

GREENS CREEK MINING COMPANY

# STAGE 2 EXPANSION OF TAILINGS FACILITY POND 6 EXPANSION CONSTRUCTION CONTRACT NO. CWI CIVIL WORKS



## DRAWINGS

DRAWING No.	REV. No.	TITLE
D-54001	0	LOCATION PLAN
D-54002	0	TAILINGS FACILITY GENERAL ARRANGEMENT
D-54003	0	POND 6 FOUNDATION EXCAVATION PLAN
D-54004	0	POND 6 UTILITIES PLAN SHEET 1 OF 2
D-54004	0	POND 6 UTILITIES PLAN SHEET 2 OF 2
D-54005	0	POND 6 FOUNDATION DRAINAGE DETAILS
D-54006	0	POND 6 FINAL GRADING PLAN
D-54007	0	POND 6 ROAD AND DITCH PROFILE AND DETAILS
D-54008	0	POND 6 SOIL-BENTONITE WALLS PLAN, PROFILE AND DETAILS
D-54009	0	POND 6 INSTRUMENTATION PLAN

## TECHNICAL SPECIFICATIONS

SECTION	TITLE
4.1	GENERAL
4.2	MEASUREMENT AND PAYMENT
4.3	MOBILIZATION AND DEMOBILIZATION
4.4	DEMOLITION
4.5	CLEARING AND EXCAVATION
4.6	FOUNDATION PREPARATION AND FILL
4.7	FOUNDATION LINER (NOT USED OR INCLUDED)
4.8	DRAINAGE SYSTEM
4.9	SOIL-BENTONITE WALL

APRIL 11, 2008-APPROVED FOR TENDER

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## SECTION 4.1 – GENERAL

### 1. BACKGROUND

1. Greens Creek Mine is located within Admiralty Island National Monument about 18 miles southwest of Juneau, Alaska.
2. Tailings generated at the mine are dewatered to about 12% moisture. A portion of the dewatered tailings are used for underground backfill and the rest are placed on surface in a “dry” tailings disposal facility (TDF) near the port facilities at Hawk Inlet.
3. An expansion of the TDF is required to accommodate the continued dry tailings placement. The planned expansion work incorporates five separate areas around the perimeter of the TDF, which will be commissioned over a period of several years. The work planned for 2008 includes completion of the Northwest Expansion area, and the new Pond 6 development area for tailings disposal.
4. The Pond 6 development will include: the excavation of Pond 6 sludge, peat and sand to natural till; the dismantling, removal and salvage/disposal of Wet Well 5; placement of a granular drainage layer on prepared grade; installation of drainage collection and monitoring systems; the installation of one new wet well; the construction of a degritting basin and workpad; the construction of soil-bentonite walls, and; the construction of surface water and groundwater management facilities. The Pond 6 development work is scheduled for construction in 2008 and 2009. The 2008 work will be limited to the degrit pad development.
5. Other work related to the TDF expansion will be done concurrently, including completion of the Northwest/Pit 5 Tailings Expansion, construction of the new water treatment plant adjacent to Pond 7 and construction of a water line from the mill to Pond 7. Technical Specifications for completion of the Northwest/Pit 5 Tailings Expansion are covered under Contract No. P06001-CW1 Civil Works.
6. The Owner will require the Contractor to use established on-site work permitting and isolation procedures for the Work.

### 2. SCOPE OF WORK

1. This Specification covers only the Pond 6 development.
2. Mobilization and Demobilization.
3. Develop the sand borrow site, as needed, including: clear, grub and strip the borrow area; deck salvageable timber; haul overburden to Pit 7; provide water and sediment control; quarry, screen and haul (about 3 miles) bedding sand, drain rock and other materials from the 1.5 Mile A-Road Borrow and stockpile the screened product as directed.
4. Re-route and commission all required operating utilities (water lines), including trenching, bedding, pipe placement, HDPE pipe welding and trench-backfilling and temporary by-passes as directed. Decommission out-of-service utility stubs (except electrical) or ends as directed. The work shall be done in consultation with the Owner and/or Sub-contractors. The location, elevation and grade of all installed and re-routed utilities shall be surveyed by the Contractor. Pipeline grades are critical.

5. Contractor will provide trenching and install pipe chases for electrical cable routes. Electrical cables and communication lines will be installed by Others. Upon completion of electrical cable pulls, some minor contouring will be required at the utility outlets.
6. All demolished or salvaged equipment or parts (other than soil, rock or concrete) shall be decontaminated within containment (spray-washed) before removal from the Site. Salvage and/or dispose of materials to designated sites, within 1.5 miles distance. Decommission out-of-service utility stubs or ends as directed.
7. Receive, organize and provide storage for all pipe materials and geosynthetic products.
8. The scope of work for the Pond 6 expansion is as follows:
  - a) Dewater Pond 6. Water from Pond 6 shall not escape containment and shall be routed to a degrit basin upstream of Pond 7 or to the water treatment plant in Pit 5 or as directed by the Owner.
  - b) Excavate the Pond 6 sludge and haul to a specified location within containment. Peat, sand and other foundation materials below Pond 6 shall be excavated and materials placed within designated containment areas expected to be on top of the tailings pile. Excavation rate may be limited depending upon stability considerations in both the excavation area and the disposal site. Delays due to adverse weather are to be expected. Access roads for the excavation will be designated clean or dirty by the Owner, and are the responsibility of the contractor to maintain and water as directed.
  - c) Prepare foundation including the following:
    - i. As required: clear, grub, and strip; fragment and remove oversize boulders and bedrock; and, excavate organic materials, mineral soil, tailings and other deleterious materials identified by the Owner from the Work footprint. All materials in Pond 6 will be considered contaminated. Any site outside of containment must be kept uncontaminated and clean.
    - ii. Salvage road materials for re-use; provide alternative drainage for ditch water flowing into the Site or pumping systems as required to keep any work areas from flooding.
    - iii. Remove Pond 6 liner on embankment and dispose of as directed by the Owner.
    - iv. Relocate and/or decommission service lines and equipment as directed, including trench excavation, decontamination, bedding of utilities, backfilling and survey of installations.
    - v. Install foundation drainage including pipe collection system, and tie-in to existing foundation drains. Repair and rehabilitate existing drains as required.
    - vi. Contour all soil, bedrock and fill surfaces in the area to achieve specified grades.
    - vii. Place a layer of granular drainage material over the prepared grade.
    - viii. Install new or extend existing instrumentation and leads in conduits within or over the bedding layer and service layer, and connect to a monitoring system, all as directed.

- ix. Maintain and dewater Pond 6 to minimize truck spillage and overall quantity of wet hauls.
  - x. Maintain water pumps during construction.
  - d) Connect the new seepage collection system to the existing drainage system or other specified collection points.
  - e) Install new wet well and connect to the new and existing drainage systems as specified.
  - f) Construct new perimeter roads as specified.
  - g) Extend the new lined perimeter ditch as specified.
  - h) Place “guard rail” boulders or other safety berm along the shoulder of the access road, as directed. Boulders shall be obtained from stockpiles within the tailings area, as directed by Owner.
  - i) Construct new soil-bentonite wall and raise existing soil bentonite walls as specified.
  - j) Construct degrit basin and appurtenant structures, as directed.
9. Re-establish local haulage and maintenance access, as directed and maintain watering and sediment controls.
10. Road access to Water Treatment Plant must be open and maintained at all times during construction.

### **3. LIST OF SPECIFICATIONS AND DRAWINGS FOR 2007 WORK**

#### **3.1 TECHNICAL SPECIFICATIONS**

Section 4.1	General
Section 4.2	Measurement and Payment
Section 4.3	Mobilization and Demobilization
Section 4.4	Demolition
Section 4.5	Clearing and Excavation
Section 4.6	Foundation Preparation and Fill
Section 4.7	Foundation Liner (Not Used)
Section 4.8	Drainage System
Section 4.9	Soil-Bentonite Wall

#### **3.2 CONSTRUCTION DRAWINGS**

D-54001	Location Plan
D-54002	Tailings Facility General Arrangement

D-54003	Pond 6 Foundation Excavation Plan
D-54004	Pond 6 Utilities Plan (Sheets 1 and 2)
D-54005	Pond 6 Foundation Drainage Details
D-54006	Pond 6 Final Grading Plan
D-54007	Pond 6 Road And Ditch - Profile and Details
D-54008	Pond 6 Soil-Bentonite Walls – Plan, Profile and Details
D-54009	Pond 6 Instrumentation Plan

#### 4. DEFINITIONS AND INTERPRETATIONS

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

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

## **5. CONSTRUCTION MANAGEMENT**

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

## **6. SITE POLICIES**

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

1. All safety policies of the Owner outlined elsewhere in the Contract Document shall be followed, including the use of personal protective equipment (steel toed boots/shoes, hard hats and safety glasses and others as required). All Contractor employees shall receive site specific training before entering the work site to ensure familiarity with Owner standards and policies.
2. GCMC is ISO 14001 certified and maintains high environmental and safety standards. The Contractor will receive GCMC training on the Environmental Management System and site specific safety aspects at the Site. The Contractor is responsible to have all personnel trained in the environmental and safety standards before commencement of the Work.
3. The Contractor shall have an established Safety, Health, and Environment Action Plan (SHEAP) that complies with all GCMC HSE standards and Environmental Management System (EMS). A Take 5 or similar program will be utilized with daily tool box meetings. Safety interactions will be held daily with the Owner. Weekly documented safety meetings shall be held with the Owner in a predetermined area.
4. The contractor will obey all GCMC vehicle and driving standards when driving on the A & B road system and limit their speeds to a maximum of 30MPH within the mine site area.

5. Any spills are to be dealt with immediately utilizing appropriate containment and clean up procedures in accordance with the GCMC EMS. Any release to the environment is to be reported immediately to the Owner. The Owner may be required to make notification to Government environmental authorities. No mixing of spilled materials is permitted. The Contractor's shop area will be maintained and kept free of waste build up and have covered waste barrels to limit accumulating rain water in any containers.
6. Any equipment coming into contact with tailings must be washed (particularly the tires, fenders and undercarriage) prior to exiting the impoundment area, including demolition sites. The Owner's truck wash may be used provided it does not interfere with mining operations. All wash effluent shall be contained and disposed of in an approved manner, in accordance with the EMS. The Contractor shall clean the Truck Wash floor and pads of excessive amounts of material build-up from his equipment. The contractor will only clean equipment in contained and designated areas.
7. The Contractor shall be responsible for implementing sediment control measures, to the satisfaction of the Owner. Run-off from upstream slopes and all areas in the Work is to be managed or collected for settling/screening-out of any solids before release of discharges from the Site. Discharges of any kind outside of the tailings area containment system will not be allowed under any circumstances.
8. Natural conditions such as extreme storm events should be anticipated and corrective measures taken to mitigate the effects on the Work area drainage systems. Additional monitoring for safety and the environment may be required. Loss of production time as a direct result of wind, precipitation, freezing, or other adverse weather conditions (as determined by the Owner) and the related costs are the Contractor's responsibility and deemed to be included in the unit prices for the Work.
9. The Owner will have a representative/designate on Site during the period of the project who will oversee environmental monitoring as required under the relevant permits and Project specific sediment control measures. The Owner will schedule any necessary sample collection and provide regular assessments of the performance of sediment control measures. The Contractor is responsible for compliance with all GCMC standards and regulatory requirements.
10. The removal of trees is prohibited on the Project. No live or dead trees are to be removed outside of the Project boundaries without prior authorization from the Owner.
11. Drip pans shall be used whenever oil, diesel fuel, gasoline, hydraulic fluid and other such items may leak or spill, and are to be emptied on a regular basis into designated waste disposal containers only.
12. All oil or liquid fuel will be kept in tightly closed labeled containers designated for that use at all times to eliminate spillage. The Contractor is responsible for transporting fuel and oil from the Owner's supply depot at Hawk Inlet to the Work area. All fuel and oil storage will have an impervious natural or man-made containment berm/sump to enable storage of 110% of the capacity of the containers stored within. Construction or purchase of such equipment will be the responsibility and expense of the Contractor.
13. The Owner will provide waste oil totes and several empty drums for oil filters, oily rags, etc. These are to be maintained and kept closed during the Project by the Contractor. At completion, or as required, the totes and drums will be removed from the Work site by the Owner for disposal. Different waste types (i.e., fuel, oil, glycol) must be stored in separate containers – mixing is not permitted.

14. The Contractor will provide equipment for and satisfactorily carry out the approved dust abatement program.
15. The Contractor's shop, lay-down and office areas shall be kept clean and tidy. Garbage generated by the Project is to be disposed of in the appropriate locations as directed by the Owner, including:
  - a) Clean non-hazardous debris and putrescible (food) garbage is to be disposed of daily in a location specified by the Owner;
  - b) Sanitary discharge shall not be allowed to flow onto the ground or into a fresh watercourse. Portable Toilets shall be supplied by the Owner. The Owner, as per the normal schedule presently being used on Site, will empty the unit(s).
16. All Work sites shall be kept clean and cleaned-up prior to completing the job. Normal cleanup will include:
  - a) Cleanup of all work areas, haulage routes, lay-down areas, etc.
  - b) Removal of all garbage, cans, drums, hose, pipe, used oil filters and other such items to approved locations.
  - c) Emptying, removal and cleanup of any contaminated run-off control systems and surrounding areas into approved disposal areas.
17. If extra precautions beyond those agreed upon, prior to the start of Work, are required to prevent environmental damage the actual and reasonable cost of providing such precautions will be at the Owner's expense.
18. In the case of an emergency condition, the Owner reserves the right to enter the Work area and perform the necessary cleanup at the Owner's expense. If the said emergency condition occurs as a result of the negligence or willful misconduct of the Contractor, the Contractor will bear the cost of the cleanup and all fines or penalties levied by Government agencies for the condition.
19. Construction vehicles shall not have priority status on the mine roads at any time, particularly during scheduled times for bus traffic, as per the Owner road rules policy. Bus traffic occurs at the beginning and end of each daily Owner shift. The construction schedule shall not have priority over any Owner operation for site facilities such as haulage, port or water facilities. Further, the Contractor shall ensure sufficient time for loading and off-loading of equipment and supplies to absolutely ensure no departure delays of the barge or other transport vessels.
20. From time to time the Work will require the coordination of activities between the Contractor and the Owner or Others. Notwithstanding any policies, contracts, agreements or the like, the Contractor shall cooperate fully with the Owner or Others, as directed by the Owner, to execute cooperative work in a timely manner and achieve the desired result for the Owner.

## **7. SUBMITTALS**

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

### **7.1 BEFORE WORK STARTUP**

1. Construction Schedule showing the critical path. The Contractor should assume at least 5% weather delay downtime when planning and scheduling the work.
2. Certification of hazard communication training.
3. List of all employees proposed for the Work, including name, age, and number of years working experience, social security number and position (title).
4. List of all plant, equipment, and materials proposed for the Work and requiring off-loading at Hawk Inlet, including size, weight, and axle loads for barge transport.
5. Copy of site specific safety plan, JSA's (Job Safety Analysis) and SHEAP.
6. Signed MSHA 5000-23 forms for all employees. Contractor must have a MSHA number.
7. Signed certification of substance testing for all employees proposed for the Work.
8. Documentation indicating that all construction equipment meets the MSHA minimum operating standards.
9. Contractor's predicted fuel and oil consumption requirements.
10. The contractor will be responsible for all construction survey and grade work for the project as well as survey methodology, equipment list, and qualifications of surveyor. Owner will confirm software compatibility with the Contractor to produce Owner formatted as-built drawings. Survey information will be electronically collected and backed up, to ensure efficiency, accuracy and compatibility with Owner's survey software.
11. A dust abatement plan for Owner approval.
12. The Owner will supply the Contractor with AutoCAD format electronic drawing files of the grading plan. The Contractor shall produce shop drawings that include layout points for use during construction. The construction layout produced by the Contractor shall conform to the final grading plan in the Drawings, except where prior written approval of any change is received from the Owner.
13. List of personnel or sub-contractors proposed to construct the soil-bentonite wall. Personnel installing the soil-bentonite wall must be approved by the Owner.
14. Layout of access roads and work points for construction shall be done by the Contractor.

15. Sediment controls plan for owner approval.

## **7.2 DURING THE WORK**

1. Copies of Daily Contractor Tool Box Safety meeting minutes and Daily Equipment Pre-shift cards.
2. Copies of employee's incident reports of injury or property damage. Notification to the Owner is required immediately following any incident, with a written incident report submitted to the Owner as soon as practical, but no later than the end of shift.
3. Updates of medical reports for incident status as received.
4. Written property damage reports (by end of shift) with immediate notification to the Owner.
5. Written near miss incident reports (by end of shift) with immediate notification to the Owner.
6. Copies of completed required work permits, including excavation, hot work, confined space entry, etc.
7. Copies of completed spill reports as per Owner spill policies with immediate notification to Owner and initiation of spill cleanup as a priority over the Work.
8. Copies of Daily load counts reports and equipment used. Monthly reports of total manhours on site (due on the first of every month).
9. Timely Change Order requests.
10. Daily Contractor completion / manpower sheets, showing labor and equipment hours worked on each task as well as details on any delays or breakdowns, signed and submitted to the Owner by noon the following work day.
11. Baseline surveys before starting and upon completing each component of the Work, in a timely fashion, to demonstrate compliance with design requirements and for payment and record purposes.
12. Weekly Report submitted with the weekly Construction Schedule update showing Work Completed, Work Planned, Problems Encountered, and Plan for Resolution.
13. Manufacturer construction approvals.
14. Timely submission of invoices for all work completed must be submitted for invoice within 30 days of completion of work to avoid any and all late billing issues. A 25% penalty will be applied for any invoicing past 30 days of completion. This includes all progress payments and final payments.
15. Copies of all MSHA equipment and site specific training records.

## **7.3 AT COMPLETION OF THE WORK**

1. As-built survey information of all aspects of the completed Work.

2. Timely submission of Final Invoice.
3. Request for release for site cleanup.

## **8. SURVEY LAYOUTS**

1. The Owner will supply the Contractor with AutoCAD format electronic drawing files of the grading plan. The Contractor shall produce shop drawings that include layout points for use during construction. The construction layout produced by the Contractor shall conform to the final grading plan in the Drawings, except where prior written approval of any change is received from the Owner.
2. All construction survey work, layout and grade work will be provided by the contractor as well as survey methodology, equipment list, and qualifications of surveyor. Owner will confirm software compatibility with the Contractor to produce Owner formatted as-built drawings. Survey information will be electronically collected and backed up, to ensure efficiency, accuracy and compatibility with Owner's survey software.
3. Layout surveys shall be accurate to +/- 1 inch for plan locations and +/- 1 inch for elevations.
4. Any construction survey field work done by the owner will be back charged to the contractor in the amount of \$50/hr.

## **9. PRIORITY USE OF FACILITIES**

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

## **10. HAZARDOUS MATERIALS**

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

**END OF SECTION 4.1**

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## **SECTION 4.2 – MEASUREMENT AND PAYMENT**

### **PART 1 – GENERAL**

#### **1.1 SCOPE**

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

#### **1.2 MEASUREMENT**

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

7. No work shall be undertaken that would preclude verification of any initial condition surveys or inspections.
8. The Contractor shall prepare all progress estimates and a final statement of work performed together with such supporting data and computations as are deemed necessary by the Owner to determine the accuracy of the estimates, all of which shall be submitted in an approved format.
9. All original field notes, electronic files, quantity computations, cross sections and other records taken by the Contractor, or required by the Owner for the purpose of quantity surveys, shall be furnished promptly to the Owner and shall become the property of the Owner.
10. In addition to the aforementioned surveys, the Contractor shall submit a Daily Report (as described in Section 4.1) containing a complete and accurate account of the previous day's progress to help support quantity estimates for interim payments and schedule progress. A 25% penalty will be applied for any invoicing past 30 days of completion. This includes all progress payments and final payments.

### **1.3 PAYMENT**

1. Payment for the Work will be made at the respective lump sums, provisional sums and unit rates stated in Schedule 1- Quantities and Prices, with 10% retention.
2. Except as otherwise specifically provided, the prices entered in Schedule 1 for the various items of work shall constitute full compensation for supplying, operating and maintaining all temporary works, equipment, material, labor, supervision and all other costs for performing all the work required by the Contract. Payment under the various pay items will only be made for work satisfactorily completed in accordance with the Contract requirements. Survey based quantities will be confirmed by the Owner.
3. No separate measurement or payment will be made for any items not specifically stated in Schedule 1 including:
  - a) travel time, under any circumstance;
  - b) pollution prevention or control, spill cleanup and waste disposal except as otherwise provided under Section 4.1;
  - c) survey control;
  - d) Contractor's security;
  - e) delays due to weather or Owner's operations except if provided by the General Conditions;
  - f) delays due to equipment servicing and breakdown, or material availability including Owner supplied items;
  - g) consumables;
  - h) attending safety meetings, safety or environmental training, inspections or audits;

- i) obtaining permits;
- j) delays due to instrumentation installation or geotechnical testing;
- k) soil compaction testing or delays associated with non compliant compaction, rework or additional compaction; and
- l) Contractor road access and road maintenance of these access routes.
- m) Delays due to Water Treatment Plant contractors or their facilities or their equipment.

#### **1.4 PAYMENT FOR EXTRA WORK**

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

#### **1.5 PROVISIONAL SUMS**

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

## **1.6 CONTRACTOR'S PAYMENT TO OWNER**

1. The Contractor shall reimburse the Owner, for any costs incurred including:
  - a) Overtime work (beyond the agreed work schedule for this contract) performed by the Owner's site staff to suit the convenience of the Contractor for any reason, including safety training.
  - b) Employment of site staff by the Owner after the stipulated time for completion if such employment is rendered necessary by failure of the Contractor to complete the Work by the stipulated time.
  - c) Redesign of any portion of the Work made necessary by a Contractor's error.
  - d) Rental rates on equipment borrowed from the Owner.
  - e) Materials purchased from the Owner.
  - f) \$200 per cubic yard for concrete quantities in excess of 110% of neat line requirements.
  - g) Up to \$10,000 per key employee transferred from site without Owner approval, if, in the Owner's opinion, the change of personnel has a significant delay or cost impact to the Work.
  - h) \$10,000 per day or portion thereof for any uncontrolled fuel or petroleum by-product spill.
  - i) \$50/hr for all survey work or volume documentation work.
  - j) The cost of reinstallation of any damaged or destroyed monitoring wells and/or other instrumentation.
  - k) Any equipment damage by blasting activities at value of purchase.
  - l) \$200/day of any sediment control issues deemed to be unacceptable by the Owner.

## **1.7 STANDBY**

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

## **PART 2 – PAY ITEMS**

### **2.1 MOBILIZATION AND DEMOBILIZATION**

1. Mobilization shall be estimated to the Juneau AML dock site and shall include the costs of: insurance; permits; moving personnel, supplies and equipment; providing temporary roads and facilities; setup, and all other preparation for performing the Work. Owner will cover expenses from AML in Juneau to the Hawk Inlet port by barge only unless otherwise specified. Mobilization costs shall also include time for personnel to be indoctrinated into the Owner's safety and environmental management system program (allow for a total of 3 days of training at the site, or in Juneau).

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

2. Mobilization will not be considered complete and will not be paid until all completed MSHA employee training documentation has been provided to the Owner. Time is of the essence. The crew shall receive MSHA training before arriving on site.
3. Demobilization will be considered complete when all labor, equipment, plant, temporary facilities and surplus and waste materials have been removed from Site and the work areas have been cleaned and graded, all to the satisfaction of the Owner. The limits of cleanup, final grading and drainage include the areas of borrow, stockpiles, permanent work, temporary work, and lay-down and adjacent grounds thereof, that have been disturbed by the Contractor. Owner will cover expenses for AML freight barge from Hawk Inlet to the AML Juneau dock.
4. The lump sum tendered shall be relative to the costs involved but shall not exceed 10% of the Total Bid Amount.
5. Mobilization will be 60% of the lump sum price for this pay item. Demobilization will be paid at 40% of the lump sum price.
6. Progress payments will be made against the lump sum price in proportion to the completed mobilization activities making adjustments for any advanced monies.

### **2.2 DEMOLITION**

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

4. Caution shall be exercised for all demolition work as hazardous gases may be present in the existing utility lines. Appropriate training shall be provided and proper personal protective equipment (PPE) shall be available for use at no cost to the Owner.

### **2.3 CLEARING AND EXCAVATION**

1. Measurement of clearing, grubbing and stripping will be of the plan area that is satisfactorily cleared, grubbed, stripped, logs decked, stumps and woody debris piled and burned or otherwise disposed of; all in an approved manner.
2. Measurement of excavation, by machine or by hand, will be made to the nearest unit of measure of the bank volume. Bank volume shall mean material volume in-place before excavation including natural ground, stockpiles and waste piles.
3. Measurement will be made to the lines and levels shown on the Drawings or approved by the Owner.
4. Temporary measures to control groundwater and surface water, and compliance with the environmental management system are considered incidental to the work and will not be measured.
5. Excavation permits will be required and keep at an appropriate site.

### **2.4 ROCK FRAGMENTATION**

1. Measurement of rock fragmentation by drilling, blasting, barring, wedging or other quarrying techniques will be made to the nearest unit of measure of bank volume. Bank volume shall mean material volume in-place before fragmentation including intact bedrock formations, or any rock-block or boulder greater than 3 ft average diameter.
2. Measurement will be made to the lines and levels shown on the Drawings or approved by the Owner.
3. Fragmentation includes the execution of controlled blasting, line drilling, smooth blasting or pre-shearing in areas where rock damage due to blasting is to be minimized.
4. Controlled perimeter blasting is required for utility trenches and where the synthetic liner system anchors in bedrock or around any facilities are required.

### **2.5 FILLS**

1. The Owner will provide the following materials for the Work only:
  - a) drain gravel of the specified gradation, in stockpiles at a location specified by the Owner.

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

2. Use of stockpiled fill shall require prior approval. Due to limited available space fill stockpiles may impinge onto the Work area. No measurement will be made of stockpiled materials that require

removal from the Work area, during or at completion of the Work. No payment will be made for interim stockpiles or stockpile moves.

3. Measurement will be made to the nearest unit of measure, stated in Schedule 1, of approved fills satisfactorily placed and compacted to the lines and levels shown on the Drawings or approved by the Owner. The measurement will reflect in-place volumes after compaction.
4. Fills placed beyond the approved or specified lines and levels will not be measured for payment.
5. Temporary measures to control groundwater and surface water, quality control and quality assurance testing and compliance with the environmental management system are considered incidental to the work and will not be measured. Contractor shall prevent any damage to fill areas from runoff and provide sediment controls.
6. Contractor will not be compensated for delays due to installing instrumentation or due to compaction testing.

## **2.6 PERMANENT STOCKPILES**

1. Measurement will be made to the nearest unit of measure of material (by survey) meeting the specified gradation, stockpiled in an approved manner at an Owner-designated location not more than 1.5 miles from Pit 5 area.
2. Measurement will be made of the stockpiled material that is hauled to the site and not used for the permanent work.

## **2.7 OVERHAUL**

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

## **2.8 GEOSYNTHETICS**

1. The Owner will supply geosynthetics for the Work only. The Contractor is responsible for all other related consumables to supporting the liner installations.
2. Measurement will be made to the nearest square unit of measure of approved geosynthetics satisfactorily placed and protected to the lines and levels shown on the Drawings or approved by the Owner. Measurement will be to the weld line where new and existing geosynthetics are joined (if applicable).

3. Measurement will be based on true surface area excluding folds, overlaps and anchoring trenches.
4. Supply and installation of fabric-to-concrete fasteners will not be measured but considered incidental to the Work.
5. Geosynthetic used in permanent pipe installation will not be measured separately for payment and will be considered incidental to the Work.

## **2.9 PIPE**

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

## **2.10 CONCRETE**

1. Concrete and reinforcing steel will be provided by the Owner without cost to the Contractor, delivered to the work site for the permanent Work only.
2. Measurement for payment of concrete will be in cubic yards calculated from neat dimensions indicated on the Drawings or authorized in writing by the Owner. Concrete placed beyond dimensions indicated or authorized will not be measured.
3. No deductions will be made for volume of concrete displaced by reinforcing steel.
4. Formwork will not be measured for payment.
5. Supply and installation of concrete reinforcement and bedrock anchor bolts, and bolt grouting will not be measured but considered incidental to the Work. Foundations will be surveyed and as-built drawings produced for accuracy checks.
6. No separate measurement will be made for areas requiring concrete repair as a result of damage caused by Contractor during his construction activity.

## **2.11 PROVISIONAL SUMS**

1. Measurement for work on Provisional Sum items will be made on a time and material basis, with labor and equipment hours spent directly on the work measured to the nearest 15 minutes.

2. Payment for work on Provisional Sum items will be made out of the applicable Provisional Sums in Schedule 1, on a time and materials basis as set out in the Special Conditions. Any impact costs on other Contractor operations due to work on Provisional Sum items will be considered incidental to the Work.
3. Contractor will receive no payment for delays resulting from the execution of provisional work.
4. Owner will provide instruments, tubing, conduit, membrane and the like for piezometers and lysimeters. Bedding of instrumentation will be considered an incidental cost to the Contractor and should be included in the installation bid.

## **2.12 LUMP SUMS**

1. Payment for each Lump Sum item in Schedule 1 will be made only upon satisfactory completion of the work prescribed in that item.
2. Owner will provide an HDPE sump for installation of a new Wet Well as specified. (HOLD PENDING DETAILED DESIGN).
3. The installation of reinforced concrete or mass concrete associated with the Work in each Lump Sum item will be measured and paid separately.
4. Owner will provide pipe, fittings, valves and the like for decommissioning old utilities and for installation of new temporary utilities, as directed.
5. Salvage of items identified by the Owner within the planned demolition of facilities will be incorporated into the bid unless approved by the Owner.

**END OF SECTION 4.2**

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## **SECTION 4.3 – MOBILIZATION AND DEMOBILIZATION**

### **PART 1 - GENERAL**

(not applicable)

### **PART 2 - PRODUCTS**

(not applicable)

### **PART 3 – EXECUTION**

#### **3.1 MOBILIZATION**

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

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

#### **3.2 COMMENCEMENT AND COORDINATION**

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

### **3.3 DESIGNATED AREAS**

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

### **3.4 EMPLOYEE TRAINING**

The Contractor shall perform all MSHA training of its employees before arrival on Site and shall not use scheduled construction time for this purpose. The Contractor shall obtain an MSHA number before mobilizing. The Owner will give additional and specific on-site training for safety (MSHA requirements) and for the Owner's Environmental Management System (EMS) ISO 14001 program. Allow for 3 full days of site specific training for all personnel prior to work.

### **3.5 DEMOBILIZATION**

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

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

### **3.6 END OF WORK CONDITION**

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

## **PART 4 – MEASUREMENT AND PAYMENT**

For Measurement and Payment see Section 4.2.

### **END OF SECTION 4.3**

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## **SECTION 4.4 - DEMOLITION**

### **PART 1 – GENERAL**

#### **1.1 DESCRIPTION**

1. The work covered in this section consists of supplying all labour, materials and equipment for:
  - a) Removal of Wet Well 5.
  - b) Removal of existing utilities as required or directed by the Owner.
  - c) Local excavations and fills as required and approved.
  - d) Materials to be salvaged shall be identified by the Owner at the pre-bid site meeting - attendance is mandatory.
2. The Owner will identify known hazardous materials. Nonetheless, the Contractor shall pay special attention during its inspection and during the work to identify hazardous materials and shall obtain Owner's direction for demolition and disposal, including but not limited to insulation.
3. The Contractor shall:
  - a) Isolate, with the Owner, any pipe works or electrical utilities that connect to the Demolition area;
  - b) Undertake a detailed pre-demolition inventory to verify existing conditions;
  - c) Design demolition techniques and sequences;
  - d) Co-operate with the Owner in preventing damage to all buried utilities and repair if damaged;
  - e) Remove all demolition materials to approved disposal or salvage areas, within 1.5 miles of the site, including contaminated soils, as designated by the Owner;
  - f) Decontaminate, by pressure washing, all materials to be removed from within containment;
  - g) Take care not to damage remaining utilities; and
  - h) Provide and install barricades, safety fencing and erosion controls at the work site as required.
4. All demolition materials are the property of the Owner.

## **1.2 DEFINITIONS**

Not required.

## **1.3 STANDARDS**

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

## **1.4 RECORDS AND SUBMITTALS**

1. Submissions with the Bid
  - a) The Contractor shall undertake its own detailed inspection of the facilities to be demolished and decontaminated and shall submit the results of that inspection with the bid.
  - b) The Contractor shall submit with the bid a plan and schedule for demolition of the specified structures.
2. Submission Before Performing the Work
  - a) Fourteen days prior to commencing any demolition, the Contractor shall verify with the Owner the total extent of demolition, decontamination, removal and disposal. The Contractor shall submit a detailed plan and schedule for demolition and disposal/salvage of materials.
  - b) Should demolition procedures require the use of temporary structural support, 7 days prior to implementation, submit engineering details of such support.

## **1.5 PROTECTION**

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

## **PART 2 – PRODUCTS**

(not applicable)

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

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

### **3.2 DEMOLITION OF STEEL STRUCTURES**

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

### **3.3 DEMOLITION OF CONCRETE STRUCTURES**

1. Execute all demolition by means other than blasting, except as permitted by the Owner.
2. Remove all concrete and reinforcing steel as indicated in the approved plan. The edge of the cavity or excavation shall be trimmed to a stable angle in accordance with applicable safety regulations. All adjoining pipes/wires/utilities shall be neatly trimmed at the edge of the excavation. Pipes with flowing water shall be capped in an approved manner.
3. Take all necessary preventative measures to avoid spilling materials by using suitable transportation vehicles, avoiding overloading and otherwise exercise due care. In the event of spillage, clean the affected areas to the satisfaction of the Owner at no additional cost to the Owner.
4. Break concrete within the demolition limits by mechanical means, such as drilling, wedging, jackhammer, hydraulic splitter and any other means approved by the Owner, and trim the reinforcing steel from the concrete pieces. Keep the reinforcing steel separate from other materials.

5. At the end of each day's work, leave the structures in safe condition so that no part is in danger of toppling or falling. Provide a safety barrier which meets the requirements of MSHA.
6. Demolish to minimize dusting. Keep materials wetted to the satisfaction of the Owner.
7. Provide protection from flying materials during demolition for all area personnel.

### **3.4 SAFETY**

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

### **3.5 CLEAN UP**

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

### **3.6 EXCAVATION AND BACKFILL**

1. Excavation and backfill shall be performed in accordance with the requirements of MSHA regulations.
2. Excavation procedures shall be adopted which will not, at any time, adversely affect the stability of any slope.
3. The Contractor shall use special care and attention while working near the edge of the Southeast Expansion – Area 1 tailings storage area so as to not undermine, de-stabilize or damage the liner foundation or drainage system, except as directed.
4. The Contractor shall provide stable excavation slopes at the end of demolition. Temporary backfill may be required to satisfy applicable regulations or the use of trench boxes.

## **PART 4 - MEASUREMENT AND PAYMENT**

For Measurement and Payment see Section 4.2.

**END OF SECTION 4.4**

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## SECTION 4.5 – CLEARING AND EXCAVATION

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

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

#### 1.2 DEFINITIONS

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

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

### **1.3 CODES AND STANDARDS**

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

## 1.4 SUBMITTALS

1. The Contractor shall submit the information requested in Section 4.1 – General and the following information for approval. Work shall not start until applicable approvals are obtained in writing from the Owner.
2. Excavation  
The Contractor shall submit plans and descriptions of methods and sequences for common, peat and rock excavation of the work areas.
3. The Contractor shall submit a safety plan for encountering hazardous gases, such as hydrogen sulfide during construction.
4. Blasting  
At least 14 days before the start of blasting on site, the Contractor shall submit the following:
  - a) copies of valid Blaster’s Certificates for the Contractor’s blasting supervisor and blasters;
  - b) a blasting safety plan;
  - c) a commercial description and technical information of the proposed blasting products (explosives, detonators, fuses, etc.);
  - d) location, design and capacity of explosives and detonator magazines, along with procedures for the handling of explosives on and off site;
  - e) a copy of all required permits; and
  - f) after the blasting program begins, the Contractor shall maintain and make available to the Owner at the magazine or other location as required:
    - i. explosives and detonator magazine logs registering the receipts and consumption of explosives, detonators, and accessories; and
    - ii. daily shift records showing drilling patterns, detonation delay sequences, and the type and quantity of explosives per hole, per delay, and per blast.

## 1.5 BLASTING SUPERVISOR

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

- a) have a valid blaster’s certificate;
- b) have at least 3 years experience in the use of explosives on surface rock excavation projects of a similar nature; and

- c) direct the activities of all blasting operations and other blasters on site including inventory maintenance.

## **PART 2 – PRODUCTS**

(not applicable)

## **PART 3 – EXECUTION**

### **3.1 METHODS**

1. The Contractor shall conform to the following general guidelines for all excavation activities:
  - a) Develop excavation methods, techniques, and procedures with due consideration for safety, environmental hazards and the nature of materials to be excavated particularly in saturated areas.
  - b) Take precautions to preserve in an undisturbed condition all materials outside the excavation lines.
  - c) Prevent excavation beyond the excavation lines shown on the Drawings unless otherwise approved.
  - d) Dispose of excavated material in the approved designated areas. Under no circumstance shall water, tailings or deemed contaminated material from within the tailings facility be discharged, ponded, or stockpiled outside of the facility.
  - e) The tailings, waste or contaminated materials and water, located within the tailings facility could be acidic or contain hazardous substances from the native rock or from any subsequent milling or processing. The Contractor shall provide all necessary safety equipment for their staff, and shall comply with all applicable health and safety regulations including a gas environment.
  - f) The construction of temporary roads, ramps, or fills to allow equipment access to certain areas could be required, and shall be identified by the Contractor before the start of excavation. The Contractor shall be responsible for construction, deconstruction and safe disposal of all such temporary structures in approved areas, all at no extra cost to the Owner.
  - g) Spill response and cleanup materials will be kept at the site for emergency response to spills from equipment, particularly outside of containment.
  - h) Sludge, tailings, peat, sand and other excavated materials shall be kept separate from each other during excavation, transport and disposal.
  - i) Transport vehicles must be water tight with tailgates. Spillage will be cleaned up and roads maintained for safe travel.
  - j) All transported materials will be compacted as specified.

### **3.2 UTILITIES**

1. Most utility installation, relocation, or tie-in work is expected to be performed by the Contractor, as directed by the Owner. Utility installations will utilize standard industry bedding and compaction practices and all underground utilities installed shall be demarcated with hazard tape 2 feet above the fill bedding and be located by survey for record drawings.
2. An approved “dig permit” from the Owner is required for any excavation. The Contractor shall request dig permits from the Owner, in writing, not less than 96 hours before commencing any utility excavation. The Owner will work with the Contractor to establish the location and extent of any buried utilities. The Contractor shall immediately cease work and inform the Owner when unknown utilities are encountered, or if utilities are not located as indicated in the dig permit, and perform repairs as directed. This will not constitute a delay and contractor should have repair materials ready before commencing with the excavation. Owner-approved isolation/lock-out procedures (energy isolation) shall be used around live systems, and must be coordinated with the Owner. A Hot Works permit and Confined Space permit may also be needed.
3. Damage or lost time caused by Contractor negligence shall be satisfactorily repaired at no cost to the Owner.
4. The Contractor shall obtain an approved dig permit from the Owner where work involves breaking into or connecting to existing services or working in close proximity to utility locations. All utility tie-ins will utilize the Owner’s isolation standards and lockout procedures to protect personnel and property. It shall be assumed that all pipelines and containers could, potentially, contain and release hydrogen sulfide gas, and appropriate caution shall be exercised.
5. All utilities removed from the work area shall be pressure washed, cut into appropriate lengths and placed into Owner-provided rubbish bins at the site. Owner will deliver and remove the rubbish bins.
6. All abandoned utilities that will remain in the Work area shall be neatly terminated at the margin of the Work and capped or plugged as directed.
7. The Contractor shall record the position and elevation by survey of all existing, re-routed and abandoned service lines encountered in the Work.
8. Hand excavation will be required within 2 ft of any known or suspected live utilities or utilities to be salvaged or modified. Before excavating, live electrical utilities located within 10 ft of the Work shall be isolated in coordination with KGCMC excavation policies and personnel.
9. Hand excavation will be required when excavating around, isolating or recovering monitoring wells, wet wells or other instrumentation.

### **3.3 CLEARING, GRUBBING AND STRIPPING**

1. The Contractor shall survey, lay-out, and flag the clearing lines. The Owner will inspect and confirm the clearing limits with the Contractor before the start of Work. Clearing outside the specified or approved areas shall not be carried out without prior written approval.

2. After clearing is completed, the Contractor shall identify hazard trees outside the clearing area that pose a safety concern, and submit a plan showing the location of the hazard trees within 24 hours of clearing completion. No further work will be permitted in the cleared area until the hazard trees have been dealt with in an approved manner.
3. All cutting and clearing activities shall be performed in strict accordance with the Timber Settlement Contract in force at the site. All recoverable timber shall be decked in 32 ft lengths.
4. Top soil shall be excavated from the Work area to the approved depths and limits and hauled for disposal in designated disposal areas. Trucks shall have sealed boxes to avoid leakage and spillage during transport. Organic materials will be keep separate from sand, till and bedrock materials.
5. All necessary water control and sediment control measures within and around the excavations are considered incidental to the Work. Pumps may be required to control runoff during storms. The Contractor shall provide personnel throughout the work to maintain drainage and sediment controls, including off days, if needed. Penalties exist for sediment control to the Owner.
6. Woody debris shall be piled and burned in an approved manner and in an approved location.
7. Woody debris and waste that is not designated for burning shall be disposed of in stable piles with lifts not more than 3 ft thick, and compacted with a minimum of 3 passes of loaded construction equipment. Organics shall be spread or crushed to avoid nesting and void formation.

### **3.4 COMMON EXCAVATION**

1. Common materials (including peat) shall be excavated from the Work area to the approved depths and limits and hauled to the designated disposal areas located less than three miles away. Sludge, tailings, and peat shall be segregated during excavation and stockpiled separately from other materials. Trucks shall have sealed boxes to avoid leakage and spillage during transport, and shall not be overfilled.
2. Necessary water control and sediment control measures within and around the excavation are considered incidental to the Work. Pumps may be needed for runoff control at times.
3. Areas with unacceptable soil or material shall be sub-excavated and disposed of in the proper areas as directed.
4. The entire foundation area shall be excavated to the approved lines or as directed before commencement of fill placement, except in the case of sub-excavations that could pose a safety hazard.
5. Excavation tolerances shall be +0 inches to –6 inches of specified or approved lines and levels.
6. Haul trucks shall not exceed the allowable road speed and be prepared for operating in soft, wet road conditions. Extra care shall be taken to avoid articulated truck bed rollovers. All rollovers shall be reported immediately to Owner.
7. Appropriate personal protective equipment is required for potential release of hydrogen sulfide gas. Contractor must comply with GCMC respirator policy.

8. Contractor shall monitor slopes for movement as directed by the Owner during all excavation along or near the Embankment Road dam and service road. Any movement of the slopes shall be immediately reported to the Owner. Slope stabilization measures shall be undertaken as directed by the Owner.

### 3.5 ROCK FRAGMENTATION

1. All rock fragmentation will be subject to review and approval before and during the excavation.
2. The rock is described as graphitic phyllite, sericite/chlorite phyllite, or argillite. The phyllite is moderately hard and is dissected by steeply-dipping folia. The argillite is hard. Both rock types could be jointed, fractured or locally sheared. Dilation of folia or joints could be encountered in some areas. The distribution of rock types within the Work area is available from the Owner and are generic, not detailed based on existing pit observations. The removal of intact rock is expected to require drilling and blasting. Ripping with heavy equipment is not considered a practical fragmentation technique, unless localized. Large boulders or oversize rock may be fragmented by drill and blast techniques or by an excavator-mounted pneumatic rock breaker. Creating oversized rock during quarry blasts is to be minimized and rocks reduced as necessary.

3. Blasting Safety

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

- a) Signaling and warning systems for labour and equipment prior to blasting.
- b) Blasting mats, screens, fences or barriers for protection against flying rock during blasting.
- c) Specific temporary support required on all exposed rock faces. Measures may include scaling, meshing, bolting, shotcreting and/or other techniques. No other work shall take place until the support measures are in place.
- d) Extreme caution shall be taken when working around existing facilities. Blast damage shall be immediately corrected by the contractor to any and all affected facilities not planned for demolition.

4. Blasting Procedures

The following procedures shall apply to all blasting operations:

- a) The production blast design shall be submitted at least 24 hours before the planned blast.
- b) The blast design shall include sketches and comments showing the physical location and dimensions of the planned blast as well as all relevant drilling, charging, and delay data.
- c) The blast shall not proceed without:
  - i. the Owner's approval; and

- ii. the presence of the Blasting Supervisor.
- d) The accuracy and control of blasting operations shall be evaluated by the evidence of perimeter hole traces and regularity of the excavation planes. The Contractor shall alter any aspect of the blasting cycle to improve the blast control, if directed.
- e) The Contractor shall measure and record peak particle velocity during blasting as directed by the Owner. Peak particle velocity due to blasting as measured at the surface at locations determined by the Owner shall not exceed the following limits unless specifically directed in writing.
  - (1) Toe of tailings pile 6 in/s
  - (2) Water treatment plant 4 in/s

From time to time, following interpretation of monitoring data, the Owner may vary the allowable peak ground velocity limits.

- f) The maximum allowable over break shall be 6 inches on final edges and surfaces. Fractured rock due to over break may require removal, as directed.
- g) Excavation tolerances shall be +0 inches to –6 inches of specified or approved lines and levels.
- h) Excavation surfaces shall be scaled and barred to remove loose, shattered, and “drummy” materials. Overhangs shall be removed. After the installation of temporary rock support (if required), the Owner may inspect the exposed faces and, as required, instruct the Contractor to perform additional work.
- i) Should the Contractor require excavation beyond the lines and levels shown on the Drawings, then the additional excavation:
  - i. Shall be subject to approval.
  - ii. Shall be subject to the same controls and restrictions applicable to the required excavations.
  - iii. Shall be performed at the Contractor’s cost.
  - iv. May require to be replaced with structural fills or concrete as determined by the Owner and at no cost to the Owner.

### **3.6 CONTAMINATED MATERIALS EXCAVATION**

- 1. Contaminated materials shall be excavated from the Work as directed and hauled to the designated disposal areas located less than 1.5 miles away. Trucks shall have sealed boxes to avoid leakage and spillage during transport. The Contractor shall provide daily haulage logs and volume surveys and compaction test data.

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2. Necessary water control and sediment control measures within and around the excavation are considered incidental to the Work.

## **PART 4 – MEASUREMENT AND PAYMENT**

For Measurement and Payment see Section 4.2.

**END OF SECTION 4.5**

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## SECTION 4.6 – FOUNDATION PREPARATION AND FILL

### PART 1 – GENERAL

#### 1.1 DESCRIPTION

1. Proof-roll soil and fractured bedrock foundations.
2. Backfill sub-excavations using specified rockfill or other approved materials.
3. Place specified fill materials.
4. Install French ‘burrito’ drains and piping to provide drainage for the tailings pile foundation.
5. Install instrumentation as directed.
6. Initially shape the perimeter collection ditches and maintain operational surface ditches to avoid flooding or operational delays during construction.

#### 1.2 CODES AND STANDARDS

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

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

## PART 2 – PRODUCTS

### 2.1 GENERAL

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

### 2.2 FILL MATERIALS

1. Fill gradations shall be as follows:

PARTICLE SIZE <i>U.S. Sieve Size</i> <i>(inches/No)</i>	FILL TYPE AND % FINER THAN (BY WEIGHT)				
	6-inch Minus Rockfill		Foundation Drainage Blanket and Bedding Sand		Tailings – Supplied by Owner
	Coarse Limit	Fine Limit	Coarse Limit	Fine Limit	
<i>6 inch</i>	100				
<i>3 inch</i>	87				
<i>1.5 inch</i>	77				
<i>1 inch</i>	70				
<i>3/4 inch</i>	65				
<i>1/2 inch</i>					
<i>3/8 inch</i>	53	100	100		
<i>1/4 inch</i>					
<i># 4</i>	39	90	78	100	
<i># 10</i>	25	75	56	85	
<i># 20</i>	13	51	32	70	
<i># 40</i>	5	31	19		
<i>#60</i>	0	20	11		100
<i># 100</i>		10	6		90 - 100
<i># 200</i>		5	3	7	80 - 90

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

2. Pit-run rockfill, shall have not more than 5% by weight passing the No. 200 sieve.

Select rockfill shall have 16-inch maximum particle size, a  $D_{50}$  of 6-inches and not more than 5% by weight passing the 1-inch sieve.

Rockfills shall be clean, well graded and free of organics. Maximum particle size shall not be greater than 80% of the lift thickness at any given location. Approved over-sized boulders, of average diameter not exceeding specified lift thickness, may be placed in designated and approved areas, provided they are adequately embedded in the surrounding compacted fill, to the Owner's satisfaction.

3. Drain gravel shall be hard, durable, ¾-inch to 3/8-inch clean, crushed rock.
4. Till to be used as fill shall not contain cobbles larger than 6 inch diameter when used as fill.
5. Select till shall be 2-inch minus material.
6. Sand shall be obtained from the 1.5 Mile A-Road source.
7. Rockfill shall be obtained from the excavations, existing stockpiles and the NW Quarry.
8. Pyritic rock will not be allowed in construction of the Work, including drains, roads, berms or foundations unless within containment. The Owner will make all rock quality designation. No delays will be claimed for the time to designate rock quality.

### **2.3 WATER**

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

## **PART 3 - EXECUTION**

### **3.1 TEMPORARY STOCKPILES**

1. Incidental handling and temporary stockpiling of material from existing stockpiles will not be measured separately for payment.

### **3.2 QUARRYING**

1. Quarrying shall conform to the rock excavation requirements of Section 4.5 – Clearing and Excavation.

### **3.3 GRADE PREPARATION**

1. Grade shall be prepared to the lines shown on the Drawings. With prior approval, grade lines may be adjusted in the field to suit local topography or ground conditions or to minimize the use of backfill material, and shall be free of abrupt or sharp changes unless otherwise specified. In general, adjustments to grade lines which increase the tailings or water storage capacity of the area will be acceptable provided there are no additional costs to the Owner. Contractor is responsible for survey and accuracy of grade.
2. Exposed excavation surfaces shall be smooth, firm, unyielding, proof-rolled and compacted with a minimum of 6 overlapping passes of a 12-ton vibratory compactor. The Contractor shall adjust the number of passes and moisture condition the soil as necessary to achieve the required compaction. The prepared surface shall be approved before the placement of fill to bring the area back up to specified grade levels.
3. Loose, friable, or weak foundation materials shall be removed as directed.
4. Fill used to raise excavation surfaces to required grades shall consist of pit run rockfill, except for the final 1.5 ft which shall be 6-inch minus rockfill, placed in the specified manner unless otherwise directed.
5. In areas where road fill will be placed over soft soil, the Contractor shall place Owner-provided woven geotextile on the foundation, in an approved manner, before placing the road fill.

### **3.4 GRADE LINES**

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

### **3.5 INSTRUMENTATION**

1. The Contractor shall provide assistance, including provision of manpower and equipment, to the Owner for installation of new monitoring wells, lysimeters and piezometers within the expansion footprint, and extension of the associated ducts and cabling from new and existing instruments to an area outside the limits of the expansion, as directed.
2. The Contractor shall excavate trenches, install ducts and cabling, and backfill trenches back to the required grade lines as directed. Trench boxes must be used if necessary.
3. The Owner will provide instruments and associated hardware.

4. The Contractor shall coordinate its other operations around the instrumentation work. The Work shall be carried out with care and caution for the protection of the instruments.
5. Contractor will be responsible for all costs associated with replacement of monitoring devices or instrumentation that are damaged or destroyed due to Contractor operations.

### **3.6 FOUNDATION DRAINS**

1. Groundwater collection drains, also known as French drains and “Burrito” drains, may be required in areas where seepage is uncovered during the foundation preparation work. The Foundation drains consist of filter-sock wrapped, perforated HDPE pipe installed in a trench backfilled with drain gravel, and with the pipe and drain gravel enclosed in prescribed non-woven geotextile filter. The layout and total length of the drains may differ from that indicated on the Drawings depending on ground conditions.
2. The pipe will be supplied by the Owner. Pipe details are shown on the drawings.
3. The Contractor shall report drainages or seeps that are found during the excavation for the Owner to evaluate further action.

### **3.7 FILL PLACEMENT**

1. Drain gravel will be supplied free of charge (for use in the Work only) to the Contractor in a stockpile at Hawk Inlet and/or other locations closer to the Work site. The Contractor shall be responsible for loading from the stockpile(s) and hauling to the placement areas. In addition, haulage operations from the camp area will be restricted to between 5 a.m. and 7:30 p.m. due to camp operations and sleeping personnel and shall follow all applicable Owner road rules. Contractor shall use all materials efficiently and reduce any waste of the product.
2. All fills shall be placed incrementally in horizontal lifts starting from the lowest ground levels, unless otherwise approved.
3. All fills are susceptible to particle segregation during placing and spreading, especially the 6-inch minus and pit run rockfills. The Contractor shall use placing and spreading methods that prevent segregation from occurring, or provide an approved method of repairing segregation prior to compacting the materials.
4. The foundation sand layer shall be placed in one lift and compacted as described in the table below. The Contractor shall adjust the number of passes and moisture condition the soil as required to achieve the specified compaction. Moisture conditioning shall be carried out during or immediately before compacting each lift, with the water content of the placed material being as uniform as practicable throughout the layer. Compaction testing shall be carried out by the Contractor for acceptance of the work, with the Owner confirming with duplicate testing as needed.
5. Hand operated compactors shall be used within 2 ft of buried conduits, utilities, liner or similar sensitive structures. All wells in the excavated areas shall be preserved and recovered.

6. At least 4 hours notice shall be provided to the Owner before placing foundation sand material in any area and the Work shall not start until approval has been obtained.
7. Due to the cost of production, foundation sand material thickness shall not exceed 1 inch more than the specified layer thickness at any location, and then only if the occurrence is localized in nature as determined by the Owner. Excess material in the foundation sand layer shall be salvaged and reused elsewhere in the Work or stockpiled for future use by Others at no additional cost to the Owner.
8. The Contractor shall prevent surface water runoff or water from any other source from eroding fill materials placed for the Work, and shall immediately repair any damage resulting from such erosion, at no cost to the Owner including material costs. Contractor should have adequate bulk covers (tarps) to protect all working areas from erosion.
9. All materials whether in permanent Works or in stockpiles shall have a smooth final contour that sheds runoff and shall be stable. Secondary earthwork will be required to leave the storage sites, as well as any sediment control structures needed for the piles, in good order to the Owner's satisfaction. This work will not be measured.
10. The fills shall be placed as follows:

FILL DESCRIPTION	AS PLACED MOISTURE CONTENT	LIFT THICKNESS (IN) <sup>(2)</sup>	MINIMUM DENSITY STANDARD PROCTOR % <sup>(1)</sup>	MINIMUM PASSES/LIFT & COMPACTOR TYPE
Sand (foundation layer)	moist	12	98	4, 12t vibratory roller
Drain Gravel (pipe bedding)	moist	6	method spec →	locally, if directed
Drain Gravel (bedding)	moist	6	95	4, hand operated compactor
Sand (trench backfill and pipe bedding)	moist	6	98	4, hand operated compactor
Select Till	-1% to +0.5% of optimum	6	98	4, hand operated compactor
Till	-1% to +0.5% of optimum	6	98	6, 12t vibratory roller
6-in. Minus Rockfill (foundations and roads)	wet	24	method spec →	6, 12t vibratory roller
Pit-run Rockfill	Foundations	wet	36	method spec →
	Roads	moist	18	method spec →

(1) At optimum standard Proctor moisture content.

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

### 3.8 COMPACTION EQUIPMENT

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

### **3.9 WATERING EQUIPMENT**

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

### **3.10 RESTRICTIONS DUE TO WEATHER AND SUSPENSION OF OPERATIONS**

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

### **3.11 SEDIMENT AND DRAINAGE CONTROL**

1. The Contractor shall provide equipment and facilities such as silt fences, floc logs, hay bales, tarps, rock armoring, pumps and settling ponds as required to control drainage around the work site and to prevent the discharge of sediment from construction and precipitation run-off from entering any natural water course downstream of the Site.
2. Sediment and drainage controls shall be to the satisfaction of the Owner.

**3.12 QUALITY CONTROL**

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

FILL	TESTS AND FREQUENCY (Maximum Volume placed per test) (yd <sup>3</sup> )			
DESCRIPTION	MOISTURE CONTENT	IN-SITU DENSITY	GRADATION	STANDARD PROCTOR
Foundation Sand	500	500	500	2000

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

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11. Initial stockpile surveys/quantities will be supplied to the Contractor, and confirmation of volumes will be the Contractor's responsibility to avoid any material shortages. The Contractor shall be responsible for maintaining and efficiently utilizing the stockpiled materials for Work related use only to avoid any material shortages. The Contractor shall always use the closest available materials and disposal sites unless otherwise directed. The Contractor shall promptly inform the Owner of any potential material shortages. A material shortage will not be a basis for claiming additional compensation on account of a delay due to the material shortage.
12. Road access to Pond 7 and all Water Treatment Plant work must always be maintained.

#### **PART 4 - MEASUREMENT AND PAYMENT**

For Measurement and Payment see Section 4.2.

**END OF SECTION 4.6**

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## **SECTION 4.8 – DRAINAGE SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

1. The drainage system for the Pond 6 Expansion area will comprise:
  - a) French ‘burrito’ drains in the foundation, to intercept ground water;
  - b) A new wet well, designated Wet Well A, and necessary piping to collect foundation drainage and pump to treatment (HOLD PENDING DETAILED DESIGN);
  - c) A degrit basin to collect surface drainage flows from perimeter ditches before flows report to Pond 7;
  - d) Extensions to existing utilities currently reporting to Pond 6; and
  - e) Lined surface ditches at the perimeter of the tailings placement area.
2. The foundation French ‘burrito’ drains consist of perforated HDPE pipe covered with a geotextile sock embedded in drain gravel.
3. Ditches shall be lined with reinforced polypropylene geomembrane. Velocity breaks consisting of small piles of clean rock shall be placed at intervals along the ditches, as directed.
4. Breaches through service road to existing tailings pile foundation drainage materials and extensions of WW#2 piping to new caisson. This also entails a liner removal from Pond 6.

### **PART 2 – PRODUCTS**

#### **2.1 GENERAL**

1. Drain gravel, drain pipe, geotextile, and geomembrane will be supplied by the Owner to the Contractor free of charge for the Work only. The materials will be stored at Hawk Inlet.
2. All pipe shall be joined by thermal butt fusion as outlined in ASTM D 2657, Heat Joining Polyolefin Pipe and Fittings wherever possible unless otherwise directed by the Owner.

#### **2.2 DRAIN GRAVEL**

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

### **2.3 DRAIN PIPE**

1. All solid and perforated drain pipe for the foundation drains shall consist of 8-inch diameter SDR 9 HDPE pipe. Perforated pipes shall be covered with a geotextile sock.
2. Existing utility pipes shall be extended or decommissioned as indicated on Drawing D-54004, unless otherwise directed by the Owner. New pipe extensions shall consist of SDR 9 HDPE pipe with nominal diameter as indicated on drawing D-54004.

### **2.4 WET WELL (HOLD PENDING DETAILED DESIGN)**

1. Wet Well A shall consist of a 96-inch outer diameter, 84-inch inner diameter HDPE Weholite pipe, provided by the Owner.

### **2.5 DITCH LINER BEDDING**

1. Sand bedding (see Section 4.6) or Owner-supplied non-woven geotextile shall be used as directed.

### **2.6 DITCH LINER**

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

### **2.7 VELOCITY BREAKS**

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

### **2.8 GEOTEXTILE FOR FOUNDATION 'BURRITO' DRAINS**

1. Geotextile for foundation 'burrito' drains shall consist of 100-mil SI Geosolutions Geotex non-woven needle punched polypropylene geotextile.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

1. The Contractor shall be responsible for pick up of Owner supplied materials from storage and transport to the placement location.
2. Support of open trenches and excavations shall be in accordance with applicable laws and regulations.

3. The Contractor shall exercise due caution to prevent injury to personnel.
4. High winds and rain can occur at the site. The Contractor shall secure and protect all materials and installations of ditch liner during construction to prevent wind-lifting, tearing or water damage to in-place bedding materials.

### **3.2 DRAIN GRAVEL**

1. Drain gravel shall be placed as described in Section 4.6 and on the Drawings.

### **3.3 PIPE BEDDING/BACKFILL**

1. Pipe bedding/backfill shall be placed as described in Section 4.6 and on the Drawings.

### **3.4 DRAIN PIPE**

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

### **3.5 WET WELL (HOLD PENDING DETAILED DESIGN)**

1. The Contractor shall construct a compacted, level foundation for the Wet Well as directed by the Owner.
2. Wet Wells shall be placed such that the base is level, and such that prefabricated inlets and outlets are oriented to receive pipes as directed on the drawings. Pipe fusion to pre-fabricated Wet Well inlets and outlets shall occur in general accordance to item 3.4 of this Section. The Contractor shall ensure that no gaps are left between the foundation and the base of the Wet Well.

### **3.6 DITCH LINER BEDDING**

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

### **3.7 DITCH LINER**

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

### **3.8 VELOCITY BREAKS**

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

## **PART 4 - MEASUREMENT AND PAYMENT**

For Measurement and Payment see Section 4.2.

**END OF SECTION 4.8**

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## SECTION 4.9 - SOIL-BENTONITE WALL

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

1. Work consists of the supply of all labor, equipment and materials necessary to carry out the excavation, backfill, finish grading, and all other work associated with the construction of the soil-bentonite wall (hereinafter called the Work) as indicated on the Drawings and as specified herein. The necessary equipment to construct the Work will be the responsibility of the Contractor.
2. Without in any way limiting the scope of the foregoing, the Work shall consist, in general, of the following:
  - a. Modifications of the existing site conditions as necessary (i.e. construction of platforms, etc.) for the installation of the Work; and
  - b. Construction of the Work, including construction of new soil-bentonite walls and raising of existing walls as shown in the Drawings at the suggested mix proportions provided in this specification (meeting a target hydraulic conductivity of  $10^{-7}$  cm/s), or alternative mixture pre-approved by the Owner.
3. All Work shall be performed in accordance with the General Conditions, Special Conditions, Technical Section and Drawings. Where standards are referenced, the reference shall be to the latest final revision of the standard. The Contractor shall cooperate with the Owner to facilitate monitoring activities and shall provide all reasonable assistance to allow the Owner to take samples, carry out in situ testing and monitoring, measure the Work, and monitor progress and workmanship.
4. The Specialty Contractors pre-approved by the Owner and which the Contractor must use one of to construct the Work are as follows:

Geo-Solutions Inc.

Mr. Steven Day  
Vice President  
26 West Dry Creek Circle, Suite  
600  
Littleton, Colorado  
80120

Phone: (720) 283 - 0505  
Fax: (720) 283 - 8055  
e-mail: sday@geo-solutions.com  
website: www.geo-solutions.com

Inquip Associates Inc.

Mr. Oscar Hensgen  
President  
P.O. Box 2182  
Santa Barbara, California  
93120

Phone: (805) 687 - 2007  
Fax: (805) 682 - 0396  
website: www.inquip.com

Hayward Baker Inc.

Mr. Alan Ringen  
1780 Lemonwood Drive  
Santa Paula, California  
93060

Phone: (805) 933 - 1331  
Fax: (805) 933 - 1338  
website: www.haywardbaker.com

**1.2 CODES AND STANDARD**

<b>TEST METHOD</b>	<b>DESCRIPTION</b>
API 13A	Oil Well Drilling Fluid Material
API RP 13B	Standard Procedure for Testing Drilling Fluids
ASTM C143	Concrete Slump Test
ASTM D422	Standard Test Method for Particle Size Analysis of Soils
ASTM D1140	Standard Test Method for Amount of Materials in Soils Finer than No. 200 Sieve
ASTM D4318	Liquid Limit, Plastic Limit and Plasticity Index of Soils
ASTM D5084 Method C	Falling Head Hydraulic conductivity Test

**PART 2 - PRODUCTS**

**2.1 GENERAL**

1. All materials used to perform the Work shall comply with the Specifications, and be subject to review by the Owner. A summary of the minimum material requirements is provided in Table 1, attached at end of this Specification.
2. All materials shall be new. Unless otherwise specified, the Contractor shall comply with manufacturer’s latest printed instructions for materials, storage and installation methods. The Contractor shall notify the Owner in writing of any conflict between these specifications and manufacturers’ instructions. In such instances, the Owner will designate which document is to be followed.

**2.2 WATER**

1. Water used to prepare the bentonite slurry and the soil-bentonite backfill, shall be hauled by the Contractor from Cannery Creek or Zinc Creek (located two (2) miles from the Work area). A Temporary Use Permit shall be required if Zinc Creek is used as a water source.

**2.3 BENTONITE**

1. Bentonite shall be Contractor supplied, and shall be pulverized (powder) premium grade sodium cation montmorillonite, conforming to API specification 13A, Section 4 Bentonite, Wyoben Hydrogel, or equivalent as submitted by the Contractor for review by the Owner.

**2.4 SOIL FOR BACKFILL**

1. Where possible, soil from the excavation for the trench shall be used or blended with soil from an Owner designated till source for the soil-bentonite backfill. It is the responsibility of the Contractor to confirm that the gradation and quality of the borrow materials will produce soil bentonite mixtures with the specified

- properties. The Contractor shall remove all refuse, wood, roots, peat, organic matter, construction debris and other deleterious materials prior to using the soil.
2. As the main target for the Work is the hydraulic conductivity ( $< 10^{-7}$  cm/s) and not the strength, the Contractor shall limit the amount of lumps or particles larger than 4 inches in the soil (s) used for backfill.

## **PART 3 - EXECUTION**

### **3.1 EXISTING FACILITIES**

1. The Owner will work with the Contractor to establish the location and extent of service lines in the area of the Work. Where required, the Owner will, under own forces or with the Contractor's assistance, remove or temporarily relocate service lines that are directly affected by the Work. The Contractor is responsible for obtaining, on a daily basis, dig permits when working in and around any utilities. Any damage caused by the Contractor as a result of not obtaining approved dig permits shall be repaired at his expense, as required by the Owner. Electrical lines must be de-energized before working near or in close proximity of the line, as directed by Owner. De-energizing of electrical lines is weather dependent and may interfere with Contractor's activities.
2. In addition the Contractor shall:
  - a) Immediately advise the Owner and confirm findings in writing when unknown utilities are encountered.
  - b) Obtain approved dig permits and carry out Work at times directed by the Owner where Work involves breaking into or connecting to existing services or working in close proximity to utility locations.
  - c) Record locations, including elevations, of maintained, rerouted and abandoned service lines encountered in the Work.
  - d) Avoid damage to any adjacent property, structures, monitoring wells and instrumentation.

### **3.2 LAYOUT**

1. The Contractor shall establish survey control points and layout points for the Work. The Contractor shall provide and maintain secondary layout points at intervals deemed necessary by the Contractor along the Work and at a 10 feet (or further if required) offset. The layout points shall be stakes brightly painted, and shall indicate the chainage. Any damaged or displaced survey points shall be promptly replaced by the Contractor. The Contractor is responsible for providing all as-built details in regards to the Work to the Owner.

### **3.3 WORKING PLATFORM(S)**

1. The Contractor shall provide level working platforms suitable for his needs prior to the start of the Work. The working platform (s) shall be properly drained, with drainage of the slurry toward the containment areas. The working platform(s) are to be constructed of 6 inch minus Quarry rockfill. At completion of the Work, the working platform(s) will be incorporated into the perimeter road to the lines and grades shown on the Drawings.

### **3.4 BENTONITE-WATER SLURRY**

1. All bentonite-water slurries shall be mixed in a colloidal, paddle, or other suitable mixer that can completely disperse the bentonite particles and produce a stable, colloidal suspension of bentonite-water slurry.
2. No slurry shall be mixed by hand or in the trench. The Contractor shall also have the necessary sumps, pumps, valves, hoses, supply lines, and other equipment required to supply adequately a continuous quantity of slurry to the trench. The Contractor shall measure and record the amount of water used each day for the production of slurry, and shall record the amount of slurry made on a daily basis.
3. The Contractor shall provide storage ponds and/or tanks of sufficient capacity, and shall ensure that there is always enough slurry to meet sudden demands caused by slurry losses. If slurry ponds are used, they shall be lined with an approved (by Owner) flexible membrane liner. At the end of the Work the Contractor shall remove the ponds and liners and/or tanks and mix the excess slurry with non-organic soil excavated from the Work or Mill Borrow and dispose of the soil mix in a location acceptable to the Owner.
4. Slurry in the ponds and/or tanks shall be agitated and circulated continuously (to ensure a uniform mixture with no clumps) to keep it ready for use in the construction of the slurry trench. The ponds and/or tanks shall be sufficiently stable to ensure there is no leakage.
5. Minimum new and old slurry characteristics are given in Table 1, attached at the end of this Specification.

### **3.5 TRENCH EXCAVATION**

1. The Contractor shall take all necessary steps to ensure that the trench is stable. Excavation of the trench shall be achieved with a suitable excavator so that the required trench width of 3 feet can be carried to the final depth of cut. The trench shall be excavated to the depth specified on the Drawings, but the Owner may require the Contractor to modify the final depth as a result of the soil conditions encountered during excavation.
2. The Contractor shall take all reasonable steps to limit the trench width to 3 feet, and the trench width shall not be greater than 5 feet, except when authorized by the Owner for the removal of obstacles.
3. Excavation shall be with an excavator bucket with a convex base or V-bottom and long teeth. The backhoe bucket shall have a minimum width of 3 feet. Special chopping, chiseling or other suitable equipment may be used to satisfactorily accomplish the trench excavation, without causing instability of the adjacent ground. The Contractor shall provide means of breaking and removing obstacles in the path of the slurry

trench. In the event that an obstacle cannot be broken or removed after a half hour of attempting to do so, the Contractor shall request authorization from the Owner to divert the slurry trench around the obstacle.

4. The Contractor shall demonstrate that the trench is continuous and reaches the specified depth. The action and movement of the trench excavation equipment shall assure trench continuity, such that the excavation tools can be passed vertically from the top of the trench to the bottom, as well as horizontally along the centerline of the trench without encountering unexcavated materials.
5. Excavation of the trench shall be to the depth specified on the Drawings, typically 3 feet into low hydraulic conductivity soil or to bedrock, or 3 feet into the existing soil-bentonite wall. Upon completion of the excavation, any loose material or cuttings shall be removed from the bottom of the trench with the excavation equipment to ensure that the trench contact with the underlying low hydraulic conductivity soil and/or bedrock contact is clean. The depth of the trench shall be sounded every 5 feet horizontally, or at the discretion of the Owner, with a vertical rigid pole (to be supplied by the Contractor) to determine the presence of any sediment overlying the surface of the soil and/or bedrock contact. This rod shall be kept at the location of the excavator at all times. The Contractor shall assign one person to measure the trench, and assist the excavator operator at all times during excavation. This person shall also ensure that the level of slurry in the trench is maintained at the required levels.
6. The Contractor may use bulkheads if circumstances prevent excavation of a continuous trench. The bulkhead must be removed and replaced with soil-bentonite backfill. The removal of the bulkhead must be such that no bulkhead material is deposited on the backfill face during the removal of the bulkhead, leading to trapped pockets during subsequent backfilling operations. To ensure this, it is recommended that during backfilling, the backfill at the bottom of the trench be kept at least 60 feet from the bulkhead during the bulkhead removal. The number, location and details of any bulkheads shall be subject to the review of the Owner.
7. The slurry shall be introduced into the trench as soon as trenching begins. The slurry level shall be kept in the trench at a level determined by the Contractor as appropriate to prevent the trench walls from caving in. The Contractor shall have personnel, equipment and materials ready to raise the slurry level at any time in the event of a sudden loss of slurry. To this end, the Contractor shall have personnel on site to raise the level of the slurry at any time, day or night, holidays included.
8. If the unit weight of the slurry in the trench exceeds the specified limits or becomes unworkable, the heavy slurry shall be removed by pumps or other methods proposed by the Contractor and reviewed by the Owner.
9. Excavation equipment operators shall pause with the bucket over the trench once the bucket emerges from the trench, in order to allow the slurry to drain out before swinging to unload, so as to limit the spread of the slurry. The Contractor will use appropriate methods to minimize slurry loss from the trench and also the mixing of excavated material particles with the slurry.
10. Soil excavated from the trench that will not be used for trench backfill shall, at all times after its excavation, be kept separate from soil to be included in the trench backfill and shall, as soon as is practical, be removed from the Work area and transported by the Contractor to an Owner designated area. Trucks for the transport of excavated material shall be sealed to avoid leakage and spilling during transport.

### **3.6 EXCESS EXCAVATION**

1. The Contractor shall oversee all excavations to the finished excavation level.
2. As soon as the excavation has reached the design depth, the Contractor shall request the Owner to determine if further removal of material from the trench is required.
3. Where the excavation carried out by the Contractor exceeds the limits indicated on the Drawings or specified herein, or the limits of excess excavation authorized by the Owner, then such unauthorized excess excavation shall not be included in the computed Work, but shall be at the Contractor's expense as shall all necessary soil-bentonite material as required by the Owner to backfill the void created by such excavations.

### **3.7 SOIL-BENTONITE BACKFILL**

1. Backfill (granular material with a limited percentage of particle size greater than 4 inch and a minimum of 20% fines passing No. 200 sieve size) for the Work shall consist of a mixture of excavated soil or borrow soil, water from Cannery Creek or Zinc Creek (pH between 6.5 and 10) and bentonite (minimum of 2% dry weight of backfill to achieve a minimum  $10^{-7}$  cm/s hydraulic conductivity). Prior to any backfill operations, the Contractor shall carry out a minimum of two (2) hydraulic conductivity tests on their proposed soil-bentonite backfill mix designs, using site soil material. The test results, indicating grain size and water content of soil used, percent bentonite added and slump achieved, shall be made available to the Owner at least two (2) weeks prior to the start of the backfilling operation.
2. The soil and bentonite-water slurry shall be mixed adjacent to the trench excavation. Equipment for the preparation and placement of backfill shall consist of suitable types of earth moving, blending, or grading equipment, capable of thoroughly mixing the soil backfill into a homogeneous paste, with no clumps, having the required properties in Table 1, attached at the end of this Specification. Prior to the commencement of Work, the Contractor shall submit for the Owner's review a description of the equipment to be used for preparing and placing backfill, and the procedures to be used.
3. Bentonite addition shall be based on the mix proportions of the bentonite slurry and the dry bagged bentonite mix as determined by the backfill mix design tests to achieve a minimum 2% bentonite by dry weight of backfill, and to achieve a slump of between 4 to 6 inches.
4. Prior to placement of soil-bentonite backfill, the trench shall be sounded every 5 feet horizontally, or at the discretion of the Owner, with a rigid vertical probe to determine if any sediment has collected on the bottom. Any sediment greater than 6 inches thick shall be removed or put into suspension as directed by the Owner.
5. The backfill for the trench shall be placed continuously in the direction of excavation, such that there is no mixing with the slurry and no segregation.
6. At the tie-in of a new soil-bentonite wall with an existing cutoff wall, the interface of the existing cutoff wall shall be sloped in such a fashion that the new backfill shall follow a relatively smooth transition in grade with a slope no steeper than 1H: 1V.

7. The end of the soil-bentonite trench shall precede the toe of the backfill slope so that the toe of the backfill shall not be less than 50 feet from the end of the excavation. Backfill placement operations shall proceed in such a fashion that the surface of the backfill below the slurry shall follow a relatively smooth change in grade between 5H: 1V and 10H: 1V, and shall not have hollows which may trap pockets of slurry during subsequent backfilling. Free dropping of backfill material through slurry is not permitted.
8. If bulkheads are used, for the start of any trench section, the trench backfill shall be placed by lowering it to the bottom of the trench with a clamshell bucket (or approved equivalent) until the surface of the backfill rises to the level of the working platform at the end of the trench. The Contractor shall submit a procedure to the Owner for approval prior to using any bulkhead.
9. Additional backfill shall be placed in such a manner that the backfill enters the trench by displacement down the forward face of the previously placed backfill. To accomplish this, sufficient backfill shall be piled on top of the existing backfill to cause a slump action behind the face of the backfill in the trench. Care shall be taken to contain the spread of backfill beyond the trench.
10. The trench shall be backfilled to the original ground elevation. Survey stakes shall mark the as-constructed centerline of the Work at 50 feet intervals or as directed by the Owner.
11. As the trench excavation nears completion, the Contractor shall use as much slurry from the trench as possible to make backfill, so as to reduce the amount of excess slurry left at the end of the Work. The remaining excess slurry will be mixed with non-organic soil excavated from the cutoff trench and placed in a location acceptable to the Owner.

### **3.8 TRENCH CAP**

1. A trench cap is required for the Work as directed by Owner. The trench cap shall consist of 6-inch minus roadfill compacted in small lifts to 95% standard proctor density, wrapped in non-woven geotextile and surrounded by woven polypropylene geotextile.

### **3.9 QUALITY CONTROL AND TESTING**

1. Quality control tests, as specified in Table 1, attached at the end of this Specification, shall be carried out by the Contractor, and all measurements shall be reported on forms approved by the Owner. Any materials that do not meet the minimum requirements of the Specification shall not be used and shall be removed from the site, to an area designated by the Owner. All Work not in compliance with the Specification shall be removed or remediated by the Contractor, as required by the Owner.
2. The Contractor's minimum record and test requirements for soils encountered during excavation, slurry preparation and backfill placement are as follows:
  - a) Excavation

The Contractor shall record the soils encountered during excavation and mark up a longitudinal section of the trench with the soil types encountered and depth of trench excavated. Bedrock should be noted as encountered.

b) Bentonite

A certificate of acceptance with the material specification shall be obtained from the bentonite manufacturer for each delivery.

c) Slurry

New and old slurry shall be tested for unit weight and viscosity. Slurry shall also be tested for filtrate loss. Samples of slurry from the trench shall be obtained using a special apparatus designed to collect the sample at depth. The sample from the trench shall be obtained from a depth equal to half the depth of the trench at the location sampled or at a depth specified by the Owner. The Owner shall determine the sample locations.

d) Backfill

The soil used for the soil-bentonite backfill shall have the minimum properties as specified in Section 3.7 or in Table 1. Soil-bentonite backfill shall be tested for slump (slump shall be between 4 inches to 6 inches) prior to placement in the trench. The required dry bagged bentonite shall be pre positioned on the working platform according to calculations based on the anticipated trench depth and as approved by the Owner. A minimum 2% bentonite by dry weight of backfill is required. The soil-bentonite mixture shall result in a minimum hydraulic conductivity of less than  $10^{-7}$  cm/s.

To prove adherence to the Specifications, the Contractor shall take, at the frequency specified in Table 1, samples of backfill for laboratory testing to determine bulk density and hydraulic conductivity. Samples shall be nominally 3 inches diameter, and be tested in flexible wall permeameters, or rigid wall permeameters that permit the test to be run under a finite vertical effective stress. The tests shall be run under a hydraulic gradient of 50, a vertical effective stress of 6 psi and a confining stress equivalent to the at-rest condition, using water sampled from the upslope drainage collection system. All hydraulic conductivity tests shall adopt the same procedure, gradient, sample size, and other parameters for the tests. Testing methods for hydraulic conductivity tests shall be as in ASTM D-5084, Method C, Falling Head Hydraulic Conductivity Test. Samples taken for hydraulic conductivity tests shall be large enough to be split into three volumes. The Contractor shall test one volume and store the remaining two volumes. The remaining two volumes will be made available to the Owner to test if required.

Should the result of the hydraulic conductivity test on the backfill mixture during the progress of the Work indicate a hydraulic conductivity greater than  $10^{-7}$  cm/s, the Contractor shall stop the backfilling, make additional tests as required and make any necessary adjustments in the mix to the satisfaction of the Owner before proceeding with the Work.

### 3.10 RECORDS

1. All Quality Assurance/Quality Control (QA/QC) records shall be neat and legible. For the Work, the Contractor shall keep daily records of:

- a) Quantity of water used for the slurry.
- b) Quantity of slurry manufactured, including quantity of bentonite used.
- c) Surface area in vertical profile of trench excavated per day per excavator.
- d) Soil profile along the soil-bentonite wall.
- e) Surface area in vertical profile of soil-bentonite wall backfilled, with chainages.
- f) Volume of soil removed from the site and Owner approved delivery location.
- g) QA/QC test results, with the chainage and depth of samples.
- h) Survey records, notes and details of the work.

### **3.11 SITE LABORATORY**

1. The Contractor shall provide the Owner with a detailed description of the on-site laboratory proposed for the site to perform the QA/QC tests required in the Specifications. A qualified technician shall be assigned to the laboratory for the QA/QC tests.
2. The Contractor shall also provide a container to store various material samples.

### **3.12 HEALTH AND SAFETY**

1. All ponds, stockpiles and open trenches shall be marked, fenced and guarded to prevent wildlife and/or persons unfamiliar with the Work from falling in. Site platforms, apart from mixing areas, shall be kept free from mud greater than 6 inches deep. Ponds will comply with MSHA and KGCMC regulations regarding floatation devices.
2. Appropriate safety gear, including safety tethers, shall be supplied by the Contractor, for use by all personnel working in close proximity of the open trench excavation including trench boxes. The Contractor shall submit a safety procedure to the Owner that demonstrates the protocol that will be followed when personnel are working in close proximity to the open trench excavation. In addition, all safety policies of Owner outlined in the General Conditions and Special Conditions sections of this contract shall be followed, especially the use of PPE equipment (steel toes boots, hard hats and safety glasses). Contractor safety gear shall meet KGCMC standards.

### **3.13 ENVIRONMENTAL AWARENESS**

1. The Contractor will take all necessary steps to adhere to the environmental policies of the Owner outlined in the General Conditions, Special Conditions and Technical sections of this contract during

GREENS CREEK MINING COMPANY (GCMC)  
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Section 4.0 – Technical Section  
Contract No. CW Civil Works

the course of the Work. In particular, equipment washing will be limited to specified areas within the Work area and any fresh water run-off areas will be protected from impacts of the construction.

### **3.14 END OF WORK CONDITION**

1. The Contractor shall leave the site as found prior to the start of the Work except for the Work completed under this Specification. Restoration shall be to the satisfaction of the Owner.

KENNECOTT GREENS CREEK MINING COMPANY (KGCMC)

Stage 2 Construction – 2007 (DRAFT)

Section 4.0 – Technical Section

Contract No. P06001 –CW Civil Works

**Table 1 Contractors Minimum QA/QC – Soil-Bentonite Wall**

SUBJECT	STANDARD	TYPE OF TEST	FREQUENCY	SPECIFIED VALUES
<b>MATERIALS</b>				
Water	N/A	pH, TSS Total Hardness	Per water source or as changes are evident	As required to properly hydrate bentonite with approved additive pH = 6.5-10
Bentonite	API 13A	Certificates to show compliance to API 13A	1 per truckload	Premium grade sodium cation montmorillonite
Soil Material (Native or Mill Borrow)	ASTM D1140	Washed sieve	1 per shift and source	Min. 20% passing No. 200 Sieve
	ASTM D422			Limited 4 inch particles
<b>BENTONITE-WATER SLURRY</b>				
Ponds / Mixing Tank	API 13B	Viscosity	2 per shift	Min. 40 s Marsh @ 70 ± 5°F
	API 13B	Density	2 per shift	Max. 70 pcf, Min. 65 pcf
	API 13B	Filtrate Loss	1 per shift	Max loss 25 cc in 30 min. @ 100 psi
Trench	API 13B	Viscosity	2 per shift	Min. 40 s Marsh @ 70 ± 5°F
	API 13B	Density	2 per shift	Max. 80 pcf, Min. 64 pcf
<b>BACKFILL</b>				
Trench	ASTM D-5084	Method C, Falling Head Hydraulic conductivity Test	1 per 300 feet of trench or, at least once per week	< 1.0 x 10 <sup>-7</sup> cm/s (target value)
Trench	ASTM C143	Slump	1 per 100 feet of trench, at least once per shift	4 inch min, 6 inch max
Trench	API 13B	Density	1 per 100 feet of trench, at least once per shift	Greater than 15 pcf above slurry unit weight
Trench	N/A	Backfill Slope	1 per 100 feet of trench, at least once per shift	5H:1V - 10H:1V

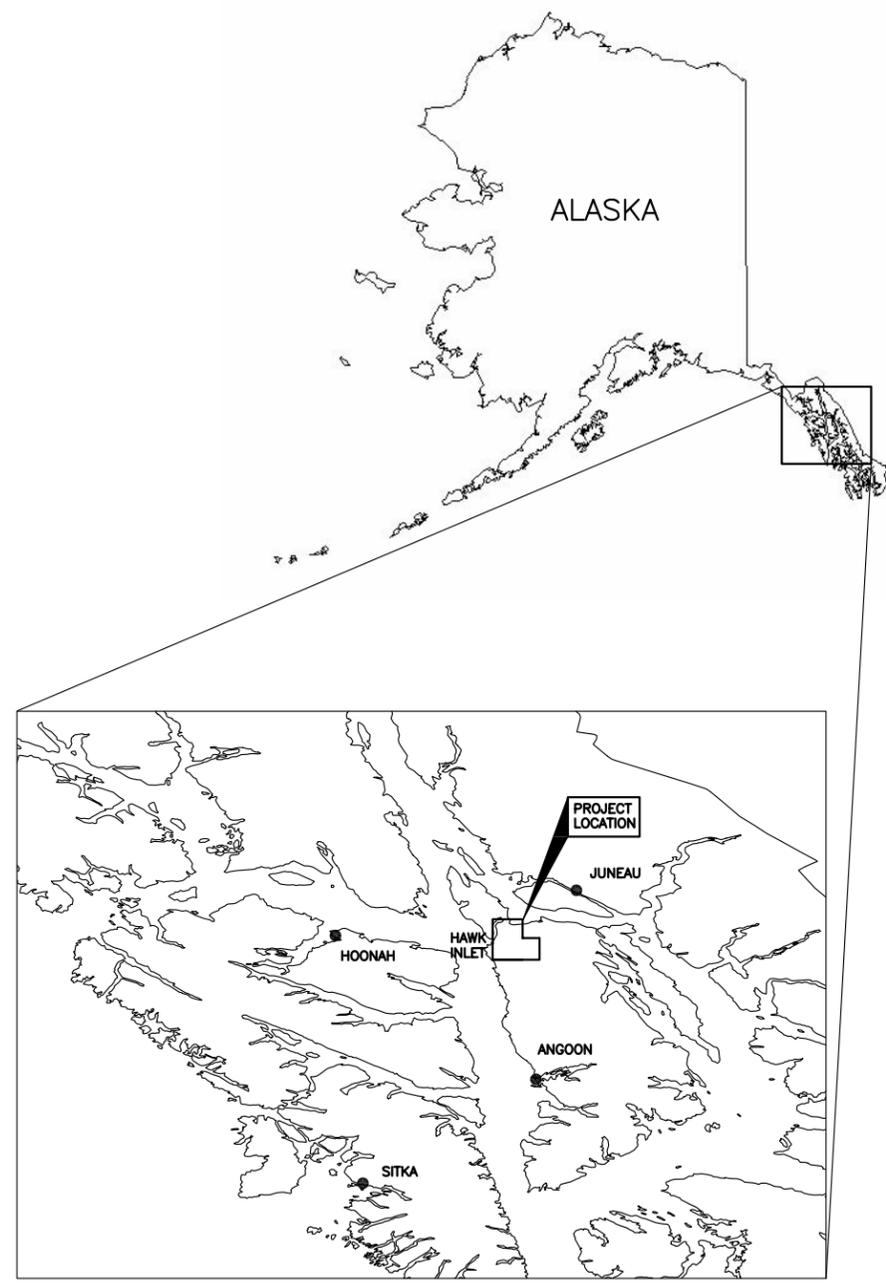
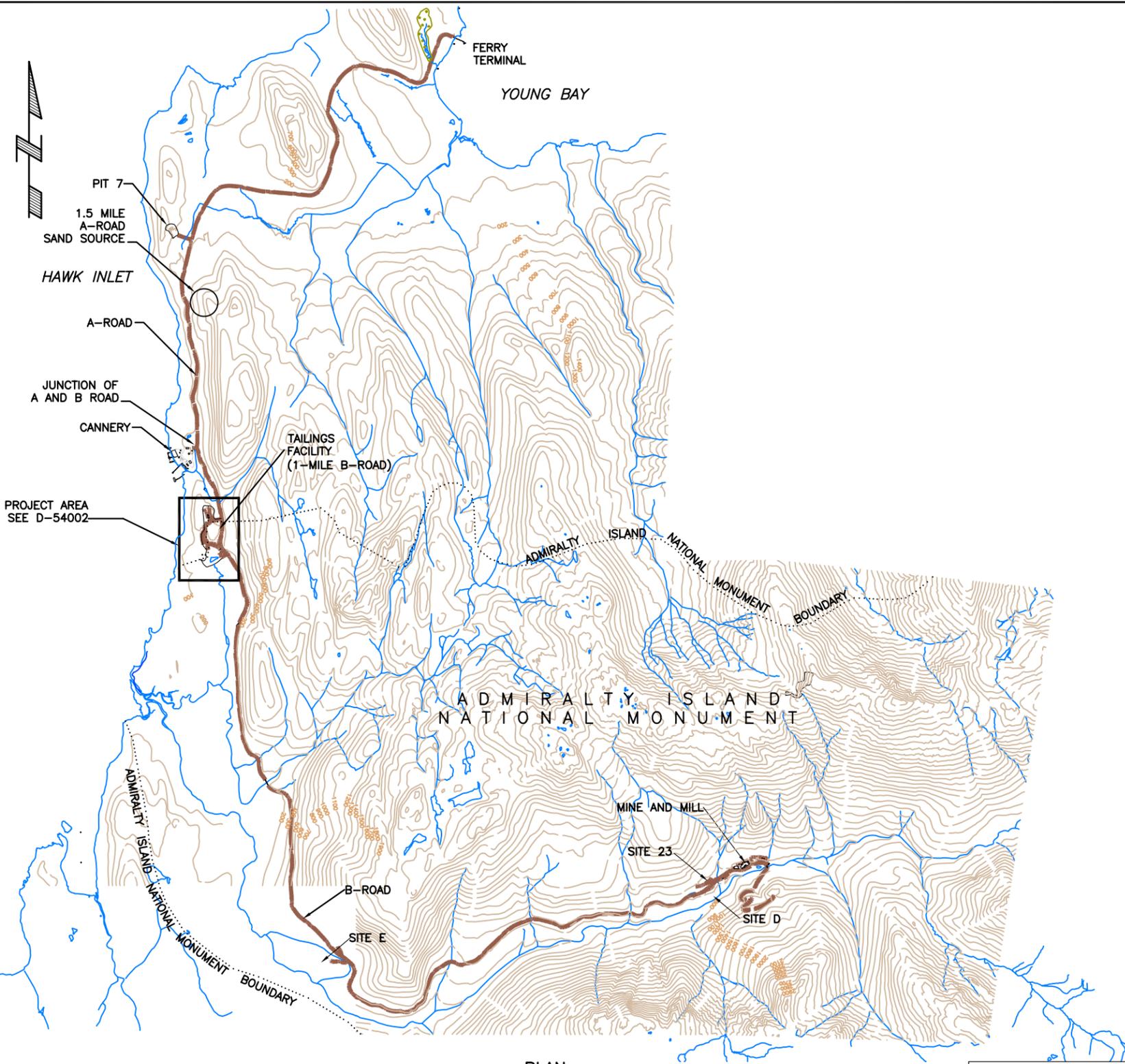
**Table 1 Contractors Minimum QA/QC – Soil-Bentonite Wall (continued)**

SUBJECT	STANDARD	TYPE OF TEST	FREQUENCY	SPECIFIED VALUES
TRENCH EXCAVATION				
Continuity After Excavation and Cleaning	Movement of excavator	Probing with rigid rod	Whole trench every 5 feet	Continuous trench Less than 2 inches of sediments over hard bedrock
Depth Prior to Backfilling	Movement of excavator	Probing with rigid rod	Every 5 feet	Less than 2 inches of sediments on trench bottom

**PART 4 - MEASUREMENT AND PAYMENT**

For Measurement and Payment see Section 4.2.

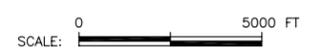
**END OF SECTION 4.9**



**KEY PLAN**  
SCALE: NTS

**PLAN**

**APPROVED FOR TENDER**



**NOTES:**

1. BASE PLAN PROVIDED BY GCMC, OCTOBER 2000.
2. CONTOUR INTERVAL IS 100 FT.
3. ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE. COORDINATES AND ELEVATIONS ARE REFERENCED TO MINE DATUM.

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CLIENT  
**GREENS CREEK MINING COMPANY**

PROJECT  
STAGE 2 EXPANSION OF TAILINGS FACILITY  
POND 6 EXPANSION CONSTRUCTION

TITLE  
**LOCATION PLAN**

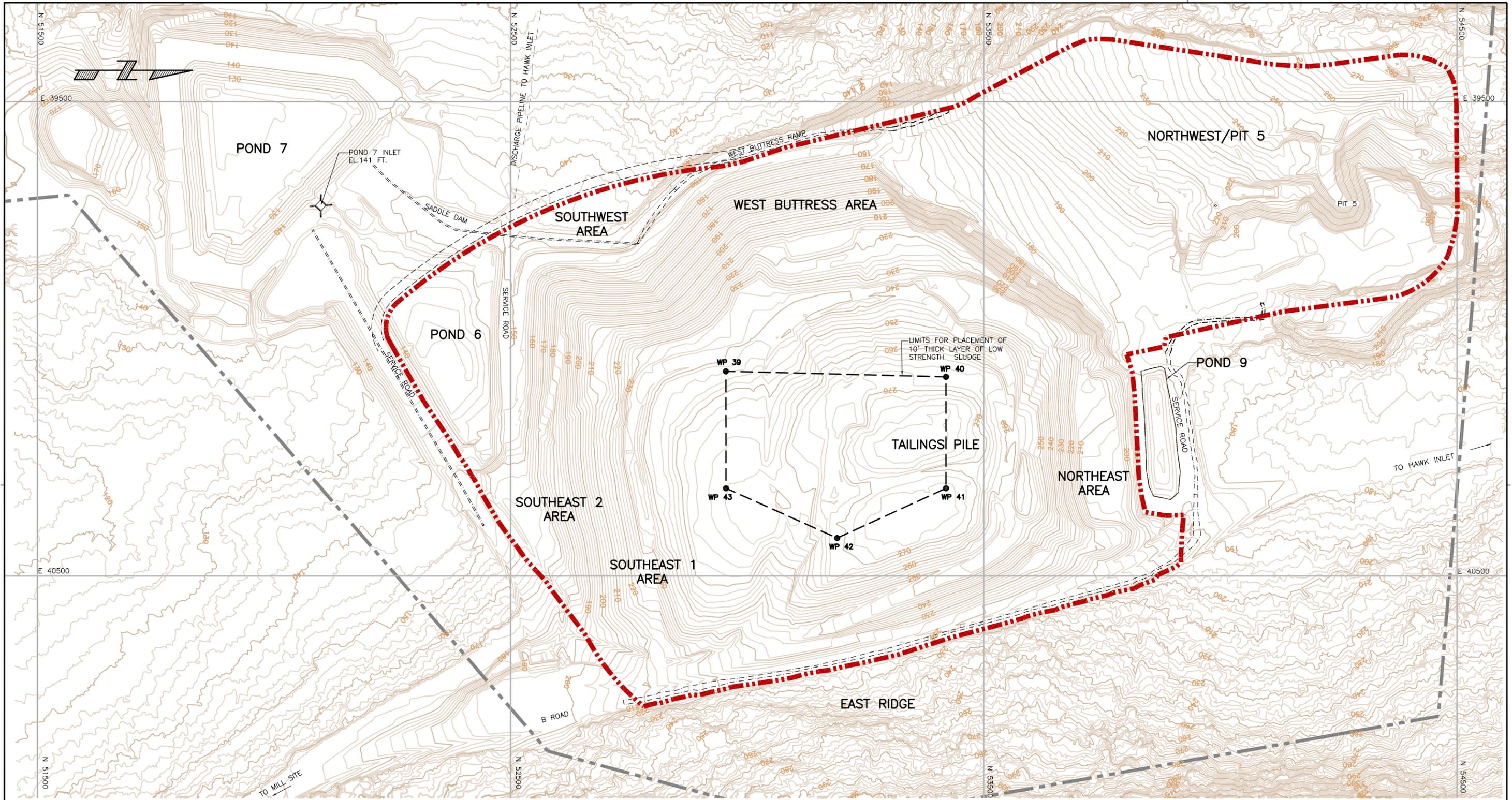
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		0	APR 11, 2008	APPROVED FOR TENDER	AW	AD	LC	LM

SCALE AS SHOWN	PROJECT No. M07802 A54	DWG. No. D-54001	REV. 0
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KCB-C-11D



POINT	NORTHING (FT.)	EASTING (FT.)
WP 39	52 955.0	40 068.0
WP 40	53 420.0	40 080.0
WP 41	53 420.0	40 315.0
WP 42	53 190.0	40 420.0
WP 43	52 955.0	40 315.0

**LEGEND**

	PROPOSED TAILINGS EXPANSION
	EXISTING SOIL-BENTONITE WALL
	LEASE BOUNDARY
	PROPOSED ROAD

**GENERAL NOTES:**

1. BASE TOPOGRAPHY PROVIDED BY GCMC (FEBRUARY, 2008).
2. LOCATIONS AND ELEVATIONS ARE IN FEET UNLESS OTHERWISE NOTED.

**APPROVED FOR TENDER**



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CLIENT

**GREENS CREEK MINING COMPANY**

PROJECT: STAGE 2 EXPANSION OF TAILINGS FACILITY  
POND 6 EXPANSION CONSTRUCTION

TITLE: TAILINGS FACILITY  
GENERAL ARRANGEMENT

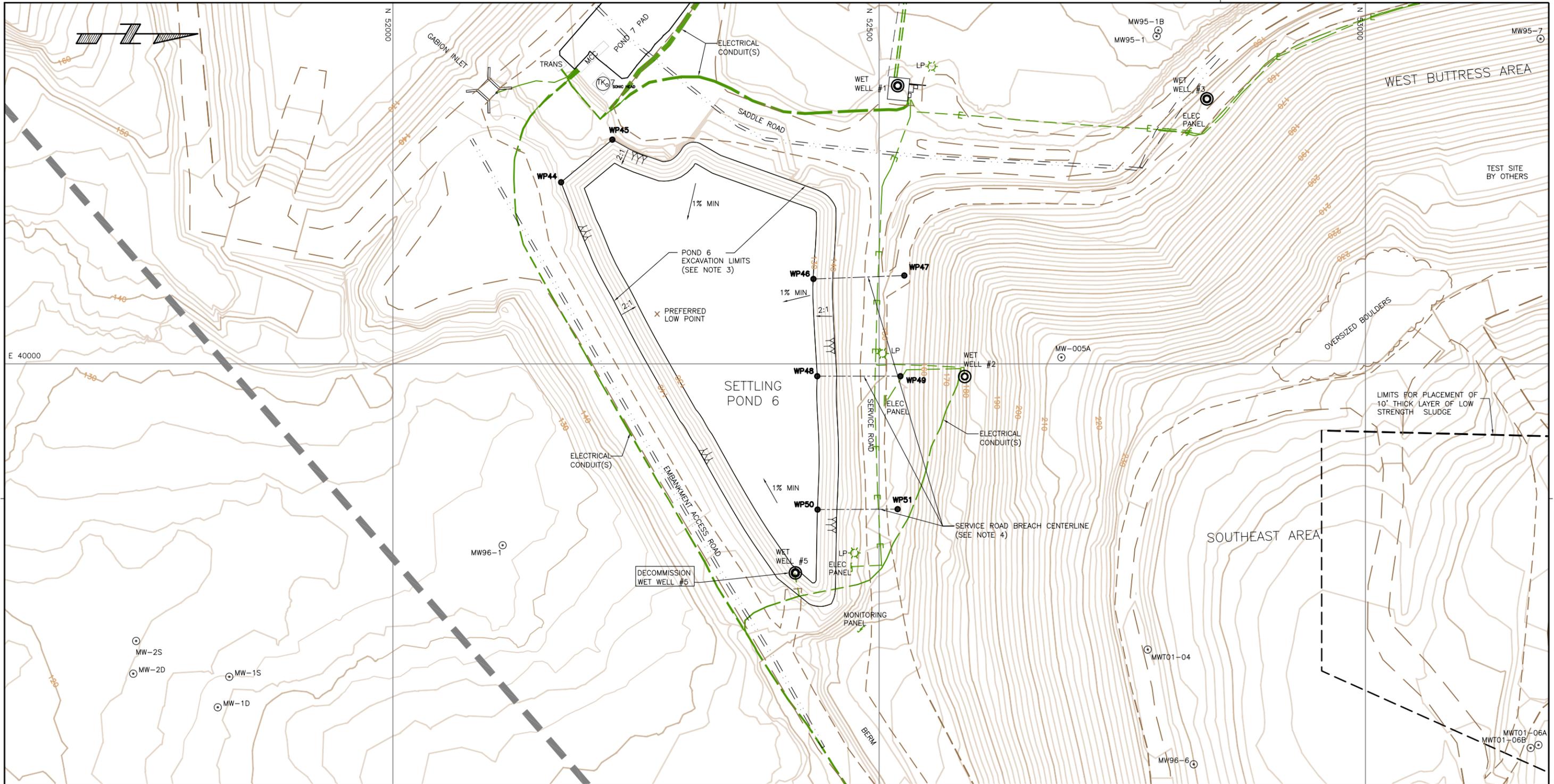
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NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D

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 Xrefs: BM\_Greens CK\_FEB2008

KCB-C-11D



**LEGEND**

- EXISTING ROAD
- EXISTING SOIL-BENTONITE WALL
- LEASE BOUNDARY
- MW-005A MONITORING WELLS
- ELECTRICAL LINES

- NOTES:**
1. BASE TOPOGRAPHY PROVIDED BY GCMC (FEBRUARY, 2008).
  2. LOCATIONS AND ELEVATIONS ARE IN FEET UNLESS OTHERWISE NOTED.
  3. ALL PEAT, SAND, SLUDGE TO BE REMOVED FROM POND 6 FOOTPRINT. FOUNDATION TO BE GRADED TO A COMMON LOW POINT SUCH THAT TILL EXCAVATION IS MINIMIZED AND MINIMUM GRADE IS 1%. EXCAVATION LIMITS SHALL BE AS DIRECTED.
  4. BREACH EXISTING SERVICE ROAD DOWN TO EXISTING FOUNDATION DRAIN BLANKET. DIG PERMIT REQUIRED DUE TO EXISTING ELECTRICAL CONDUITS IN AREA.
  5. ANY BEDROCK EXPOSED DURING EXCAVATION SHALL BE REPORTED TO OWNER IMMEDIATELY.

POINT	NORTHING (FT.)	EASTING (FT.)
WP 44	52 173.0	39 813.7
WP 45	52 225.6	39 770.0
WP 46	52 432.4	39 912.9
WP 47	52 525.8	39 909.4
WP 48	52 436.3	40 012.6
WP 49	52 521.9	40 012.6
WP 50	52 436.6	40 149.5
WP 51	52 519.0	40 149.0

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CLIENT

**GREENS CREEK MINING COMPANY**

PROJECT  
STAGE 2 EXPANSION OF TAILINGS FACILITY  
POND 6 EXPANSION CONSTRUCTION

TITLE  
POND 6  
FOUNDATION EXCAVATION PLAN



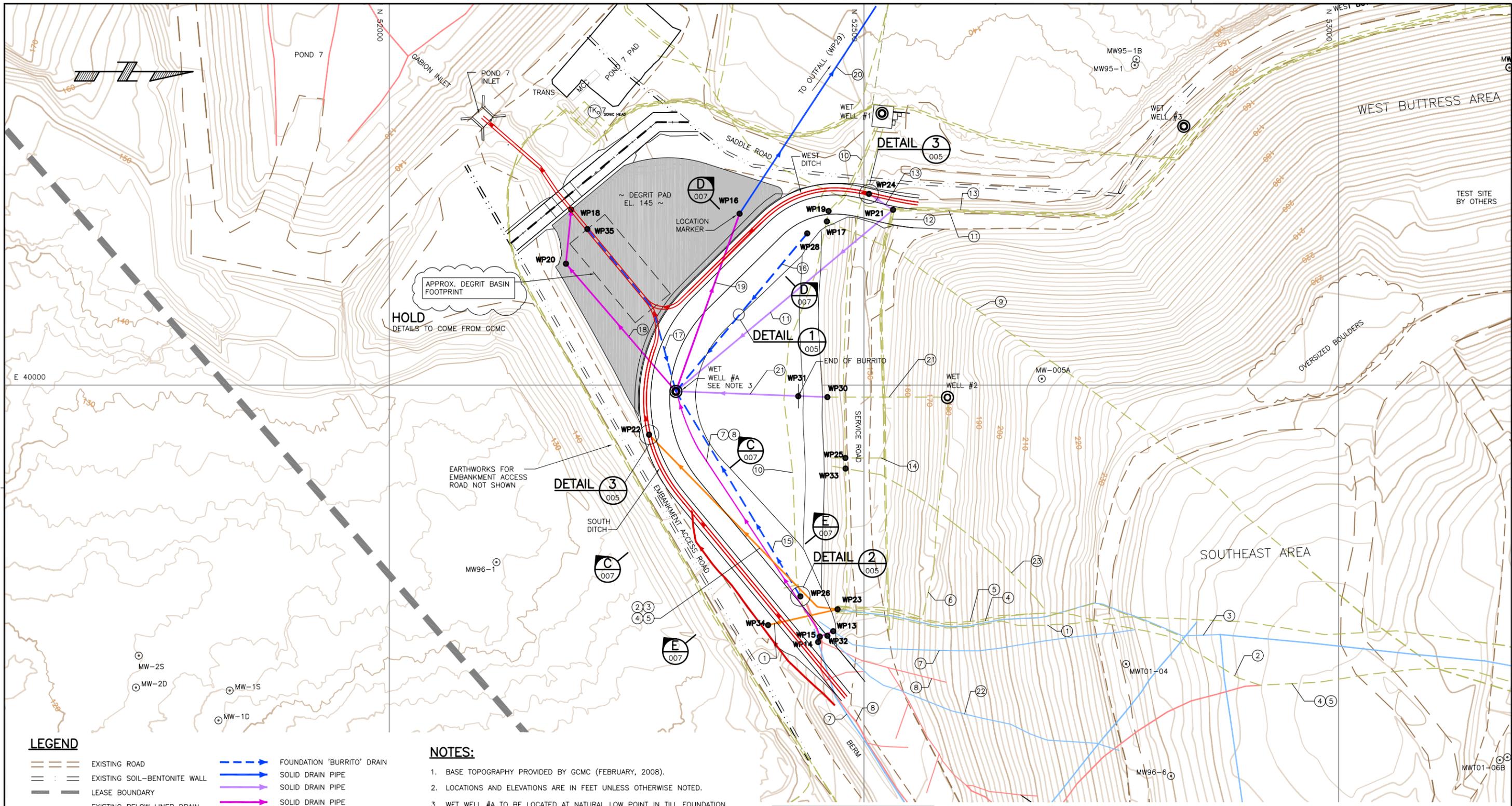
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		0	APR 11, 2008	APPROVED FOR TENDER				

SCALE	PROJECT No.	DWG. No.	REV.
AS SHOWN	M07802 A54	D-54003	0

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**LEGEND**

	EXISTING ROAD		FOUNDATION 'BURRITO' DRAIN
	EXISTING SOIL-BENTONITE WALL		SOLID DRAIN PIPE
	LEASE BOUNDARY		SOLID DRAIN PIPE
	EXISTING BELOW LINER DRAIN		SOLID DRAIN PIPE
	EXISTING ABOVE LINER DRAIN		SOLID DRAIN PIPE
	EXISTING WASTE WATER PIPE		DIRTY ROAD
	MW-005A MONITORING WELLS		SURFACE DITCH
	WP15 WORK POINTS		PIPE NUMBER (REFER TO D-54004 SHEET 2 FOR DESCRIPTION)
	NEW SOIL-BENTONITE WALL		

- NOTES:**
1. BASE TOPOGRAPHY PROVIDED BY GCMC (FEBRUARY, 2008).
  2. LOCATIONS AND ELEVATIONS ARE IN FEET UNLESS OTHERWISE NOTED.
  3. WET WELL #A TO BE LOCATED AT NATURAL LOW POINT IN TILL FOUNDATION, WET WELL DETAILS TO BE PROVIDED BY GCMC.
  4. FOR WORK POINT COORDINATES SEE SHEET 2.
  5. FOR PIPE INSTALLATION DETAILS SEE DWG. D-54005.

APPROVED FOR TENDER

SCALE: 0 100 FT.

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		TITLE POND 6 UTILITIES PLAN SHEET 1 OF 2	SCALE AS SHOWN
		PROJECT No. M07802 A54	DWG. No. D-54004
			REV. 0

DRAWING NO.	REFERENCE DRAWING	NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
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PIPE NUMBER	HDPE PIPE DESCRIPTION	WORK POINTS (SEE NOTE 1)	NORTHING (FT.)	EASTING (FT.)	INVERT ELEVATION (FT.)	NEW PIPE APPROX. LENGTH (FT.)	AVERAGE GRADE (%)	COMMENT
1	Non-active 10" ø Solid DB-04 Feed to Pond 6	WP 23	52472.2	40235.5	150.0	75	1.2%	Extend to edge of dirty road and cap.
		WP 34	52399.0	40252.2	149.1			
2	6" ø Solid French Drain from Northeast	WP 23	52472.2	40235.5	150.0	270	1.0%	Discharge to South Ditch.
		WP 22	52273.6	40052.1	147.4			
3	6" ø Solid French Drain from 2002 Southeast Above Liner	WP 23	52472.2	40235.5	150.0	270	1.0%	Discharge to South Ditch.
		WP 22	52273.6	40052.1	147.4			
4	16" ø Solid French Drain from Pond 9	WP 23	52472.2	40235.5	150.0	270	1.0%	Discharge to South Ditch.
		WP 22	52273.6	40052.1	147.4			
5	8" ø Solid French Drain from Pond 9 Underdrain	WP 23	52472.2	40235.5	150.0	270	1.0%	Discharge to South Ditch.
		WP 22	52273.6	40052.1	147.4			
6	10" ø Solid Wet Well 2 Feed to Pond 6	WP 23	52472.2	40235.5	150.0			Decommission and cap.
7	8" ø Solid Above Liner French Drain from Southeast 2	WP 13	52467.6	40258.6	141.6	320	5.2%	Tie- in to 8" ø pipe at WP 13 and WP 14. Two-8" ø pipes to transition to a single 8" ø pipe at WP 15, reports to Wet Well A
		WP 14	52451.7	40269.9	141.6			
		WP 15	52453.5	40264.2	140.0			
		WP 27	52301.9	40006.6	126.0			
8	8" ø Solid Below Liner French Drain from Southeast 2	WP 15	52453.5	40264.2	138.0	299	4.0%	Two-8" ø pipes to transition to a single 8" ø pipe at WP 15, reports to Wet Well A.
		WP 27	52301.9	40006.6	126.0			
9	12" ø Solid Backwash from Pit 5 to Pond 6	WP 17	52461.0	39828.1	144.0			Decommission and cap.
10	8" ø Solid Stormwater Bypass to Wet Well 1	WP 19	52462.7	39817.2	144.0			Remove all pipes from Wet Well #1 unless pipe goes through existing slurry wall, then pipes to be cut 50-ft from wall or as directed and capped.
11	12" ø Solid from Northwest Under Liner Drain	WP 21	52530.7	39815.9	143.0	298	5.7%	Pipe shall follow cut grade lines as directed.
		WP 27	52301.9	40006.6	126.0			
12	12" ø Solid Water Treatment Feed	WP 21	52530.7	39815.9	147.0			Decommission and cap.
13	6" ø Solid Wet Well 3 to Tank 6 Feed	WP 21	52530.7	39815.9	145.0	31	N/A	Pumped line. Tie in at SW corner of tailings pile and discharge to West Ditch.
		WP 24	52505.3	39799.2	148.0			
14	6" ø Solid Wet Well 3 to Tank 6 Bypass to Pond 6	WP 25	52480.4	40076.6	145.0			Decommission and cap.
15	8" ø Perforated Pond 6 Foundation 'Burrito' Drain	WP 26	52433.0	40222.0	133.0	252	3.6%	
		WP 27	52301.9	40006.6	124.0			
16	8" ø Perforated Pond 6 Foundation 'Burrito' Drain	WP 28	52440.3	39840.7	132.6	216	4.0%	
		WP 27	52301.9	40006.6	124.0			
17	8" ø Perforated Pond 6 Foundation 'Burrito' Drain	WP35	52208.6	39836.1	132.2	195	4.2%	
		WP 27	52301.9	40006.6	124.0			
18	6" ø Solid Pipe from Wet Well A to Pond 7	WP 27	52301.9	40006.6	123.0	235	N/A	Pumped line to Pond 7 Inlet.
		WP 20	52186.1	39872.5	137.0			
		WP 18	52191.6	39815.6	142.0			
19	12" ø Solid Pipe from Wet Well A to Location Marker	WP 27	52301.9	40006.6	122.0	198	1.0%	Install location marker at WP16 as directed by Owner.
		WP 16	52369.0	39820.0	120.0			
20	12" ø Solid Pipe from Location Marker to Outfall (future)	WP 16	52369.0	39820.0	120.0	778	1.0%	This pipe to be installed by extending Pipe 19 at closure of facility (by others). Location of manholes to be determined by qualified engineer prior to pipe installation
		WP 29	53010.0	39380.0	112.0			
21	6" ø Solid Pipe from Wet Well 2 to Wet Well A	WP 30	52461.5	40012.6	143.0	162	10.6%	Tie-in to pipe from Wet Well 2 in Burrito drain Burrito from Wet Well 2 ends at WP 31. Pipe shall follow cut grade lines as directed.
		WP 31	52430.8	40011.7	130.0			
		WP 27	52301.9	40006.6	126.0			
22	8" ø Solid Pipe from Southeast 2	WP 32	52461.5	40263.4	145.0			Temporary construction dewatering drain pipe. Decommission and cap.
23	8" ø Solid DB05 Feed to Pond 6	WP 33	52480.6	40087.7				Uncertain- Greens Creek to confirm location, purpose and work required.
		?						

**NOTES:**

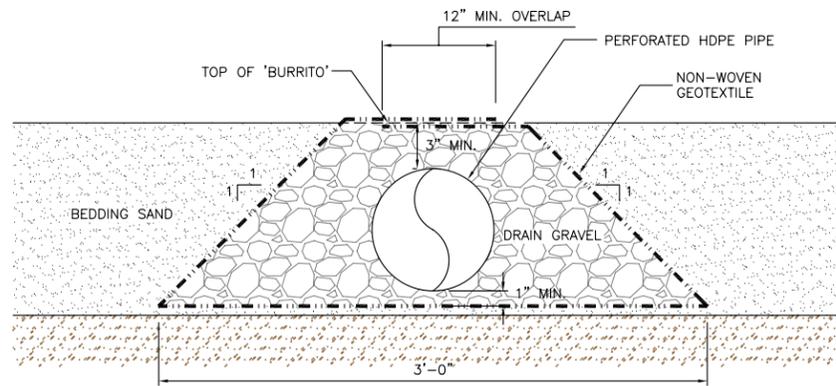
- SEE DRAWING D-54004 SHEET 1 OF 2 FOR PLAN LOCATIONS OF WORK POINTS.
- PIPES MAY BE FIELD FIT TO MINIMIZE TILL EXCAVATION AND ROCK FILL REQUIREMENTS, PROVIDED A MINIMUM 1% PIPE GRADE IS MAINTAINED.
- ALL PIPES SHALL BE SDR11 UNLESS OTHERWISE DIRECTED BY OWNER.

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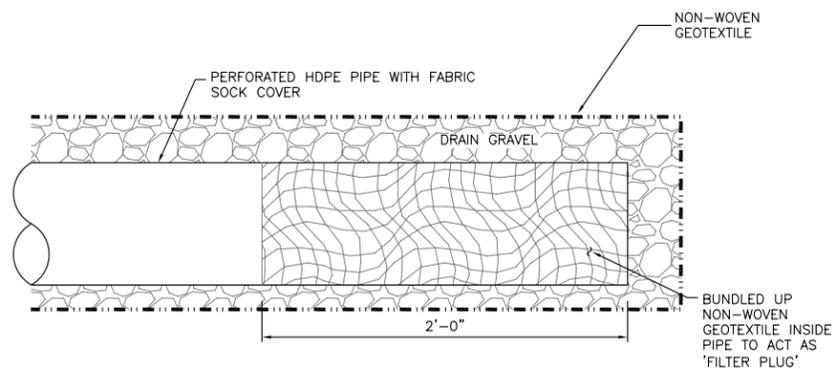
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REFERENCE DRAWING	NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D



**DETAIL 1**  
NTS 004

**FOUNDATION 'BURRITO' DRAIN – TYPICAL**



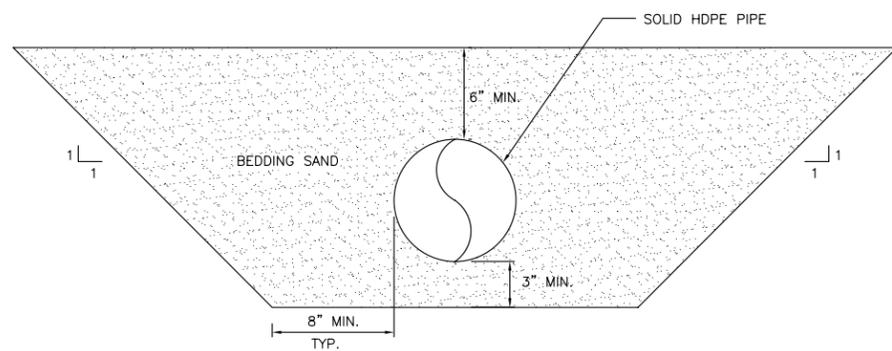
**DETAIL 2**  
NTS 004

**TYPICAL FOUNDATION 'BURRITO' DRAIN TERMINATION DETAIL**



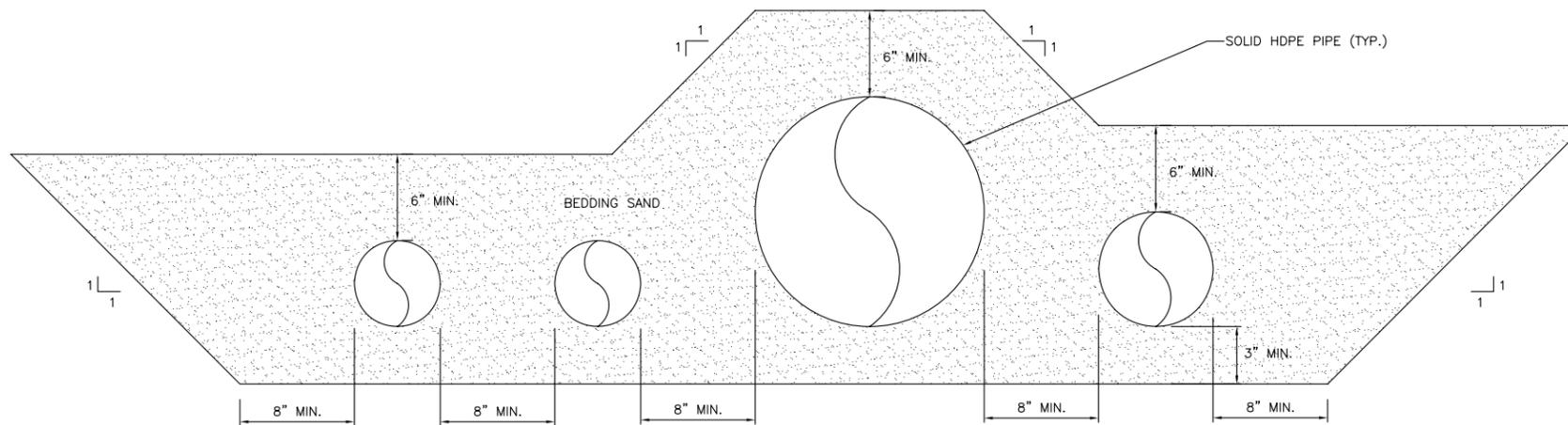
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NTS 004

**TYPICAL PIPE/DITCH LINER PENETRATION DETAIL**



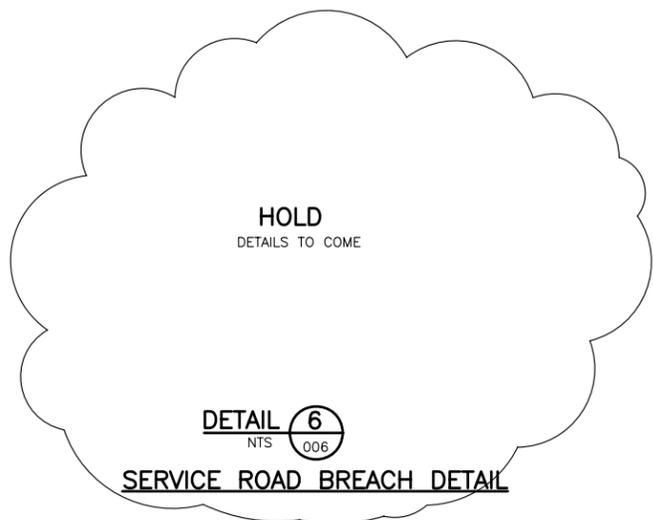
**DETAIL 4**  
NTS -

**TYPICAL SOLID PIPE EMBEDMENT – SINGLE PIPE INSTALLATION**



**DETAIL 5**  
NTS 007

**TYPICAL SOLID PIPE EMBEDMENT – MULTIPLE PIPE INSTALLATION**



**DETAIL 6**  
NTS 006

**SERVICE ROAD BREACH DETAIL**

**NOTE:**

1. LOCATIONS, ELEVATIONS AND DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.

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CLIENT  
**GREENS CREEK MINING COMPANY**

PROJECT  
STAGE 2 EXPANSION OF TAILINGS FACILITY  
POND 6 EXPANSION CONSTRUCTION

TITLE  
POND 6  
FOUNDATION DRAINAGE DETAILS

SCALE NTS	PROJECT No. M07802 A54	DWG. No. D-54005	REV. 0
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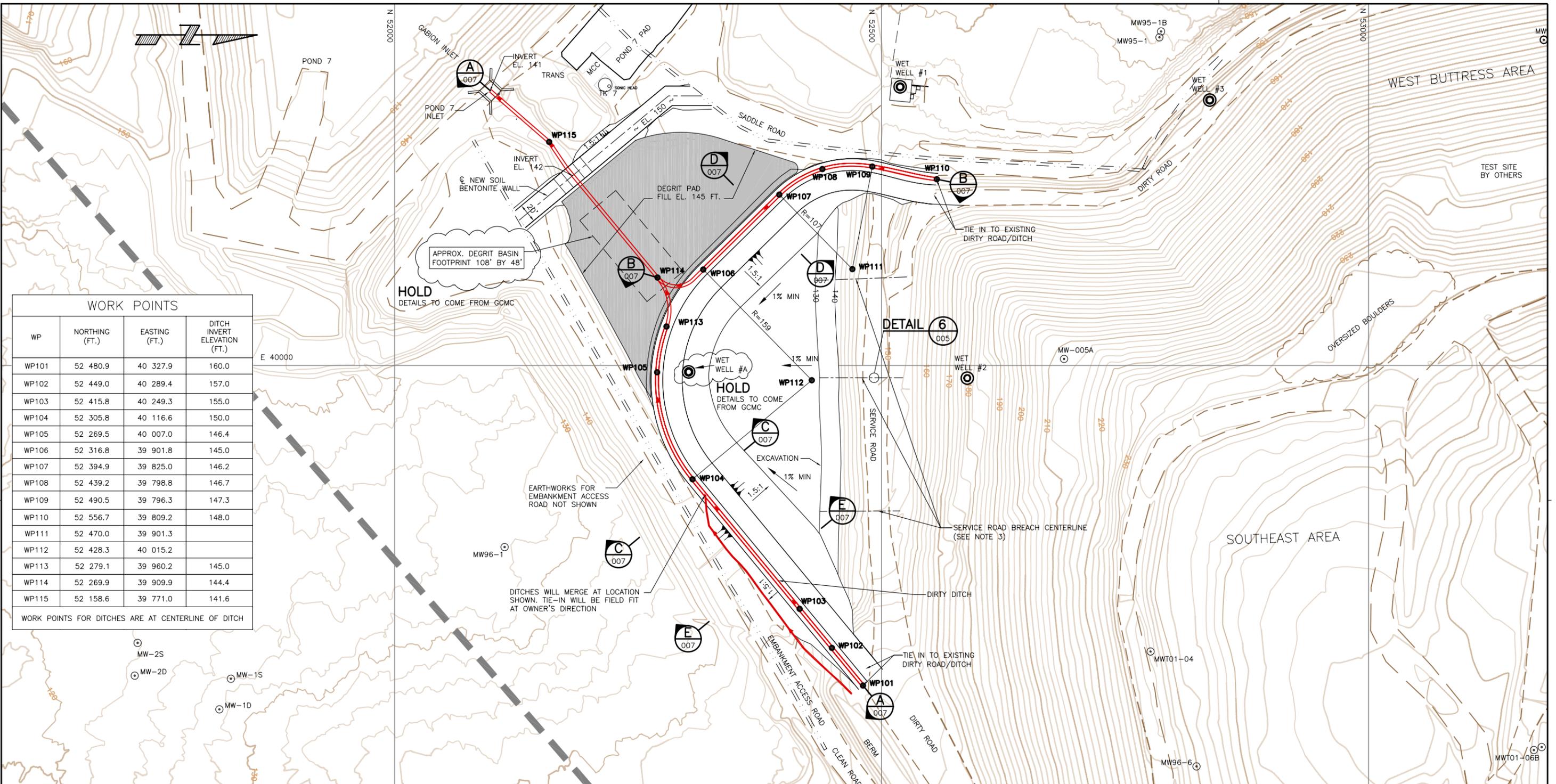
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WORK POINTS			
WP	NORTHING (FT.)	EASTING (FT.)	DITCH INVERT ELEVATION (FT.)
WP101	52 480.9	40 327.9	160.0
WP102	52 449.0	40 289.4	157.0
WP103	52 415.8	40 249.3	155.0
WP104	52 305.8	40 116.6	150.0
WP105	52 269.5	40 007.0	146.4
WP106	52 316.8	39 901.8	145.0
WP107	52 394.9	39 825.0	146.2
WP108	52 439.2	39 798.8	146.7
WP109	52 490.5	39 796.3	147.3
WP110	52 556.7	39 809.2	148.0
WP111	52 470.0	39 901.3	
WP112	52 428.3	40 015.2	
WP113	52 279.1	39 960.2	145.0
WP114	52 269.9	39 909.9	144.4
WP115	52 158.6	39 771.0	141.6

WORK POINTS FOR DITCHES ARE AT CENTERLINE OF DITCH

**LEGEND**

- EXISTING ROAD
- EXISTING SOIL-BENTONITE WALL
- LEASE BOUNDARY
- SURFACE DITCH
- WP5 WORK POINTS (DITCH CENTERLINE)

**NOTES:**

1. BASE TOPOGRAPHY PROVIDED BY GCMC (FEBRUARY, 2008).
2. LOCATIONS AND ELEVATIONS ARE IN FEET UNLESS OTHERWISE NOTED.
3. FILTER CLOTH WRAPPED 3/4 INCH MINUS DRAINROCK SHALL BE PLACED AT EACH SERVICE ROAD BREACH TO TIE EXISTING FOUNDATION DRAIN BLANKET INTO POND 6 FOUNDATION DRAIN BLANKET. **HOLD**
4. ENTIRE SURFACE OF EXPOSED TILL FOUNDATION SHALL BE COVERED WITH 1' MIN. COMPACTED SAND LAYER.

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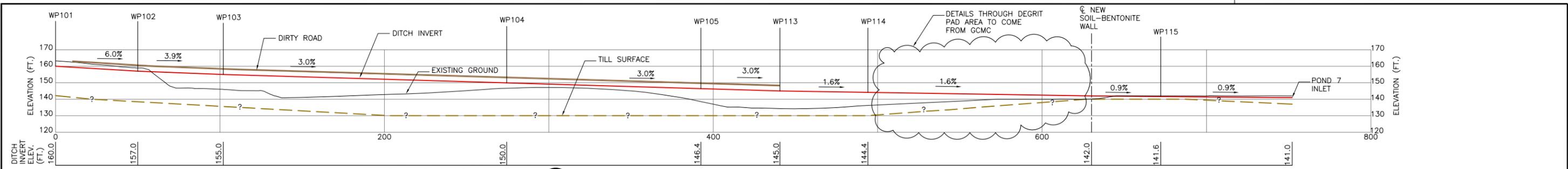
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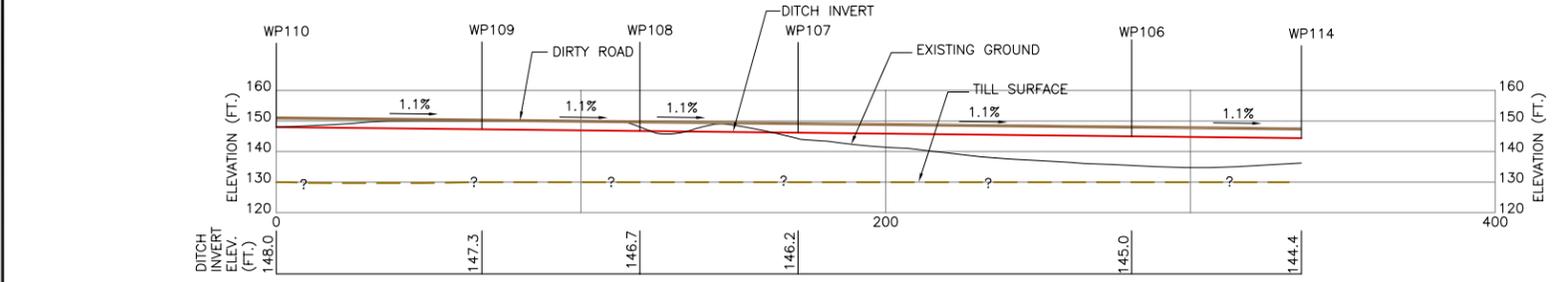
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TITLE	POND 6 FINAL GRADING PLAN		
SCALE	PROJECT No.	DWG. No.	REV.
AS SHOWN	M07802 A54	D-54006	0

DRAWING NO.	REFERENCE DRAWING	NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
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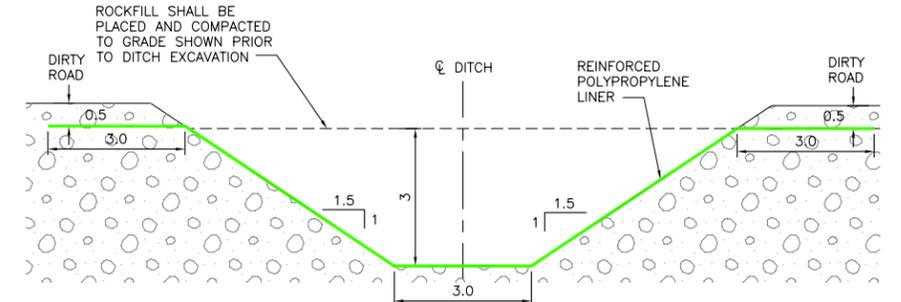




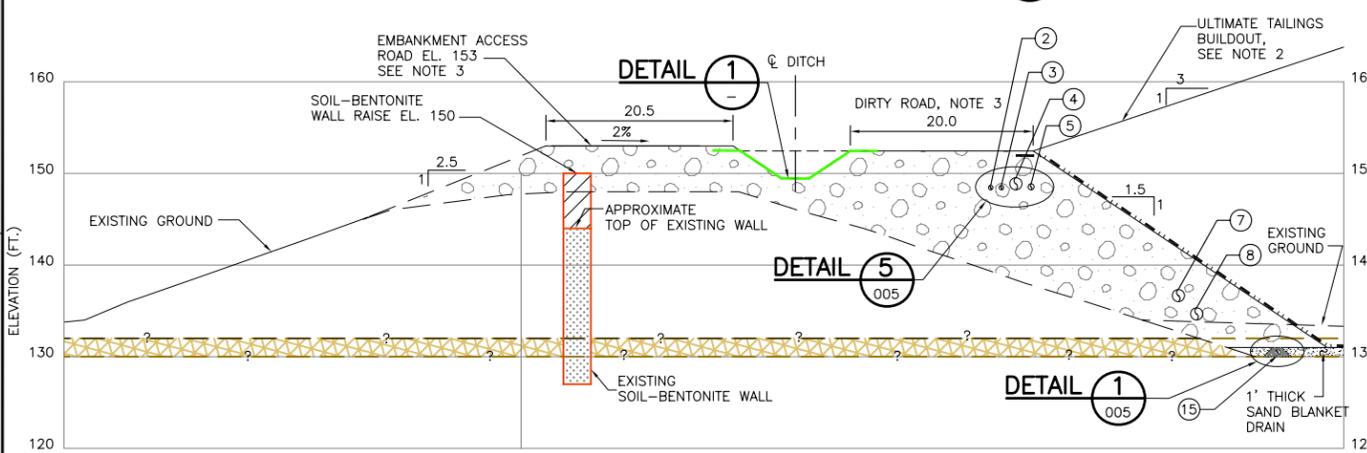
**ROAD AND DITCH PROFILE A**  
SCALE A



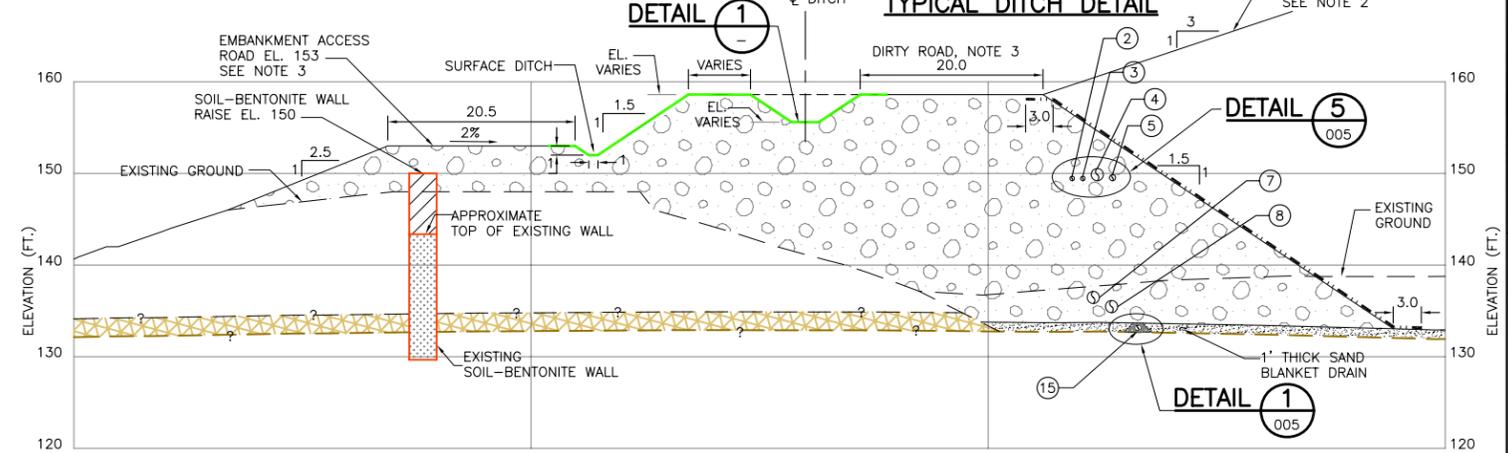
**ROAD AND DITCH PROFILE B**  
SCALE A



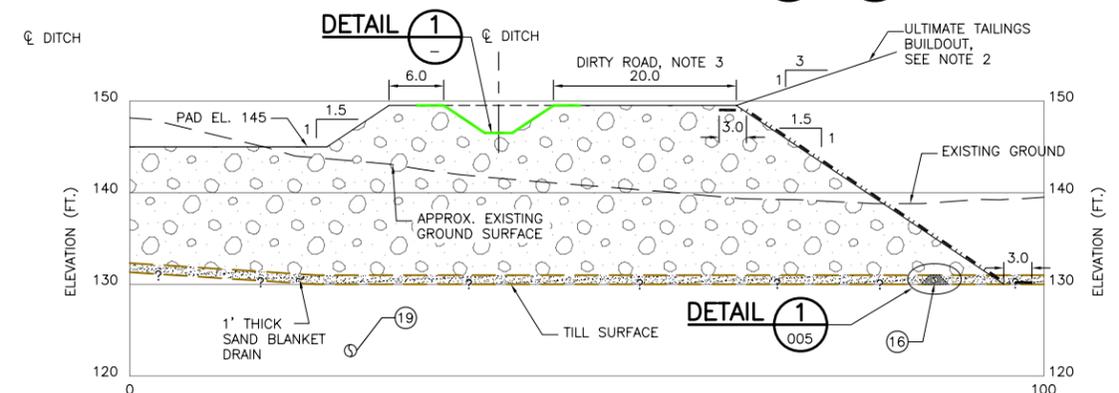
**DETAIL 1**  
NTS



**ROAD AND DITCH SECTION C**  
SCALE B



**ROAD AND DITCH SECTION E**  
SCALE B



**ROAD AND DITCH SECTION D**  
SCALE B

- LEGEND**
- 6" MINUS ROCKFILL
  - PEAT
  - BEDDING SAND
  - SOIL-BENTONITE MIXTURE
  - NON-WOVEN GEOTEXTILE
  - PIPE NUMBER (REFER TO D-54004 SHEET 2 FOR DESCRIPTION)

- NOTES:**
1. LOCATIONS, ELEVATIONS AND DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
  2. SLOPE OF ULTIMATE TAILING BUILD OUT NO STEEPER THAN 3H:1V.
  3. GUARD RAIL OR SAFETY BERM SHALL BE INSTALLED AS DIRECTED. NOT SHOWN.
  4. FOR SOIL-BENTONITE WALL DETAILS SEE DWG. D-54008.

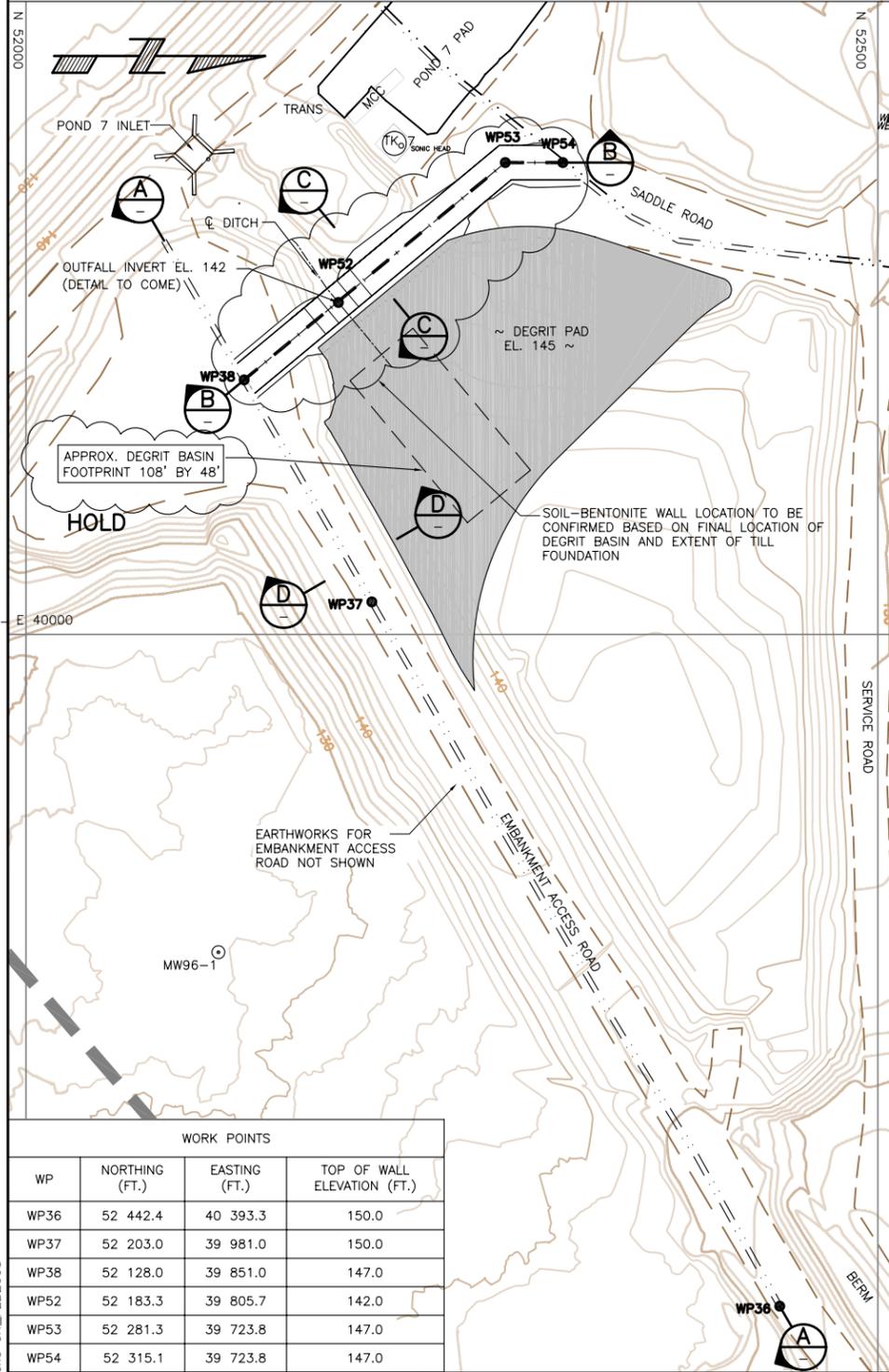
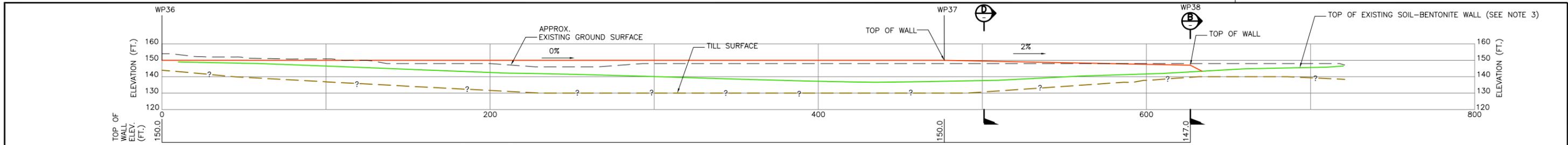


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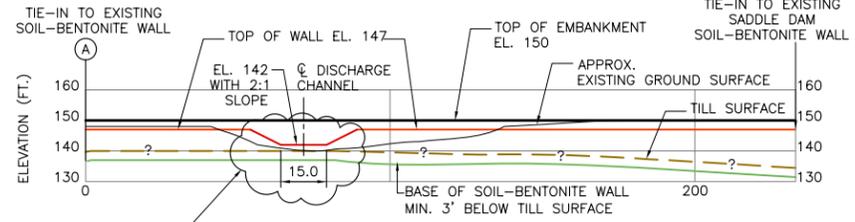
AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.	<b>GREENS CREEK MINING COMPANY</b>	CLIENT <b>GREENS CREEK MINING COMPANY</b>  PROJECT STAGE 2 EXPANSION OF TAILINGS FACILITY POND 6 EXPANSION CONSTRUCTION  TITLE POND 6 ROAD AND DITCH PROFILE AND DETAILS
		SCALE AS SHOWN PROJECT No. M07802 A54 DWG. No. D-54007 REV. 0

DRAWING NO.	REFERENCE DRAWING	NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
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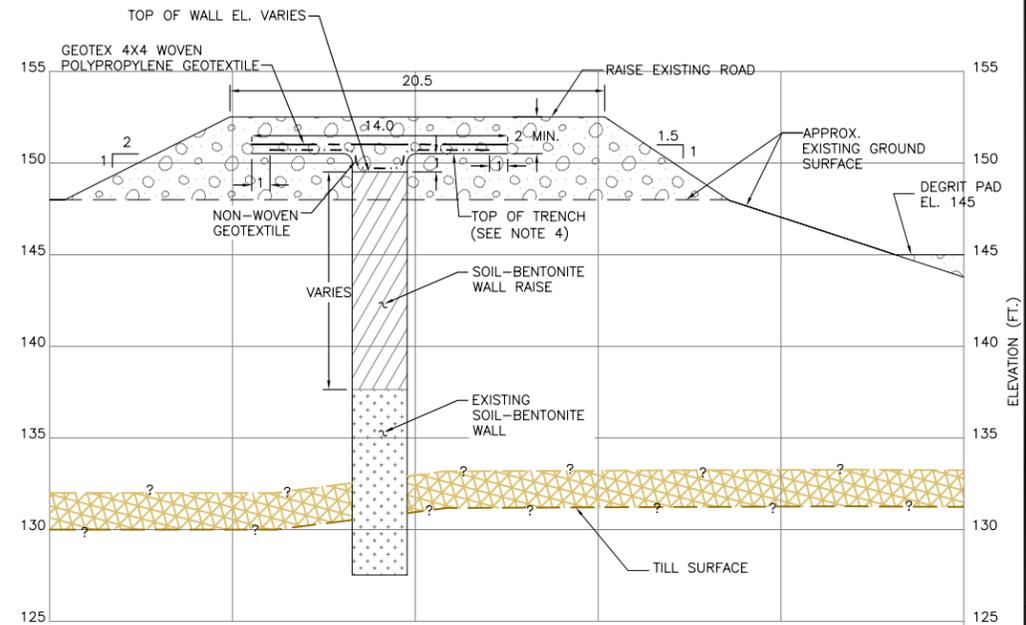
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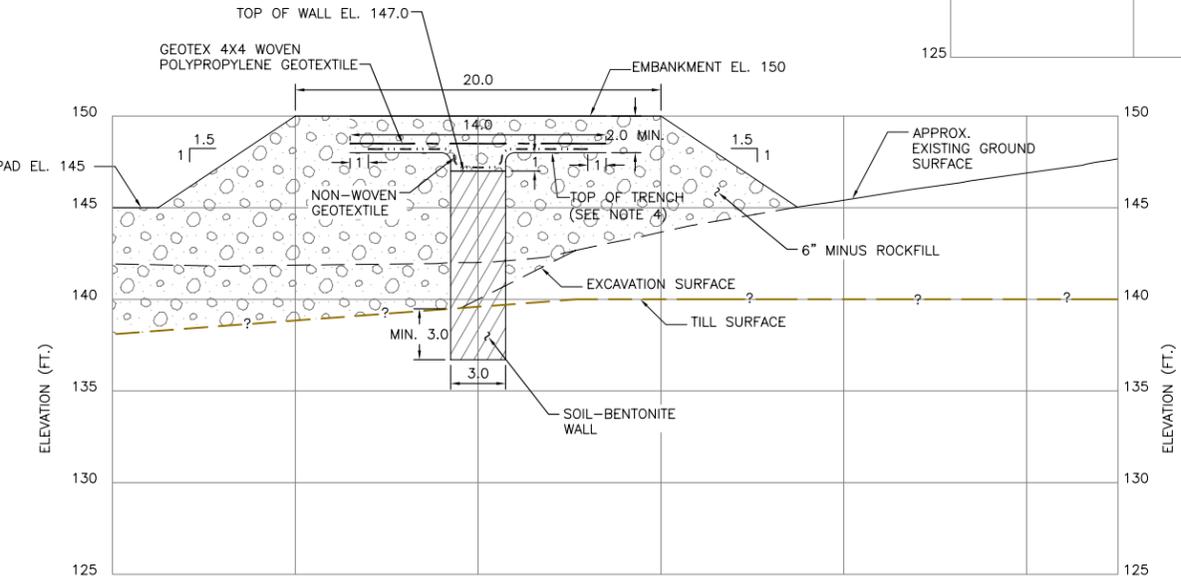
**SOIL-BENTONITE WALL PROFILE (A)**  
SCALE B



**SOIL-BENTONITE WALL PROFILE (B)**  
SCALE B



**SOIL-BENTONITE WALL SECTION (D)**  
SCALE C



**SOIL-BENTONITE WALL SECTION (C)**  
SCALE C

**LEGEND**

- EXISTING ROAD
- EXISTING SOIL-BENTONITE WALL
- LEASE BOUNDARY
- NEW SOIL-BENTONITE WALL
- WP37 WORK POINTS
- 6" MINUS ROCKFILL
- PEAT
- SOIL-BENTONITE MIXTURE

**NOTES:**

1. BASE TOPOGRAPHY PROVIDED BY GCMC (FEBRUARY, 2008).
2. LOCATIONS, ELEVATIONS AND DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.
3. TOP OF EXISTING SOIL-BENTONITE WALL ESTIMATED FROM MAIN EMBANKMENT AS-BUILT PRODUCED BY SRK (JAN. 1989), AS PROVIDED BY GCMC. IT IS ASSUMED THE WALL HAS SETTLED OVER TIME, TO BE CONFIRMED IN THE FIELD.
4. 6" MINUS ROCK FILL TO BE PLACED AND COMPACTED TO TOP OF TRENCH LEVEL PRIOR TO SOIL-BENTONITE WALL TRENCH EXCAVATION.



WORK POINTS			
WP	NORTHING (FT.)	EASTING (FT.)	TOP OF WALL ELEVATION (FT.)
WP36	52 442.4	40 393.3	150.0
WP37	52 203.0	39 981.0	150.0
WP38	52 128.0	39 851.0	147.0
WP52	52 183.3	39 805.7	142.0
WP53	52 281.3	39 723.8	147.0
WP54	52 315.1	39 723.8	147.0

**PLAN**  
SCALE A

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CLIENT  
**GREENS CREEK MINING COMPANY**

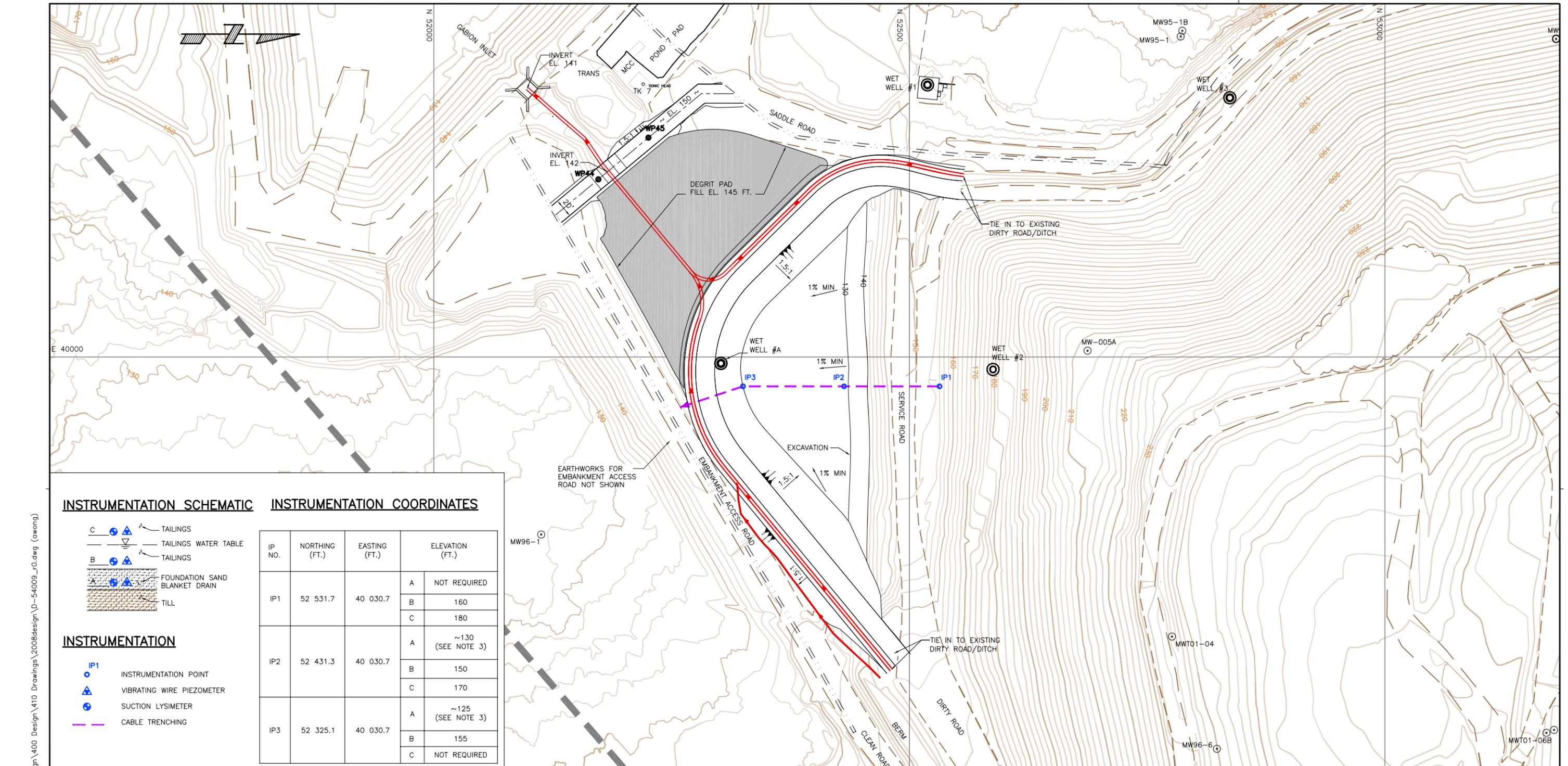
PROJECT  
STAGE 2 EXPANSION OF TAILINGS FACILITY  
POND 6 EXPANSION CONSTRUCTION

TITLE  
POND 6  
SOIL-BENTONITE WALLS  
PLAN, PROFILE AND DETAILS

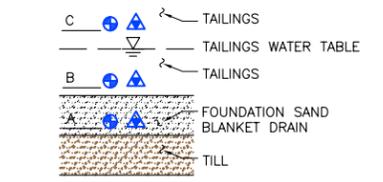
SCALE AS SHOWN PROJECT No. M07802 A54 DWG. No. D-54008 REV. 0

NO.	DATE	ISSUE / REVISION	DRAWN	CHK'D	DESIGN	APP'D
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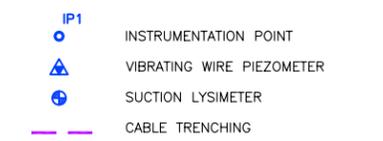
**INSTRUMENTATION SCHEMATIC**



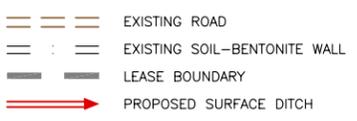
**INSTRUMENTATION COORDINATES**

IP NO.	NORTHING (FT.)	EASTING (FT.)	ELEVATION (FT.)	
			A	B
IP1	52 531.7	40 030.7	A	NOT REQUIRED
			B	160
			C	180
IP2	52 431.3	40 030.7	A	~130 (SEE NOTE 3)
			B	150
			C	170
IP3	52 325.1	40 030.7	A	~125 (SEE NOTE 3)
			B	155
			C	NOT REQUIRED

**INSTRUMENTATION**



**LEGEND**



**NOTES:**

1. BASE TOPOGRAPHY PROVIDED BY GCMC (FEBRUARY, 2008).
2. LOCATIONS AND ELEVATIONS ARE IN FEET UNLESS OTHERWISE NOTED.
3. ELEVATION OF INSTRUMENTS IN FOUNDATION LAYER SHALL BE CONFIRMED ONCE NATURAL TILL SURFACE IS EXPOSED.

**APPROVED FOR TENDER**



<p>AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.</p>	<p>CLIENT</p> <p><b>GREENS CREEK MINING COMPANY</b></p>	<p>PROJECT</p> <p>STAGE 2 EXPANSION OF TAILINGS FACILITY POND 6 EXPANSION CONSTRUCTION</p>
	<p>TITLE</p> <p>POND 6 INSTRUMENTATION PLAN</p>	<p>SCALE</p> <p>AS SHOWN</p>
<p>DRAWING NO.</p> <p>REFERENCE DRAWING</p>	<p>DATE</p> <p>APR 11, 2008</p>	<p>ISSUE / REVISION</p> <p>APPROVED FOR TENDER</p>
<p>DRAWN</p> <p>AW</p>	<p>CHK'D</p> <p>AD</p>	<p>DESIGN</p> <p>LC</p>
<p>APP'D</p> <p>LM</p>	<p>PROJECT No.</p> <p>M07802 A54</p>	<p>DWG. No.</p> <p>D-54009</p>
<p>NO.</p>	<p>DATE</p>	<p>ISSUE / REVISION</p>
<p>REV.</p> <p>0</p>	<p>SCALE</p> <p>AS SHOWN</p>	<p>PROJECT No.</p> <p>M07802 A54</p>
<p>REV.</p> <p>0</p>	<p>DWG. No.</p> <p>D-54009</p>	<p>PROJECT</p> <p>STAGE 2 EXPANSION OF TAILINGS FACILITY POND 6 EXPANSION CONSTRUCTION</p>

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