TABLE OF CONTENTS- APPENDICES
R645-301-200 CHAPTER 2

*Not included on disk

In the vicinity of the proposed substitute topsoil borrow area, three soil units were mapped. They are Strych stony fine sandy loam, Atrac fine sandy loam and Gerst-Badland-Rubbleland Complex. Only the Strych and Atrac units have enough soil depth for soil removal. The Gerst-Badland-Rubbleland Complex was determined to have little, if any, removable soil resources.

If reclamation proves unfeasible at the minesite using the proposed method of leaving some of the topsoil protected in place, approximately 37,000 cubic yards of material could be salvaged from the substitute topsoil borrow area. Approximately 12,000 cubic yards could be salvaged from the from the Strych unit and 25,000 cubic yards from the Atrac unit. These salvage volumes assume that 18 to 24 inches of material would be left in place for reclamation of the topsoil borrow area.

Each soil pedon sampling location was divided into major soil horizons. About 2 quarts of soil material was collected for each sample. The samples were sent to Inter-Mountain Laboratories, Inc. in Sheridan Wyoming for soil characterization according to UDOGM guidelines. Fifty-six soil samples were sent in for standard analyses as specified in UDOGM Table 1 (Analytical Methods for Baseline Soils Data), Table 6 (Recommended Laboratory Methods), as well as discussions with a UDOGM soil scientist/reclamation specialist (Nyenhuis 1997). The parameters include: soil texture, pH, organic matter percent, saturation percent, electrical conductivity, CaCO3, soluble potassium, soluble magnesium, soluble calcium, soluble sodium, sodium adsorption ratio, selenium and boron. Based on a discussion with a UDOGM soil scientist/reclamation specialist (Nyenhuis 1997) certain tests were not necessary at this time. They are: available water capacity, alkalinity, total nitrogen and available phosphorus. Organic matter percent was substituted for organic carbon.

In addition, rock fragment content (% by volume), Munsell color, and qualitative calcium carbonate content were determined in the field by Mr. Nyenhuis, as well as soil texture by the hand-texture method. Field methodology as well as laboratory analyses and field descriptions for the soil horizons can be referenced in Appendix 2-2 and 2-4.

As part of the effort to present an alternate "reduced slope" highwall reclamation plan (see Appendix 5-9), additional sampling and analysis of the topsoil/subsoils (from the designated topsoil storage pile) was performed by Colorado Analytical Laboratories, Inc. in early 2003. These evaluations are presented in Appendix 2-9.

222.400 Present and potential productivity of the existing soils was conducted by Mr. George Cook from the Natural Resources Conservation Service and is presented in the Tables of Appendix 3-1.

naturally occurring growth media. The Travesilla pockets would be salvaged and placed in the topsoil stockpile. Colluvial growth medium (CGM) from the loop area will be stored within the core of sediment pond embankments (a sign will be placed on these stockpile areas to indicate the nature of the material stockpiled and to protect the material from contamination); CGM from the left fork coal pile area will be stored within the coal pad. During final reclamation the CGM in the sediment pond impoundments will be used to backfill the loop area cutslopes. The structural material forming the inside surface of the sediment ponds (ie. the imported, compacted material) will first be removed and disposed of since it may be contaminated with coal fines. Likewise, the cap layer overlying the coal pad CGM material will be removed and disposed of, revealing the CGM material stored below. This coal pad CGM material will then be used to backfill the cutslopes in the left fork of the coal storage area.

During construction, material available from the cut slopes will be used as fill and placed into the adjacent pad areas. During reclamation, the process will be performed in reverse order. The native fill, will be used primarily to fill in and restore the adjacent cut slopes. Fill from the pads will be replaced in the adjacent cuts in 18"-24" lifts and compacted sufficiently to achieve adequate structural stability.

The reverse order of construction and reclamation applies to large boulders as well. During initial construction, large boulders which occurred naturally along the surface were placed in the bottom of the fill areas above the culvert after the culvert had been installed. Native fill materials from the adjacent cut slopes were then placed over these boulders as the pads were constructed. In essence, the larger boulders were being "stored" in the depths of the pad fill until the time of final reclamation. During reclamation, the boulders will be re-exposed and will be placed once again on the reclaimed surface to replicate their original premining occurrence. Since the boulders were the first to go into the fill during construction, (followed by the native fill and lastly by the imported fill), they will be the last to come back out of the fill during reclamation. Since they will come out last, they will be available to be placed back along the surface of the reclaimed slopes.

In the main canyon area, where pad fills are more shallow, the boulders were "stored" in the outslopes of the sediment ponds along with the colluvial growth medium (CGM) obtained from the loop area rubbleland. (The structural portion along the inside surface of the pond embankments was constructed with imported fill material, which was placed and compacted as needed, to achieve the necessary structural engineering parameters. This structural portion of the pond embankment will have been in contact with impounded water and coal fines during the operational life of the mine. Therefore,

APPENDIX 2-9

TOPSOIL ANALYSIS
COLORADO ANALYTIC LABORATORIES (2003)

SOIL CHEMISTRY TESTS

BACKFILL & TOPSOIL

Colorado Analytical Laboratories, Inc.

LABORATORY ANALYSIS REPORT

REPORT TO: KERRY REPOLA

LAB NO: 12419

DATE RCVD: 1/17/03

COMPANY: ADVANCED TERRA TESTING, INC.
833 PARFET STREET
LAKEWOOD, CO 80215

REPORTED: 2/7/03

P.O. #: VERBAL

PROJECT: 460-03 WESTRIDGE MINE AGAPITO ASSOCIATES

PARAMETER	METHOD REFERENCE	MIN. REPORTING LIMIT	UNITS
TEXTURE-HYDROMETER	USDA	1	PERCENT
pH (PASTE)	SSSA	0.1	UNITS
ELECTRICAL CONDUCTIVITY	SSSA	0.1	MMHOS/CM
TOTAL ORGANIC CARBON	WESTERN STATES	0.01	PERCENT
SODIUM ADSORPTION RATIO	USDA	0.1	UNITS
CENT SATURATION	SSSA	0.1	PERCENT
BLE SELENIUM	SSSA	0.05	PPM
AVAILABLE BORON	SSSA	0.1	PPM
CaCO3	WESTERN STATES	0.1	%
K-FACTOR (Kf)	USDA	0.1	UNITS

REFERENCES:

SSSA = "METHODS OF SOIL ANALYSIS; PART 3"; SOIL SCIENCE SOCIETY OF AMERICA"; AGRONOMY; 2nd EDITION, 1986; A. KLUTE

ASA2 = "METHODS OF SOIL ANALYSIS, PART 2"; ASA No. 9 AMERICAN SOCIETY of AGRONOMY; 2nd EDITION, 1982; A. L. PAGE

USDA60 = "DIAGNOSIS and IMPROVEMENT of SALINE & ALKALI SOILS"; USDA HANDBOOK 60; UNITED STATES SALINITY LABORATORY STAFF; 2nd EDITION, 1969; L.A. RICHARDS

ANALYSIS SUPERVISED BY

DATA APPROVED FOR RELEASE BY

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

ADVANCED TERRA TESTING, INC.
KERRY REPOLA
PROJECT: 460-03 WESTRIDGE MINE AGAPITO ASSOCIATES

	HYDROMETER RESULTS-TEXTURE			USDA	
SAMPLE ID	SAND (%)	SILT (%)	CLAY (%)	TEXTURE	% SATURATION
BACKFILL COMPOSITE	56	30	14	SANDY LOAM	24.3
TOPSOIL COMPOSITE	44	36	20	LOAM	37.7

BDL = BELOW DETECTION LIMIT
PPM = PARTS PER MILLION
MEQ/100G = MILLIEQUIVALENT PER 100 GRAMS
MEQ/L = MILLIEQUIVALENT PER LITER

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

ADVANCED TERRA TESTING, INC.
KERRY REPOLA
PROJECT: 460-03 WESTRIDGE MINE AGAPITO ASSOCIATES

SAMPLE ID	pH-paste (units)	Elec. Conductivity (mmhos/cm)	Soluble Selenium (ppm)	Available Boron (ppm)	Total Organic Carbon (%)
BACKFILL COMPOSITE	7.8	6.84	0.11	0.98	0.5
TOPSOIL COMPOSITE	7.8	0.68	0.11	0.47	1.2

BDL = BELOW DETECTION LIMIT
PPM = PARTS PER MILLION
MEQ/100G = MILLIEQUIVALENT PER 100 GRAMS
MEQ/L = MILLIEQUIVALENT PER LITER

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

ADVANCED TERRA TESTING, INC.
KERRY REPOLA
PROJECT: 460-03 WESTRIDGE MINE AGAPITO ASSOCIATES

			<----------SOLUBLE---------->			
SAMPLE ID	LIME (% CaCO3 EQUIV.)	Kr(UNITS)	CALCIUM (meq/L)	MAGNESIUM (meq/L)	SODIUM (meq/L)	SAR (UNITS)
BACKFILL COMPOSITE	19.2	0.32	96.7	19.7	62.9	8.2
TOPSOIL COMPOSITE	3.3	0.38	14.8	4.0	2.3	0.8

BDL = BELOW DETECTION LIMIT
PPM = PARTS PER MILLION
MEQ/100G = MILLIEQUIVALENT PER 100 GRAMS
MEQ/L = MILLIEQUIVALENT PER LITER

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

LABORATORY ANALYSIS REPORT

REPORT TO: KERRY REPOLA

LAB NO: 12419

DATE RCVD: 1/17/03

REPORTED: 2/7/03

BILL TO: ADVANCED TERRA TESTING
833 PARFET STREET
LAKEWOOD, CO 80215

P.O. #: VERBAL

PROJECT: 460-03 WESTRIDGE MINE AGAPITO ASSOCIATES

PARAMETER	METHOD REFERENCE	MIN. REPORTING LIMIT	UNITS
ACID/BASE POTENTIAL	SOBEK:		
NEUTRALIZATION POTENTIAL	method 3.2.3	0.1	T/1000T
TOTAL SULFUR	method 3.2.4	0.1	T/1000T

T/1000T = TONS CaCO3 per 1000 TONS SAMPLE

REFERENCES:

SOBEK = "FIELD & LABORATORY METHODS APPLICABLE TO OVERBURDENS & MINESOILS"; EPA-600/2-78-054; USEPA; 1978; A. A. SOBEK

ANALYSIS SUPERVISED BY

DATA APPROVED FOR RELEASE BY

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

KERRY REPOLA
ADVANCED TERRA TESTING
LAB NO: 12419
460-03 WESTRIDGE MINE AGAPITO ASSOCIATES
2/7/03

SAMPLE ID	TOTAL SULFUR (PERCENT)	TOTAL SULFUR (T/1000T)	TOTAL CARBONATE (NEUTRALIZATION POTENTIAL T/1000T)	pH (UNITS)
BACKFILL COMPOSITE	0.303	9.5	191.8	7.8
TOPSOIL COMPOSITE	0.044	1.4	33.3	7.8

*NON TOXIC pH value

*SAMPLES ARE CONSIDERED NON TOXIC IF THE pH IS ABOVE 4.0 AND THE ACID BASE POTENIAL BASED ON THE PYRITIC SULFUR (OR SULFUR) IS GREATER THAN -4. ABP BASED ON TOTAL SULFUR REPRESENTS A WORST CASE CONDITION

NOTE: NON TOXIC MEANS NON ACID FORMING.
TOXIC MEANS POTENTIALLY ACID FORMING.

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

KERRY REPOLA
ADVANCED TERRA TESTING
LAB NO: 12419
460-03 WESTRIDGE MINE AGAPITO ASSOCIATES
2/7/03

SAMPLE ID	TOTAL SULFUR ACID BASE POTENTIAL (T/1000T)	COMMENT*
BACKFILL COMPOSITE	182.3	NON TOXIC
TOPSOIL COMPOSITE	31.9	NON TOXIC

*SAMPLES ARE CONSIDERED NON TOXIC IF THE pH IS ABOVE 4.0 AND THE ACID BASE POTENIAL BASED ON THE PYRITIC SULFUR (OR AL SULFUR) IS GREATER THAN -4. ABP BASED ON TOTAL SULFUR REPRESENTS A WORST CASE CONDITION

NOTE: NON TOXIC MEANS NON ACID FORMING.
TOXIC MEANS POTENTIALLY ACID FORMING.

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

KERRY REPOLA
ADVANCED TERRA TESTING
LAB NO: 12419
460-03 WESTRIDGE MINE AGAPITO ASSOCIATES
2/7/03

SAMPLE ID	PYRITIC SULFUR (PERCENT)	PYRITIC SULFUR (T/1000T)	PYRITIC SULFUR ACID BASE POTENTIAL (T/1000T)	COMMENT
BACKFILL COMPOSITE	-	-	-	NON TOXIC-based on TS
TOPSOIL COMPOSITE	-	-	-	NON TOXIC-based on TS

*SAMPLES ARE CONSIDERED NON TOXIC IF THE pH IS ABOVE 4.0 AND THE ACID BASE POTENIAL BASED ON THE PYRITIC SULFUR (OR TAL SULFUR) IS GREATER THAN -4. ABP BASED ON TOTAL SULFUR REPRESENTS A WORST CASE CONDITION

NOTE: NON TOXIC MEANS NON ACID FORMING.
TOXIC MEANS POTENTIALLY ACID FORMING.

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

CORROSION TEST SUMMARY

Client: Agapito Associates
Location: Project #460-03

Job Number: 2452-08
Date Tested: 01-22-03 SJG

Sample ID	Temperature (deg C)	pH
Composite Backfill 1,2,3,4,5	25	7.9

ADVANCED TERRA TESTING, inc

Data entry SR
Checked by: OPM
FileName: AOZ01234

Date: 01/23/2003
Date: 01/27/03

R645-301-340 RECLAMATION PLAN

Refer to Appendix 5-5 for a detailed discussion of the West Ridge Mine Construction/Reclamation Plan.

R645-301-341 REVEGETATION

A revegetation plan has been formulated for the mine site area in C Canyon based on conversations with DOGM technical specialists and consultants that specialize in specific fields. Because of the experimental practice being proposed for approximately 5 of the 25 acres, some of the reclamation techniques being proposed may be somewhat different than the usual practice. In the mine site area, WEST RIDGE Resources, Inc. is proposing to use a geotextile fabric to protect topsoil resources in place along the bottom of the right fork drainage and adjacent south slope and also near the confluence of the forks with the main canyon drainage. The yard fill will be placed on either the original ground surface or the geotextile fabric, depending on the area. During reclamation of the mine yard, the yard fill will be removed and approximate original contour re-established and the geotextile removed. Following the removal and regrading, three different reclamation methods will be implemented depending on the area. Revegetation will proceed in the following manner.

Reclamation of the mineyard, with the exception of the experimental practice/geotextile area will proceed as outlined below:

1) In areas where topsoil previously existed but was removed prior to construction the following method will be used.

   a) Fill will be removed until approximate original contour is achieved.

   b) Topsoil will be replaced in each area and reapplied to the prepared surface to a depth of 12-18 inches.

   c) A certified noxious weed-free alfalfa hay mulch will be blown over the topsoiled surface at a rate of 2,000 pounds per acre. Fertilizer, if determined necessary by soil testing, would also be applied at this time.

   d) The surface will be gouged with irregularly shaped depressions approximately 24" x 36" x 18" deep. This will also mix the hay and fertilizer into the upper portion of the soil surface.

   e) The appropriate seed mix (Tables 3-2A, 3-2B, 3-2C, and 3-2D) will be either

broadcast or hydroseeded on the area at the rate specified on the table. Hydroseeding would combine a tackifier and small amount of mulch with the seed mix to mark the area of coverage during application.

f) A certified noxious weed-free straw mulch will be applied to the surface at a rate of 2,000 pounds per acre and held to the surface with a wood fiber mulch and tackifier applied to the surface at a rate of 500 pounds per acre.

g) If root stock is listed in the seed mix, the containerized plants will be planted at the rate specified in the seed list table.

2) For areas devoid of topsoil resources, such as the rock outcrop/rubbleland areas, a different methodology will be applied.

a) In fill areas, fill will be removed down to the original slope as marked by brightly colored marker strips. Approximate original contour will be achieved by removing fill material down to that original, pre-existing surface. A remnant layer of fill material will be left in place to serve as a growth medium. The thickness of this layer may vary from a skiff (i.e. 2-3") up to 18-24" in areas where natural depressions and irregularities occur in the original existing surface.

b) For cut areas, fill will be placed in the cut in 18" lifts until approximate original contour is achieved. The fill will be obtained from the adjacent pad fills.

c) A certified noxious weed-free alfalfa hay mulch will be blown over the topsoiled surface at a rate of 2,000 pounds per acre. Fertilizer, if determined necessary by soil testing, would also be applied at this time.

d) The surface will be gouged with irregularly shaped depressions approximately 24" x 36" x 18" deep. This will also mix the hay into the upper portion of the soil surface.

e) The appropriate seed mix (Tables 3-2A, 3-2B, 3-2C, and 3-2D) will be either broadcast or hydroseeded on the area at the rate specified on the table.

f) A certified noxious weed-free straw mulch will be applied to the surface at a rate of 2,000 pounds per acre and held to the surface with a wood fiber mulch and tackifier applied to the surface at a rate of 500 pounds per acre.

3) Reclamation of the experimental practice/geotextile area, where topsoil was protected in-place, will proceed as outlined below:

   a) Once the yard fill has been removed, the geotextile fabric covering the original ground surface will be removed.

   b) A certified noxious weed-free alfalfa hay mulch will be blown over the topsoiled surface at a rate of 2,000 pounds per acre. Fertilizer, if determined necessary by soil testing, would also be applied at this time.

   c) The re-exposed soil surface will be gouged with a pattern of irregularly shaped depressions approximately 24" x 36" x 18" deep. This will also mix the hay into the upper portion of the soil surface.

   d) The area will be either broadcast or hydroseeded with the appropriate seed mixture listed in Tables 3-2A through 3-2D. The seed will be applied at a rate specified on the table.

   e) A certified noxious weed-free straw mulch will be applied to the surface at a rate of 2,000 pounds per acre and held to the surface with a wood fiber mulch and tackifier applied at a rate of 500 pounds per acre.

   f) If root stock is listed in the seed mix, the containerized plants will be planted at the rate specified in the seed list table.

Reclamation of the minesite will begin once all surface facilities and structures have been demolished and removed. Cut areas will be restored to approximate original contour as the yard fill is removed. The cut areas will be backfilled and regraded using fill material taken from the adjacent pad area. Fill will be placed in the cuts in 18"-24" lifts and compacted sufficiently to achieve adequate structural stability. After the cut slopes have been re-contoured and re-topsoiled they can then be revegetated. Much of the revegetation efforts on these slopes can be accomplished by using the adjacent pad fill areas as a work platform for equipment and materials.

Fill will be removed from the pads in 5-10 foot lifts starting from the upper end of the yard and proceeding down canyon. As the yard area is being removed to establish approximate original contour, the yard pad fill will be excavated and hauled underground or off-site for permanent storage. At the intersection of the pre-existing topsoiled slope and the pad fill, the geotextile fabric will be re-located. The pad fill will be carefully removed from the top of the geotextile fabric as the yard fill is being excavated. This will allow reclamation to be

done on vertical increments of the hillside that will be easy to access from the adjacent yard level.

As the mine site is being regraded, approximate original contour (AOC) will be restored and the topsoil reapplied. The surface will then be mulched and gouged. An alfalfa hay mulch will be applied at a rate of 2,000 pounds per acre to the reclaimed areas that have been regraded and covered by topsoil or substitute topsoil and reseeded. A certified noxious weed-free hay will be utilized for mulch during final reclamation. Gouging will be used to roughen the surface to capture and retain water (moisture) for seedlings and to incorporate the hay into the soil. Gouging consists of imprinting the surface with a pattern of depressions measuring approximately 24" x 36" x 18" deep.

Exposed surface areas will use vegetative stabilization, where practical, to control erosion and fugitive dust. Revegetative efforts (including regrading, topsoiling, fertilizing and mulching) will be conducted as soon as possible after regrading and retopsoiling but prior to the end of October.

A species seed list and amount of seed per acre for revegetation of the mine yard area are listed in Tables 3-2A, 3-2B, and 3-2C (from Chapter 3 of the West Ridge PAP) and are included herein for ease of reference.

Reseeding will be accomplished by hydroseeding or broadcast seeding the regraded prepared surface areas concurrently during final reclamation. Hydroseeding will combine a tackifier and a small amount of mulch with the seed mix to mark the area of coverage during application. Steeper areas of the mine yard, such as the experimental practice/geotextile area, will be broadcast seeded and raked in or hydroseeded.

Revegetated areas will be visually monitored on a quarterly basis, or following heavy storm events, for damage and erosion problems. Water will be diverted away from active rills and gullies. Erosion will be repaired if the gully is unstable and repair can be done without jeopardizing healthy vegetation. Surface roughening should significantly increase water retention and minimize the potential for erosion.

Sediment control during pad fill excavation will be met by continued use of the sediment pond located at the downstream end of the yard area. The main bypass culvert inlets and an adequate amount of fill to maintain the existing headwall will be left intact during this phase of the fill retrieval process. After the fill removal process reaches the bottom of the canyon, the bypass culvert will be exposed. At this time, the culvert will be removed and the underlying geotextile fabric lifted away from the soil surface below.

Once the culvert is removed, access up through the canyon will no longer be possible. Therefore, prior to removing the culvert, all other phases of reclamation will have to be

completed (ie, cutslopes regrading, backfill removal, highwall reclamation, topsoil replacement, and soil treatment on the regraded and re-contoured slopes). Once these pre-requisite reclamation stages have been completed, removal of the culvert (and reclamation if the channel) can begin.

Rills and gullies of an excessive nature, which form on regraded and re-topsoiled areas and disrupt the approved postmining land use or cause or contribute to a violation of water quality standards for receiving streams, will be filled, regraded or stabilized. The area will then be reseeded.

Pest damage will also be evaluated during the quarterly inspection. Should a problem persist and endanger the viability of the entire revegetated area, a response appropriate for the situation will be initiated.

Supplemental irrigation is not planned for the site. However, mulching is planned and should decrease evaporation and optimize use of soil moisture and natural precipitation. Other measures will be used, in conjunction with mulching, to conserve available soil moisture. Depending on the slope and areal extent of application, other methods that could be used would include disking along the contour where slopes allow and land imprinting, pitting or gouging. A small backhoe or comparable piece of equipment would be used to create gouged depressions approximately 24" x 36" x 18" deep. WEST RIDGE Resources will continue to investigate alternative means of increasing water availability.

Pesticides and herbicides will be used only if a problem is identified and spraying is deemed necessary to control damage to reclamation. Using certified noxious weed-free straw will reduce the potential for noxious weeds to become a problem. Pest control measures to be utilized would depend on what type of problem exists.

Revegetation success will be judged on the effectiveness of the vegetation for the approved postmining land use. The sampling techniques for measuring success and methods identified in DOGM's "Vegetation Information and Monitoring Guidelines, Appendix A" will be referenced during the post revegetation evaluation. A revegetation timetable is provided in Table 3-1 at the end of this text. Annual monitoring will be included as part of the annual report submitted to DOGM.

Based on the information available from the vegetation survey on-site, it appears that reclamation at this site is feasible. Native species have re-established themselves successfully on previous disturbances without seed or mulch application or surface preparation. Also, reclamation has been done on the Horse Canyon minesite, about 10 miles south of C Canyon, with considerable success. The Horse Canyon minesite has a similar orientation and aspect. Precipitation is also similar between the sites.

Landscape diversity will be achieved by restoring the site to approximate original, premining topography through site regrading. The variation in slope aspects, grades and lengths will serve to promote diversity in vegetative species and communities within the reclaimed area. Replacement of soil materials and storage of the undisturbed soils in-place will help to restore the pre-existing vegetation to what previously existed at the site. Roughening of the soil surface will promote retention of moisture in the soil and thus diversity in the species that can establish on the regraded site. The placement of large rocks and boulders on the regraded soil surface will serve to promote species diversity by creating mico-climates on a particular slope and aspect. The rocks will also create visual diversity on the regraded slopes making them appear similar to the adjacent undisturbed slopes.

341.100 A Revegetation Timetable is provided as Table 3-1.

Annual monitoring will be included as part of the annual report submitted to DOGM.

Revegetation will be monitored on an annual basis in June of each year. During the first three years following final reclamation, the site will be inspected, visually, on a quarterly basis in order to monitor for adverse affects. Should excessive erosion be noted, water will be diverted away from the critical area and the gully repaired as soon as possible. Refer to R645-301-355.

341.200 Species and Amount Of Seed Per Acre

341.210 A species seed list and amount of seed per acre for revegetation of the mine yard area are listed in Tables 3-2A, 3-2B, and 3-2C. The seed mix for the proposed topsoil borrow site is provided on Table 3-2D.

341.220 Reseeding will be accomplished by hydroseeding or broadcast seeding the large areas during final reclamation. Hydroseeding will combine tackifier and a small amount of mulch with the seed mix to mark the area of coverage during application. Steeper areas of the mine yard will be broadcast seeded and raked in or hydroseeded. For interim reclamation, the seed mixture will be hand broadcast over the surface and raked to cover the seed.

341.230 Straw mulch will be utilized on all areas that are seeded during final reclamation. The straw will be held in place with a tackifier and wood fiber mulch applied over the straw at the recommended rate. This will provide a cohesive cover that will resist water and wind erosion. The straw will be certified as certified noxious weed-free.

341.240 Supplemental irrigation is not planned for the site. However, mulching is planned and should decrease evaporation and optimize use of soil moisture and natural precipitation. Other measures will be used, in conjunction with mulching, to conserve available soil moisture. Depending on the slope and areal extend of application, other methods to be used would include disking along the contour where slopes allow and land imprinting, pitting, pocking and gouging. For gouging, a backhoe or comparable piece of equipment would be used to create irregularly shaped depressions approximately 24" x 36" x 18" deep. WEST RIDGE Resources, Inc. will continue to investigate alternative means of increasing water availability.

Pesticides and herbicides will be used only if a problem is identified and spraying is deemed necessary to control damage to reclamation. Using certified noxious weed-free straw will reduce the potential for noxious weeds to become a problem. Pest control measures to be utilized would depend on what type of problem exists.

341.250 Revegetation success will be judged on the effectiveness of the vegetation for the approved postmining land use. The sampling techniques for measuring success and methods identified in DOGM's "Vegetation Information and Monitoring Guidelines, Appendix A" will be referenced during the post revegetation evaluation.

The reference area method will be used to demonstrate adequate cover and production in revegetated areas. Reference area locations are shown on Maps 3-1 and 3-2, and Appendices 3-1 and 3-1A.

Regarding erosion control monitoring, WEST RIDGE Resources, Inc. proposes to utilize "Erosion Condition Classification System" (Humphreys, 1990), the erosion classification system developed by the BLM and modified by Mark Humphreys of OSM. In utilizing this system, SSF values would be kept at less than or equal to the surrounding undisturbed areas.

The Division has developed woody plant density success standards for this site which have also been reviewed and approved by DWR. The standards are as follows:

Pinyon/Juniper	800 per acre
Douglas Fir/Maple	2,000 per acre
Douglas Fir/Rocky Mountain Juniper	2,500 per acre
Sagebrush/Grass	2,500 per acre

Quantitative vegetative information for the Douglas Fir/Maple reference area is provided

Canyon sweetvetch seed was collected by Dr. Patrick Collins (Mount Nebo Scientific) in C Canyon in 1999 prior to construction of the minesite. This seed was later used to re-seed the topsoil pile. This constitutes the on-going field test to determine the viability of using canyon sweetvetch in the seed mix for final reclamation. Dr. Collins is presently monitoring the success of the sweetvetch population on the topsoil pile. If it appears that the sweetvetch is successful and can be added to the reclamation seed mix, seed will be collected from the topsoil population, as well as other populations in C Canyon and/or nearby canyons, at the time of final reclamation.

TABLE 3-3

MINESITE RECLAMATION -INTERIM RECLAMATION
SPECIES LIST AND SEEDING RATE
INTERIM REVEGETATION SEED MIXTURE FOR
TEMPORARY DISTURBANCE AT THE MINESITE

SCIENTIFIC NAME	COMMON NAME	BROADCAST RATE #PLS LBS/ACRE
GRASSES		
Elymus lanceolatus	Thickspike Wheatgrass	4.5
Elymus smithii	Western Wheatgrass	5.0
Poa pratensis	Kentucky Bluegrass	0.4
Stipa hymenoides	Indian Ricegrass	4.0
Elymus spicatus	Bluebunch Wheatgrass	6.0
FORBS		
Achillea millefolium	Yarrow	0.1
Artemisia ludoviciana*	Louisiana sage	0.1
Hedysarum occidentale var. canone	Canyon Sweetvetch	0.0**
	TOTAL	20.1

* Subject to availability

**Hedysarum occidentale var. canone (Canyon Sweetvetch) will be seeded on the topsoil stockpile only as an interim revegetation measure and to propagate seed. The seeding rate would be determined by future field tests and on-site seed availability.

R645-301-354 REVEGETATION: TIMING

Areas to be revegetated will be seeded following regrading and retopsoiling activities but prior to late October. This will allow time to get the seed on the ground before winter snowfall makes the site inaccessible.

R645-301-355 REVEGETATION: MULCHING AND OTHER SOIL STABILIZING PRACTICES

Suitable mulch and other soil stabilizing practices will be used on regraded, retopsoiled areas as delineated for each site. A certified noxious weed-free straw will be utilized for mulch during final reclamation. Typically, the straw will be applied over seeded areas at a rate of 2,000 pounds per acre and tacked to the surface using mulch and tackifier.

Revegetated areas will be visually monitored on a quarterly basis, or following heavy storm events, for damage and erosion problems. Water will be diverted away from active rills and gullies. Erosion will be repaired if the gully is unstable and repair can be done without jeopardizing healthy vegetation.

Pest damage will also be evaluated during the quarterly inspection. Should a problem persist and endanger the viability of the entire revegetated area, a response appropriate for the situation will be initiated.

R645-301-356 REVEGETATION: STANDARDS FOR SUCCESS

Standards for reclamation success will be evaluated accordance with DOGM's "Vegetation Information and Monitoring Guidelines", Appendix A. The success of final reclamation will be judged on the effectiveness of the vegetation for the postmining land use and the extent of cover compared to the extent of cover for the reference area. Ground cover, production or stocking will be considered equal to the approved success standard when it reaches 90% of the success standard. Statistical adequacy of all statistical sampling will be determined using the following formula:

$$N_{min} - \frac{t^2 S^2}{(dx)^2}$$

where: t = the value from appropriate t-table*, (2-tail test for pre-mine studies, 1-tail test for success studies)
s = the sample standard deviation,

d = the desired change in the mean,
x = the sample mean of the parameter in question

* = All parameters are to be tested at the 90% confidence level with a 10% change in the mean (d = .1).

Ground cover will be estimated by using one of the methods listed in "Vegetation Information Guidelines" Appendix A.

Production measurements will be made in accordance with DOGM's "Vegetation Information Guidelines" Appendix A. Estimates may be made by the methodology which the vegetation consultant feels is the most suitable method to used for the work being performed.

An evaluation of species composition will be made, including species present, form and diversity.

For a postmining land use of grazing and wildlife habitat, the ground cover and production will be equal to or greater that a reference area. The Division's "Vegetation Information Guidelines", Appendix A will be utilized for the evaluation of the success of revegetation. Appendix B will be references for calculating diversity.

For areas previously disturbed by mining activities that were not reclaimed to the requirements of the regulations, and will be reclaimed after proposed mining operations have ceased, the vegetative ground cover will not be less than the ground cover existing before redisturbance and will be adequate to control erosion.

Siltation structures will be maintained until the disturbed area is revegetated and stabilized. They will remain in place at least two years after the last augmented seeding. Siltation structures may include sediment traps, straw bales, silt fences or filter baskets. Removal will be contingent upon revegetation and stabilization of the area as well as DOGM concurrence. Following removal, the area of the sediment control structure will be revegetated in accordance with the reclamation plan.

TABLE OF CONTENTS- APPENDICES
R645-301-500 CHAPTER 5

*Not included on disk

R645-301-540 RECLAMATION PLAN

R645-301-541 GENERAL INFORMATION

541.100 Upon final cessation of coal mining activities at the proposed site, WEST RIDGE Resources, Inc. will permanently reclaim all affected areas in accordance with the regulations and approved permit.

541.200 WEST RIDGE Resources, Inc. is not proposing surface coal mining and reclamation activities.

541.300 All surface equipment, structures, or other facilities not designated to be left in conjunction with the post-mining land use plan will be disassembled and removed. The affected area will then be reclaimed.

541.400 The reclamation plan for the proposed disturbed areas within the proposed permit area is presented in detail in Appendix 5-5. The plan is outline below for quick reference. Appendix 5-5, however, contains the detail and discussion for the reclamation plan. All proposed plans have been designed to comply with R645-301 and environmental protection requirements.

All lands within the proposed permit area affected by impacts of mining will be reclaimed in accordance with the approved DOGM permit. WEST RIDGE Resources, Inc. commits to mitigate the impacts caused by mining as soon as possible upon discovery of those impacts.

Reclamation of the mine site will begin with the demolition of all buildings and structures. The materials will be removed from the site and hauled to an approved solid waste landfill. After demolition and structural removal of all existing structures at the site, regrading activities will commence. The yard area will be restored to approximate original contour. Excess fill material will be hauled into the abandoned mine entries. The portals will be then be sealed and backfilled according to the approved sealing plan. See Figures 5-1 and 5-2.

The highwall will be backfilled as described in Appendix 5-9. Fill will be placed to the top of the highwall area. Boulders will be used on the highwall benches to add an additional measure of stability to the fill slopes.

During reclamation activities, the undisturbed drainage diversion culverts will be removed to reestablish the canyon drainages. Diversion culverts will be excavated and the natural drainages re-established beginning at the top of the culverts and working downstream.

As portions of the mineyard are regraded, topsoil will be re-applied and the area gouged to contain runoff and sediment. The area will then be reseeded and mulched. This will be done for the entire reclaimed area. Map 5-9, Mine Site Reclamation, shows the reclamation drainage plan. See Appendix 7-4 for the design details regarding reclaimed channels.

Drainage from the reclaimed areas will be treated prior to entering the undisturbed drainage in the reestablished channels. Surface gouging, silt fences, and straw bales will be utilized for sediment treatment.

Restoration of the drainage channels will seek to present a natural appearance to the drainage while providing a suitable channel configuration. The designs presented are for a permanent structure and calculated for a 100 year, 6 hour event.

The reclaim channel side slopes, widths, and gradients have been designed to closely resemble the premining channel and the channel above and below the disturbed area. The reclaimed channel will be capable of passing the same flow as the undisturbed channel above and below the reclaimed area. As no riparian zone exists along the drainage channel, the regraded slopes will be hydroseeded and mulched with the same treatment used on the yard areas.

In response to a request from the Division an alternate to the approved highwall reclamation plan using a lesser slope is included in Appendix 5-9. The Division approved this alternate reclamation plan on April 24, 2006. Therefore, WEST RIDGE Resources, Inc has now adopted it as the preferred reclamation plan. Under this "reduced slope"plan, the amount of backfill placed against the highwall will increase by approximately 50,000 cubic yards. However, the amount of excess pad fill which will have to be hauled away will decrease by the same amount. According to the current approved bonding calculations (Nov. 2001) the Division estimates the cost of backfilling the highwall at $2.15/yd (x 50,000 yd = $107,500). And the cost of removing the excess pad fill at $2.92/yd (x 50,000 yd = $146,000). Therefore the cost of adopting the "reduced slope" reclamation plan should be approximately $38,500 less than the currently approved plan. Therefore, the existing reclamation bond should be adequate for the alternate "reduced slope" reclamation plan.

TABLE A
RECLAMATION EARTHWORK MASS BALANCE SUMMARY

The following outlines the complete reclamation mass balance for all materials in cubic yards.

Mine Facilities	
Regrading	
Excess Fill (to be removed)	(176,355)*
Cut Area (to be filled in)	134,247*
Demolition Concrete, Approximate	1,338
Net Quantity	**40,770 Yd.3***

*These quantities reflect the reduced slope highwall reclamation plan. (Appendix 5-9)

TABLE B
RECLAMATION EARTHWORK VOLUME SUMMARY

Section	Total Fill	Total Cut
Left Fork	15,910.0	30,357.4
Right Fork	50,101.5*	27,702.5*
Main Canyon	68,235.9	118,295.5
Reclamation Earthwork Totals	134,247.4*	176,355.4*

Excess cut material (42,108* cubic yards) will be permanently stored underground.

*These quantities reflect the reduced slope highwall reclamation plan. (Appendix 5-9)

TABLE C
RECLAMATION EARTHWORK CROSS SECTION VOLUME SUMMARY
MAIN CANYON: 0+00 - 25+00

MAIN CANYON 0+00 - 25+00	CUT AREA	VOLUME YD.3	FILL AREA	VOLUME YD.3	DIFFER. (CUT-FILL) YD.3
1+00	0.0		0.0		
		2,659.6		140.6	2,519.1
2+00	1,436.2		75.9		
		5,506..5		185.9	5,320.6
3+00	1,537.3		24.5		
		3,259.3		146.1	3,113.1
4+00	222.7		54.4		
		1,096.7		391.1	705.8
5+00	369.5		156.8		
		1,087.2		724.1	363.1
6+00	217.6		234.2		
		1,133.9		714.4	419.4
7+00	394.7		151.6		
		1,278.3		504.1	774.3
8+00	295.6		120.6		
		2,773.0		270.6	2,502.4
9+00	1,201.8		25.5		
		3,120.0		310.9	2,809.1
10+00	483.0		142.4		
		1,448.5		792.2	656.3
11+00	299.2		285.4		
		1,499.4		934.6	564.8
12+00	510.5		219.3		
		2,084.8		2,078.1	6.7
13+00	615.3		902.9		
		4,071.1		3,255.2	815.9
14+00	1,583.1		854.9		
		5,766.3		3,143.7	2,622.6
15+00	1,530.7		842.7		
		6,453.7		6,463.0	(9.3)
16+00	1,954.3		2,647.3		
		12,344.8		5,170.7	7,174.1
17+00	4,711.9		144.9		
		10,458.0		1,536.7	8,921.3
18+00	935.4		684.9		
		7,775.4		1,639.6	6,135.7
19+00	3,263.3		200.5		
		12,083.5		1,113.7	10,969.8
20+00	3,261.8		400.9		
		10,873.3		1,773.0	9,100.4
21+00	2,609.8		556.5		
		7,517.8		2,531.9	4,985.9
22+00	1,449.8		810.7		
		4,389.4		5,071.5	(682.1)
23+00*	920.5		1,927.9		
		4,889.4		12,375.4	(7,486.0)
24+00*	1,719.8		4,754.8		
		4,725.6		16,968.9	(12,243.3)
25+00*	832.0		4,408.4		
TOTAL*	**32,355.8**	**118,295.5**	**20,627.9**	**68,235.9**	**50,059.6**

*** Volumes reflect reduced slope highwall reclamation plan. (Appendix 5-9)**

TABLE D
RECLAMATION EARTHWORK CROSS SECTION VOLUME SUMMARY
RIGHT FORK: 25+00 - 42+00

MAIN CANYON 0+00 - 25+00	CUT AREA	VOLUME YD.3	FILL AREA	VOLUME YD.3	DIFFER. (CUT-FILL) YD.3
25+00*	832.0		4,408.4		
		2,074.1		12,811.1	(10,737.0)
26+00*	288.0		2,509.6		
		1,263.5		9,163.3	(7,899.8)
27+00*	394.3		2,438.6		
		5,462.4		5,580.2	(1,178.0)
28+00*	2,555.4		574.7		
		7,185.4		1,846.3	5,339.1
29+00	1,324.7		422.3		
		4,690.7		1,247.8	3,443.0
30+00	1,208.3		251.5		
		3,139.4		1,729.1	1,410.4
31+00	487.0		682.2		
		1,482.8		2,553.5	(1,070.7)
32+00	313.7		696.7		
		591.3		2,432.4	(1,841.1)
33+00	5.6		616.8		
		307.0		2,416.5	(2,109.4)
34+00	160.2		688.1		
		497.4		2,264.8f	(1,767.4)
35+00	108.4		534.9		
		336.9		1,567.4	(1,230.6)
36+00	73.5		311.5		
		203.0		2,000.0	(1,797.0)
37+00	36.1		768.5		
		68.1		2,282.6	(2,214.4)
38+00	0.7		464.1		
		136.5		1,411.5	(1,275.0)
39+00	73.0		298.1		
		174.6		637.4	(462.8)
40+00	21.3		46.1		
		64.4		121.5	(57.0)
41+00	13.5		19.5		
		25.0		36.1	(11.1)
42+00	0.0		0.0		
TOTAL*	**7,895.7**	**27,702.5**	**15,731.6**	**50,101.5**	**(22,299.0)**

*** Volumes reflect reduced slope highwall reclamation plan. (Appendix 5-9)**

TABLE E
RECLAMATION EARTHWORK CROSS SECTION VOLUME SUMMARY
LEFT FORK: 19+00 - 28+00

MAIN CANYON 0+00 - 25+00	CUT AREA	VOLUME YD.3	FILL AREA	VOLUME YD.3	DIFFER. (CUT-FILL) YD.3
19+00	2,958.4		101.4		
		11,252.6		3,369.6	7,883.0
20+00	3,118.0		1,718.2		
		10,031.5		3,703.5	6,328.0
21+00	2,299.0		281.7		
		5,890.9		2,332.8	3,558.1
22+00	882.1		978.0		
		1,887.4		2,898.9	(1,011.5)
23+00	137.1		587.4		
		489.3		1,858.3	(1,369.1)
24+00	127.1		416.1		
		466.7		1,113.0	(646.3)
25+00	124.9		184.9		
		236.9		421.3	(184.4)
26+00	3.0		42.6		
		53.9		145.7	(91.9)
27+00	26.1		36.1		
		48.3		66.9	(18.5)
28+00	0.0		0.0		
		0.0	0.0		
TOTAL	**9,675.7**	**30,357.4**	**4,346.4**	**15,910.0**	**14,447.4**

REPLACE THESE PAGES IN APPENDIX 5-5

The face-up material is not expected to pose a threat to the underlying in-situ topsoil for the following reasons:

a) The face-up material will be tested to insure that it is non toxic and non acid forming.

b) The face-up material and in-situ topsoil will be separated by a geotextile layer and a 2' (minimum) layer if non-waste fill material.

c) The face-up material will be capped with a layer of fill material (imported and native) which will preclude moisture from leaching down through he face-up material into the in-situ topsoils.

8i) Construction of the Various Mine Pad Levels: Construction of the various operational areas of the mine (pads) will utilize standard cut-and-fill earthwork methods. Most pads will contain areas of both cut and fill. Cut areas will normally be located along the outer edges of the pads along the hillsides. Fill areas will normally be located in the interior of the pads over the deeper portions of the channel. The cutslopes will be constructed at the same time as the pad fill is being placed. Material generated from the cutslopes will be used as fill material in the pads. Cut depths will normally range from 0-20' deep, averaging about 10' deep; fill depths will range from 0-40', averaging about 15'-20' deep.

Material excavated from the cutslopes will be placed as fill material in the adjacent fill areas of the pads.

It should be noted that the projected cutslope limits depicted on Map 5-5 (surface facilities map) are computer generated and assume mathematical absolutes such as 1:1 slopes in cuts and 2:1 slopes in fills. As such, some cut slope projections may extend up slope in somewhat unrealistic proportions. In reality, cutslopes in competent rock areas, (which constitutes much of the C Canyon area) may normally be steeper than 1:1, but will vary depending on the specific lithology in any given area. As a general rule, cutslopes will not extend vertically avo e the finished pad level by more than about 20'. This is typical for other mines constructed in the Book Cliffs, such as Andalex's Tower operation located in

8j) Placement of Pad Surfacing Material: Pads will be completed using the native fill material obtained by excavating the adjacent sideslopes. Once completed, however, all operational mine pad areas will be capped with a layer of granular road material. This layer will be 4"-6" thick and will be used to provide a finished surface for mine operation purposes. It will also provide a protective cap layer over the underlying pad fill material which will be re-used during final reclamation as backfill to re-establish the cutslopes. The cap layer will protect the underlying fill from oils, grease, salts, coal fines, and other possible continents. During final reclamation this contaminated cap layer will be scraped off and disposed of and will not be utilized for any post-mining reclamation purposes. This cap layer will be placed over much of the operational pads, covering an estimated 210,000 sq. ft. of the mineyard. Total volume of the cap layer material is estimated at 3,722 cubic yards.

8k) Installation of Surface Ditches and Culverts: As stated earlier, the sediment pond will be constructed as early as possible in order to provide maximum sediment control during the term of the construction project. Once the pad levels are constructed, along with the interconnecting roadways, drainage control ditches and culverts will be installed which will route all surface drainage into the newly constructed sediment ponds. Disturbed area ditches and culverts will be designed to handle a 10 yr. 24 hr. storm event. Where necessary, ditches will be lined with concrete or rip rap to prevent erosion where velocities are expected to exceed 5 feet/sec. (Design details for all ditches and culverts can be found in Appendix 7-4.) Culvert inlets will be designed to provide adequate freeboard for design flows; outlets will be rip-rapped where necessary to prevent scouring.

The outlet of the main bypass culvert (located below the office pad) will be equipped with a substantial rip-rap apron. This rip-rap apron will be designed to serve as an effective energy dissipater and will slow the flow of water from a 1 year, 6 hour event so that the exit velocity at the discharge end of the apron is no greater than a similar flow event within the pre-existing, undisturbed channel at the same location. Construction details of this rip rap apron can be found in Appendix 7-4.

8l) Construction of Coal Handling Facilities: Construction of the coal handling facilities will be scheduled to allow the mine to get into full production as quickly as possible. The underground mining operation cannot function smoothly until the elevated conveyor gallery and discharge structure are fully operational. On the other hand, the mine conveyor cannot become fully operational until the mine workings are developed far enough underground from the portals to allow the conveyor to be extended into the mine works and become an integral working part of the continuous miner production section. Once the initial mine workings have been connected up underground with crosscuts, the conveyor can then become operational.

throughout the entire length of the mineyard during the pad fill removal process. This will be done in order to keep the undisturbed drainage separated from the ongoing earthwork underway during reclamation. During the fill removal process, the bypass culvert inlet structures will be left in place at the upstream ind of the mine site in both the right fork and the left fork. A 40' wide berm will be left intact at the upstream culvert inlets to continue to serve as the culvert headwall and to continue to divert the undisturbed drainage into the bypass culvert. By the time the pad fill has been removed and the cutslopes have been re-established, all that will remain in the canyon where the mine pads had been previously will be the bypass culvert and the backfill immediately around and over the top of it. The backfill over the culvert will continue to provide access up through the canyon for subsequent reclamation activities.

Reclaim Portal Highwall: ***Note: In response to a request from the Division an alternate to the previously approved highwall reclamation plan using a lesser slope is included in Appendix 5-9. The Division approved this alternate reclamation plan on April 24, 2006. Therefore, WEST RIDGE Resources, Inc has now adopted it as the preferred reclamation plan. For specific details of this revised highwall reclamation plan refer to Appendix 5-9. By way of reference, Appendix 5-9 is now included as part of this reclamation plan.***

One of the primary cutslope re-establishment projects will involve the portal highwall. Backfilling and reclamation of the portal highwall will not take place until all the excess fill has been removed (ie. hauled underground) and all other cutslopes have been backfilled to approximate original contour. By the time the highwall is ready for backfill the only reclamation phases remaining will be the re-application of topsoil, removal of the culvert, and revegetation of the newly reclaimed surfaces. The still-remaining backfilled culvert will serve as the primary roadway to provide the necessary access to the portal area for transportation of excess fill material into the mine works, and for boulders and backfill material used to reclaim the portal highwall cutslope.

The portal face-up material will be placed inside the portal area to backfill the portal between the portal opening and concrete block seals located approximately 30' inside the portal. Broken concrete, asphalt and portal face-up material will be placed for permanent disposal within the portals and along the inside of the portal bench area. Any face-up material used to backfill the portal bench will be covered with at least four feet of earthen backfill material.

Portal face-up material and other backfill, will be placed using a backhoe starting at the up dip (southern) end of the portal bench and working northward. As the slope is completed, topsoil will be placed into the surface nooks between the boulders. The surface of the slope will then be revegetated in the same manner as the rest of the reclaimed site.

Final reclamation of the portal highwall will not take place until after the excess backfill material has been removed from the pads, transported into the portals, and placed permanently in the underground mine workings as described previously. (Note: If, however, the excess imported pad fill is hauled offsite for disposal rather than hauled into the mine, the portal highwall will be backfilled as soon as the portals have been sealed utilizing the portal face-up material stored in the mine pad.)

4f) Reapply Topsoil to Backfilled Cutslopes: After the cutslopes in the S/T/C areas have been backfilled and re-established to approximate original contour, the slopes will then be re-topsoiled. Topsoil will be reapplied to the slopes in the conventional manner. Topsoil will be hauled in the truck and spread with a front end loader and/or backhoe. Areas to receive topsoil will be marked with stakes indicating the depth of application. A topsoil specialist 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

APPENDIX 5-9

ALTERNATE HIGHWALL RECLAMATION PLAN

APPENDIX 5-9

ALTERNATE
HIGHWALL AREA RECLAMATION
USING A
SMALLER VERTICAL ANGLE SLOPE

WEST RIDGE MINE

Introduction

The Division has requested an evaluation of an alternate to the approved reclamation plan for the portal highwall area utilizing a smaller vertical angle slope.

This evaluation is based on lessening the reclaimed highwall slope to 31.2° to 33.6°. This would be accomplished by shifting the proposed main channel approximately 20' - 40' to the northwest during final reclamation. This channel shift would occur only at cross-section stations 23+00 through 28+00 [Plate 1] to allow the lessening of the reclaimed highwall slope.

All topsoil handling and placement, and revegetation practices of the reclaimed slope of the highwall area will be done according to the existing approved reclamation plan. Implementation of this alternate reclamation plan will affect a small portion of the approved experimental practice area. Insitu topsoil in this affected area will be salvaged at the time of final reclamation in accordance with the approved plan.

I. Proposed Plan

Under this scenario, the main channel would be relocated approximately 20' - 40' to the northwest between cross-section stations 23+00 and 28+00 during final reclamation. The highwall would then be backfilled, compacted, topsoiled and reseeded in the same manner as the other cutslopes on the site. The final location of the channel will be determined by the toe of the reclaimed highwall. As shown on Plates 2A, 2B, 2C and 2D, this is the point where the reclaimed highwall slope meets the original (reclaimed) surface to the northwest. Calculations show that by reducing the reclaimed highwall angle to 33.61° or less, and using the proposed backfill material, a factor of safety of greater than 1.3 can be attained for saturated conditions and greater than 1.9 for dry, normal conditions.

The proposed shift in the reclaimed channel will affect an area of the experimental practice "in-situ" topsoil of approximately 400' in length by 80' in width, or approximately 0.74 acres. This represents approximately 15.5% of the overall experimental practice area. The culvert and any available in-situ topsoil will be removed from this area during final reclamation. The topsoil will be replaced, and the restored channel will be rip-rapped to provide erosion protection through the reclaimed area.

The proposed area of relocation is shown on Plate 1 and the proposed new reclaimed cross-sections are shown on Plates 2A, 2B, 2C and 2D. The proposed new channel profile is shown on Plate 3.

Proposed reconstruction and hydrology are shown on Plate 4, and reclamation area and soil types are shown on Plate 5.

Please note that all Plates in this Appendix are based on "As-Built" contour information.

II. Calculations

Stability calculations were performed using the Hoek Method from Rock Slope Engineering. Under this method, stability projections can be made using known soil characteristics such as density, cohesion and internal friction angle, as well as proposed slope height. This information can then be plotted on the provided circular failure charts to determine factors of safety for both Dry and Saturated Conditions.

The Hoeck Method for stability analyses was selected for the following reasons:

(1) This method provides for a "worst-case" scenario by using a circular failure prediction based on the total height of the highwall, although the actual failure surface would be considerably smaller due to the presence of some bedrock near the base;

(2) The West Ridge highwall is comparable to other highwalls in this area that have been designed, approved and sucessfully reclaimed based on the Hoeck Method of stability analyses.

It should be noted that various soil samples have been taken and analyzed for the backfill material. The samples were taken directly from the area which will be used as backfill.

The samples were taken by West Ridge and Agapito personnel in December 2002; however, the analyses results indicated a high cohesion (1877 psf) and friction angle (54°) value. Since these numbers have been questioned by some reviewers, it was decided that a previous set of sample results, which are considerably more conservative, would be used for the calculations.

The density, cohesion and internal friction angle of the proposed backfill material were taken from soil samples taken by Agapito Associates from the source area of the pad material in 2002. The sample locations are shown on Plate 1, and the laboratory analyses are included as an addendum to this appendix. This is the area (upper material storage pad) from which the highwall backfill material will be taken.

Slope heights and angles were measured directly from Plate 1 and Plates 2A, 2B, 2C and 2D. The relevant numbers for the calculations are listed for each cross section on Table 1 of this report. These numbers were then applied to the equations on the Circular Failure Charts No. 1 and No. 5 to determine the Static Safety Factor for Dry and Saturated Conditions, respectively (Figures 1 and 2).

Based on the proposed soil characteristics and highwall slope angles, Factors of Safety for Dry Conditions run from a minimum of 1.98 to 2.26, and a minimum of 1.32 to 1.50 for Saturated Conditions.

Summary

Factors of Safety for the complete highwall reclamation at West Ridge Mine can be significantly increased by shifting the proposed reclaimed highwall toe approximately 40' to the northwest. Using previously tested sample results and new proposed reclaimed slope angles, the static safety factor of the reclaimed highwall can be increased to a minimum of 1.98 to 2.26 for Dry Conditions and a minimum of 1.32 to 1.50 for Saturated Conditions.

This proposed change would affect a small portion of the experimental practice "in-situ" topsoil area; however, the impact would be minor (approximately 15.5% of the experimental practice area), and topsoil could still be salvaged and replaced on this area during final reclamation.

This proposal would allow for complete and stable highwall reclamation without the need for special drains, special material and placement methods and specialized planting. However, this alternative would also require the Division to grant an AOC variance. It may also increase the possibility of future, post bond-release channel erosion due to a storm event exceeding the design of the reclaimed channel.

Table 1
Using Proposed Backfill Material
Move Reclaimed Channel 40' to NW

Station	24+00	25+00	26+00	27+00
Toe	7045	7042	7042	7.44
Top	7150	7130	7130	7130
VD (H)	105	88	88	86
HD	158	140	140	142
Slope Angle	33.61°	32.15°	32.15°	31.20°
Safety Factor (Dry)	1.98	2.14	2.14	2.26
Safety Factor (Saturated)	1.32	1.44	1.44	1.50

Hoek Method - Rock Slope Engineering

*Density (γ) = 121.6 lb/ft^3
*Cohesion (c) = 771.7 psf
*Friction Angle (ϕ) = 38.4°

*Based on sample results of soil samples from the source area of the pad material analyzed by Agapito personnel in 2002.

Hydrologic Design

Under this alternate highwall reclamation scenario, approximately 500' of the main channel in the right fork will be reconstructed, as shown on Plate 1. The reconstruction will occur between cross-section stations 23+00 and 28+00 (See Plates 1 through 5).

As indicated earlier in this report, the final location of the channel in this area will be determined by the toe of the reclaimed highwall. As shown on Plates 2A, 2B, 2C and 2D, this is the point where the reclaimed highwall slope meets the original (reclaimed) surface to the northwest. A profile of the proposed reclaimed channel compared to the original channel is shown on Plate 3 of this Appendix. It should be noted that the original channel had slopes ranging from 4.67% to 10.00% with an overall average slope of 6.40% through this area. The proposed reconstructed channel will have slopes ranging from 3.55% to 11.68% with an overall average slope of 6.80%.

It is proposed to construct a natural appearing channel with a 12' - 15' bottom width and approximately 2:1 side slopes, with a minimum depth of 3.5'. The lower, steeper portion of the reconstructed channel, from Station 23+00 through 25+00, will have a minimum 12' bottom width, and will be rip-rapped for erosion protection. The upper portion of the channel, from Station 25+00 through 28+00, will have a much flatter slope, a 15' bottom width and will not be rip-rapped.

Construction of the channel will start by removing topsoil from the channel site and stockpiling it for use on the reclaimed highwall area. The channel will then be excavated and the material also stockpiled for backfilling. The realigned channel will be reconstructed and rip-rapped as shown on Figures 3 and 4.

In an effort to give the rip-rapped portion of the channel a more natural appearance, the following steps will also be taken.

(1) Some large rocks ($18D_{50}$ or greater) will be randomly placed in the channel bottom;

(2) The rip-rapped portion of the channel will be covered with at least 12" of soil to provide a media for plant growth;

(3) The restored channel will be hydroseeded during the final seeding of the site.

It should be noted that in the event bedrock or large colluvial blocks should hamper installation of the proposed realigned channel, the alignment and/or grade may be slightly altered to provide a channel with at least the minimum cross-sectional area and erosion protection of the designed channel.

Channel Design

As shown on Map 5-9 "Mine Site Reclamation" and on Plate 4 of this Appendix, the proposed channel reconstruction area is within the reclaimed channel area designated RC-GG. Channel RC-GG is discussed in Appendix 7-4, under Section 4, "Design of Drainage Control Structures for Reclamation Hydrology". The following is a comparison of the original channel RC-GG and the proposed realigned channel through the same section:

Parameter	RC-GG Sta. 23+00 - 28+00 Original Channel	(23+00 - 25+00) Steeper Section of Realigned Channel	(25+00 - 28+00) Flatter Section of Realigned Channel
100 year/6 hour runoff	69.98 cfs	69.98 cfs	69.98 cfs
Bottom Width:	12 ft.	12 ft.	15 ft.
Side Slopes:	2H:1V	2H:1V	2H:1V
Channel Slope:	6.4%	11.68%	3.55%
Reclaimed Depth:	3.5 ft.	3.5 ft.	3.5 ft.
Manning's No.:	0.035	0.035	0.035
Flow Velocity	7.70 fps	9.34 fps	5.98 fps
Required Area:	9.09 ft^2	7.49 ft^2	11.70 ft^2
Flow Depth:	0.68 ft.	0.57 ft.	0.71 ft.

As indicated above, the original channel had an average slope of 6.40% with an expected flow velocity of 7.70 fps for the 100 year - 6 hour storm. The steeper section of the realigned channel (Station 23+00 through 25+00) will have an average slope of 11.68% and an expected flow velocity of 9.34 fps for the 100 year-6 hour storm. Since the expected flow velocity through this area is greater than 6.0 fps, this portion of the channel will be protected from erosion by armoring with at least 10" D_{50} rip-rap. The rip-rap design is based on Figure 2 of Appendix 7-4 and as shown on Figure 4 of this Appendix. The upper portion of the realigned channel (Station 25+00 through 28+00) will have a much flatter slope of 3.55%, and an expected flow velocity of 5.98 fps for the 100 year-6 hour storm. Since the expected flow velocity is less than 6.0 fps, this portion of the reconstructed channel will not need to be rip-rapped. A typical section of this portion of the channel is shown on Figure 3 of this Appendix.

Summary

The proposed reconstruction of approximately 500' of the main right fork channel will be completed using native materials. Since expected velocities for the 100 year - 6 hour storm runoff are greater than 6.0 fps, in the lower, steep channel section (Station 23+00 through 25+00) this portion of the channel will be rip-rapped in accordance with the approved plan. The upper flatter section of the channel (Station 25+00 through 28+00) will not need to be rip-rapped.

CHANNEL FLOW CALCULATIONS

Title of run: RC-GG (ORIGINAL)

Solving for	Depth Normal

Trapedeziod

Flow depth (ft)	0.68
First Side slope	2.0
Second Side slope	2.0
Bottom width (ft)	12.00
Slope of diversion	0.0640
Manning"s n	0.035
CFS	69.98
Cross section area (sqft)	9.09
Hydrualic radius	0.60
fps	7.70
Froude number	1.75

Title of run: RC-GG (23+00-25+00)

Solving for	Depth Normal

Trapedeziod

Flow depth (ft)	0.57
First Side slope	2.0
Second Side slope	2.0
Bottom width (ft)	12.00
Slope of diversion	0.1168
Manning"s n	0.035
CFS	69.98
Cross section area (sqft)	7.49
Hydrualic radius	0.51
fps	9.34
Froude number	2.30

Title of run: RC-GG (25+00-28+00)

Solving for	Depth Normal

Trapedeziod

Flow depth (ft)	0.71
First Side slope	2.0
Second Side slope	2.0
Bottom width (ft)	15.00
Slope of diversion	0.0355
Manning"s n	0.035
CFS	69.98
Cross section area (sqft)	11.70
Hydrualic radius	0.64
fps	5.98
Froude number	1.31

FIGURES

C=Cohesion-psf

Y=Density-pcf

H=Slope Height-ft.

ϕ=Internal Friction Angle

(DRYCONDITIONS)

CIRCULAR FAILURE CHART NUMBER 1

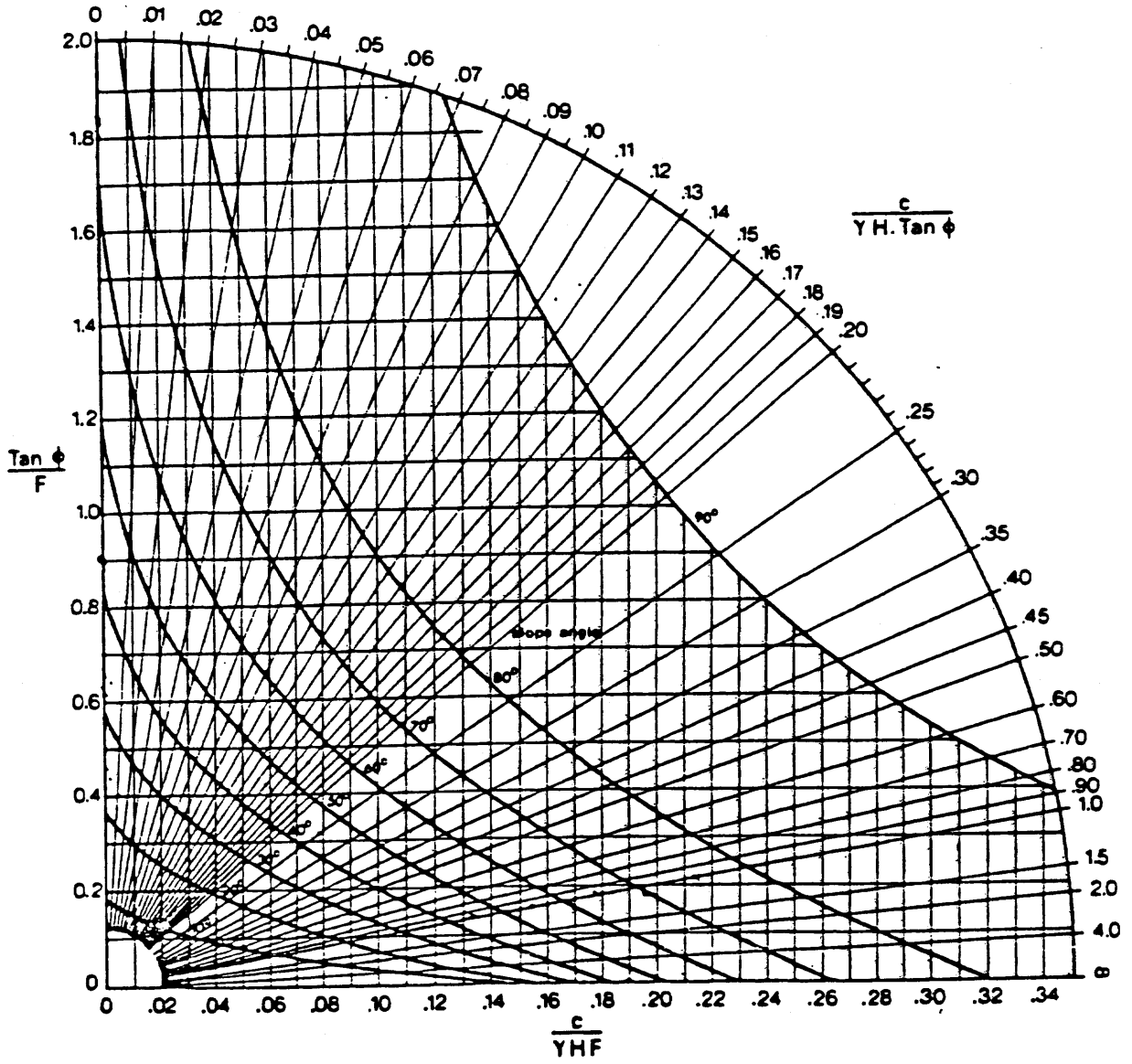


Figure 1

C=Cohesion-psf

Y=Density-pcf

H=Slope Height-ft.

ϕ=Internal Friction Angle

(SATURATED CONDITIONS)

CIRCULAR FAILURE CHART NUMBER 5

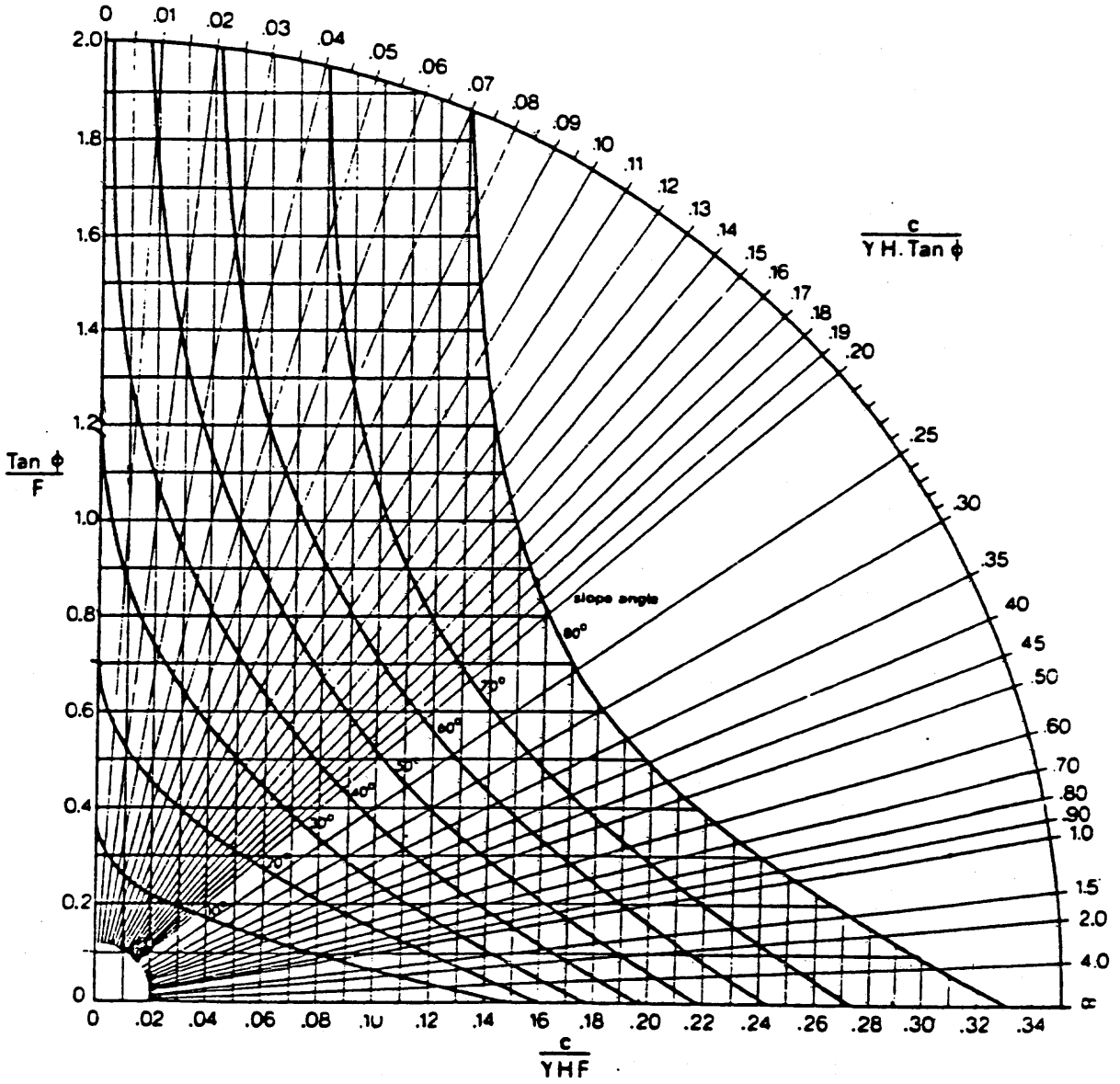
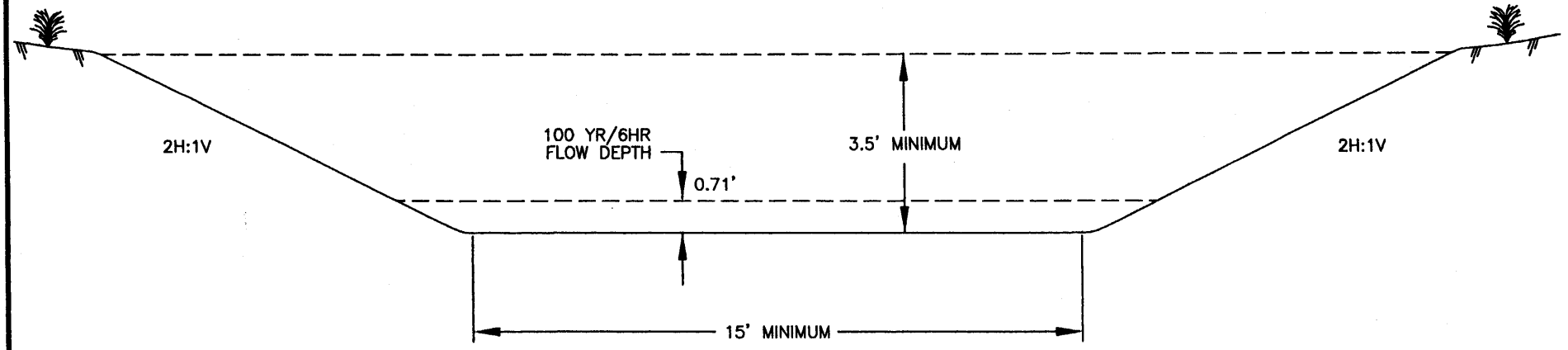


Figure 2

FIGURE 3



TYPICAL SECTION OF
RECONSTRUCTED CHANNEL RC-GG
STATION 25+00 - 28+00

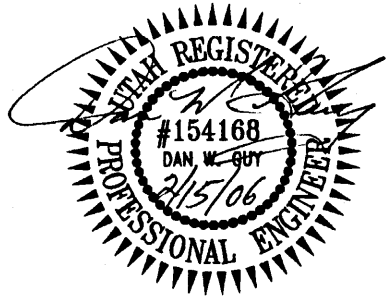
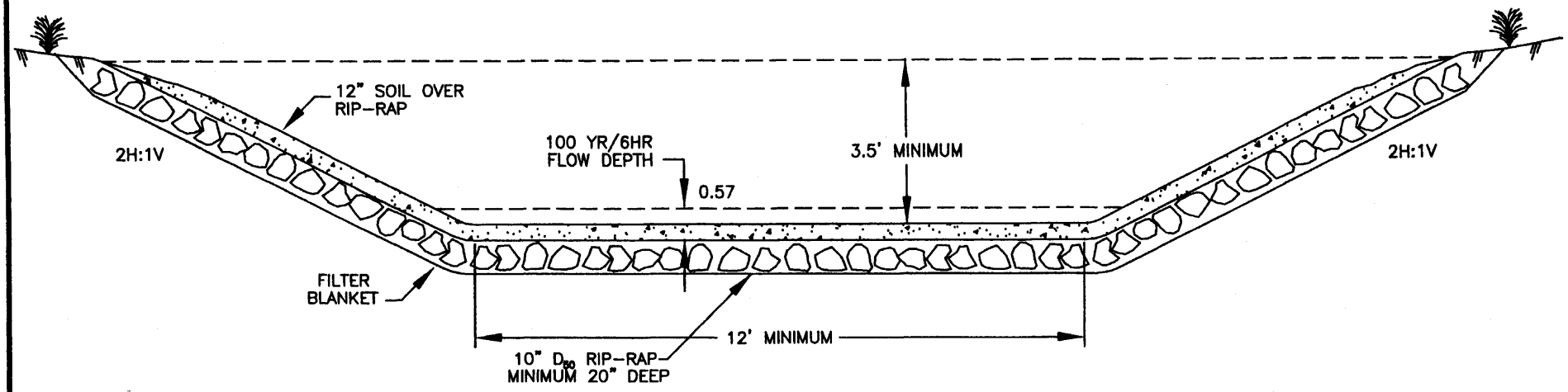


FIGURE 4

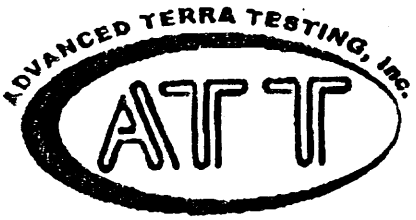


TYPICAL SECTION OF
RECONSTRUCTED CHANNEL RC-GG
RIP-RAPPED SECTION
STATION 23+00 - 25+00

ADDENDUM 1

LABORATORY ANALYSES
FOR
PROPOSED HIGHWALL BACKFILL

FAX TRANSMITTAL FORM



833 Parfet Street
Lakewood, Colorado 80215
USA

Date: January 4, 2002

Name:	Jim Cremeens
Company/Dept:	Agapito
FAX No:	970-245-9234
Telephone No:	

From:

Name:	Chris Wienecke
Company/Dept:	ADVANCED TERRA TESTING, Inc.
FAX No:	(303) 232-1579
Telephone No:	(303) 232-8308

Number of Pages in Transmission, Including Transmittal Sheet: 11

Hard Copy Will Be Mailed: X

Hard Copy Will Not Be Mailed:

Additional Instructions/Comments: Results of direct shear test, and some index tests.

Please call if you have any questions. Regards,

Chris

APPENDIX A

LABORATORY TESTING DATA FOR BACKFILL MATERIAL

LARGE SCALE INTERNAL DIRECT SHEAR TEST DATA

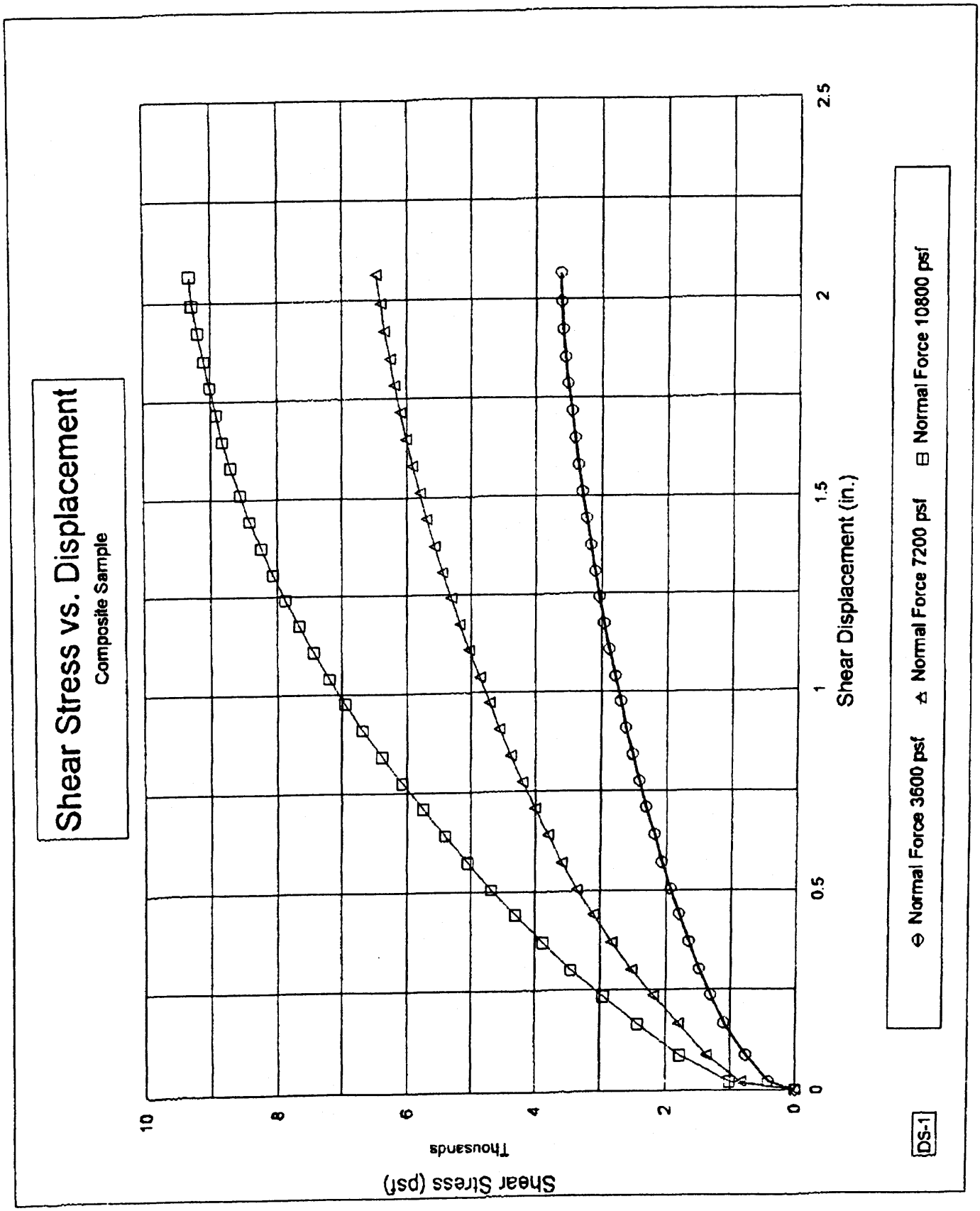
ASTM D 3080 - 12"x12" Box

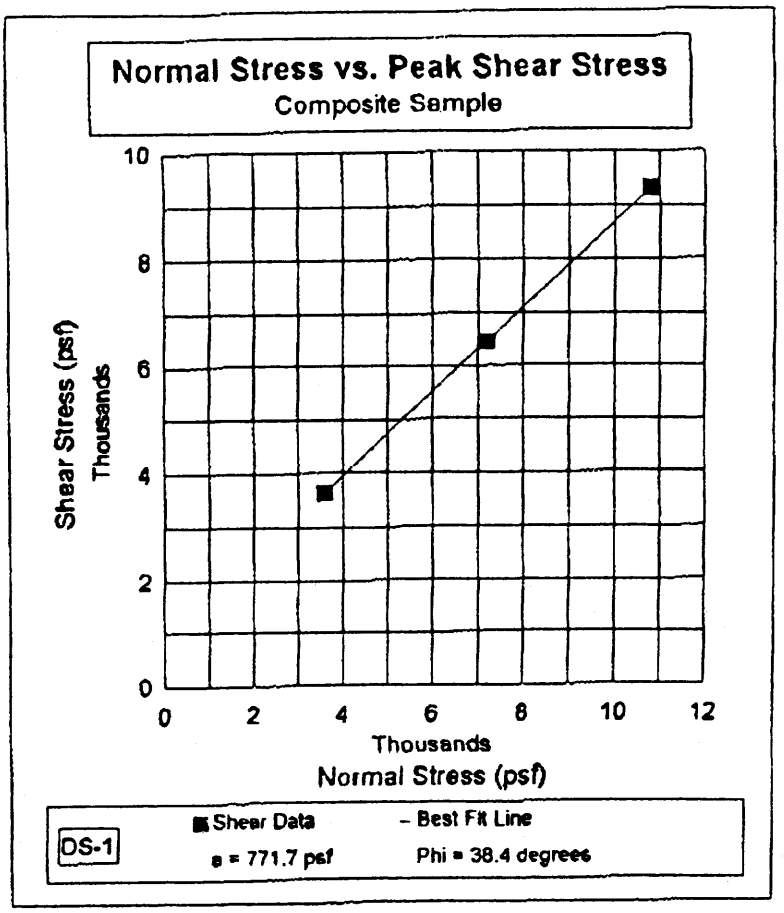
CLIENT:	Agapito Associates	Date:	1-4-02
Project No:	2452-05	Test date:	1-3&4-02
Project:	Andalex - West Ridge Mine	Technician:	SR
Interface:	Composite Sample	Shear Rate:	0.04"/min.
Special conditions:	JN.: 460-03	Test Series:	DS-1

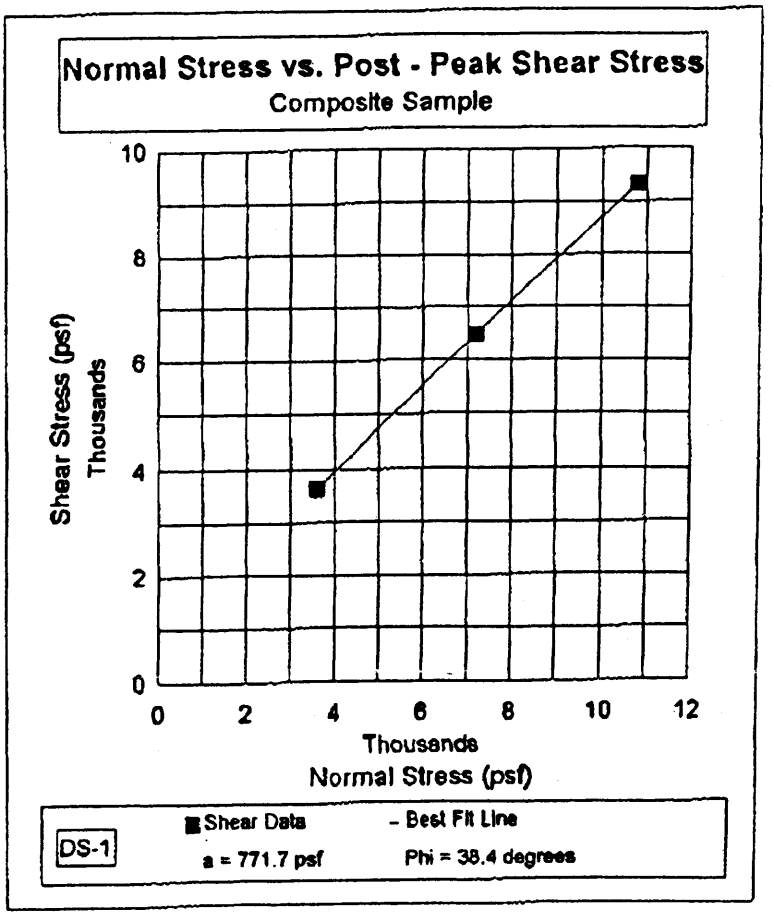
Displacement (inches)	Normal Force 3600 psf Shear Stress (psf)	Normal Force 7200 psf Shear Stress (psf)	Normal Force 10800 psf Shear Stress (psf)
0	0	0	0
0.022	410	826	1007
0.087	760	1368	1779
0.166	1105	1804	2425
0.234	1308	2164	2947
0.301	1492	2520	3440
0.37	1652	2627	3876
0.438	1804	3096	4300
0.504	1935	3351	4678
0.571	2065	3586	5042
0.64	2166	3805	5402
0.708	2312	4004	5747
0.773	2414	4198	6066
0.841	2523	4364	6383
0.907	2621	4557	6682
0.975	2709	4713	6954
1.039	2792	4866	7200
1.106	2877	5027	7434
1.175	2960	5178	7665
1.241	3031	5312	7876
1.307	3096	5442	8070
1.375	3157	5571	8239
1.444	3220	5691	8409
1.511	3288	5800	8550
1.578	3345	5913	8698
1.647	3398	6014	8827
1.715	3449	6106	8920
1.785	3503	6190	9010
1.851	3547	6262	9101
1.921	3586	6346	9191
1.992	3614	6410	9265
2.063	3619	6473	9317

Data Entered By: SR
Data Checked By: CW
File Name: AODS1A

Date: 1-4-02
Date: 01/04/02


Shear Stress vs. Displacement
Composite Sample
Shear Stress (psf)
Thousands
10
8
6
4
2
0
0
0.5
1
1.5
2
2.5
Shear Displacement (in.)
Normal Force 3600 psf
Normal Force 7200 psf
Normal Force 10800 psf
DS-1


Normal Stress vs. Peak Shear Stress
Composite Sample
Shear Stress (psf)
Thousands
0
2
4
6
8
10
0
2
4
6
8
10
12
Thousands
Normal Stress (psf)
DS-1
Shear Data
Best Fit Line
a = 771.7 psf
Phi = 38.4 degrees


Normal Stress vs. Post - Peak Shear Stress
Composite Sample
Shear Stress (psf)
Thousands
0
2
4
6
8
10
0
2
4
6
8
10
12
Thousands
Normal Stress (psf)
DS-1
Shear Data
Best Fit Line
a = 771.7 psf
Phi = 38.4 degrees

Moisture Content Determinations
ASTM D 2216

CLIENT: Agapito Associates
LOCATION: Andalex-West Ridge Mine

JOB NO.: 2452-05

BORING	
SAMPLE DEPTH	
SAMPLE NO.	
DATE SAMPLED	
DATE TESTED	12-19-01 KF
SOIL DESCRIPTION	Project #460-03
MOISTURE DETERMINATIONS	
Wt. of Wet Soil & Dish (gms)	953.22
Wt. of Dry Soil & Dish (gms)	870.45
Net Loss of Moisture (gms)	82.77
Wt. of Dish (gms)	15.00
Wt. of Dry Soil (gms)	855.45
Moisture Content (%)	9.7

Data entered by: MC
Data checked by: _____
FileName:

SR
Date: 12-20-01
AOMDMINE

Date: 12/20/2001

ADVANCED TERRA TESTING, INC.

USCS Classification
D 2487

CLIENT	AGAPITO Associates	JOB NO.	2452-05
BORING NO.		SAMPLED	
DEPTH		DATE TESTED	1-2-02 SR
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Project #460-03	DRY SIEVE	No
LOCATION	Andalex-West Ridge Mine		

ATTERBERG CLASSIFICATION: CL-ML

% Gravel =	48.96
% Sand =	26.14
% Fines =	24.91

D60 =	N/A
D30 =	N/A
D10 =	N/A
Cu =	N/A
Cc =	N/A

Classification = GC-GM, Silty, clayey gravel with sand

Data entered by: SR
Data checked by: DFM
FileName: AOG0COMP

Date: 01/03/2002
Date: 1/03/02
ADVANCED TERRA TESTING, INC.

MECHANICAL ANALYSIS - SIEVE TEST DATA
ASTM D 422

CLIENT AGAPITO Associates

JOB NO. 2452-05

BORING NO.
DEPTH
SAMPLE NO.
SOIL DESCR. Project #460-03
LOCATION Andalex-West Ridge Mine

SAMPLED
DATE TESTED 1-2-02 SR
WASH SIEVE Yes
DRY SIEVE No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g)	68.64
Wt. Dry Soil & Pan (g)	67.45
Wt. Lost Moisture (g)	1.19
Wt. of Pan Only (g)	3.63
Wt. of Dry Soil (g)	63.82
Moisture Content %	1.9
Wt. Hydrom. Sample Wet (g)	168.23
Wt. Hydrom. Sample Dry (g)	165.15

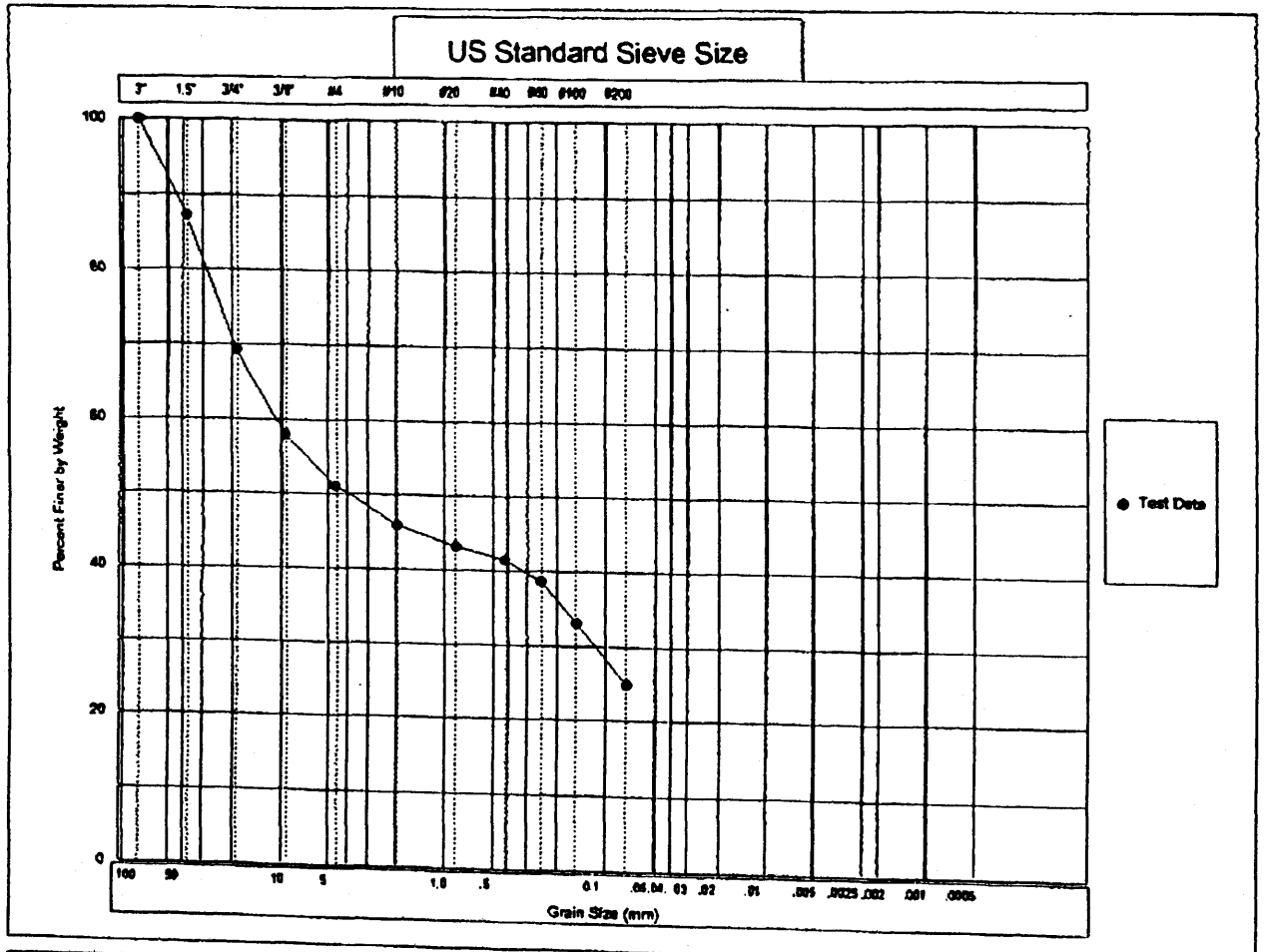
WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	7119.50
Weight of + #10 Before Washing (g)	4203.00
Weight of + #10 After Washing (g)	3813.68
Weight of - #10 Wet (g)	2916.50
Weight of - #10 Dry (g)	3245.31
Wt. Total Sample Dry (g)	7058.99
Calc. Wt. "W" (g)	359.23
Calc. Mass + #10	194.07

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	899.89	899.89	899.89	12.7	87.3
3/4"	0.00	1268.67	1268.67	2168.56	30.7	69.3
3/8"	0.00	791.94	791.94	2960.50	41.9	58.1
#4	0.00	495.42	495.42	3455.92	49.0	51.0
#10	0.00	357.76	357.76	3813.68	54.0	46.0
#20	3.75	13.47	9.72	9.72	56.7	43.3
#40	3.72	9.98	6.26	15.98	58.5	41.5
#60	3.67	14.17	10.50	26.48	61.4	38.6
#100	3.67	23.28	19.61	46.09	66.9	33.1
#200	3.56	33.15	29.59	75.68	75.1	24.9

Data entered by: SR Date: 01/03/2002
Data checked by: DRM Date: 1/02/02
FileName: AOG0COMP

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

USCS

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WENTWORTH

Client: AGAPITO Associates Boring No.:
Job Number: 2452-05 Depth: Sample No.:
Classification: GC-GM, silty, clayey gravel with sand

Advanced Terra Testing, Inc.

ATTERBERG LIMITS TEST
ASTM D 4318

CLIENT Agapito Associates

JOB NO. 2452-05

BORING NO.
DEPTH
SAMPLE NO.
SOIL DESCR.
LOCATION

DATE SAMPLED
DATE TESTED 1/2/02 CJW

Proj # 460-03
Andalex-West Ridge Mine

Plastic Limit Determination

	1	2	3
Wt Dish & Wet Soil	5.28	7.63	5.66
Wt Dish & Dry Soil	4.64	6.65	4.96
Wt of Moisture	0.64	0.98	0.70
Wt of Dish	0.75	0.75	0.74
Wt of Dry Soil	3.89	5.90	4.22
Moisture Content	16.45	16.61	16.59

Liquid Limit Determination Device Number 0258

	1	2	3	4
Number of Blows	19	24	28	30
Wt Dish & Wet Soil	10.51	9.70	10.72	9.39
Wt Dish & Dry Soil	8.65	8.02	8.87	7.79
Wt of Moisture	1.86	1.68	1.85	1.60
Wt of Dish	0.76	0.74	0.75	0.73
Wt of Dry Soil	7.89	7.28	8.12	7.06
Moisture Content	23.57	23.08	22.78	22.66

Liquid Limit	23.0
Plastic Limit	16.6
Plasticity Index	6.5

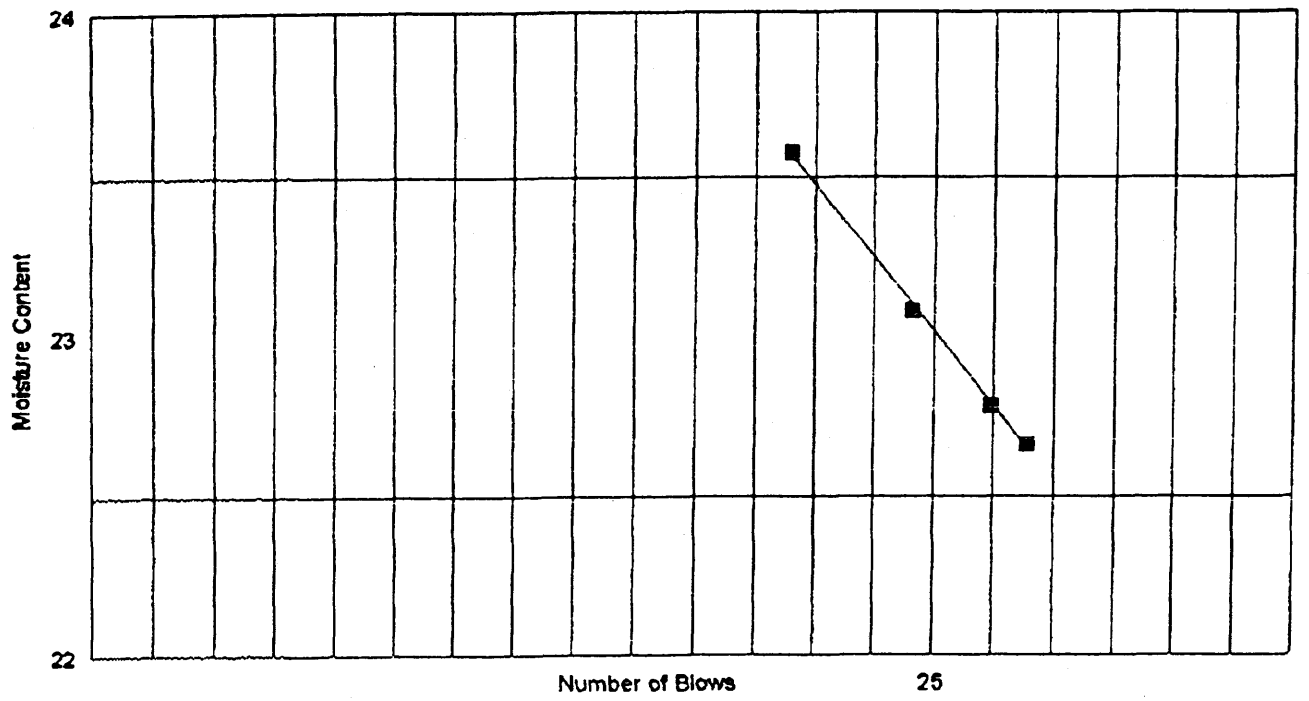
Atterberg Classification CL-ML

Data entry by: CJW Date: 01/03/2002
Checked by: AEM Date: 1/03/02
FileName:
JAN-04-2002 16:17

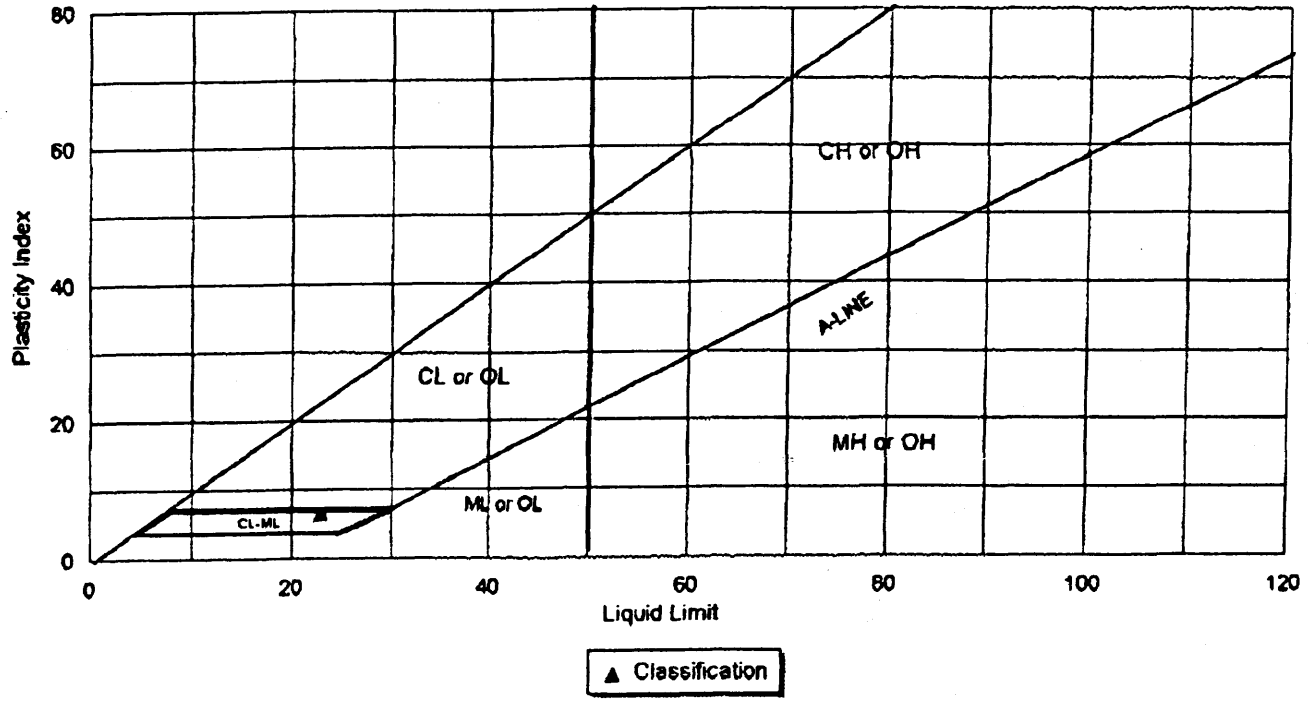
AOGOAWRM
303 232 1579

ADVANCED TERRA TESTING, INC.
99% P.09

Atterberg Limits, Flow Curve



PLASTICITY CHART



COMPACTION TEST
ASTM D 698 C

CLIENT: Agapito Associates JOB NO. 2452-05

[redacted]RING NO.
DEPTH
SAMPLE NO.
SOIL DESCR. Proj.# 460-03

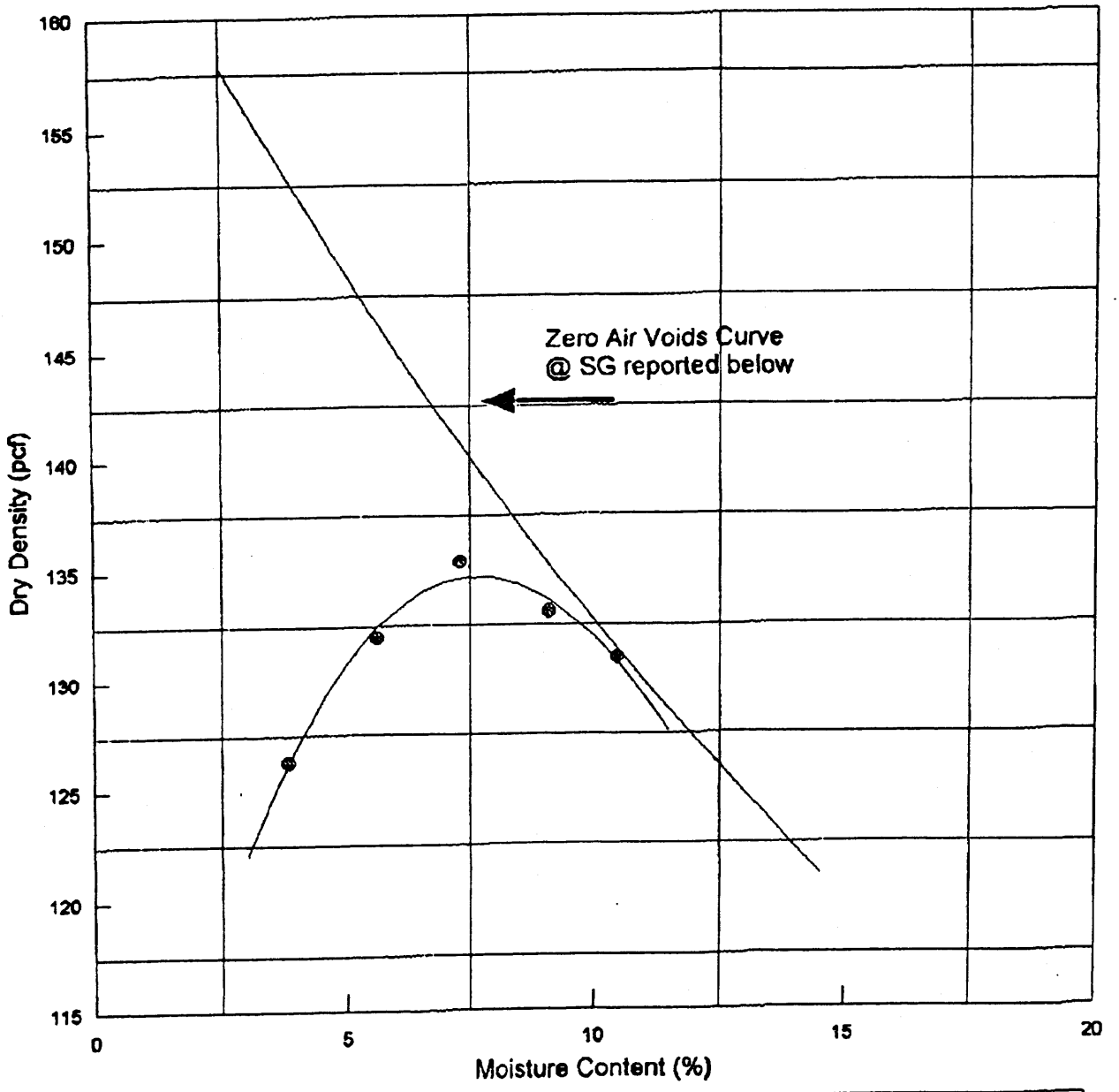
DATE SAMPLED
DATE TESTED 12-28-01 MM
LOCATION Andalex - West Ridge Mine

Moisture Determination	1	2	3	4	5
Wt of Moisture added (ml)	120.00	240.00	360.00	480.00	600.00
Wt. of soil & dish (g)	746.03	827.40	1022.54	819.06	911.60
Dry wt. soil & dish (g)	710.52	770.14	932.17	730.80	800.41
Net loss of moisture (g)	35.51	57.26	90.37	88.26	111.19
Wt. of dish (g)	15.57	15.39	15.72	15.47	15.79
Net wt. of dry soil (g)	694.95	754.75	916.45	715.33	784.62
Moisture Content (%)	5.11	7.59	9.86	12.34	14.17
Corrected Moisture Content	3.79	5.61	7.29	9.11	10.46
Density determination					
Wt of soil & mold (lb)	21.52	22.17	22.68	22.59	22.55
[redacted] of mold (lb)	12.50	12.50	12.50	12.50	12.50
[redacted] wt. of wet soil (lb)	9.02	9.67	10.18	10.09	10.05
[redacted] wt of dry soil (lb)	8.69	9.16	9.49	9.25	9.10
Dry Density, (pcf)	115.87	122.08	126.51	123.30	121.31
Corrected Dry Density (pcf)	126.27	131.64	135.40	132.68	130.98
Volume Factor	13.333	13.333	13.333	13.333	13.333

[redacted] entered by: KF Date: 12/31/2001
Data checked by: SR Date: 1-2-02
FileName: AOPRAWRM
JAN-04-2002 16:17

ADVANCED TERRA TESTING, INC.
303 232 1579

Proctor Compaction Test



- Best Fit Curve ● Actual Data

- Zero Air VoidsCurve @ SG = 2.70

OPTIMUM MOISTURE CONTENT = 7.6 MAXIMUM DRY DENSITY = 134.7
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

PROPOSED CHANNEL RELOCATION

COMPOSITE BACKFILL
SAMPLE LOCATIONS

EXTENT OF HIGHWALL

EXISTING CHANNEL LOCATION

UTAH REGISTERED
#154168
DAN W. GUY
2/23/06
PROFESSIONAL ENGINEER

Legend:

Original Channel Location: ----------

Alternate Channel Relocation: - - - - - -

Culvert: ———

Sample Locations: ●

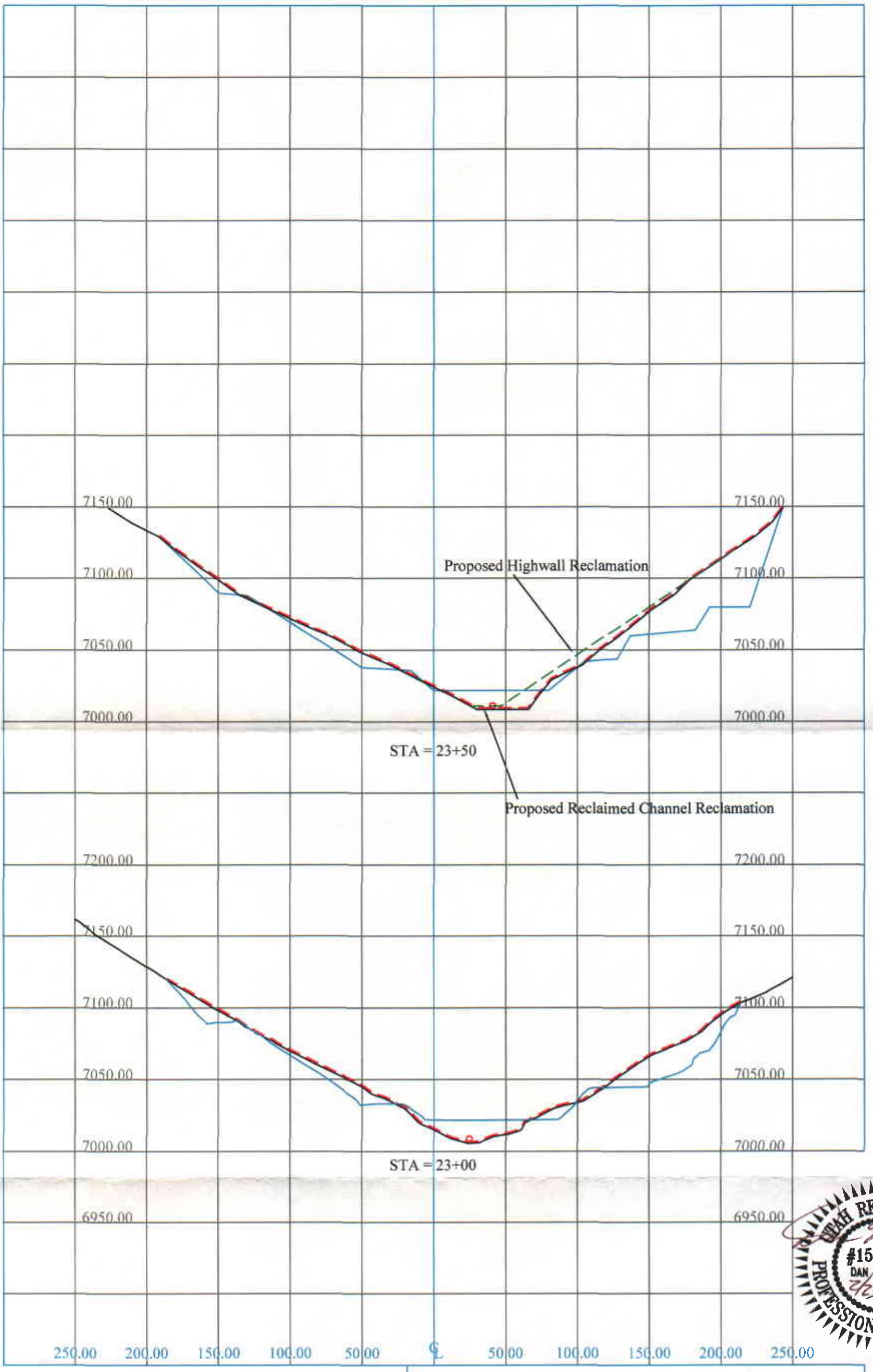
Scale: 1" = 100'

WEST RIDGE MINE

Plate 1

Appendix 5-9
Channel Relocation
for
Alternate Highwall Reclamation

ACAD REF: Plate 1 REV: 1 DATE: 04/06/05



Scale: 1" = 70' Refer to Map 5-6 for cross-section index

Legend:
- Original Surface
- As Constructed Surface
- Approved Reclaimed Surface
- Alternate Reclaimed Surface
- Bypass Culvert

UTAH REGISTERED #154168 DAN W. GUY 2/23/06 PROFESSIONAL ENGINEER

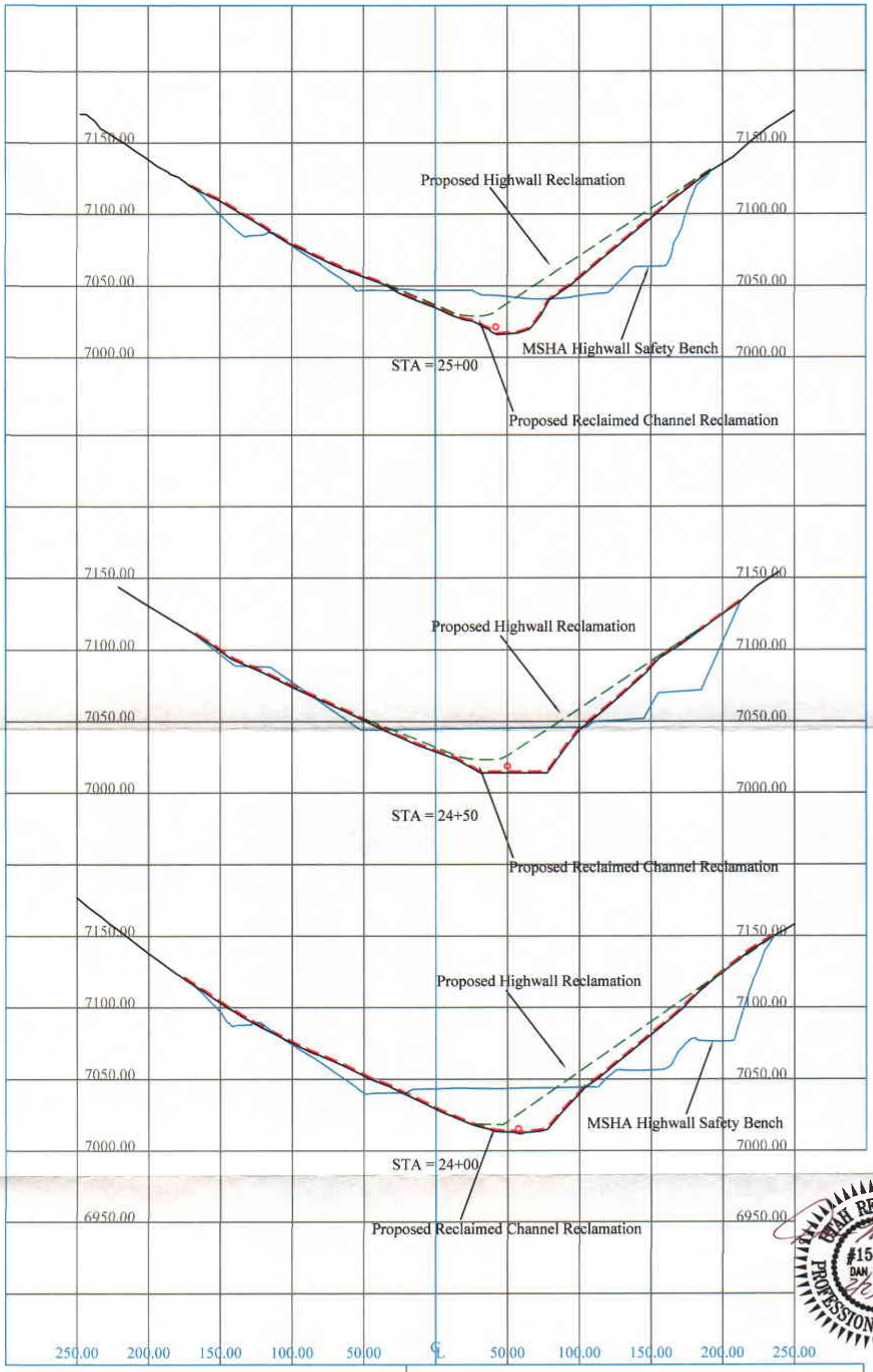
WEST RIDGE MINE

Plate 2A

Appendix 5-9

Alternate Reclaimed Highwall Cross-Sections

ACAD REF: Plate 2 REV: 3 DATE: 02/21/06



UTAH REGISTERED
#154168
DAN W. GUY
2/23/06
PROFESSIONAL ENGINEER

Scale: 1" = 70' Refer to Map 5-6 for cross-section index

Legend:
- Original Surface
- As Constructed Surface
- Approved Reclaimed Surface
- Alternate Reclaimed Surface
- Bypass Culvert

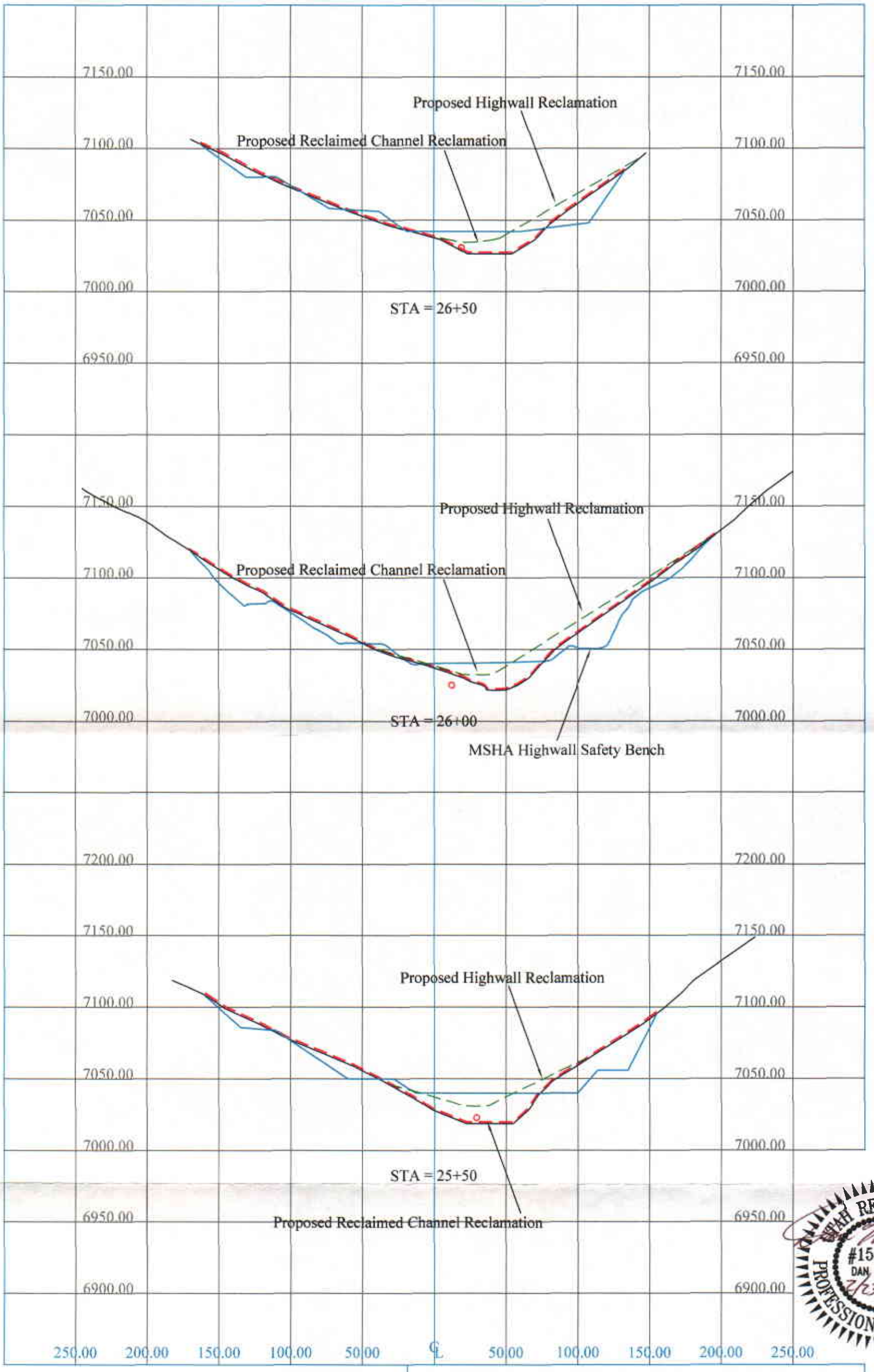
WEST RIDGE MINE

Plate 2B

Appendix 5-9

Alternate Reclaimed Highwall Cross-Sections

ACAD REF: Plate 2 REV: 3 DATE: 02/21/06



Scale: 1" = 70' Refer to Map 5-6 for cross-section index

Legend:
- Original Surface
- As Constructed Surface
- Approved Reclaimed Surface
- Alternate Reclaimed Surface
- Bypass Culvert

UTAH REGISTERED #154168 DAN W. GUY 2/23/06 PROFESSIONAL ENGINEER

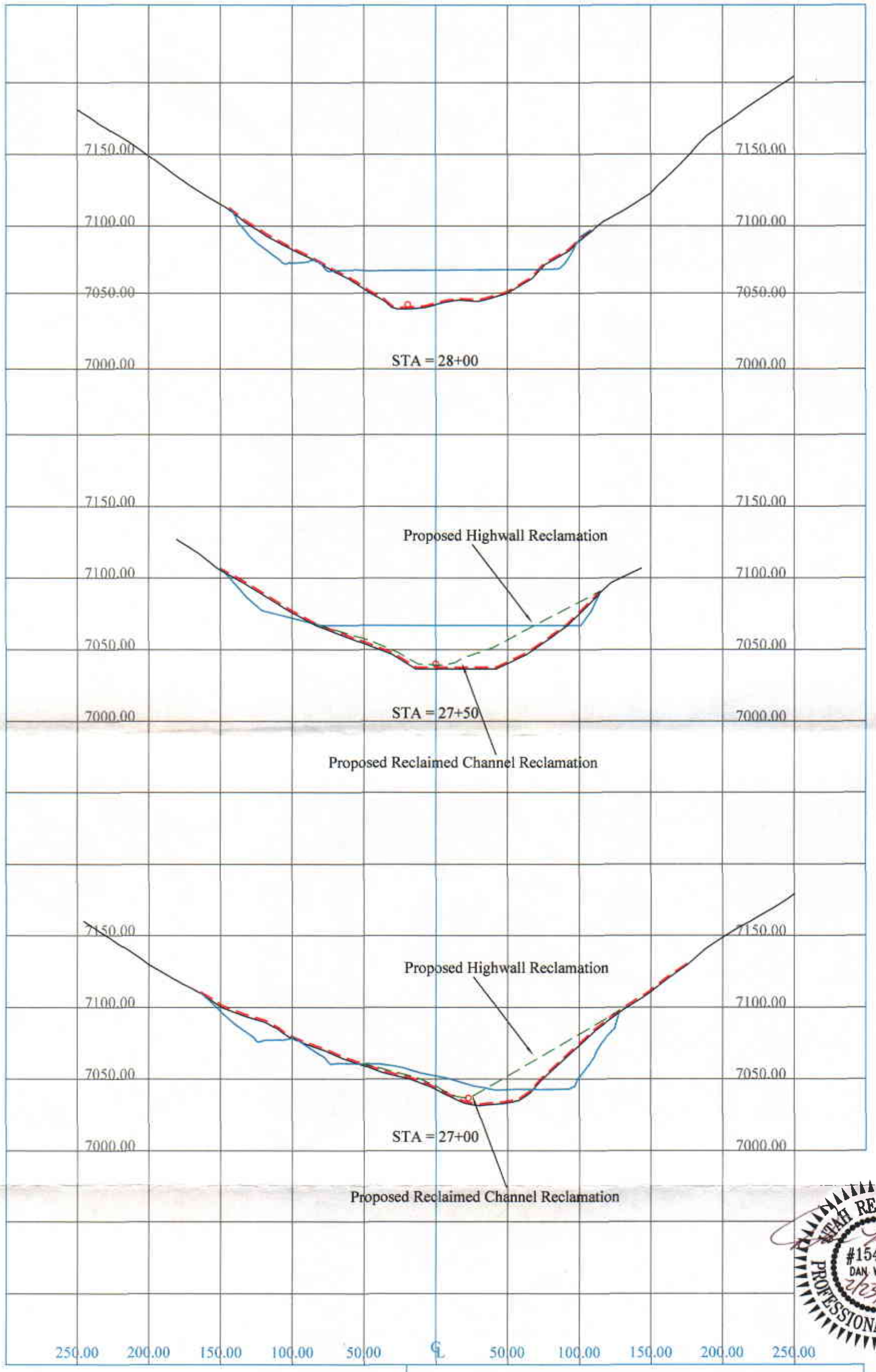
WEST RIDGE MINE

Plate 2C

Appendix 5-9

Alternate Reclaimed Highwall Cross-Sections

ACAD REF: Plate 2 REV: 3 DATE: 02/21/06



Scale: 1" = 70' Refer to Map 5-6 for cross-section index

Legend:
- Original Surface
- As Constructed Surface
- Approved Reclaimed Surface
- Alternate Reclaimed Surface
- Bypass Culvert

WEST RIDGE MINE

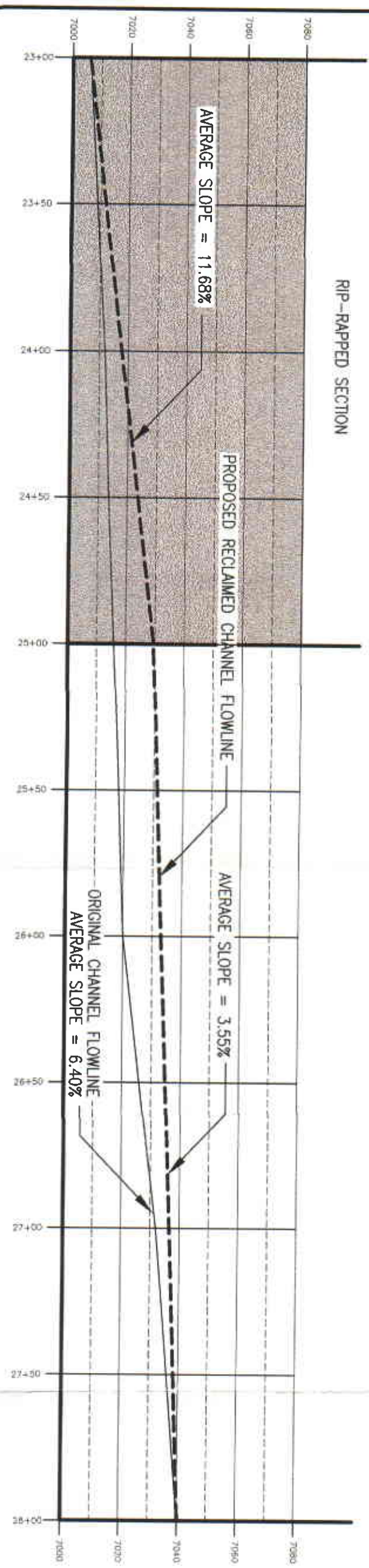
Plate 2D

Appendix 5-9

Alternate Reclaimed Highwall Cross-Sections

ACAD REF: Plate 2 REV: 3 DATE: 02/21/06

UTAH REGISTERED #154168 DAN W. GUY 2/23/06 PROFESSIONAL ENGINEER



UTAH REGISTERED
#154168
DAN W. GUY
2/15/06
PROFESSIONAL ENGINEER

Scale: 1" = 40'

Map 5-6 in Volume B

Legend:

Original Channel Flowline: _____

Proposed Reclaimed Channel Flowline: - - - - -

WEST RIDGE MINE

Plate 3

Appendix 5-9

Alternate Reclaimed Channel Profile

ACAD REF: Plate 3 REV: 2 DATE: 02/15/2006

LEGEND:

DISTURBED AREA BOUNDARY

APPROXIMATE GEOTEXTILE BOUNDARY

ORIGINAL (AND RECLAIMED) SURFACE CONTOUR WITHIN GEOTEXTILE AREA

APPROVED RECLAMATION SURFACE CONTOUR

ORIGINAL CHANNEL

ALTERNATE RECLAMATION SURFACE CONTOUR

PROPOSED RESTORED CHANNEL

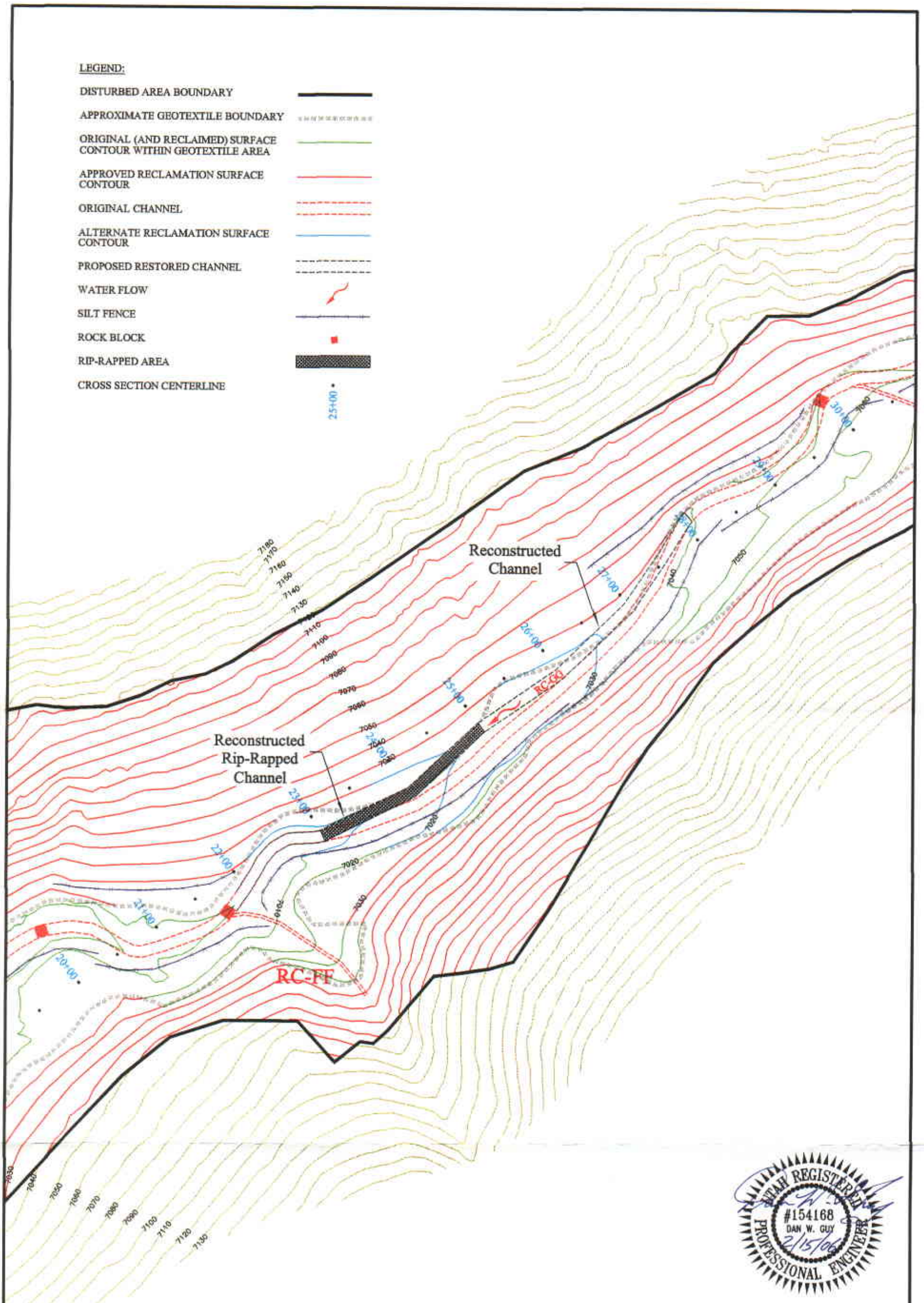
WATER FLOW

SILT FENCE

ROCK BLOCK

RIP-RAPPED AREA

CROSS SECTION CENTERLINE 25+00



NOTE:

REFER TO MAPS 5-6A, 5-6B AND 5-6C IN VOLUME B FOR MINESITE RECLAMATION CROSS SECTIONS.

Scale: 1"= 100'

Re: Map 5-9 in Volume B

UTAH REGISTERED #154168 DAN W. GUY 2/15/06 PROFESSIONAL ENGINEER

WEST RIDGE MINE

Plate 4

Appendix 5-9

Alternate Reclaimed for Highwall Area

ACAD REF: Plate 4 REV: 4 DATE: 02/15/2006

	C/R/F	Channel/Rock/Fill
	C/T/F	Channel/Topsoil/Fill
	S/T/F	Slope/Topsoil/Fill
	S/R/F	Slope/Rock/Fill
	S/T/C	Slope/Topsoil/Cut
	S/R/C	Slope/Rock/Cut

PROPOSED CHANNEL RELOCATION

EXTENT OF HIGHWALL

UTAH REGISTERED #154168 DAN W. GUY 11/23/06 PROFESSIONAL ENGINEER

Note: Contours depict as-built surface.

Scale: 1" = 100'

Re: Map 5-10 in Volume B

WEST RIDGE MINE

Plate 5

Appendix 5-9
Construction/Reclamation
Area-Types
Alternate Highwall Reclamation

ACAD REF: Plate 4 REV: 2 DATE: 02/08/05