APPENDIX A

Point Thomson Project
Mine Site Mining and Rehabilitation Plan

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MINING AND REHABILITATION PLAN
POINT THOMSON GRAVEL MINE SITE

POINT THOMSON PROJECT, ALASKA

By **Exxon Mobil Corporation**
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INTRODUCTION

An estimated 2,651,100 cubic yards of gravel will be needed for the Point Thomson Project (Project). This includes placing gravel for three production pads, an airstrip, 12 miles of infield roads, and several ancillary pads. A gravel mine site will be developed to supply gravel for the Project.

Mine site preparation, operation, closure and rehabilitation plans are designed to minimize tundra disturbance at the site and provide some high value waterfowl habitat after closure. The mine site excavation will be flooded and used as a water reservoir for the Point Thomson Project after mining of gravel is completed.

Additional information regarding the size, shape, and location of the mine site excavation and overburden storage areas is contained in the following figures:

- Figure 1: Location of mine site and overburden storage areas for the Point Thomson Project
- Figure 2: Mine site layout during mining operations
- Figure 3: Mine site excavation section and stockpile sections
- Figure 4: Mine site layout after mining operations
- Figure 5 Mine excavation section after mining operations
- Figure 6: Proposed diversion channel to the adjacent stream

Total mine site disturbed area is approximately 142.4 acres. This includes a staging area for mining activities, temporary overburden storage areas (on seasonal ice pads) and excavation surface area of approximately 59.3 acres.

EXISTING CONDITIONS

The proposed Point Thomson mine site is located approximately 17.3 miles east of the Badami Production Facility and is located at South ½ Section 10, Township 9 North, Range 23 East, Umiat Meridian (Figure 1).

This site was chosen due to proximity to Project facilities and to minimize impact to lake habitat in the area. Preliminary geotechnical characterization of the material source was conducted in 2001. Based upon the information obtained in 2001 and the currently required volume of gravel the attached mining plan was developed. The Project is planning on obtaining additional geotechnical information at this site 2nd quarter 2010 which will further define the mine site configuration. However, the outer perimeter boundary shown in Figure 2 describes the proposed maximum aerial extent of the mine site for permitting requirements.

The revegetation performance standards listed in Table 2 reflect current plans for rehabilitation of the site after mining activities have ceased.

MINING PLAN

General

The mine site will provide gravel for construction of facilities for the Project. The gravel will be mined from the site over a single winter season and a stockpile of gravel will be created so any gravel for facility maintenance after the first winter season, such as for addressing settlement, is available without further mining activities at this site.

The excavated gravel area is shown in Figures 2 and 3. The tundra and overburden overlaying the excavated area will be moved to seasonal ice pads adjacent to the excavation and temporarily stored in stockpiles to the south and west of the excavation. The gravel stockpile will be constructed to the west of the excavation. The mined area is expected to provide approximately 2,651,100 cubic yards of gravel and develop approximately 726,100 cubic yards of overburden.

Summer Mining Plan

No summer mining activities are currently planned.

Winter Mining Plan

The site will be accessed by ice road during the construction of the Project facilities. The ice road route will be determined after field reconnaissance of the area is conducted during the summer 2010.

Mining operations will occur during winter months and will include the preparation of gravel access roads and staging areas for equipment near the mine site. The south side of the excavated area will be offset approximately 1000 feet from the Point Thomson road

system for safety considerations. The excavated area will be located as close as practicable to the proposed road system to minimize environmental impact, provide access for the proposed reservoir operations, and access for rehabilitation efforts.

Examination of the area surrounding the excavated area suggests that the permafrost is uniform with little thermokarst or ice polygon features. Based on the geotechnical investigations to date, significant solid ice features that could thaw and erode into the excavated area are not expected. The site will be monitored during overburden stripping to identify any such ice features. If massive ice is encountered, it will be excavated and replaced with overburden prior to spring break-up.

Mining operations will commence with survey and staking followed by overburden stripping. An average 8 of feet of overburden will be removed from the excavated area and temporarily stockpiled on ice pads. The organic or active layer (approximately 2 ft. thick) will be removed and stockpiled separately from the inorganic layer. The depth of the organic layer will be confirmed by visual inspection during stripping operations to optimize the amount of organic soil recovered. Mining operations will include blasting and mechanical excavation to a depth of approximately 40 feet below the overburden.

Stepped access ramps will be constructed into the excavated area as mining progresses deeper into the excavated area. Road access to the excavated area is favored on the north and south sides of the excavation. The road gradient into the excavated area will not exceed a 10% gradient. Mined gravel will be transported from the mine site to the various facility location via a combination of gravel roads and ice roads. The excavated area side walls will be stepped as shown in Figure 3.

RESERVOIR OPERATIONS

General

The mine excavation will be used as the fresh water reservoir for the Project. A diversion channel, as shown in Figure 6, will be constructed at the northeast corner of the excavation and will tie into the small stream adjacent to the mine site. This channel will provide the initial water volume needed to fill the site during the first spring flood after construction and will provide for annual recharge during subsequent spring breakup runoffs. A gravel access road will be constructed off of the main Point Thomson road system to the diversion channel for maintenance of this structure. An intake system will be constructed after the mine excavation is flooded and will supply water via pipelines to the Project facilities.

It is expected that the majority of rehabilitation activities can take place prior to the reservoir operations.

REHABILITATION PLAN

Introduction

This plan describes methods and procedures for rehabilitating the Point Thomson mine site. The plan is subject to confirmation based on a soils and biological assessment of the site prior to mining operations. The plan may be amended as site specific information is available and as the rehabilitation progresses over time. Proposed monitoring is listed in Table 1; the target revegetation performance standards are listed in Table 2.

The Project mine site rehabilitation plan is to place stockpiled overburden back into the excavated area, creating stable side walls with shallow water areas. The excavated area will be allowed to fill with spring runoff from the small stream adjacent to the excavation via an inlet structure constructed after mining operations have ceased; the flooded mine site will serve as a water source for the Project. Excavating gravel in one winter season minimizes the overall mine site footprint by utilizing ice pads for temporary overburden stockpiles.

In addition to providing a freshwater source for the Project, the mine site will be rehabilitated to provide a diversity of habitats. Barren areas above the high water mark will be seeded with the native grass *Puccinellia borealis*, eventually succeeding to other native species. Shallow water areas will be sprigged with *Arctophila fulva*, a pendant grass that provides high value waterfowl habitat. Although providing fish overwintering habitat is not a specific goal of the rehabilitation plan, it is not planned to install fish exclusion devices in the intake channel described above.

Surrounding Vegetation

The vegetated area surrounding the Point Thomson mine site is a relatively flat, rolling landscape with minimal topographic relief. The vegetation is wet and moist tundra dominated by *Eriophorum angustifolium* and *Carex aquatilis*. *Arctophila fulva* is present in wetter areas and shallow flooded habitats. *Dupontia fischeri* may be locally prevalent and in drier areas tussock tundra dominated by *Eriophorum vaginatum* may also occur.

Rehabilitation Methodology

The excavated area will be prepared for rehabilitation after mining operations cease. The planned configuration of the area is shown in Figure 4. Inorganic overburden will be placed over the stepped benches in the excavated side walls and allowed to form side slopes whose natural angle of repose is expected to be between 2:1 and 3:1 H:V, as shown in Figure 5. These side slopes would be consistent with other material sites in Prudhoe Bay Unit and Kuparuk Unit. It is anticipated that all the inorganic material will be placed back in the excavated area to moderate the side slopes. Shallow water habitat will be created in a scalloped pattern along the rim of the excavation. The harvested organic material will be stockpiled on ice, pads adjacent to the mine site and after the single-season completion of gravel extraction, used during revegetation efforts in the surrounding excavated area, in the shallow water habitat, and elsewhere within the Point

Thomson Project area where suitable application is identified. The material is used as an organic top soil layer in an effort to promote seed germination. It may be scarified and mixed with the mineral soil for better overall soil composition.

Rehabilitation Treatments

5H:1V slopes and scalloped areas around the margins of the pit that are expected to be above the water line will be seeded with *Puccinellia borealis*, a native grass that is short-lived and non-competitive to invasion by indigenous tundra plant species. An application of approximately 3-5 lb/acre of *P. borealis* should provide adequate cover (BP Exploration (Alaska), Inc. et al. 2004). *P. borealis* seed is available in limited quantities, and this seeding plan (either the species or the year of planting) may be modified if enough seed is not available. *Arctophila fulva* will be sprigged in shallow waters of the mine site to improve habitat and increase species diversity in the revegetated area.

Application of phosphorus fertilizer should enhance revegetation of the site by seeded grass and sprigs and naturally invading indigenous species. An application of 400 lbs $acre^{-1}$ 10-20-20 NPK is commonly used in the Prudhoe Bay and Kuparuk regions as an appropriately balanced fertilizer to promote revegetation. The Point Thomson Project, however, is located in the Canning River alluvial fan where loess deposition creates low acidity high mineral soils (Walker and Everett 1991). Phosphorous is likely to be the primary limiting nutrient, however soil samples will be collected and analyzed for available nutrients to finalize the most suitable, site-specific fertilizer composition and application rate.

Nitrogen concentrations in surface waters are important for evaluating nutrient availability or nutrient overload for aquatic organisms. Ammonia is a common ingredient in fertilizers, septic system effluent, and animal waste; nitrates/nitrites also are associated with fertilizers because they are degradation compounds of ammonia. Fertilizer application, if done properly, is unlikely to degrade surface water quality in the flooded mine site below Alaska Water Quality Standards (18 AAC 70) of 10 milligrams per liter(mg/L) nitrates, 1 mg/L nitrites, and 10 mg/L total nitrate and nitrite. The State of Alaska does not have a standard for phosphorous. Soil sampling to determine the site-specific fertilization requirements will prevent the application of unnecessary fertilizer. Best Management Practices (BMPs) will be developed for use in fertilizer application to minimize runoff and associated water quality concerns. BMPs to be considered include:

- apply fertilizer evenly to the site,
- do not apply fertilizer directly to surface waters,
- do not apply fertilizer to frozen ground,
- immediately clean up any spill of fertilizer to land
- do not apply fertilizer to land within 5 feet of the high water mark.

The area will be allowed to settle during the first summer following mine site close out. Soil samples will be collected, and the area will be inspected to determine required rehabilitation treatments. Rehabilitation treatments will begin during the following

growing season; after breakup and before freeze up in autumn when the soil surface has thawed and drained of excess moisture. The seeded grass is expected to reach maturity by the third growing season following seeding and to begin declining after four to five growing seasons, allowing natural invaders to occupy the site.

Performance Standards

By the tenth year following cultivation treatments, seeded areas should support 10% total live vascular plant cover including seeded grass cultivars. At least five species of naturally colonizing plants should be present, with at least 0.2% cover by each. These performance standards should lead to a stabilizing plant cover on the site while also promoting eventual replacement of seeded grasses with naturally colonizing species. These standards do not apply to areas that are ponded for more than four weeks during the growing season. Sprigged species are expected to persist, but there will be no quantitative performance standard associated with sprigged species (Table 1).

Monitoring for Performance Standards

Progress of vegetation relative to performance standards will be monitored. Live vascular cover and species composition will be assessed using point intercept sampling according to the schedule in Table 2. If intermediate sampling indicates that vegetation has not established enough to meet the proposed standards, additional remedial actions may be required to increase plant cover. Final monitoring will determine whether the revegetation performance standards have been met.

Reporting

Progress reports will be submitted by 1 February of the year following site visits according to the schedule in Table 1. Reports will be provided to State of Alaska Department of Natural Resources, U. S. Army Corp of Engineers, the U. S. Fish and Wildlife Service, and the North Slope Borough.

Remedial Action

If monitoring suggests that performance standards may not be met by Year 10, additional seeding, fertilizing, and/or other planting approaches will be considered in consultation with agency representatives.

REFERENCES

BP Exploration (Alaska), Inc, Conoco Phillips Alaska, Inc., ABR, Inc., and Lazy Mountain Research. 2004. North Slope Plant Establishment Guidelines Table May 11, 2004. Prepared by Oasis Environmental, Inc. 10 pp.

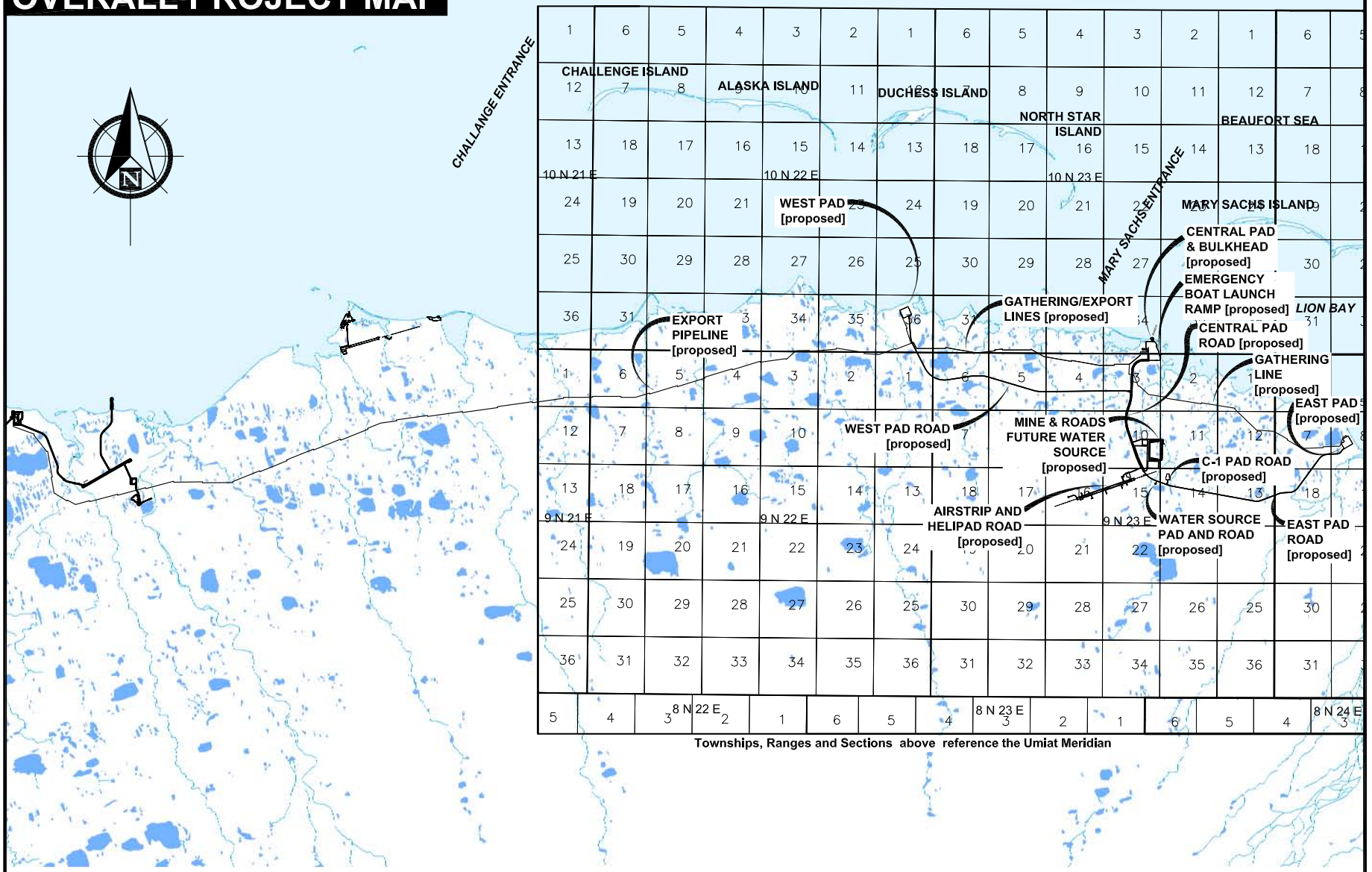
Walker, D.A. and K.R Everett. “Road dust and its environmental impact on Alaska taiga and tundra.” Arctic and Alpine Research. 19(1987):479-489.

Table 1. Goals, Objectives, Performance Standards, and Monitoring Methods	
Goals	Establish diverse and productive wetland and upland plant communities on the site similar to those of the surrounding area, thereby improving the appearance of the site and improving its suitability for some wildlife species.
Objectives	Short-term establishment of seeded grass that will not persist, allowing natural tundra plant species to invade the site over time.
Performance Standard	By year 10, 10% cover by live vascular plants, including seeded grasses, with at least 1% cover of naturally colonizing species. Species composition consisting of at least 5 naturally colonizing species with 0.2% canopy cover each, on the excavated area and the gravel pad removal area.
Monitoring Methods	For vegetation cover, use point intercept sampling for measuring plant cover.

Table 2. Proposed schedule for application of rehabilitation treatments, site monitoring, and reporting.

Year	Treatment & Monitoring	Reporting
First summer following site close out	Sample soil and have it tested for fertility and other features. Inspect site to determine extent of rehabilitation activities required.	None.
Year 0	Apply fertilizer and seed, and install sprigs.	Progress report.
Year 2	Measure vegetation cover and species composition, and compile a species list, using point intercept sampling in seeded areas. Sample soil where revegetation success appears lacking. Observe surface stability and sprig survival qualitatively.	Progress report.
Year 6	Measure vegetation cover and species composition, and compile a species list, using point intercept sampling in seeded areas. Sample soil where revegetation success appears lacking. Observe surface stability and sprig survival qualitatively.	Progress report.
Year 10	Measure vegetation cover and species composition, and compile a species list, using point intercept sampling in seeded areas. Sample soil where revegetation success appears lacking. Observe surface stability and sprig survival qualitatively.	Final report.

OVERALL PROJECT MAP



POINT THOMSON PROJECT

TOWNSHIP, RANGE AND SECTION MAP

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FIGURE 1

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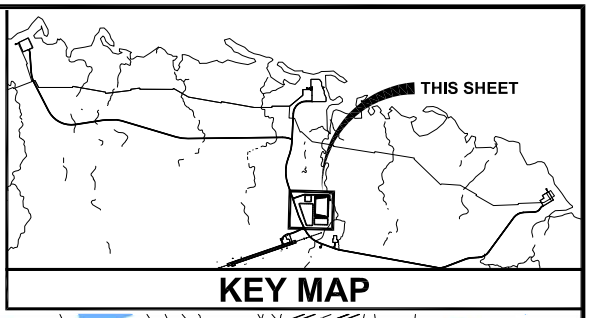
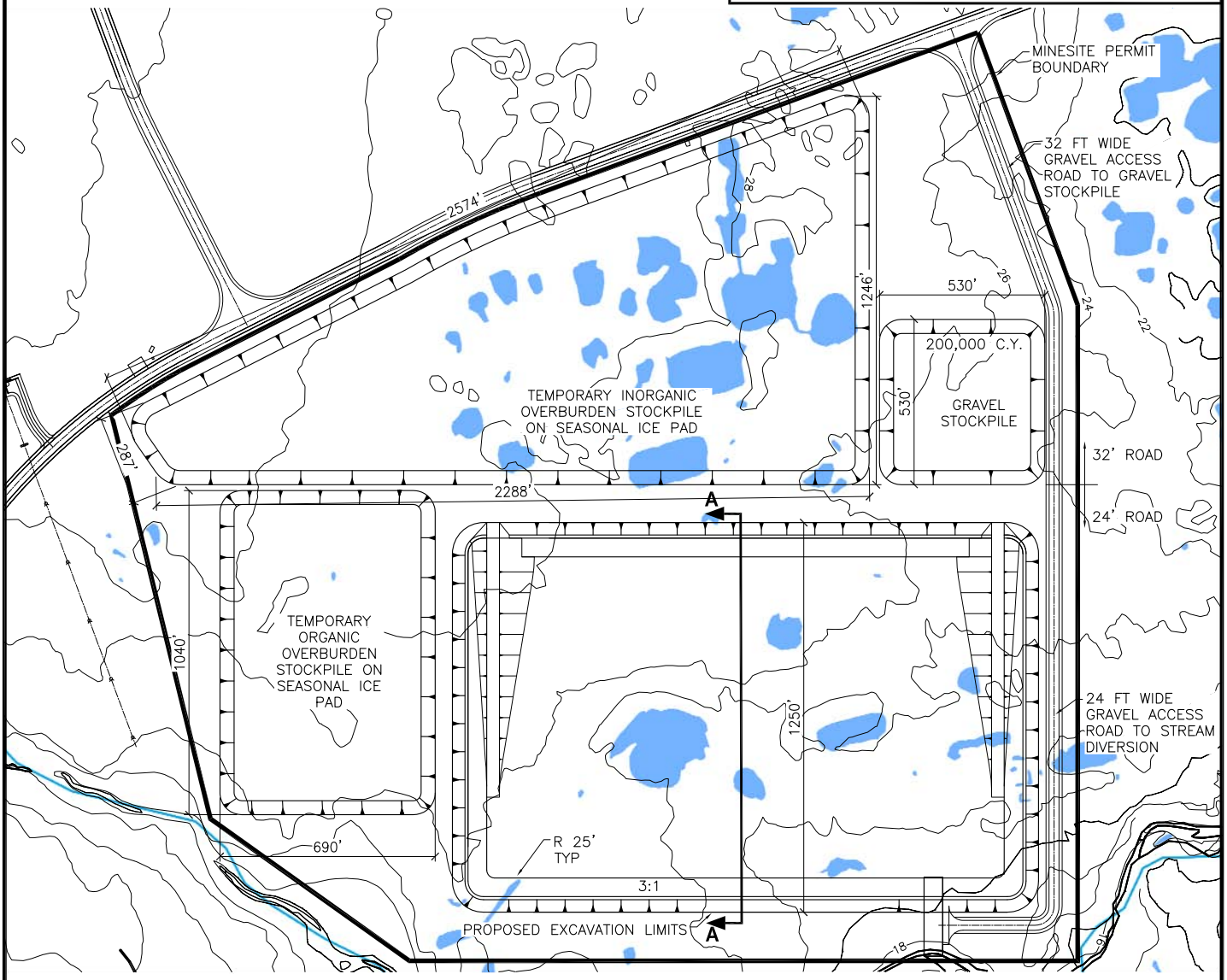
PROPOSED GRAVEL MINE PLAN





APPROXIMATE VOLUMES

ORGANIC OVERBURDEN	189,000	CU YDS
INORGANIC OVERBURDEN	537,100	CU YDS
GRAVEL DEMAND	2,651,100	CU YDS
AVAILABLE GRAVEL FILL	2,783,000	CU YDS
32 FT. WIDE GRAVEL ACCESS ROAD	21,900	CU YDS
24 FT. WIDE GRAVEL ACCESS ROAD	20,700	CU YDS
MINESITE PERMIT AREA	162.2	ACRES

PROPOSED GRAVEL MINE PLAN

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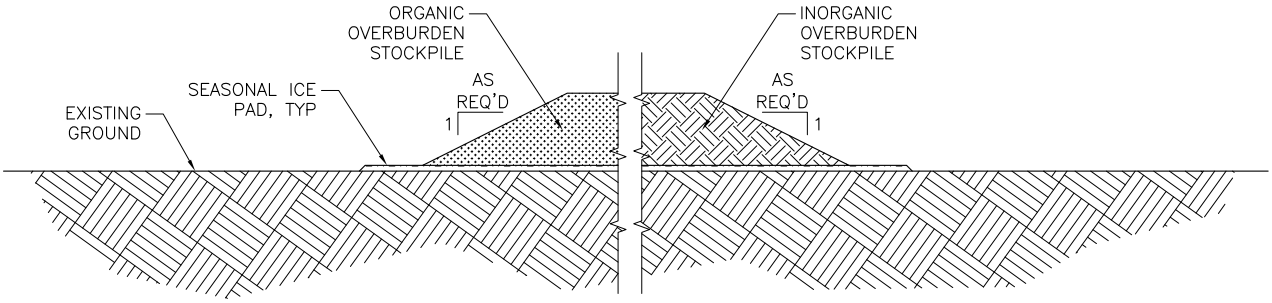
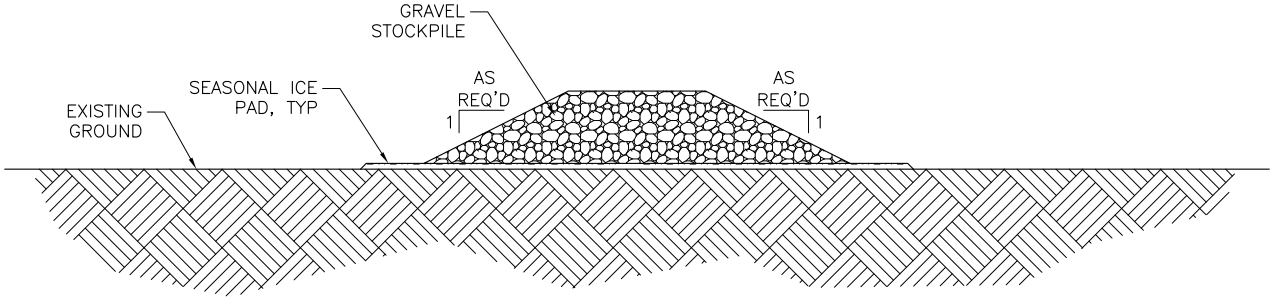
FIGURE 2 10-15-2009

PROPOSED GRAVEL MINE SECTIONS



TEMPORARY ORGANIC/INORGANIC OVERBURDEN STOCKPILE TYPICAL SECTION

NTS



GRAVEL STOCKPILE TYPICAL SECTION

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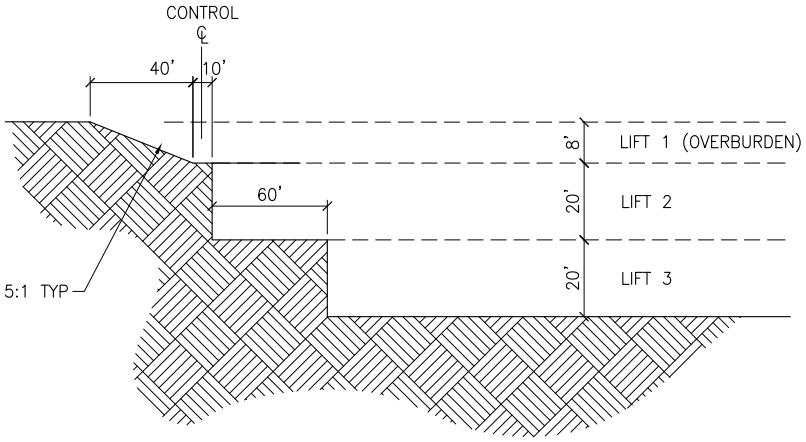

SECTION A-A

SCALE 1H:2V

NOTES:
1. ACCESS RAMPS NOT SHOWN FOR CLARITY.
2. ESTIMATED ORGANIC OVERBURDEN DEPTH IS ±2FT, ESTIMATED INORGANIC OVERBURDEN DEPTH IS ±6FT.

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PROPOSED GRAVEL MINE SECTIONS

FIGURE 3

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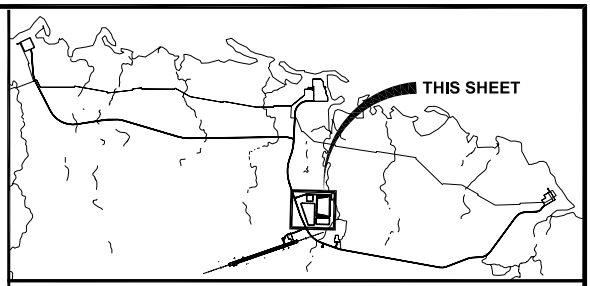
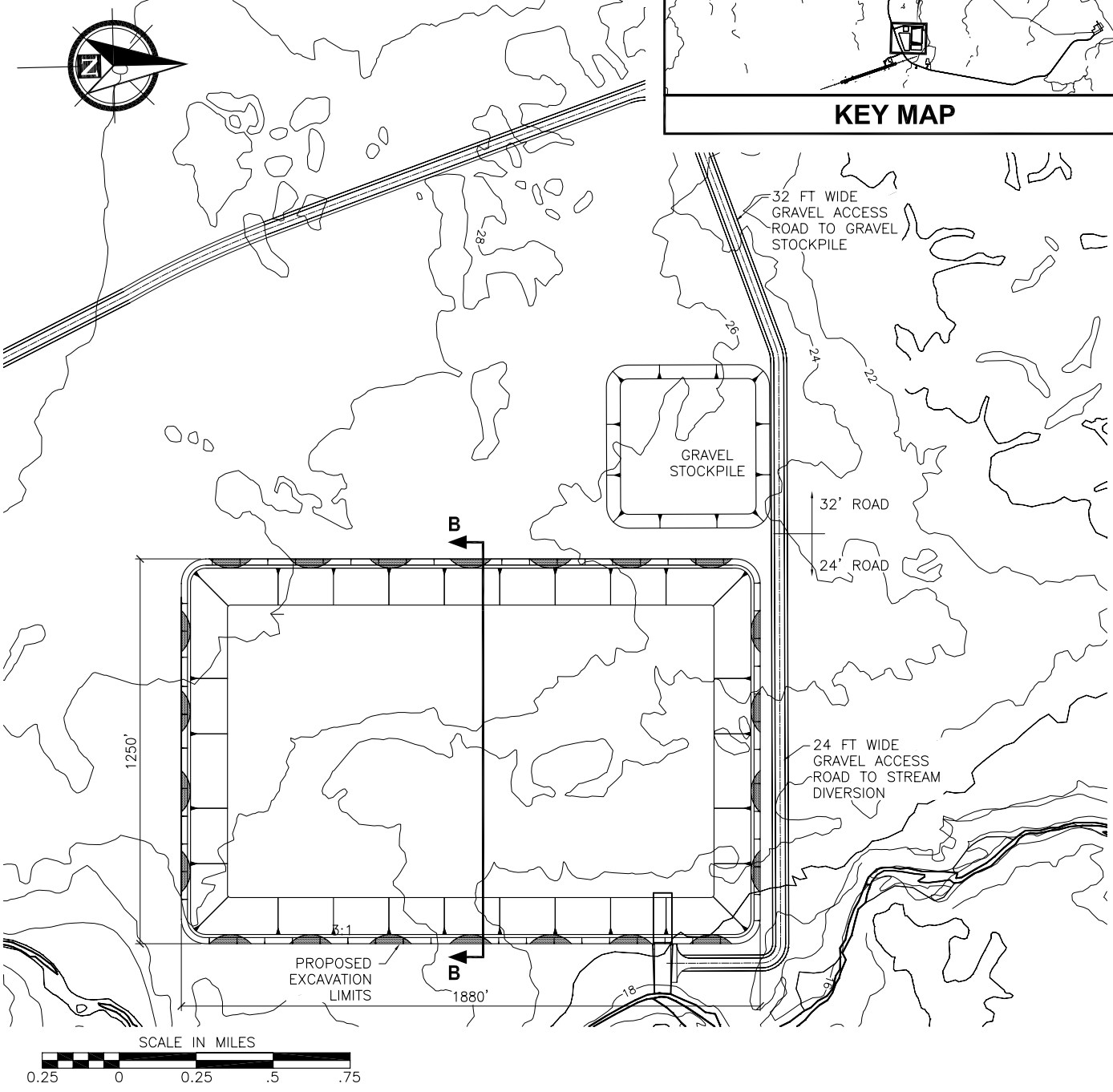
PROPOSED GRAVEL MINE REHABILITATION PLAN



KEY MAP



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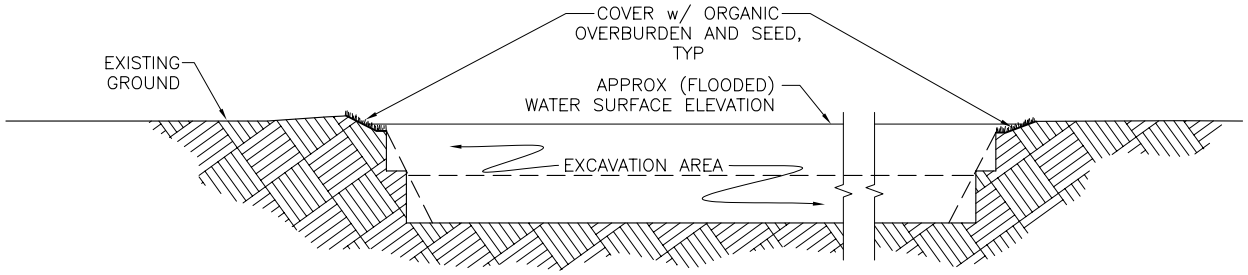
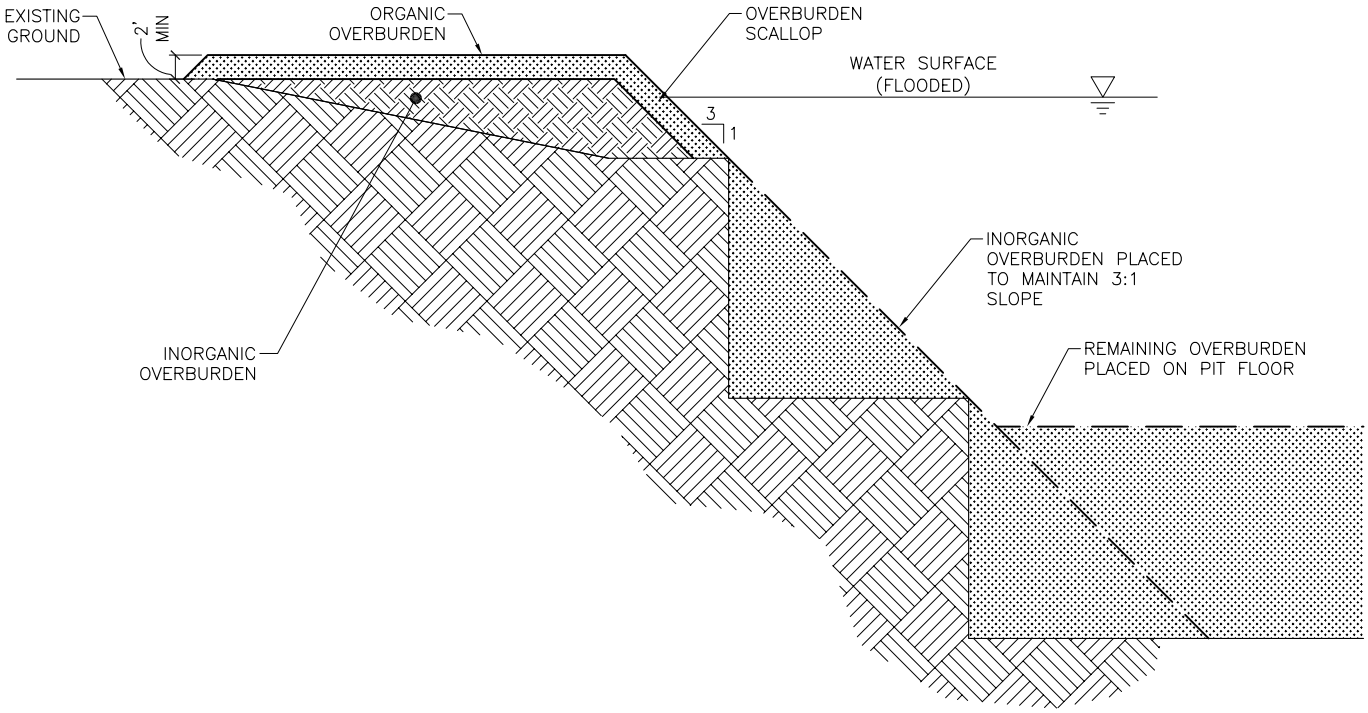
PROPOSED GRAVEL MINE REHABILITATION PLAN

FIGURE 4 10-15-2009

PROPOSED GRAVEL MINE REHABILITATION SECTIONS



SECTION B-B
SCALE 1H:2V



OVERBURDEN SCALLOP TYPICAL SECTION
NTS

GRAVEL MINE REHABILITATION SECTIONS

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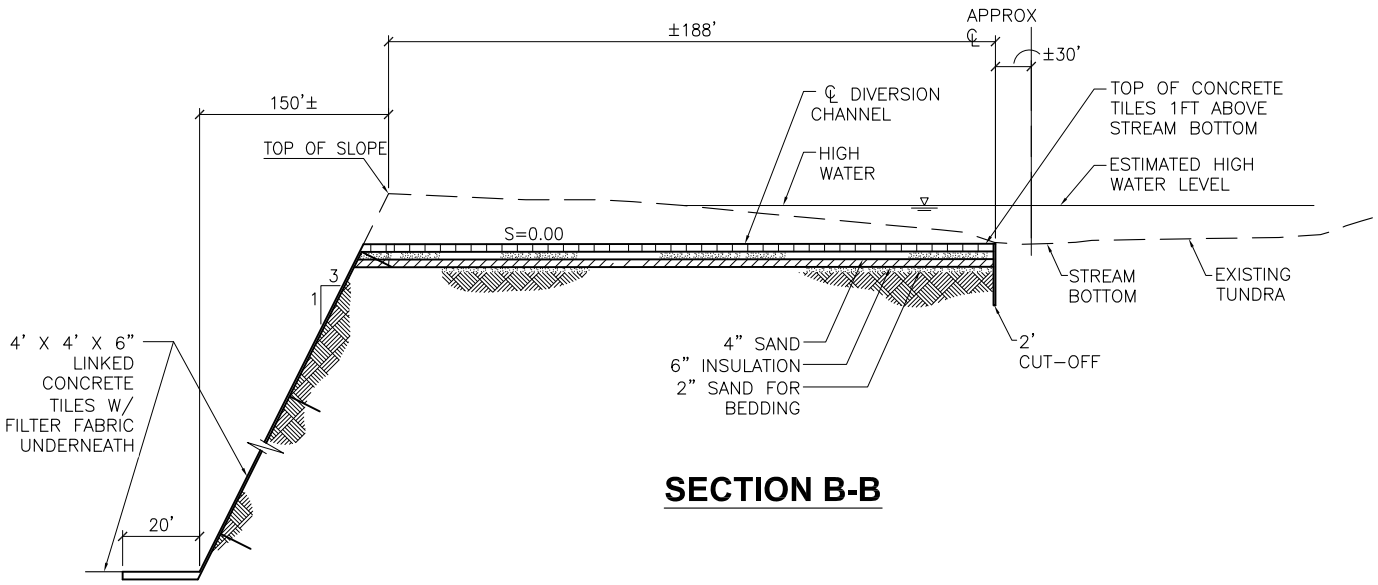
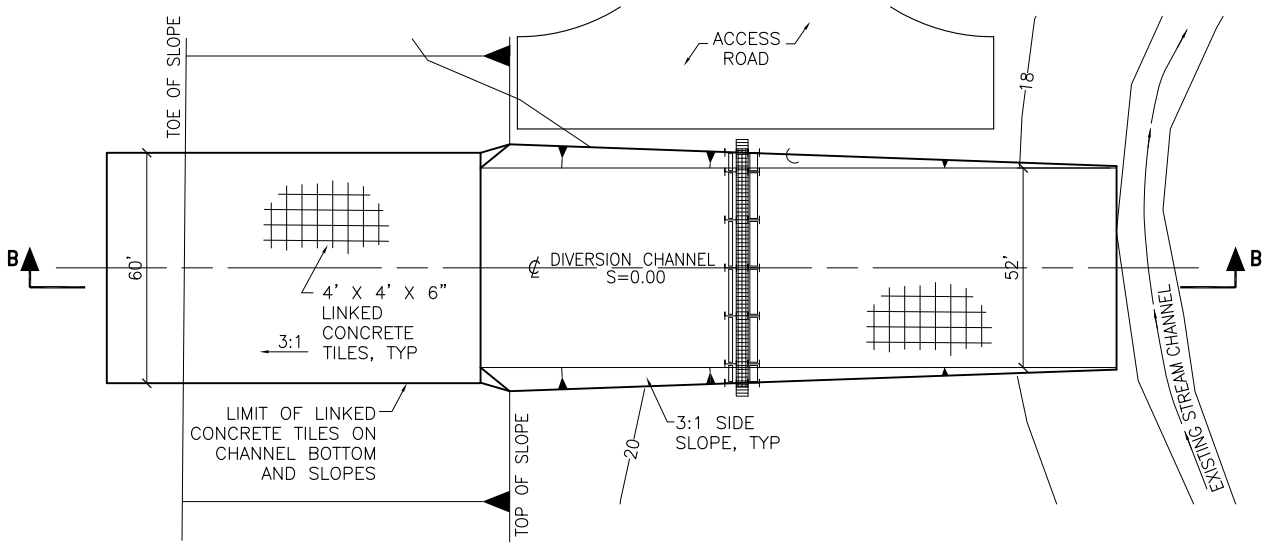
FIGURE 5	10-15-2009

PROPOSED GRAVEL MINE DIVERSION CHANNEL



SECTION B-B



DIVERSION CHANNEL PLAN

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FIGURE 6	10-15-2009

PROPOSED GRAVEL MINE DIVERSION CHANNEL