CHAPTER 1

LEGAL, FINANCIAL, COMPLIANCE, AND RELATED INFORMATION

1.12 Identification of Interest

1.12.1 Business entity

Applicant is a corporation, incorporated under the laws of the state of Utah, and registered to do business in Utah.

1.12.2 Applicant

Applicant:

GENWAL Resources, Inc.
P.O. Box 1077
Price, Utah 84501
Telephone (435) 564-4000
Employer I.D. #87-0533099

Operator:

GENWAL Resources, Inc.
P.O. Box 1077
Price, Utah 84501
Telephone (435) 564-4000

Resident Agent:

Gary E. Gray
GENWAL Resources, Inc.
P.O. Box 1077
Price, Utah 84501
Telephone (435) 564-4000

As operator of the mine, GENWAL Resources, Inc. will continue as Permittee under Permit No. ACT/015/032.

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Name and address of Andalex's President is:

Douglas H. Smith
Andalex Resources, Inc.
45 West 10000 South, Suite 401
Sandy, Utah 84070
Assumed position 07/01/94

Resident Agent of Andalex:

Mike Glasson
Andalex Resources, Inc.
P.O. Box 902
Price, Utah 84501
Telephone (435) 637-5385

Names and addresses of officers of GENWAL Resources, Inc.:

OFFICERS	TITLE	DATE POSITION WAS ASSUMED
Peter B. Green	Chairman of Board of Directors	01/09/95
Douglas H. Smith	President	01/09/95
John Bradshaw	Vice President Finance & Treasurer	01/09/95
Samuel C. Quigley	Vice President	01/09/95

DIRECTORS	TITLE	DATE POSITION WAS ASSUMED
Peter B. Green	Director	12/13/94
Ronald C. Beedie	Director	12/13/94
Douglas H. Smith	Director	12/13/94

The address for the above officers and directors is:

GENWAL Resources, Inc.
45 West 10000 South, Suite 401
Sandy, Utah 84070

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DIRECTORS	TITLE	DATE POSITION WAS ASSUMED
Peter B. Green	Director	05/11/90
Ronald C. Beedie	Director	01/05/88
John Bradshaw	Director	07/01/94

The principal shareholder of Andalex Resources, Inc. is as follows:

The capital stock of Andalex Resources, Inc. is one hundred percent (100%) owned and controlled by Prospect Holdings S.A. Prospect Holdings S.A. does not have an employer identification number. Andalex Resources, S.A. and Andalex Holdings, LTD, owners and controllers of the parent entity do not have employer identification numbers, Appendix 1-9 Section A.

Andalex Resources, Inc.
45 West 10000 South, Suite 401
Sandy, Utah 84070

Other names under which Andalex Resources, Inc. and Prospect Holdings S.A. is or has operated in the United States within the last five years preceding the date of this application are listed below:

Andalex Resources, Inc., Tower Division
Andalex Resources, Inc., Cimarron Division
AMCA Coal Leasing, Inc.
West Ken Coal Corporation
Andalex Resources, Inc., Little Creek Division

Legal owners of area to be affected by surface operations and facilities:

United States Government
Administered by the United States
Department of Agriculture, Forest Service,
Intermountain Region
Manti-La Sal National Forest
599 West River Drive
Price, Utah 84501

GENWAL Resources, Inc.
P.O. Box 1077
Price, Utah 84501
Telephone (435) 564-4000
Revised 4/05/2003 Employer I.D. #87-0533099

GENWAL Resources, Inc.
P.O. Box 1077
Price, Utah 84501
Telephone (435) 564-4000

Mineral Ownership:

United States Government
Administered by the United States
Dept. of Interior, Bureau of Land Management
Moab District
P.O. Box AB
Price, Utah 84501

Owners of contiguous areas both surface and underground:

See Plate 1-1

1.12.7 Mine Identification: MSHA Numbers

Crandall Canyon Mine 21 Nov, 1991
MSHA No. 42-01715

I.P.A.
Horse Canyon mine site Unknown
MSHA No. 42-01715

Andalex Resources, Inc. - Tower Division
MSHA No. 42-01474, 42-01750, 42-02028, 42-01864

1.12.8 Pending Interests of Lands Contiguous to Permit Area:

The applicant has no pending interests in lands contiguous to the permit area.

1.13 Violation Information:

The applicant currently operates coal mining operations under ACT/015/032 for the Crandall Canyon Mine in Emery county, Utah. Permit ACT/015/032 was approved and issued May 13, 1993.

CHAPTER 2

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Note: Bold number plates and appendices are included with this submittal.

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Note: Bold number figures and tables are included with this submittal.
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CHAPTER 2

SOILS

2.10 Introduction

This chapter presents soil resource data and soil mapping for the Crandall Canyon Mine. This information has been compiled from the previously approved Mine Reclamation Plan ACT/015/032 and newly gathered data associated with the approved culvert expansion. Additional soil information from the proposed south portals is also included. Soil studies were conducted in accordance with guidelines issued by the Utah Division of Oil, Gas, and Mining. All surveys fulfilled the requirements established by the Soil Conservation Service (SCS).

The permit area and coal leases are delineated on Plate 1-1. The disturbed area is presented on Plate 5-3. There will be no surface disturbance within the Incidental Boundary Change area. The area is being added to facilitate the extention of underground main entries and will not affect the ground surface or vegetation.

This chapter presents a description of the premining soil resources, feasible use of substitute soils, topsoil and subsoil to be saved, stockpiling of soils, and surveys of the soils.

2.20 Environmental Description

The mine and existing area of disturbance is at an elevation of approximately 7500-7800 feet on a southern exposure with slopes ranging from 5% to 70%. The disturbance associated with the culvert expansionl include the canyon floor and the associated toeslopes. The mean annual soil temperature is 40 to 44 degrees F and the average annual precipitation is 20 to 23 inches.

The soils are classified as Entisols and Mollisols. The Entisols are shallow, found on the steeper slopes and have a moderate to high erosion hazard. The Entisols are classified as poor for the recoverability of topsoil due to the steepness of slope (50-70 percent) and the high percent of large rocks on and in the surface layer (35-60 percent). Recovery of topsoil from these areas is difficult.

The Mollisols are found on more moderate slopes and are deep, well drained soils which have a moderate to low erosion hazard. The Mollisols generally have a deep, well formed A horizon. These soils in general can produce large amounts of topsoil and subsoil that can be removed, stockpiled, and used as good growth medium for reclamation.

2.21 Prime Farmland Investigation

The land within the permit area has not been historically used as cropland nor is the area conducive to intensive agricultural uses. GENWAL contacted SCS in Salt Lake City and obtained a letter of negative determination enclosed as Appendix 2-1 from Mr. T.B. Hutchings Ph.D., SCS State Soil Scientist.

Also, information from the field survey completed by Valley Engineering was sent to SCS and a letter was received by GENWAL indicating a negative determination for the presence of an alluvial floor. The SCS letter is included with this application as Appendix 2-2. Both of these negative determinations are supported by the findings of Mr. Dean Larson, Soil Scientist with the Price Office of the U.S. Forest Service (Appendix 2-3A).

2.22 Soil Survey

The initial soil survey was conducted by Valley Engineering. Refer to Plate 2-1 for the existing surface disturbance. Accurate soil survey information and productivity data were obtained and are representative of the entire disturbed area (see Appendix 2-3 and Plate 2-1).

A supplemental soil survey was conducted by GENWAL personnel, Chris Hansen of Earthfax and David Steed of EIS in the summer of 1995 and 1996 to assess the undisturbed soils in the area of the culvert expansion project (Plate 2-4). These data have close correlation with and support the findings of the previous soil surveys.

2.22.2 Soil Identification

The "Soil Study" report prepared by Valley Engineering is included as Appendix 2-3 and the "Soil Types Study Map" is included as Plate 2-1. An additional soils study, prepared by the U.S. Forest Service, is included under Appendix 2-3A. The data collected for the approved culvert expansion project are contained in Appendix 2-3B. An additional soil study was prepared by James Nyenhuis for the south portal expansion (see Appendix 2-6). A map is included with this report.

2.22.3 Soil Description

Soil descriptions are found in the "Soil Study" report prepared by Valley Engineering included as Appendix 2-3 and on the "Soils Types Study Map" included as Plate 2-1.

Also, additional soil survey information can be found in Addendum to Appendix 3-2, Synopsis of Riparian Baseline Inventory of Crandall Creek and Review of Baseline Riparian Inventory of Crandall Creek Proposed Crandall Mine Expansion for a more thorough discussion on hydric soils.

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2.22.4 Present and Potential Productivity of Existing Soils

The present and potential productivity of soil within the disturbed area and the approved culvert expansion have been assessed to determine the volume of suitable growth materials and the difference between topsoil and subsoil. The following data have been supplied in Appendix 2-3 and 2-3B: sodium absorption ratio (SAR); electrical conductivity (ECE); saturation percentage; soluble calcium; magnesium and sodium; organic matter content; and lime content. Appendix 2-6 defines the productivity of the soils in the proposed south portal area.

The larger rock fragments encountered during topsoil salvage operations that could damage equipment during loading and transportation operations will be sorted out during salvage operations. Moderate-size fragments will be salvaged with the topsoil and stockpiled. The ECE values are very low in all samples as shown on page 8 of Appendix 2-3 and in Appendix 2-3B. There are no problems with salinity. The SAR values are also very low in all samples, indicating there are no problems with sodium salts, the pH is slightly alkaline which is normal for the area. All samples have some presence of carbonate.

On June 2, 1992, Mr. Larry Johnson and personnel from Environmental Industrial Service inventoried three areas that have interim reclamation. The areas in question are shown on Figure 8a and are listed as Areas 1, 2, and 3 respectively. The purpose of the inventory was to determine the depth of in-place soil and the success of the revegetation. The inventory also indicated that none of the reclaimed areas were topsoil storage sites.

Soil depths were determined utilizing a six foot probe driven into the ground on approximately 5 foot centers. At each test point, the probe was driven in three times in an area approximately 12 inches in diameter at a 90 degree angle to the surface and the depth of soil noted. The maximum depth encountered was then recorded and plotted.

A small portion of Area 1 had soil material to a depth of 24 inches. However, this soil was determined to be insitu soil that had not been disturbed due to its close proximity to an island of undisturbed vegetation. In addition to the reclaimed areas, the soil depths at the two undisturbed areas were also inventoried. Both areas average 39 inches of soil, but included approximately 50% cobble size rock (4 inches to 6 inches in diameter). Thus, this soil would yield less than 18 inches of usable top and subsoil if salvaged. Therefore, the net gain of soil to be utilized in other areas does not appear to justify the destruction of the existing established islands of mature vegetation.

The topsoil piles were inventoried to attempt to determine the disposition of distribution of topsoil and subsoil. All three storage areas appeared to be made up of similar material with no distinct change in color and/or texture which might distinguish subsoil or topsoil placement. The inventory consisted of minor probing and ocular estimates of the surface only. Due to the well established vegetation and the stability of the piles of soil, a more extensive inventory would serve no purpose other than to damage the integrity of the storage sites.

The pedogenic process will become somewhat restricted for the soils stored in the topsoil stockpiles. The physio-chemical changes that may occur include nitrogen loss, loss of micro biological life forms, the existence of anaerobic conditions within the deeper portions of the stockpiles, and structural breakdown of the soils. These changes will be minimized by avoiding compaction during stockpile construction and by segregating the individual soil units where practical.

Topsoil from the culvert expansion area was salvaged from the area south of the warehouse identified as the north slope area (Map Unit A), the south slope bench area (Map Unit B), and the south slope of the hillside adjacent to the coal pile area (Map Unit C) as shown on Figure 8B. Two additional new areas, shown as Map Unit D and Map Unit E on Figure 8B, were identified for topsoil salvage, during pad construction, in the southwest corner of the mine yard expansion area. Immediately east and contiguous to Unit D is a rocky point that was recontoured during the yard expansion. This area is identified as Map Unit E. Topsoil was removed from this point but because this work was done after most of the topsoil recovery was finished, this volume of material was not included in the soil report prepared by Pat Johnston, the soil consultant who supervised and monitored the topsoil recovery and stockpiling operations during the yard expansion operations. Nielson Construction Project Manager Mark Greenhaulgh oversaw the topsoil removal and stockpiling from this particular area. Approximately 108 cubic yards of topsoil was removed and stockpiled at stockpile #4 from this nose cut area.

Soil was also removed, during the surface expansion project, from two areas, designated as Map Unit G, during the construction project. This soil was collected from a narrow strip along the south side of the road and old loadout site and from the new area that was disturbed when the sediment pond was reconstructed. Approximately 160 cubic yards of topsoil material was removed from these two areas and stockpiled.

No topsoil or substitute topsoil materials was salvaged from the area associated with the stream or streambank or the area of steep slope area on the southern flank of the stream. To preserve the alluvial and residual soils and stream channel in this area, GENWAL covered the insitu stream area with a geotextile fabric prior to placing any backfill during construction. Similarly on the steep slope area to the south of the stream bank a geotextile fabric was placed on the surface before placing any backfill material. During the culvert expansion approximately 2.5 acres of in place topsoil were protected using the geotextile (see Figure 8D). A description of the geotextile used is given in Appendix 2-7. During the south portal construction an additional 0.08 acres of in place topsoil will be protected with geotextile.
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After the lower pad of the Expansion Area was completed to finish grade, the permanent coal storage area was prepared. Topsoil material was removed from Map Unit C (Figure 8B), a small area of the adjacent slope near the location where the southern flank of the coalpile rests against the existing hillside. This topsoil was salvaged under the direction of Pat Johnston, soil scientist, to assure optimum recovery of the soil resource in this area. The soil was stockpiled at topsoil stockpile #4 for storage until it is utilized during final reclamation. Between all salvage areas, about 3,880 cubic yards of topsoil was collected and stockpiled at stockpile #4 for final reclamation. This amount exceeded the original projection of 3,480 cubic yards by 400 cubic yards.

During coal storage and stockpiling activities, coal was pushed up beyond area C onto an area where topsoil had not been stripped. In order to abate violations N98-45-1-1 and N98-45-3-1, GENWAL has removed the coal from the area where topsoil had not been removed on the south slope. (The approximate area is identified as Map Unit F on Figure 8B.) The previously undisturbed topsoil area, which had been covered with coal, was cleaned thoroughly using the best technology available. The topsoil was then removed under the supervision of Pat Johnston, reclamation specialist/soil scientist between August 5- August 18, 1998 and transported to topsoil stockpile #4. The topsoil was removed from the slope area that was and could potentially be affected by the coal stockpile in the future. Approximately 690 cubic yards (69 truck loads) was salvaged from the slope. The visible topsoil depth averaged 3-4 inches over this area but 8-9 inches was actually removed due to the steepness of the slope and the operational constraints of the equipment on the steep slope.

During phase 2 of the surface expansion, three portals will be established on the south slope of the mine yard. The new portals will be constructed along the south side of the upper pad of the existing mine-yard (refer to Plate 5-3). This area is presently serving as the parking lot and material storage yard. The new portals will consist of an intake portal, a fan portal, and a belt portal. The intake portal will be used to accommodate fresh air intake into the mine, and also to provide primary travel access into the mine for employees and materials. The fan portal will support a ventilation fan which will suck return ventilation air out of the mine. The belt entry will be located south of the existing coal pile and will contain the main conveyor belt hauling coal out of the mine.

Construction of the portals will be done within the existing permitted disturbed area boundary. The existing disturbed area boundary will not be increased. The existing sediment pond has been sized to accommodate this new portal construction area, so no changes to the sediment pond

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will be required. Except for adding a new culvert under the access ramp to the new portal, none of the previously approved and existing surface drainage structures will be affected.

In the area of the new south portals, the base of the coal seam is located approximately 17' above (i.e., higher than) the level of the existing mine-yard. An earthen ramp will be constructed on the existing pad to gain access up to the level of the coal seam. In the area of the intake and fan portals, the existing hill slope will be excavated with a back-hoe to expose the coal seam in preparation for construction of the portal canopies. A small elevated pad will also be constructed in front of the fan portal on which the mine fan can later be installed. This fan pad will be constructed as a continuation of the access ramp leading to the intake portal. The access ramp to the intake portal and the fan pad will be constructed partially using the earthen material generated in the process of facing up the coal seam and partially using fill material hauled in from an off-site borrow source. (See Appendix 2-8 for laboratory analysis of the native fill and the imported fill) The imported fill material will come from the same source (i.e., the same borrow pit) that supplied the pad material for the recently completed surface expansion. This borrow site would be the Nielson Construction commercial borrow pit located in Huntington Canyon below the power plant. The source of fill material has been determined to be free of noxious weeds (see Appendix 2-9). As the access ramp is being constructed a new culvert (C-11A) will be added to handle sheet flow drainage from the upper material yard (see Plate 7-5). It is estimated that approximately 3500 cubic yards of fill will be needed to construct the access ramp/fan pad. This quantity will be verified after construction on the as-built plans.

As the access ramp and fan pad are constructed from the existing yard surface up to the level of the coal seam outcrop, some of the new fill material will be placed up against the intervening existing undisturbed slope. Part of the access ramp/fan pad will therefore be constructed on top of the existing slope. Before this ramp/pad is constructed, topsoil along the existing slope below the fan pad and access ramp will be protected in-place using a geotextile cover placed along the undisturbed slope under the fill material. This topsoil protection technique would be identical to the approved method used during construction of the existing surface expansion facilities (Phase I surface expansion). It is estimated that approximately 3366 square feet (0.08 acres) of in place soil will be protected by geotextile during construction of the south portals. A description of the geotextile to be used is given in Appendix 2-7.

After the access ramp and fan pad have been constructed (and the underlying in-place topsoil protected with geotextile), the portal excavation can begin. Prior to starting the portal cuts, the existing topsoil at the portal sites will first be salvaged. Topsoil conditions along the south slope portal area is similar to the conditions at the adjacent coal pile area where topsoil was salvaged during August, 1998. This topsoil salvage effort is described in appendix 2-5, Part II, prepared by Pat Johnson, soil scientist. At that area, according to Ms. Johnson's report, the depth of true topsoil was 3" but an average of 8" - 9" of material was taken due to the operating nature of the backhoes which were employed in the salvage process. In addition, an intensive soil inventory and site investigation was performed on the south slope on August 18, 1998 and is included in Appendix 2-6.

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In order to minimize the area of additional disturbance associated with the construction of the south portals these portals will be constructed by excavating individual pockets into the hillside for each portal rather than along a common highwall. By utilizing individual pocket cuts for the portals the total area of new disturbance is expected to be less than 4500 sq. ft. (0.11 acres). Topsoil will be removed from the areas of the south portal pocket cuts prior to excavation as described in Section 2.31.1. According to the Nyenhuis survey, the upper 2 feet (24 inches) is suitable for salvage. Based on the Nyenhuis soil survey it is anticipated that approximately 9000 cu. ft. (333 yds.) of topsoil will be salvaged from the intake and fan portal cuts.

The salvaged topsoil will be stored on the existing topsoil pile #4 located off-site at the bottom of Crandall Canyon. This topsoil pile is constructed on Forest Service land under a Special Use Permit issued on 8/17/87. This pile #4 was originally constructed in 1997 curing Phase 1 of the surface facility expansion. At that time it was designed and constructed sufficiently large to accommodate the additional topsoil storage requirements for the Phase 2 south portal construction. The Forest Service has concurred with the addition of the south portal topsoil to this pile. All topsoil removal, salvage and storage will be over-seen, directed and monitored by an independent soils scientist approved by the Division. A report of the topsoil salvage operation will be prepared by the soil scientist and added to the MRP upon completion as Appendix 2-5, Part III.

After the portal sites have been faced up construction of the portal canopies will begin. These canopies will be constructed from steel I-beams and plate according the MSHA guidelines. The canopies will be anchored to concrete footers. These canopies will provide a safe structure from which the miners can begin driving the entries back into the coal seam. After the intake and fan entries have been driven into the hillside and connected together underground with a cross-cut, work can then be started on construction of the mine fan installation. While the fan is being installed, the miners will drive the belt entry from inside the mine out to the belt portal. During this phase of development, mined coal will be moved away from the surface with a front-end loader, a mobile radial stacker, or some other temporary means of conveyance. After the belt portal connection is completed, a new conveyor truss will be installed from a concrete landing at the belt portal out to the existing coal pile. All coal from the mine will then be delivered directly to the existing coal pile and will be crushed and loaded on trucks through the existing coal handling facilities.

Power, water, communications, and other mine infrastructure will be supplied to the south portals as an extension of the pre-existing Crandall Canyon Mine facilities.

Figure 5-11 depicts a typical cross-section through the south portals, showing the pocket cut, access ramp, lu-situ soil geotextile protection, and the portal canopy construction.

Plate 5-3 depicts that area of the south slope where the portals are proposed to be located during phase 2 expansion in mid-1999. Plate 5-3 also shows the cut slope disturbance in the southwest portion of the mine yard. The topography for this portion of the mine yard has been revised to reflect the as-built configuration. A side canyon drainage channel conveying undisturbed area runoff to the main Crandall Creek channel forms the western boundary of the mine yard in this area. Rip rap for the culvert inlet headwall was installed on both sides of the channel farther up the embankments than depicted on the proposed construction map. This additional rip rap was added
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to protect the main culvert inlet from erosion due to the side canyon drainage. Rip rap was added to the side channel to increase the integrity of the channel and to prevent the channel embankment from eroding thus allowing undisturbed drainage to enter the mine yard area. The same rip rap specifications used for the main undisturbed drainage inlet culvert and headwall were also used for armoring the side channel.

GENWAL is also considering a second possible option for constructing the south portal intake and fan portals. Instead of constructing a ramp up to the level of the coal seam, short tunnels would be driven from the existing yard level up to the coal seam. In this scenario the pocket cuts would be be made into the hillside lower down at the same level as the existing pad. This level is approximately 15' below the base of the coal seam. Since the coal seam sits directly on top of the Star Point Sandstone, this sandstone out-crops at the existing yard level. Tunneling would begin in the sandstone and ramp up underground to the coal seam.

If the tunnels are driven at an incline of 10% they will be about 160' long to where they intersect the base of the coal seam. At 8' high and 20' wide, excavation of the two tunnels (intake and fan) would generate approximately 1900 cu yds. of material during construction. This tunnel excavation material will consist of sandstone mixed with coal. This excess material would be disposed of by placing it in a 6' deep layer along the existing fill bank located between the upper material yard and the coal storage pad. This embankment is part of the designated coal storage area and currently is covered with coal. Therefore, after the tunnel excavation material is layered onto the embankment, it too will be covered over by the active coal pile for the remaining life of the mine. Refer to Figure 13-a and 5-13b for more details of this tunneling construction option.

Upon final reclamation the tunnel excavation material would be hauled back into the mine tunnels where it would be sealed up prior to backfilling the portals. Backfilling and reclamation of the portal pocket cuts would be the same regardless of whether the ramp or tunnel option is selected. If GENWAL elects the tunnel construction option, topsoil will be salvaged in exactly the same manner as described previously. The amount of topsoil salvaged, stored and redistributed would be the same regardless. If the tunnel option is selected, there would be no additional in-place topsoil required to be protected with geotextile, because there would be no fill material placed up against the hillside.

If this option is selected, GENWAL commits to ensuring the protection of the hydrologic balance for surface and groundwater systems as required by R645-301-731. The tunnel excavation material will be tested for acid- and toxic-forming material and the analytical results of this testing will be presented to the Division. The hydrologic balance will be protected in the following manner.

a) The excavation material will consist of fragmented Star Point sandstone. This sandstone

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outcrops naturally in the minesite area and is one of the major geological features which determine the character of Crandall Canyon and many other canyons in the Wasatch Plateau. This predominant sandstone is not known to be acid- or toxic-forming anywhere in the Utah coalfields. However, further site-specific testing of the sandstone will be conducted prior to any construction.

b) The proposed location of the material storage is on top of the existing pad fill. Any runoff from this area would report to the existing sediment pond.

c) The existing pad fill in the proposed storage area varies between 10' and 40' thick over the bypass culvert and is densely compacted. This thickness of compacted fill material is sufficient to preclude any leaching downward into the bypass culvert or groundwater.

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Stockpile #4 will be constructed with topsoil removed from the surface expansion project. The stockpile will be located across the road and north of stockpile #3. This location was previously surveyed for cultural resources by Forest Service archeologist, Barbara Blackshear. No cultural resources were located. Soil survey information for this area is presented in Appendix 2-3A.

The pile area will accomodate approximately 5,000 cubic yards of soil material with sideslopes on a 3:1 slope and a top elevation of 6,997'. Approximately 4,756 cubic yards of material were salvaged from the surface expansion area. Approximately 333 cubic yards of additional material is expected to be salvaged from the south portals. Refer to Plates 2-5, 2-5A and 2-5B for design detail. These plates will be updated in the MRP to reflect the as-built configuration after construction of the south portals is complete.

The topsoil and substitute topsoil materials are stored in Stockpile #4 and will be protected from erosion by a vegetative cover. Upon placement and configuration of the topsoil stockpile, two tons per acre of organic mulch and an approved seed mix was applied at the specified rate approved by the Division. The mulch and seed was applied to the topsoil stockpile in the early fall of 1997. Silt fence was placed around the perimeter of the pile.

2.32 Topsoil and Subsoil Removal

All topsoil and subsoil, associated with the initial disturbance, were removed during the construction season of 1982. The volumes of salvaged topsoil and subsoil, included in Section 2.42, is 9,219 bank cubic yards. The topsoil was stored in four locations as shown on Plates 2-2, 2-2a, 2-3, and 2-5. The topsoil associated with the proposed culvert expansion will be removed and stockpiled according to approved plans. Areas showing soil removal are shown on Plate 2-4 and Figure 8B; and the stockpile area is shown on Plates 2-3 and 2-5.

2.33 Topsoil Substitute and Supplements

Section 2.24 and 2.42 of this chapter address the substitute topsoil soils and their perspective locations.

2.34 Topsoil Storage

All topsoil and subsoil from the initial disturbed area were removed and stored during the construction season of 1982. The volumes of salvaged topsoil and subsoil are included in Section 2.42 of this chapter. The topsoil was stored in four locations as shown on Plates 2-2, 2-2a, 2-3, and 2-5. Sections 2.31 and 2.42 of this chapter address the topsoil storage and location of the topsoil piles.

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2.42 Soil Redistribution

The soil redistribution volumes are presented in the table below for the 13.6 acre surface facility site and 1.40 acre topsoil stockpile areas. (Refer to Figure 8C.)

AREA IDENTIFICATION	ACREAGE	DEPTH	VOLUME
Original Surface Facilities Area			
Portal Area	0.90 acres	12"	1,452 CY
Shop Area	1.09 acres	12"	1,759 CY
Old Substation Area	0.40 acres	12"	645 CY
Old Loadout Area	2.11 acres	12"	3,404 CY
Subtotal	4.50 acres	12"	7,260 CY
Expansion Area			
North Slope Area	0.14 acres	16"	300 CY
S. Slope Bench Area	0.49 acres	16"	1,051 CY
Coal Pile Area	0.41 acres	12"	662 CY
SW corner of mine yard	0.28 acres	12"	452 CY
Nose cut area	0.11 acres	12"	178 CY
Upper coal pile area	0.15 acres	12"	242 CY
Loadout/pond area	0.22 acres	12"	355 CY
South Portals	0.11 acres	16"	236 CY
Subtotal	1.91 acres	12"/16"	3,477 CY
Total Topsoiled Area	6.41 acres		10,737 CY

Areas Not Topsoiled

Forest Service Road	0.53 acres
Forest Service Trail Head	0.29 acres
Topsoil Storage Areas	1.40 acres
Interim Reclamation Areas	0.78 acres
Undisturbed Areas - N. Side	0.48 acres
Unaffected Area Culvert Inlet	0.50 acres
South Slope Area	2.50 acres
Undisturb. South Area	1.89 acres
Area East of Old Loadout	0.22 acres
Subtotal	8.59 acres
TOTAL AREA	**15.00 acres**

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The 1.40 acres comprising the four topsoil/subsoil locations will not require soil redistribution since the native topsoil is still in place. The USFS access road and trailhead area will be left intact removing an additional 1.47 acres from reclamation requirements. On the south slope of the Expansion Area, where the fill will be placed to create the coal stockpile yard, the topsoil has been left inplace and protected by geotextile fabric. This area will not have any additional soil material placed on it during final reclamation. Topsoil material recovered from this area will instead be dedicated to reclaiming the original mine yard area and area adjacent to the road. On the south slope area adjacent to the permanent coal storage area, topsoil will be removed from a small area of the adjacent slope near the location of the future stacking tube where the southern flank of the coalpile will rest against the existing hillside. This topsoil will be salvaged under the direction of a soils scientist to assure optimum recovery of the soil resource in this area. The soil will be stockpiled off-site at an approved storage location until it is re-used during final reclamation.

The topsoil requirements will be met from the following areas:

SOIL	ACREAGE	VOLUME	DEPTH
Stockpile 1 (JDE & TCE)	0.20	943 cy	NA
Stockpile 2 (JDE & TCE)	0.20	1087 cy	NA
Stockpile 3 (JDE & TCE)	0.50	3709 cy	NA
Stockpile 4 (Additional)	0.50	2052 cy	NA
Stockpile 4			
from coal storage area, Summer 1997 (Areas A, B, C, D, E & G)		4,066 cy	
From coal storage area, August 1998 (Area F)		690 cy	
From South Portals		333 cy	
TOTAL		**12,880 cy (previously 9,519)**	

The subsoil material has been chemically and physically analyzed, to allow for the suitability determination as a plant growing media (Appendix 2-3). The subsoil was removed from the JDE and TCE areas outlined on Plate 2-1 (see Plate 5-3 for surface facilities).

Topsoil and subsoil of the JDE soil type are stored at the above referenced four locations (Plates 2-2, 2-2a and 2-3). Topsoil stockpiles are a mixture of soil types JDE and TCE. The soil types were not segregated during placement in the existing topsoil stockpiles. Topsoil piles will be maintained in their present location and condition until approval is received from the Division for redistribution.

Revised 4/05/2003

APPENDIX 2-6

SOIL SURVEY REPORT
PROPOSED PHASE TWO EXPANSION AREA
(SOUTH PORTALS)
JAMES NYENHUIS

4/05/2003

APPENDIX 2-6

SOIL SURVEY REPORT
PROPOSED PHASE TWO EXPANSION AREA
(SOUTH PORTALS)
JAMES NYENHUIS

11/22/02

SOIL SURVEY REPORT
PROPOSED PHASE TWO EXPANSION AREA
CRANDALL CANYON MINE

for

GENWALL RESOURCES, INC.
Huntington, Utah

Submitted to:
ANDALEX RESOURCES, INC.
Price, Utah

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March 1999

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1.0 INTRODUCTION

This report is prepared subsequent to a field study performed to characterize the soil resources and determine the potential soil salvage depths of the proposed expansion area at the Genwall Resources, Inc. Crandall Canyon Mine located northwest of Huntington in Emery County, Utah.

1.1 OBJECTIVES

The basic objectives of the field investigation were to map and describe the soils of the study area in sufficient detail to characterize their physical and chemical properties, and depths to which they may be salvaged as a source of topsoil for reclamation purposes. Thus, the site-specific characteristics of the soil that may influence soil salvage, stockpiling, and redistribution were inventoried. A detailed Order 1 soil survey, including mapping, sampling, description, laboratory analysis, suitability evaluation, and report preparation was needed to generate the required information. The general objectives relating to the soil survey are as follows:

- Satisfy soils requirements as found in UDOGM "Guidelines for Management of Topsoil and Overburden for Underground and Surface Mining" (Leatherwood and Duce 1988);

- Collect, review, and evaluate all existing soils, vegetation, geologic, hydrologic, and climatic information to gain a basic understanding of the soils and related disciplines on the site prior to initiation of field work;

- Describe, sample, evaluate, and report site-specific soils data;

- Prepare a soils report, including recommended soil salvage depths, to aid in the completion of the reclamation planning documents needed for permit approval.

2.0 METHODS - SCOPE OF WORK

2.1 EXISTING DATA REVIEW AND EVALUATION

All existing soils and related discipline information for the general study area was compiled and reviewed prior to initiation of the soils field work. This review included soils information for the site taken from: (1) Appendix 2-3B, Supplemental Soils Inventory for the Crandall Canyon Proposed Culvert Expansion (revised 6-19-97), (2) previous USFS mapping in the area and their map unit and taxonomic unit descriptions on file (Manti-LaSal National Forest 1995), and (3) the "Soil Survey of Parts of the Price River and Huntington River Watersheds" (Swenson et. al. 1983). Project maps and air photos were also reviewed.

It should be noted that all methods for soil survey work performed as part of this project are standard methods for detailed Order 1 soil surveys. All procedures and methods were in accordance with current Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) and UDOGM soil survey methods for coal mining projects. Furthermore, all technical specifications were in accordance with current standards and procedures of the USDA-NRCS National Cooperative Soil Survey Program.

2.2 SOIL MAPPING

Mr. James Nyenhuis, a Certified Professional Soil Scientist/Soil Classifier (ARCPACS 2753), mapped soils at the Order 1 level of intensity for the proposed expansion area. The mapping and sampling activities were conducted on August 19 and October 30, 1998. The field mapping was done utilizing the Crandall Canyon Mine Surface Facility (Topographic) Map at a scale of 1"=50'.

All standards and procedures for soil mapping and profile description were in accordance with current NRCS methods, as described in the Soil Survey Manual (Soil Survey Staff 1993); National Soils Handbook, as currently amended (Soil Survey Staff 1997); Keys to Soil Taxonomy, eighth edition (Soil Survey Staff 1998), Field Book for Describing and Sampling Soils (Schoeneberger et.al. 1998), and applicable UDOGM topsoil and overburden guidelines (Leatherwood and Duce 1988).

Upon initiation of soils field work, traverses were walked to determine overall soil and landscape characteristics. Each major soil/landscape unit was tentatively located on the ground and delineated on the base maps. Based on these preliminary observations, representative sample sites were selected for detailed soil pedon description and sampling. Backhoe pits were dug at some of the sample sites; other sites were hand-dug.

2.3 SOIL SAMPLING AND PROFILE DESCRIPTION

Each typical soil pedon was described and sampled according to current methods and standards of the National Cooperative Soil Survey. The following parameters were described, by horizon, for each soil pedon: horizon symbol, depth, and boundary; color; texture; structure; consistence; coarse fragment content; effervescence; clay films if present; soil mottles if present; and the amount, size, and depth of major roots. In addition, general site information was recorded at each sampling site including: existing dominant vegetation, physiography-landform, slope, aspect, erosion condition, drainage class, and depth to a saturated zone or ground water if encountered.

Samples were collected in the field and analyzed at Inter-Mountain Laboratories (IML) in Farmington, New Mexico for standard soil parameters. The soil analyzes included pH; electrical conductivity (EC); saturation percent; calcium, magnesium, and sodium (meq/l); sodium adsorption ratio (SAR), texture including sand, very fine sand, silt, and clay; calcium carbonate percent; Boron (ppm); Selenium (ppm); Total Kjeldahl Nitrogen (TKN) percent; Nitrate Nitrogen (mg/L); Total Organic Carbon (TOC) percent; Organic Matter percent; and 1/3 bar and 15 bar water capacity.

Table 1 is list of "Parameters and Analytical Procedures for Soil Analysis" and is taken from IML's standard methods and procedures. These methods are consistent with those recommended by UDOGM (Leatherwood and Duce 1988).

The sampling site locations and numbers were plotted on the field map as accurately as possible. All sample locations were flagged and numbered in the field. Samples were collected from fresh backhoe pits or hand-dug pits. The sampled soil material was placed in clean, labeled, polyethylene plastic bags, and kept cool and as dry as possible to limit chemical changes. The upper horizons of many profiles were moist upon sampling, and were air dried prior to shipment to IML for analysis. Each sample was split at the laboratory with one portion being used for analysis and an archival portion retained for additional tests, if necessary.

2.4 EVALUATION OF SOIL SUITABILITY

Criteria to establish suitability of soil (topsoil) or soil substitute material were largely those contained in the UDOGM "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining" Table 2 "Overburden Evaluation for Vegetative Root Zone" (Leatherwood and Duce 1988). This information is presented as Table 2, "Soil Suitability Criteria".

One exception to criteria presented in Table 2 was utilized. Although Table 2 considers >30 percent rock fragments (for both gravels, 2mm to 3" in size; and cobbles, 3" to 10" in size) to be

unacceptable; and >10 percent stones and boulders (>10" in size) to also be unacceptable, recent discussion with UDOGM soil scientist Mr. Robert Davidson, and experience on similar projects, supports a rationale for salvaging and reclaiming with soils which have a higher rock fragment content (Davidson 1998). Although higher unacceptable thresholds were not set, the revised practice is to salvage suitable soil with higher amounts of rock content, perhaps as high as 50 to 60 percent for gravels and cobbles, and up to 35 percent for 10" to 24" stones, and up to 20 percent for small boulders.

All field and laboratory data have been analyzed and evaluated using standard soil suitability, interpretation, and classification criteria. Soils were classified according to current Soil Taxonomy criteria as stated in eighth edition of Keys to Soil Taxonomy (Soil Survey Staff 1998), and then correlated to NRCS soil series as possible.

Correlation of site-specific soils to NRCS soil series, if possible, allows use of established NRCS soil interpretation values such as hydrologic group number (for runoff evaluation), "K" factors (for use in water erosion hazard evaluations), and "WEG" group number (wind erodibility group status for wind erosion hazard evaluation) for the site-specific soils. In addition, one may quantitatively determine the "K" factor and "WEG" from use of the field and laboratory data and appropriate nomographs.

3.0 RESULTS AND DISCUSSION

3.1 REVIEW OF EXISTING SOILS INFORMATION

The soils within the Crandall Canyon Mine Disturbed Area Boundary have been previously inventoried. A general mapping of the soils in Crandall Canyon, at a scale of 1"=2000', was completed by the Forest Service as part of their soil survey in progress (Manti-LaSal National Forest 1995). This information is contained in the soil survey file at the Forest Service office in Price, Utah, and is also on file at the Andalex Resources office in Price.

Three map units were delineated by the Forest Service in the area: Map Unit 20 (Strych-Pathead-Podo Families-Rubbleland Complex, 30 to 80% slopes), Map Unit 107 (Curecanti-Elwood-Duchesne Families Complex, 20 to 70% slopes), and Map Unit 711 (Bundo-Lucky Star-Adel Families Complex, 30 to 70% slopes). Descriptions for these units are contained in the Crandall Canyon Mine PAP (Appendix 2-7, Soil Survey Information, Genwall Resources, Inc. - Crandall Canyon Mine, Mill Fork Lease Tract, Crandall/Huntington Canyon Areas).

In addition to the Forest Service soils information, portions of the proposed disturbed area were also mapped, sampled, and described by Mr. Randy Gainer, Mr. Chris Hansen, and Mr. David Steed (Crandall Canyon Mine, Proposed Culvert Expansion, Supplemental Soil Inventory, Appendix 2-3B, Revised 6-19-97). Most of this field work was conducted within the Proposed Culvert Disturbed Area with Map Units A and B delineated along two narrow stream terrace benches. The soils in Map Units A and B were described in the field and soil samples were analyzed by Inter-Mountain Laboratories in Farmington, New Mexico, but were not classified and correlated to soil series names. This work is depicted on the soils map previously presented as Plate 2-4 of the Crandall Canyon Mine PAP.

Only one sample site (TH-2) was located on the north-facing slope located on the south side of Crandall Creek within the Disturbed Area Boundary. No sample sites were located on the south-facing slope located north of Crandall Creek nor on the stream terrace located just west of the permit boundary. These areas (the north and south-facing slopes above Crandall Creek) retained the map unit numbers used in the Forest Service mapping (Map Units 107 and 711 for the north-facing slope, and Map Unit 20 for the south-facing slope). The stream terrace located just west of the permit boundary was included in Map Unit 711.

3.2 SOIL SURVEY MAP

As part of the current survey, a detailed soils map was completed in the field, at a scale of 1"= 50', on a topographic base map of the study area. The soils map is attached to this report. The legend on the map includes all map unit symbols and names, as well as the soil sample locations and site numbers.

Six map units were delineated within the current study area and will be described below. The map units are:

- Map Unit C, Pathead gravelly sandy loam, 40 to 70% slopes
- Map Unit D, Datino gravelly sandy loam, 20 to 35% slopes
- Map Unit RL-RO, Rubbleland-Rock Outcrop
- Map Unit REC, Reclaimed Land
- Map Unit E, Lucky Star loam, 40 to 80% slopes
- Map Unit F, Becks Family, 2 to 6% slopes

3.3 SOIL LABORATORY RESULTS

The soil laboratory data for the 15 sample locations is presented as Appendix A. A total of 28 soil samples were analyzed by Inter-Mountain Laboratories of Farmington, New Mexico. Six of the profiles (CC1 through CC6) fully sampled by major horizon. For all nine sample sites on the north-facing slope (GW-1 through GW-9), a composite sample of the upper two feet was collected for analysis.

The soil samples were analyzed by Inter-Mountain Laboratories (IML) in Farmington, New Mexico, and the results meet quality assurance and quality control (QA/QC) specifications. The results of a standard 10 percent rerun are very similar to the original results, and are included with the laboratory data in Appendix A.

3.4 SOIL MAP UNIT DESCRIPTIONS

The current study was conducted in order to obtain more site-specific data in the three areas mentioned above: (1) the south-facing slope on the north side of Crandall Creek, (2) the north-facing slope on the south side of Crandall Creek, and (3) the stream terrace just south of Crandall Creek located immediately west of the Disturbed Area Boundary at the Crandall Canyon Mine. The six map units are grouped according to the slope or terrace on which they appear. Map Units C, D, RO-RL, and REC are located on the south-facing slope. Map Unit E is located on the north-facing slope, and Map Unit F is located on the stream terrace of Crandall Creek just west of the Disturbed Area Boundary.

3.4.1 South-Facing Slope

The first area is the south-facing slope located upslope from the existing mine shop and the Forest Service trailhead parking area. Both the mine shop and the trailhead parking area are located on the extended upper pad at the mine. Elevations range from approximately 7870 to 7925 feet and are similar to those for the north-facing slope. Native vegetation is a mixture of Utah juniper, aspen, sagebrush, Douglas fir, wild rose, and grasses. Four hand-dug pits were described and sampled on this slope (CC-1, CC-2, CC-3, and CC-4). The "CC" prefix is for "Crandall Canyon".

3.4.1.1 Map Unit C, Pathead gravelly sandy loam, 40 to 70% slopes

Map Unit C is the largest and most dominant map unit on this south-facing slope. Three sample sites (CC-2, CC-3, and CC-4) are located in Map Unit C, and the soil correlates to the Pathead soil series. Pathead is well drained and is forming in residuum and colluvium from sandstone and shale. It classifies as a "Loamy-skeletal, mixed (calcareous) frigid Typic Ustorthent". Although usually a soil series is included in only one depth category, Pathead can range from moderately deep to deep (Manti-LaSal National Forest 1995).

Pathead has moderate permeability and available water capacity, and rapid runoff. Hydrologic group status is B or C. Rock fragments on the surface and in the surface layer average about 15 percent gravels, 13 percent cobbles, and 6 percent stones and boulders. The major rooting depth was observed to range from 20 to 29 inches. Soil erodibility is moderate, and the erosion hazard of exposed soil is moderate to high. Map Unit C is limited primarily by steep slopes and a moderate to high percentage of rock fragments throughout the Pathead soil profile.

3.4.1.2 Map Unit D, Datino gravelly sandy loam, 20 to 35% slopes

Map Unit D is located on a small fan-toeslope just above the trailhead parking area. Sample site CC-1 is located in Map Unit D, and the soil correlates to the Datino soil series. Datino is well drained and is forming in slopewash alluvium and colluvium from sandstone and shale. It was previously classified as a "Loamy-skeletal, mixed Typic Haploboroll" (Jensen and Borchert 1988), but due to recent changes in soil taxonomy, it now classifies as a "Loamy-skeletal, mixed Typic Haplustoll" (Soil Survey Staff 1998).

Datino is moderately permeable and has moderate to high available water capacity. The major rooting depth was observed to be 26 inches. The organic matter content of the surface layer was 3.6 percent. Hydrologic group status is B, runoff is rapid and the hazard of water erosion is high.

3.4.1.3 Map Unit RL-RO, Rubbleland-Rock Outcrop

Map Unit RL-RO occupies a small area on the west side of a drainage channel that exists upslope between the trailhead parking area and the mine shop. Rubbleland has many scattered surface stones and boulders. Rock outcrop is exposed sandstone. Small inclusions of the Pathead soil are intermingled throughout the unit. Pathead inclusions constitute about 15 percent of the unit.

3.4.1.4 Map Unit REC, Reclaimed Land

Map Unit REC (Reclaimed Land) is located on a narrow linear area in which a culvert was placed on the slope adjacent to the above-mentioned drainage. Soil was reapplied above the culvert and revegetation is present. No soil samples were taken of this reapplied topsoil. It is estimated that approximately six inches of soil was reapplied to this small area.

3.4.2 North-Facing Slope

The second part of the current study area is a very steep north-facing slope located on the south side of Crandall Canyon just above the lower and extended upper pads at the mine. Elevation ranges from approximately 7870 to 7960 feet. Native vegetation primarily is a mixture of Douglas fir and White fir communities.

Six backhoe pits (GW-1 through GW-6) were dug across the slope in an area where the slope had been cleared. The trees had been previously cut off at about one-foot height above the ground surface although the surface itself had not been disturbed. Three additional sample sites (GW-7, GW-8, and GW-9) were located and hand-dug in an adjacent forested area on the slope above the coal storage pile. As mentioned above, one previous soil sample site (TH-2) was also located on this north-facing slope.

3.4.2.1 Map Unit E, Lucky Star loam, 40 to 80% slopes

Map Unit E was designated for soils on this north-facing slope. Most of this slope was previously designated as Map Unit 711. The small portion of the slope previously mapped as Map Unit 107 was not part of the current survey and remains as Map Unit 107. Lucky Star was previously classified as a "Loamy-skeletal, mixed Boralfic Cryoboroll" (Manti-LaSal National Forest 1995), but due to recent changes in soil taxonomy it now classifies as a "Loamy-skeletal, mixed Ustic Haplocryoll" (Soil Survey Staff 1998).

Although Lucky Star is a deep soil, it ranges from moderately deep (20 to 40 inches to bedrock) to deep (40 to 60 inches to bedrock) on the study area. Permeability and available water capacity are both moderate, runoff is slow to medium, and hydrologic group status is B. Rock

fragment content of the surface layer averages about 13 percent and is equally divided among gravels, cobbles, and stones and boulders. The major rooting depth was observed to be 24 inches. Soil erodibility is low, and the erosion hazard of exposed soil is moderate to high. Map Unit E is limited by steep slopes.

3.4.3 Crandall Creek Stream Terrace

The third part of the current study area is a stream terrace located on the south side of Crandall Creek and just west of the mine permit area boundary. Elevation ranges from approximately 7890 to 7910 feet. Native vegetation includes Douglas fir, aspen, and mixed grasses. A portion of this bench appears to have been slightly disturbed at some time in the past, perhaps for a turn-around at the end of an old two-track road or to pile timber or slash, and it has been naturally somewhat revegetated with sparse young aspen.

Although the dominant soil on this terrace appears to be similar to those previously described and sampled as Map Units A and B, a separate unit (Map Unit F) was designated for soils on this particular stream terrace located just outside the mine permit area boundary. Two sample sites (CC-5 and CC-6) were located on this terrace.

3.4.3.1 Map Unit F, Becks Family, 2 to 6% slopes

Map Unit F is composed of one dominant soil, Becks Family, 2 to 6 percent slopes. Becks Family was previously classified as a "Loamy-skeletal, mixed Aquic Cryoboroll" (Manti-LaSal National Forest 1995), but due to recent changes in soil taxonomy it now classifies as a "Loamy-skeletal, mixed Fluvaquentic Haplocryoll" (Soil Survey Staff 1998).

In the study area, Becks Family is a deep, somewhat poorly drained soil with moderately rapid permeability, slow runoff, high available water supply but moderately low available water capacity, and hydrologic group status D. Rock fragment content of the surface layer is about 15 percent and is mainly gravels. The major rooting depth was observed to be between 17 and 26 inches. Soil erodibility and erosion hazard of the exposed soil is moderate.

3.5 SOIL PROFILE DESCRIPTIONS

Fifteen soil profiles (numbered GW-1 through GW-9 for soils on the north-facing slope, and CC-1 through CC-6 for soils on the south-facing slope and on the Crandall Creek stream terrace) were described and sampled at representative locations within Map Units C, D, E, and F in the study area. The soil profile descriptions are presented in field-notation tabular format in Table 3 of this report. A brief description of the profiles of the four major soils contained in the study area map units follows. The four soils are: Pathead gravelly sandy loam (Map Unit C), Datino gravelly

sandy loam (Map Unit D), Lucky Star loam (Map Unit E), and Becks Family gravelly sandy loam (Map Unit F).

3.5.1 Pathead gravelly sandy loam (Map Unit C)

As stated above, Pathead is classified as a "Loamy-skeletal, mixed (calcareous) frigid Typic Ustorthent". Typically, the "A" horizon surface layer is a brown (10YR 5/3, dry) gravelly sandy loam about 8 inches thick. For purposes of this project, the surface layer includes the true "A" horizon and a similar, immediately underlying, thin transition horizon to the soil substratum. Both of these horizons are grouped together as the "A" horizon. The surface layer has moderate, medium granular structure and neutral to mildly alkaline reaction (pH 7.3 to 7.7). Gravel content is about 15 to 20 percent. Cobbles, stones, and boulders account for an additional 15 to 27 percent.

The underlying "C" horizon substratum is divided into an upper ("C1") and lower ("C2") part. The "C1" upper substratum horizon begins at about 8 inches and ranges in depth from 15 to 29 inches with an average lower depth of 23 inches. Typically, the "C1" horizon is a brown (10YR 5/3, dry) very gravelly sandy loam to sandy clay loam with moderate, medium subangular blocky structure. It has mildly alkaline reaction (pH 7.4 to 7.8). Rock fragment content averages about 32 to 40 percent with about 20 percent gravel, 10 percent cobbles, and 2 to 10 percent stones and boulders.

The "C2" lower substratum horizon begins at the base of the "C1" horizon and generally extends to a depth of 40 inches or more. Typically, the "C2" horizon is a light brownish gray (10YR 6/2, dry) to brown (10YR 5/3. dry) very gravelly sandy clay loam to sandy loam with massive structure. It has mildly to moderately alkaline reaction (pH 7.8 to 8.2). Rock fragment content averages about 55 to 70 percent with 20 to 45 percent gravels, 15 percent cobbles, and 10 to 25 percent stones and boulders.

3.5.2 Datino gravelly sandy loam (Map Unit D)

The Datino soil is classified as a "Loamy-skeletal, mixed Typic Haplustoll". Typically, the surface layer is about 10 inches thick and is composed of an upper ("A1") and lower part ("A2"). It is a very dark grayish brown (10YR 3/2, dry), very dark brown (10YR 2/2, moist) gravelly sandy loam with moderate, medium granular structure and mildly alkaline reaction (pH 7.6 to 7.8). The surface layer meets criteria for a mollic epipedon. Gravel content averages about 15 percent. Cobbles average about 3 to 5 percent, and stones and boulders on the soil surface average about 10 percent.

A cambic "Bw" subsoil horizon underlies the surface layer. For sample site CC1 it extends from 10 to 26 inches in depth and is a yellowish brown (10YR 5/4, dry) sandy clay loam with moderate

medium subangular blocky structure and moderately alkaline reaction (pH 8.2). Total rock fragment content averages about 45 percent with 30 percent gravel, 10 percent cobbles, and 5 percent stones and boulders.

A substratum "C" horizon underlies the subsoil and extends to a depth of 40 inches or greater. It is a brown (10YR 5/3, dry) sandy clay loam with massive structure and moderately alkaline reaction (pH 8.3). Total rock fragment content averages about 45 percent with 30 percent gravels, 10 percent cobbles, and 5 percent stones and boulders.

3.5.3 Lucky Star loam (Map Unit E)

The Lucky Star soil is now classified as a "Loamy-skeletal, mixed Ustic Haplocryoll". Typically, the "A" horizon surface layer is a dark brown (10YR 4/3, dry) loam about 7 inches thick with moderate, medium granular structure and neutral reaction (pH 7.2). Rock fragment content averages about 12 percent with 5 percent gravels, 2 percent cobbles, and 5 percent stones and boulders. The surface layer meets criteria for a mollic epipedon. Along the north-facing slope, the surface layer is overlain by about 1.5 to 2 inches of semi-decomposed needles and twigs comprising an "Oe" horizon.

A cambic "Bw" subsoil horizon often underlies the surface layer and is a yellowish brown (10YR 5/4, dry) loam with moderate, medium subangular blocky structure and neutral reaction. It extends from the base of the surface layer to a depth ranging between 18 and 26 inches [illegible] a similar rock fragment content as the surface layer. Remnants of a thin eluvial "E" horizon are often found mixed in with the upper part of the "Bw" horizon.

A "C" horizon substratum layer underlies the subsoil and extends to a depth ranging between 30 and 60 inches or more. Along the north-facing slope, weathered coal is often encountered at the base of the soil substratum. The "C" horizon is old colluvial material that has slide downslope and covered the coal layer. The "C" horizon is a light brownish gray (10YR 6/2, dry) very stony sandy loam to sandy clay loam with massive structure. Rock fragment content averages 50 to 75 percent with about 15 percent gravels, 10 percent cobbles, and 35 to 50 percent stones and boulders.

3.5.4 Becks Family gravelly sandy loam (Map Unit F)

The Becks Family soil is now classified as a "Loamy-skeletal, mixed Fluvaquentic Haplocryoll". Typically, the surface layer is a dark grayish brown (10YR 4/2, dry) gravelly sandy loam about 7 to 10 inches thick. It has moderate medium granular structure and neutral to mildly alkaline reaction (pH 6.9 to 7.4). Rock fragment content of the surface layer is only about 15 percent and is 10 percent gravels, 2 to 3 percent cobbles, and 1 to 2 percent stones and boulders. The surface layer meets criteria of a mollic epipedon.

A "BC" subsoil horizon or an upper "C" horizon substratum layer underlies the surface layer. Typically, it is a grayish brown (10YR 5/2, dry) to light yellowish brown (10YR 6/4, dry) very gravelly sand to gravelly sandy loam that extends from the base of the surface layer to a depth of 17 to 26 inches. It has single grain to massive structure and neutral to mildly alkaline reaction (pH 7.2 to 7.8). Rock fragment content varies across the terrace and can range from 18 to 67 percent based on data from the CC5 and CC6 sample sites. Gravel can range from 15 to 55 percent; cobbles from 2 to 10 percent; and stones and boulders from 1 to 2 percent.

The underlying "C" horizon, or lower "C" horizon, substratum extends from the base of the overlying horizon to a depth of 40 inches or more. Typically, it is a very gravelly light brownish gray (10YR 6/2, dry) to dark gray (10YR 4/1, dry) sandy loam with massive structure and mildly alkaline reaction (pH 7.5 to 7.8). The dark gray color of at sample site CC5 is a "low chroma" redoximorphic feature which is consistent with a fluctuating water table beneath this stream terrace. Alluvial groundwater was estimated at the time of sampling to be at about 26 and 30 inches, respectively, for sample sites CC5 and CC6. Rock fragment content ranges from 45 to 55 percent with 30 to 40 percent gravels, 10 percent cobbles, and 5 percent stones and boulders.

3.6 SOIL SUITABILITY, RECOMMENDED SALVAGE DEPTHS, AND SOIL VOLUMES

A reclamation potential suitability evaluation for each soil profile in all study area Map Units was performed based on comparison of site-specific field and laboratory data with criteria and threshold values contained in the UDOGM table "Overburden Evaluation for Vegetative Root Zone" (Leatherwood and Duce 1988). As previously noted, the UDOGM table is included as Table 2 in this report. The results of the suitability evaluation indicate the following.

3.6.1 Map Unit C, Pathead gravelly sandy loam, 40 to 70% slopes

The entire Pathead profile is both non-saline (EC< 1.9) and non-sodic (SAR< 1.1). Calcium carbonate content averages about 25 percent and ranges from 16 to 33 percent. Clay content averages 17 percent and ranges from 11 to 21 percent. Rock fragment content ranges from about 30 to nearly 50 percent for the surface layer, from about 32 to 40 percent for the upper "C" horizon substratum layer, and from about 55 to 70 percent for the lower "C" horizon substratum layer. Organic matter percent averages about 2.6 percent for the surface layer, just under 2 percent for the upper substratum "C1" layer, and about 1.1 percent for the lower substratum "C2" layer. Both Boron and Selenium contents are very low, less than 0.5 mg/Kg (ppm) and 0.02 mg/Kg (ppm) respectively.

In terms of soil suitability, the surface and upper substratum layers, to an average depth of 23 inches, is entirely "good" or "fair" rated assuming that its' 30 to 50 percent rock fragments,

3.6.4 Map Unit REC, Reclaimed Land

If Map Unit REC were to be re-disturbed, it is estimated that approximately 6 inches of suitable soil material may be available for salvage from above the drainage culvert. Soil volume can be calculated subsequent to finalization of expansion plans.

3.6.5 Map Unit E, Lucky Star loam, 40 to 80% slopes

The Lucky Star profile is both non-saline and non-sodic. Organic matter content of the upper 2 feet averages 4.1 percent and ranges from 3.1 to 4.9 percent. Calcium carbonate content of the upper 2 feet averages 12.6 percent and ranges from 6 to 18 percent. Clay content of the upper 2 feet averages 21.8 percent and ranges from 18 to 30 percent. Rock fragment content averages about 12 percent for the upper 2 feet, and about 50 to 75 percent from 2 feet until bedrock is encountered with 35 to 50 percent of these lower rock fragments being stones and boulders. Both Boron and Selenium content are very low with less than 0.5 mg/Kg (ppm) and 0.02 mg/Kg (ppm) respectively.

In terms of soil suitability, the approximate upper 2 feet is entirely suitable for salvage assuming equipment can operate on this very steep slope. Rock fragment content, particularly stones and boulders, are limiting below 2 feet, and water erosion and landslide hazard would increase with deeper salvage. As a result, up to 2 feet of suitable soil is available for salvage from Map Unit E. Soil volumes could be calculated subsequent to finalization of expansion plans.

3.6.6 Map Unit F, Becks Family gravelly sandy loam, 2 to 6% slopes

The entire Becks Family profile is both non-saline (EC< 1.7) and non-sodic (SAR< 0.9). Calcium carbonate content averages about 13 percent, and ranges from 11 to 16 percent. Clay content averages about 13 percent, and ranges from 5 to 17 percent. Rock fragment content of the surface layer averages about 15 percent, and is mainly gravels. It increases with depth from 18 to nearly 70 percent, again mainly gravels. Organic matter content of the surface layer ranges from 2.4 to 3.2 percent. It varies irregularly with depth and ranges from 0.3 to 3.8 percent beneath the surface layer. Both Boron and Selenium contents are very low, less than 0.4 mg/Kg (ppm) and 0.02 mg/Kg (ppm) respectively.

In terms of soil suitability, the surface layer, on average about 8.5 inches thick, is entirely suitable for salvage. The underlying "BC" or upper "C" horizon, to a depth of 17 to 26 inches, can have very gravelly sand texture which is rated unnacceptable, and in addition, has poor rated available water capacity. A fluctuating water table is encountered at the base of this "BC" or upper "C" horizon, on average at about 21 inches. As a result, only the upper 8.5 inches of soil is available for salvage should this stream terrace be proposed for disturbance. Soil volumes could be calculated subsequent to finalization of expansion plans.

4.0 REFERENCES

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TABLE 1

Parameters and Analytical Procedures for Soil Analysis

Taken from UDOGM "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining (Leatherwood and Duce 1988), and Inter-Mountain Laboratories, Inc., Standard Methods and Procedures

Parameter-Units	Procedure-Reference
Sample Preparation	Samples were air dried at less than 35°C. Clods were broken up prior to grinding and sieving the sample. Large rock fragments were removed and weighed. Sample material was sieved. Remaining rock fragments left on the 10 mesh (2 mm) sieve were removed and weighed. Remaining soil clods left on the 10 mesh screen were ground until the sample just passed the screen. Excessive grinding of sample material was avoided during the entire sample preparation procedure.
Subsampling less than 2 mm fraction	U.S. Salinity Lab (1969), Method 1.
Rock fragment content percent by volume	SCS Soil Survey Investigation Report No. 1, Method 3B, page 18.
Preparation of saturation extract and saturation percentage determination	ASA Mono. No. 9, Part 2, (2 ed). 1982. Method 10-2.3.1, page 169.
pH (determination using saturated paste)	ASA Mono. No. 9, Part 2, (2 ed). 1982. Method 10-3.2, page 171. pH performed on saturation paste, method 10-2.3.1, page 169.
Conductivity of saturation extract in mmhos/cm at 25°C	ASA Mono. No. 9, Part 2, (2 ed). 1982. Method 10-3.3, pages 172-173. Use saturation paste extract.
soluble calcium, magnesium, and sodium in meq/l	ASA Mono. No. 9, Part 2, (2 ed). 1982. Method 10-3.4. pages 173-174.
Sodium Adsorption Ratio	U.S. Salinity Lab (1969), p. 26.
Selenium (ppm)	Extraction: ASA Mono. No. 9, Part 2, (2 ed). 1982. Method 25-9.1. Analysis: Hydride AA, ASTM D3859-93. 1993.
Boron (ppm)	Extraction: ASA Mono. No. 9, Part 2, (2 ed). 1982. Method 25-9.1. Analysis: by ICP, EPA Method 200.7.
Organic Matter in percent	For OM <7.0%: CSU Tech Bulletin LT B88-2 (1988); For OM > 7.0%: Storer (1984)
Carbonate in percent	ASA Mono. No. 9, Part 2, (2 ed). 1982. Method 11-2.4, pages 188-191.
Particle size analysis in percent sand, silt, and clay	Hydrometer method. Black et al. 1965. Methods of soil analysis. ASA Mono No. 9, Part 1, method 43-5, pages 562-566.
Textural classification	USDA (1951), p. 209.
Sand Fractionation (very fine sand)	ASA Mono. No. 9, Part 1, (2 ed). 1986. Method 15-5.2.4, Pages 405 and 406.

TABLE 2

SOIL SUITABILITY CRITERIA

Parameters	Good	Fair	Poor	Unacceptable
pH	6.1 - 8.2	5.1 - 6.1 8.2 - 8.4	4.5 - 5.0 8.5 - 9.0	<4.5 >9.0
EC mmhos/cm 25°C	0 - 2	2 - 8	8 - 15	>15
Saturation %	25% - 80%		<25% >80%	
Texture	sl, l, sil, scl, vfsl, fsl	c, sicl, sc, ls, lfs	sic, s, sc, c, cos, fs, vfs	g, vcos
SAR	0 - 4	5 - 10	10 - 12 fine texture 10 - 15 coarse texture	>12 fine texture >15 coarse texture
Selenium	less than 0.1 mg/kg			>0.1 mg/kg
Boron	less than 5.0 mg/kg			>5.0 mg/kg
Acid/Base Potential	> -5 tons $CaCO^3$ per 1,000 tons material			< -5 tons $CaCO^3$ per 1,000 tons material
% Coal fines	undetermined at this time			
Available water capacity (in/in)	>0.10	0.05 - 0.10	<0.05	
Rock Fragments (% volume)				
<3 inches diameter	0 - 15	15 - 25	25 - 30	>30
3 - 10 inches	0 - 15	15 - 25	25 - 30	>30
>10 inches	0 - 3	3 - 7	7 - 10	>10

UDOGM: Overburden Evaluation for Vegetative Root Zone; Table 2 (Leatherwood and Duce 1988).

TABLE 3

SOIL PROFILE DESCRIPTIONS

Horizon[2]	Depth Inches[2]	Texture[3]	Color[4]		Structure[5]	Consistence[6]			Roots[7]	Rock Fragments[8] %	Reaction[9]	Boundary[10]	Additional Features and Comments
			Dry	Moist		Dry	Moist	Wet					
CC4 Pathead, Map Unit C													
A	0-8	Sandy Loam	10YR 5/3	10YR 4/3	M M GR	SO	VFR	SS/SP	Many M, F, VF and Com CO	20 GR, 25 CB, 2 S/B	ES	CS	
C1	8-25	Sandy Loam	10YR 5/2	10YR 4/2	M M SBK	SH	VFR	SS/SP	Many M, F, VF and Com CO	20 GR, 10 CB, 2 S/B	ES	GW	
C2	25-43+	Sandy Loam	10YR 5/3	10YR 4/3	Massive	H	FR	S/SP	Few CO, M, F, VF	45 GR, 15 CB, 10 S/B	ES	--	
	stopped by rocks												
CC5 Becks Family, Map Unit F													
A	0-10	SL	10YR 4/2	10YR 3/2	M M GR	SO	VFR	SS/SP	Many M, F, VF Few CO	10 GR, 3 CB, 2 S/B	EM	CW	
C1	10-26	LS, Sand	10YR 6/4	10YR 5/4	Massive	LO	LO	NS/NP	Many M, F, VF Few CO	55 sub-rounded gravel, 10 CB, 2 S/B	ES	CW	
C2g	26-44	SL	10YR 4/1	10YR 3/1	Massive	H	FI	S/SP		30 GR, 10 CB, 5 S/B	ES	--	
	stopped by rocks												

TABLE 3

SOIL PROFILE DESCRIPTIONS FOOTNOTES

1 Soil Series, and Soil Classification according to current NRCS information and criteria. Soil classification based on Keys to Soil Taxonomy, eighth edition (Soil Survey Staff 1998).

2 Horizon and Depth based on site-specific conditions at the sample location.

3 Texture and texture modifier abbreviations:

S	Sand	SCL	Sandy Clay Loam	CB	Cobbly	GR	Gravely
LS	Loamy Sand	CL	Clay Loam	CBV	Very Cobbly	GRV	Very Gravely
SL	Sandy Loam	SICL	Silty Clay Loam	CBX	Extremely Cobbly	GRX	Extremely Gravely
L	Loam	SIC	Silty Clay	CN	Channery	SH	Shaley
SIL	Silt Loam	C	Clay	CNV	Very Channery	SR	Stratified
SI	Silt			CNX	Extremely Channery		

4 Color, Dry and Moist: Munsell Soil Color Chart, 1975 Edition.

5 Structure:

Grade	Size	Type
W Weak	VF Very Fine	PL Platy
M Moderate	F Fine	GR Granular
S Strong	M Medium	SBK Subangular Blocky
	CO Coarse	ABK Angular Blocky
	VCO Very Coarse	PR Prismatic
		W Massive Weak Massive Massive
		S Massive Strong Massive
		SG Single Grained
		Cloddy

6 Consistency:

Dry		Moist		Wet	
LO	Loose	LO	Loose	NS	Non Sticky
SO	Soft	VFR	Very Friable	SS	Slightly Sticky
SH	Slightly Hard	FR	Friable	S	Sticky
H	Hard	FI	Firm	VS	Very Sticky
VH	Very Hard	VFI	Very Firm	NP	Non Plastic
EH	Extremely Hard	EFI	Extremely Firm	SP	Slightly Plastic
				P	Plastic
				VP	Very Plastic

7 Roots:

Number	Type
Very Few	VF Very Fine
Few	F Fine
Com (Common)	M Medium
Many	CO Coarse

Roots are described in terms of a specified size (type) and quantity (number). The size classes are:

Very Fine: Less than 1 mm in diameter
Fine: 1 to 2 mm in diameter
Medium: 2 to 5 mm in diameter
Coarse: 5 mm or larger in diameter
Roots larger than 10 mm in diameter may be described separately.

Quantity classes or roots are defined in terms of numbers of each size per unit area--1 square centimeter for very fine and fine roots, and 1 square decimeter for medium and coarse roots. All roots smaller than 10 mm in diameter are described in terms of the following quantity classes:

Few: Less than 1 per unit area of the specified size
Common: 1 to 5 per unit area of the specified size
Many: More than 5 per unit area of the specified size
Roots are described as to number first, and type second.

[8] Rock Fragments: All coarse fragment percentages (% by volume) are taken from the field soil profile descriptions. Lithologic modifier types (gravelly, channery, etc.) are also taken from the field soil profile description forms for each sampled profile.

[9] Reaction:

Effervescence		Reaction		pH
		Str. Acid	Strongly Acid	5.1 - 5.5
		Mod. Acid	Moderately Acid	5.6 - 6.0
EO	Non-Effervescent	Sl. Acid	Slightly Acid	6.1 - 6.5
SE	Slightly Effervescent	Neutral	Neutral	6.6 - 7.3
EM	Moderately Effervescent	Mild. Alk.	Mildly Alkaline	7.4 - 7.8
ES	Strongly Effervescent	Mod. Alk.	Moderately Alkaline	7.9 - 8.4
EV	Violently Effervescent	Strong Alk.	Strongly Alkaline	8.5 - 9.0
		Very Strong Alk.	Very Strongly Alkaline	>9.0

[10] Horizon Boundaries:

Distinctness	Topography
A Abrupt (<2 cm thick)	S Smooth (the boundary is a plane with few or no irregularities)
C Clear (2 to 5 cm thick)	W Wavy (the boundary has undulations in which depressions are wider than they are deep)
G Gradual (5 to 15 cm thick)	I Irregular (the boundary has pockets that are deeper than they are wide)
D Diffuse (>15 cm thick)	B Broken (at least one of the horizons or layers separated by the boundary is discontinuous and the boundary is interrupted).

APPENDIX A

SOIL LABORATORY DATA

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

Andalex Resources, Inc.

Price, UT

Client Project ID: Genwal/Himonas

Date Received: 08/26/98

IML Project #0398S04914

Report Date: 09/18/98

Lab Id	Sample Id	Depths Feet	pH s.u.	EC mmhos/cm	Saturation %	Ca meq/L	Mg meq/L	Na meq/L	SAR	Sand %	Silt %	Clay %	Texture USDA	CaCO3 %
0398S04914	GW-1	0 - 2	7.2	0.582	45	4.4	1.3	0.43	0.26	46	35	19	L	6.0
0398S04915	GW-2	0 - 2	7.1	0.464	44	3.5	1.2	0.53	0.34	36	38	26	L	16
0398S04916	GW-3	0 - 2	7.2	0.507	50	3.5	1.6	0.46	0.29	34	36	30	CL	12
0398S04917	GW-4	0 - 2	7.0	0.561	42	4.1	1.5	0.40	0.24	44	35	21	L	17
0398S04918	GW-5	0 - 2	7.3	0.550	53	4.5	1.1	0.33	0.20	42	38	20	L	18
0398S04919	GW-6	0 - 2	7.1	0.550	52	4.3	1.5	0.37	0.22	38	37	25	L	11
0398S04920	GW-7	0 - 2	7.3	0.485	41	4.0	1.1	0.37	0.24	50	32	18	L	9.2
0398S04921	GW-8	0 - 2	7.3	0.518	44	4.5	1.3	0.28	0.16	48	33	19	L	15
0398S04922	GW-9	0 - 2	7.2	0.485	37	3.9	1.2	0.37	0.23	52	30	18	SL	8.8

Inter-Mountain Laboratories, Inc.

2506 West Main Street | Farmington, New Mexico 87401 | Tel. (505) 326-4737

Andalex Resources, Inc.

Price, UT

Client Project ID: Genwal/Himonas

Date Received: 08/26/98

IML Project #0398S04914

Report Date: 09/18/98

Lab Id	Sample Id	Depths Feet	Boron Soluble mg/Kg	Selenium AB-DTPA mg/Kg	TKN %	Nitrogen Nitrate mg/L	TOC %	Organic Matter %	Exch. Sodium %	1/3 bar water %	15 bar water %
0398S04914	GW-1	0 - 2	0.3	<0.01	0.15	0.7	2.2	3.8		24.2	10.8
0398S04915	GW-2	0 - 2	0.3	<0.01	0.13	0.5	2.2	3.8		21.0	13.3
0398S04916	GW-3	0 - 2	0.4	<0.01	0.20	0.7	2.7	4.7		24.0	16.7
0398S04917	GW-4	0 - 2	0.3	<0.01	0.14	0.5	2.5	4.3		21.9	11.4
0398S04918	GW-5	0 - 2	0.5	<0.01	0.23	2.6	2.9	4.9		27.9	15.5
0398S04919	GW-6	0 - 2	0.2	<0.01	0.21	0.7	2.9	4.9		27.2	16.7
0398S04920	GW-7	0 - 2	<0.2	<0.01	0.12	2.0	2.2	3.8		22.1	9.9
0398S04921	GW-8	0 - 2	0.3	<0.01	0.15	0.6	2.3	3.9		23.5	10.1
0398S04922	GW-9	0 - 2	0.2	0.02	0.10	1.0	1.8	3.1		19.6	8.4

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

Andalex Resources, Inc.

Price, UT

Crandall Canyon Mine

Client Project ID: Genwal Resources

Date Received: 11/05/98

IML Project #0398S06538

Report Date: 11/30/98

Lab Id	Sample Id	Depths	pH	EC	Saturation	Ca	Mg	Na	SAR	Sand	Silt	Clay	Texture USDA	Very Fine Sand
		inch	s.u.	mmhos/cm	%	meq/L	meq/L	meq/L		%	%	%		%
0398S06536	CC1	0 - 5	7.6	1.05	40	3.9	2.0	7.5	4.4	54	29	17	SL	15
0398S06537	CC1	5 - 10	7.8	1.64	31	3.3	1.2	19	13	56	26	18	SL	16
0398S06538	CC1	10 - 26	8.2	0.94	28	9.0	1.3	12	5.5	52	25	23	SCL	13
0398S06539	CC1	26 - 45	8.3	0.80	28	7.7	1.4	10	4.9	54	25	21	SCL	14
0398S06540	CC2	0 - 8	7.8	0.66	33	5.7	1.3	0.78	0.42	58	25	19	SL	12
0398S06541	CC2	8 - 15	7.7	0.55	35	4.7	1.2	0.71	0.42	56	24	20	SCL	11
0398S06542	CC2	15 - 40	7.8	1.90	38	12	6.6	3.2	1.1	58	21	21	SCL	9
0398S06543	CC3	0 - 9	7.7	0.62	38	5.5	1.0	0.50	0.28	56	27	17	SL	14
0398S06544	CC3	9 - 29	7.8	0.57	39	4.7	0.97	0.70	0.42	54	27	19	SL	11
0398S06545	CC3	29 - 54	8.2	0.56	26	1.9	4.1	1.4	0.80	52	37	11	SL	18
0398S06546	CC4	0 - 8	7.3	0.72	34	8.2	1.2	0.50	0.26	62	25	13	SL	14
0398S06547	CC4	8 - 25	7.4	0.72	35	6.9	1.4	0.63	0.31	60	23	17	SL	14
0398S06548	CC4	25 - 43	7.7	0.44	33	4.6	1.3	0.82	0.48	58	25	17	SL	14
0398S06549	CC5	0 - 10	7.4	0.84	35	6.4	0.69	0.39	0.21	68	21	11	SL	12
0398S06550	CC5	10 - 26	7.8	0.36	25	3.1	0.72	0.48	0.35	88	7	5	S	3
0398S06551	CC5	26 - 44	7.8	0.40	33	3.1	1.4	0.87	0.58	64	19	17	SL	11
0398S06552	CC6	0 - 7	6.9	1.08	41	12	1.6	0.51	0.20	68	19	13	SL	13
0398S06553	CC6	7 - 17	7.2	0.93	48	10	1.5	0.55	0.23	64	21	15	SL	14
0398S06554	CC6	17 - 42	7.5	1.68	34	13	5.6	2.9	0.94	68	17	15	SL	14

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

Andalex Resources, Inc.

Price, UT

Crandall Canyon Mine

Client Project ID: Genwal Resources

Date Received: 11/05/98

IML Project #0398S06536

Report Date: 11/30/98

Lab Id	Sample Id	Depths inch	CaCO3 %	Boron Soluble mg/Kg	Selenium AB-DTPA mg/Kg	TKN %	Nitrogen Nitrate mg/L	TOC %	Organic Matter %	1/3 bar water %	15 bar water %
0398S06536	CC1	0 - 5	15	1.0	<0.01	0.24	<0.2	2.1	3.6	21.8	12.5
0398S06537	CC1	5 - 10	15	0.8	<0.01	0.15	<0.2	1.6	2.7	21.3	11.2
0398S06538	CC1	10 - 26	17	<0.4	<0.01	0.09	<0.2	1.1	1.9	21.6	11.9
0398S06539	CC1	26 - 45	17	<0.4	<0.01	0.08	<0.2	0.9	1.6	20.8	11.6
0398S06540	CC2	0 - 8	26	0.5	<0.01	0.13	1.2	1.6	2.8	17.3	9.3
0398S06541	CC2	8 - 15	23	<0.4	<0.01	0.11	1.2	1.2	2.1	16.7	9.8
0398S06542	CC2	15 - 40	33	<0.4	<0.01	0.07	<0.2	0.7	1.3	18.1	10.6
0398S06543	CC3	0 - 9	24	0.4	<0.01	0.14	<0.2	1.3	2.2	18.9	10.0
0398S06544	CC3	9 - 29	25	<0.4	<0.01	0.10	1.1	1.1	1.8	17.7	11.0
0398S06545	CC3	29 - 54	31	0.4	<0.01	0.02	1.4	0.2	0.3	14.6	5.1
0398S06546	CC4	0 - 8	16	<0.4	<0.01	0.14	1.3	1.6	2.7	16.3	6.8
0398S06547	CC4	8 - 25	22	<0.4	0.02	0.12	1.5	1.2	2.0	17.1	8.1
0398S06548	CC4	25 - 43	25	<0.4	0.02	0.09	1.1	1.0	1.7	14.5	7.3
0398S06549	CC5	0 - 10	13	<0.4	0.02	0.10	1.6	1.4	2.4	15.9	7.1
0398S06550	CC5	10 - 28	16	<0.4	0.01	0.02	<0.2	0.2	0.3	6.2	2.1
0398S06551	CC5	28 - 44	14	<0.4	<0.01	0.07	1.0	0.7	1.3	15.5	6.6
0398S06552	CC6	0 - 7	11	<0.4	0.01	0.15	1.2	1.8	3.2	18.4	10.2
0398S06553	CC6	7 - 17	12	<0.4	<0.01	0.19	1.4	2.2	3.8	23.1	13.4
0398S06554	CC6	17 - 42	11	<0.4	<0.01	0.07	1.0	1.1	1.8	18.3	7.2

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

Andalex Resources, Inc.

Price, UT

Crandall Canyon Mine

Client Project ID: Genwal Resources

Date Received: 11/05/98

IML Project #0398S06536

Report Date: 11/30/98

Lab Id	Sample Id	Depths	pH	EC	Saturation	Ca	Mg	Na	SAR	Sand	Silt	Clay	Texture USDA	Very Fine Sand
		inch	s.u.	mmhos/cm	%	meq/L	meq/L	meq/L		%	%	%		%
0396S06539	CC1	26 - 45	8.3	0.80	28	7.7	1.4	10	4.9	54	25	21	SCL	14
0398S06539D	CC1	26 - 45	8.3	0.80	32	7.8	1.4	11	5.0	54	25	21	SCL	13
0398S06551	CC5	26 - 44	7.8	0.40	33	3.1	1.4	0.87	0.58	64	19	17	SL	11
0398S06551D	CC5	26 - 44	7.8	0.41	33	3.1	1.4	0.93	0.62	64	20	16	SL	11

Inter-Mountain Laboratories, Inc.

2506 West Main Street Farmington, New Mexico 87401 Tel. (505) 326-4737

Andalex Resources, Inc.

Price, UT

Crandall Canyon Mine

Client Project ID: Genwal Resources

Date Received: 11/05/98

IML Project #0398S06536

Report Date: 11/30/98

Lab Id	Sample Id	Depths	CaCO3	Boron Soluble	Selenium AB-DTPA	TKN	Nitrogen Nitrate	TOC	Organic Matter	1/3 bar water	15 bar water
		inch	%	mg/Kg	mg/Kg	%	mg/L	%	%	%	%
0398S06539	CC1	26 - 45	17	<0.4	<0.01	0.08	<0.2	0.9	1.6	20.8	11.6
0398S06539D	CC1	26 - 45	17	<0.4	<0.01	0.08	<0.2	0.9	1.6	21.3	11.4
0398S06551	CC5	26 - 44	14	<0.4	<0.01	0.07	1.0	0.7	1.3	15.5	6.6
0398S06551D	CC5	26 - 44	13	<0.4	<0.01	0.07	1.0	0.8	1.3	15.9	6.5

Fax Cover Sheet

kinko's

226 East Harmony Road
Fort Collins, Colorado 80525
Tel: (970) 223-3915
Fax: (970) 223-3519

Date: 3-1-02

To: DAVE SHAVER

Company: WEST RIDGE RESOURCES

Fax: 435 564 4002

From: JIM NYENHUIS

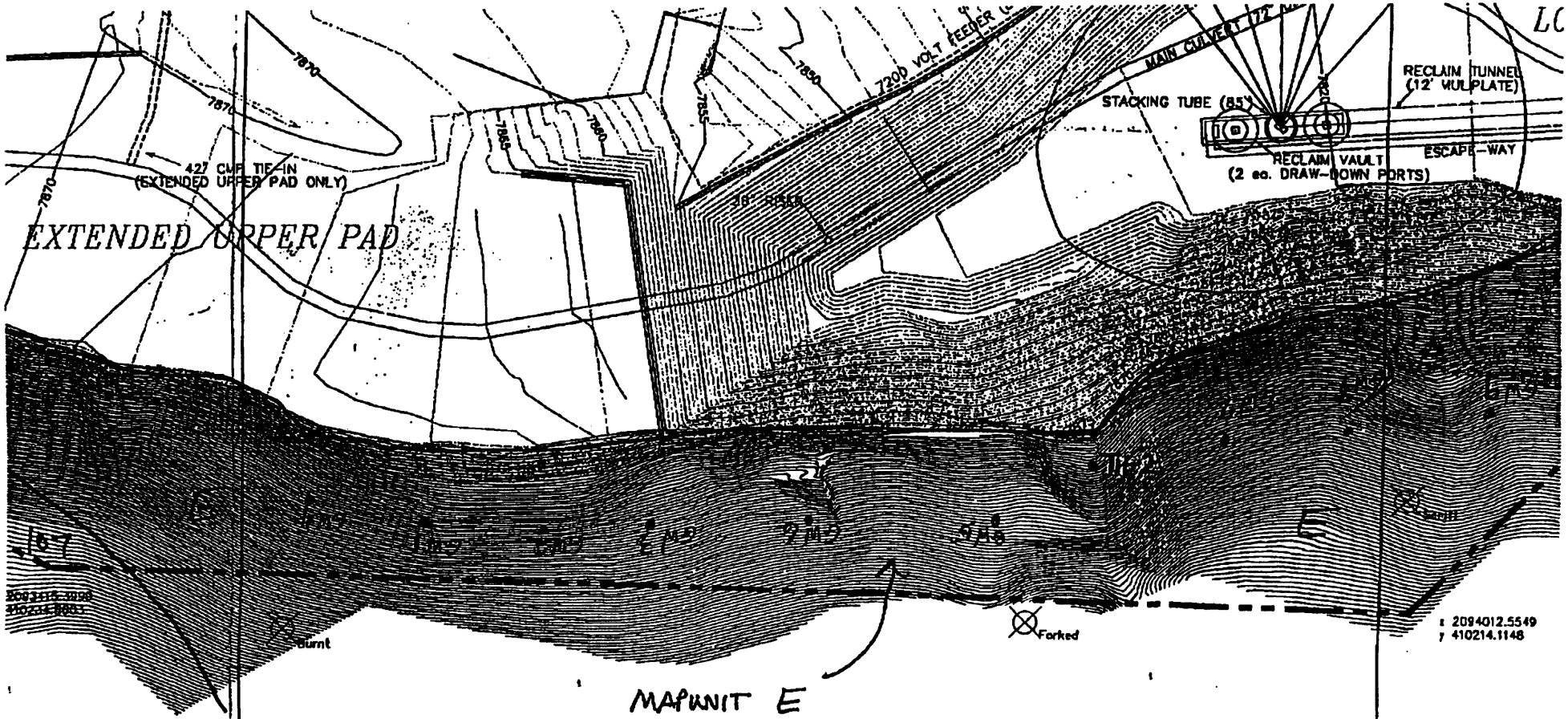
Company: SOIL SCIENTIST

Tel: 970 204 9167

Number of pages including this one: _____

Comments:

north slope
Crandal Canyon
soils



LEGEND:

JERSEY BARRIER

EXISTING ROAD LIMITS

Fax Cover Sheet

kinko's

226 East Harmony Road
Fort Collins, Colorado 80525
Tel: (970) 223-3975
Fax: (970) 223-3519

Date: 3-2-02

To: DAVE SHAVER

Company: WEST RIDGE RESOURCES

Fax: 435 564 4002

From: JIM NYENHUIS

Company: SOIL SCIENTIST

Tel: 970 204 9167

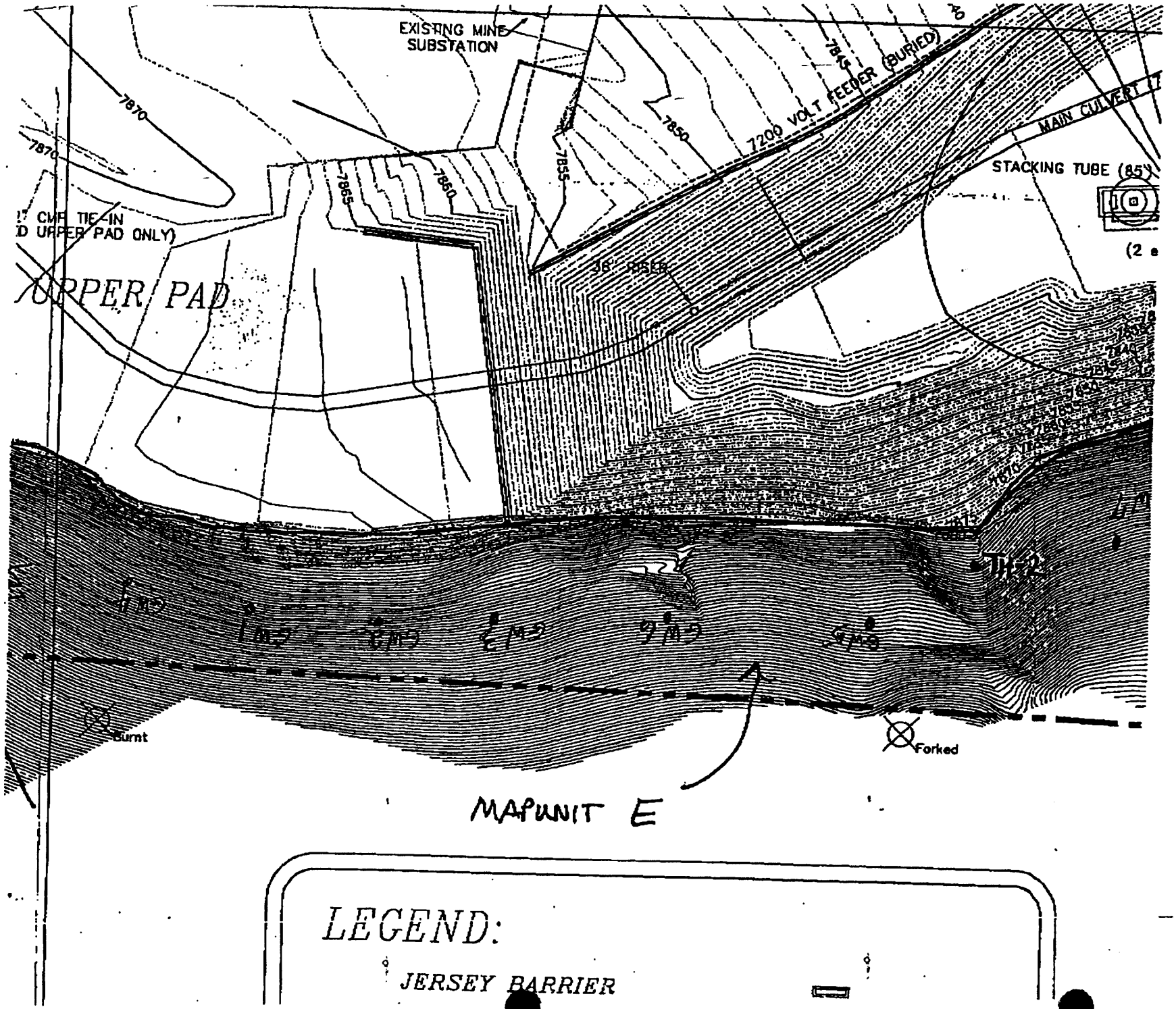
Number of pages including this one: _____

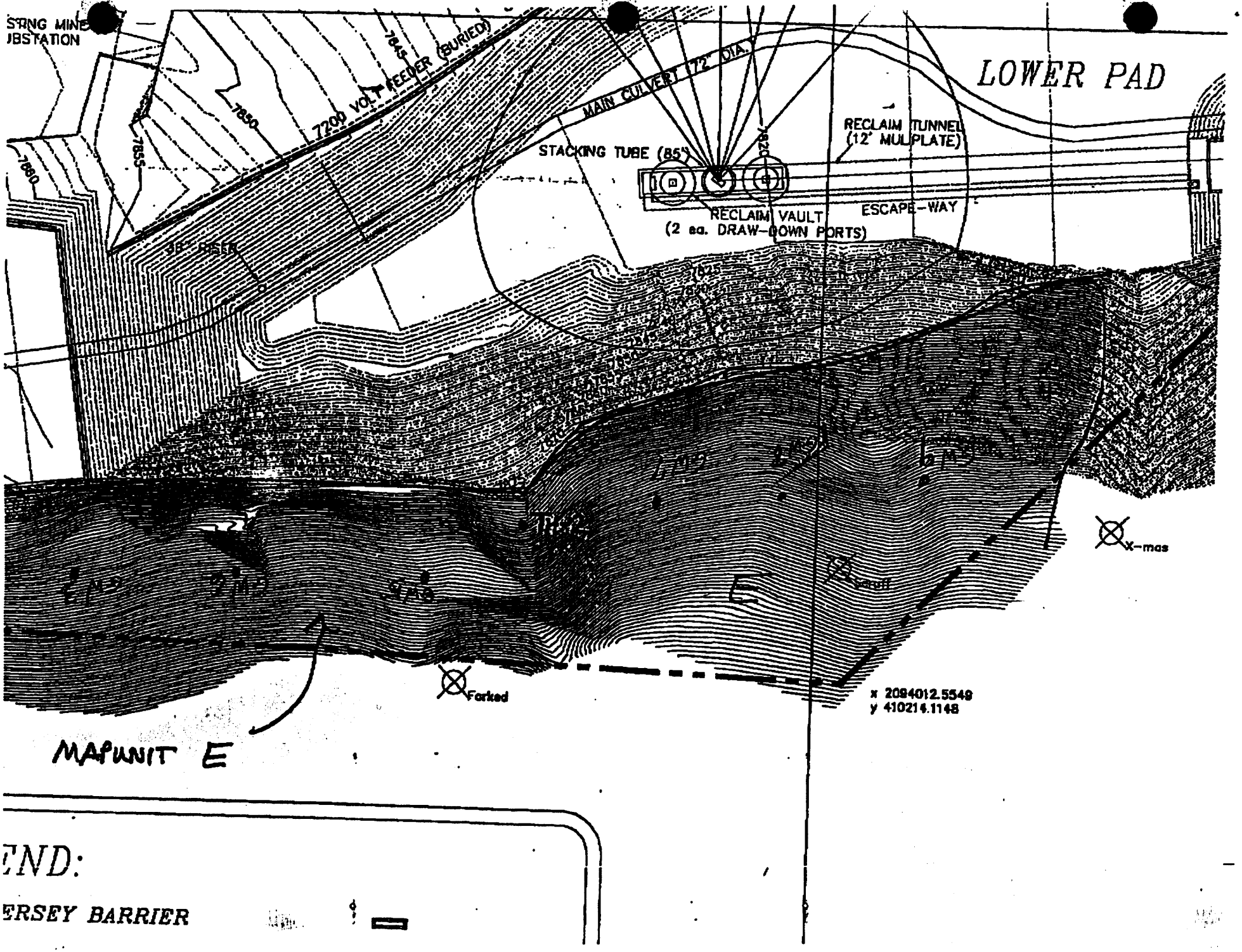
Comments:

I am refaxing the map in 2 parts to make sure you get it all.

Jim N.

Call if you need to.


EXISTING MINE SUBSTATION
7870
7870
7865
7860
7855
7850
7845
7200 VOLT FEEDER (BURIED)
MAIN CULVERT
STACKING TUBE (85')
36" RISER
UPPER PAD
TH-2
Burnt
Forked
MAPUNIT E
LEGEND:
JERSEY BARRIER


STRING MINE
UBSTATION
7845
7200 VOLT FEEDER (BURIED)
MAIN CULVERT 72" DIA.
LOWER PAD
7850
7855
7860
7820
RECLAIM TUNNEL
(12' MULPLATE)
STACKING TUBE (85')
RECLAIM VAULT
(2 ea. DRAW-DOWN PORTS)
ESCAPE-WAY
38" RISER
7825
7800
7795
7790
1 M2
4 M2
6 M2
4 M2
3 M2
2 M2
E
Vault
x-mas
Forked
x 2094012.5549
y 410214.1148
MAPUNIT E
END:
ERSEY BARRIER

APPENDIX 2-7

GEOTEXTILE PROPERTIES

4/05/2003

The geotextile fabric will have the following minimum properties:

MECHANICAL PROPERTIES		UNITS
Grab Tensile Strength		
ASTM D 4632		
MD @ Utlimate	0.89 (200	kN (lbs)
CMD @ Ultimate	0.89 (200	kN (lbs)
MD/CMD Elongation @ Ultimate		
Mullen Burst Strength		
ASTM D 3786	2756 (400)	kPa (psi)
Trapeziodal Tear Strength		
ASTM D 4833	0.33 (75)	kN (lbs)
Puncture Strength		
ASTM D 4833	0.40 (90)	kN (lbs)
UV Resistance after 500 hrs.		
ASTM D 4355	70	% Strength
HYDRAULIC PROPERTIES		
Apparent Opening Size		
ASTM D 4751	0.300 (50)	mm(US sieve)
Permittivity	0.05	sec-1

This type of geotextile was chosen because of its strength characteristics and is longevity. According to the manufacturer's representatives the strength of the geotextile is not affected by moisture, or contact with earthen materials. In a buried condition away from the harmful exposure to ultraviolet radiation, the geotextile is expected to retain essentially all of its original strength even after 20 years of service. In fact, the geotextile is manufactured specifically for such permanent, long life situations such as under highways, railroad grades, dams and other similar applications. Care will be taken te ensure that the geotextile is properly overlapped and secured at the edges to provide total areal coverage in accordance with manufacturers recommended installation instructions.

APPENDIX 2-8

LABORATORY ANALYSIS
NATIVE FILL AND IMPORTED FILL

4/05/2003

APPENDIX 2-8

LABORATORY ANALYSIS
NATIVE FILL AND IMPORTED FILL

11/22/02

Table 1: Laboratory Results from Soil Sampling at the Crandall Canyon Mine: South Portal (Dec. 2002)

Parameter	Results	Criteria
Texture	Sandy Loam	Good
Total Organic Carbon (%)	<0.1	Good
Acid Base Potential (Tot. S ABP t/1000t)	207	Acceptable
pH	7.2	Good
Saturation %	23.1	Poor
Electrical Conductivity (mmhos/cm @ 25°C)	5.25	Fair
Available Water Capacity (in./in.)	0.04+	Poor to Fair
Sodium Adsorption Ratio	3.96	Good
Boron (ppm)	0.28	Acceptable
Selenium (ppm)	0.08	Acceptable
Soil sampling done by West Ridge Resources, East Carbon, UT Lab work & parameters requested by West Ridge Resources, East Carbon, UT Laboratory analyses by Inter-Mountain Laboratories, Inc., Sheridan, WY Analyses interpretations by Mt. Nebo Scientific, Inc., Springville, UT		

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

West Ridge Resources, Inc.
794 North "C" Canyon Road
East Carbon, UT 84520

Client Project ID: Topsoil
Date Received: 12/17/02

Set #0102S25050
Report Date: 12/30/02

Lab Id	Sample Id	pH	Saturation	EC @ 25°C	Calcium	Magnesium	Sodium	SAR
		s.u.	%	mmhos/cm	meq/L	meq/L	meq/L	
0102S25050	So. Portals Fill	7.2	23.1	5.25	17.0	31.4	19.5	3.96
~~0102S25051~~	~~Highwall Fill~~	~~7.4~~	~~61.7~~	~~1.19~~	~~5.07~~	~~5.11~~	~~0.11~~	~~0.09~~

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

West Ridge Resources, Inc.
794 North "C" Canyon Road
East Carbon, UT 84520

Client Project ID: Topsoil
Date Received: 12/17/02

Set #0102S25050
Report Date: 12/30/02

Lab Id	Sample Id	Coarse Fragments %	Sand %	Silt %	Clay %	Texture	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t
0102S25050	So. Portals Fill	66.5	70.0	17.0	13.0	SANDY LOAM	<0.1	0.02	0.62	208	207
~~0102S25051~~	~~Highwall Fill~~	~~[illegible]~~	~~[illegible]~~	~~15.0~~	~~[illegible]~~	~~LOAM~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Soil Analysis Report

West Ridge Resources, Inc.
794 North "C" Canyon Road
East Carbon, UT 84520

Client Project ID: Topsoil
Date Received: 12/17/02

Set #0102S25050
Report Date: 12/30/02

Lab Id	Sample Id	Available Sodium	Exchangeable Sodium	Boron	Nitrogen Nitrate	Selenium	TKN
		meq/100g	meq/100g	ppm	ppm	ppm	%
0102S25050	So. Portals Fill	0.72	0.27	0.28	1.10	0.08	0.03
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

APPENDIX 2-9

LETTER REGARDING NOXIOUS WEEDS IN FILL

4/05/2003

Michael O. Leavitt
Governor
Gary G. Peterson
Commissioner

State of Utah
DEPARTMENT OF AGRICULTURE
GOVERNOR'S CABINET

350 North Redwood Road
Salt Lake City, Utah 84116-3087
(801) 538-7100
(801) 538-7126 FAX

January 27, 2003

Genwal Resources
PO Box 1077
Price, Ut 84501

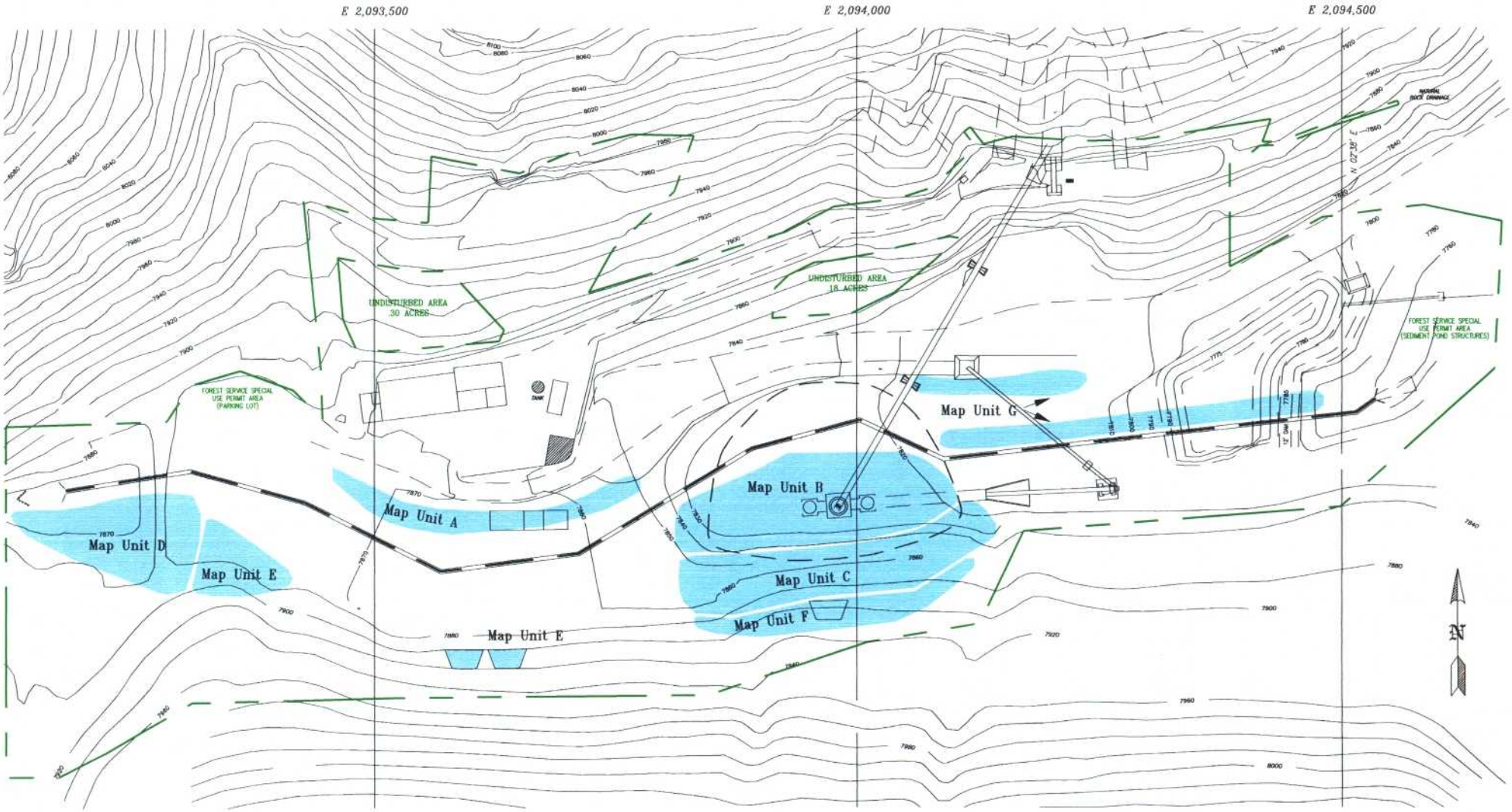
Dear Gary Gray:

On January 13, 2003, I inspected the gravel pit of Nielsen Construction located at 2000 W Canyon Rd. west of Huntington, Utah. The purpose of my inspection was to see if any noxious weed were growing in the area of the gravel pit. I did not see any noxious weeds or remnants of noxious weeds within the pit or within 300 ft. surrounding the pit area.

Mr. Kevin Peacock, crusher manager for Nielsen Construction explained that the top three feet of soil is removed and piled in an area about 300 yards west of the pit before the fill dirt is removed.

Sincerely,

Carl Bott
Comp. Specialist
Utah Department of Agriculture & Food



SOIL SALVAGE AREAS

		Acreage	Volume
Map Unit A	(N. Slope Area)	0.14 ac	180 yd.3
Map Unit B	(S. Slope Bench Area)	0.49 ac	1,728 yd.3
Map Unit C	(Coal Pile Area)	0.41 ac	
Map Unit D	(SW corner of mine yard)	0.28 ac	1,872 yd.3

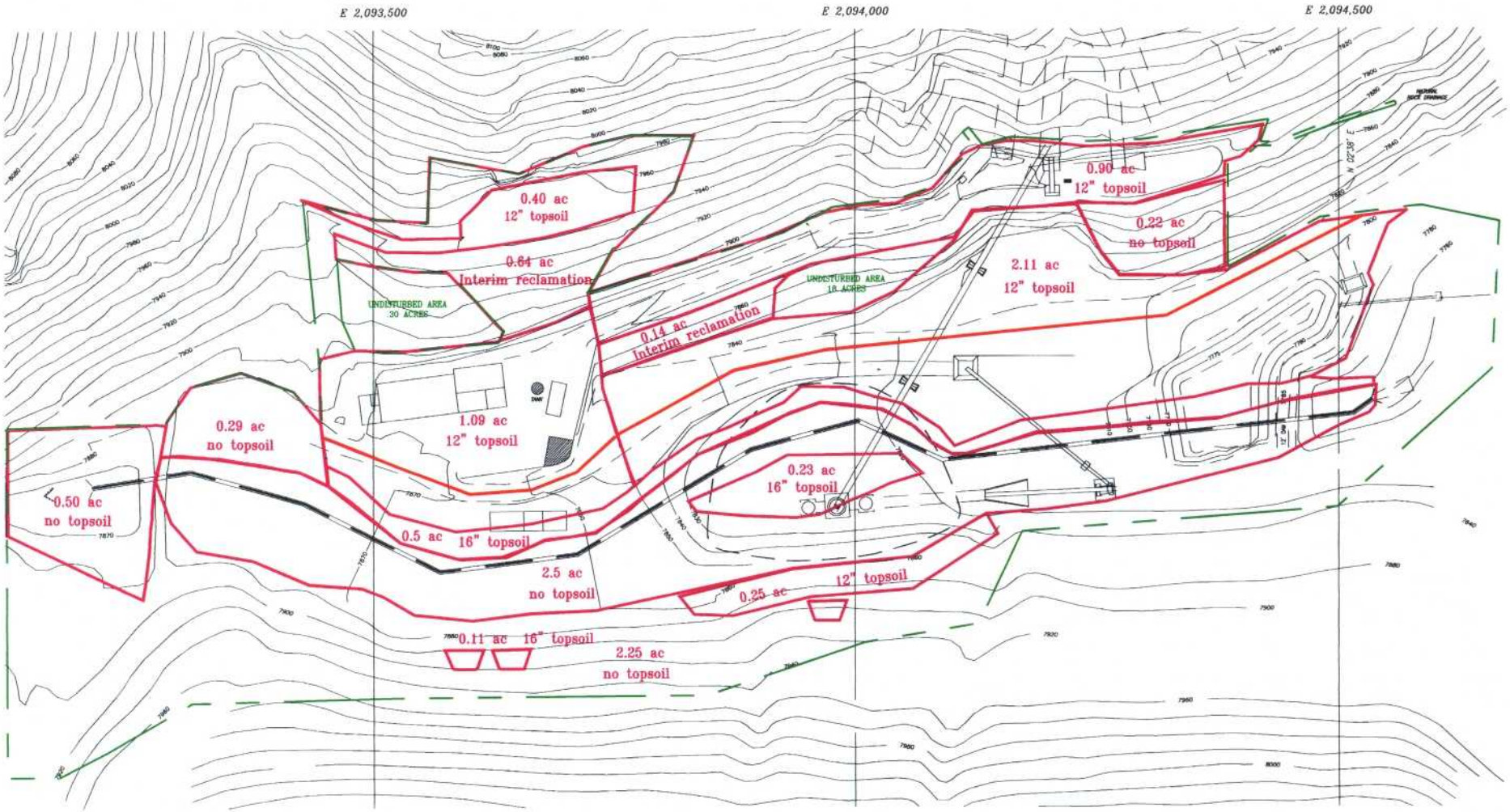
		Acreage	Volume
Map Unit E	(Nose cut area/south portals)	0.22 ac	441 yd.3
Map Unit F	(coal pile area)	0.15 ac	690 yd.3
Map Unit G	(loadout/pond area)	0.22 ac	178 yd.3

02/20/03

FIGURE 8B SOIL SALVAGE AREAS

Scale: 1" = 150'

Acad Ref: FIG-8B.dwg



12" Topsoil		16" Topsoil		No Topsoil	
Shop Area	1.09 ac	N. Slope Area	0.50 ac	FS Road	0.53 ac
Old Loadout Area	2.11 ac	S. Slope Bench Area	0.23 ac	Trailhead	0.29 ac
Portal Area	0.90 ac	South Portals	0.11 ac	Topsoil Storage	0.90 ac
Old Substation Area	0.40 ac			Interim Reclamation	0.78 ac
Coal Pile Area	0.25 ac			Undisturbed Areas - N. Side	0.48 ac
				Undisturbed Area Culvert Inlet	0.50 ac
				South Slope Area	2.50 ac
				Undisturbed Expan. Area	2.00 ac
				Area East of Old Loadout	0.22 ac

N

FIGURE 8C
SOIL REDISTRIBUTION AREAS

Acad Ref: soilare.dwg

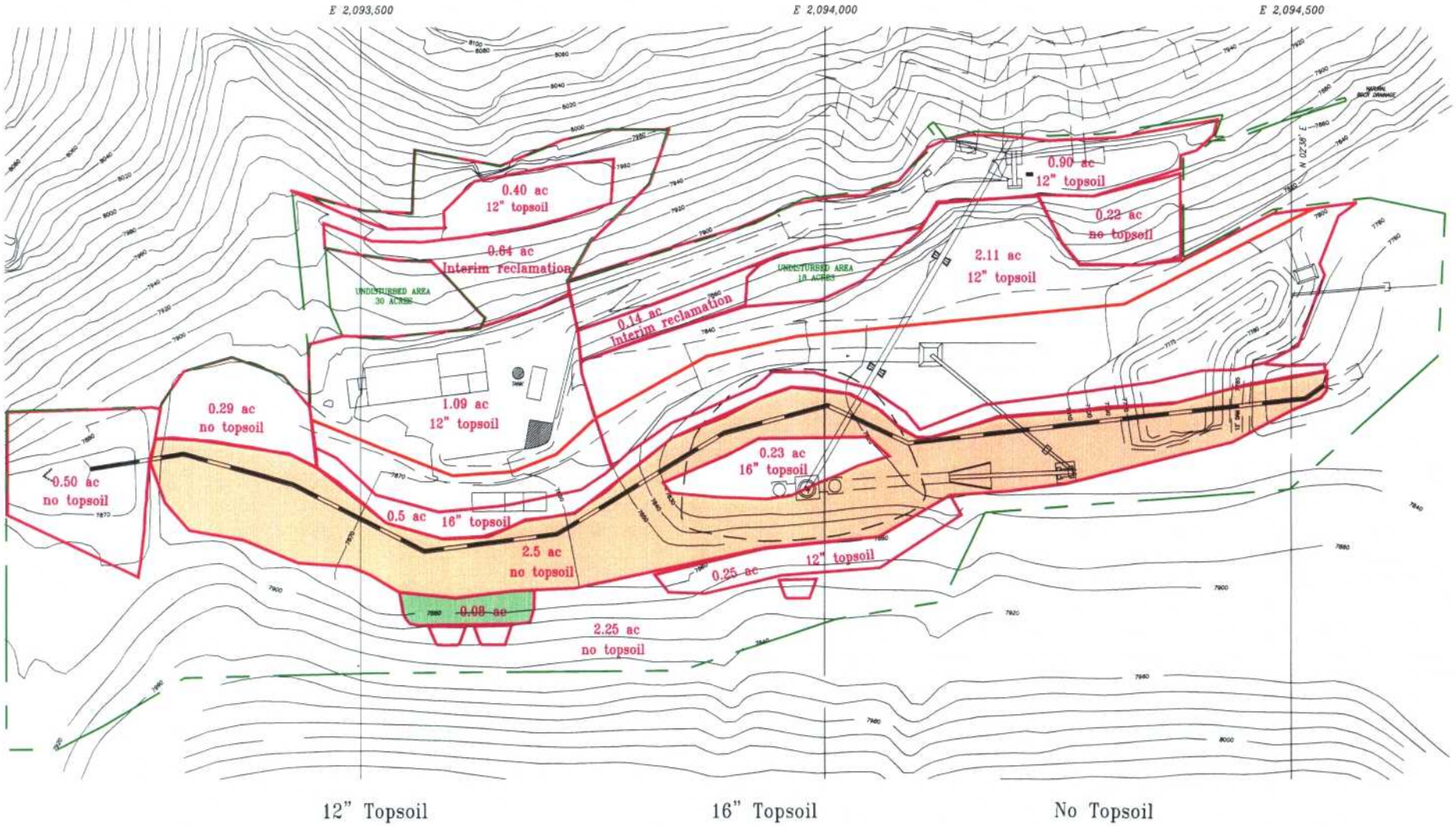


FIGURE 8D
SOIL AREAS PROTECTED BY GEOTEXTILE

Proposed South Portals

Culvert Expansion

Acad Ref: Fig 8D.Dwg

CHAPTER 5

FIGURES

FIGURE NUMBER	DESCRIPTION	PAGE
5-1	Certification Report Sedimentation Pond	5-2
5-2	Sedimentation Pond Inspection Report	5-3
5-4	Maximum Subsidence Graph	
5-5	Vertical Subsidence Distribution	
5-8	Structure Map / Hiawatha Coal Seam	
5-10	Typical Shotcrete Installation	
5-11	Typical Profile, South Portal Pocket Cuts	
5-12	Cross Section, South Portal Belt Conveyor	
5-13a	Tunnel Construction Option (Plan)	
5-14a	Tunnel Construction Option (Profile)	

(Note: Unless otherwise noted, figures follow Chapter 5 text)

Revised 4/05/2003

CHAPTER 5

LIST OF APPENDICES (continued)

APPENDIX NUMBER	DESCRIPTION
5-16	Storage Pad Stability Analysis
5-17	Road Expansion (within permit area) Safety Factor, Drawings
5-18	Fire Prevention Plan
5-19	Slope Stability Investigation Portal Pad
5-20	Bond Estimate (DOGM determination)
5-21	Reclamation Fill Stability Analysis At The Crandall Canyon Mine Emery County, Utah
5-22	Crandall Canyon Mine Site Reclamation Plan
5-23	Air Quality Permit Amendment, South Portals

Note: Bold number plates and appendices are included with this submittal.

Revised 4/05/2003

5.23.7 Annual Production of Coal

Annual coal production in 1991, 1992, 1993 and 1994 was 877,500, 1,178,089, 1,474,824 and 1,660,900 raw tons, respectively. During 1993-1995 total production tonnage was approximately 1,750,000 raw tons annually. This production was achieved by the use of continuous mining machines, continuous haulage equipment, and/or diesel driven coal haulers. From 1995 to the end of the century total production coal tonnage is forecasted to be 2,500,000 tons, with the aid of longwall mining.

5.23.8 Access To Future Reserves

Access to future reserves will be maintained by the North Mains entries, Main West entries, 1st North, and 1st Right sections. North Mains will maintain access to the mine as well as Main West. Main West will also maintain access to the west and to the South. 1st North will maintain access to the north and east, while 1st Right will maintain access to the north and west. (See Plate 5-2 and page 5-15A). Access to federal coal south and east of the Dellanback fee parcel (i.e., the South Crandall LBA) will be maintained.

5.23.9 Projected Mining by Future Permit for the Planned Life of the Mine

All coal around the permit area has the potential for future mining by the Crandall Canyon Mine. The projected mining for the Incidental Boundary Change area and the Dellanback fee parcel is shown on Plate 5-2.

Operating Schedule and Employment

The mine employees approximately 125 people at present. The mine will operate four eight hour production shifts per day, five days a week. Two maintenance crews will operate 8 hours a day, five days a week, to accommodate rockdusting and general cleanup of the mine. When market or mining conditions dictate, production can be expanded to seven days per week, 52 weeks per year.

5.23.10 Safety Training

The mine is equipped with modern emergency facilities and has an organized safety program. All mine employees are required to meet MSHA first aid and safety training requirements. Visitors are required basic training before entering the mine.

Revised 4/05/2003

case scenario. The subsidence values were reduced according to Figure 5-5 for areas that border a barrier pillar along the perimeter of the lease shown on Plate 5-2.

Horizontal movement which would create slope failure along the escarpment is not expected to occur due to subsidence because only limited coal outcrop occurs within the lease (the east side of the lease area). Within that area of old works no pillar extraction is anticipated.

As with areas in the western part of lease SL-062648 and at the Co-Op's Trail Canyon and Bear Canyon Mines and the Beaver Creek #4 mine, no escarpment failure has occurred. Horizontal movement creating tension or compression cracks can not be projected due to the overburden thickness and lack of jointing density and attitude data along the surface rock exposures.

In addition, GENWAL will mine no closer than 200 feet to any outcrop (with the exception of portals) and, in accordance with Forest Service Stipulation #20, no mining will be done within a zone that might impact the Joes Valley Fault. This area is determined by a 22 degree angle-of-draw (from vertical) eastward from the surface expression of the Joes Valley Fault was used to project the outer limits of subsidence. Thus, subsidence will not intercept the Joes Valley Fault. If subsidence does occur along the western perimeter, all effects of the subsidence will be maintained within the mining permit boundary. No perennial streams will be affected. On the Dellenbach fee tract mining will not extend closer than 200 feet from the outcrop (other than portals) and no closer than 50 feet from the property boundaries. It should be noted that the mine projections and timing for the Dellenbach tract, shown on Plate 5-2, will change if Genwal acquires the South Crandall Federal Lease.

It is accepted practice in this area to use two sources of information for subsidence evaluation. The sources are: 1) "Some Engineering Geologic Factors Controlling Coal Mine Subsidence in Utah and Colorado",Geologic Survey Professional Paper 969, by C. Richard Dunrud, 1976, and 2) "SME Mining Engineering Handbook", Volume 1, by Arthur B. Cummins and Ivan A. Given, 1973. The conclusions based upon the above source material are tempered by on site evaluation and actual experience based on similar mining conditions in late Cretaceous overburdens with similar thicknesses and strengths. The surface area topography within the lease is shown on Plate 3-1, 3-1a, 1-1 and others. The topographic map shows the relative steep sloping sides of the canyons which contains Crandall Canyon Creek, Blind Canyon Creek, and Horse Canyon Creek where rock outcrops are abundant. However, there are few, if any, talus slopes.

5.25.10 Subsidence Control Plan

The Subsidence Control Plan contained herein addresses specifically those items that are required by R645-301-525 Pertaining to Subsidence. This plan is an amendment to the original application filed on December 17, 1980, by GENWAL the SUBSIDENCE CONTROL PLAN FOR GENWAL COAL COMPANY, INC., as prepared by David A. Skidmore and L. G. Manwaring of Revised 4/05/2003

Coal Systems Inc., on August 28, 1981; and the Mid-term permit revisions dated 5-30-86. The format of the currently approved COAL SYSTEMS report will be used with the conclusions based upon the results of the drilling of the Blind Canyon seam which was obtained in April, 1985, and the Hiawatha seam data obtained to date during mine development. The original application was submitted pursuant to the following: Title 40, Chapter 10, Utah Code Annotated, 1943, as amended,

Revised 4/05/2003

There was and has been no evidence of escarpment subsidence or failure. There are no further plans to monitor escarpments in the area not visible from Huntington or Crandall Canyons. The subsidence/escarpment survey results were recorded and submitted to the appropriate regulatory authority. No escarpment failure occurred.

5.25.15 Anticipated Effects of Planned Subsidence

If subsidence does occur, surface effects may include minimal ground lowering and temporary tensional fractures at the margins of the subsided area. Any subsidence occurring on the 160 acre Dellenbach fee tract should have minimal effects on the surface. There are no escarpments, raptor nests, archeology site, streams or springs located the Dellenbach tract. This tract (surface and underground) is privately owned by Genwal Resources Inc. The tract is within the presently approved permit area and is included in the current subsidence monitoring plan.

5.25.16 Mitigation of Damages

As previously presented within this chapter, no material damage or diminution of value or foreseeable use of lands is expected to occur. GENWAL has been in consultation with the BLM and received their concurrence with the conclusions presented in this document, a copy of the BLM correspondence may be found in Appendix 5-5. Displacement of wildlife due to subsidence may be minimal. However, springs within the potential subsidence limit are a significant resource to the local wildlife and may be impacted.

Seeps and springs within the possible subsidence limit emit water from the North Horn Formation, Price River Formation, Blackhawk Formation, and the Castlegate Sandstone. A limited number of seeps and springs are found to issue from the Blackhawk Formation and Castlegate Sandstone units within the area of possible subsidence limits. These seeps and springs show only limited use by deer and elk. Subsidence from mining in these areas will have minimal impacts on water supplies from seeps and springs in the vicinity of the mine. Water monitoring and the Probable Hydrologic Consequences are discussed in detail in Chapter 7 of this permit.

Seeps and springs within the possible subsidence limit of mining emit water from the North Horn and Price River Formations 100 to 2100 feet (10 to 210 times the coal bed thickness) above the interval to be mined. If repeated subsidence via roof failure occurs, elastic deflation is believed to occur at a distance of nine coal seam thicknesses (90 feet) above the coal. If any tension cracks do develop, they should be sealed by clay migration occurring during elastic deformation. As a result, these seeps and springs should not be affected by subsidence. However, monitoring will be conducted as described in Chapter 7.

GENWAL recognizes the fact that the Division of Wildlife Resources, the Division of Oil, Gas, and Mining and the USFS consider all seeps and springs to be important to wildlife. If, during

the monitoring of the springs, non-climatic diminutions of flow from any seep or spring in the area are substantiated, GENWAL will notify the Division of Wildlife Resources, the Division of Oil, Gas, and Mining, the State Engineer and the U. S. Forest Service. If documentation concludes that mining efforts at the Crandall Canyon Mine have reduced or eliminated the flow from the seeps and

Revised 4/05/2003

Specifications for Shotcreting Cut Slopes

Average slope:	1/3:1
Matting:	11 gauge 2" x 4" or 9 gauge 4" x 4" wire mesh 6' wide x full length of slope
Securement:	5/8" x 24" long bolts w/ plates or 3/4" x 24" long rebar type anchors w/ plates
Drainage:	2" PVC pipe, 24" long, perforated, located at top and bottom of slope, 6' to 10' on centers. Pipes will be inset into the slope with the end extending outside the shotcrete. Drainage of the slope will be collected by the 2" PVC pipes and allowed to flow to the outside of the shotcrete.
Shotcrete: (per batch)	1800 lbs sand 800 lbs pea gravel 425 lbs cement 400 lbs fly ash
Application:	Applied with a Reed Sova III or Reed M40 pump w/ accelerator. Minimum thickness applied 2"

See Figure 5-10 for a cross sectional detail of shotcrete application.

This MRP covers the expansion of the surface facilities as shown on Plate 5-3. It should be noted that this represents the initial phase of the Crandall Canyon mine surface improvement. As shown, surface improvements will include a new intake portal, a new belt conveyor portal and a new fan portal.

Revised 4/05/2003

The new portals will be constructed along the south side of the upper pad of the existing mine-yard (refer to Plate 5-3). This area is presently serving as the parking lot and material storage yard. The new portals will consist of an intake portal, a fan portal, and a belt portal. The intake portal will be used to accommodate fresh air intake into the mine, and also to provide primary travel access into the mine for employees and materials. The fan portal will support a ventilation fan which will suck return ventilation air out of the mine. The belt entry will be located south of the existing coal pile and will contain the main conveyor belt hauling coal out of the mine.

Construction of the portals will be done within the existing permitted disturbed area boundary. The existing disturbed area boundary will not be increased. The existing sediment pond has been sized to accommodate this new portal construction area, so no changes to the sediment pond will be required. Except for adding a new culvert under the access ramp to the new portal, none of the previously approved and existing surface drainage structures will be affected.

In the area of the new south portals, the base of the coal seam is located approximately 17' above (i.e., higher than) the level of the existing mine-yard. An earthen ramp will be constructed on the existing pad to gain access up to the level of the coal seam. In the area of the intake and fan portals, the existing hill slope will be excavated with a back-hoe to expose the coal seam in preparation for construction of the portal canopies. A small elevated pad will also be constructed in front of the fan portal on which the mine fan can later be installed. This fan pad will be constructed as a continuation of the access ramp leading to the intake portal. The access ramp to the intake portal and the fan pad will be constructed partially using the earthen material generated in the process of facing up the coal seam and partially using fill material hauled in from an off-site borrow source. The imported fill material will come from the same source (i.e., the same borrow pit) that supplied the pad material for the recently completed surface expansion. This borrow site would be the Nielson Construction commercial borrow pit located in Huntington Canyon below the power plant. As the access ramp is being constructed a new culvert (C-11A) will be added to handle sheet flow drainage from the upper material yard (see Plate 7-5).

As the access ramp and fan pad are constructed from the existing yard surface up to the level of the coal seam outcrop, some of the new fill material will be placed up against the intervening existing undisturbed slope. Part of the access ramp/fan pad will therefore be constructed on top of the existing slope. Before this ramp/pad is constructed, topsoil along the existing slope below the fan pad and access ramp will be protected in-place using a geotextile cover placed along the undisturbed slope under the fill material. This topsoil protection technique would be identical to the approved method used during construction of the existing surface expansion facilities (Phase I surface expansion).

After the access ramp and fan pad have been constructed (and the underlying in-place topsoil protected with geotextile), the portal excavation can begin. Prior to starting the portal cuts, the existing topsoil at the portal sites will first be salvaged. Topsoil conditions along the south slope
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portal area is similar to the conditions at the adjacent coal pile area where topsoil was salvaged during August, 1998. This topsoil salvage effort is described in appendix 2-5, Part II, prepared by Pat Johnson, soil scientist. At that area, according to Ms. Johnson's report, the depth of true topsoil was 3" but an average of 8" - 9" of material was taken due to the operating nature of the backhoes which were employed in the salvage process. In addition, an intensive soil inventory and site investigation was performed on the south slope on August 18, 1998 and is included in Appendix 2-6.

In order to minimize the area of additional disturbance associated with the construction of the south portals these portals will be constructed by excavating individual pockets into the hillside for each portal rather than along a common highwall. Topsoil has already been removed from the belt portal site. By utilizing individual pocket cuts for the portals the total area of new disturbance is expected to be less than 4500 sq. ft. (0.11 acres). Topsoil will be removed from the areas of the south portal pocket cuts prior to excavation as described in Section 2.31.1. According to the Nyenhuis survey, the upper two feet (24 inches) is suitable for salvage. Based on the Nyenhuis soil survey it is anticipated that approximately 9000 cu. ft. (333 yds.) of topsoil will be salvaged from the intake and fan portal cuts.

The salvaged topsoil will be stored on the existing topsoil pile #4 located off-site at the bottom of Crandall Canyon. This topsoil pile is constructed on Forest Service land under a Special Use Permit issued on 8/17/87. This pile #4 was originally constructed in 1997 during Phase 1 of the surface facility expansion. At that time it was designed and constructed sufficiently large to accommodate the additional topsoil storage requirements for the Phase 2 south portal construction. The Forest Service has concurred with the addition of the south portal topsoil to this pile. All topsoil removal, salvage and storage will be over-seen, directed and monitored by an independent soils scientist approved by the Division. A report of the topsoil salvage operation will be prepared by the soil scientist and added to the MRP upon completion as Appendix 2-5, Part III.

After the portal sites have been faced up construction of the portal canopies will begin. These canopies will be constructed from 6" steel I-beams and 1/4" steel plate according the MSHA guidelines. These canopies will measure approximately 8' high by 20' wide and will extend underground as far as needed to insure adequate roof protection. The canopies will be anchored to concrete footers. These canopies will provide a safe structure from which the miners can begin driving the entries back into the coal seam. These portal canopies will be similar to the existing portal canopies. After the intake and fan entries have been driven into the hillside and connected together underground with a cross-cut, work can then be started on construction of the mine fan installation. The fan will be an 8' diameter Spendrup or Joy axial vane (or equivalent) electric powered fan. It will not have a diesel powered back up. It will be mounted on concrete foundations located on the newly constructed fan pad. The fan installation will be very similar to the existing fan structure. While the fan is being installed, the miners will drive the belt entry from inside the mine out to the belt portal. During this phase of development, mined coal will be moved away from the surface with a front-end loader, a mobile radial stacker, or some other temporary means of conveyance. After the belt portal connection is completed, a new conveyor truss will be
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installed from a concrete landing at the belt portal out to the existing coal pile. The conveyor will be 48" wide, supported on a steel box truss which will extend from the new portal to the existing stacking tube. An intermediate bent support may be required, depending on final engineering. If this bent is required it will be anchored to a concrete foundation constructed on the existing coal pad. The conveyor will be covered to minimize fugitive dust. The air quality permit will be revised prior to construction to include the new conveyor (see Appendix 5-23). This truss/bent structure will be similar to the existing truss/bent structure, but only one fourth as long. All coal from the mine will then be delivered directly to the existing coal pile and will be crushed and loaded on trucks through the existing coal handling facilities.

The access ramp leading into the portals will be approximately 100' long and 20' wide. It will have jersey barrier guards along both sides. The ramp will be constructed from the imported fill material, laid down in 12" - 18" lifts, and compacted to 90%. The only vehicles using the ramp will be underground mine vehicles going in and out of the mine. Therefore the ramp is not considered a road. Drainage from the ramp will be handled by the existing drainage structures and the new culvert (C-11A) as shown on Plate 7-5. It is estimated that approximately 3500 cubic yards of fill will be needed to construct the access ramp/fan pad. This quantity will be verified after construction on the as-built plans.

Power, water, communications, and other mine infrastructure will be supplied to the south portals as an extension of the pre-existing Crandall Canyon Mine facilities.

Figure 5-11 depicts a typical cross-section through the south portals, showing the pocket cut, access ramp, in-situ soil geotextile protection, and the portal canopy construction.

Figure 5-12 depicts a typical cross section along the south portal conveyor belt structure.

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GENWAL is also considering a second possible option for constructing the south portal intake and fan portals. Instead of constructing a ramp up to the level of the coal seam, short tunnels would be driven from the existing yard level up to the coal seam. In this scenario the pocket cuts would be be made into the hillside lower down at the same level as the existing pad. This level is approximately 15' below the base of the coal seam. Since the coal seam sits directly on top of the Star Point Sandstone, this sandstone out-crops at the existing yard level. Tunneling would begin in the sandstone and ramp up underground to the coal seam.

If the tunnels are driven at an incline of 10% they will be about 160' long to where they intersect the base of the coal seam. At 8' high and 20' wide, excavation of the two tunnels (intake and fan) would generate approximately 1900 cu yds. of material during construction. This tunnel excavation material will consist of sandstone mixed with coal. This excess material would be disposed of by placing it in a 6' deep layer along the existing fill bank located between the upper material yard and the coal storage pad. This embankment is part of the designated coal storage area and currently is covered with coal. Therefore, after the tunnel excavation material is layered onto the embankment, it too will be covered over by the active coal pile for the remaining life of the mine. Refer to Figure 13-a and 5-13b for more details of this tunneling construction option.

Upon final reclamation the tunnel excavation material would be hauled back into the mine tunnels where it would be sealed up prior to backfilling the portals. Backfilling and reclamation of the portal pocket cuts would be the same regardless of whether the ramp or tunnel option is selected. If GENWAL elects the tunnel construction option, topsoil will be salvaged in exactly the same manner as described previously. The amount of topsoil salvaged, stored and redistributed would be the same regardless. If the tunnel option is selected, there would be no additional in-place topsoil required to be protected with geotextile, because there would be no fill material placed up against the hillside.

If this option is selected, GENWAL commits to ensuring the protection of the hydrologic balance for surface and groundwater systems as required by R645-301-731. The tunnel excavation material will be tested for acid- and toxic-forming material and the analytical results of this testing will be presented to the Division. The hydrologic balance will be protected in the following manner.

a) The excavation material will consist of fragmented Star Point sandstone. This sandstone outcrops naturally in the minesite area and is one of the major geological features which determine the character of Crandall Canyon and many other canyons in the Wasatch Plateau. This predominant sandstone is not known to be acid- or toxic-forming anywhere in the Utah coalfields. However, further site-specific testing of the sandstone will be conducted prior to any construction.

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b) The proposed location of the material storage is on top of the existing pad fill. Any runoff from this area would report to the existing sediment pond.

c) The existing pad fill in the proposed storage area varies between 10' and 40' thick over the bypass culvert and is densely compacted. This thickness of compacted fill material is sufficient to preclude any leaching downward into the bypass culvert or groundwater.

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5.42.72 through 5.42.742 Excess Waste

All waste material generated from the removal of the structures will be removed from the property and sold as scrap or disposed of in a state approved land fill. See Section 5.28 of this chapter for more detail on excess waste and spoil.

5.42.80 Estimate of Reclamation Costs

Estimate of reclamation costs are included under Appendix 5-20. Final costs for reclamation, taken from Appendix 5-20, are as follows:

DEMOLITION	$1,004.728
BACKFILLING AND GRADING	$ 353,000
SOIL DISTRIBUTION	$ 35,524
GENERAL	$ 112,598
REVEGETATION	$ 34,187
MONITORING	$ 105,727
SUBTOTAL	$1,645,763
INDIRECT COSTS	
CONTINGENCIES	10.00%
ENGINEERING FEES	5.00%
MOBILIZATION/DEMOBILIZATION	2.5%
CONTRACT MANAGEMENT	5.0%
ESCALATION FACTOR (1.42% OVER 3 YEARS)	1.42%
TOTAL INDIRECT COSTS	23.92%
TOTAL	**$2,044,687**
BOND AMOUNT	**$2,045,000**

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5.53 Backfilling and Grading

Backfilling and regrading of disturbed lands has been designed to restore all disturbed areas affected by surface operations to the approximate original contour of the land. This is made possible by the fill material required by the 1997 facility expansion project. Reclamation of affected areas, including revegetation is outlined in Chapter 3, Section 3.41.

During reclamation, the subsoils or backfill material will be laid down in 12" to 18" lifts and compacted through repeated travel by heavy equipment. This method has been utilized by a number of mines in the area and appears to give excellent compaction prior to topsoiling. In areas with slopes of less than 30%, the subsoil will be ripped to a depth of 18" prior to topsoil placement. In areas having average slopes of more than 30% the subsoil will be ripped to a depth of 12", where practical. Topsoil will then be redistributed in a manner that achieves an approximate, uniform stable thickness and other specifications stated in Chapter 2, Section 2.42 of this document.

Removal or Reduction of Cut Slopes and Highwalls

Prior to backfilling and grading of the highwall area above the portals and the cutslopes above the old coal loadout area and the pocket cuts at the south portals, existing shotcrete, wire mesh, clips, and other related material will be removed and disposed of in an appropriate manner. All noncombustible material generated from the removal of shotcrete will be disposed of underground (within the mine) prior to the sealing of the portals. All other waste generated will be removed and disposed of in an appropriate State permitted land fill.

Backfilling and grading will proceed so as to eliminate the cut slope, pocket cuts and highwall. Refer to Plate 5-3 for the highwall location. The cut slope above the coal stockpile area will be backfilled to match the approximate original contour with fill material from the Expansion Area pad. The Forest Service Trailhead Access Road will be left in place, but the surface will be modified to meet design specifications, as directed, by the Forest Service (see Appendix 1-2). See Plate 5-17 for the Forest Service road location.

The stability of the reclaimed highwall and cutslopes has a safety factor greater than 1.3 and is shown in Appendix 5-21.

No highwalls or remnants will remain after reclamation.

Terracing and Erosion Control

No terracing will be done. All final grading and surface preparation of overburden completed prior to the redistribution of the topsoil will be done along the contour to minimize erosion in areas with slopes less than 30%. In areas with slopes greater than 30% the grading, preparation and placement in a direction other than generally parallel to the contour will be used. Revised 4/05/2003

3. Seal and Backfill Portals

Upon the completion of the disposal of the excess Expansion Area fill material in the mine workings, the portals will be sealed and backfilled. The four portals on the north side are: bath house entrance, intake air entry, belt entry and fan (return air) entry. The three portals on the south side are the intake, belt and fan entries. The seals will be constructed approximately 25-35 feet inby from the portal openings and will be built according to MSHA regulations. Equipment necessary for sealing would be a cement mixer and hand tools. After finishing the construction of the seals, the 25 to 35 feet of entry from the portals to the seals will be backfilled with additional fill material from the Expansion Area.

4. Backfill, Grade and Topsoil - Portal Area

Once the portals have been sealed and backfilled, reclamation work can then commence on the Portal Area. This work consists of backfilling the cuts to approximate original contour, placing topsoil on the backfilled area and seeding the topsoiled area. Since the Portal Area (and the associated access road) is on a slope, this work will be done in short segments starting at the eastern-most (upper-most) portion of the area and working westward across the portal area and thence down the access road to the Shop Area. Fill material from the Expansion Area will be utilized to backfill and reclaim the highwall area. The fill material will contain rock fragments of all sizes, including a significant amount of 6" to 8" rock fragments. These rocks will assist in providing slope stability and aid revegetation by helping to retain moisture. The fill material will be topped with 12" of topsoil material to promote plant growth.

Mobile heavy equipment will be utilized to move and place fill in highwall and yard areas and the south portal pocket cuts. A front end loader and end dumps will be used to remove fill material from the Expansion Area and haul the material up to the Portal Area. The lifts will be built up horizontally with a slight slope on each lift toward the highwall. Material will be spread into lifts of 18 to 24 inches deep. The loader will compact each lift as the next lift is put in. A backhoe will be used to place and compact the final lift. Before placing topsoil on the final backfilled surface, that surface will be roughened with the backhoe bucket. This will help prevent slippage of the topsoil layer and promote root penetration.

Genwal has committed to adding nutrients as determined by laboratory analysis conducted on topsoil samples taken before topsoil redistribution and during final reclamation. The method used to ensure adequate and representative samples from different locations and depths within the topsoil stockpile include: taking two soil samples per stockpile and collecting samples with a soil auger at two foot increments. Samples of the undisturbed soil adjacent to the regraded site will also be taken for a baseline chemical reference. **Fertilizer will be added to the redistributed topsoil, prior to seeding, if a need is indicated by laboratory results. The fertilizer will be spread on the redistributed topsoil and either disked or hand-raked into the soil (depending on the steepness of the slope).**

Areas to receive topsoil will be marked with stakes indicating the depth of application. A
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reclamation supervisor will oversee the topsoil redistribution operation. Topsoil will be left in a roughened condition prior to seeding to minimize compaction and erosion as well as promote infiltration of precipitation.

5. Revegetation - Portal Area

Revegetation procedures for the Portal Area and the south portal pocket cuts involves a **four step** program: **1) application of fertilizer (if laboratory testing indicates a need),** 2) hydroseed, 3) hydromulch the entire area with a wood fiber mulch to stabilize soil during vegetative growth and control runoff, 4) plant containerized stock to further stabilize the soil and provide vegetative diversity. **Hydroseeding will combine the tackifier and small amount of mulch with the seed mix (to mark the area of coverage) during application to the redistributed topsoil.** All seed utilized on the site will be certified pure live seed. After the seeding step, the mulch (wood fiber and hay/straw) and tackifier will be applied to the seedbed surface. The plant containerized stock will be planted in the second year of reclamation. **Revegetation work will not be done until fall (September-October).**

6. Demolition - Old Substation Area

The only structures existing at the Old Substation Area is the termination structure for the mine powerline. This powerline will be dismantled and removed from the site prior to completion of final reclamation.

7. Backfill, Grade and Topsoil - Old Substation Area

As excess fill from the Expansion Area is placed in the underground mine workings, additional fill from the Expansion Area will be hauled to the Old Substation Area for backfilling. The cut slope above the pad will be backfilled to the approximate original contour. The area will then be topsoiled and revegetated.

Genwal has committed to adding nutrients as determined by laboratory analysis conducted on topsoil samples taken before topsoil redistribution and during final reclamation. The method used to ensure adequate and representative samples from different locations and depths within the topsoil stockpile include: taking two soil samples per stockpile and collecting samples with a soil auger at two foot increments. Samples of the undisturbed soil adjacent to the regraded site will also be taken for a baseline chemical reference. Fertilizer will be added to the redistributed topsoil as indicated by laboratory results of the most needful increment.

The areas to be topsoiled will be marked with stakes indicating the depth of application. A reclamation supervisor will oversee the topsoil redistribution operation. Topsoil will be left in a roughened condition prior to seeding to minimize compaction and erosion as well as promote infiltration of precipitation.
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Based on recent correspondence, the Forest Service now indicates that it prefers to have the asphalt totally removed from the road surface upon final reclamation. This position differs from the stipulations of the existing Forest Service Special Use Permit that requires that a 14' asphalt running surface be left in place upon final reclamation. Genwal commits to reclaiming the road through the minesite to any standard desired by the Forest Service at the time of final reclamation. At the present time, however, it is difficult for Genwal to commit to a reclamation standard for the road that is contrary to the existing Forest Service Special Use Permit.

16. Demolition and Removal of Surface Facilities - Expansion Area

The facilities to be removed from the Expansion Area are: the overhead conveyor, stacking tube, reclaim vault and tunnel/escapeway tube, crusher building, MCC building, loadout conveyor, truck loadout and loading platform. Removal of these facilities will take place simultaneously with removal of facilities from the aforementioned areas. After these surface facilities are removed, the only structures that will remain will be the sedimentation pond and associated spillway and discharge structure as well as the conveyance ditches, berms and culverts necessary to route drainage to the pond. Refer to Plates 5-16 and 7-5 for location of these structures.

Equipment used in the demolition and disposal of the facilities include: a front end loader, a backhoe, highway end dump trucks, a trackhoe, a crane, truck with flat bed trailer, oxy-acetylene torches, air compressor and power tools, etc.

17. Removal of Fill Material and Recontouring - Expansion Area

Reclamation of the Expansion Area (which includes the south portal access ramp) is different from the other reclaimed areas because restoration of the approximate original contour involves removal of fill material rather than placement of backfill material. As described in the preceding sections, fill material removed from the Expansion Area will be used to regrade and restore approximate original contour at the Portal Area, Old Substation Area, Shop Area, and the Old Loadout Area. Therefore, these reclamation operations will be accomplished simultaneously. Expansion Area fill that is not slated for use as backfill for the aforementioned areas (i.e. excess fill) will be disposed of in the underground mine workings as described previously.

Reclamation of the Expansion Area involves three separate procedures involving three separate areas: the North Slope of the Expansion Area, the Crandall Creek Channel Area, and the South Slope of the Expansion Area. As described previously, the North Slope Expansion Area is that area north of the existing Crandall Creek and south of the existing Forest Service road. The South Slope Expansion Area includes the steeper hillside located south of the existing Crandall Creek and the south portal area. The Crandall Creek Channel Area is the area within and immediately on either side of the existing creek channel.
Revised 4/05/2003

APPENDIX 5-23

AIR QUALITY PERMIT AMENDMENT
SOUTH PORTALS

4/05/2003

Appendix 5-23

 Utah!
Where ideas connect
Department of Environmental Quality
Division of Air Quality

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Governor

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Executive Director

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DAQE-AN0225003-03

March 20, 2003

Dave Shaver
Genwal Resources Incorporated
P. O. Box 1077
Price, Utah 84526

Dear Mr. Shaver:

Re: Approval Order: Modification of Existing Approval Order DAQE-827-01 to Add Equipment, Emery County - CDS B; ATT; NSPS, HAPs, TITLE V
Project Code: N0225003

The attached document is the Approval Order (AO) for the above-referenced project.

Future correspondence on this Approval Order should include the engineer's name as well as the DAQE number as shown on the upper right-hand corner of this letter. Please direct any technical questions you may have on this project to Mr. M. Maung. He may be reached at (801) 536-4153.

Sincerely,

Richard W. Sprott, Executive Secretary
Utah Air Quality Board

RWS:MM:re

cc: Southeastern Utah District Health Department

STATE OF UTAH

Department of Environmental Quality

Division of Air Quality

APPROVAL ORDER: MODIFICATION OF EXISTING APPROVAL ORDER DAQE-827-01, TO ADD EQUIPMENT

Prepared By: Maung Maung, Engineer
(801) 536-4153
Email: mmaung@utah.gov

APPROVAL ORDER NUMBER

DAQE-AN0225003-03

Date: March 20, 2003

Genwal Resources Incorporated
Source Contact
Dave Shaver
(435) 564-4000

Richard W. Sprott
Executive Secretary
Utah Air Quality Board

Abstract

Genwal Resources, Inc. located in Emery County has proposed to modify their existing Approval Order DAQE-827-01, to add new equipment and to reduce coal output to 4.3 million tons per year. The company has proposed to construct a portal from the south seam, and to install an additional truss-supported covered conveyor to transfer the coal from the south portal to the location of the existing stacking tube. The equipment currently used from the north portal will remain unchanged.

Emery County is an attainment area of the National Ambient Air Quality Standards (NAAQS) for all pollutants. This source is subject to New Source Performance Standards (NSPS) under 40 CFR Part 60 Subpart Y- Standards of Performance for Coal Preparation Plants. Because this source is a NSPS source, it also falls under the 40 CFR Part 70 or CAA Title V regulations. The emissions, in tons per year, will change as follows: PM_{10} = - 0.12.

The change in emissions will result in the following potential to emit totals: PM_{10} = 6.86, NO_x = 4.57, SO_2 = 0.31, CO = 3.57, VOC = 0.80.

The project has been evaluated and found to be consistent with the requirements of the Utah Administrative Code Rule 307 (UAC R307). A public comment period was held in accordance with UAC R307-401-4 and no comments were received. This air quality Approval Order (AO) authorizes the project with the following conditions, and failure to comply with any of the conditions may constitute a violation of this order.

General Conditions:

1. This Approval Order (AO) applies to the following company:

Facility Location	Corporate Office Location
Genwal Resources, Inc.	Genwal Resources, Inc.
SR 31 Mile Post 33	794 North C Canyon Road
Huntington Canyon	East Carbon, Utah 84520
Huntington, Utah 84528	PHONE NUMBER: (435) 564-4000
PHONE NUMBER: (435) 687-5420	FAX NUMBER: (435) 564-4002

The equipment listed below in this AO shall be operated at the following location:

PLANT LOCATION:

SR 31 Mile Post 33, Huntington Canyon, Huntington, Utah 84528, Emery County

Direction: Take SR 31 northwest from Huntington, Utah. Follow SR 31 for 33 miles and turn left (west) on to the Forest Service Road. Follow Forest Service Road for two miles up Crandall Canyon to Genwal mine.

Universal Transverse Mercator (UTM) Coordinate System: UTM Datum NAD27
4,369.0 kilometers Northing, 483.0 kilometers Easting, Zone 12

2. All definitions, terms, abbreviations, and references used in this AO conform to those used in the Utah Administrative Code (UAC) Rule 307 (R307), and Title 40 of the Code of Federal Regulations (40 CFR). Unless noted otherwise, references cited in the AO conditions refer to those rules.

3. The limits set forth in this AO shall not be exceeded without prior approval in accordance with R307-401.

4. Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be approved in accordance with R307-401-1.

5. All records referenced in this AO or in applicable NSPS, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or Executive Secretary's representative upon request, and the records shall include the two-year period prior to the date of the request. All records shall be kept for the following minimum periods:

A.	All Records	Two years
B.	Emission inventories	Five years from the due date of each emission statement or until the next inventory is due, whichever is longer.

6. Genwal Resources, Inc. shall install the covered conveyor and conduct its operations of the mining activities in accordance with the terms and conditions of this AO, which was written pursuant to the Notice of Intent submitted to the Division of Air Quality (DAQ) on December 19, 2002.

7. This AO shall replace the AO (DAQE-827-01) dated October 1, 2001.

8. The approved installations shall consist of the following equipment or equivalent. Equivalency shall mean identical performance, including any emission discharge, if emissions are involved. It shall be verified and approved by the Executive Secretary before the equipment or the process is changed.

   A. One Jeffrey 56 feet crusher rated at 800 tons per hour
   B. One concrete stacking tube, 12 feet in diameter, 85 feet high
   C. One wheeled loader, one dozer
   D. Two covered conveyor systems (one new)
   E. One truck-loadout station, completely enclosed, (for highway vehicles) with surge bin and telescopic chute

Limitations

9. Genwal Resources Incorporated shall notify the Executive Secretary in writing when the installation of the equipment listed in Condition #8.D has been completed and is operational, as an initial compliance inspection is required. To insure proper credit when notifying the Executive Secretary, send your correspondence to the Executive Secretary, attn: Compliance Section.

If construction and/or installation has not been completed within eighteen months from the date of this AO, the Executive Secretary shall be notified in writing on the status of the construction and/or installation. At that time, the Executive Secretary shall require documentation of the continuous construction and/or installation of the operation and may revoke the AO in accordance with R307-401-11.

10. Visible fugitive dust emissions from haul-road traffic and mobile equipment in operational areas shall not exceed 20% opacity. Visible emissions determinations for traffic sources shall use procedures similar to Method 9, but the requirement for observations to be made at 15-second intervals over a six-minute period shall not apply. Six points, distributed along the length of the haul road or in the operational area, shall be chosen by the Executive Secretary or the Executive Secretary's representative. An opacity reading shall be made at each point when a vehicle passes the selected points. Opacity readings shall be made ½ vehicle length or greater behind the vehicle and at approximately ½ the height of the vehicle or greater. The accumulated six readings shall be averaged for the compliance value.

11. The following production limit shall not be exceeded:

    A. 4,300,000 tons of coal per rolling 12-month period

    To determine compliance with a rolling 12-month total the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. The records of production shall be kept on a daily basis. Production shall be determined by examination of company sales records and production records.

Roads and Fugitive Dust

12. All unpaved roads and other unpaved operational areas which are used by mobile equipment shall be water sprayed and/or chemically treated to reduce fugitive dust. Control is required at all times (24 hours per day every day) for the duration of the project/operation. Records of water treatment shall be kept for all periods when the plant is in operation. Treatment shall be of sufficient frequency and quantity to maintain the surface material in a damp/moist condition or unless it is below freezing. The opacity shall not exceed 20% during all times the areas are in use. The records shall include the following items:

    A. Date
    B. Number of treatments made
    C. Rainfall received, if any, and approximate amount
    D. Time of day treatments were made

    Records of treatment shall be made available to the Executive Secretary upon request and shall include a period of two years ending with the date of the request.

13. The haul road shall be paved and shall be periodically swept or sprayed clean as dry conditions warrant or as determined necessary by the Executive Secretary. Records of cleaning of the paved road shall be kept.

14. Water sprays shall be installed at the following points to control fugitive emissions if the opacity limit can not be maintained:

    A. All crushers
    B. All screens
    C. All conveyor transfer points
    D. All stockpiles
    E. All operation areas

    The sprays shall operate whenever dry conditions warrant or as determined necessary by the Executive Secretary.

15. The following limit shall apply to the storage pile:

    A. Size not to exceed - 1.5 acres

    The storage piles shall be watered to minimize generation of fugitive dusts as dry conditions warrant or as determined necessary by the Executive Secretary.

Federal Limitations and Requirements

16. In addition to the requirements of this AO, all provisions of 40 CFR 60, New Source Performance Standards (NSPS) Subparts A and Y, 40 CFR 60.1 to 60.18 and 40 CFR 60.250 to 60.254 (Standards of Performance for Coal Preparation Plants) apply to this installation.

Records & Miscellaneous

17. At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this Approval Order including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Executive Secretary which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded.

18. The owner/operator shall comply with R307-150 Series. Inventories, Testing and Monitoring.

19. The owner/operator shall comply with R307-107. General Requirements: Unavoidable Breakdowns.

The Executive Secretary shall be notified in writing if the company is sold or changes its name.

This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including R307.

A copy of the rules, regulations and/or attachments addressed in this AO may be obtained by contacting the Division of Air Quality. The Utah Administrative Code R307 rules used by DAQ, the Notice of Intent (NOI) guide, and other air quality documents and forms may also be obtained on the Internet at the following web site: http://www.eq.state.ut.us/eqair/aq_home.htm

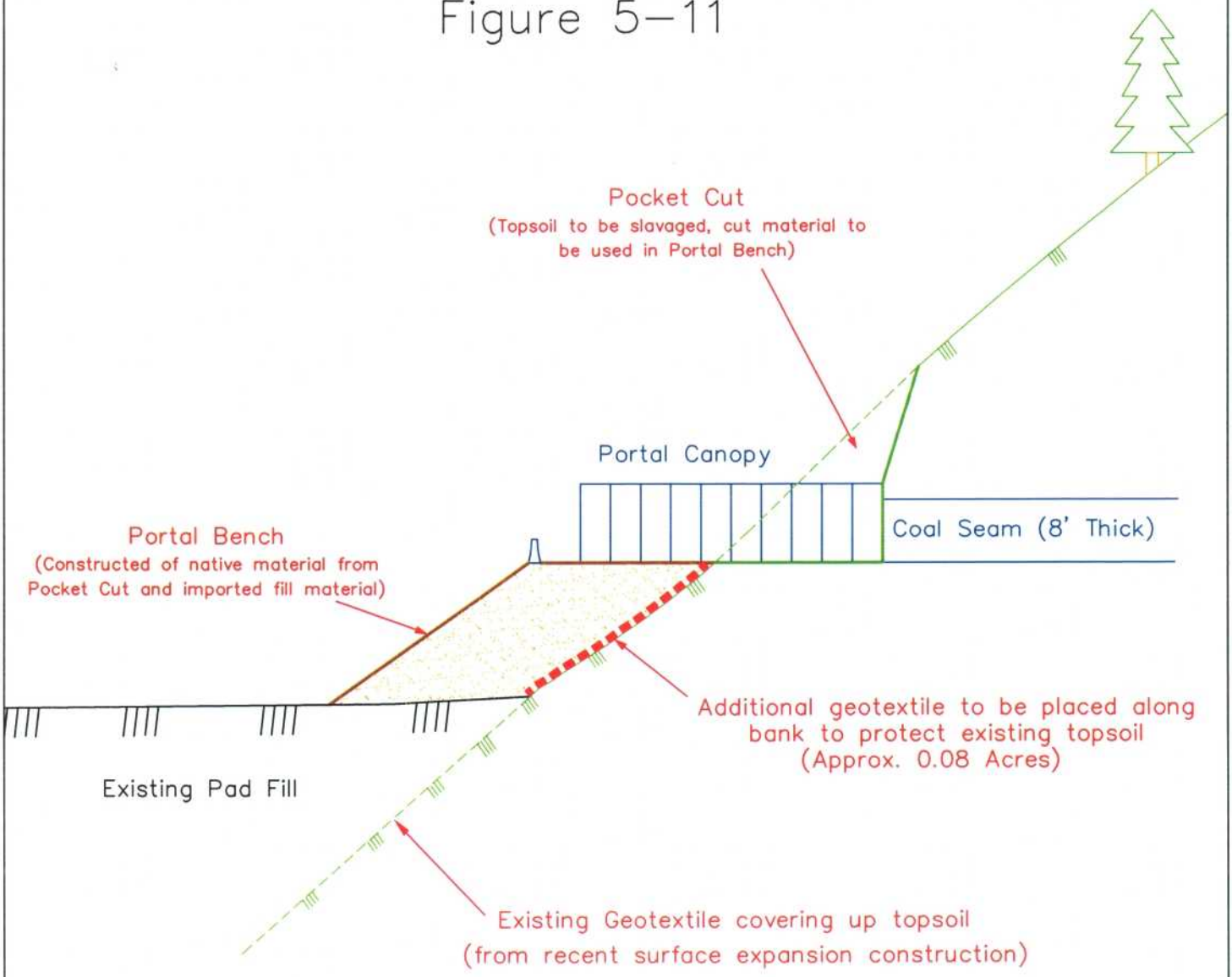
The Potential To Emit (PTE) emissions for this source (the entire plant) are currently calculated at the following values:

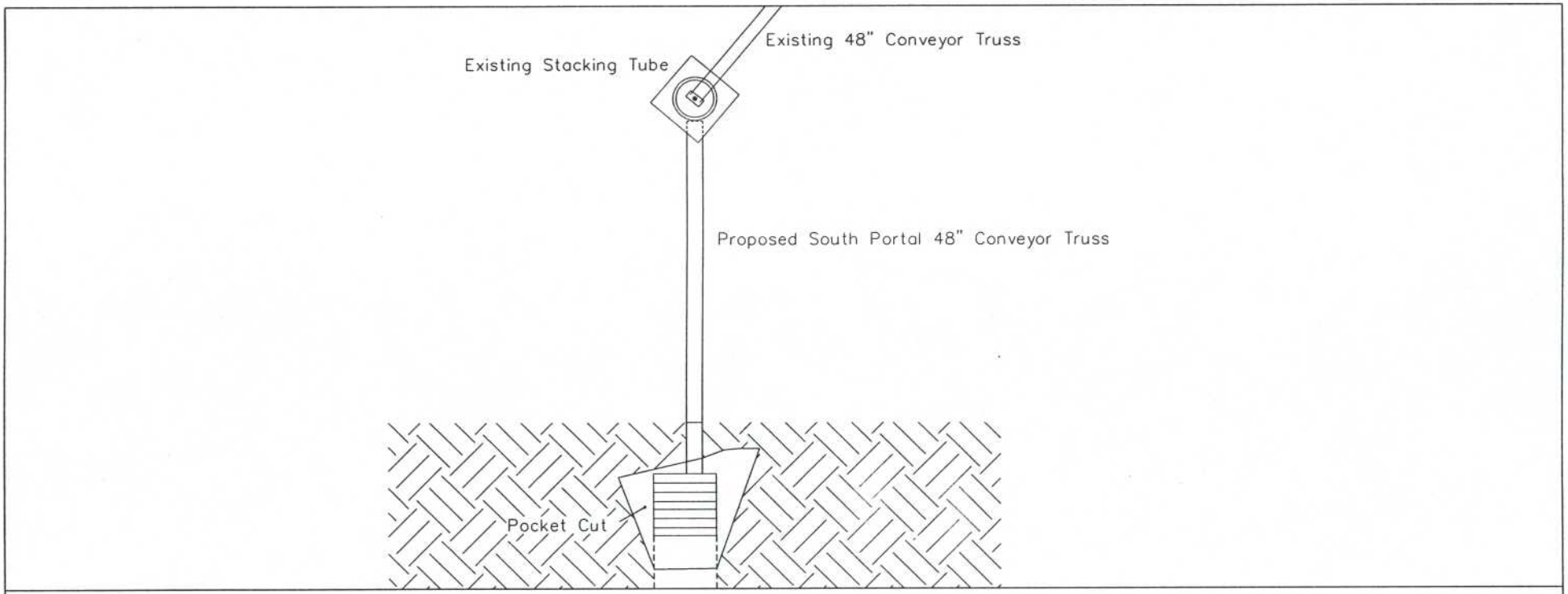
Pollutant	Tons/yr
PM_{10}	6.86
SO_2	0.31
NO_x	4.57
CO	3.57
VOC	0.80

Approved By:

Richard W. Sprott, Executive Secretary
Utah Air Quality Board

Profile of South Portal Pocket Cuts
Typical Section Through Intake Portal
Figure 5–11





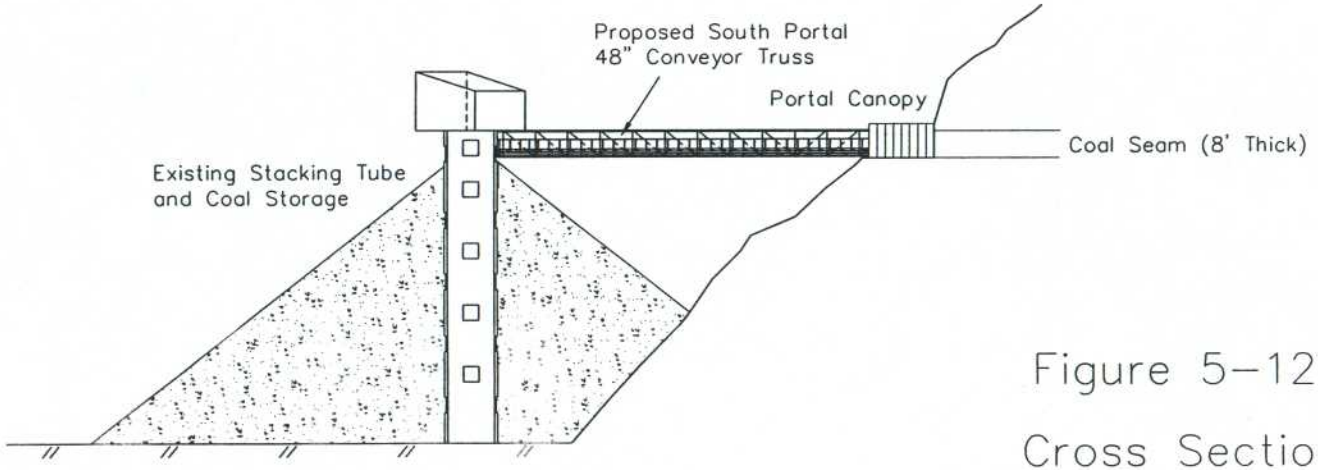


Figure 5-12

Cross Section
South Portal Belt Conveyor

Acad Ref: Figure 5-12.Dwg

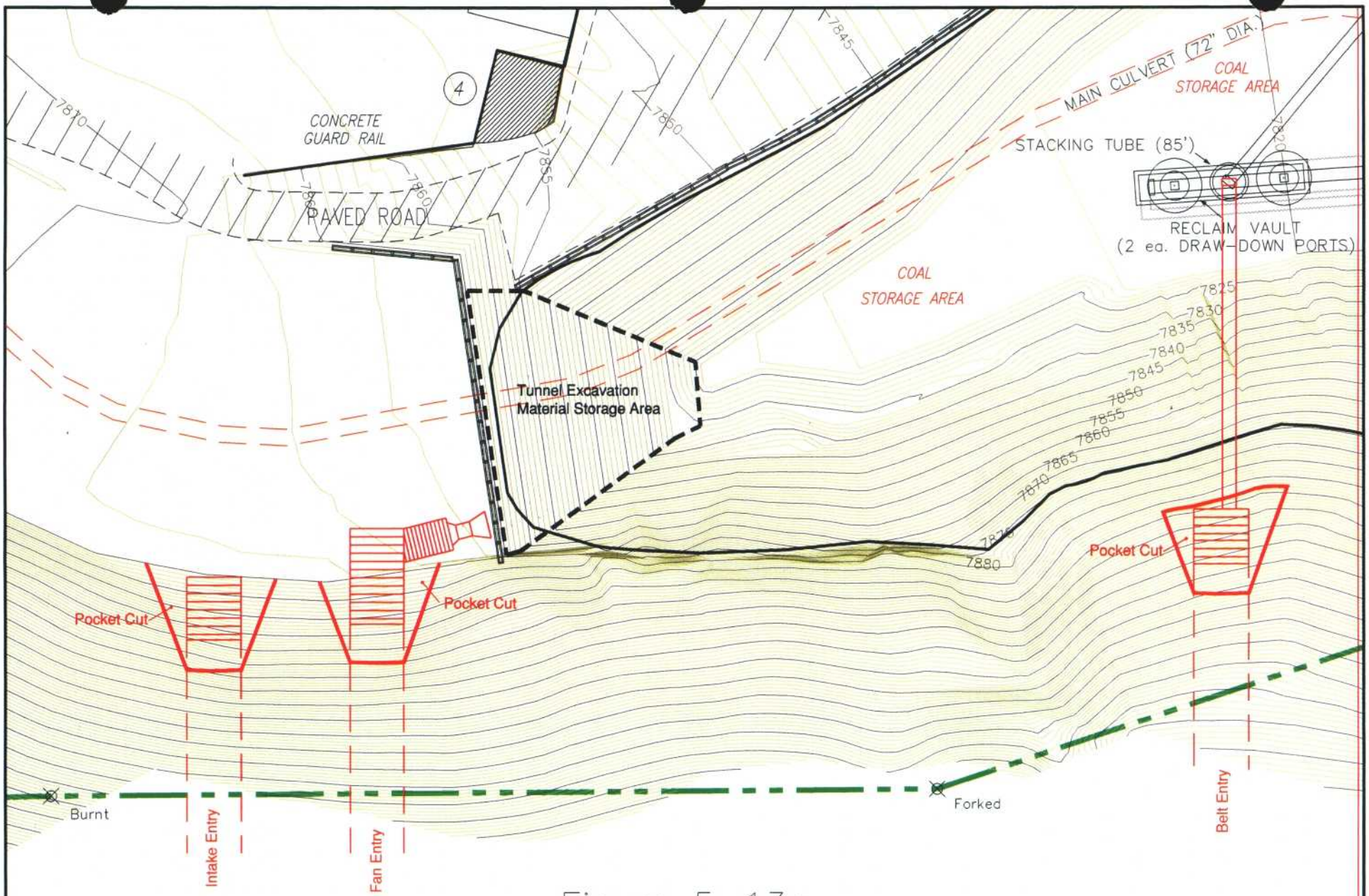


Figure 5–13a

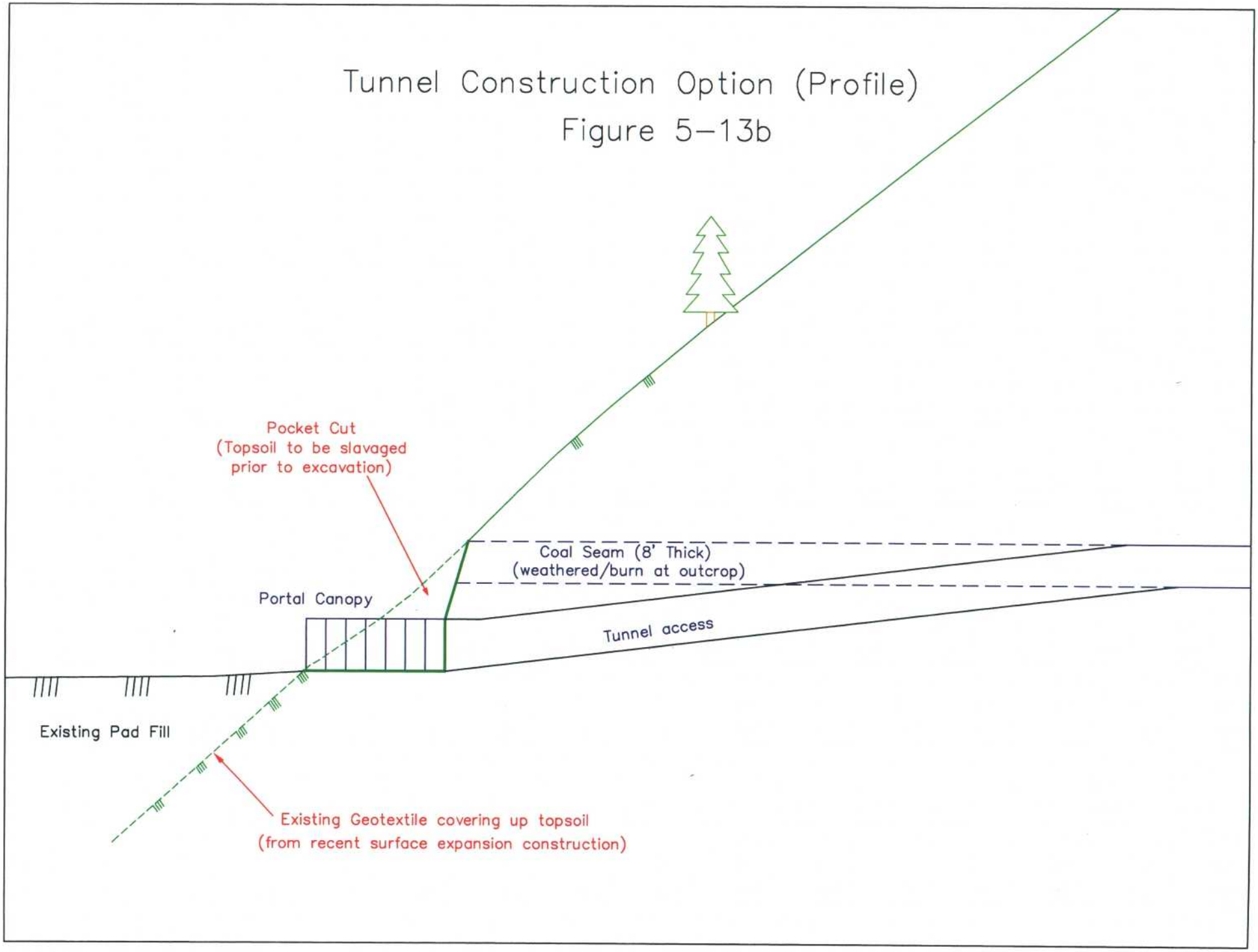
Tunnel Construction Option (Plan)

Scale: 1"=50'

Acad Ref: Figure 5–13.dwg

Tunnel Construction Option (Profile)

Figure 5–13b



Appendix 5-20a

Bond Calculations
(DOGM)

Bonding Calculations
Crandall Canyon Mine C/007/032
Revised March 24, 2003

Bond Summary

Direct Costs

Subtotal Demolition and Removal	$880,579.00	
Subtotal Backfilling and Grading	$451,209.00	
Subtotal Revegetation	$42,385.00	
Direct Costs	$1,374,173.00	
Indirect Costs		
Mob/Demob	$137,417.00	10.0%
Contingency	$68,709.00	5.0%
Engineering Redesign	$34,354.00	2.5%
Main Office Expense	$93,444.00	6.8%
Project Mainagement Fee	$34,354.00	2.5%
Subtotal Indirect Costs	$368,278.00	26.8%
Total Cost in 2006 Dollars	$1,742,451.00	
Escalation factor		0.0289
Number of years		4
Escalation	$210,329.00	
Reclamation Cost 2004	$1,952,780.00	
Bond Amount (rounded to nearest $1,000)	$1,953,000.00	

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
01	Shop 01																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	160	20	20										64000	CF	$16,000.00
	Structure's Vol. Demolished																0.35	830	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													830	CY	$8,591.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	Nielson Construction	Neilson Con.	7	/TON													830	CY	$5,810.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$30,401.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	160	20	0.5										59	CY	$594.00
	Concrete's Vol. Demolished																1.3	77	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													77	CY	$104.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													77	CY	$249.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													77	CY	$554.00
	Subtotal																			**$1,501.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$31,902.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
02	Ventilation Fan 02																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	60	20	16.67										20004	CF	$5,001.00
	Structure's Vol. Demolished																0.35	259	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													259	CY	$2,681.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	Nielson Construction	Neilson Con.	7	/TON													259	CY	$1,813.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$9,495.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	60	20	0.5										22	CY	$221.00
	Concrete's Vol. Demolished																1.3	29	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													29	CY	$39.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													29	CY	$94.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													29	CY	$209.00
	Subtotal																			$563.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$10,058.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
03	Rock Dust Silo 03																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF			30	12							FT		3393	CF	$848.00
	Structure's Vol. Demolished																0.35	44	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													44	CY	$455.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	Nielson Construction	Neilson Con.	7	/TON													44	CY	$308.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$1,811.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	2	3	2							4			2	CY	$20.00
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													3	CY	$4.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													3	CY	$10.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													3	CY	$22.00
	Subtotal																			$56.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$1,867.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
04	Concrete Dump Pad 04																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	30	25	1								FT		28	CY	$282.00
	Concrete's Vol. Demolished																1.3	36	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													36	CY	$49.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													36	CY	$116.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													36	CY	$259.00
	Subtotal																			$706.00
	Asphalt Demolition																			
	Demolition Cost	Pavement removal (asphalt) 3 inch	02220 875 1710	3.89	/SY	135	130									FT		1950	YD2	$7,586.00
	Concrete's Vol. Demolished							0.25								FT	1.3	211	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													211	CY	$285.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													211	CY	$682.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													211	CY	$1,519.00
	Subtotal																			$10,072.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$10,778.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
05	Power Center 05																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Mechanical Equipment	Mechanical equipment heavy	15055 300 3600	745	/ton							5				Ton		5	Ton	$3,725.00
	Transformer	Mechanical equipment heavy	15055 300 3600	745	/ton							2				Tom		2	Tom	$1,490.00
	Underground Wire	Wire Removal	Soldier Creek	4.81	/LF	900										CLF		900	LF	$4,329.00
	Aerial Wire	Wire Removal	Soldier Creek	4.81	/LF	500										CLF		500	LF	$2,405.00
	Chain Link Fence	Chain link remove 8'-10'	02220 875 0700	2.77	/LF	120										LF		120	LF	$332.00
	Subtotal																			**$12,281.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	25	21	0.67										13	CY	$131.00
	Concrete's Vol. Demolished																1.3	17	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													17	CY	$23.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. tri	02320 200 0320	3.23	/CY													17	CY	$55.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													17	CY	$122.00
	Subtotal																			**$331.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$12,612.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
06	Power Poles 06																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Remove wire	Wire Removal	Soldier Creek	4.81	/LF	180												180	LF	$866.00
	Remove conduit (use wire)	Wire Removal	Soldier Creek	4.81	/LF	100												100	LF	$481.00
	Remove Fixtures (use poles)	Powerpole	Hiawatha	100	EA										6	EA		6	EA	$600.00
	Remove Poles	Powerpole	Hiawatha	100	EA										6	EA		6	EA	$600.00
	Disposal Costs																			
	Subtotal																			$2,547.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$2,547.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
07	Underground Bathhouse 07																			
	Structure's Demolition Cost	Masonary Bld. Large	02220 100 0080	0.26	/CF						14000					CF		14000	CF	$3,640.00
	Structure's Vol. Demolished																0.35	181	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													181	CY	$1,873.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													181	CY	$724.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$6,237.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	70	20	0.5										26	CY	$262.00
	Concrete's Vol. Demolished																1.3	34	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													34	CY	$46.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													34	CY	$110.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													34	CY	$245.00
	Subtotal																			**$663.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$6,900.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
08	Portals 08																			
	Structure's Demolition Cost	Seal Portals	AML1	5200	EA.										6	EA		6	EA	$31,200.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$31,200.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$31,200.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
09	BeltPortals 09																			
	Structure's Demolition Cost	Seal Portals	AML1	5200	EA.										1	EA		1	EA	$5,200.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$5,200.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$5,200.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
10	Crusher Pad 10																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	36	20	1										720	CF	$180.00
	Structure's Vol. Demolished																0.35	9	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													9	CY	$93.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													9	CY	$36.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$309.00
	Equipment 's Disposal Cost	Mechanical equipment heavy	15055 300 3600	745	/ton							3				ton		3	ton	$2,235.00
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$2,235.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	36	20	1										27	CY	$272.00
	Concrete's Vol. Demolished																1.3	35	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													35	CY	$47.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													35	CY	$113.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													35	CY	$252.00
	Subtotal																			$684.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						418					CF		15	CY	$151.00
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													20	CY	$27.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													20	CY	$65.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													20	CY	$144.00
	Subtotal																			$387.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$3,615.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
11	Mine Belt 11																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost	Mechanical equipment heavy	15055 300 3600	745	/ton							2.5				ton		3	ton	$2,235.00
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$2,235.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$2,235.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
13	Silo 13																			
	Structure's Demolition Cost	Mixed Materials Bld. Large	02220 100 0100	0.26	/CF			75	30							FT		53014	CF	$13,784.00
	Structure's Vol. Demolished																0.35	687	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													687	CY	$7,110.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													687	CY	$2,748.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$23,642.00**
	Equipment 's Disposal Cost	Mechanical equipment heavy	15055 300 3600	745	/ton							20				ton		20	ton	$14,900.00
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			**$14,900.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	160	20	0.5										59	CY	$594.00
	Concrete's Vol. Demolished																1.3	77	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													77	CY	$104.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													77	CY	$249.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													77	CY	$554.00
	Subtotal																			**$1,501.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$40,043.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
14	Weight Shed 14																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						2					CY		2	CY	$20.00
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													3	CY	$4.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													3	CY	$10.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													3	CY	$22.00
	Subtotal																			**$56.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						235					CF		9	CY	$91.00
	Concrete's Vol. Demolished																1.3	12	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													12	CY	$16.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													12	CY	$39.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													12	CY	$86.00
	Subtotal																			**$232.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						80					CF		3	CY	$30.00
	Concrete's Vol. Demolished																1.3	4	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													4	CY	$5.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													4	CY	$13.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													4	CY	$29.00
	Subtotal																			**$77.00**
	Total																			**$365.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
15	Bulk Oil 15																			
	Structure's Demolition Cost	Masonary Bld. Large	02220 100 0080	0.26	/CF	55	20	10										11000	CF	$2,860.00
	Structure's Vol. Demolished																0.35	143	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													143	CY	$1,480.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													143	CY	$572.00
	Subtotal																			**$4,912.00**
	Tank																			
	Dismantling Cost	9000 gal to 12000 gal tank	02115 200 0130	1225	Ea.										1	Ea		1	EA	$1,225.00
	Loading Costs																			
	Transport Costs	9000 gal to 12000 gal tank	02115 200 1029	1100	Ea.										1			1	EA	$1,100.00
	Disposal Costs	9000 gal to 12000 gal tank	02115 200 0320	305	Ea.										1			1	EA	$305.00
	Subtotal																			**$2,630.00**
	Slab																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	55	0.5								FT		20	CY	$201.00
	Concrete's Vol. Demolished																1.3	26	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													26	CY	$35.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													26	CY	$84.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													26	CY	$187.00
	Subtotal																			**$507.00**
	Footings																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	150	2	1								FT		11	CY	$111.00
	Concrete's Vol. Demolished																1.3	14	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													14	CY	$19.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													14	CY	$45.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													14	CY	$101.00
	Subtotal																			**$276.00**
	Slab																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	20	0.5								FT		7	CY	$70.00
	Concrete's Vol. Demolished																1.3	9	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													9	CY	$12.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													9	CY	$29.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													9	CY	$65.00
	Subtotal																			**$176.00**
	Walls																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	0.67	8.4								FT		4	CY	$40.00
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													5	CY	$7.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													5	CY	$16.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													5	CY	$36.00
	Subtotal																			**$99.00**
	Total																			**$8,600.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
17	Truck Pad 17																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF															
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						750					CF		28	CY	$282.00
	Concrete's Vol. Demolished																1.3	36	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													36	CY	$49.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													36	CY	$116.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													36	CY	$259.00
	Subtotal																			$706.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$706.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
18	General Storage 18																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	20	60	23								FT		27600	CF	$6,900.00
	Structure's Vol. Demolished																0.35	358	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													358	CY	$3,705.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													358	CY	$1,432.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$12,037.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	67.5	0.67								FT		34	CY	$342.00
	Concrete's Vol. Demolished																1.3	44	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													44	CY	$59.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													44	CY	$142.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													44	CY	$317.00
	Subtotal																			$860.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$12,897.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
19	Reclaim Hopper Belt 19																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost	Mechanical equipment heavy	15055 300 3600	745	/ton							5				ton		5	ton	$3,725.00
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$3,725.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$3,725.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
20	Visual Disconnect 20																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost	Mechanical equipment heavy	15055 300 3600	745	/ton							1				ton		1	ton	$745.00
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$745.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	4	6	0.5								FT		0	CY	$0.00
	Concrete's Vol. Demolished																1.3	0	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													0	CY	$0.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													0	CY	$0.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													0	CY	$0.00
	Subtotal																			$0.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$745.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
21	New Shop 21																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	20	62.5	20								FT		25000	CF	$6,250.00
	Structure's Vol. Demolished																0.35	324	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													324	CY	$3,353.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													324	CY	$1,296.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$10,899.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	62.5	0.5								FT		23	CY	$231.00
	Concrete's Vol. Demolished																1.3	30	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													30	CY	$41.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													30	CY	$97.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													30	CY	$216.00
	Subtotal																			$585.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$11,484.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
22	Shop Extension 22																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	20	30	12								FT		7200	CF	$1,800.00
	Structure's Vol. Demolished																0.35	93	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													93	CY	$963.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													93	CY	$372.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$3,135.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	30	0.5								FT		11	CY	$111.00
	Concrete's Vol. Demolished																1.3	14	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													14	CY	$19.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trip	02320 200 0320	3.23	/CY													14	CY	$45.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													14	CY	$101.00
	Subtotal																			**$276.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$3,411.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
23	Shotcrete Slopes 23																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						46					CY		46	CY	$463.00
	Concrete's Vol. Demolished																1.3	60	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													60	CY	$81.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													60	CY	$194.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													60	CY	$432.00
	Subtotal																			$1,170.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$1,170.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
24	Fan Transformer 24																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost	Mechanical equipment heavy	15055 300 3600	745	/ton							0.25				ton		0.25	ton	$186.00
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$186.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	6	8	0.67								FT		1	CY	$10.00
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													1	CY	$1.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. tri	02320 200 0320	3.23	/CY													1	CY	$3.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													1	CY	$7.00
	Subtotal																			$21.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$207.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
25	Chain Link Fence 25																			
	Structure's Demolition Cost	Chain link remove 8'-10'	02220 875 0700	2.77	/LF	120										LF		120	LF	$332.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$332.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$332.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
26	Concrete Guard 26																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	530	2	3								FT		118	CY	$1,187.00
	Concrete's Vol. Demolished																1.3	153	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													153	CY	$207.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													153	CY	$494.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													153	CY	$1,102.00
	Subtotal																			$2,990.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	250	10	0.67								FT		62	CY	$624.00
	Concrete's Vol. Demolished																1.3	81	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													81	CY	$109.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													81	CY	$262.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													81	CY	$583.00
	Subtotal																			$1,578.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$4,568.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
27	Retaining Wall 27																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	530	2	3								FT		118	CY	$1,187.00
	Concrete's Vol. Demolished																1.3	153	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													153	CY	$207.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. tri	02320 200 0320	3.23	/CY													153	CY	$494.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													153	CY	$1,102.00
	Subtotal																			$2,990.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$2,990.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
28	Culverts 28																			
	UD-1	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	295	3.5	7								FT		268	CY	$3,296.00
	C2, C4, C8, C10	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	600	2	4								FT		178	CY	$2,189.00
	C1	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	60	1.5	3								FT		10	CY	$123.00
	C12	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	85	1.25	2.5								FT		10	CY	$123.00
	C3, C7, C9, C11	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	251	1	2								FT		19	CY	$234.00
	UD-3	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	500	1.5	3								FT		83	CY	$1,021.00
	C-5	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	120	1	2								FT		9	CY	$111.00
	Bypass	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	1400	2	4								FT		415	CY	$5,105.00
	Main Creek	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	1400	6	12								FT		3733	CY	$45,916.00
	Subtotal																			**$58,118.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$58,118.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
29	Guard Rail 29																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Remove Rails	Guiderail remove	02220 875 0800	10.75	LF	120										LF		120	LF	$1,290.00
	Remove Posts	Guide Posts Remove	02220 875 0860	12.7	Ea										10	EA		10	EA	$127.00
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$1,417.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$1,417.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
30	Inlets 30																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost	Mechanical equipment heavy	15055 300 3600	745	/ton							1				ton		1	ton	$745.00
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			$745.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						11				3	CY		33	CY	$332.00
	Concrete's Vol. Demolished																1.3	43	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													43	CY	$58.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													43	CY	$139.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													43	CY	$310.00
	Subtotal																			$839.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	4	6	0.67								FT		1	CY	$10.00
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													1	CY	$1.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													1	CY	$3.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													1	CY	$7.00
	Subtotal																			$21.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$1,605.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
31	Sed Pond Culvert 31																			
	CMP 24	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY	110	2	4								FT		33	CY	$406.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$406.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$406.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
32	Gabion Retaining Wall 32																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						2000					CF		74	CY	$744.00
	Concrete's Vol. Demolished																1.3	96	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													96	CY	$130.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													96	CY	$310.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													96	CY	$691.00
	Subtotal																			$1,875.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$1,875.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
33	Water Wells 33																			
	Structure's Demolition Cost	Plug Well	AML3	5000	EA.										4	EA		4	EA	$20,000.00
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$20,000.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$20,000.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
34	Headwalls 34																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	18	18	0.5								FT		6	CY	$60.00
	Concrete's Vol. Demolished																1.3	8	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													8	CY	$11.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													8	CY	$26.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													8	CY	$58.00
	Subtotal																			**$155.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY						3600					CF		133	CY	$1,338.00
	Concrete's Vol. Demolished																1.3	173	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													173	CY	$234.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													173	CY	$559.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													173	CY	$1,246.00
	Subtotal																			**$3,377.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Overhead Conveyor Supports 35																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	7	7	2							6	FT		22	CY	$221.00
	Concrete's Vol. Demolished																1.3	29	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													29	CY	$39.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													29	CY	$94.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													29	CY	$209.00
	Subtotal																			$563.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	2	2	4							6	FT		4	CY	$40.00
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													5	CY	$7.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													5	CY	$16.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													5	CY	$36.00
	Subtotal																			$99.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$662.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
36	Reclaim Tunnel 36																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	170	12	1								FT		76	CY	$765.00
	Concrete's Vol. Demolished																1.3	99	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													99	CY	$134.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													99	CY	$320.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													99	CY	$713.00
	Subtotal																			$1,932.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$1,932.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
37	Feeder Boxes 37																			
	Structure's Demolition Cost	Concrete Bld. Large	02220 100 0050	0.35	/CF	13.5	16.5	8.5							3	FT		5680	CF	$1,988.00
	Structure's Vol. Demolished																0.35	74	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													74	CY	$766.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													74	CY	$296.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$3,050.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	8	5	0.5							3	FT		2	CY	$20.00
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													3	CY	$4.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													3	CY	$10.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													3	CY	$22.00
	Subtotal																			**$56.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$3,106.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
38	Reclaim Conveyor Supports 38																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	4.5	4.5	1							2	FT		2	CY	$20.00
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													3	CY	$4.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													3	CY	$10.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													3	CY	$22.00
	Subtotal																			**$56.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	2	4	2							2	FT		1	CY	$10.00
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													1	CY	$1.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													1	CY	$3.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													1	CY	$7.00
	Subtotal																			**$21.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$77.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
39	Crusher Platform Supports 39																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	8	8	3							4	FT		28	CY	$282.00
	Concrete's Vol. Demolished																1.3	36	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													36	CY	$49.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													36	CY	$116.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													36	CY	$259.00
	Subtotal																			**$706.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	4	4	4							4	FT		9	CY	$91.00
	Concrete's Vol. Demolished																1.3	12	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													12	CY	$16.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													12	CY	$39.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													12	CY	$86.00
	Subtotal																			**$232.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$938.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
40	Feeder Conveyor Supports 40																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	4.5	4.5	1							2	FT		2	CY	$20.00
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													3	CY	$4.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													3	CY	$10.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													3	CY	$22.00
	Subtotal																			**$56.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	2	4	2							2	FT		1	CY	$10.00
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													1	CY	$1.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													1	CY	$3.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													1	CY	$7.00
	Subtotal																			**$21.00**
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$77.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
41	Scale Pads 41																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	20	0.5							2	FT		15	CY	$151.00
	Concrete's Vol. Demolished																1.3	20	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													20	CY	$27.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													20	CY	$65.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													20	CY	$144.00
	Subtotal																			**$387.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	12	60	1							2	FT		53	CY	$533.00
	Concrete's Vol. Demolished																1.3	69	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													69	CY	$93.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													69	CY	$223.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													69	CY	$497.00
	Subtotal																			**$1,346.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	12	60	2							2	FT		107	CY	$1,076.00
	Concrete's Vol. Demolished																1.3	139	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													139	CY	$188.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													139	CY	$449.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													139	CY	$1,001.00
	Subtotal																			**$2,714.00**
	Total																			**$4,447.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
42	New Scale House 42																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	20	20	8								FT		3200	CF	$800.00
	Structure's Vol. Demolished																0.35	41	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													41	CY	$424.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													41	CY	$164.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$1,388.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	20	30	0.5								FT		11	CY	$111.00
	Concrete's Vol. Demolished																1.3	14	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													14	CY	$19.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													14	CY	$45.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													14	CY	$101.00
	Subtotal																			$276.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	3	8	1.5								FT		1	CY	$10.00
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													1	CY	$1.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													1	CY	$3.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													1	CY	$7.00
	Subtotal																			$21.00
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	0.66	80	0.66								FT		1	CY	$10.00
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													1	CY	$1.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													1	CY	$3.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													1	CY	$7.00
	Subtotal																			$21.00
	Total																			$1,706.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
43	Proposed Bathhouse 43																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	60	100	18								FT		108000	CF	$27,000.00
	Structure's Vol. Demolished																0.35	1400	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													1400	CY	$14,490.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													1400	CY	$5,600.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$47,090.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	60	100	0.5								FT		111	CY	$1,117.00
	Concrete's Vol. Demolished																1.3	144	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													144	CY	$194.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													144	CY	$465.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													144	CY	$1,037.00
	Subtotal																			**$2,813.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	3	320	1.5								FT		53	CY	$533.00
	Concrete's Vol. Demolished																1.3	69	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													69	CY	$93.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													69	CY	$223.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													69	CY	$497.00
	Subtotal																			**$1,346.00**
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	10.06	/CY	1	80	0.66								FT		2	CY	$20.00
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													3	CY	$4.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													3	CY	$10.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													3	CY	$22.00
	Subtotal																			**$56.00**
	Total																			**$51,305.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
44	Coal Silo 44																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF			60	12							FT		6786	CF	$1,697.00
	Structure's Vol. Demolished																0.35	88	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													88	CY	$911.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													88	CY	$352.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$2,960.00
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$2,960.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
45	Conveyors 45																			
	Structure's Demolition Cost	Steel Bld. Large	02220 100 0012	0.25	/CF	5	780	4								FT		15600	CF	$3,900.00
	Structure's Vol. Demolished																0.35	202	CY	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage	12 CY (16 Ton) Dump Truck 5 mi. md. trip	02320 200 0540	10.35	/CY													202	CY	$2,091.00
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY													202	CY	$808.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$6,799.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$6,799.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
46	Parking Lot 46																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Pavement removal (asphalt) 3 inch	02220 875 1710	3.89	/SY					4800						SY		4800	SY	$18,672.00
	Concrete's Vol. Demolished							0.25								FT	1.3	520	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													520	CY	$702.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. tri	02320 200 0320	3.23	/CY													520	CY	$1,680.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													520	CY	$3,744.00
	Subtotal																			$24,798.00
	Concrete Demolition																			
	Demolition Cost	Pavement removal (asphalt) 3 inch	02220 875 1710	3.89	/SY					4400						SY		4400	SY	$17,116.00
	Concrete's Vol. Demolished							0.25								FT	1.3	477	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													477	CY	$644.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. tri	02320 200 0320	3.23	/CY													477	CY	$1,541.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													477	CY	$3,434.00
	Subtotal																			$22,735.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$47,533.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
47	RubberLiner 47																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished	Mechanical equipment heavy	15055 300 3600	745	/ton							32.5				ton		33	ton	$24,585.00
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$24,585.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	xxxxx																			
	Total																			**$24,585.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
48	Culvert Bedding Removal 48																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Stream Bed Sand																			
	Demolition Cost	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY						1296					CY		1296	CY	$15,941.00
	Concrete's Vol. Demolished																1.3	1685	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													1685	CY	$2,275.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													1685	CY	$5,443.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													1685	CY	$12,132.00
	Subtotal																			$35,791.00
	Culvert Bed Sand																			
	Demolition Cost	Excavation 1 CY backhoe earth	02315 440 2040	12.3	/CY						3630					CY		3630	CY	$44,649.00
	Concrete's Vol. Demolished																1.3	4719	CY	
	Loading Cost	Front end loader 3 CY	02315 400 1300	1.35	/CY													4719	CY	$6,371.00
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	02320 200 0320	3.23	/CY													4719	CY	$15,242.00
	Disposal Costs	Disposal on site	02220 550 4200	7.2	/CY													4719	CY	$33,977.00
	Subtotal																			$100,239.00
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	xxxxx																			
	Total																			$136,030.00

Ref.	Description See Backfilling & Grading Plan	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
49	Off Site Dump Fee 49																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	City Services	City Services Price	4	/CY						66096					CY		66096	CY	$264,384.00
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			**$264,384.00**
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			**$264,384.00**

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	See Backfilling and Grading																			
	Drainage Control 50																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel																			
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			
	Filter Material	Silt fence	02370 550 1100	0.97	LF	3000														
	Rip-rap	Rip-Rap dumped 300 lbs. average	02370 300 0370	27.5	Ton							2100				LF		3000	LF	$2,910.00
																TON		2100	TON	$57,750.00
	Subtotal																			
	Concrete Demolition																			$60,660.00
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			$60,660.00

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost
	Shop 01																			$31,902.00
	Ventilation Fan 02																			$10,058.00
	Rock Dust Silo 03																			$1,667.00
	Concrete Dump Pad 04																			$10,778.00
	Power Center 05																			$12,612.00
	Power Poles 06																			$2,547.00
	Underground Bathhouse 07																			$6,900.00
	Portals 08																			$31,200.00
	BeltPortals 09																			$5,200.00
	Crusher Pad 10																			$3,615.00
	Mine Belt 11																			$2,235.00
	Silo 13																			$40,043.00
	Weight Shed 14																			$365.00
	Bulk Oil 15																			$8,600.00
	Truck Pad 17																			$706.00
	General Storage 18																			$12,897.00
	Reclaim Hopper Belt 19																			$3,725.00
	Visual Disconnect 20																			$745.00
	New Shop 21																			$11,484.00
	Shop Extension 22																			$3,411.00
	Shotcrete Slopes 23																			$1,170.00
	Fan Transformer 24																			$207.00
	Chain Link Fence 25																			$332.00
	Concrete Guard 26																			$4,568.00
	Retaining Wall 27																			$2,990.00
	Culverts 28																			$58,118.00
	Guard Rail 29																			$1,417.00
	Inlets 30																			$1,605.00
	Sed Pond Culvert 31																			$406.00
	Gabion Retaining Wall 32																			$1,875.00
	Overhead Conveyor Supports 35																			$662.00
	Reclaim Tunnel 36																			$1,932.00
	Feeder Boxes 37																			$3,106.00
	Reclaim Conveyor Supports 38																			$77.00
	Crusher Platform Supports 39																			$938.00
	Feeder Conveyor Supports 40																			$77.00
	Scale Pads 41																			$4,447.00
	New Scale House 42																			$1,706.00
	Proposed Bathhouse 43																			$51,305.00
	Coal Silo 44																			$2,960.00
	Conveyors 45																			$6,799.00
	Parking Lot 46																			$47,533.00
	RubberLiner 47																			$24,585.00
	Culvert Bedding Removal 48																			$136,030.00
	Off Site Dump Fee 49																			$264,384.00
	Drainage Control 50																			$60,660.00
	Total																			**$880,579.00**

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Crandell Canyon Mine															
Backfilling and Grading															
Ripping Fill Area (D9 Dozer)															
D9R Semi-U EROPS (9-43) (3Q02)	17060	64.8	0.1	49.35	227.26	1	227.26	$/HR	57387	CY	1473	CY/HR	39	HR	$8,863.00
Multi-Shank Ripper 360-519 P (9-49) (3Q02)	2580	7.65	0.1	0	24.54	1	24.54	$/HR					39	HR	$957.00
Subtotal															$9,820.00
Backfill On Site															
Loading															
988F Series II 2000 EROPS (9-27) (3Q02)	12710	54.35	0.1	49.35	188.57	1	188.57	$/HR	70192	CY	498	CY/HR	140.9	HR	$26,570.00
Hauling															
769D (20-1) (2Q02)	10640	39.75	0.1	39.15	149.38	2	298.76	$/HR	70192	CY	498	CY/HR	140.9	HR	$42,095.00
Place with Excavator															
CAT 375L 2001 (10-8)(3Q02)	23630	83.6	0.1	49.35	289	1	289	$/HR	12805	CY	181.3	CY/HR	70.6	HR	$20,403.00
Place with Dozer															
D9R Semi-U EROPS (9-43) (3Q02)	17060	64.8	0.1	49.35	227.26	1	227.26	$/HR	57387	CY	215	CY/HR	266.9	HR	$80,656.00
Subtotal															$149,724.00
Backfill Off Site															
Loading															
988F Series II 2000 EROPS (9-27) (3Q02)	12710	54.35	0.1	49.35	188.57	1	188.57	$/HR	66096	CY	583	CY/HR	113.4	HR	$21,384.00
Hauling															
8X4 85,000lbs 15-18 CY (20-1) (2Q02)	4430	25.2	0.1	39.15	94.56	17	1607.52	$/HR	66096	CY	583	CY/HR	113.4	HR	$182,293.00
Subtotal															$203,677.00
Miscellaneous Removal/Excavate Stream Channels															
436B (4WD) Ext. 2000 EROPS (9-17) (3Q02)	3575	13.75	0.1	49.35	86.82	1	86.82	$/HR	1560	CY	151.1	CY/HR	10.3	HR	$894.00
Subtotal															$894.00
Total Backfilling and Grading															$364,115.00

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Crandell Canyon Mine															
Topsoil Distribution															
Load From Topsoil Stockpile															
Load															
966F Series II EROPS 1999 (9-27) (3Q02)	6295	25.25	0.1	49.35	116.47	1	116.47	$/HR	10737	CY	298.8	CY/HR	35.9	HR	$4,181.00
Haul															
6X4 50,000lbs 10-12 CY (20-1) (2Q02)	2855	18.25	0.1	39.15	77.07	5	385.35	$/HR	10737	CY	298.8	CY/HR	35.9	HR	$13,834.00
Subtotal															$18,015.00
Place Topsoil					38.5	0.5	19.25	$/HR					35.9	HR	$691.00
Place with Wheel Loader															
966F Series II EROPS 1999 (9-27) (3Q02)	6295	25.25	0.1	49.35	116.47	1	116.47	$/HR	7354	CY	160.1	CY/HR	45.9	HR	$5,346.00
Grading															
D7R Semi-U (9-43) (3Q02) 2001	10335	35.55	0.1	49.35	153.05	1	153.05	$/HR	7354	CY	145	CY/HR	50.7	HR	$7,760.00
Excavator															
CAT 375L 2001 (10-8)(3Q02)	23630	83.6	0.1	49.35	289	1	289	$/HR	3383	CY	181.3	CY/HR	18.7	HR	$5,404.00
Subtotal															$19,201.00
Total															$37,216.00

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Crandell Canyon Mine															
Support Equipment and Labor															
Backfilling															
5,000 gal H2O truck Diesel (20-6) (2Q02)	4895	27.15	0.1	39.15	99.61	1	99.61	$/HR					306	HR	30481
Pickup Truck Crew 4x4 1 ton (20-7) (2Q02)	860	3.85	0.1	0	9.74	1	9.74	$/HR					306	HR	2980
Foreman Average, Outside				53.65			53.65	$/HR					306	HR	16417
Subtotal															49878
Total															49878

7.21 General Requirements

This section presents a description of the hydrologic resources within the Crandall Canyon Mine permit area.

7.22 Cross Sections and Maps

Figures 7-1 through 7-12 and Plates 7-1 through 7-17 of this chapter depict existing surface and groundwater occurrences within and adjacent to the Crandall Canyon Mine permit area. These figures also illustrate the topography, streams, springs, wells, water monitoring locations, and other hydrologic design information pertinent to the Crandall Canyon Mine.

7.2 Sampling and Analysis

All water samples are collected and analyzed according to methods in either the "Standard Methods for the Examination of Water and Waste Water" or the 40 CFR parts 136 and 434.

7.24 Baseline Information

(It should be noted that the Dellenbach fee tract is included in the currently approved permit area. All current data for hydrologic, geologic, and climatologic information applies to the Dellenbach tract.)

7.24.1 Groundwater Information

This section is a comprehensive view of the groundwater hydrology for the Crandall Canyon Mine permit and surrounding area.

Scope

This section presents discussions of groundwater conditions within and adjacent to the permit area, which consists of lease areas SL 062648 and U 054762, State leases ML21568 and ML21569, and UTU-68082 (Plate 7-12). Conclusions drawn herein are based upon detailed seep and spring surveys of the area, limited exploratory drilling, results of stream monitoring, and the results of groundwater investigations conducted by others in the region of the mine.

Methodology

Seep and spring surveys were conducted in 1985, 1987, and 1989 through 1993, within an area that extended approximately one mile north, west, and south of the boundaries of the permit area. The study area for the survey was bounded by Huntington Creek on the east, the east-west ridge between the North Fork of Horse Canyon and the South Fork of Huntington Creek on the

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north, Bald Ridge and Bald Mountain in Scad Valley to the west, and Mill Fork on the south.

An aerial reconnaissance of the survey area was initially conducted to provide an indication of spring locations and site accessibility. The area was then traversed on foot to allow springs and seepage points to be precisely located, examined, and sampled. Geologic conditions at all seeps and springs were noted in the field, including lithologic and structural controls and the geologic formation from which the seepage issued. Signs of usage were also noted. The flow rate was visually estimated and (if sufficient water was present) a sample of the water was collected. The temperature of the water issuing from the spring was measured at the site. All samples were subsequently analyzed in the field for pH and specific conductance.

Hydrologic characteristics of the North Horn, Price River, Castlegate, and Blackhawk Formations are reviewed in this section. Locations of seeps and springs monitored during 1985, 1987, and 1989 through 1993 are shown on Plate 7-12. The geologic occurrence and use of seeps and springs are found in Appendix 7-16. Flow rate and temperature measurements appear in Appendix 7-17. Specific conductivity and pH measurements are found in Appendices 7-18 and 7-19 respectively. Field water-quality measurements are summarized in Appendix 7-20. Laboratory analytical reports for groundwater collected from the eight quarterly sampled seep/spring locations are also contained in Appendix 7-20.

Seep and spring surveys were conducted in the area around the IBC (Incidental Boundary Change) area during 1987, 1989 and 1990. No seeps or springs were identified in the IBC area. The area was resurveyed by Gary Gray and Eric Peterson in 1998.

Regional Groundwater Hydrology

Six formations outcrop in the Mine Permit Area (Plate 6-1). According to Doelling (1972), the Masuk Shale Member of the Mancos Shale (Km on Plate 6-1) is a light gray to blue-gray marine sandy shale in the mine vicinity. This unit is exposed at the mouth of Crandall Canyon and in adjacent areas along Huntington Creek. The Masuk Shale Member yields water locally to seeps and springs but does not serve as a regionally important aquifer (Danielson et al., 1981).

The Star Point Sandstone (Ksp) is predominantly a light-gray massive sandstone with minor interbedded layers of shale and siltstone near its base (Doelling, 1972). In the vicinity of the mine, the Star Point Sandstone is 350 to 450 feet thick. The Star Point serves as an important regional aquifer (Danielson et al., 1981), yielding water to several minor and some major springs where fractured and jointed.

The Blackhawk Formation (Kb) is the principal coal-bearing unit in the region (Doelling, 1972). This formation consists of interbedded layers of sandstone, siltstone, shale, and coal, and reaches a thickness of about 1000 feet in the mine area. The principal coal seam (the Hiawatha seam) is present at the base of the formation. The formation yields water to springs and coal mines when fractured. At GENWAL the water has been encountered within the Starpoint Sandstone approximately 50-100 feet below the contact point with Hiawatha seam.
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APPENDIX 7-4

CRANDALL CANYON MINE
SEDIMENTATION AND DRAINAGE CONTROL PLAN

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1. Introduction

The Sedimentation and Drainage Control Plan for the Crandall Canyon Mine has been designed according to the State of Utah R645- Coal Mining Rules, November 1, 1996. All design criteria and construction will be certified by a Utah Registered Professional Engineer.

This plan has been divided into the following three sections:

1) *Design of Drainage Control Structures for the Proposed Construction*
2) *Design of Sediment Control Structures*
3) *Design of Drainage Control Structures for Reclamation*

The general surface water control plan for this project will consist of the following:

(a) *The proposed pad expansion will necessitate modifications of a number of existing hydrologic structures on the site. In an effort to clarify the new plan, the entire sedimentation and drainage control plan has been re-evaluated for the site and presented in this Appendix.*

(b) *The general plan for the pad expansion is to divert undisturbed drainage from Crandall Canyon above the minesite through a 6' diameter CMP culvert beneath the expansion area and discharge below the disturbed area. As a result of the expansion, existing culverts C-2, C-8, C-10 and Ditch DD-9 will be removed. 2 new ditches (DD-12 & DD-13) and 3 new culverts (Main Canyon, C-11 and C-11A) will be added to provide for drainage control for the expanded facility. The existing sediment pond will also be expanded to contain additional runoff from the expansion area. All other existing drainage controls will remain unchanged. All minesite drainage controls are shown on Plate 7-5 "Drainage Map".*

2.8 Culvert Sizing

Minimum culvert sizing is based on the following Manning's Equation; using the Haestad Methods, Flowmaster I, Version 3.42 computer program:

$$D = \left(\frac{2.16 \; Q \; n}{\sqrt{S}} \right)^{0.35}$$

where: D	=	*Required Diameter (feet)*	
Q	=	*QP = Peak Discharge (cfs)*	
n	=	*Roughness Factor (0.020 for cmp)*	
S	=	*Slope (ft. Per ft.)*	

Using the above formula, minimum required culvert sizes were calculated for each applicable area. Culverts were then selected above the required minimum, and these sizes were checked for adequacy against the Culvert Nomograph included as Figure 1 of this report.

2.9 Culverts

As indicated in Section 1, the proposed pad expansion will necessitate modifications of a number of existing hydrologic structures on the site, including culverts. As a result of the expansion, existing culverts C-2, C-8 and C-10 will be removed. Two new culverts (Main Canyon, C-11) were added to provide drainage control for the expanded facility during phase I of the surface expansion. One more (C-11A) will be added during the phase II south portal construction. All other existing culverts on the site will remain unchanged.

Culverts have been sized according to the calculations previously described, and are summarized on the following tables. The culverts are shown on Plate 7-5, Drainage Map.

TABLE 5
RUNOFF CONTROL STRUCTURE
WATERSHED SUMMARY

Structure	*Type*	*Contributing Watersheds*
Main Culvert	*Culvert*	*Crandall Canyon Above Mine*
UD-1	*Culvert*	*WSUD-1*
UD-2	*Culvert*	*WSUD-2*
UD-3	*Culvert*	*WSUD-3*
DD-1	*Ditch*	*WSDD-1, WSDD-2*
DD-3	*Ditch*	*WSDD-1, WSDD-2, WSDD-3*
DD-4	*Ditch*	*WSDD-1, WSDD-2, WSDD-3, WSDD-4, WSDD-8, WSDD-12*
DD-5	*Ditch*	*WSDD-1, WSDD-2, WSDD-3, WSDD-4, WSDD-5, WSDD-8, WSDD-12*
DD-7	*Ditch*	*WSDD-7, WSDD-11*
DD-8	*Ditch*	*WSDD-8*
DD-11	*Ditch*	*WSDD-11*
DD-12	*Ditch*	*WSDD-12*
DD-13	*Ditch*	*WSDD-13*
DD-14	*Sheet Flow*	*WSDD-14*
C-1	*Culvert*	*WSDD-1, WSDD-2, WSDD-3, WSDD-8*
C-3	*Culvert*	*WSDD-7, WSDD-11, WSDD-15*
C-4	*Culvert*	*WSDD-10*
C-5	*Culvert*	*WSDD-11*
C-6	*Culvert*	*WSUD-2*
C-7	*Culvert*	*WSDD-1, WSDD-2, WSDD-3*
C-9	*Culvert*	*WSDD-4, WSDD-12*
C-11	*Culvert*	*WSDD-12*
C-11A	*Culvert*	*WSDD-12*
C-12	*Culvert*	*WSDD-1, 2, 3, 4, 5, 8, 12*
C-13	*Culvert*	*WSDD-13*
C-14	*Slot Culvert*	*WSDD-4*
C-15	*Slot Culvert*	*WSDD-15*
C-16	*Culvert*	*WSDD-13*
C-17	*Culvert*	*WSDD-13*
Sediment Pond	*Pond*	*WSDD-1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14*

TABLE 6
RUNOFF CONTROL STRUCTURE
FLOW SUMMARY

Structure	Type	10 year/6 hour Peak Flow-cfs	10 year/24 hour Peak Flow-cfs	25 year/6 hour Peak Flow-cfs	100 year/6 hour Peak Flow-cfs
Main Culvert	Culvert	-	-	-	222.79
UD-1	Culvert	1.91	-	3.68	6.81
UD-2	Ditch	0.04	-	0.08	0.21
UD-3	Culvert	0.23	-	0.43	0.89
DD-1	Ditch	0.06	0.20	0.10	-
DD-3	Ditch	0.32	0.78	0.47	-
DD-4	Ditch	2.39	5.96	3.49	-
DD-5	Ditch	2.62	6.48	3.81	-
DD-7	Ditch	0.21	0.85	0.34	-
DD-8	Ditch	0.41	1.40	0.62	-
DD-11	Ditch	0.10	0.57	0.18	-
DD-12	Ditch	1.55	3.58	2.26	-
DD-13	Ditch	2.62	6.08	3.83	-
DD-14	Sht Flw	0.39	0.88	0.56	-
C-1	Culvert	0.73	2.18	1.09	-
C-3	Culvert	0.21	0.85	0.34	-
C-4	Culvert	3.01	6.79	4.02	-
C-5	Culvert	0.10	0.57	0.18	-
C-6	Culvert	0.04	-	0.08	-
C-7	Culvert	0.32	0.78	0.47	-
C-9	Culvert	0.11	0.20	0.14	-
C-11	Culvert	1.55	3.58	2.26	-
C-11A	Culvert	1.55	3.58	2.26	-
C-12	Culvert	2.62	5.96	3.49	-
C-13	Culvert	2.62	6.08	3.83	-
C-14	Slot Cul.	0.11	0.20	0.14	-
C-15	Slot Cul.	0.06	0.11	0.08	-
C-16	Culvert	2.62	6.08	3.83	-
C-17	Culvert	2.62	6.08	3.83	-
Sediment Pond	Pond	6.23	15.13	9.07	-

TABLE 7
(Continued)
DISTURBED DITCH DESIGN SUMMARY

Ditch	*DD-12*	*DD-13 (MIN.)*	*DD-13 (MAX.)*
Slope (%)	*3.29*	*1.79*	*50.00*
Length (ft.)	*50*	*280*	*80*
Manning's No.	*0.035*	*0.035*	*0.035*
Side Slope (H:V)	*1:1*	*1:1*	*2:1*
Bottom Width (ft.)	*0*	*0*	*2*
Peak Flow 10/6 (cfs)	*1.55*	*2.62*	*2.62*
Peak Flow 10/24 (cfs)	*3.58*	*6.08*	*6.08*
Flow Depth (ft.) 10/6	*0.71*	*0.97*	*0.15*
Flow Depth (ft.) 10/24	*0.97*	*1.33*	*0.24*
Flow Area (ft^2) 10/6	*0.50*	*0.94*	*0.34*
Flow Area (ft^2) 10/24	*0.94*	*1.77*	*0.60*
Velocity (fps) 10/6	*3.07*	*2.79*	*7.66*
Velocity (fps) 10/24	*3.79*	*3.44*	*10.12*
Rip-Rap Req'd (Y/N)	*N*	*N*	*Y*
Rip-Rap D_{50}	-	-	*9"*

** All ditches are triangular.*
Note: Slope/Lengths from Plate 7-5.
Note: DD-12 is shortened due to construction of the south portal access ramp/fan pad.

TABLE 9
DISTURBED CULVERT DESIGN SUMMARY

Culvert	C-1	C-3	C-4	C-5	C-6	C-7	C-9	C-11	C-11A	C-12	C-13	C-14	C-15	C-16	C-17
Slope (%)	16.67	8.00	25.07	57.14	17.20	3.00	3.50	3.50	1.50	4.50	3.00	1.00	1.00	25.00	20.00
Length (ft.)	60	360	69	120	12	80	18	30	60	330	100	40	30	40	60
Manning's No.	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Peak Flow 10/6 (cfs)	0.73	0.21	3.01	0.10	0.04	0.32	0.11	1.55	1.55	2.62	2.62	0.11	0.06	2.62	2.62
Peak Flow 10/24 (cfs)	2.18	0.85	6.79	0.57	N/A	0.78	0.20	3.58	3.58	5.96	6.08	0.20	0.11	6.08	6.08
Min. Diam. Req'd (ft.) 10/6	0.41	0.28	0.60	0.14	0.13	0.39	0.25	0.68	0.80	0.79	0.85	0.32	0.25	0.57	0.60
Min. Diam. Req'd (ft.) 10/24	0.62	0.46	0.82	0.28	N/A	0.54	0.32	0.93	1.09	1.08	1.17	0.40	0.32	0.79	0.82
Diam. Installed (ft.)	1.50	2.00	2.00	1.00	1.00	1.00	1.00	1.50	1.50	2.00	2.00	1.00	1.00	1.67	1.50
Velocity (fps) 10/6	5.55	3.53	10.54	6.13	3.11	2.71	2.20	4.27	3.10	5.35	4.59	1.38	1.18	10.17	9.35
Velocity (fps) 10/24	7.30	5.01	12.91	9.47	N/A	3.39	2.56	5.26	3.83	6.56	5.67	1.60	1.38	12.55	11.54
Rip-Rap D_{50}	6"	-	12"	6"	-	-	-	-	-	6"	-	-	-	12"	12"

Note: Slope/Lengths from Plate 7-5.
Source: (Haestad Methods, Flowmaster I, Version 3.42)

Map(s) is kept with this application located in the Public Information Center of our Salt Lake City office.