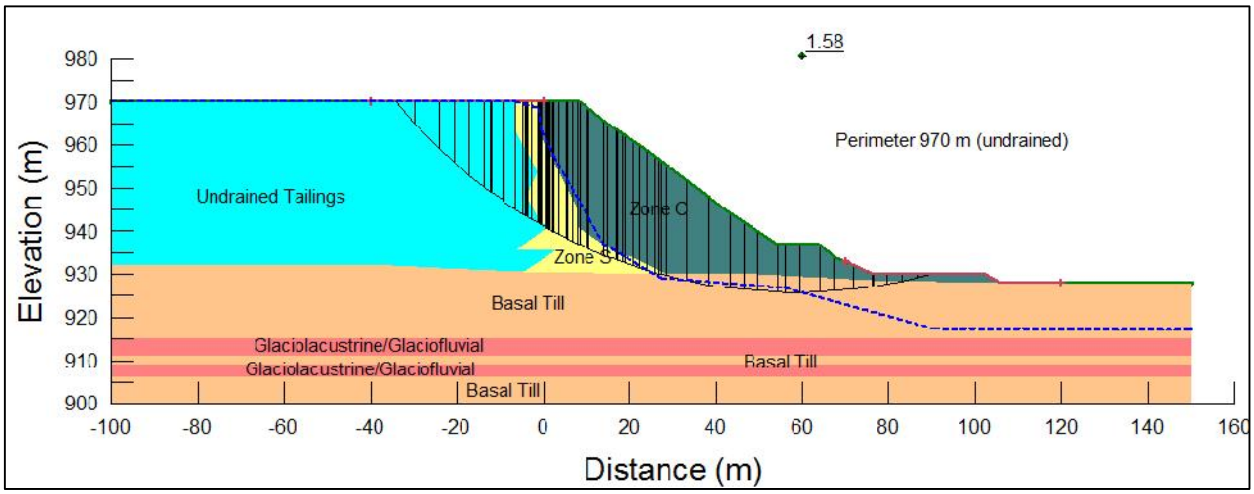
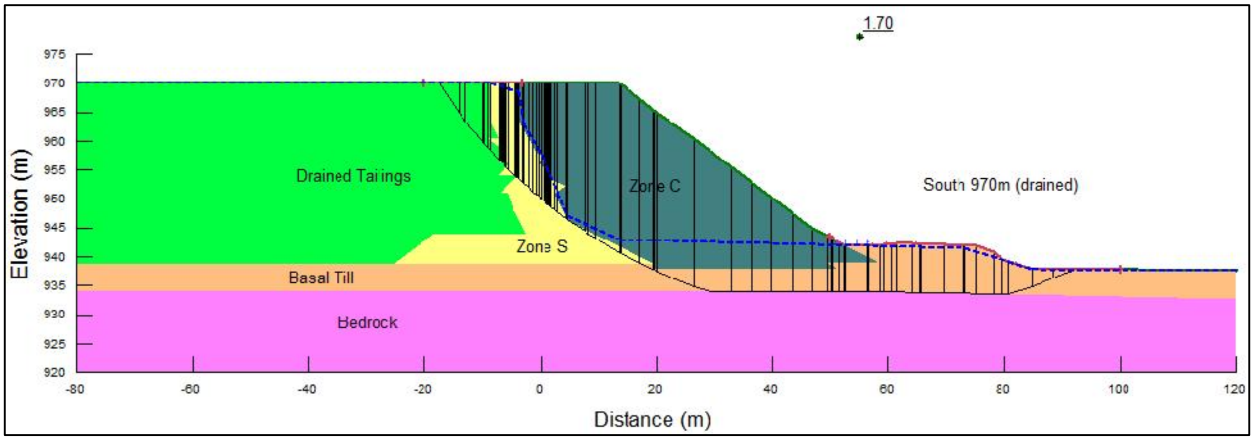
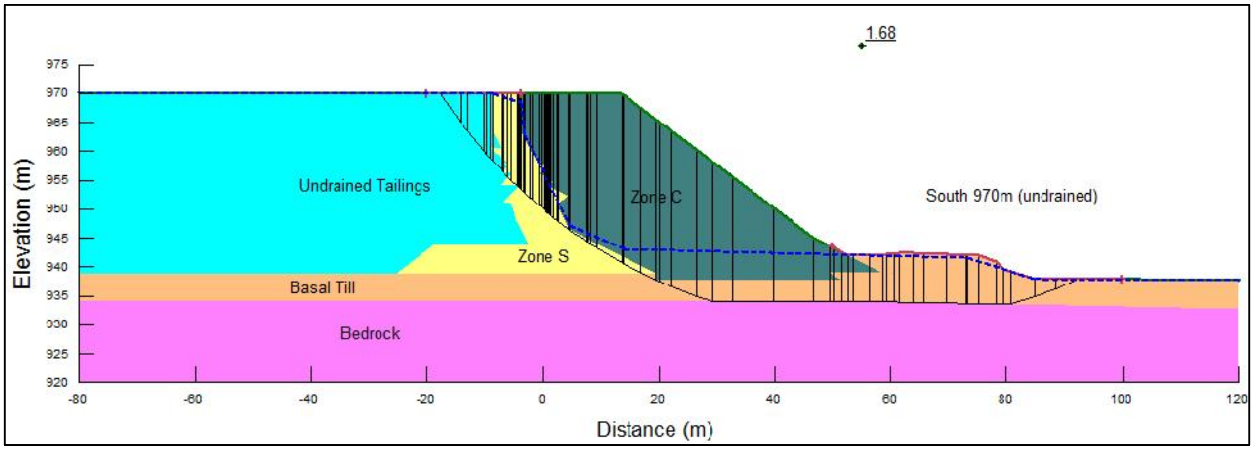


Figure 2.4: South Embankment Stability Analysis

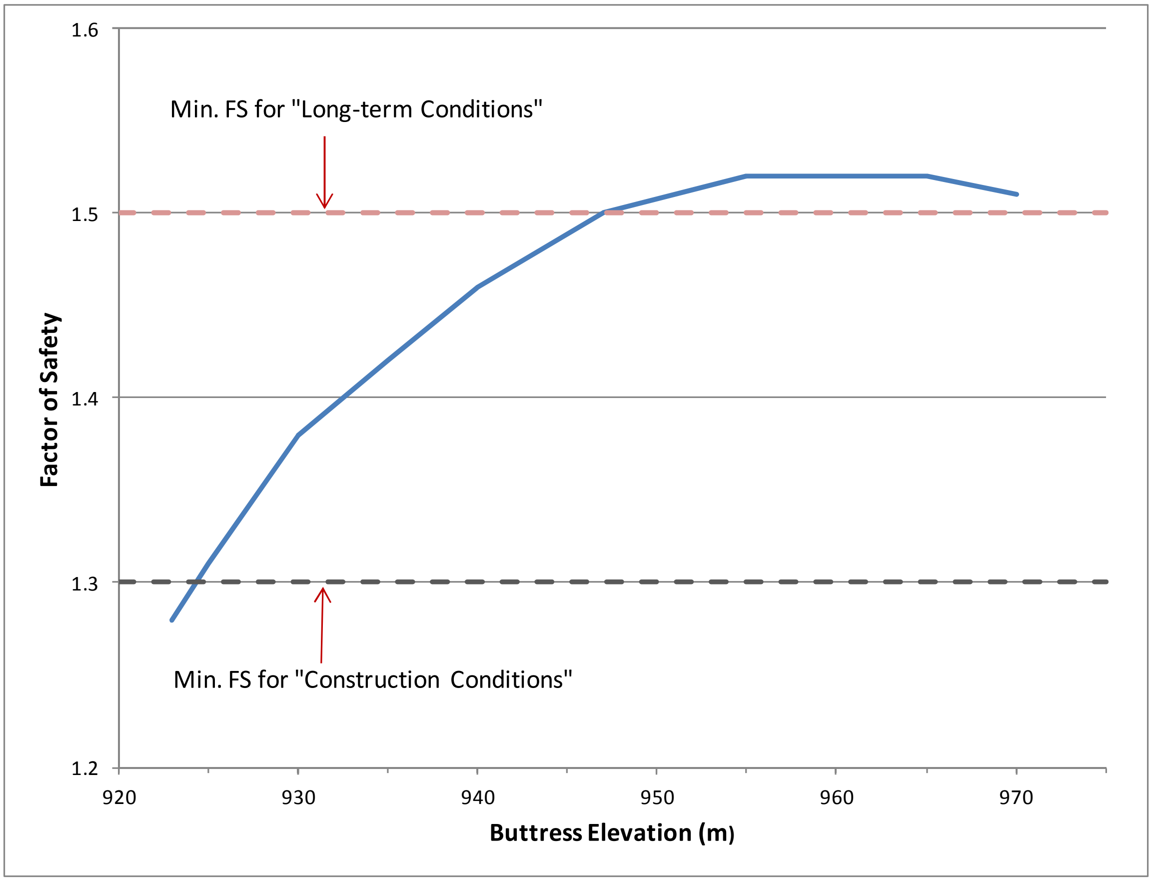




2.2 Buttress Stability Results

Based on the results noted above, the construction of a NAG waste rock toe buttress is recommended for the main embankment. The buttress should be constructed along the toe of the main embankment, directly above the existing buttress. (currently at a maximum elevation of about 921.0 m) The buttress option was considered on the most critical section (Ch. 20+60) under drained tailings conditions, varying the buttress crest elevation from a minimum El. 923.0 m to a maximum El. 970.0 m. Results of the stability analysis are illustrated in Figures 2.5 and 2.6.

Figure 2.5: Stability Results with Buttress - Main Embankment (Ch. 20+60) (Drained Tailings Condition)



The results of the stability analyses show that the construction of a NAG rockfill buttress to a minimum El. 925.0 m provides the main embankment the minimum required factor of safety to satisfy construction conditions as well as post-liquefaction conditions (residual shear strength assigned to the tailings) up to embankment crest El. 970.0 m.

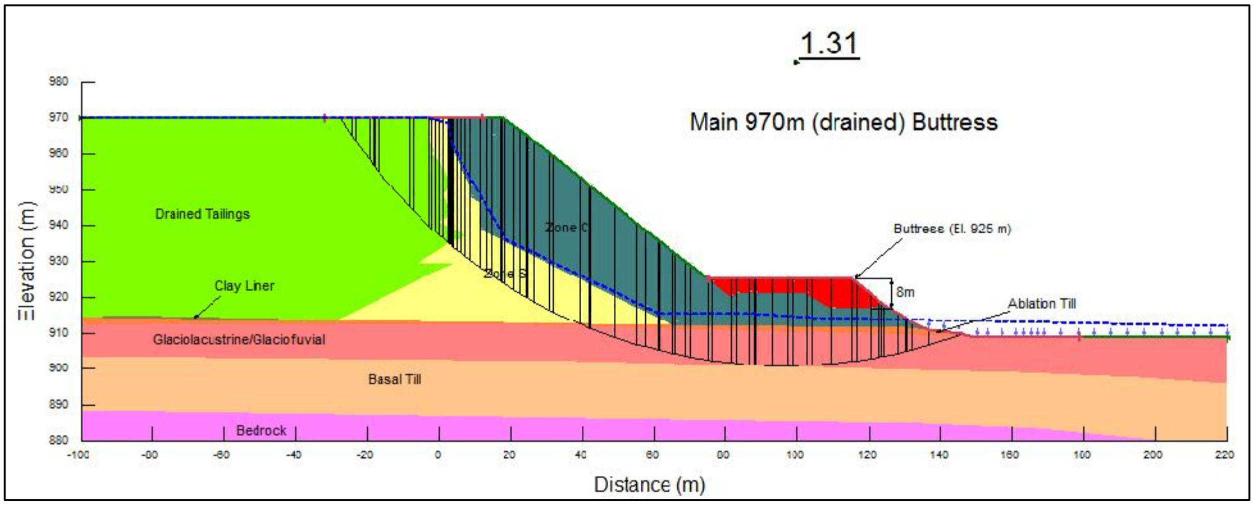
For verification, the analysis with a buttress to El. 925.0 m was completed for section C of the main embankment, the results shown below in Table 2.2 and Figure 2.7

Table 2.2: Factor of Safety Summary (El. 925.0 m Buttress)

Embankment	Stage 9 (El. 970 m) *With Buttress to El. 925 m*
Tailings shear strength: **Drained (c' = 0, σ' = 30°)*	
Main - Section A (Ch. 20+60)	1.31
Main - Section C (Ch. 18+50)	1.43
Tailings shear strength: **Undrained (Su/σ_v' = 0.1)*	
Main - Section A (Ch. 20+60)	1.27
Main - Section C (Ch. 18+50)	1.36

*Note: Minimum acceptable Factors of safety for: Drained = 1.3, Undrained = 1.1

Figure 2.6: Main Embankment Stability Analysis with El. 925.0 m Buttress *(Section A – Ch. 20+60)*



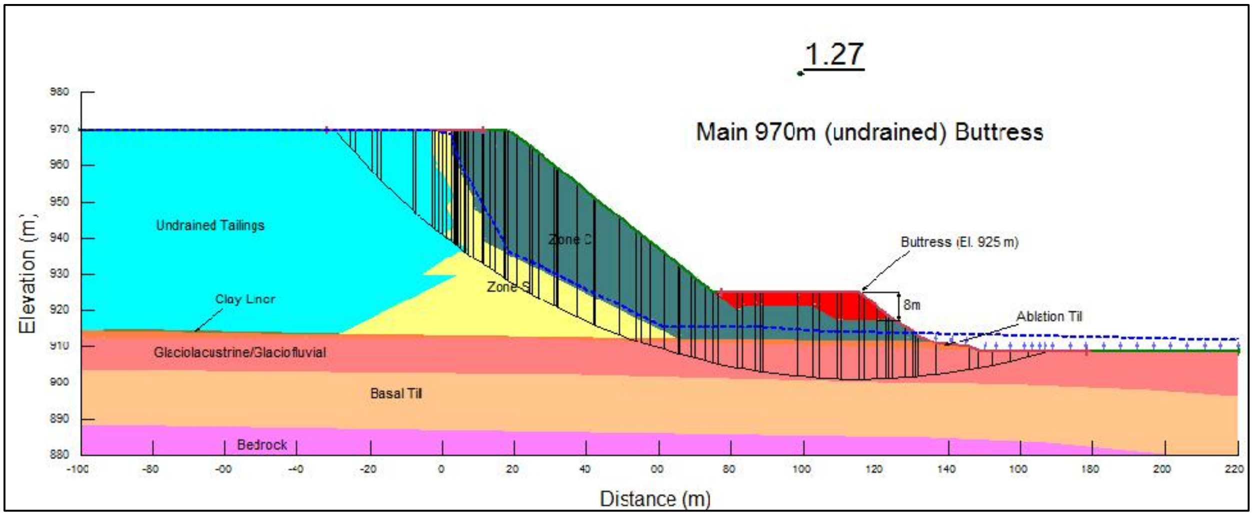
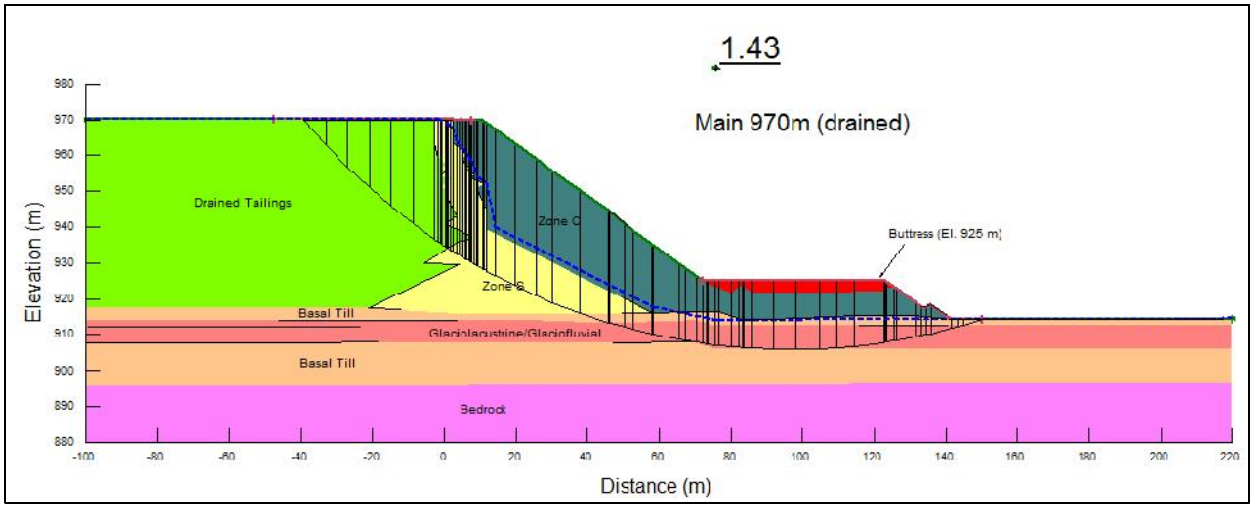
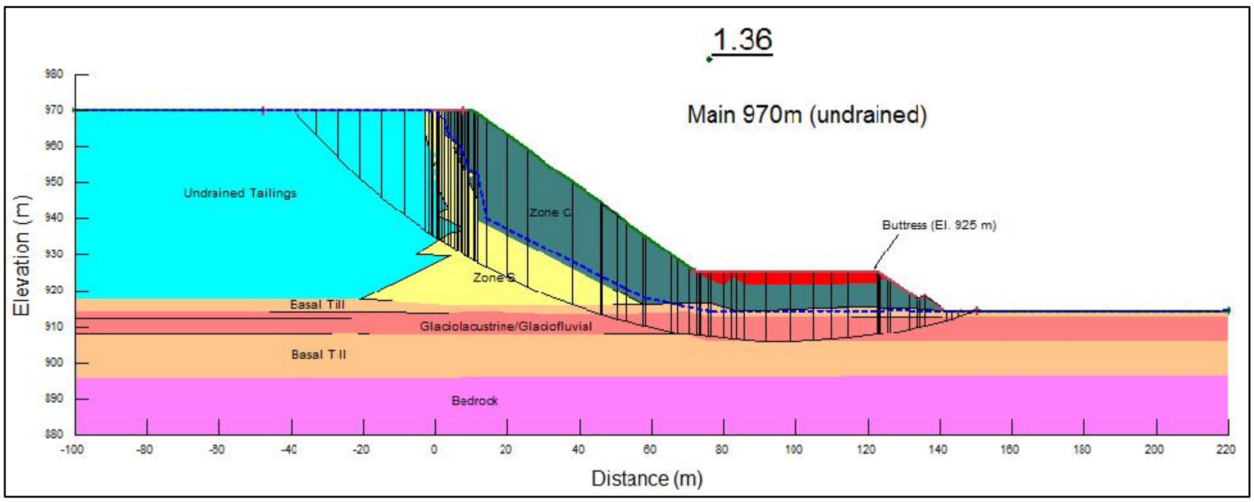


Figure 2.7: Main Embankment Stability Analysis with El. 925.0 m Buttress *(Section C – Ch. 18+50)*





2.3 Pore Pressure Alert Levels

Pore pressure alert levels are a useful means of relating monitored piezometer data to the stability analyses and the achieved factors of safety, and triggering a pre-determined response if those levels are exceeded.

To determine the pore pressure alert levels in the foundation piezometers, additional stability analyses were performed. As the main embankment cross section was determined to be the critical section, as stated above, this cross section and the pore pressures associated with this section were utilized to assess and assign alert levels. A red, yellow, green "stoplight" approach was utilized and the alert conditions are defined as follows:

- Red (factor of safety at or below 1.1) – If the foundation piezometers indicate a red condition, crest raising is to cease. AMEC's Principal Engineer is to be informed immediately, and a corrective course of action will be implemented as per direction of the AMEC's Principal Engineer, including intensified monitoring, and placement of a stabilization buttress to flatten the overall slope in the embankment area of concern.
- Yellow (factor of safety above 1.1 and below 1.3) – If the foundation piezometers indicate a yellow condition, work should be temporarily suspended in and around the embankment, AMEC's Principal Engineer is to be informed, and a corrective action will be implemented as per direction of AMEC's Principal Engineer. Access to the embankment should be limited to essential personnel.
- Green (factor of safety at or above 1.3) – If the foundation piezometers indicate a green condition, work in and around the embankment is to continue as needed.

It should be noted that a yellow or red condition is not automatically triggered by a single piezometer on a given instrumentation section yielding a reading of concern. Such conditions will only be triggered if most or all foundation piezometers on a given section reach the requisite alert levels. If individual piezometers on a section approach or reach threshold levels while the remainder do not, additional and/or intensified monitoring may be specified, but the threshold levels described above will not be deemed as having been triggered.

Besides the specified alert levels, piezometric trends (i.e. change over time) are to be closely monitored in the foundation piezometers. Small variations in the piezometric readings are expected, however if a spike occurs in any of the foundation piezometers, and/or an unexpected a consistent trend of increasing pore pressure is noted, AMEC's Principal Engineer is to be informed immediately to assess the situation.

The results of the pore pressure alert level stability analyses are presented in Figure 2.8 and Figure 2.9, and are summarized in Table 2.3 and Table 2.4 below, which applies only for the main and perimeter embankment piezometers. Factor of safety values for the south embankment are sufficiently high that monitoring of piezometric trends, without defined alert levels, is deemed sufficient at the present time.

Table 2.3: Foundation Piezometer Alert Levels (Main Embankment)

Condition	Modeled Pore Pressure Elevation Head (m)	Above Original Ground Elevation (912m) (m)
RED	Above 933	>21
YELLOW	Between 916 and 933	4 to 21
GREEN	Less than 916	<4

Table 2.4: Foundation Piezometer Alert Levels (Perimeter Embankment)

Condition	Modeled Pore Pressure Elevation Head (m)	Above Original Ground Elevation (928m) (m)
RED	Above 939	>11
YELLOW	Between 935 and 939	7 to 11
GREEN	Less than 935	<7

Figure 2.8: Pore Pressure Alert Levels Stability Analysis (Main Embankment – Section A, Ch. 20+60)

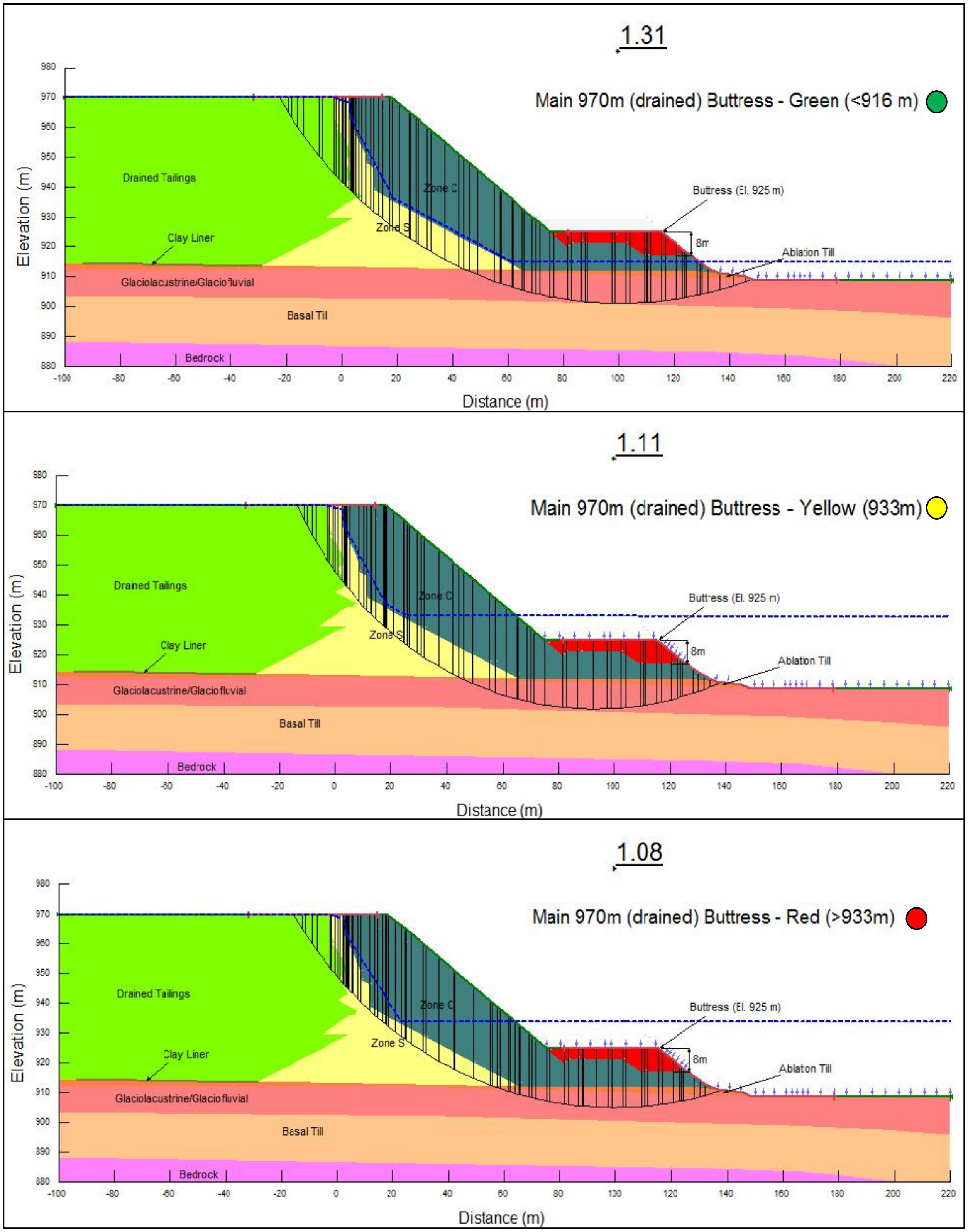
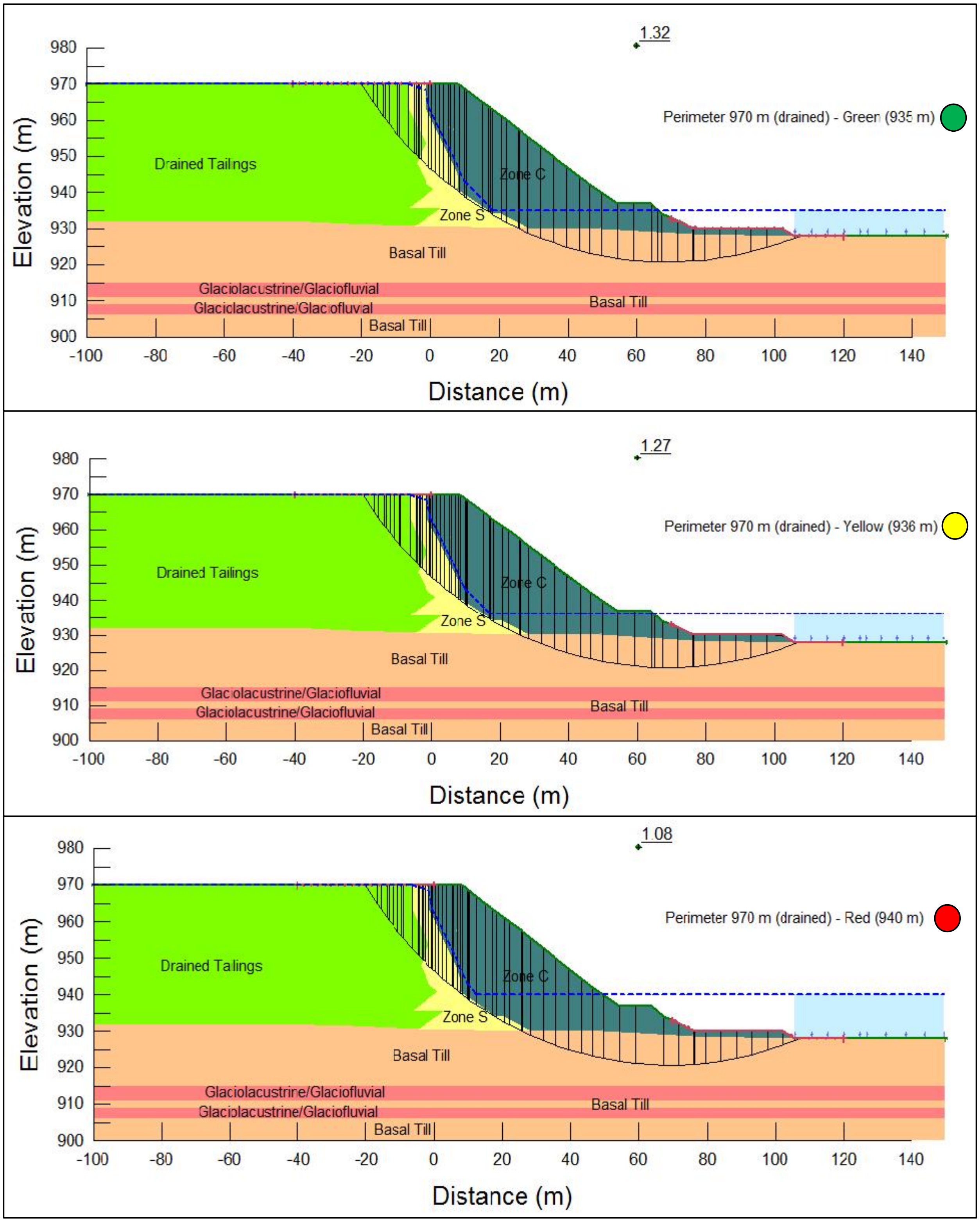


Figure 2.9: Pore Pressure Alert Levels Stability Analysis (Perimeter Embankment)



Please note that phreatic surface indicated is applied for the tailings, the till core, and the foundation soils only. Rockfill shell is assumed fully drained.

3.0 LIMITATIONS AND CLOSURE

This report has been prepared for the use of MPMC. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. It has been prepared in accordance with generally accepted geology and geotechnical engineering practices. No other warranty, expressed or implied, is made.

Respectfully submitted,

AMEC Environment & Infrastructure,
a division of AMEC Americas Limited

Reviewed by:

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Geotechnical Engineer

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APPENDIX B

Sample Daily Construction Report

Mount Polley Mine

Tailing Storage Facility Embankment – Stage 8 (2012)

CONSTRUCTION DAILY REPORT

DAILY REPORT NO.: TSF12-07-18

AMEC PROJECT NO.: VM00560A

HOURS WORKED: 6:00am to 6:00pm (12.0 hours)   **WEATHER:** 29° C, Sunny

DESCRIPTION OF WORK PERFORMED TODAY

Construction Activities

Zone S – PE:

- Till placed between **Sta. 45+75 to 47+75.** El. 960.5m

Zone F – SE:

- Filter placed between **Sta. 12+75 to 16+00.**
- Filter graded between **Sta. 5+75 to 15+40.**

Zone F – ME:

- Filter placed between **Sta. 16+00 to 21+00.**

PE:

- Tie-in preparations continue.

Compaction Testing

-Till material **tested** and **approved** from **Sta. 28+00** to **Sta. 32+00.** **(Lift 2)**
-Till material **tested** and **approved** from **Sta. 39+00** to **Sta. 42+00.** **(Lift 2)**

Material Testing

- Moisture test performed
- Filter (in-place) sample collected

Instrumentation Monitoring

- N/A

REMARKS (Delays, interruptions, extra work activities, unusual occurrences, etc. relevant to today's work)

- AMEC Representative on site (Dmitri Ostritchenko)
- Peterson on site

CRITICAL INFORMATION

- N/A

***Field Inspector*. Mitchell Regenstreif** ____________________ ____________________
Signature Date

***AMEC Rep.* Dmitri Ostritchenko** ____________________ ____________________
Signature Date

MPMC R*ep.* Blythe Golobic ____________________ ____________________

DAILY PHOTOGRAPHS

Figure 1: Filter placed near to the ME pipe.

Figure 2: Completion of the SE filter layer.

Figure 3: **Tie-in preparations by corner-5.**