RHINO

CASTLE VALLEY MINING LLC

PHASE I AND II BOND RELEASE

OF

TANK SEAM ROAD,

UPPER STORAGE PAD,

AND

PORTAL PAD ACCESS AREA

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Incoming
C0150025
#4402
K

RHINO
CASTLE VALLEY MINING LLC

9 September 2013

Mr. Daron Haddock
Utah Division of Oil, Gas & Mining
1594 West North Temple, Suite 1210
P. O. Box 145801
Salt Lake City, Utah 84114-5801

Re: Bond Release, Castle Valley Mining, LLC, C/015/025

Dear Mr. Haddock

We are requesting a Phase I and II bond release on the work already completed at Castle Valley Mining, LLC.

A substantial amount of reclamation work has been done on the Tank Seam Portal and Access Road areas, Upper Storage Pad and portions of the Portal Pad.

The total direct cost for this work is $105,034. The total indirect cost for this work is $$28,148. Both costs are in 2018 dollars. The difference in escalation costs is $10,293.

The total Bond Release that we are requesting in 2018 dollars rounded to the nearest $1,000 is $143,000.

The redline/strikeout documentation for the bond release is attached and the appropriate maps.

If you have any questions, please call me at (435) 687-5454

Sincerely,

Tony Welch
Resident Agent

Tony Welch

File in:
- ☐ Confidential
- ☒ Shelf
- ☐ Expandable

Date Folder 092613 C/ 0150025
Incoming

RECEIVED
SEP 26 2013
DIV. OF OIL, GAS & MINING

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change ☐ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☒ Transfer ☐

Permittee: Castle Valley Mining, LLC
Mine: _____ **Permit Number:** ACT 015/0025
Title: Phases I and II Bond Release
Description, Include reason for application and timing required to implement:
Bond Release on reclaimed areas TS- 8, 10 11 and portions of 7

Instructions: If you answer yes to any of the first eight questions, this application may require Public Notice publication.

☐ Yes ☒ No 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ ☐ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☒ Yes ☐ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☒ Yes ☐ No 6. Does the application require or include public notice publication?
☐ Yes ☒ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☒ Yes ☐ No 15. Does the application require or include soil removal, storage or placement?
☒ Yes ☐ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☒ Yes ☐ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☒ Yes ☐ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☒ Yes ☐ No 21. Have reclamation costs for bonding been provided?
☐ Yes ☒ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?
☐ Yes ☒ No 24. Does the application include confidential information and is it clearly marked and separated in the plan?

Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Print Name	Position	Date	Signature (Right-click above, choose certify then have notary sign below)
JAREN JORGENSEN	ENGINEER TECH	9/23/2013	JAREN JORGENSEN

Subscribed and sworn to before me this 23rd day of Sept. 2013

Notary Public: Chris M. Christensen, state of Utah

My commission Expires: April 24, 2015
Commission Number: 607905
Address: 51 N. Main
City: Huntington State: Ut Zip: 84528

NOTARY PUBLIC
CHRIS M CHRISTENSEN
607905
COMMISSION EXPIRES
APRIL 24, 2015
STATE OF UTAH

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED SEP 26 2013 DIV. OF OIL, GAS & MINING

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Castle Valley Mining, LLC
Mine:
Title: Phases I and II Bond Release

Permit Number: ACT 015/0025

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☒ Add	☐ Replace	☐ Remove	Public Notice
☒ Add	☐ Replace	☐ Remove	Notification Letters - Surface and Sub-surface Owners
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 1, Page 1-12
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 2, Pages 2-4, 2-13, 2-19, 2-26, 2-34, 2-35, 2-39, and 2-40
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 5, Pages 5-11, 5-21, 5-24, 5-43, 5-44, 5F-2, 5F-4, 5F-8, 5I-61, and
☐ Add	☒ Replace	☐ Remove	5I-77
☐ Add	☒ Replace	☐ Remove	Chapter 5, Appendix R - Cross-Sections Tank Seam Access Road
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 7, Pages 7-113, 7-114, 7-115, 7-117, 7-119, 7-120, 7-121, 7-133,
☐ Add	☒ Replace	☐ Remove	7-134, 7-139, 7G-49, 7G-51, 7G-54, 7G-55, 7G-56, 7G-57, 7G-70, 7G-71, 7G-72, 7G-73,
☐ Add	☒ Replace	☐ Remove	7G-74, 7G-97, 7G-102, 7G-105, 7G-108, 7G-109, 7G-111, 7G-112, 7G-138, 7G-142, 7G-143,
☐ Add	☒ Replace	☐ Remove	7G-144, 7G-145, 7G-146, 7G-147, 7G-148, 7G-149, 7G-171, 7G-172, 7G-173, 7G-174, 7G-175
☐ Add	☒ Replace	☐ Remove	7G-176, 7G-177, 7G-178, and 7H-53
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 8, TABLE 8-1, Page 8-2
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 8, Appendix A, DOGM Reclamation Calculations
☐ Add	☒ Replace	☐ Remove	Redline/Strikeout Chapter 2, Page 3-iv
☐ Add	☒ Replace	☐ Remove	Chapter 3, Appendix M - Castle Valley Mine (Rhino Energy) Vegetation Sampling
☐ Add	☒ Replace	☐ Remove	Map 2-1A - SOILS MAP
☐ Add	☒ Replace	☐ Remove	Map 2-3C - RECLAMATION AREA
☐ Add	☒ Replace	☐ Remove	Map 2-3E - RECLAMATION AREA
☐ Add	☒ Replace	☐ Remove	Map 5-2C - SURFACE FACILITIES
☐ Add	☒ Replace	☐ Remove	Map 5-6C - POST-MINING TOPOGRAPHY
☐ Add	☒ Replace	☐ Remove	Map 5-6E - POST MINING TOPOGRAPHY
☐ Add	☒ Replace	☐ Remove	Map 7-1C - HYOROLOGY MAP
☐ Add	☒ Replace	☐ Remove	Map 7-5 - WATERSHED MAP
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

Received by Oil, Gas & Mining

RECEIVED
SEP 26 2013
DIV. OF OIL, GAS & MINING

PHASE I

BOND RELEASE

PUBLIC NOTIFICATION NEWSPAPER

AFFIDAVIT OF PUBLICATION

STATE OF UTAH)

ss.

County of Emery,)

I, Richard Shaw, on oath, say that I am the Publisher of the Emery County Progress, a weekly newspaper of general circulation, published at Castle Dale, State of Utah and County aforesaid, and that a certain notice, a true copy of which is hereto attached, was published in the full issue of such newspaper for 4 (Four) consecutive issues, and on the Utah legals.com webwsite; the first publication was on the 25th day of June, 2013, and that the last publication of such notice was in the issue of such newspaper dated the 16th day of July, 2013.

Richard Shaw – Publisher

Subscribed and sworn to before me this 16th day of July 2013.

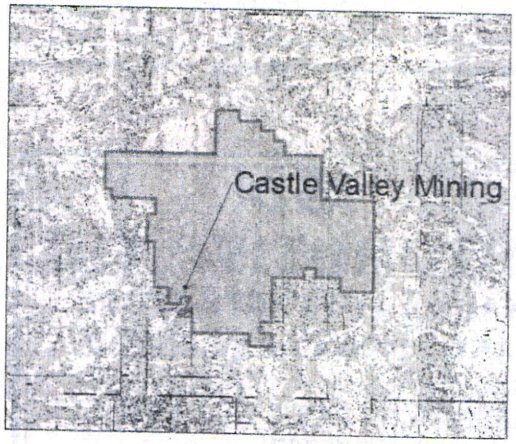
Notary Public My commission expires January 10, 2015 Residing at Price, Utah

Publication fee, $ 408.00

LINDA THAYN
NOTARY PUBLIC-STATE OF UTAH
COMMISSION# 604351
COMM. EXP. 01-10-2015

PUBLIC NOTICE
APPLICATION FOR PHASE I AND II BOND RELEASE
BEAR CANYON MINE
CASTLE VALLEY MINING, LLC
PERMIT C/015/0025, RENEWED 12/15/2008
EMERY COUNTY, UTAH

Notice is hereby given that Castle Valley Mining, LLC, 5550 W. Bear Canyon Rd., Huntington, Utah 84528, with Tony Welch as Resident Agent, has filed an application with the Utah Department of Natural Resources, Division of Oil, Gas and Mining for a Phase I and II bond release on disturbed lands currently in Permit C/015/0025 pursuant to R645-301-880 and R645-30-400 of the Utah Coal Program Regulations. The permit area as shown below is from the Hiawatha U.S. Geological Survey 7.5-minute Quadrangle map. The permit area affected is located in Emery County, Utah, in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian.



The Phase I and II bond release application is for a bond reduction of $ 331,000.00 on the current bond of $1,825,000.00 for the Tank Seam Access Road and covers a total of 5.62acres. All areas within the Tank Seam Access Road meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment. Reclamation of 5.62 acres was completed in the summer of 2009.

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5201

Closing date for submission of such comments, objections and request for an informal conference on this proposal must be submitted within 30 days of the last publication.

Published in the Emery County Progress June 25, July 2, 9 and 16, 2013.

NOTIFICATION LETTERS
SURFACE AND SUB-SURFACE
OWNERS

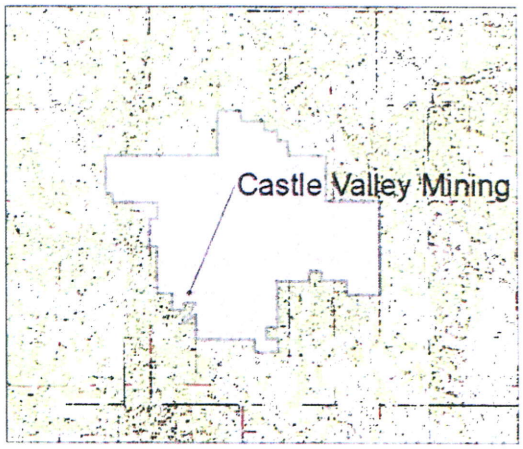
RHINO
CASTLE VALLEY MINING LLC

Intermountain Power Agency
10653 South River Front Parkway, Suite 120
South Jordon, Utah 84095

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

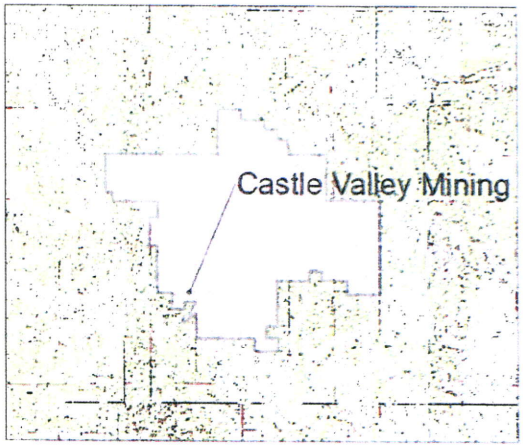
RHINO
CASTLE VALLEY MINING LLC

Nevada Energy
6226 West Sahara Avenue
Las Vegas, Nevada 89146

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

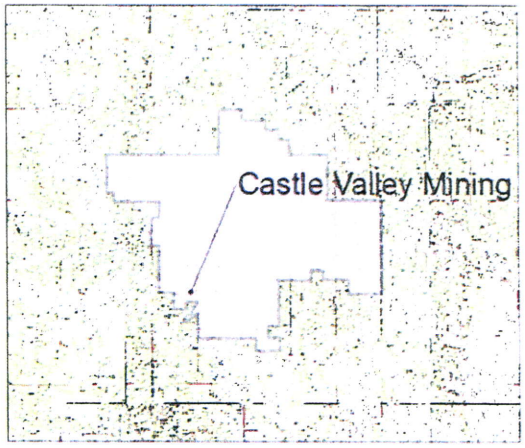
RHINO
CASTLE VALLEY MINING LLC

State of Utah School & Institutional Trust Land Administration
675 East 500 South, Suite 500
Salt Lake City, Utah 84102

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

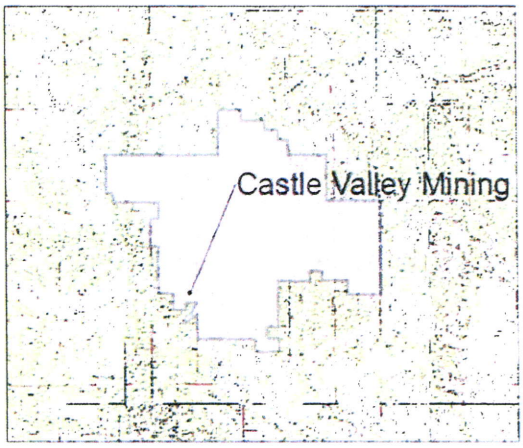
RHINO
CASTLE VALLEY MINING LLC

Genwall Coal Company
Utah American Energy
Attn. Mr. Jay Marshall
P. O. Box 190
East Carbon, Utah 84520

Dear Mr. Marshall,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

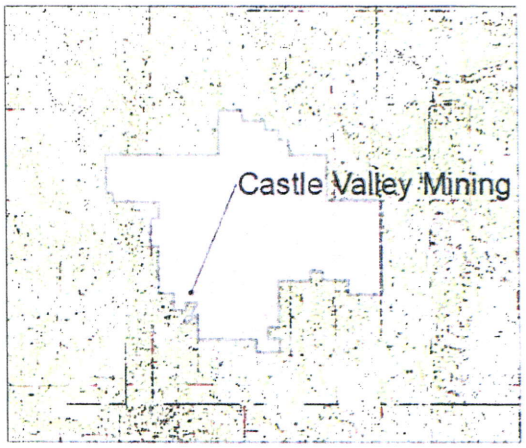
RHINO
CASTLE VALLEY MINING LLC

Interwest Mining Company
Attn. Mr. Scott Childs
1407 W. North Temple
Suite 310
Salt Lake City, Utah 84116

Dear Mr. Childs,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

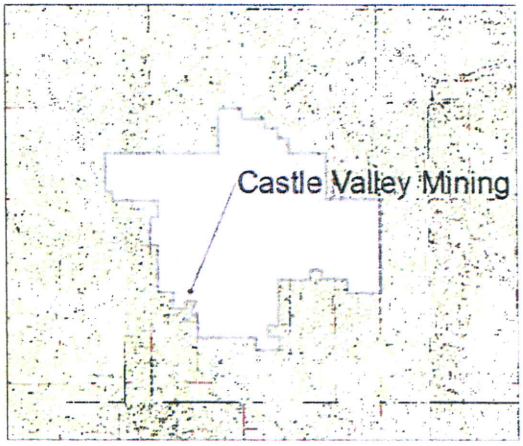
RHINO
CASTLE VALLEY MINING LLC

A U. Mines Inc.
Cimmeron Coal
1325 Airmotive Way 175V
Reno, Nevada 89502-3201

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

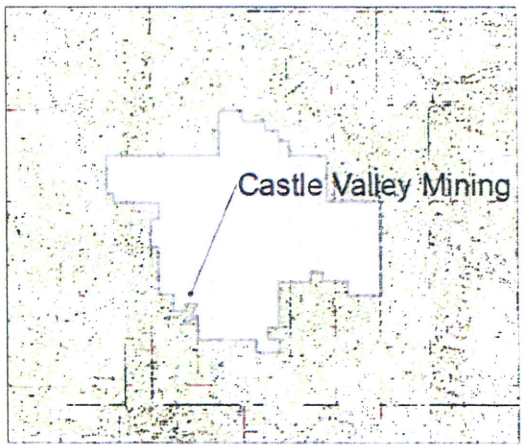
RHINO
CASTLE VALLEY MINING LLC

ANR Company, Inc.
3212 South State Street
Salt Lake City, Utah 84115

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

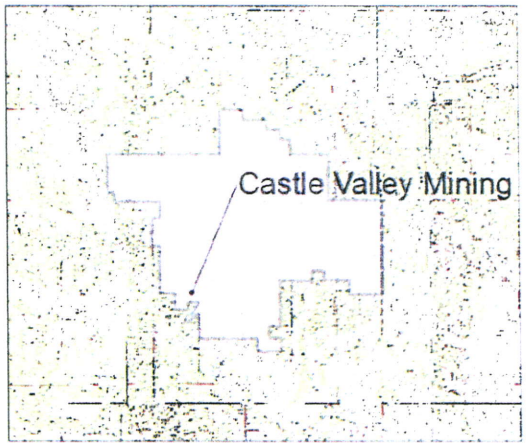
RHINO
CASTLE VALLEY MINING LLC

Bureau of Land Management
Utah State Office
P. O. Box 45155
Salt Lake City, Utah 84145-0155

Dear Sirs,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

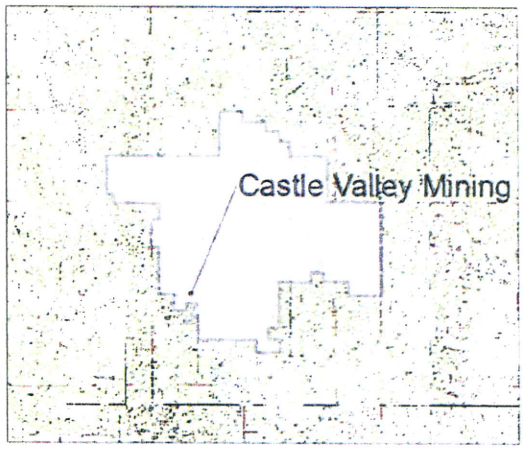
RHINO
CASTLE VALLEY MINING LLC

C. O. P. Development
53 West Angel Ave.
Salt Lake City, Utah 84115

Dear Sire,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely, Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

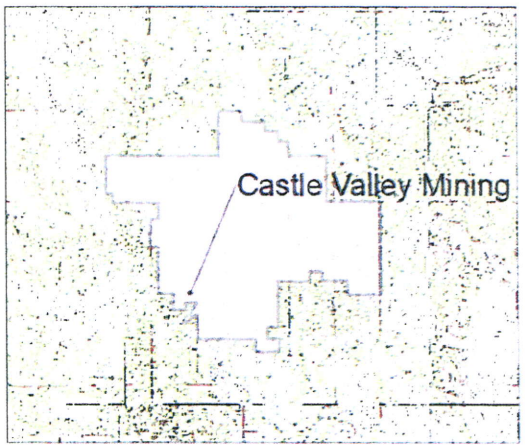
RHINO
CASTLE VALLEY MINING LLC

Emery County
P. O. Box 629
Castle Dale, Utah 84513

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

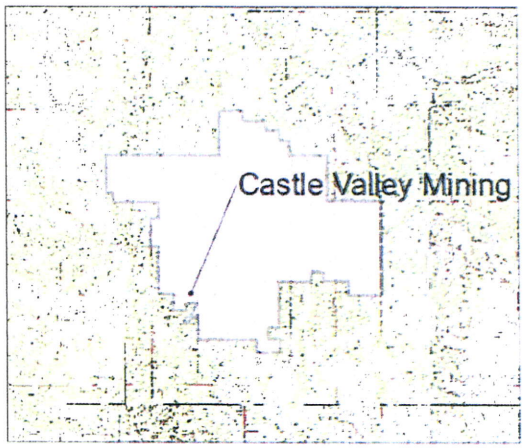
RHINO
CASTLE VALLEY MINING LLC

U. S. Forest Service
Manti-LaSal National Forest
Attn. Forest Supervisor
599 Price River Dr.
Price, Utah 84501

Dear Sir,

This is a letter of notification that Castle Valley Mining, LLC, owner of Bear Canyon Coal Company at 5550 W. Bear Canyon Rd., Huntington, Utah 84528 is submitting to the Utah Division of Oil, Gas and Mining an application for Phase I and Phase II bond release for the Tank Seam Access Road and Portal Pad, Upper Storage Pad and Portal Pad. The bond release is under Permit C/015/0025 in Emery County, Utah.

The bond release action is in Township 16 South, Range 7 East, Section 26, Salt Lake Base & Meridian and is shown in the map below:



This map was taken from the Hiawatha U. S. Geological Survey 7.5 minute quadrangle.

The Phase bond release application is for Continental Casualty Company #929518448 for $331,000.00 of $1,825,000.00 bond for the Tank Seam Access Road and other areas covering a total of 5.62 acres. All areas within the Tank Seam Access Road and other areas meet the requirements of the regulations for post mine land use of Wildlife Habitat, Recreational, Grazing and Timber, including stabilization of lands, restoration of drainage, and vegetation establishment.

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

Written comments, objections and requests for an informal conference on this proposal may be addressed to:

Utah Coal Program
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84111-5801

Closing date for submission of such comments, objections and requests for an informal conference on this proposal must be submitted within 30 days of receipt of this letter.

A Public Notice will be published in the Emery County Progress.

Sincerely,

Tony Welch

Tony Welch
Resident Agent

P.O. Box 475 • Huntington, UT 84528
Phone (435) 687-5454 • Fax (435) 687-5037

CHAPTER 1

R646-601-100 GENERAL CONTENTS

Table 1-4 Surface Disturbance Summary Error! Bookmark not defined.			
DESCRIPTION	**Total acres**	**Pre-1977 acres**	**New acres**
Ball Park Topsoil Pile	1.27	-0-	1.27
Lower Haul Road	1.60	1.60	-0-
Sed Pond B & Scale Office Pad	2.60	1.23	1.37
Sed Pond A	0.75	-0-	0.75
Main Pad Area	12.32	8.89	3.43
Portal Access Road	3.25	0.02	3.23
Blind Canyon Seam Portal Area	1.81	0.51	1.30
Upper Storage Pad	~~0.87~~ 0	-0-	~~0.87~~ 0
Shower House Pad	1.83	-0-	1.83
Tank Seam Access Road	~~2.91~~ 0	-0-	~~2.91~~ 0
Tank Seam Portal Pad	~~0.66~~ 0	-0-	~~0.66~~ 0
No. 3 Mine Access Road	3.26	-0-	3.26
Conveyor belt Access/Topsoil Stockpile	1.50	-0-	1.50
Upper Conveyor belt Access Road No. 2	0.96	-0-	.96
WHR Blind Canyon Seam Portal Area	1.58	-0-	1.58
1No. 4 Mine Access Road	~~2.74~~ 0.89	-0-	~~2.74~~ 0.89
2WHR Tank Seam Portal Pad Area	~~0.55~~ 2.22	-0-	~~0.55~~ 2.22
TOTAL	~~40.46~~35.84	12.25	~~28.21~~23.59

116.200 No Response is needed

CHAPTER 2

R645-301-200 SOILS

222.300 Soil description

A description of each soil-mapping unit is contained in the reports in Appendix 2-E and 2-F. Table 2-2 lists the Acreage of each soil unit found in the disturbed area. Following is a summary of each map unit.

Table 2-2 Soil Unit Acreages Within the Disturbed Area

Soil Symbol	Total Disturbed Acreage	Acreage with Topsoil Recovered	Est. Topsoil Depth (inches)
~~Disturbed~~	~~23.70~~	~~2.56~~[1]	~~In-place material~~[2]
DZE	~~1.83~~19.46	~~1.83~~[3]4.75[1&2]	6
PDR	~~1.91~~0.00	~~1.91~~0.00	0-6
TR	~~1.66~~3.77	~~1.66~~3.77	0-3
PC	~~0.53~~0.47	0.41	12
WIN	~~2.45~~2.21	0.52	15
WR	~~0.72~~0.75	0.50	10
DON	~~0.45~~0.43	0.43	40
DG	~~3.96~~3.64	~~2.22~~3.23	6-30
GP	~~1.55~~2.22	0.23	6-10
DCP	~~0.75~~0.71	~~0.29~~0.22	6-15

1 Main Topsoil Pile, 1,480 cu yds recovered from Scalehouse Pad area.
2 ~~See Appendix 2-D.~~ Shower House Topsoil material, 1,200 cu. yds. Recovered.
~~3 Shower House Topsoil material, 1,200 cu yds recovered.~~

Table 2-3 Available Substitute Topsoil Material

Location	Drill Hole	Drill Depth (in)	Area (acres)	Volume Available (cu. yd)	Minimum Cut Depth (in)
TS-3	SEDB-1	24	.09	296	13
TS-3	SEDB-2	48	.09	602	13
TS-3	SHP-1	60	1.34	10,797	13
TS-3	SHP-2	60	.81	6,533	13
TS-3 Totals			2.33	18,228	
TS-4	SEDA-1	24	.24	777	2.5
TS-4	SEDA-2	24	.20	641	2.5
TS-4 Totals			.44	1,418	
TS-5	SP-1	18	.69	1,680	18
TS-5	SP-2	24	.36	1,150	24
TS-5	CSP-1	96	.95	12,190	30
TS-5	CSP-2	84	1.32	14,863	27
TS-5	CSP-3	72	.25	1,931	27
TS-5	CSP-4	60	1.67	13,469	27
TS-5	CSP-5	72	3.03	29,325	27
TS-5 Totals			8.28	74,608	
TS-6	PAR-1	84	2.62	29,589	12
TS-7	LHP-1	96	~~1.73~~	~~22,329~~10067	12
TS-8	USP-1	120	~~.87~~	~~14,036~~0	12
TS-9	REF-1	36	.26	1,253	18
TS-9	REF-2	36	.71	3,413	18
TS-9	REF-3	36	.23	1,122	18
TS-9 Totals			1.20	5,788	

The following table summarizes the volumes of topsoil being stored.

Table 2-5 Topsoil Summary Table

Description	cu yd
Main Topsoil Pile	1,480
Tank Seam Road Topsoil Storage Areas	~~1,000~~
Wild Horse Ridge Topsoil Pile	12,254
Wild Horse Ridge Tank Seam Topsoil Pile	1,400
Subtotal	~~16,134~~15,134
On-site Material (Substitute Topsoil)	~~36,452~~140,376
Total	~~52,586~~155,510

Tank Seam Access Road and Portal Pad Topsoil Pile

A survey of topsoil material was performed in the area of the Tank Seam access road and portal pad area in 1992. Four sites were sampled and the soil was analyzed. These sites are designated on Plate 2-3E as TSA-1, TSA-2, TSA-3 and TSA-4 (See Appendix 2-A for test results). Results indicated highest organic matter accumulations in the top 0-6 inches. Test results also indicate that the material tested is suitable for final reclamation material at all depths. See discussion in Appendix 2-D. Soil depths were determined by the visible presence of organic matter and a distinct soil color change. The observations indicated a varying soil depth of 0 to 8 inches, the lesser depths being in the steep rocky areas. During construction, topsoil was stripped at depths varying from 0 to 8 inches by visually observing the depth at which organic material is found in the soil. The volume of topsoil which was recovered and placed in the designated storage area is 1,000 cubic yards.

~~Topsoil was recovered on the access road during construction and relocated to topsoil areas shown on Plate 5-2C and 5-2E. Plates 2-2 show the details of the topsoil stockpiles. Upon completion of the topsoil recovery and storage, the topsoil was revegetated. A berm is maintained around the piles to totally contain runoff from the piles. Typical dimensions of the berms are shown on Plates 2-2 and described in Appendix 7-K, BTCA area "P".~~

This topsoil pile was utilized in the reclamation of the Tank Seam Access Road and Portal Pad.

Wild Horse Ridge Topsoil Stockpile

A survey of topsoil material was performed in the area of the shower house pad and Sediment Pond "C". Three sites were sampled and the soil was analyzed. These sites are

Table 2-7 Reclamation Area Summary					
MARK[1]	DESCRIPTION	Total ac.[1,2,3]	Re-contour acres[1&3]	Pre-1977 acres[2]	New acres
TS-1	Ball Park Topsoil Pile	1.27	0.0	-0-	1.27
TS-2	Lower Haul Road	1.6	0.0	1.6	-0-
TS-3	Sed Pond B & Scale Office Pad	2.60	1.41	1.23	1.37
TS-4	Sed Pond A	0.75	0.75	-0-	0.75
TS-5	Main Pad Area	12.32	9.41	8.89	3.43
TS-6	Portal Access Road	3.25	3.25	0.02	3.23
TS-7	Blind Canyon Seam Portal Area	1.81	1.81	0.51	1.30
TS-8	Upper Storage Pad	~~0.87~~0	~~0.83~~0	-0-	~~0.87~~0
TS-9	Shower House Pad	1.83	1.83	-0-	1.83
TS-10	Tank Seam Access Road	~~2.91~~0	~~2.91~~0	-0-	~~2.91~~0
TS-11	Tank Seam Portal Pad	~~0.66~~0	~~0.59~~0	-0-	~~0.66~~0
TS-12	Wild Horse Ridge Access Road	3.26	0.22	-0-	3.26
TS-13	Conveyor belt Access/Topsoil	1.50	1.14	-0-	1.50
TS-14	Upper Conveyor belt Access Road	.96	0.66	-0-	0.96
TS-15	WHR Blind Canyon Seam Portal Area	1.58	1.58	-0-	1.58
TS-16	WHR TS Lower Portal Access Road	0.89	0.0	-0-	0.89
TS-17	WHR TS Upper Access Road and Pad	2.22	1.74	-0-	2.22
TOTAL		~~40.28~~35.84	~~28.13~~23.80	12.25	~~28.03~~22.59

Notes:

1. See Plates 2-3.
2. See Plates 5-2.
3. The total acres represent acreage which will be reclaimed. Some of the acres will not require re-contouring or regrading during reclamation. The "Re-contour acres" represent the total acres which will require regrading. The "Total acres" shown will be reclaimed in accordance with the reclamation plan.

The proposed substitute topsoil material will be re-tested in the final five years of operations according to Table 5O-1 and will include Total Petroleum Hydrocarbons by EPA Methods 8015 and 418.1. The location of these samples will correlate with the areas generating the most substitute topsoil material as described in Appendix 5-I. Following regrading, soils remaining on the surface as substitute topsoil material will be sampled for pH, EC, and Total Hydrocarbons by EPA method 8015 for diesel fuel and 418.8 for waste oil.

Table 2-8 Substitute Topsoil Summary

	Topsoil Amounts Required			Substitute Topsoil Generated from Cuts (cu. yd.)			
Location	Area (acres)	Depth (in.)	**Volume (cu. yd.)**	Topsoil Stockpile	Sub. Topsoil Generated	Sub. Topsoil Not Regraded	Total Topsoil
TS-3	1.41	12	**2,275**	0	2,080	2,563	**4,643**
TS-4	.75	10	**1,008**	0	1,008	0	**1,008**
TS-5	9.41	12	**15,181**	0	20,814	4,537	**25,351**
TS-6	3.25	12	**5,243**	0	7,111	0	**7,111**
TS-7	~~1.81~~0.52	12	**~~2,920~~**839	0	~~4,170~~867	0	**~~4,170~~867**
TS-8	~~.83~~0	12	**~~1,339~~**	0	~~3,552~~0	0	**~~3,552~~0**
TS-9	1.83	12	**2,952**	1,200	3,761	0	**4,961**
Total			~~36,452~~ 33,032				~~50,796~~ 43,323

TS-6 Portal Access Road. This area was disturbed prior to initiation of Mining by Co-Op Mining Co. and did not have topsoil recovered for reclamation purposes. This area has received special attention in the past and is discussed in Appendix 2-C. This area will be treated the same as area TS-2. 29,589 cu. yd. of substitute topsoil material is available in the recovered area. 7,111 cu. yd. of material will be used giving a minimum depth of 12 inches of substitute topsoil material over the entire area. 2,553 cu. yd. of fill material will be generated in this area for use in TS-7 and TS-8.

TS-7 Portal Pad Area. Most of this area is within the pre-1977 disturbed area and did not have topsoil recovered for reclamation purposes. Downcast material will be recovered for reclamation. 22,329 cu. yd. of substitute topsoil material is available in the recovered area. 4,170 cu. yd. of this material will be used giving a minimum depth of 12 inches of substitute topsoil material over the entire area. 11,582 cu. yd. of fill material will come from TS-5 and TS-6. All but approximately 0.52 acres have been reclaimed.

TS-8 Upper Storage Pad. ~~This area did not have topsoil recovered for reclamation purposes. Non-toxic and non-acid forming materials are stored on the pad. Sources for contamination are minimal. This area will be treated the same as TS-7. Some material from the lower pad areas will be required to recover the highwalls. See Appendix 5-I. 14,036 cu. yd. of substitute topsoil material is available in the recovered area. 3,552 cu. yd. of this material will be used giving a~~

~~minimum depth of 12 inches of substitute topsoil material over the entire area. 1,952 cu. yd. of fill material will come from TS-5 and TS-6.~~ This area has been reclaimed.

TS-9 Shower House Pad. This area will have topsoil recovered for reclamation purposes. Sources for contamination are minimal. Following recontouring at the time of final reclamation, the topsoil material recovered prior to construction will be spread over the surface to attain an approx depth of 7 inches. Additional in place material has been tested and is available in the recovered area for substitute topsoil. At least 2,952 cu. yd. of this material will be placed below the 7 inches of topsoil, giving a minimum depth of 12 inches of topsoil or substitute topsoil material over the entire area.

TS-10 Tank Seam Access Road. ~~Topsoil material recovered during construction will be placed in the topsoil storage piles located along the Tank Seam access road and is shown on Plate 2-2E. Additional plant growth material will not be required.~~ This area has been reclaimed.

TS-11 Tank Seam Portal Pad. ~~Topsoil material recovered during construction will be placed in the topsoil storage pile shown on Plate 2-3E and 2-2E.~~ This area has been reclaimed.

CHAPTER 5

R645-301-500 ENGINEERING

TABLE OF CONTENTS (Continued)
CHAPTER 5 ENGINEERING

LIST OF APPENDICES

APPENDIX	DESCRIPTION	PAGE
Appendix A	Existing Structures	5A-1
Appendix B	Culinary Water System	5B-1
Appendix C	Subsidence Control and Monitoring	5C-1
Appendix D	Toxic Materials and Handling	5D-1
Appendix E	Surface Blasting Plan	5E-1
Appendix F	Mine Road	5F-1
Appendix G	Tank Seam Access Road	5G-1
Appendix H	Slope Stability Analysis In Access Roads	5H-1
Appendix I	Cut and Fill Calculations	5I-1
Appendix J	Wild Horse Ridge – Blind Canyon Seam Pad and Conveyor Access Roads	5J-1
Appendix K	Wild Horse Ridge Tank Seam Access Roads	5K-1
Appendix L	Morhland Access Roads	5L-1
Appendix M	Blind Canyon Intake and Fan Portals	5M-1
Appendix N	Shower House Waste Disposal System	5N-1
Appendix O	Sediment Pond Material	5O-1
Appendix P	#4 Mine Auxiliary Portal	5P-1
Appendix Q	Load-Out Expansion	5Q-1
Appendix R	Cross Sections – Tank Seam Access Road, Upper Storage Pad and Mine #1	5R-1

R645-301-527 Transportation Facilities

There are ~~eleven~~ nine primary roads in the permit area: Bear Canyon Haul Road, ~~Portal Access Road~~, ~~Tank Seam Access Road~~, Shower House Road, road to Sediment Pond A, Tipple Access Road, Shop Road, No. 3 Mine Access Road, No. 4 Mine Access Road, and the No.1 and No.2 Conveyor Access Roads. All roads are shown on Plates 5-2. Road profiles and typical cross sections are shown on Plates 5-4. A description of all roads is included in Appendix 5-F, along with maintenance procedures. Construction of the Tank Seam Access Road is discussed in Appendix 5-G. Construction of the Wild Horse Ridge road is discussed in Appendix 5-J. Construction of the Wild Horse RidgeTank Seam Road is discussed in Appendix 5-K. Construction of the Mohrland Road is discussed in Appendix 5-L. Construction of the No. 4 Mine Access Road is discussed in Appendix 5-K.

The mine area is approached on the Bear Canyon Haul Road. The #1 mine portal is reached on the Portal Access Road. ~~The Tank Seam Portal is reached on the Tank Seam Access Road.~~ The Wild Horse Ridge area is accessed on the No. 3 Mine Access Road. The WHR Tank Seam is accessed on the No. 4 Mine Access Road. Six other primary roads provide access; to the Sediment Pond A, the coal preparation facility (tipple), the shop, the Wild Horse Ridge conveyor belts, and to the Shower House.

The Bear Canyon Haul Road, No. 3 Mine Access Road, and part of the No. 4 Mine Access Road are also used by customers of Sportsman's Hunting to access a hunting cabin, which exists in the right fork of Bear Canyon. This non-mining recreational use of the road occurs primarily from May until November, typically 2-3 times per week. A lease agreement

~~3~~Coal will be transferred from the Tank Seam to the Blind Canyon Seam of the Bear Canyon No. 1 Mine through a 7 ft diameter borehole, which has been bored from the surface adjacent to the portal. The conveyor from the portal and the drop tube structure will be enclosed. Air cannons will be placed on the outside of the drop tube to prevent the wedging of coal in the tube. A 7 ft diameter borehole will be used in Wild Horse Ridge to transfer coal from the Tank Seam (#4 Mine) to the Blind Canyon Seam (#3 Mine). This borehole, ~~however, will be~~was constructed underground.

Coal from the #3 mine will be transferred from the portal area to the tipple using an overland conveyor. This conveyor is shown on Plates 5-2C, 5-2F and 5-2G. The conveyor will either be suspended in the air from cables or set on stands on the ground. Because the Wild Horse Ridge area is an important migratory path for the deer and elk, restriction of this migration by the conveyor in areas where it sets on the ground is a concern. To mitigate this potential problem, the stands will be constructed to suspend the bottom of the conveyor belt a minimum of 36" above the ground. A typical cross-section of the conveyor is shown in Appendix 7-K, Figure 1. All moving parts are contained within the spill pan, so there will be no danger to wildlife passing under the conveyor.

Tank Seam Access Road Reclamation

~~This section provides a detailed description of the backfilling and grading plans for the Tank Seam Access Road and Portal Area. Reclamation will be scheduled to allow revegetating of the area in conjunction with backfilling and grading.~~

~~As soon as the Tank Seam portals are sealed and all facilities removed, the borehole will be filled using the cuttings from initial construction of the borehole. These cuttings will be stored underground in the Blind Canyon Seam during operation. Backfilling will begin at the Tank Seam Portal Area. Backfilled material shall be placed by heavy equipment such as a front-end loader and track backhoe in lifts not exceeding 18 inches and compacted as described on page 5H-27. Lifts will be placed parallel to the slope of the road until the final lifts are reached which are wide enough for the equipment to drive on. Final lifts will be placed by a backhoe and compacted in a sloping manner as shown in Figure 5-5.~~

~~In areas where fill material is located on the outslope, fill material will be pulled back using a backhoe and the material incorporated into the lifts placed on the cut bench. Where large fill areas exist, the fill will be excavated in a reverse sequence from the placement described in Appendix 5-G. This will allow the fill to be removed and then reclamation to proceed from the bottom of the slopes toward the top, as the "pilot cut" is reclaimed.~~

~~Fill material will be excavated from around the large boulders, which were left in place during construction using a backhoe, and the approximate original contour of the slope will be restored. Channels will be restored in the large fill areas by duplicating the configuration shown in Appendix 7-H.~~

~~As the lifts are placed and fill material retrieved, topsoil will be redistributed on the outslope and upper lifts and spread using a backoe. Boulder sized rock fragments will be embedded into the surface in the upper lifts as described on page 5H-27 in order to obtain, at a minimum, a surface rock cover of 32.75 percent, which equals the reference area cover shown on page 5A-24.~~

~~Using the bucket of the backhoe, the surface will then be ripped and scarified, creating horizontal pockets approx. 8 to 12 inches deep to aid in water retention for revegetation. The bucket will also spread the topsoil at the top of the cut in a manner to blend the reclaimed slope with the natural slope above.~~

~~As backfilling progresses down the road, seed will be placed on the completed slopes behind backfilling by hand. Following seeding, erosion control matting similar to Excelsior S-2 or equivalent will be placed on the slopes by hand, and stapled to the reclaimed surfaces.~~

~~Reclamation will progress in this manner to the bottom of the Tank Seam Access Road.~~

The Tank Seam Portal Pad (TS-11), Tank Seam Access Road (TS-10), Upper Storage Pad (TS-8) and 1.29 acres of the Blind Canyon Seam Portal Area (TS-7) have been reclaimed.

GENERAL COMMENTS

Construction

All roads shall be constructed and maintained in such a manner that the approved design standards are met throughout the life of the entire transportation facility. This shall include maintenance of the surface, shoulders, parking, side areas, and erosion control structures for safe and efficient utilization of the road. Road are shown on Plates 5-2. Cross sections and profiles are found on Plates 5-4.

The horizontal alignment of each road is consistent with the existing topography and with the volume, speed, and weight of anticipated traffic. The highly traveled Primary Haul Road and ~~Portal Access Road~~ are surfaced with 4 in. min of durable road base material. The high percentage of coarse granular material in the native soil provides for adequate surfacing of the remaining roads. Additional road base may be added to all roads as required. Damage to the roads from use or weather events shall be promptly repaired.

Ditches and culverts have been designed and installed to control and safely pass or contain run-off from a 10-yr, 24-hr precipitation event. Ditches are rip-rapped as required. Culverts are fitted with trash racks to prevent plugging and buried adequately to prevent crushing. Rock or concrete headwalls are provided at inlets to all culverts, and

Reclamation

All roads shall be removed upon completion of the mining operation except those approved as part of the post-mining land use. The timing and procedure of removal and reclamation is discussed in detail under the Backfilling and Grading Plan in R645-301-553 See R645-301-540, and Chapters 7, 2 and 3 for full reclamation procedures.

During reclamation road surfacing material will be removed and salvaged or buried as fill material in the reclamation of highwalls, see Appendix 5-I. Reclamation will then be accomplished by ripping up the remaining base, and ensuring that suitable plant growth material is in place prior to planting the area with the approved seed mix. During this time, all culverts shall be removed and either salvaged or disposed of in an approved landfill, and the natural drainage patterns shall be restored.

PRIMARY ROADS

There are ~~11~~9 Primary roads within the Permit Area. Each road is described below. Construction of the Tank Seam Access road is described in Appendix 5-G. Construction of the Wild Horse Ridge Access road and Conveyor Access roads are described in Appendix 5-J. Construction of the No. 4 Mine Access Road is described in Appendix 5-K.

Tank Seam Access Road

~~This road is approximately 3,150 ft long, and provides access to the Bear Canyon #2 Mine, located in the Tank Seam. The road has an overall slope of approximately 9 percent, and does not exceed 17 percent at any point. Construction of this road is discussed in Appendix 5-G.~~

~~The Tank Seam Access Road will be maintained in accordance with the requirements of this Appendix. During snow storms, snow will be plowed to and stored against the cut slope of the road along the ditches, in order to prevent saturation of the fill outslopes along the road due to snow melt~~

This road has been reclaimed.

Wild Horse Ridge Access Road

This road is approximately 4,850 ft long, and provides access to the Bear Canyon #3 Mine, located in the Blind Canyon Seam in Wild Horse Ridge. The road has an overall grade of 10.5 percent, and does not exceed 18 percent at any point. This road existed prior to mining and will remain in place to meet the post-mining land use. Construction of this road is discussed in Appendix 5-J.

TS-7 Blind Seam Portal Pad

TS-7 will be reclaimed as shown on the following cross-sections in order to match the contours shown on plate 5-6C. 11,582 cu. yd. of material from either TS-5 or TS-6 will be used here for the reclamation. Three highwalls are located in this section and all of them will be completely covered with fill material. The highwall shown on section 3+00 is the belt entry and passes under the road before it enters the coal seam. Table 5I-6 show a summary of the cut and fill volumes. 678 cu. yd. of material generated during the load-out expansion is being stored in this area. This is not included in table 5I-6.

Table 5I-6 - Area TS-7 Cut & Fill Summary

	Fill (-) Volumes (cu. yd.)	Cut (+) Volumes (cu. yd.)			Volume Cumulative (cu. yd.)
Section	**Total Fill Volume**	Substitute Topsoil	Regular Soil	**Total Cut Volume**	
0+00	~~2,881~~0	~~1,078~~0	~~1,274~~0	~~2,352~~0	~~-529~~0
1+00	~~2,633~~0	~~867~~0	~~718~~0	~~1,585~~0	~~-1,577~~0
2+00	~~1,630~~0	~~578~~0	~~274~~0	~~852~~0	~~-2,355~~0
3+00	~~1,356~~0	~~248~~		~~248~~0	~~-3,463~~0
3+50	1,355	137		137	~~-4,681~~-1,218
4+00	1,996	45		45	~~-6,632~~-3,169
5+00	1,703	685		685	~~-7,650~~-4,187
6+00	~~696~~0	~~67~~		~~67~~0	~~-8,279~~0
7+00	~~989~~0	~~420~~0		~~420~~0	~~-8,848~~0
7+50	~~443~~0	0		0	~~-9,291~~0
8+00	~~2,355~~0	~~45~~	~~19~~0	~~64~~0	~~-11,582~~0
Totals	~~18,037~~5,054	~~4,170~~867	~~22,207~~0	~~6,455~~867	

TS-8 Upper Storage Pad

~~TS-8 will be reclaimed as shown on the following cross-sections. The soil labeled as Tank Seam Access Road fill material was not included in the calculations since it will be used while reclaiming the Tank Seam Access Road (Appendix 5-G). 1,000 yds³ of this material will remain in place as described on page 5G-10. A volume of 1,952 cu. yd. of fill material will come from TS-5 or TS-6. A summary of the cut and fill volumes is shown in Table 5I-7.~~ This area has been reclaimed.

Table 5I-7 - Area TS-8 Cut & Fill Summary

	Fill (-) Volumes (cu. yd.)	Cut (+) Volumes (cu. yd.)			Volume Cumulative (cu. yd.)
Section	**Total Fill Volume**	Substitute Topsoil	Regular Soil	**Total Cut Volume**	
0+00	~~2,100~~0	~~552~~0	0	~~552~~0	~~-574~~0
1+00	~~1,300~~0	~~1,463~~0	~~7~~0	~~1,470~~0	~~-404~~0
2+00	~~2,218~~0	~~1,537~~0	~~107~~0	~~1,644~~0	~~-1,952~~0
Totals	~~5,618~~0	~~3,552~~0	~~114~~0	~~3,666~~0	

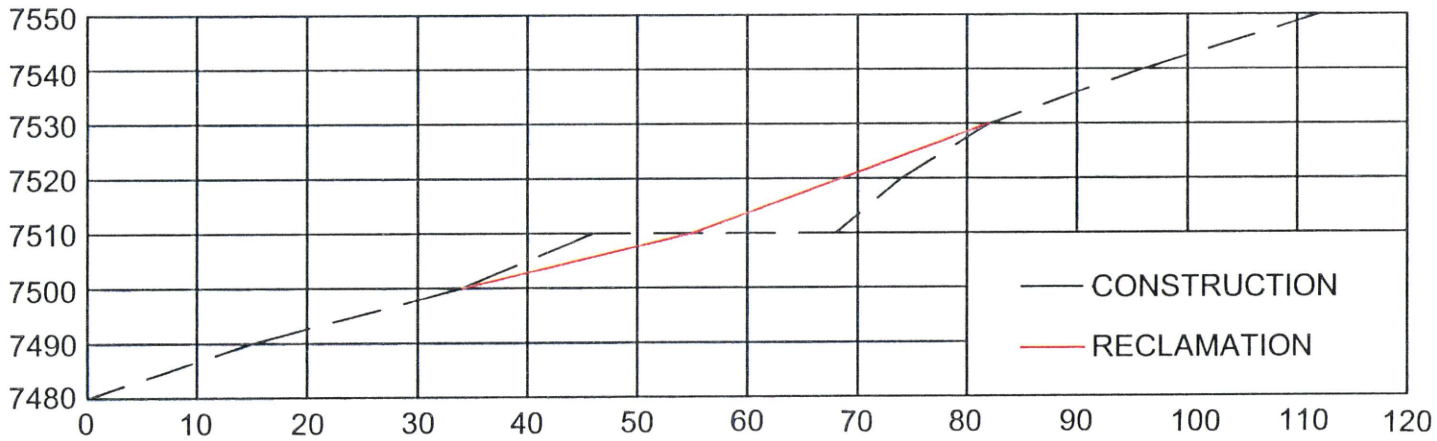
APPENDIX R

CROSS – SECTIONS

TANK SEAM ACCESS ROAD, UPPERSTORAGE PAD

AND MINE #1

STATION 2+00



Environmental
Industrial
Services

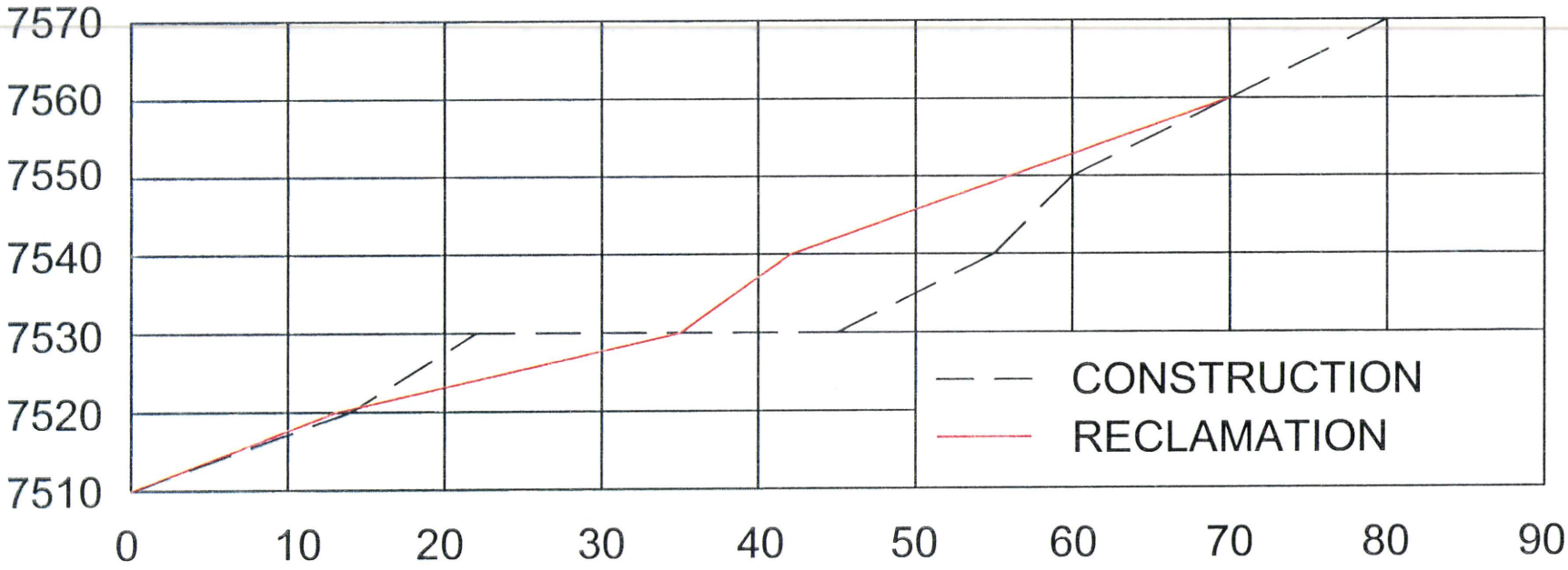
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
SCALE:
SHEET: 5R-1

STATION 4+00



Environmental
Industrial
Services

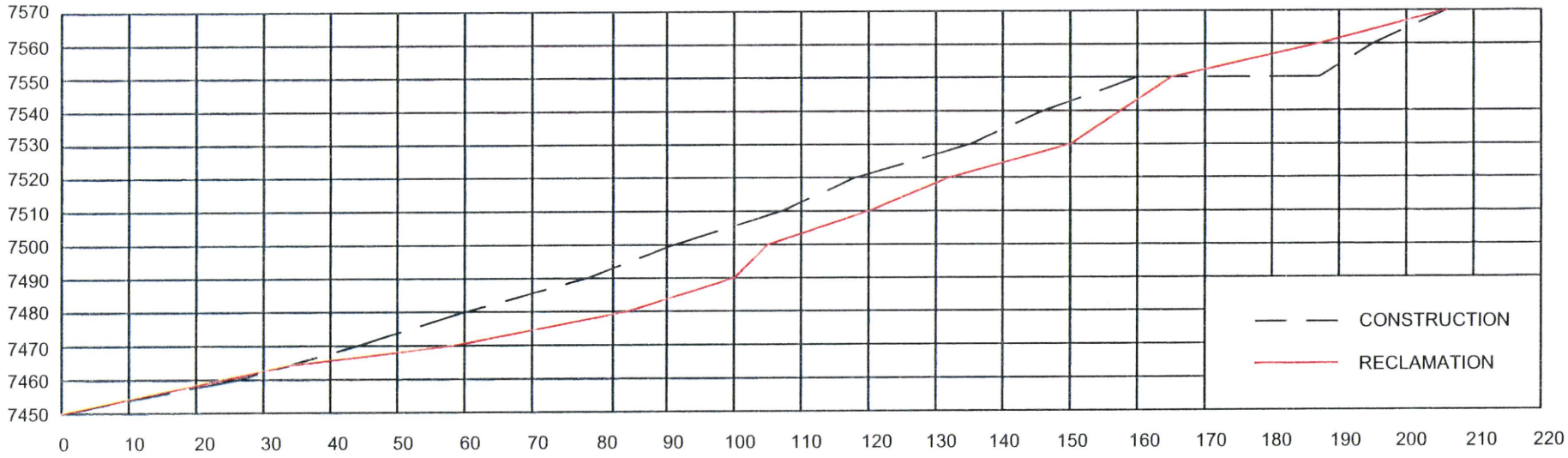
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
SCALE:
SHEET: 5R-2

STATION 6+00



Environmental
Industrial
Services

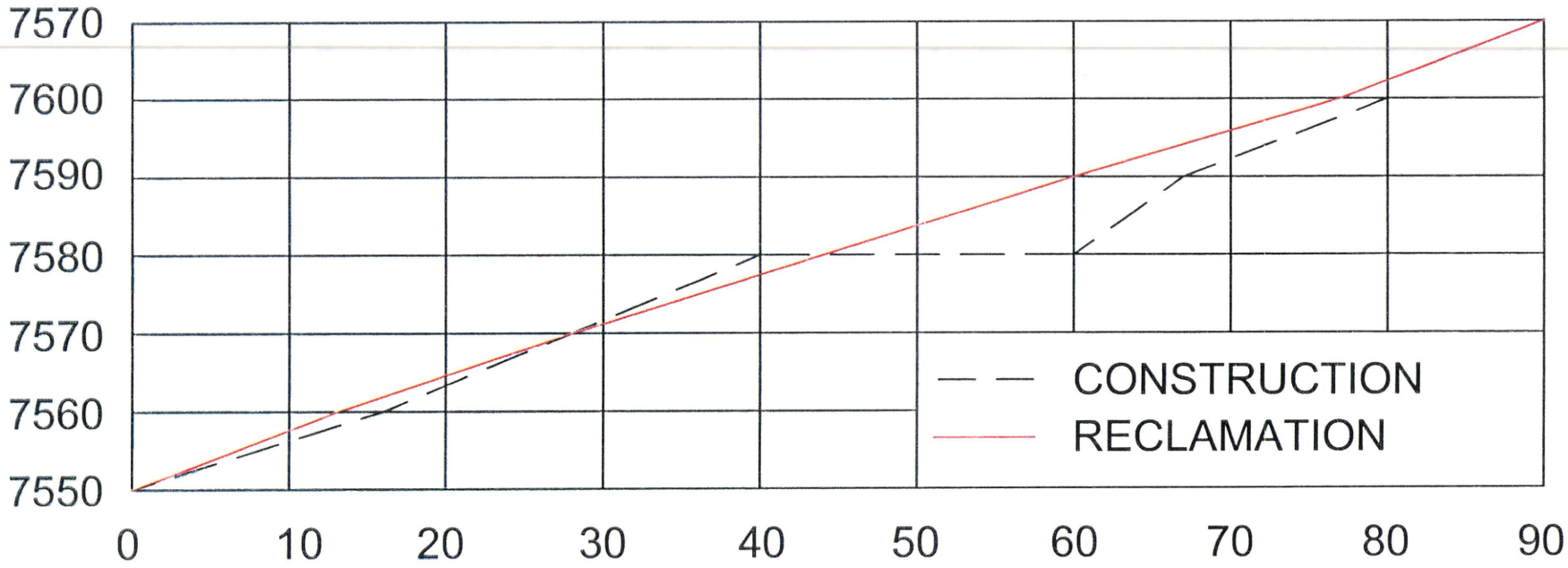
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: / BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
5R-3
SCALE:
SHEET:

STATION 8+00



Environmental
Industrial
Services

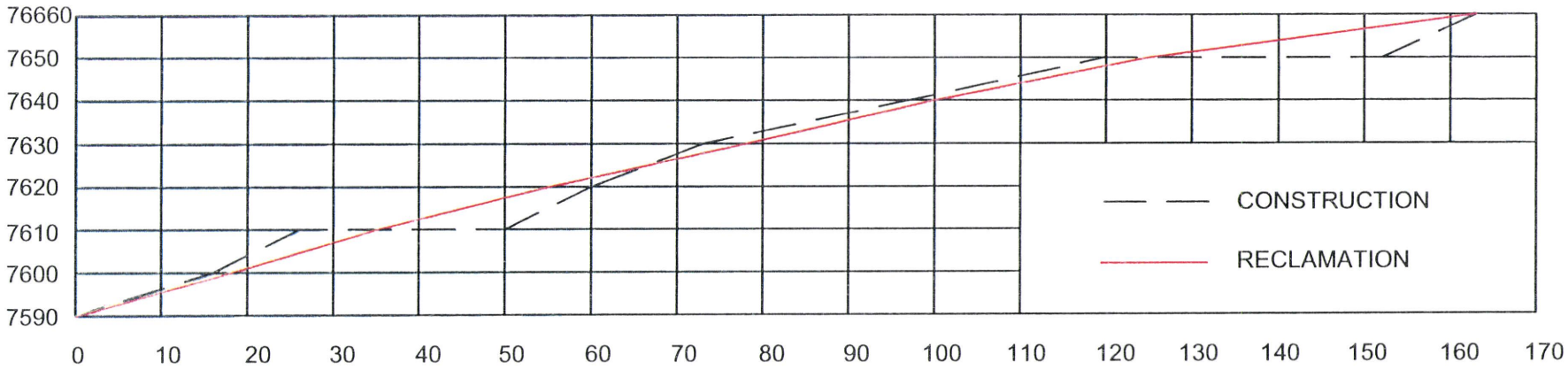
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO:
5R-4
SCALE:
SHEET:

STATION 10+00



Environmental
Industrial
Services

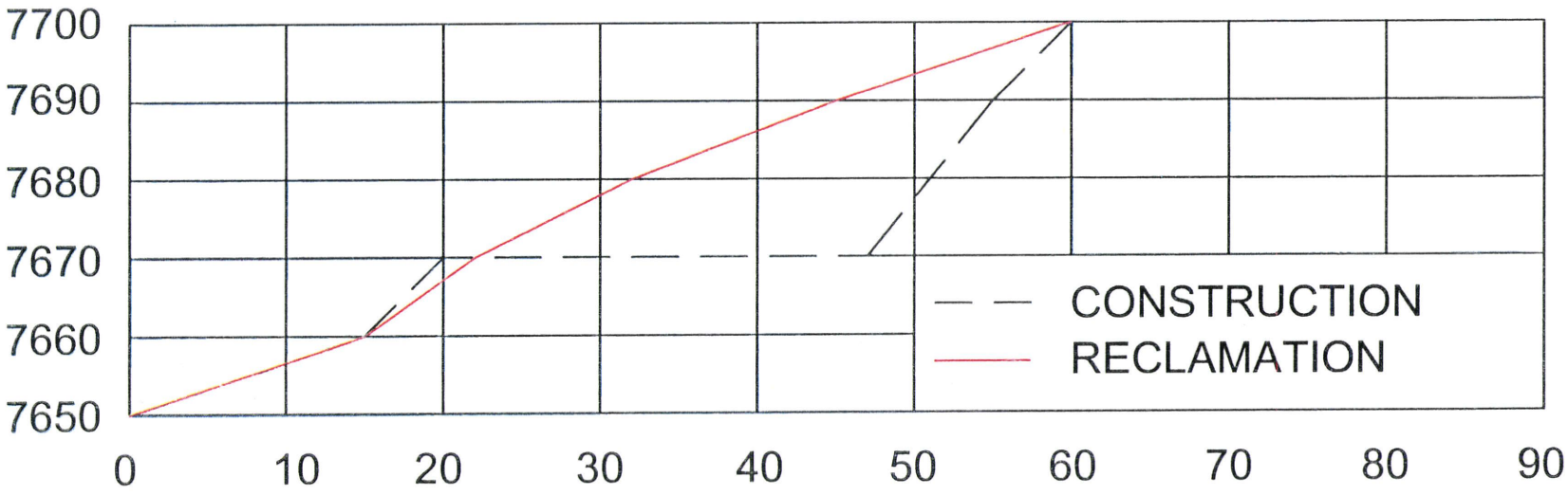
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
SCALE:
SHEET: 5R-5

STATION 12+00



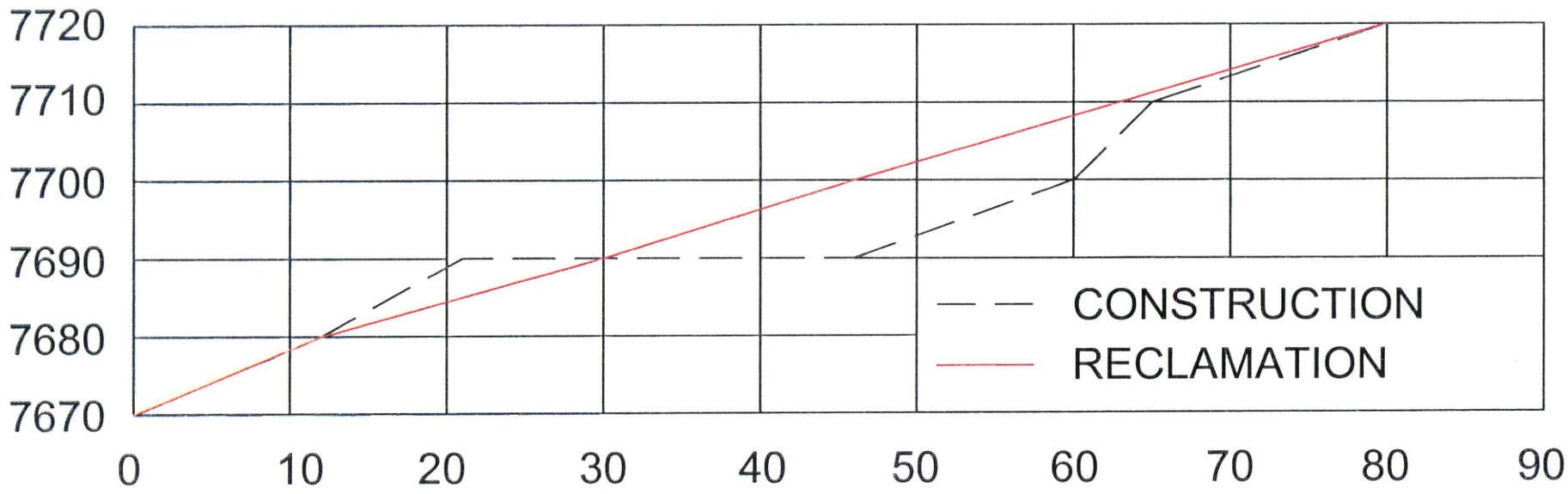
Environmental
Industrial
Services

Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
SCALE:
SHEET: 5R-6



Environmental
Industrial
Services

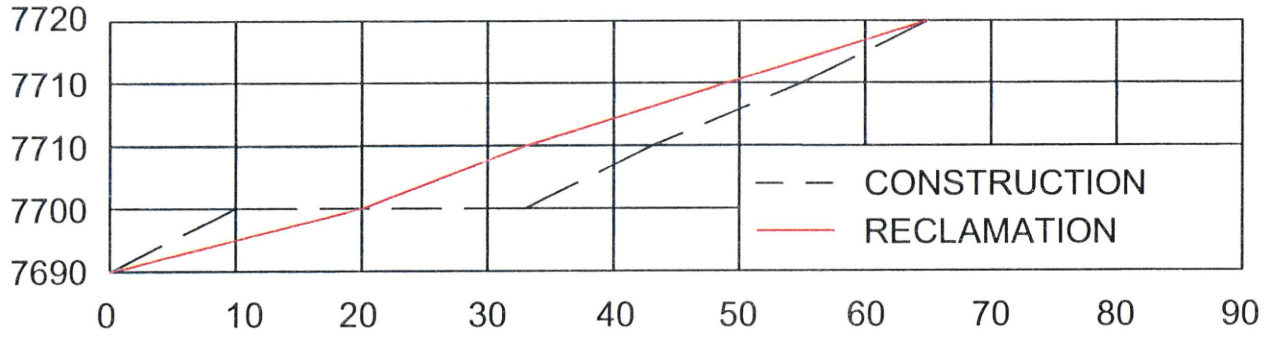
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
5R-7
SCALE:
SHEET:

STATION 16+00



Environmental
Industrial
Services

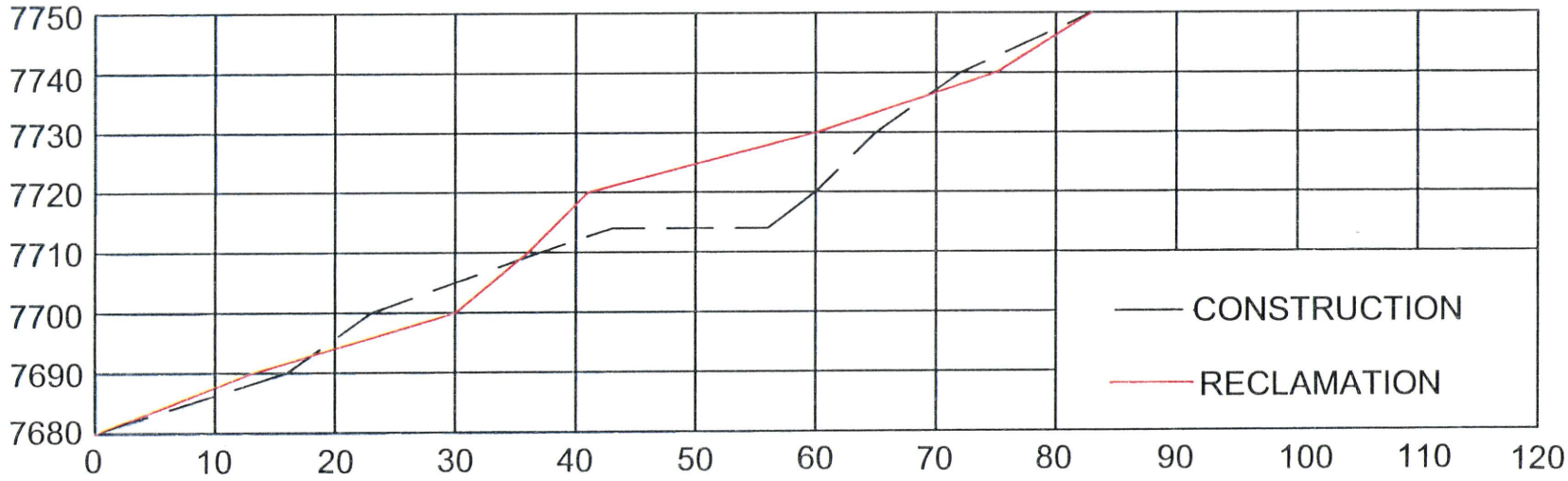
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
5R-8
SCALE:
SHEET:

STATION 18+00



Environmental
Industrial
Services

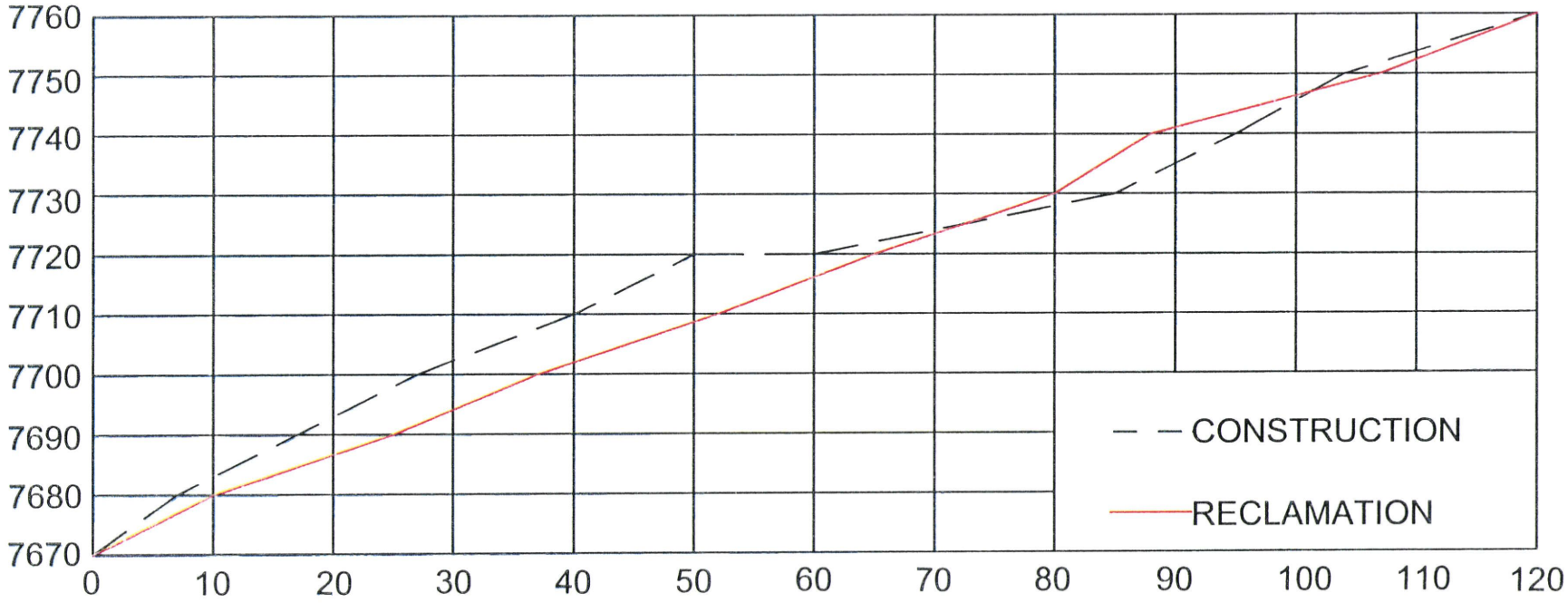
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
5R-9
SCALE:
SHEET:

STATION 20+00
PORTAL AREA



Environmental
Industrial
Services

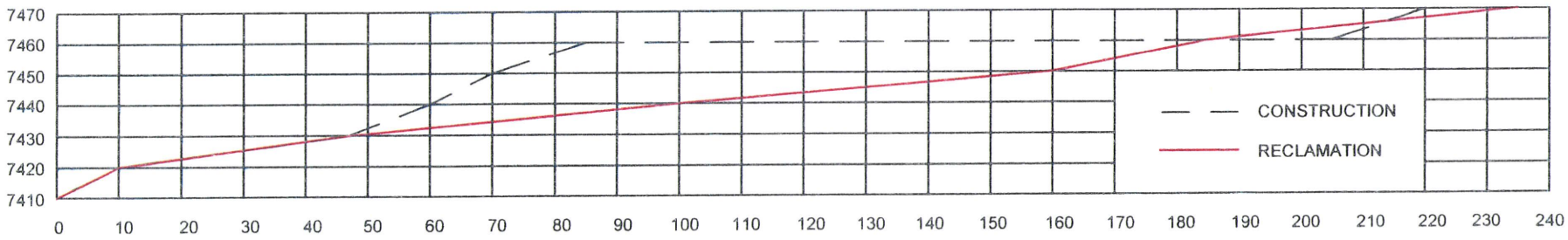
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.:
5R-10
SCALE:
SHEET:

UPPER STORAGE PAD
8-A



Environmental
Industrial
Services

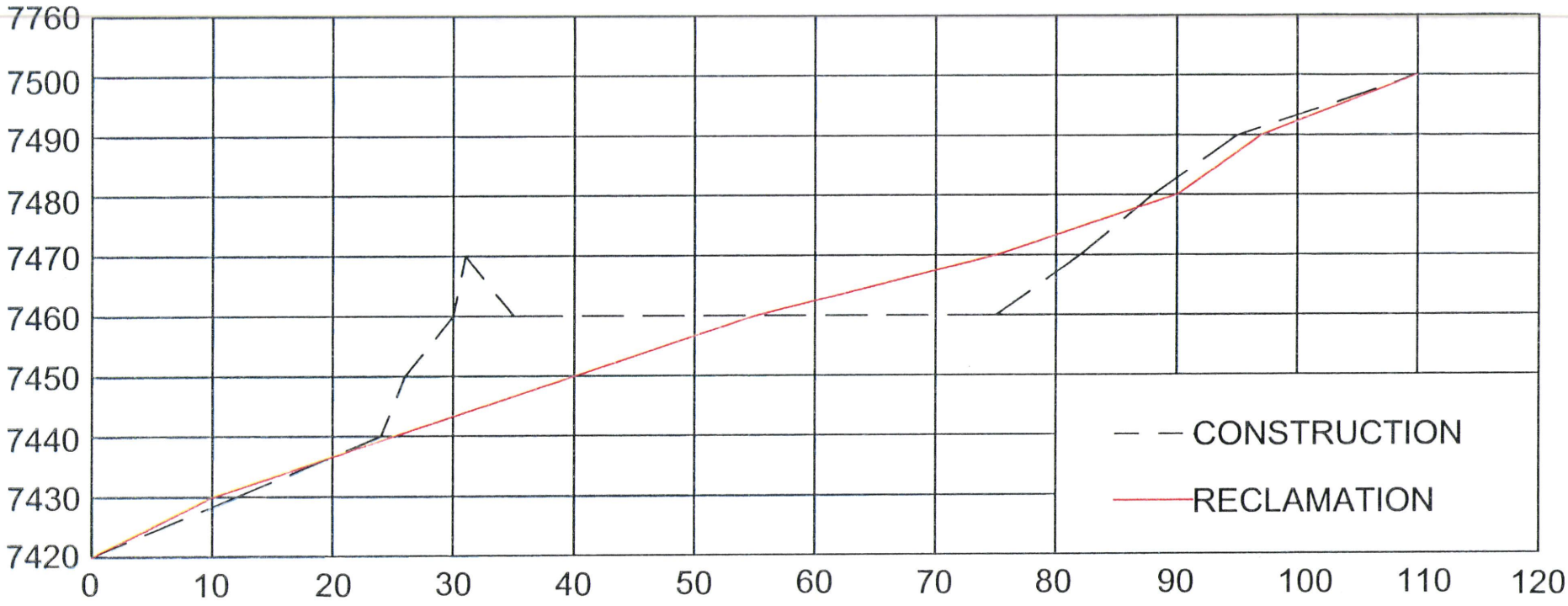
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO:
5R-11

PORTAL PAD AREA
STATION 7- A



Environmental
Industrial
Services

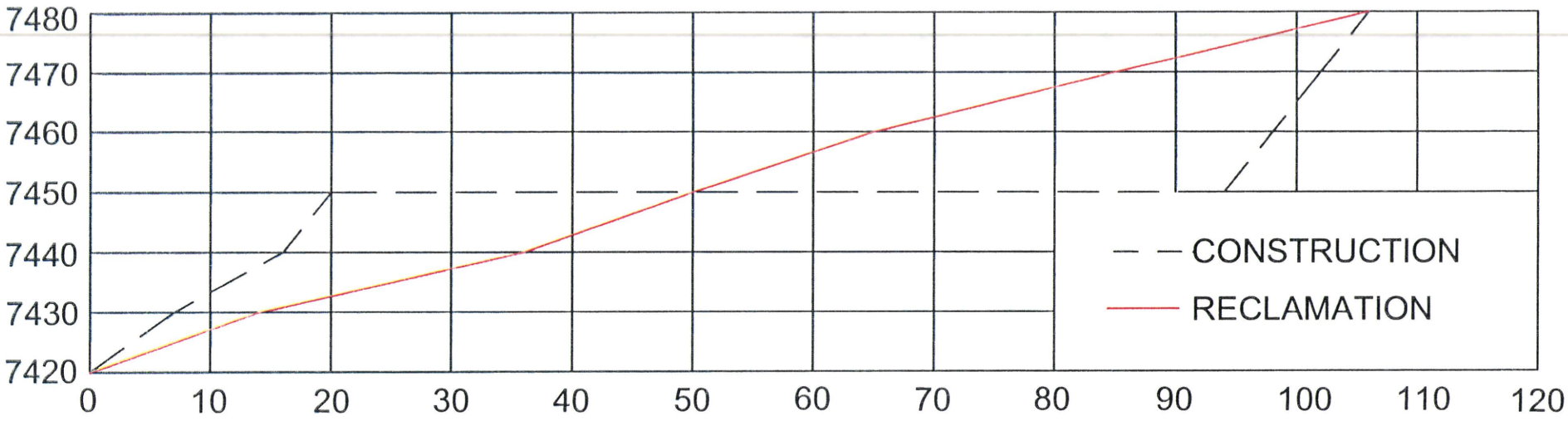
Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO
5R-12
SCALE:
SHEET:

PORTAL PAD AREA
STATION 7-B



Environmental
Industrial
Services

Environmental & Engineer Consulting
31 NORTH MAIN
HELPER, UTAH 84526
(435) 472-3814

DATE:	REVISION	DATE: / BY:

DRAWN BY:
CHECK BY:
ENGINEERED BY:

SIZE:
DWG NO.
5R-13
SCALE:
SHEET:

CHAPTER 7

R645-301-700 HYDROLOGY

Table 7-24 Summary of Division Ditch Calculations

Ditch	Bottom Width (Ft)	Top Width (Ft)	Depth (Ft)	Type Side Slope H:V	Measured Slope %	Contributing Watershed	REQ'D Av. Rip-Rap Size (In.)
~~D-1D~~	~~0~~	~~1.33~~	~~0.67~~	~~1:1~~	~~2 Min 11 Max~~	~~AD-3A~~RECLAIMED	~~Soil~~
D-2D	0	1.33	0.67	1:1	6 Min 20 Max	AD-3A, AD-5	Bedrock
D-3D	0	2	1	1:1	2 Min 6 Av. 18 Max	AD-3A, AD-5, AD-7	Soil Soil Grouted
D-4D	0	2	1	1:1	2 Min 6 Av. 17 Max	AD-14	Soil Soil D_{50} 6"
D-5D	0	1.33	0.67	1:1	4 Min 10 Max	AD-9	Soil
D-6D	0	3	1.5	1:1	2 Min 4 Max	AD-3A, AD-5 AD-7, AD-9, AD-10 AD-12, AD-14	Soil
D-7D	2	3.5	0.75	1.5:1	2 Min 6 Av. 55 Max	AD-1A, AD-1B, AD-2A AD-2B, AD-2C, AD-3B AD-4, AD-6, AD-8	Soil Soil D_{50} 6"
D-8D	0	2	1	1:1	2 Min 7 Max	AD-13	Soil
D-8D Water Bar	0	14	0.33	6:1	3 Av.	AD-13	Soil
D-9D	0	2	1	1:1	4 Min 10	AD-15	Soil
D-10D	1	3.33	0.67	1.5:1	7 Min 50	AD-6, AD-3B, (part) AD-2B, AD-2C	D_{50} 4" Bedrock
D-11D	0	1	0.5	1:1	41 Min Near Vert.	Tipple Wash Hose	Grouted Rip-Rap
D-12D	0	1	0.5	1:1	81 Av.	Tipple Wash Hose	Soil
D-13D Water Shed	0	6	0.5	10:1 2:1	0.5 Av.	AD-6 Partial	Soil
D-14D	0	1.33	0.67	1.5:1	0.06 Av.	AU-4A	Soil
D-15D	0	2.00	1.00	1:1	0.05 Av.	AD-16	Soil
D-16D	0	1.50	1.75	1:1	0.05 Av.	AD-18	Soil
D-17D	0	.96	1	1:1	0.08 Av.	AU-23, AD-20	Soil

Notes: 1. Dimensions given indicate minimum requirements. Actual dimensions may vary. Minimum required cross-sections will be maintained.

2. The use of line drainage ditches is required when flow velocities exceed approximately 5 feet per second. Rip-rap may be installed where not required.

Table 7-24 Summary of Division Ditch Calculations (Cont)

Ditch	Bottom Width (Ft)	Top Width (Ft)	Depth (Ft)	Type Side Slope H:V	Measured Slope %	Contributing Watershed	REQ'D Av. Rip-Rap Size (In.)
~~D-1U~~	~~2~~	~~1.33~~	~~0.67~~	~~1:1~~	~~2 Min~~ ~~8 Max~~	~~AU-5~~RECLAIMED	~~Soil~~
D-2U	~~0~~10 MIN	~~1.33~~10 MIN	~~0.67~~1 MIN	1:1	7 Min 10 Max	AU-6, AU-11, AD-3A, AD-3B, AD-6	Soil
D-3U	~~1~~10 MIN	~~2~~10 MIN	~~0.5~~1 MIN	1:1	4 Min 18 Max	AU-8, AU*6, AU-11, AD-3A, AD-3B, AD-6	Soil
D-4U	~~110 MIN~~	410 MIN	~~1~~1 MIN	~~1.5~~1:1	1 Min 10 Av. 18 Max	AU-10, AU-8, AU-6, AU-11,AD-3[a], AD-3B,AD-6	Soil Soil D_{50} 6"
D-5U	0	1	0.5	1:1	4 Min 13 Max	AU-15	Soil
D-6U	0	1.33	0.67	1:1	3 Min 16 Max	AU-14	Soil
D-7U	0	1.33	0.67	1:1	1 Min 16 Max	AU-12	Soil
D-8U	2	4	0.67	1:1	2 Min 31 Max	AU-1, AU-1[a], AU-1B, AU—1C, AU-2, AU-2[a], AU-2B	Soil
D-9U	3	5	1	1:1	1 Min 6 Max	AU-16	Soil D_{50} 4"
D-10U	3	4	0.5	1:1	3 Min 10 Max	AU-17	Soil
D-11U	0	2	1	1:1	3 Min 8 Max	Misc. road damage	Soil
D-12U	0	3	1	1.5:1	3 Min 9 Max	AU-18	Soil D_{50} 4"
D-13U	0	2	1	1:1	2 Min 23 Max	Misc. road damage	Soil
D-14U	4	5.5	0.5	1.5:1	6 Min 66 Max	Sed Pond A Outlet	D_{50} 4" D_{50} 10"
~~D-15U~~	~~0~~	~~2~~	~~0.67~~	~~1.5:1~~	~~5 Min~~ ~~16 Max~~	~~AU-3~~RECLAIMED	~~Soil~~
~~D-16U~~	~~0~~	~~2~~	~~0.67~~	~~1.5:1~~	~~10 Av.~~	~~AU-1B~~RECLAIMED	~~Soil~~

Table 7-24 Summary of Division Ditch Calculations (Cont)

Ditch	Bottom Width (Ft)	Top Width (Ft)	Depth (Ft)	Type Side Slope H:V	Measured Slope %	Contributing Watershed	REQ'D Av. Rip-Rap Size (In.)
~~D-17U~~	~~0~~	~~2~~	~~0.67~~	~~1.5:1~~	~~13 Av.~~	~~AU-1[a]~~RECLAIMED	~~Bedrock~~
~~D-18D~~	~~0~~	~~2~~	~~0.67~~	~~1.5:1~~	~~5 Min~~	~~AU-1~~RECLAIMED	~~Soil~~
~~D-19U~~	~~0~~	~~2~~	~~0.67~~	~~1.5:1~~	~~6 Av.~~	~~AU-2B~~RECLAIMED	~~Soil~~
D-20U	0	1.33	0.67	1:1	16 Av.	AU-42	Soil
D-21U	0	2	1.0	1:1	13 Av.	AU-43	D_{50}=3"
D-22U	0	3	1.0	1.5:1	11 Av.	AU-19, AU-25	D_{50}=6"
D-23U	0	1.16	0.58	1:1	19 Av.	AU-36	Soil
D-24U	0	1.16	0.58	1:1	14 Av.	AU-35	Soil
D-25U	0	1	0.5	1:1	16 Av.	AD-17	Soil
D-26U	0	1	0.5	1:1	24 Av.	AU-32	Soil
D-27U	0.50	2	0.5	1.5:1	13 Min, 30 Max	AU-31	Soil
D-28U	0	1	0.5	1:1	14 Av.	AU-33	Soil
D-29U	0	1.33	0.67	1:1	8 Av.	AU-34	Soil
D-30U	0	1.16	0.58	1:1	13 Av.	AU-25	Soil
D-31U	0	3	1.0	1.5:1	12 Av.	AU-20, AU-26	Bedrock
D-32U	0	1	0.5	1:1	17 Av.	AU-30	Soil
D-33U	0	1.16	0.58	1:1	18 Av.	AU-29	Soil
D-34U	1	2.74	0.58	1.5:1	11 Av.	AU-24	Soil
D-35U	0	2.0	1.0	1:1	10 Av.	AU-29	Soil
D-36	0	1.0	0.5	1:1	8 Av.	AU-27	Soil
D-37	0	1.4	0.7	1:1	8 Av.	AU-26, AU-21	Soil
D-38	0	1.33	.0.67	1:1	12 Min, 20 Max	AU-21	D_{50}=3"
D-39	0	1.0	0.5	1:1	10 Av.	AU-28	Soil

CULVERT CHARACTERISTICS

Culvert	Dia. (in.)	Type	Contributing Watersheds	Peak Q(cfs)	Slope (ft/ft)	Outlet Condition
~~C-1U~~	~~30~~	~~CMP Flexible~~	~~AU-3, AU-4 AU-4A, AU-5~~ RECLAIMED	~~4.40~~	~~0.12 0.73~~	~~Bedrock~~
~~C-2U~~	~~12~~	~~stl pipe~~	~~AU-11~~ ABANDONED IN PLACE	~~0.09~~	~~0.08~~	~~Soil~~
~~C-3U~~	~~12~~	~~CMP~~	~~AU-6,AU-7, AU-11~~ ABANDONED IN PLACE	~~2.20~~	~~0.08~~	~~4" rip rap~~
~~C-4U~~	~~12~~	~~CMP~~	~~AU-8, AU-9~~ ABANDONED IN PLACE	~~1.32~~	~~0.05~~	~~Soil~~
C-5U	12	CMP	AU-8,AU-9, AU-15	1.45	0.05	Soil
C-6U	12	CMP	AU-6, AU-7, AU-11 AU-13, AU-14	2.65	0.05	4" rip rap
C-7U	12	CMP	AU-12	0.34	0.05	6" rip rap
C-8U	18	Flexible CMP,RCP	AU-3, AU-3A, AU-4, AU-4A,AU-5	4.45	0.13	12" rip rap
C-9U	60	stl pipe	Bear Creek	108.18	0.06	48" rip rap
C-10U	60	RCP	Bear Creek	108.18	0.06	48" rip rap
C-11U	18	CMP	AU-16	4.92	0.10	6" rip rap
C-12U	24	CMP	AU-17	3.29	0.04	6" rip rap
C-13U C-13aU	15	CMP	misc. road drainage	1.00	0.06	Soil
C-14U	60	CMP	Bear Creek	108.18	0.06	48" rip rap
C-15U	18	CMP Flexible	AU-1B, AU-12 AU-2A, AU-2B	1.46	0.05 0.78	27" rip rap
~~C-16U~~	~~15~~	~~CMP Flexible~~	~~AU-1,AU-1A~~RECLAIMED	~~4.34~~	~~0.05 080~~	~~Bedrock~~
~~C-17U~~	~~12~~	~~CMP~~	~~AU-1~~RECLAIMED	~~0.83~~	~~0.18~~	~~3" rip rap~~
~~C-18U~~	~~15~~	~~CMP Flexible~~	~~AU-2~~RECLAIMED	~~0.30~~	~~0.05 0.75~~	~~10" rip rap~~
~~C-19U~~	~~15~~	~~CMP Flexible~~	~~AU-2A~~RECLAIMED	~~0.22~~	~~0.05 0.75~~	~~9" rip rap~~
~~C-20U~~	~~15~~	~~CMP Flexible~~	~~AU-2B~~RECLAIMED	~~0.50~~	~~0.05 0.75~~	~~15" rip rap~~

Table 7-25 Culvert Characteristics (Cont)

Culvert	Diameter (in.)	Type	Contributing Watersheds	Slope (ft/ft)	Outlet Condition
~~C-1D~~	~~15~~	~~CMP flexible~~	~~AD-6, AD-3B~~ RECLAIMED	~~1.00~~	~~24" rip-rap~~
C-2D	15	CMP, RCP flexible	AD-2B, AD-2C, AD-3B, AD-4, AD-6	4.0	10" rip-rap
~~C-3D~~	~~20~~	~~slt pipe~~	~~AD-3A~~RECLAIMED	~~0.03~~	~~4" rip-rap~~
C-4D	21	CMP	AD-3A, AD-5, AD-7, AD-14, C-10D	0.18	9" rip-rap
C-5D	18	CMP	AD-9, AD-3A, AD-5 AD-7	~~0.08~~0.07	~~Soil~~3" rip rap
C-6D	12	CMP	AD-10	0.48	9" rip-rap
C-7D	18	CMP	Abandoned In Place		
C-8D	~~18~~	~~CMP~~	~~AD-3A, AD-5, AD-7~~ REPLACED WITH C-5D	~~0.05~~	~~3" rip-rap~~
C-9D	18	CMP	See C-8D	0.05	3" rip-rap
C-10D	18	CMP	Tipple Wash Hose	0.03	Soil
~~C-11D~~	~~12~~	~~CMP flexible~~	~~AD-4A~~RECLAIMED	~~0.05~~ ~~0.25~~	~~3" rip-rap~~
C-12D	8	CMP	AD-18	0.05	Soil
C-13D	12	CMP	AU-23, AD-20	0.07	Soil

Diversion Structures Modifications

Culvert C-8U Extension, 1989

In order to reduce migration of coal fines into undisturbed drainage, culvert C-8U which passes under the storage pad, was extended uphill approximately 60 ft during the summer of 1989. A berm will be built to meet the required headwater and to prevent runoff to the south from entering the drainage. The headwall will be riprapped and the existing trash rack will be resecured to the culvert as presently installed. Extending the culvert will increase the distance between the coal storage and the inlet to the culvert.

A small sediment basin will be constructed and maintained at the inlet of culvert C-8U in the Spring of 1992, and cleaned as needed to reduce potential impacts of suspended solids to surface waters.

~~Culvert Outlet C-1U 1991~~

~~In order to reduce erosion occurring at the outlet of culvert C-1U, a flexible culvert was added to the end of the in-place culvert. The extension extends to a point where the discharge is onto the rock cliff. The only runoff that crosses the slope below the Upper Storage Pad will then be the direct impact precipitation. The flexible culvert is attached to the slope using the method identified in Figure 7-13. Vegetation will be evaluated, stabilized, and supplemented as required.~~

~~A splash basin and drainage channel will be established at the immediate impact area in the downcast material at the base of the cliff, to direct drainage to the original drainage path. Due to the inaccessible nature of the location all work will be performed by hand. This limits the size of rip-rap that can be placed so the construction will be reviewed by qualified personnel along with the division. See Figure 7-8 for a profile of the cliff and downfall area. The remaining downcast material in the pile at the base of the cliff will be stabilized with erosion control matting and using interim reclamation procedures defined in R545-301-331.~~

This was reclaimed.

Ditches D-2U, D-3U AND D-4U 2008

As reclamation is on in the area and the work is progressing down from the top. The drainage for TS-6 (Primary Portal Access Road) has been modified. Hiawatha Coal will temporarily show culverts C-2U, C-3U and C-4U as abandoned in place until the culverts are removed as reclamation activities progress through that area. As reclamation progresses, the flow to ditches D-2U, D-3U and D-4U will change as hydrologic structures are removed up stream. There will be no change to the outflow of D-4U which currently discharges into Bear Creek. Hiawatha Coal intends to utilize the existing roadway as the channel, which will add extensive width to the existing ditches. This will allow for the increased peak flows through the ditches. As these ditches are all considered undisturbed and the roadway drainage is also considered undisturbed, this should not have any adverse affects to the Bear Creek Drainage. See Appendix 7G for Flow Characteristics.

Tank Seam Portal Pad & Access Road

~~Due to the remote location of the Tank Seam Portal Pad with respect to the sedimentation ponds, drainage from the portal area will be controlled using a silt fence as shown on Plate 7-1E (BTCA Area "U"). The area, approx. 0.25 acres, will be used only for mine access and portal structures, and will not be used for storage. Ditch D-14D will convey the drainage from AU-4A, which includes the portal pad, to culvert C-11D. A silt fence will be located prior to the inlet of C-11D.~~

~~Runoff will be conveyed past the Tank Seam Access Road via ditches and culverts (See Plates 7-1C and 7-1E). Runoff from the disturbed slopes and cut faces along the access road, designated as BTCA areas "H" through "T", will be treated with silt fences and/or erosion control matting as described in Appendix 7-K.~~

~~Culvert outlets will be located in places where the outlet conditions meet or exceed the minimum requirements, which are shown in Appendix 7-G. Table 7-25 shows the actual outlet conditions which will exist for each culvert. These conditions reflect existing conditions within the premining channels at the points where the culvert outlets will be located. The culverts along the road will not require any disturbance at the outlets, but will use the premining conditions, which exist.~~

~~The reclaimed channel designs for the Tank Seam Access Road are described in Appendix 7-H, and reflect the pre-mining channel conditions. Pre-mining channels consisted of eroded channels passing over large boulders embedded into the soil and/or bedrock. Reclamation activities for the channels will involve excavating the channel back to the pre-~~

~~mining configuration. The majority of the boulders in the pre-mining channels will remain as markers, which can be excavated back to. Photographs of the pre-mining channels are contained in Appendix 7-H, and the profiles on Plate 7-8C reflect the pre-mining profiles and descriptions.~~ THIS AREA HAS BEEN RECLAIMED.

Wild Horse Ridge Access

The portal pad for the Bear Canyon No. 3 Mine will drain into Sediment Pond "D". For the remaining disturbed areas associated with the Wild Horse Ridge access road and conveyor belt, runoff will be controlled using alternate (ASCA) treatments. See Plates 7-1F and 7-1G for division structures and ASCA areas (BTCA Area "V", "W", "X" and "Y").

Runoff control for these ASCA areas are described in Appendix 7-K, and will consist of silt fences, erosion control matting and/or catch basins as described in Appendix 7-K and shown on Plates 7-1F and 7-1G. ASCA areas under the conveyor belt will be protected by a pan structure on the conveyor belt is described in Appendix 7-K.

Designs for the ditches and culverts associated with this area are included in Appendix 7-G and summarized in Tables 7-24 and 7-28.

The reclaimed channel designs for the Wild Horse Ridge Area are described in Appendix 7-H and Section 7.3.

Table 7-26 Characteristics of Proposed Reclaimed Channels

Channel	Bottom Width (ft)	Side Slopes	Depth (ft)	Lining
~~RC-1~~[1]	~~6~~	~~1.5:1~~	~~1.5~~	~~D50 = 6"~~
RC-2	3	2:1	1.5	D50 = 9"
RC-3	3	2:1	1.5	D50 = 9"
RC-4	4	2:1	1.5	D50 = 6"
RC-5	1.5	2:1	1.5	D50 = 6"
RC-6	2	2:1	1.5	D50 = 6"
RC-7	6	2:1	4	D50 = 24"
RC-8	8	2:1	2.5	D50 = 24"
RC-9	7	2:1	3	D50 = 24"
RC-10	6	1.5:1	6	D50 = 24"
RC-11	2	2:1	1.5	D50 = 6"
RC-12	1	2:1	2	D50 = 6"
RC-TS1	10'-12' Avg.	1:1 Typ	8'-9' Avg.	12"-72" Rock
RC-TS2	12' Avg.	1.5:1 Typ	4' Avg.	Bedrock 12"-72" Rock
RC-TS3	6' Avg.	1.5:1 Typ	4' Avg.	12"-60" Rock
RC-TS4	15' Avg.	1:1 Typ	4' Avg.	8"-36" Rock
RC-TS5	4'-6' Avg.	1.5:1 Typ	2'-6' Avg.	18"-48" Rock
RC-TS6	20' Avg.	1:1 Typ	2'-5' Avg.	Bedrock 18"-48" Rock

Note: 1. Have been reclaimed

CULVERT CHARACTERISTICS

Culvert	Dia (in.)	Type	Contributing Watersheds	Peak Q(cfs)	Slope (ft/ft)	Outlet Condition
C-1U	~~30~~	~~CMP Flexible~~	~~AU-3, AU-4, AU-4A, AU-5~~ RECLAIMED	~~4.40~~	~~0.12 0.73~~	~~Bedrock~~
C-2U	~~12~~	~~stl pipe~~	~~AU-11~~ABANDONED IN PLACE	~~0.09~~	~~0.08~~	~~soil~~
C-3U	~~12~~	~~CMP~~	~~AU-6, AU-7, AU-11~~ABANDONED IN PLACE	~~2.20~~	~~0.05~~	~~4" rip-rap~~
C-4U	~~12~~	~~CMP~~	~~AU-8, AU-9~~ ABANDONED IN PLACE	~~1.32~~	~~0.05~~	~~Soil~~
C-5U	12	CMP	AU-8, AU-9, AU-15	1.45	0.05	Soil
C-6U	12	CMP	AU-6, AU-7, AU-11 AU-13, AU-14	2.65	0.05	4" rip-rap
C-7U	12	CMP	AU-12	0.34	0.05	6" rip-rap
C-8U	18	Flexible CMP, RCP	AU-3, AU-3A AU-4, AU-4A, AU-5	4.45	0.13	12" rip-rap
C-9U	60	stl pipe	Bear Creek	108.18	0.06	48" rip-rap
C-10U	60	RCP	Bear Creek	108.18	0.06	48" rip-rap
C-11U	18	CMP	AU-16	4.92	0.10	6" rip-rap
C-12U	24	CMP	AU-17	3.29	0.04	6" rip-rap
C-13U C-13aU	15	CMP	misc. road drainage	1.00	0.06	Soil
C-14U	60	CMP	Bear Creek	108.18	0.06	48" rip-rap
C-15U	18	CMP flexible	AU-1B, AU-2 AU-2A, AU-2B	1.46	0.05 0.78	27" rip-rap
C-16U	~~15~~	~~CMP flexible~~	~~AU-1, AU-1A~~ RECLAIMED	~~1.34~~	~~0.05 0.80~~	~~Bedrock~~
C-17U	~~12~~	~~CMP~~	~~AU-1~~RECLAIMED	~~0.83~~	~~0.18~~	~~3" rip-rap~~
C-18U	~~15~~	~~CMP flexible~~	~~AU-2~~RECLAIMED	~~0.30~~	~~0.05 0.75~~	~~10" rip-rap~~
C-19U	~~15~~	~~CMP flexible~~	~~AU-2A~~RECLAIMED	~~0.22~~	~~0.05 0.75~~	~~9" rip-rap~~
C-20U	~~15~~	~~CMP flexible~~	~~AU-2B~~RECLAIMED	~~0.50~~	~~0.05 0.75~~	~~15" rip-rap~~

CULVERT CHARACTERISTICS (con't)

Culvert	Dia (in.)	Type	Contributing Watersheds	Peak Q(cfs)	Slope (ft/ft)	Outlet Condition
C-1D	~~15~~	~~CMP, flexible~~	~~AD-6, AD-3B~~ RECLAIMED	~~0.93~~	~~1.00~~	~~24" rip-rap~~
C-2D	15	CMP, RCP, flexible	AD-2B, AD-2C, AD-3B, AD-4, AD-6	1.47	0.40	10" rip-rap
C-3D	~~20~~	~~stl pipe~~	~~AD-3A~~ RECLAIMED	~~0.23~~	~~0.03~~	~~4" rip-rap~~
C-4D	21	CMP	AD-3A, AD-5 AD-7, AD14, C-10D	2.66	0.18	9" rip-rap
C-5D	18	CMP	AD-3A, AD-5, AD-7, AD-9	2.59 ~~0.23~~	0.07 ~~0.08~~	3" rip-rap ~~soil~~
C-6D	12	CMP	AD-10	0.62	0.48	9" rip-rap
C-7D	18	CMP	Abandoned In Place			
~~C-8D~~	~~18~~	~~CMP~~	Replaced with C-5D ~~AD-3A, AD-5 AD-7~~	~~2.36~~	~~0.05~~	~~3" rip-rap~~
C-9D	18	CMP	See C-8D	2.36	0.05	3" rip-rap
C-10D	18	CMP	TIPPLE WASH HOSE	0.25	0.03	soil
C-11D	~~12~~	~~CMP flexible~~	~~AU-4A~~RECLAIMED	~~0.35~~	~~0.05~~ ~~0.25~~	~~3" rip-rap~~
C-12D	8	CMP	AD-18	0.55	0.05	soil

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

~~Project Description~~	
Worksheet	C-1U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.730000~~	~~ft/ft~~
~~Diameter~~	~~30~~	~~in~~
~~Discharge~~	~~4.40~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.26~~	~~ft~~
~~Flow Area~~	~~0.3~~	~~ft²~~
~~Wetted Perimeter~~	~~1.65~~	~~ft~~
~~Top Width~~	~~1.53~~	~~ft~~
~~Critical Depth~~	~~0.69~~	~~ft~~
~~Percent Full~~	~~10.5~~	~~%~~
~~Critical Slope~~	~~0.014104~~	~~ft/ft~~
~~Velocity~~	~~16.01~~	~~ft/s~~
~~Velocity Head~~	~~3.98~~	~~ft~~
~~Specific Energy~~	~~4.24~~	~~ft~~
~~Froude Number~~	~~6.67~~	
~~Maximum Discharge~~	~~204.19~~	~~cfs~~
~~Discharge Full~~	~~189.82~~	~~cfs~~
~~Slope Full~~	~~0.000392~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

~~Minimum required riprap conditions = 30" m.d. riprap at outlet~~

~~At Slope = 0.12 ft/ft, flow depth = 0.41 ft~~

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-2U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.015~~	
~~Slope~~	~~0.080000~~	~~ft/ft~~
~~Diameter~~	~~12~~	~~in~~
~~Discharge~~	~~0.09~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.07~~	~~ft~~
~~Flow Area~~	~~2.5e-2~~	~~ft²~~
~~Wetted Perimeter~~	~~0.54~~	~~ft~~
~~Top Width~~	~~0.52~~	~~ft~~
~~Critical Depth~~	~~0.12~~	~~ft~~
~~Percent Full~~	~~7.2~~	~~%~~
~~Critical Slope~~	~~0.008424~~	~~ft/ft~~
~~Velocity~~	~~3.60~~	~~ft/s~~
~~Velocity Head~~	~~0.20~~	~~ft~~
~~Specific Energy~~	~~0.27~~	~~ft~~
~~Froude Number~~	~~2.89~~	
~~Maximum Discharge~~	~~9.39~~	~~cfs~~
~~Discharge Full~~	~~8.73~~	~~cfs~~
~~Slope Full~~	~~0.000008~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description		
Worksheet	C-3U	
~~Flow Element~~	~~Circular Channel~~	
~~Method~~	~~Manning's Formula~~	
~~Solve For~~	~~Channel Depth~~	

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.050000~~	~~ft/ft~~
~~Diameter~~	~~12~~	~~in~~
~~Discharge~~	~~2.20~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.51~~	~~ft~~
~~Flow Area~~	~~0.4~~	~~ft²~~
~~Wetted Perimeter~~	~~1.58~~	~~ft~~
~~Top Width~~	~~1.00~~	~~ft~~
~~Critical Depth~~	~~0.63~~	~~ft~~
~~Percent Full~~	~~50.6~~	~~%~~
~~Critical Slope~~	~~0.024382~~	~~ft/ft~~
~~Velocity~~	~~5.52~~	~~ft/s~~
~~Velocity Head~~	~~0.47~~	~~ft~~
~~Specific Energy~~	~~0.98~~	~~ft~~
~~Froude Number~~	~~1.54~~	
~~Maximum Discharge~~	~~4.64~~	~~cfs~~
~~Discharge Full~~	~~4.32~~	~~cfs~~
~~Slope Full~~	~~0.012997~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-4U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.050000~~	~~ft/ft~~
~~Diameter~~	~~12~~	~~in~~
~~Discharge~~	~~1.32~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.38~~	~~ft~~
~~Flow Area~~	~~0.3~~	~~ft²~~
~~Wetted Perimeter~~	~~1.33~~	~~ft~~
~~Top Width~~	~~0.97~~	~~ft~~
~~Critical Depth~~	~~0.49~~	~~ft~~
~~Percent Full~~	~~38.0~~	~~%~~
~~Critical Slope~~	~~0.020695~~	~~ft/ft~~
~~Velocity~~	~~4.83~~	~~ft/s~~
~~Velocity Head~~	~~0.36~~	~~ft~~
~~Specific Energy~~	~~0.74~~	~~ft~~
~~Froude Number~~	~~1.60~~	
~~Maximum Discharge~~	~~4.64~~	~~cfs~~
~~Discharge Full~~	~~4.32~~	~~cfs~~
~~Slope Full~~	~~0.004679~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-16U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.800000~~	~~ft/ft~~
~~Diameter~~	~~15~~	~~in~~
~~Discharge~~	~~1.34~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.18~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.96~~	~~ft~~
~~Top Width~~	~~0.87~~	~~ft~~
~~Critical Depth~~	~~0.46~~	~~ft~~
~~Percent Full~~	~~14.1~~	~~%~~
~~Critical Slope~~	~~0.017971~~	~~ft/ft~~
~~Velocity~~	~~12.69~~	~~ft/s~~
~~Velocity Head~~	~~2.50~~	~~ft~~
~~Specific Energy~~	~~2.68~~	~~ft~~
~~Froude Number~~	~~6.42~~	
~~Maximum Discharge~~	~~33.66~~	~~cfs~~
~~Discharge Full~~	~~31.29~~	~~cfs~~
~~Slope Full~~	~~0.001467~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

~~Minimum required riprap conditions = 27" m.d. riprap at outlet~~

~~At slope = 0.05 ft/ft, flow depth = **0.35** ft.~~

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-17U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.180000~~	~~ft/ft~~
~~Diameter~~	~~12~~	~~in~~
~~Discharge~~	~~0.83~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.22~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.96~~	~~ft~~
~~Top Width~~	~~0.82~~	~~ft~~
~~Critical Depth~~	~~0.38~~	~~ft~~
~~Percent Full~~	~~21.5~~	~~%~~
~~Critical Slope~~	~~0.019427~~	~~ft/ft~~
~~Velocity~~	~~6.69~~	~~ft/s~~
~~Velocity Head~~	~~0.70~~	~~ft~~
~~Specific Energy~~	~~0.91~~	~~ft~~
~~Froude Number~~	~~3.04~~	
~~Maximum Discharge~~	~~8.81~~	~~cfs~~
~~Discharge Full~~	~~8.19~~	~~cfs~~
~~Slope Full~~	~~0.001850~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

~~Minimum required riprap conditions = 3" m.d. riprap at outlet~~

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-18U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.750000~~	~~ft/ft~~
~~Diameter~~	~~15~~	~~in~~
~~Discharge~~	~~0.30~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.09~~	~~ft~~
~~Flow Area~~	~~3.8e-2~~	~~ft²~~
~~Wetted Perimeter~~	~~0.67~~	~~ft~~
~~Top Width~~	~~0.64~~	~~ft~~
~~Critical Depth~~	~~0.21~~	~~ft~~
~~Percent Full~~	~~7.0~~	~~%~~
~~Critical Slope~~	~~0.018728~~	~~ft/ft~~
~~Velocity~~	~~7.90~~	~~ft/s~~
~~Velocity Head~~	~~0.97~~	~~ft~~
~~Specific Energy~~	~~1.06~~	~~ft~~
~~Froude Number~~	~~5.72~~	
~~Maximum Discharge~~	~~32.60~~	~~cfs~~
~~Discharge Full~~	~~30.30~~	~~cfs~~
~~Slope Full~~	~~0.000074~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

~~Minimum required riprap conditions = 10" m.d. riprap at outlet~~

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-19U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.750000~~	~~ft/ft~~
~~Diameter~~	~~15~~	~~in~~
~~Discharge~~	~~0.22~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.08~~	~~ft~~
~~Flow Area~~	~~3.1e-2~~	~~ft²~~
~~Wetted Perimeter~~	~~0.62~~	~~ft~~
~~Top Width~~	~~0.60~~	~~ft~~
~~Critical Depth~~	~~0.18~~	~~ft~~
~~Percent Full~~	~~6.1~~	~~%~~
~~Critical Slope~~	~~0.019286~~	~~ft/ft~~
~~Velocity~~	~~7.20~~	~~ft/s~~
~~Velocity Head~~	~~0.80~~	~~ft~~
~~Specific Energy~~	~~0.88~~	~~ft~~
~~Froude Number~~	~~5.61~~	
~~Maximum Discharge~~	~~32.60~~	~~cfs~~
~~Discharge Full~~	~~30.30~~	~~cfs~~
~~Slope Full~~	~~0.000040~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

~~Minimum required riprap conditions = 9" m.d. riprap at outlet~~

~~At slope = 0.05 ft/ft, flow depth = **0.14** ft.~~

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-20U
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.750000~~	~~ft/ft~~
~~Diameter~~	~~15~~	~~in~~
~~Discharge~~	~~0.51~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.11~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.76~~	~~ft~~
~~Top Width~~	~~0.72~~	~~ft~~
~~Critical Depth~~	~~0.28~~	~~ft~~
~~Percent Full~~	~~9.0~~	~~%~~
~~Critical Slope~~	~~0.018052~~	~~ft/ft~~
~~Velocity~~	~~9.28~~	~~ft/s~~
~~Velocity Head~~	~~1.34~~	~~ft~~
~~Specific Energy~~	~~1.45~~	~~ft~~
~~Froude Number~~	~~5.91~~	
~~Maximum Discharge~~	~~32.60~~	~~cfs~~
~~Discharge Full~~	~~30.30~~	~~cfs~~
~~Slope Full~~	~~0.000212~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

~~Minimum required riprap conditions = 15" m.d. riprap at outlet~~

~~At slope = 0.05 ft/ft, flow depth = **0.22** ft.~~

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description		
Worksheet	C-3D	
~~Flow Element~~	~~Circular Channel~~	
~~Method~~	~~Manning's Formula~~	
~~Solve For~~	~~Channel Depth~~	

~~Input Data~~		
~~Mannings Coefficient~~	~~0.015~~	
~~Slope~~	~~0.030000~~	~~ft/ft~~
~~Diameter~~	~~20~~	~~in~~
~~Discharge~~	~~0.23~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.12~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.92~~	~~ft~~
~~Top Width~~	~~0.87~~	~~ft~~
~~Critical Depth~~	~~0.17~~	~~ft~~
~~Percent Full~~	~~7.4~~	~~%~~
~~Critical Slope~~	~~0.007435~~	~~ft/ft~~
~~Velocity~~	~~3.16~~	~~ft/s~~
~~Velocity Head~~	~~0.16~~	~~ft~~
~~Specific Energy~~	~~0.28~~	~~ft~~
~~Froude Number~~	~~1.93~~	
~~Maximum Discharge~~	~~22.46~~	~~cfs~~
~~Discharge Full~~	~~20.88~~	~~cfs~~
~~Slope Full~~	~~0.000004~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

Culvert C-8D

Replaced with culvert C-5D

WORKSHEET

WORKSHEET for CIRCULAR CHANNEL

RECLAIMED

Project Description	
Worksheet	C-11D
~~Flow Element~~	~~Circular Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.024~~	
~~Slope~~	~~0.250000~~	~~ft/ft~~
~~Diameter~~	~~12~~	~~in~~
~~Discharge~~	~~0.35~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.13~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.74~~	~~ft~~
~~Top Width~~	~~0.67~~	~~ft~~
~~Critical Depth~~	~~0.24~~	~~ft~~
~~Percent Full~~	~~13.0~~	~~%~~
~~Critical Slope~~	~~0.019305~~	~~ft/ft~~
~~Velocity~~	~~5.82~~	~~ft/s~~
~~Velocity Head~~	~~0.53~~	~~ft~~
~~Specific Energy~~	~~0.66~~	~~ft~~
~~Froude Number~~	~~3.43~~	
~~Maximum Discharge~~	~~10.38~~	~~cfs~~
~~Discharge Full~~	~~9.65~~	~~cfs~~
~~Slope Full~~	~~0.000329~~	~~ft/ft~~
~~Flow Type~~	~~Supercritical~~	

~~Minimum required riprap conditions = 3" m.d. riprap at outlet~~

~~At slope = 0.05 ft/ft, Flow depth = **0.19** ft~~

DITCH CHARACTERISTICS

DITCH	CHANNEL SLOPE %	CONTRIBUTING WATERSHED	PEAK Q(cfs)	BANK AND BOTTOM DESC.	MANNING'S $\eta^{(a)}$
D-1D	~~2 Min, 11 Max~~	~~AD-3A~~RECLAIMED	~~0.23~~	~~Rocky Soil~~	~~0.03~~
D-2D	6 Min, 20 Max	AD-3A, AD-5	0.53	Rocky Soil, Bedrock	0.03
D-3D		Replaced with C-5D			
D-4D	2 Min, 7 Av 17 Max	AD-14	0.05	Soil	0.03
D-5D		Replaced with C-5D			
D-6D	2 Min, 4 Max	AD-3A, AD-5, AD-7 AD-9, AD-10, AD-12 AD-14	3.63	Rocky Soil	0.03
D-7D	2 Min, 6 Av 55 Max	AD-1A, AD-1B, AD-2A AD-2B, AD-2C, AD-3B AD-4, AD-6, AD-8	4.90	Soil $D_{50} \approx 3"$	0.03 0.033
D-8D	2 Min, 7 Max	AD-13	1.23	Soil	0.03
D-8D Water Bar	3 Av.	AD-13	1.23	Soil	0.013
D-9D	4 Min, 10 Max	AD-15	1.20	Soil	0.03
D-10D	7 Min, 50 Max	AD-6, AD-3B, AD-2C	1.03	$D_{50} \approx 4"$	0.033
D-11D	41 Min Near Vertical Max	TIPPLE WASH HOSE	0.25	Grouted rip-rap	0.035
D-12D	81 Av.	TIPPLE WASH HOSE	0.25	Grouted	0.03
D-13D Water Bar	0.5 Av.	AD-6 Partial	0.23	Soil	0.03
D-14D	~~0.06 Av.~~	~~AU-4A~~RELAIMED	~~0.35~~	~~Soil~~	~~0.03~~
D-15D	0.05 Av.	AD-16	1.24	Soil	0.03
D-16D	0.05 Av.	AD-18	0.55	Soil	0.03
D-17D	0.08	AU-23,AD-20	0.99		

DITCH CHARACTERISTICS (cont)

DITCH	CHANNEL SLOPE %	CONTRIBUTING WATERSHED	PEAK Q (cfs)	BANK AND BOTTOM DESC.	MANNING'S $\eta^{(a)}$
D-1U	~~2 Min, 8 Max~~	~~AU-5~~RECLAIMED	~~2.51~~	~~D_{50}2", D_{max}4"~~	~~0.03~~
D-2U	7 Min, 10 Max	AU-6, AU-11AD-3A,AD-3B, AD-3B, AD-6	~~0.48~~ 1.64	Rocky Soil	0.03
D-3U	4 Min, 18 Max	AU-8, AU-6,AU-11,AD-3A,AD-3B, AD-6	~~0.72~~ 4.08	Rocky Soil	0.03
D-4U	1 Min, 10 Av, 18 Max	AU-10, AU-8, AU-6, AU-11, AD-3A, AD-9B, AD-6	~~4.05~~ 8.73	~~Rocky Soil~~D_{50} 6"	0.03
D-5U	4 Min, 13 Max	AU-15	0.13	Rocky Soil	0.03
D-6U	3 Min, 6 Max	AU-14	0.35	Rocky Soil	0.03
D-7U	1 Min, 16 Max	AU-12	0.34	Rocky Soil	0.03
D-8U	2 Min, 6 Av 31 Max	AU-1, AU-1A, AU-1B AU-1C, AU-2 AU-2A, AU-2B	4.75	Soil D_{50}6"	0.033
D-9U	1 Min, 6 Max	AU-16	4.92	D_{50}4"	0.03
D-10U	3 Min, 10 Max	AU-17	3.29	D_{50}4"	0.03
D-11U	3 Min, 8 Max	misc. road drainage	1.0[b]	Soil	0.03
D-12U	3 Min 9 Max	AU-18	4.0	Soil D_{50}4"	0.03
D-13U	2 Min, 6 Av, 23 Max	misc. road drainage	1.0[b]	Soil	0.03
D-14U	6 Min, 66 Max	Outlet of Sed Pond A	8.9	D_{50}4" D_{Max}10"	0.03
D-15U	5 Min, 11 Av, 16 Max	AU-3	0.52	soil	0.03
D-16U	~~10 Av~~	~~AU-1B~~RECLAIMED	~~0.44~~	~~soil~~	~~0.03~~
D-17U	~~13 Av~~	~~AU-1, AU-1A~~RECLAIMED	~~1.34~~	~~bedrock~~	~~0.03~~
D-18U	~~5 Min, 11 Av 17 Max~~	~~AU-1~~RECLAIMED	~~0.83~~	~~soil, bedrock~~	~~0.03~~
D-19U	~~6 Av~~	~~AU-2B~~RECLAIMED	~~0.50~~	~~soil~~	~~0.03~~
D-20U	16 Av	AU-42	0.67	soil	0.03
D-21U	13 Av	AU-43	1.75	D_{50} =3"	0.03
D-22U	11 Av	AU-19, AU-25	4.33	D_{50} =6"	0.03

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	DITCH D-1D (Max Slope)
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Slope~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.03 0~~	
~~Depth~~	~~0.26~~	~~ft~~
~~Left Side Slope~~	~~1.00~~	~~V : H~~
~~Right Side Slope~~	~~1.00~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.23~~	~~cfs~~

~~Results~~		
~~Slope~~	~~0.113739~~	~~ft/ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.74~~	~~ft~~
~~Top Width~~	~~0.52~~	~~ft~~
~~Critical Depth~~	~~0.32~~	~~ft~~
~~Critical Slope~~	~~0.038399~~	~~ft/ft~~
~~Velocity~~	~~3.40~~	~~ft/s~~
~~Velocity Head~~	~~0.18~~	~~ft~~
~~Specific Energy~~	~~0.44~~	~~ft~~
~~Froude Number~~	~~1.66~~	
~~Flow Type~~	~~Supercritical~~	

~~Use Minimum Depth = 0.67 ft~~	~~Minimum Freeboard = 0.30 ft~~
~~Velocity < 5 fps~~	~~No rip-rap rquired~~

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	DITCH D-1D (Max Slope)
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Slope~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.03 0~~	
~~Depth~~	~~0.26~~	~~ft~~
~~Left Side Slope~~	~~1.00~~	~~V : H~~
~~Right Side Slope~~	~~1.00~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.23~~	~~cfs~~

~~Results~~		
~~Slope~~	~~0.113739~~	~~ft/ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.74~~	~~ft~~
~~Top Width~~	~~0.52~~	~~ft~~
~~Critical Depth~~	~~0.32~~	~~ft~~
~~Critical Slope~~	~~0.038399~~	~~ft/ft~~
~~Velocity~~	~~3.40~~	~~ft/s~~
~~Velocity Head~~	~~0.18~~	~~ft~~
~~Specific Energy~~	~~0.44~~	~~ft~~
~~Froude Number~~	~~1.66~~	
~~Flow Type~~	~~Supercritical~~	

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-14D
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.060000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.35~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.28~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~1.02~~	~~ft~~
~~Top Width~~	~~0.85~~	~~ft~~
~~Critical Depth~~	~~0.32~~	~~ft~~
~~Critical Slope~~	~~0.030894~~	~~ft/ft~~
~~Velocity~~	~~2.92~~	~~ft/s~~
~~Velocity Head~~	~~0.13~~	~~ft~~
~~Specific Energy~~	~~0.42~~	~~ft~~
~~Froude Number~~	~~1.36~~	
~~Flow Type~~	~~Supercritical~~	

~~Use Minimum Depth = 0.67 ft~~	~~Minimum Freeboard = 0.39 ft~~
~~Velocity < 5 fps~~	~~No riprap required~~

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-1U
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.020000~~	~~ft/ft~~
~~Left Side Slope~~	~~1.00~~	~~V : H~~
~~Right Side Slope~~	~~1.00~~	~~V : H~~
~~Bottom Width~~	~~2.00~~	~~ft~~
~~Discharge~~	~~2.51~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.36~~	~~ft~~
~~Flow Area~~	~~0.8~~	~~ft²~~
~~Wetted Perimeter~~	~~3.01~~	~~ft~~
~~Top Width~~	~~2.71~~	~~ft~~
~~Critical Depth~~	~~0.34~~	~~ft~~
~~Critical Slope~~	~~0.022403~~	~~ft/ft~~
~~Velocity~~	~~2.99~~	~~ft/s~~
~~Velocity Head~~	~~0.14~~	~~ft~~
~~Specific Energy~~	~~0.50~~	~~ft~~
~~Froude Number~~	~~0.95~~	
~~Flow Type~~	~~Subcritical~~	

~~Use Minimum Depth = .67 ft~~	~~Minimum Freeboard = 0.31 ft~~
~~Velocity < 5 fps~~	~~No riprap required~~

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-1U (Max Slope)
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.080000~~	~~ft/ft~~
~~Left Side Slope~~	~~1.00~~	~~V : H~~
~~Right Side Slope~~	~~1.00~~	~~V : H~~
~~Bottom Width~~	~~2.00~~	~~ft~~
~~Discharge~~	~~2.51~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.24~~	~~ft~~
~~Flow Area~~	~~0.5~~	~~ft²~~
~~Wetted Perimeter~~	~~2.67~~	~~ft~~
~~Top Width~~	~~2.47~~	~~ft~~
~~Critical Depth~~	~~0.34~~	~~ft~~
~~Critical Slope~~	~~0.022403~~	~~ft/ft~~
~~Velocity~~	~~4.76~~	~~ft/s~~
~~Velocity Head~~	~~0.35~~	~~ft~~
~~Specific Energy~~	~~0.59~~	~~ft~~
~~Froude Number~~	~~1.81~~	
~~Flow Type~~	~~Supercritical~~	

Worksheet

Worksheet for Trapezoidal Channel

Project Description		
Worksheet	D-2U	
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Channel Depth	

Input Data		
Mannings Coefficient	~~0.030~~ 0.035	
Slope	0.070000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	~~0.00~~ 10.00	Ft
Discharge	0.48	cfs

Results		
Depth	~~0.38~~0.08	ft
Flow Area	~~0.1~~0.8	ft²
Wetted Perimeter	~~1.06~~10.22	ft
Top Width	~~0.75~~10.16	ft
Critical Depth	~~0.43~~0.09	ft
Critical Slope	~~0.034812~~ 0.039795	ft/ft
Velocity	~~3.41~~2.05	ft/s
Velocity Head	~~0.18~~0.07	ft
Specific Energy	~~0.56~~0.14	ft
Froude Number	~~1.39~~1.29	
Flow Type	Supercritical	

Use Minimum Depth = ~~.67~~1.00 ft	Minimum Freeboard = ~~0.29~~0.92 ft
Velocity < 5 fps	No riprap required

Worksheet

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-2U (Max Slope)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	~~0.030~~ 0.035	
Slope	0.100000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	~~0.00~~ 10.00	ft
Discharge	~~0.48~~ 1.64	cfs

Results		
Depth	~~0.35~~0.07	ft
Flow Area	~~0.1~~0.7	ft²
Wetted Perimeter	~~0.99~~10.20	ft
Top Width	~~0.70~~10.14	ft
Critical Depth	~~0.43~~0.09	ft
Critical Slope	~~0.034810~~ 0.039797	ft/ft
Velocity	~~3.90~~2.29	ft/s
Velocity Head	~~0.24~~0.08	ft
Specific Energy	~~0.59~~0.15	ft
Froude Number	~~1.64~~1.52	
Flow Type	Supercritical	

Worksheet

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-3U Ave
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	~~0.030~~ 0.035	
Slope	0.040000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	~~1.00~~ 10.00	ft
Discharge	~~0.72~~ 4.08	cfs

Results		
Depth	~~0.21~~0.16	ft
Flow Area	~~0.2~~1.6	ft²
Wetted Perimeter	~~1.58~~10.46	ft
Top Width	~~1.41~~10.32	ft
Critical Depth	~~0.23~~0.17	ft
Critical Slope	~~0.026633~~ 0.032874	ft/ft
Velocity	~~2.89~~1.10	ft/s
Velocity Head	~~0.13~~0.06	ft
Specific Energy	~~0.34~~0.26	ft
Froude Number	~~1.21~~1.09	
Flow Type	Supercritical	

Use Minimum Depth = ~~.05~~1.00 ft	Minimum Freeboard = ~~0.29~~0.84 ft
Velocity < 5 fps	No riprap required

Worksheet

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-3U (Max Slope)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	~~0.030~~ 0.035	
Slope	~~0.180~~ 000	ft/ft
Left Side Slope	1.00	V : H
Right Side Slope	1.00	V : H
Bottom Width	~~1.00~~ 10.00	ft
Discharge	~~0.72~~ ~~4.08~~	cfs

Results		
Depth	~~0.13~~0.10	ft
Flow Area	~~0.~~21.0	ft²
Wetted Perimeter	~~1.37~~10.29	ft
Top Width	~~1.26~~10.21	ft
Critical Depth	~~0.23~~0.17	ft
Critical Slope	~~0.026633~~ 0.032876	ft/ft
Velocity	~~4.80~~3.91	ft/s
Velocity Head	~~0.36~~0.24	ft
Specific Energy	~~0.49~~0.34	ft
Froude Number	~~2.46~~2.16	
Flow Type	Supercritical	

Worksheet

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-4U
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	~~0.030~~ 0.035	
Slope	0.100000	ft/ft
Left Side Slope	~~0.67~~ 1.00	V : H
Right Side Slope	~~0.67~~ 1.00	V : H
Bottom Width	~~1.00~~ 10.00	ft
Discharge	~~4.05~~ 8.73	cfs

Results		
Depth	~~0.40~~0.19	ft
Flow Area	~~0.6~~2.0	ft²
Wetted Perimeter	~~2.43~~10.55	ft
Top Width	~~2.19~~10.39	ft
Critical Depth	~~0.59~~0.28	ft
Critical Slope	~~0.020879~~ 0.028208	ft/ft
Velocity	~~6.39~~4.40	ft/s
Velocity Head	~~0.64~~0.30	ft
Specific Energy	~~1.03~~0.50	ft
Froude Number	~~2.09~~1.76	
Flow Type	Supercritical	

Worksheet

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	D-4U (Max Slope)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	~~0.030~~ 0.035	
Slope	~~0.180~~ 000	ft/ft
Left Side Slope	~~0.67~~ 1.00	V : H
Right Side Slope	~~0.67~~ 1.00	V : H
Bottom Width	~~1.00~~ 10.00	ft
Discharge	~~4.05~~ 8.73	cfs

Results		
Depth	~~0.34~~0.16	ft
Flow Area	~~0.5~~1.7	ft²
Wetted Perimeter	~~2.22~~10.46	ft
Top Width	~~2.01~~10.33	ft
Critical Depth	~~0.59~~0.28	ft
Critical Slope	~~0.020879~~ 0.028280	ft/ft
Velocity	~~7.90~~5.27	ft/s
Velocity Head	~~0.97~~0.43	ft
Specific Energy	~~1.31~~0.59	ft
Froude Number	~~2.76~~2.32	
Flow Type	Supercritical	

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-15U
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.050000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.52~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.34~~	~~ft~~
~~Flow Area~~	~~0.2~~	~~ft²~~
~~Wetted Perimeter~~	~~1.22~~	~~ft~~
~~Top Width~~	~~1.02~~	~~ft~~
~~Critical Depth~~	~~0.38~~	~~ft~~
~~Critical Slope~~	~~0.029269~~	~~ft/ft~~
~~Velocity~~	~~3.00~~	~~ft/s~~
~~Velocity Head~~	~~0.14~~	~~ft~~
~~Specific Energy~~	~~0.48~~	~~ft~~
~~Froude Number~~	~~1.29~~	
~~Flow Type~~	~~Supercritical~~	

~~Use Minimum Depth = 0.67 ft~~	~~Minimum Freeboard = 0.33 ft~~
~~Velocity < 5 fps~~	~~No riprap required~~

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-15 U (Max Slope)
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.160000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.52~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.27~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~0.98~~	~~ft~~
~~Top Width~~	~~0.82~~	~~ft~~
~~Critical Depth~~	~~0.38~~	~~ft~~
~~Critical Slope~~	~~0.029269~~	~~ft/ft~~
~~Velocity~~	~~4.65~~	~~ft/s~~
~~Velocity Head~~	~~0.34~~	~~ft~~
~~Specific Energy~~	~~0.61~~	~~ft~~
~~Froude Number~~	~~2.22~~	
~~Flow Type~~	~~Supercritical~~	

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-16U
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.100000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.44~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.28~~	~~ft~~
~~Flow Area~~	~~0.1~~	~~ft²~~
~~Wetted Perimeter~~	~~1.01~~	~~ft~~
~~Top Width~~	~~0.84~~	~~ft~~
~~Critical Depth~~	~~0.35~~	~~ft~~
~~Critical Slope~~	~~0.029927~~	~~ft/ft~~
~~Velocity~~	~~3.74~~	~~ft/s~~
~~Velocity Head~~	~~0.22~~	~~ft~~
~~Specific Energy~~	~~0.50~~	~~ft~~
~~Froude Number~~	~~1.76~~	
~~Flow Type~~	~~Supercritical~~	

~~Use Minimum Depth = 0.67 ft~~	~~Minimum Freeboard = 0.39 ft~~
~~Velocity < 5 fps~~	~~No riprap required~~

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-17U
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.130000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~1.34~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.40~~	~~ft~~
~~Flow Area~~	~~0.2~~	~~ft^2~~
~~Wetted Perimeter~~	~~1.46~~	~~ft~~
~~Top Width~~	~~1.21~~	~~ft~~
~~Critical Depth~~	~~0.55~~	~~ft~~
~~Critical Slope~~	~~0.025795~~	~~ft/ft~~
~~Velocity~~	~~5.45~~	~~ft/s~~
~~Velocity Head~~	~~0.46~~	~~ft~~
~~Specific Energy~~	~~0.87~~	~~ft~~
~~Froude Number~~	~~2.13~~	
~~Flow Type~~	~~Supercritical~~	

~~Use Minimum Depth = 0.67 ft~~	~~Minimum Freeboard = 0.27 ft~~
~~Velocity < 5 fps~~	~~Use D_{50} = 3"~~

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-18U
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.050000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.83~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.40~~	~~ft~~
~~Flow Area~~	~~0.2~~	~~ft²~~
~~Wetted Perimeter~~	~~1.46~~	~~ft~~
~~Top Width~~	~~1.21~~	~~ft~~
~~Critical Depth~~	~~0.45~~	~~ft~~
~~Critical Slope~~	~~0.027496~~	~~ft/ft~~
~~Velocity~~	~~3.38~~	~~ft/s~~
~~Velocity Head~~	~~0.18~~	~~ft~~
~~Specific Energy~~	~~0.58~~	~~ft~~
~~Froude Number~~	~~1.32~~	
~~Flow Type~~	~~Supercritical~~	

~~Use Minimum Depth = 0.67 ft~~	~~Minimum Freeboard = 0.27 ft~~
~~Velocity < 5 fps~~	~~No riprap required typically~~
~~At maximum slope 17%~~	~~Use D_{50} = 3"~~

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-18U (Avg Slope)
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.110000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.83~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.35~~	~~ft~~
~~Flow Area~~	~~0.2~~	~~ft²~~
~~Wetted Perimeter~~	~~1.26~~	~~ft~~
~~Top Width~~	~~1.05~~	~~ft~~
~~Critical Depth~~	~~0.45~~	~~ft~~
~~Critical Slope~~	~~0.027496~~	~~ft/ft~~
~~Velocity~~	~~4.54~~	~~ft/s~~
~~Velocity Head~~	~~0.32~~	~~ft~~
~~Specific Energy~~	~~0.67~~	~~ft~~
~~Froude Number~~	~~1.92~~	
~~Flow Type~~	~~Supercritical~~	

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-18U (Max Slope)
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.170000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.83~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.32~~	~~ft~~
~~Flow Area~~	~~0.2~~	~~ft²~~
~~Wetted Perimeter~~	~~1.16~~	~~ft~~
~~Top Width~~	~~0.97~~	~~ft~~
~~Critical Depth~~	~~0.45~~	~~ft~~
~~Critical Slope~~	~~0.027496~~	~~ft/ft~~
~~Velocity~~	~~5.34~~	~~ft/s~~
~~Velocity Head~~	~~0.44~~	~~ft~~
~~Specific Energy~~	~~0.77~~	~~ft~~
~~Froude Number~~	~~2.35~~	
~~Flow Type~~	~~Supercritical~~	

Worksheet

Worksheet for Trapezoidal Channel

RECLAIMED

Project Description	
Worksheet	D-19U
~~Flow Element~~	~~Trapezoidal Channel~~
~~Method~~	~~Manning's Formula~~
~~Solve For~~	~~Channel Depth~~

~~Input Data~~		
~~Mannings Coefficient~~	~~0.030~~	
~~Slope~~	~~0.060000~~	~~ft/ft~~
~~Left Side Slope~~	~~0.67~~	~~V : H~~
~~Right Side Slope~~	~~0.67~~	~~V : H~~
~~Bottom Width~~	~~0.00~~	~~ft~~
~~Discharge~~	~~0.50~~	~~cfs~~

~~Results~~		
~~Depth~~	~~0.32~~	~~ft~~
~~Flow Area~~	~~0.2~~	~~ft²~~
~~Wetted Perimeter~~	~~1.17~~	~~ft~~
~~Top Width~~	~~0.97~~	~~ft~~
~~Critical Depth~~	~~0.37~~	~~ft~~
~~Critical Slope~~	~~0.029420~~	~~ft/ft~~
~~Velocity~~	~~3.19~~	~~ft/s~~
~~Velocity Head~~	~~0.16~~	~~ft~~
~~Specific Energy~~	~~0.48~~	~~ft~~
~~Froude Number~~	~~1.40~~	
~~Flow Type~~	~~Supercritical~~	

~~Use Minimum Depth = 0.67 ft~~	~~Minimum Freeboard = 0.34 ft~~
~~Velocity < 5 fps~~	~~No riprap required~~

Construction of the Tank Seam Access Road will require the disturbance of six channels, shown on Plate 7-7 as RC-TS1 through RC-TS6. All six channels exist as naturally eroding channels. Due to the steep maximum slopes, as shown on page 7H-16, riprap designs will not be proposed for these channels. This sections characterizes and documents the premining channels which exist prior to disturbance. Reclamation will consist of restoring these channels to this configuration and mimmicking the premining conditions, in order to obtain a naturally stable drainage and restore the approximate original configuration to the channels. These channels have all been reclaimed and are currently in Phase I Bond Release.

Disturbance of the channels will consist primarily of placing fill in the channels to provide access across the channels for the road. This will allow the channels to essential remain intact beneath the fill. Upon reclamation, the fill material will be excavated from the channels and fill areas, and the channels will be restored, with many of the large boulders shown in the photographs of each channel remaining in place for the post-mining channel. Profiles of the pre-mining, and subsequently the proposed post-mining, channels are shown on Plate 7-8C. A description of each channel follows. As the channels are reclaimed, the reclaimed channel will be blended in with the natural channels above and below the reclaimed channel by attempting to duplicate the appearance of the natural channels as they appear in the following photographs.

CHAPTER 8

R645-301-800 BOND

Bonding Calculations
Castle Valley Mining, LLC

Bond Summary

Direct Costs

Subtotal Demolition and Removal	~~$410,375.00~~		$374,742.00
Subtotal Backfilling and Grading	~~$776,040.00~~		$715,605.00
Subtotal Revegetation	~~$483,034.00~~		$439,917.00
Direct Costs	~~$1,669,449.00~~		$1,530,264.00
Indirect Costs			
Mob/Demob	~~$166,945.00~~	10.0%	$153,026.00
Contingency	~~$83,472.00~~	5.0%	$76,513.00
Engineering Redesign	~~$41,736.00~~	2.5%	$38,257.00
Main Office Expense	~~$113,523.00~~	6.8%	$104,058.00
Project Mainagement Fee	~~$41,736.00~~	2.5%	$38,257.00
Subtotal Indirect Costs	~~$447,412.00~~	26.8%	$410,111.00
Total Cost	~~$2,116,861.00~~		$1,940,375.00
Escalation factor		0.015	
Number of years		5	
Escalation	~~$163,599.00~~		$149,960.00
Reclamation Cost	~~$2,280,460.00~~		$2,090,335.00
Bond Amount (rounded to nearest $1,000)	~~$2,280,000.00~~		$2,090,000.00
2018 dollars			

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	Phase I Bond	Adj. Bond Cost
	Scale House 01																			19933		19933
	Scalehouse Pavement 02																			9831		9831
	Shower House 03																			17169		17169
	Shop 04																			17468		17468
	Machine Shop 05																			4730		4730
	WHR Shop 06																			3827		3827
	Tipple 07																			20899		20899
	Substation 08																			14251		14251
	Coal Storage Bin 09																			9521		9521
	Lump Coal 10																			5320		5320
	Coal Recovery Bin 11																			184		184
	WHR Surge Bin 12																			12086		12086
	Ditch D 8D 13																			302		302
	Lump Coal Storage Pad 14																			2792		2792
	Equipment Wash Pad 15																			580		580
	Transformer Pad Shop 16																			67		67
	Water Tanks 17																			1795		1795
	Fuel Tanks 18																			2796		2796
	Fuel Lines 19																			3260		3260
	Fans 20																			4062		4062
	Conveyor 21																			90506		90506
	Bld Tank Seam 22																			334	334	0
	Septic Tanks 23																			330		330
	Culverts 24																			16028	4920	11108
	Watchman Trailer 25																			179	179	0
	Cap and Powder Mag 26																			139		139
	Conveyor Tunnel 27																			7911		7911
	Plug Well 28																			5000		5000
	Seal Portals 29																			93600	31200	62400
	Power Lines and Poles 30																			5983		5983
	Portals AM02A No 31																			20800		20800
	Culvert Removal No 32																			817		817
	Portals No 33																			15600		15600
	Hilfiker Retaining Wall No. 34																			3938		3938
	Sampling Station No. 35																			339		339
	Total																			410376	35633	374742

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
	Scale House DT																			
	Structure's Demolition Cost	Mixed Materials Bld. Large	02 41 16.13 0100	0.29	/CF	34	83	16								FT		45152	CF	13094
	Structure's Vol. Demolished																0.3	602	CY	
	Rubble's Weight (exclude steel)												1.35			TON/CY		678	TON	
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	Nielson Construction	Nelson Con.	7	/TON													678	TON	4746
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			17940
	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	9.82	/CY	234	2	0.67								FT		12	CY	118
	Concrete's Vol. Demolished																1.3	16	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													16	CY	29
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													16	CY	88
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													16	CY	138
	Subtotal																			370
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	234	4	0.67								FT		23	CY	226
	Concrete's Vol. Demolished																1.3	30	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													30	CY	49
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													30	CY	164
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													30	CY	258
	Subtotal																			697
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	83	34	0.33								FT		34	CY	334
	Concrete's Vol. Demolished																1.3	44	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													44	CY	72
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													44	CY	241
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													44	CY	379
	Subtotal																			1026
	Total																			19933

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
	Bituminous Pavement 02																			
	Structure's Demolition Cost	Pavement removal (asphalt) 3 inch	02 41 13.17 5010	4.3	/SY					1450						SY		1450	SY	6235
	Structure's Vol. Demolished							0.083								YD	1.3	156	CY	
	Rubble's Weight (exclude steel)												2			ton/CY		406	TON	
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck	Tandem dump 18 ton payload	01 54 33 20 5300	325	/day									1.22		DAY		1.22	DAY	397
	Transportation Cost Non Steel Drive	Truck Driver, Heavy	Trhv	$36.60	HR									0.76		HR		0.76	HR	357
	Disposal Cost Non Steel	Nielson Construction	Nielson Con.	7	/TON													406	TON	2842
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			9831
	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																			9831

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
	Shower House 03																			
	Structure's Demolition Cost															FT		36800	CF	10672
	Structure's Vol.	Mixed Materials Bld. Large	02 41 16.13 0100	0.29	/CF	92	50	8									0.3	409	CY	
	Structure's Vol. Demolished												1.35			TON/CY		552	TON	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																	552	TON	3864
	Disposal Cost Non Steel	Nelson Construction	Nelson Con.	7	/TON															
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			14536
	Concrete Demolition															FT		14	CY	137
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	284	2	0.67									1.3	18	CY	
	Concrete's Vol. Demolished																	18	CY	30
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													18	CY	99
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													18	CY	155
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF															421
	Subtotal																			
	Concrete Demolition															FT		16	CY	157
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	319	2	0.67									1.3	21	CY	
	Concrete's Vol. Demolished																	21	CY	34
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													21	CY	115
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													21	CY	181
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF															487
	Subtotal																			
	Concrete Demolition															FT		56	CY	550
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	92	50	0.33									1.3	73	CY	
	Concrete's Vol. Demolished																	73	CY	120
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													73	CY	400
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													73	CY	629
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF															1699
	Subtotal																			
	Concrete Demolition															FT		1	CY	10
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	12	5.5	0.33									1.3	1	CY	
	Concrete's Vol. Demolished																	1	CY	2
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													1	CY	5
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													1	CY	9
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF															26
	Subtotal																			
	Total																			17169

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 04																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16.13 0020	0.29	/CF	40	93	14								FT		52080	CF	15103
	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																			15103
	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	9.82	/CY	197.5	4	0.67								FT		20	CY	196
	Concrete's Vol. Demolished																1.3	26	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													26	CY	43
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trk	31 23 23.20 1020	5.49	/CY													26	CY	142
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													26	CY	224
	Subtotal																			605
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	266	2	0.67								FT		13	CY	128
	Concrete's Vol. Demolished																1.3	16.9	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													16.9	CY	28
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trk	31 23 23.20 1020	5.49	/CY													16.9	CY	93
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													16.9	CY	146
	Subtotal																			395
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	40	93	0.33								FT		45	CY	442
	Concrete's Vol. Demolished																1.3	58.5	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													58.5	CY	96
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trk	31 23 23.20 1020	5.49	/CY													58.5	CY	321
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													58.5	CY	504
	Subtotal																			1363
	Total																			17466

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
	Machine Shop 05																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16.13 0020	0.29	/CF	30	45	10								FT		13500	CF	3915
	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																			3915
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	135	1	0.67								FT		3	CY	29
	Concrete's Vol. Demolished																1.3	4	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													4	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.48	/CY													4	CY	22
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													4	CY	34
	Subtotal																			92
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	150	2	0.67								FT		7	CY	69
	Concrete's Vol. Demolished																1.3	9	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													9	CY	15
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.48	/CY													9	CY	49
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													9	CY	77
	Subtotal																			210
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	30	45	0.33								FT		17	CY	167
	Concrete's Vol. Demolished																1.3	22	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													22	CY	36
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.48	/CY													22	CY	121
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													22	CY	189
	Subtotal																			513
	Total																			4730

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
	WHR Shop 06																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16.13 0020	0.29	/CF	20	40	14								FT		11200	CF	3248
	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																			3248
	Equipment's Disposal Cost																			
	Dismantling Cost																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	120	1	0.67								FT		3	CY	29
	Concrete's Vol. Demolished																1.3	4	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													4	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.48	/CY													4	CY	22
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													4	CY	34
	Subtotal																			92
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	120	2	0.67								FT		6	CY	59
	Concrete's Vol. Demolished																1.3	8	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													8	CY	13
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.48	/CY													8	CY	44
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													8	CY	69
	Subtotal																			185
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	20	40	0.33								FT		10	CY	98
	Concrete's Vol. Demolished																1.3	13	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													13	CY	21
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.48	/CY													13	CY	71
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													13	CY	112
	Subtotal																			302
	Total																			3827

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
	Tipple 07																			
	Structure's Demolition Cost																			
	Structure's Vol.	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	27	10	26								FT		6760	CF	1959
	Structure's Vol.	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	27	20	17								FT		9180	CF	2662
	Structure's Vol.	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	27	10	8								FT		2160	CF	626
	Structure's Vol.	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	20	30	51								FT		30600	CF	8874
	Structure's Vol.	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	20	30	10								FT		2400	CF	696
	Structure's Vol.	Mixed Materials Bld. Large	02 41 16 13 0100	0.29	/CF	12	20	10									0.3	888	CY	
	Structure's Vol. Demolished												1.35			TON/CY		787	TON	
	Rubble's Weight (exclude steel)																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Non Steel Truck																			
	Transportation Cost Non Steel Drive																			
	Disposal Cost Non Steel	Nielson Construction	Neilson Con.	7	/TON													787	TON	5369
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			20185
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	2	2	1.5							11	FT		2	CY	20
	Concrete's Vol. Demolished																1.3	3	CT	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													3	CT	5
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													3	CT	16
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													3	CT	26
	Subtotal																			67
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	3	3	2							4	FT		3	CY	29
	Concrete's Vol. Demolished																1.3	4	CT	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													4	CT	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													4	CT	22
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													4	CT	34
	Subtotal																			92
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	27	40	0.29							1	FT		12	CY	118
	Concrete's Vol. Demolished																1.3	16	CT	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													16	CT	29
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													16	CT	88
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													16	CT	138
	Subtotal																			370
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	20	30	0.29							1	FT		6	CY	59
	Concrete's Vol. Demolished																1.3	8	CT	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													8	CT	13
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													8	CT	44
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													8	CT	69
	Subtotal																			185
	Total																			20899

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
	Substation Dd																			
	Structure's Demolition Cost																			
		Torch Cutting Steel 1" plate	02 41 19 27 0020	1.17	/LF	26.9										LF		27	LF	32
		Torch Cutting Steel 1" bar	02 41 19 27 0040	1.36	/EA									0.77	1	Day		0.8	DAY	1
		Truck Mounted Crane 25 ton	01 54 33 60 2500	630	/day									6.2	1	HR		6.2	HR	3906
		Eq. Op., Crane or Shovel (Eqhv)	Eqhv	$46.80	HR									0.77	2	DAY		1.5	DAY	73
		Truck dump 19 ton payload	01 54 33 20 5300	325	/day									6.2	2	HR		12.4	HR	4030
		Truck Driver, Heavy	Trhv	$36.60	HR									6.2	2	HR		12.4	HR	454
		CLAB	Clab	$36.45	HR															
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			9496
	Equipment 's Disposal Cost																			
	Dismantling Cost	Chain link remove 8'-10'	02 41 13 60 1700	2.93	/LF	157									2	LF		314	LF	920
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			920
	Transformers																			
	Equipment 's Disposal Cost																			
	Dismantling Cost	Mechanical equipment heavy	23 06 05.10 3800	740	/ton							6				EA		6	EA	4440
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			4440
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	19	19	0.5							2	FT		13	CY	129
	Concrete's Vol. Demolished																1.3	17	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													17	CY	28
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. trl	31 23 23.20 1020	5.48	/CY													17	CY	93
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													17	CY	146
	Subtotal																			395
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			14251

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
	Coal Storage Bin 09																			
	Structure's Demolition Cost																			
		Torch Cutting Steel 1" plate	02 41 19 27 0020	1.17	/LF	163.3										LF		163	LF	191
		Torch Cutting Steel 1" bar	02 41 19 27 0040	1.36	/EA									0.66	1	DAY		0.7	DAY	1
		Truck Mounted Crane 25 ton	01 54 33 60 2500	630	/day									5.3	1	HR		5.3	HR	3339
		Eq. Op., Crane or Shovel (Eqhv)	Eqhv	$49.60	HR									0.66	2	DAY		1.3	DAY	53
		Truck dump 10 ton enclosed	01 54 33 20 5300	326	/day									5.3	2	HR		10.6	HR	3446
		Truck Driver, Heavy	Trhv	$36.60	HR									5.3	2	HR		10.6	HR	388
		CLAB	Clab	$36.45	HR															
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			7427
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	60	1	6								FT		13	CY	128
																	1.3	17	CY	
	Concrete's Vol. Demolished																	17	CY	28
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													17	CY	93
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trfc	31 23 23.20 1020	5.48	/CY													17	CY	146
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF															395
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	3	3	1							4	FT		1	CY	10
																	1.3	1	CY	
	Concrete's Vol. Demolished																	1	CY	2
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													1	CY	5
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trfc	31 23 23.20 1020	5.48	/CY													1	CY	9
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF															26
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	30	30	0.67								FT		22	CY	216
																	1.3	29	CY	
	Concrete's Vol. Demolished																	29	CY	48
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													29	CY	159
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trfc	31 23 23.20 1020	5.48	/CY													29	CY	250
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF															673
	Subtotal																			
	Total																			9521

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
	Lump Coal 10																			
	Structure's Demolition Cost																			
		Torch Cutting Steel 1" plate	02 41 19 27 0020	1.17	/LF	225										LF		225	LF	263
		Torch Cutting Steel 1" bar	02 41 19 27 0040	1.35	/EA									0.55	1	DAY		0.55	DAY	1
		Truck Mounted Crane 25 ton	01 54 33 60 2500	360	/day									4.4	1	HR		4.4	HR	1584
		Eq. Op., Crane or Shovel (Eqhv)	Eqhv	$49.60	HR									0.55	2	DAY		1.1	DAY	54
		Truck dump 18 ton enclosed	01 54 33 20 5300	325	/day									4.4	2	HR		8.8	HR	2860
		Truck Driver, Heavy	Trhv	$36.60	HR									4.4	2	HR		8.8	HR	322
		CLAB	Clab	$36.45	HR															
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			$5094
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	102	2	1								FT		8	CY	79
	Concrete's Vol. Demolished																1.3	10	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													10	CY	16
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													10	CY	55
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.61	/CF													10	CY	96
	Subtotal																			238
	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																			$5920

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
	Coal Recovery Bin 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																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	12	2.5	1							4	FT		4	CY	39
	Concrete's Vol. Demolished																1.3	5	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													5	CY	8
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trk	31 23 23.20 1020	5.49	/CY													5	CY	27
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													5	CY	43
	Subtotal																			117
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	12	12	0.33								FT		2	CY	20
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													3	CY	5
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trk	31 23 23.20 1020	5.49	/CY													3	CY	16
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													3	CY	26
	Subtotal																			67
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			184

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
	WWR Surge Bin 12																			
	Structure's Demolition Cost																			
		Torch Cutting Steel 1" plate	02 41 19 27 0020	1.17	/LF	458										LF		458	LF	536
		Torch Cutting Steel 1" bar	02 41 19 27 0040	1.36	/EA									0.85	1	DAY		0.85	DAY	1
		Truck Mounted Crane 25 ton	01 54 33 60 2500	$50	/day									6.8	1	HR		6.8	HR	4284
		Eq. Op., Crane or Shovel (Eqhv)	Eqhv	$49.60	HR									0.85	2	DAY		1.7	DAY	83
		Truck dump 18 ton payload	01 54 33 20 5300	325	/day									6.8	2	HR		13.6	HR	4420
		Truck Driver, Heavy	Trhv	$36.60	HR									6.8	2	HR		13.6	HR	498
		CLAB	Clab	$35.45	HR															
	Steel's Weight																			
	Truck's Capacity																			
	Haulage																			
	Transportation Cost Steel Truck																			
	Transportation Cost Steel Truck Drive																			
	Disposal Cost Steel																			
	Subtotal																			9922
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	120	6	0.67								FT		19	CY	177
	Concrete's Vol. Demolished																1.3	23	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													23	CY	38
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. tri	31 23 23 20 1020	5.48	/CY													23	CY	126
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													23	CY	199
	Subtotal																			539
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	3	3	1							4	FT		1	CY	10
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													1	CY	2
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. tri	31 23 23 20 1020	5.48	/CY													1	CY	6
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													1	CY	9
	Subtotal																			26
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	60	60	0.5								FT		56	CY	550
	Concrete's Vol. Demolished																1.3	73	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													73	CY	120
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. tri	31 23 23 20 1020	5.48	/CY													73	CY	400
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													73	CY	629
	Subtotal																			1699
	Total																			12086

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
	Ditch D 9D 13																			
	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	9.82	/CY	35	12	0.67								FT		10	CY	98
	Concrete's Vol. Demolished																1.3	13	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													13	CY	21
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23.20 1020	5.49	/CY													13	CY	71
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													13	CY	112
	Subtotal																			302
	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																			302

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
	Lump Coal Storage Pad 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	9.82	/CY	118	4	1								FT		17	CY	167
	Concrete's Vol. Demolished																1.3	22	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													22	CY	36
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													22	CY	121
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													22	CY	189
	Subtotal																			513
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	38	60	0.67								FT		75	CY	737
	Concrete's Vol. Demolished																1.3	98	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													98	CY	161
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													98	CY	537
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													98	CY	844
	Subtotal																			2279
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			2792

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
	Equipment Wash Pad 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																			
	Equipment's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	40	25	0.5								FT		19	CY	187
	Concrete's Vol. Demolished																1.3	25	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													25	CY	41
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23.20 1020	5.49	/CY													25	CY	137
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													25	CY	215
	Subtotal																			580
	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																			580

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
	Transformer Pad Shop 15																			
	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	9.82	/CY	11	9	0.5								FT		2	CY	20
	Concrete's Vol. Demolished																1.3	3	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													3	CY	5
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trl	31 23 23 20 1020	5.48	/CY													3	CY	16
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													3	CY	26
	Subtotal																			67
	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																			67

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
	Water Tanks 17																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	10			14						3	FT		4619	CF	1339
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	20			10						1	FT		1571	CF	456
	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																			1795
	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																			1795

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
	Fuel Tanks 19																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	10			13.5						2	FT		2863	CF	830
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	23			11.5						1	FT		2589	CF	893
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	19			9						3	FT		3628	CF	1052
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	11			4						1	FT		138	CF	40
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	7			7						1	FT		269	CF	78
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	6			9.5						1	FT		354	CF	103
	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																			
	Disposal Cost Steel																			
	Subtotal																			2796
	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																			2796

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
	Fuel Lines 19																			
	Structure's Demolition Cost	Pipe Steel 4" dia	02 41 13 33 3200	8.16	/LF	400										LF		400	LF	3260
	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																			3260
	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																			3260

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
	Fans 20																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished	Torch Cutting Steel 1" plate	02 41 19 27 0020	1.17	/LF	77										LF		77	LF	90
		Torch Cutting Steel 1" bar	02 41 19 27 0040	1.35	/EA										299	EA		299	EA	399
		Truck Mounted Crane 25 ton	01 54 33 60 2500	630	/day									1	1	DAY		1	DAY	630
		Eq. Op., Crane or Shovel (Eqhv)	Eqhv	$49.60	HR									8.2	1	HR		8.2	HR	400
		Truck dump 18 ton payload	01 54 33 20 5300	325	/day									1	2	DAY		2	DAY	650
		Truck Driver, Heavy	Trhv	$36.60	HR									8.2	2	HR		16.4	HR	600
		CLAB	Clab	$35.40	HR									8.2	2	HR		16.4	HR	581
	Subtotal																			3340
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	7.5	2	0.67							8	FT		3	CY	29
	Concrete's Vol. Demolished																1.3	4	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													4	CY	7
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trl	31 23 23.20 1020	5.49	/CY													4	CY	22
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													4	CY	34
	Subtotal																			92
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	16	13	0.67							4	FT		21	CY	206
	Concrete's Vol. Demolished																1.3	27	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.84	/CY													27	CY	44
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trl	31 23 23.20 1020	5.49	/CY													27	CY	148
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													27	CY	232
	Subtotal																			630
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			4062

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
	Conveyor 21																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	6230	6	6								FT		156750	CF	45168
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	60	9	9							39	FT		149760	CF	43430
	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																			88598
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	3	3	1							189	FT		63	CY	619
	Concrete's Vol. Demolished																1.3	82	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													82	CY	134
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. trfc	31 23 23.20 1020	5.48	/CY													82	CY	449
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													82	CY	706
	Subtotal																			1908
	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																			90506

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	Phase I Bond	Adj. Bond Cost
	Bld Tank Seam 22																					
	~~Structure's Demolition Cost~~	~~Steel Bld. Large~~	~~02 41 16 13 0012~~	~~0.29~~	~~/CF~~	~~12~~	~~12~~	~~9~~								~~FT~~		~~1162~~	CF	~~334~~	334	0
	Subtotal																			~~334~~	334	0
	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																			~~334~~	334	0

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
	Septic Tanks 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																			
	Excavation of Septic Tanks																			
	Excavation	Excavation Bulk Bank 2 CY (322BL)	31 23 16.42 0260	1.54	/CY	10	10	3							4	FT		44	CY	68
	Backfill	Backfill Trench Minimal Haul 2 1/4 CY	31 23 16 13 3080	1.76	/CY	10	10	3							4	FT		44	CY	77
	Subtotal																			145
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY						1.5				4	CY		6	CY	59
	Concrete's Vol. Demolished																1.3	8	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													8	CY	13
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													8	CY	44
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.81	/CF													8	CY	69
	Subtotal																			185
	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																			330

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	New Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity		Unit	Cost	Phase I Bond	Adj. Bond Cost
	Culverts 24																							
	RC 01 Remove	~~Excavation Bulk Bank 2 CY (322BL)~~	~~31 23 16 42 0260~~	~~1.54~~	~~/CY~~							~~499~~					~~CY~~		~~499~~		~~CY~~	~~767~~	767	0
	RC 02 Remove	~~Excavation Bulk Bank 2 CY (322BL)~~	~~31 23 16 42 0260~~	~~1.54~~	~~/CY~~							~~1479~~					~~CY~~		~~1479~~		~~CY~~	~~2276~~	2276	0
	RC 03 Remove	~~Excavation Bulk Bank 2 CY (322BL)~~	~~31 23 16 42 0260~~	~~1.54~~	~~/CY~~							~~448~~					~~CY~~		~~448~~		~~CY~~	~~690~~	690	0
	RC 04 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							226					CY		226		CY	348		348
	RC 05 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							178					CY		178		CY	274		274
	RC 06 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							44					CY		44		CY	68		68
	RC 07 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							451					CY		451		CY	695		695
	RC 08 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							347					CY		347		CY	534		534
	RC 09 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							3844					CY		3844		CY	5920		5920
	RC 10 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							1395					CY		1395		CY	2148		2148
	RC 11 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							44					CY		44		CY	68		68
	RC 12 Remove	Excavation Bulk Bank 2 CY (322BL)	31 23 16 42 0260	1.54	/CY							307					CY		307		CY	473		473
	Subtotal																					14263	3735	10528
	Subtotal																							
	Concrete Demolition																							
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	~~140~~	105	0.25		5							FT		~~26~~	19	CY	~~246~~	56	187
	Concrete's Vol. Demolished																	1.3	~~33~~	25	CY			
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY														~~33~~	25	CY	~~54~~	13	41
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. rnd. trip	31 23 23 17 0320	5.48	/CY														~~33~~	25	CY	~~181~~	44	137
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF														~~33~~	25	CY	~~284~~	69	215
	Subtotal																					~~765~~	187	580
	Total																					15028	3922	11106

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	Phase I Bond	Adj. Bond Cost
	Watchman Trailer 25																					
	Structure's Demolition Cost	Mixed Materials Bld. Large	02 41 16 13 0100	0.29	/CF	8	8	7								FT		448	CF	130	130	0
	Structure's Vol. Demolished																0.3	5	CY			
	Rubble's Weight (exclude steel)												1.35			TONCY		7	TON			
	Truck's Capacity																					
	Haulage																					
	Transportation Cost Non Steel Truck																					
	Transportation Cost Non Steel Drive																					
	Disposal Cost Non Steel	Nielsen Construction	Nielsen Con.	7	/TON													7	TON	49	49	0
	Steel's Weight																					
	Truck's Capacity																					
	Haulage																					
	Transportation Cost Steel Truck																					
	Transportation Cost Steel Truck Drive																					
	Disposal Cost Steel																					
	Subtotal																			179	179	0
	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																			179	179	0

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
	Cab and Powder Mag 29																			
	Structure's Demolition Cost	Steel Bld. Large	02 41 16 13 0012	0.29	/CF	6	6	8							2	FT		480	CF	139
	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																			139
	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																			139

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
	Conveyor Tunnel 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	9.82	/CY	470	7	0.5							2	FT		122	CY	1198
	Concrete's Vol. Demolished																1.3	159	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													159	CY	261
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													159	CY	871
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.81	/CF													159	CY	1399
	Subtotal																			3729
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	470	8	0.5							2	FT		139	CY	1365
	Concrete's Vol. Demolished																1.3	181	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													181	CY	297
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													181	CY	992
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.81	/CF													181	CY	1594
	Subtotal																			4248
	Concrete Demolition																			
	Demolition Cost																			
	Concrete's Vol. Demolished																			
	Loading Cost																			
	Transportation Cost																			
	Disposal Costs																			
	Subtotal																			
	Total																			7911

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
	Plug Well 28																			
	Structure's Demolition Cost	Plug Well	AML3	5000	EA.										1	EA		1	EA	5000
	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																			5000
	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																			5000

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Phase I Adj No	Unit	Swell Factor	Quantity	Phase I Adj No	Unit	Cost	Phase I Bond	Adj Bond Cost
	Seal Portals 29																							
	Structure's Demolition Cost	Seal Portals	AML1	5200	EA										~~19~~	6	EA		~~19~~	12	EA	~~93600~~	31200	62400
	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																					~~93600~~	31200	62400
	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																					~~93600~~	31200	62400

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
	Power Lines and Poles 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	Wire Removal	Old Means 1	11.3	/CLF	8700										FT		87	CLF	983
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			983
	Equipment 's Disposal Cost	Powerpole	Hiawatha	100	EA										60	EA		50	EA	6000
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			6000
	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																			[illegible]

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
	Portals AMOZA No 31																			
	Structure's Demolition Cost	Seal Portals	AML1	5200	EA										4	EA		4	EA	20800
	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																			20800
	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																			20800

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
	Culvert Removal No 32																			
	Structure's Demolition Cost																			
	Structure's Vol. Demolished																			
	Rubble's Weight (exclude slash)																			
	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																			0
	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	9.82	/CY						27.15					CY		27.15	CY	267
	Concrete's Vol. Demolished																1.3	35	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													35	CY	57
	Transportation Cost	12 CY (18 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													35	CY	192
	Disposal Costs	Disposal on site	02 41 16 17 4200	8.61	/CF													35	CY	301
	Subtotal																			817
	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																			817

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
	Portals No 33																			
	Structure's Demolition Cost	Seal Portals	AML1	5200	EA.										3	EA		3	EA	15600
	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																			15600
	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																			15600

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
	Hillker Retaining Wall No. 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																			
	Crane	Truck Mounted Crane 25 ton	01 54 33 60 2500	630	/day									2	1	days		2	days	1260
	Truck	Truck dump 16 ton payload	01 54 33 20 5300	325	/day									2	2	days		4	days	1300
	Crane Operator	Eq. Op., Crane or Shovel (Eqhr)	Eqhr	$49.80	HR									2	1	days		2	days	98
	Truck Driver	Truck Driver, Heavy	Trhr	$36.60	HR									2	2	days		4	days	146
	Labors	CLAB	Clab	$35.45	HR									16	2	hrs		32	hr	1134
	Subtotal																			3938
	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																			3938

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
	Sampling Station No. 36																			
	Structure's Demolition Cost	Steel Bld, Large	02 41 16 13 0012	0.29	/CF	9	12	10								FT		1080	CF	313
	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																			313
	Equipment 's Disposal Cost																			
	Dismantling Cost																			
	Equipment 's Vol. Demolished																			
	Loading Costs																			
	Transport Costs																			
	Disposal Costs																			
	Subtotal																			
	Concrete Demolition																			
	Demolition Cost	Concrete demolition	ConcreteDemo1	9.82	/CY	10	7	0.5								FT		1	CY	10
	Concrete's Vol. Demolished																1.3	1	CY	
	Loading Cost	Front end loader 3 CY	31 23 16 42 1300	1.64	/CY													1	CY	2
	Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. md. tri	31 23 23.20 1020	5.49	/CY													1	CY	5
	Disposal Costs	Disposal on site	02 41 16 17 4200	9.81	/CF													1	CY	9
	Subtotal																			26
	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																			339

	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	Phase I Bond	Adj. Bond Cost
Bear Canyon Mine																	
Earthwork																	
Tank Seam No 01 YS-10 & TS-11															~~27514~~	27514	0
Upper Storage Pad No 02 TS-8															~~3747~~	3747	0
Portal Pad Area No 03 TS-7															~~9635~~	2702	6933
Portal Access Road No 04															8298		8298
Coal Storage Pad No. 5															77927		77927
Scale House No.6															936		936
Sediment Ponds No.7															2227		2227
Shower House No.08															3777		3777
Wild Horse Ridge No. 09															45464		36409
Borehole No 10															36409		45464
Support No.11															~~24099~~	6474	17625
Riprap No.12															~~536007~~	19998	516009
Total															~~776040~~	60435	715605

	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	Phase I Cost	Adj. Bond Cost
Bear Canyon Mine																	
Grading																	
Tank Seam No 01 YS-10 & TS-11																	
Tank Seam Access Road and Portal Pad Area																	
Direct Cut and Fill																	
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	9649	CY	478	CY/HR	20.2	HR	5149	5149	0
Load and Haul																	
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	10661	CY	478	CY/HR	22.3	HR	5684	5684	0
6X4 50,000lbs 10-12 CY (20-15) (2nd2006)	2950	62.05	0.1	36.60	123.29	4	493.16	$/HR					22.3	HR	10997	10997	0
Place Hauled Material																	
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	10661	CY	478	CY/HR	22.3	HR	5684	5684	0
Volume									20310	CY							
Total															27514	27514	0

	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	Phase I Bond	Adj. Bond Cost
Bear Canyon Mine																	
Grading																	
Upper Storage Pad No 02 TS-8																	
Direct Cut and Fill																	
CAT 345BL II (10-24)(2nd2006) 2005	~~13900~~	~~109.55~~	~~0.1~~	~~47.50~~	~~254.88~~	~~1~~	~~254.88~~	~~$/HR~~	~~3666~~	~~CY~~	~~478~~	~~CY/HR~~	~~7.7~~	~~HR~~	~~1963~~	1963	0
Place Hauled Material From TS-5 and TS-6	~~13900~~	~~109.55~~	~~0.1~~	~~47.50~~	~~254.88~~	~~1~~	~~254.88~~	~~$/HR~~	~~3356~~	~~CY~~	~~478~~	~~CY/HR~~	~~7~~	~~HR~~	~~1784~~	1784	0
Volume									~~7022~~								
Total															~~3747~~	3747	0

	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	Qunatity Remaining	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Equip. + Labor Time/Dis.	Units	Cost	Phase I Bond	Adj. Bond Cost
Bear Canyon Mine																			
Grading																			
Portal Pad Area No 03 TS-7																			
Direct Cut and Fill																			
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	8445	5578	CY	478	CY/HR	13.5	11.7	HR	3441	459	2982
Place Hauled Material From TS-5																			
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	11592	7405	CY	478	CY/HR	24.3	15.5	HR	6194	2243	3951
Volume									18037	12983									
Total																	9635	2702	6933

	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
Bear Canyon Mine															
Grading															
Portal Access Road No 04															
Direct Cut and Fill															
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	5573	CY	478	CY/HR	11.7	HR	2982
Load and Haul															
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	2553	CY	478	CY/HR	5.3	HR	1351
6X4 50,000lbs 10-12 CY (20-15) (2nd2006)	2950	62.05	0.1	36.60	123.29	4	493.16	$/HR					5.3	HR	2614
Place Hauled Material															
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	2553	CY	478	CY/HR	5.3	HR	1351
Volume									8126						
Total															8298

	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
Bear Canyon Mine															
Grading															
Coal Storage Pad No. 5															
Load and Haul Soil to other sites															
980H Series II EROPS (9-34) (2nd2006)	16200	115.7	0.1	47.5	276.02	1	276.02	$/HR	15428	CY	577	CY/HR	26.7	HR	7370
6X4 50,000lbs 10-12 CY (20-15) (2nd2006)	2950	62.05	0.1	36.60	123.29	14	1726.06	$/HR					26.7	HR	46086
Place Hauled Material															
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	15428	CY	478	CY/HR	32.3	HR	8233
Move material on sitePlace Hauled Material															
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	25157	CY	500	CY/HR	50.3	HR	16238
Volume									40585						
Total															77927

	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
Bear Canyon Mine															
Grading															
Scale House No.6															
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	1454	CY	500	CY/HR	2.9	HR	936
Volume									1454						
Total															936

	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
Bear Canyon Mine															
Grading															
Sediment Ponds No.7															
Sediment Ponds "A"															
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	3460	CY	500	CY/HR	6.9	HR	2227
Sediment Ponds "B"															
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	0	CY	500	CY/HR	0	HR	0
Sediment Ponds "C"															
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	0	CY	500	CY/HR	0	HR	0
Volume									3460						
Total															2227

	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
Bear Canyon Mine															
Grading															
Shower House No.08															
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	5851	CY	500	CY	11.7	CY	3777
Volume									5851						
Total															3777

	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
Bear Canyon Mine															
Grading															
Wild Horse Ridge No. 09															
WHR Portal Area															
Rough Backfilling and Grading															
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	10288	CY	500	CY/HR	20.6	HR	6650
Haul and Place Topsoil															
980H Series II EROPS (9-34) (2nd2006)	16200	115.7	0.1	47.50	276.02	1	276.02	$/HR	4860	CY	577	CY/HR	8.4	HR	2319
6X4 50,000lbs 10-12 CY (20-15) (2nd2006)	2950	62.05	0.1	36.60	123.29	17	2095.93	$/HR					8.4	HR	17606
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	4860	CY	500	CY/HR	9.7	HR	3131
Subtotal															29706
WHR Upper Access Road															
Cut and Fill Material															
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.54	0.1	47.50	254.87	1	254.87	$/HR	1912	CY	478	CY/HR	4	HR	1019
Haul and Place Topsoil															
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.54	0.1	47.50	254.87	1	254.87	$/HR	2171	CY	478	CY/HR	4.5	HR	1147
6X4 50,000lbs 10-12 CY (20-15) (2nd2006)	2950	62.05	0.1	36.60	123.29	3	369.87	$/HR					4.5	HR	1664
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.54	0.1	47.50	254.87	1	254.87	$/HR	2171	CY	478	CY/HR	4.5	HR	1147
Subtotal															4977
WHR Lower Access Road															
Load and Haul Material with															
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.54	0.1	47.50	254.87	1	254.87	$/HR	1473.5	CY	478	CY/HR	3.1	HR	790
D9R Semi-U EROPS (9-50) (2H2006)	20300	134.95	0.1	47.50	322.82	1	322.82	$/HR	1473.5	CY	500	CY/HR	2.9	HR	936
Subtotal															1726
Volume									20704.5						
Total															36409

	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
Bear Canyon Mine															
Grading															
Borehole No 10															
Load and Haul Material															
980H Series II EROPS (9-34) (2nd2006)	16200	115.70	0.1	47.50	276.02	1	276.02	$/HR	10560	CY	498	CY/HR	21.2	HR	5852
6X4 50,000lbs 10-12 CY (20-15) (2nd2006)	2950	62.05	0.1	36.60	123.29	13	1602.77	$/HR					21.2	HR	33979
CAT 345BL II (10-24)(2nd2006) 2005	13900	109.55	0.1	47.50	254.88	1	254.88	$/HR	10560	CY	478	CY/HR	22.1	HR	5633
Volume									10560						
Total															45464

	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.	Equip. + Labor Time/Dis.	Units	Cost	Phase I Bond	Adj. Bond Cost
Bear Canyon Mine																		
Grading																		
Support No.11																		
Foreman Average, Outside					37.45	1	37.45	$/HR					335.6	245.5	HR	~~12568~~	3374	9194
5,000 gal H2O truck Diesel (20-17) (2nd2006)	3800	52.7	0.1	45.65	127.37	1	127.37	$/HR					35.6	26	HR	~~4534~~	1222	3312
Pickup Truck Crew 4x4 1 ton (20-17) (2nd2006)	660	15.2	0.1	0	20.85	1	20.85	$/HR					335.6	245.5	HR	~~6997~~	1878	5119
Total																~~24099~~	6474	17626

	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	Quantity Remaining	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost	Phase I Bond	Adj. Bond Cost
Bear Canyon Mine																		
Grading																		
Riprap No.12																		
Place rep-rap 18" min.thickness mat only																		
31 37 13.10 0200					75.75			$/SY	7076	6812			S.Y.			536007	19998	516009
Total																536007	19998	516009

AREA	TOTAL LENGTH	RECLAIMED LENGTH	& COMP	TOTAL RIPRAP (SY)	RECLAIMED RIPRAP (SY)
RC-1	320	320	100	125	125
RC-2	640	190	30	289	80
RC-3	1030	140	14	432	59
					264

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	Phase II Bond	Adj. Bond Cost
	Main Mine Site 01																			~~361098~~	43117	317979
	Wild Horse Ridge 02																			121938		121938
	Total																			~~483034~~		439917

Ref.	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	New Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	New Quantity	Unit	Cost	Phase I Bond	Adj. Bond Cost
	Main Mine Site 01																							
	Revegetation																							
	Drill Seeding																							
	Drill Seeding	Tractor Spreader (equip. & labor) B-66	Reveg004	24.09	/MSF					13.4							AC		584		MSF	14069		14069
	Seed Material	Bear Canyon Main Mine Shrubs	Bear Canyon 001	196	$/AC					13.4							AC		13		AC	2548		2548
	Seed Material	Bear Canyon Main Mine Forbes	Bear Canyon 002	178	$/AC					13.4							AC		13		AC	2314		2314
	Seed Material	Bear Canyon Main Mine Grass	Bear Canyon 003	188	$/AC					13.4							AC		13		AC	2444		2444
	Drill Seeding	Tractor Spreader (equip. & labor) B-66	Reveg004	24.09	/MSF					13.4							AC		584		MSF	14069		14069
	Mulch	Tractor Spreader (equip. & labor) B-66	Reveg004	24.09	/MSF					13.4							AC		584		MSF	14069		14069
	Mulch	Hay 1" material only 029105000250	Reveg001	41.19	/MSF					13.4							AC		584		MSF	24055		24055
	Stock Labor	Bare root seedlings, 11" to 16" med. soil	32 93 43 10 0140	0.78	Ea					13.4						500	AC		6700		EA	5226		5226
	Stock Material	Bear Canyon Main Transplants	Bear Canyon 004	4.66	$/AC					13.4						500	AC		6700		EA	31222		31222
	Ripping	300 HP Dozer w/ Ripper	31 23 16 32 2830	0.46	/CY					13.4							AC		21614		CY	9942		9942
	Subtotal																					119958		119958
	Hydroseeding																							
	Hydroseeding	Hydro Spreader (equip. & labor) B-81 80MS	Reveg002	24.83	/MSF					~~9.39~~	3.77						AC		~~409~~	164	MSF	10155	6083	4072
	Seed Material	Bear Canyon Main Mine Shrubs	Bear Canyon 001	196	$/AC					~~9.39~~	3.77						AC		~~9~~	4	AC	1764	980	784
	Seed Material	Bear Canyon Main Mine Forbes	Bear Canyon 002	178	$/AC					~~9.39~~	3.77						AC		~~9~~	4	AC	1602	890	712
	Seed Material	Bear Canyon Main Mine Grass	Bear Canyon 003	188	$/AC					~~9.39~~	3.77						AC		~~9~~	4	AC	1692	940	752
	Mulch	Hydro Spreader (equip. & labor) B-81	Reveg005	24.09	/MSF					~~9.39~~	3.77						AC		~~409~~	164	MSF	9853	5902	3951
	Mulch	Hay 1" material only 029105000250	Reveg001	41.19	/MSF					~~9.39~~	3.77						AC		~~409~~	164	MSF	16847	10092	6755
	Stock Labor	Bare root seedlings, 11" to 16" med. soil	32 93 43 10 0140	0.78	Ea					~~9.39~~	3.77					500	AC		~~4695~~	1885	EA	3662	2192	1470
	Stock Material	Bear Canyon Main Transplants	Bear Canyon 004	4.66	$/AC					~~9.39~~	3.77					500	AC		~~4695~~	1885	EA	21879	13096	8784
	Pocking 340 CY/AC	Excavation Bulk Bank 2 CY (322BL)	31 23 16 32 0260	1.54	/CY					~~9.39~~	3.77						AC		~~3193~~	1282	CY	4917	2943	1974
	Subtotal																					~~72371~~	~~43117~~	~~29254~~
	Riparian Planting Area																							
		Bear Canyon Main Mine Grass	Bear Canyon 008	105	$/AC					1							AC		1		AC	105		105
	Plant Stock	Bare root seedlings, 11" to 16" med. soil	32 93 43 10 0140	0.78	Ea					1						1000	AC		1000		EA	780		780
	Subtotal																					~~885~~		~~885~~
	Matting																							
	Matting	Revegetation mat, webbed	31 25 13 10 0120	7	SY					~~4.4~~	2.6						AC		~~21296~~		SY	149072		149072
	Subtotal																					~~149072~~		~~149072~~
	Total																					~~342286~~	~~43117~~	~~299169~~
	Reseed																					18810		18810
	Assume 25% reseeding																					~~361096~~		~~18810~~
	Subtotal																							
	Total																					~~361096~~	~~43117~~	~~317979~~

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
	Wild Horse Ridge 02																			
	Revegatation																			
	Drill Seeding																			
	Drill Seeding																			
	Drill Seeding																			
	Mulch																			
	Mulch																			
	Stock																			
	Ripping																			
	Subtotal																			
	Hydroseeding																			
	Hydroseeding	Hydro Spreader (equip. & labor) B-81	Revegg005	24.09	/MSF					3.74						AC		163	MSF	3927
	Hydroseeding	Bear Canyon Main Mine Grass	Bear Canyon 005	196	$/AC					3.74						AC		4	AC	784
		Bear Canyon Main Mine Grass	Bear Canyon 006	235	$/AC					3.74						AC		4	AC	940
	Hydroseeding	Bear Canyon Main Mine Grass	Bear Canyon 007	188	$/AC					3.74						AC		4	AC	752
	Mulch	Hydro Spreader (equip. & labor) B-81	Revegg005	24.09	/MSF					3.74						AC		163	MSF	3927
	Mulch	Hay 1" material only 029105000250	Revegg001	41.19	/MSF					3.74						AC		163	MSF	6714
	Stock	Bear Canyon Main Transplants	Bear Canyon 004	4.66	$/AC					3.74					500	/AC		1870	EA	8714
	Stock (labor cost = material cost)	Bare root seedlings, 11" to 16" med. soil	32 93 43 10 0140	0.78	Ea					3.74					500	/AC		1870	EA	1459
	Pocking 340 CY/AC	Excavation Bulk Bank 2 CY (322BL)	31 23 16 32 0260	1.54	/CY					3.74						AC		1272	CY	1959
	Subtotal																			29178
		Hand Spread Seed (CLAB)	32 92 19.14 0400	54.11	MSF					1.6						AC		70	MSF	3788
	Hand Seed	Bear Canyon Main Mine Grass	Bear Canyon 005	196	$/AC					1.6						AC		2	AC	392
	Seed	Bear Canyon Main Mine Grass	Bear Canyon 006	235	$/AC					1.6						AC		2	AC	470
	Hydroseeding	Bear Canyon Main Mine Grass	Bear Canyon 007	188	$/AC					1.6						AC		2	AC	376
	Stock	Bear Canyon Main Transplants	Bear Canyon 004	4.66	/MSF					1.6					500	/AC		800	EA	3728
	Stock (labor cost + material cost)	Bare rood seedlings, 11' to 16' med. Soil	23 93 43.10 0140	0.78	Ea					1.6					500	/AC		800	EA	624
	Matting	Revegetation mat, webbed	31 25 13 10 0120	7	SY					1.6						AC		7744	SY	54208
	Subtotal																			63586
	Total Vegetation																			92762
	Reseed																			4560
	Assume 25% reseeding																			4560
	Subtotal																			
	Total																			121938

PHASE II

CHAPTER 3
R645-301-300 BIOLOGY

TABLE OF CONTENTS (Continued)

CHAPTER 3 BIOLOGY

LIST OF APPENDICES

APPENDIX	DESCRIPTION	PAGE
Appendix A	Vegetation Analysis of Reference Areas	3A-1
Appendix B	Miscellaneous Data	3B-1
Appendix C	Shower House Pad Vegetation and Reference Areas	3C-1
Appendix D	Tank Seam Access Road Vegetation	3D-1
Appendix E	Vegetation Studies for the Federal Lease Area U-024316	3E-1
Appendix F	Vegetation Sampling in the Wild Horse Ridge Area	3F-1
Appendix G	Vegetation Sampling in the Wild Horse Ride Tank Seam Area	3G-1
Appendix H	Mohrland Vegetation Study	3H-1
Appendix I	Fish and Wildlife Resource Information	3I-1
Appendix J	Mitigation and Impact Avoidance Procedures, General to All Wildlife	3J-1
Appendix K	Vertebrate Species of Southeastern Utah	3K-1
Appendix L	Wildlife Survey Information	3L-1
Appendix M	Castle Valley Mine (Rhino Energy) Vegetation Sampling	3M-1

APPENDIX M

CASTLE VALLEY (RHINO ENERGY) VEGETATION SAMPLING REPORT

TANK SEAM ACCESS ROAD RECLAMATION

Castle Valley Mine (Rhino Energy) Vegetation Sampling Report
Tank Seam Access Road Reclamation

2012
Emery County, Utah

CONDUCTED AUGUST 24TH & SEPTEMBER 5TH 2012

EIS Environmental & Engineering Consulting
31 North Main Street * Helper, Utah 84526
Office – (435) 472-3814 * Toll free – (800) 641-2927 * Fax – (435) 472-8780
eisec@preciscom.net

Introduction

The Tank Seam Access Road Reclamation Area has been reclaimed since 2005. Rhino Energy contracted with EIS Environmental to survey the area for the condition, performance and overall statistical output of the area. This area is located in Bear Canyon, a branch of Huntington Canyon, located west of the town of Huntington, Utah. The reclaimed area is on an east facing slop surrounded by pinion-juniper plant communities. The reference area is located adjacent to the disturbance and was also surveyed.

Methods

Random placement of 100 foot transects were placed in the reclamation and reference areas on August 24th and September 5th 2012. Points were read every five feet for a total of 20 points per transect. Vegetation (species), rock, litter (organic material), and soil was recorded at each point. A total of 48 transects were used on the reclamation area and 20 transects on the reference site.

Results

A total of 48 transects were run over an estimated 4.96 aces. The results were gathered and tabulated in Table 1. The reference area of one acre was surveyed with 20 transects and the data gathered in Table 2. Standard deviations were calculated for both the reclamation and reference areas data in Table 3. Reference areas standard deviations are calculated in Table 4. Individual species occurrences for the reclamation area are referenced in Table 4. Reference area occurrences are shown in Table 5.

Conclusion

Grasses dominated the vegetation in the reclamation area as well as the reference area. Grasses accounted for 64.4% of the total vegetation present. Forbes consisted of 31.5% and shrubs made up the difference at 4.1%. The total cover of vegetation in this area was at 15.8% with the rest made up from rock, soil and litter.

The reference areas vegetation was composed of 98% grasses (Salina Wildrye), 2% shrubs (Curl-leaf Mahogany), and no forbs were recorded by transects. The percent of coverage by vegetation was 12.8% with the remaining percentage made up of soil, rock, and litter.

Table 1 Data From Reclamation Transects (Percent Cover)

Road Transects:		
Grasses:	**%**	**# of Occurances**
Bluebunch Wheatgrass	2.40%	23
Crested Wheatgrass	0.21%	2
Great Basin Wildrye	3.02%	29
Indian Ricegrass	0.52%	5
Intermediate Wheatgrass	0.10%	1
Salina Wildrye	2.19%	21
Saltgrass	1.35%	13
Western Wheatgrass	0.42%	4
Total Grasses:	**10.21%**	**98**
Forbs:		
Canadian Thistle	0.10%	1
Englemanns Aster	0.31%	3
Halogeton	0.21%	2
Palmers Penstemon	1.25%	12
Rubber Rabbitbrush	1.88%	18
Yarrow	0.94%	9
Yellow Rabbitbrush	0.31%	3
Total Forbs:	**5.00%**	**48**
Shrubs:		
Curl-leaf Mohagony	0.10%	1
Slender Buchwheat	0.21%	2
Wyoming Sagebrush	0.31%	3
Total Shrubs:	**0.63%**	**6**
Soils:	**37.08%**	**356**
Rock:	**30.42%**	**292**
Litter:	**16.67%**	**160**

Table 2 Data from Reference Site (Percent Cover)

Reference Site:		
Grasses:	Total %:	# of Occurances
Salina Wildrye	**12.50%**	**50**
Shrubs:		
Curl-leaf Mohagony	**0.25%**	**1**
Soils:	**41.50%**	**166**
Rock:	**21.25%**	**85**
Litter:	**24.50%**	**98**

Table 3 Road Reclamation Site Standard Deviations

Total Cover

Reclamation Area	**Mean % Cover**	**Standard Deviation**	**Sample Size**
Living Vegetation Sampled	15.83	17.52	48
Rock	30.42	22.08	48
Litter	16.67	17.89	48
Soil	37.08	23.18	48

Composition			
Shrubs/Trees	3.95	9.35	48
Forbes	31.58	22.31	48
Grasses	64.67	22.94	48

Table 4 Reference Area Standard Deviations

Reference Area	**Mean % Cover**	**Standard Deviation**	**Sample Size**
Living Vegetation Sampled	12.75	6.67	20
Rock	21.25	8.18	20
Litter	24.5	8.60	20
Soil	41.5	9.85	20

Table 5 Road Reclamation Site Individual Species Occurrences

Species	% Cover	Standard Deviation	Average/Transect
Grasses			
Bluebunch Wheatgrass	2.4	7.35	0.48
Crested Wheatgrass	0.21	2.20	0.10
Great Basin Wildrye	3.02	8.21	0.60
Indian Ricegrass	0.52	3.45	0.10
Intermediate Wheatgrass	0.10	1.52	0.02
Salina Wildrye	2.19	7.03	0.44
Saltgrass	1.35	5.54	0.27
Western Wheatgrass	0.42	3.10	0.08
Forbs:			
Canadian Thistle	0.10	1.52	0.02
Englemanns Aster	0.31	2.67	0.06
Halogeton	0.20	2.14	0.04
Palmers Penstemon	1.25	5.33	0.25
Rubber Rabbitbrush	1.88	6.52	0.38
Yarrow	0.94	4.63	0.19
Yellow Rabbitbrush	0.31	2.67	0.06
Shrubs:			
Curl-leaf Mohagony	0.10	1.52	0.02
Slender Buckwheat	0.21	2.20	0.04
Wyoming Sagebrush	0.31	2.67	0.06

Table 6 Reference Area Site Individual Species Occurrences

Species	% Cover	Standard Deviation	Average/Transect
Grasses:			
Salina Wildrye	12.5	6.61	2.5
Shrubs:			
Curl-leaf Mohagony	0.25	1.00	0.02