C/007/035 Incoming
#5019 ✓

Sunnyside Cogeneration Associates

P.O. Box 10, East Carbon, Utah 84520 • (435) 888-4476 • Fax (435) 888-2538

November 16, 2015

RECEIVED
NOV 17 2015
DIV. OF OIL, GAS & MINING

Daron Haddock
Division of Oil, Gas & Mining
1594 W. North Temple, Suite 1210
Salt Lake City, Utah 84116

RE: Sunnyside Cogeneration Associates
Task ID #5019 Culverts and Road
Sunnyside Refuse and Slurry C/007/035

Dear Mr. Haddock:

As requested in the Conditional Approval received from the Division on November 4, 2015, in relation to the Culverts and Roads amendment (Task ID #5019), SCA is submitting the requested two clean copies prepared for incorporation.

If you have any questions or if further clarification is needed please contact Rusty Netz or myself at (435) 888-4476.

Thank You,

Gerald Hascall
Agent for
Sunnyside Cogeneration Associates

cc. Rusty Netz
Plant File

APPLICATION FOR COAL PERMIT PROCESSING

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

Permittee: SUNNYSIDE COGENERATION ASSOCIATES
Mine: SUNNYSIDE REFUSE & SLURRY
Title: UPDATE CULVERTS AND ROADS - CLEAN SUBMITTAL Task 5019
Permit Number: C/007/035

Description, Include reason for application and timing required to implement:

Site needs have changed and some culverts removed or added and roads updated

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: 0.00 ☐ 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.

Gerald Hascall	Plant Manager	11/16/2015	[signature]
Print Name	Position	Date	Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 16th day of November, 2015

Notary Public: [signature], state of Utah.

My commission Expires: 12/23/15
Commission Number: 650231
Address: 1 Power Plant Rd. Sunnyside
City: Sunnyside State: UT Zip: 84539
} ss:

JODY HANSEN
Notary Public
State of Utah
Comm. No. 650231
My Comm. Expires Dec 23, 2015

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED NOV 17 2015 DIV. OF OIL, GAS & MINING

Form DOGM- C1 (Revised December 10, 2007)

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

Permittee: SUNNYSIDE COGENERATION ASSOCIATES
Mine: SUNNYSIDE REFUSE & SLURRY
Title: UPDATE CULVERTS AND ROADS - CLEAN SUBMITTAL Task 5019
Permit Number: C/007/035

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.

Add	Replace	Remove	DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐	☒	☐	Drawing 7-1
☐	☒	☐	Drawing 5-2
☒	☐	☐	Drawing 5-2K
☐	☒	☐	Permit Text - Ch5 Table of contents page and Text page 500-13
☐	☒	☐	Permit Text Appendix 7-3a Pages 1-7
☐	☒	☐	Permit Text Appendix 7-3d Pages 3-4
☐	☒	☐	Permit Text Appendix 5-7
☐	☒	☐	Drawing 7-18
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	Received by Oil, Gas & Mining
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TABLE OF CONTENTS
CHAPTER FIVE
R645-301-500 (GENERAL ENGINEERING)

R645-301-500 GENERAL ENGINEERING

TABLE OF CONTENTS
CHAPTER FIVE
R645-301-500 (GENERAL ENGINEERING)

FIGURES

Prime References

TABLES

APPENDICES

Prime References

TABLE OF CONTENTS
CHAPTER FIVE
R645-301-500 (GENERAL ENGINEERING)

PLATES

determining any significant amounts of air quality deterioration. Deterioration of the air quality is not expected during the permit period with the exception of short high wind periods when sand and smaller grained particles are picked up outside of the SCA Permit Area and added to the air in the permit area.

The haul roads used by the refuse trucks are unpaved. To control fugitive dust, roads around the main complex which are being used by mobile equipment will be treated with calcium chloride, potassium chloride, or other acceptable biodegradable, organic wetting agents or sprayed with water as required during dry periods as required by SCA's Air Quality Permit.

NON-MINING RELATED ACTIVITIES

Terra-Tek, a drilling company, has been testing drill bits periodically since 1975 in an area in the western portion of the current SCA Permit Area. They generally drill to a maximum depth of about four feet. The area where drilling typically occurs is identified on Plate 5-1. Sunnyside Coal Company allowed Terra-Tek to conduct these non-mining related activities while the area was part of their permit. SCA will likely allow the drilling to continue until such time as it conflicts with the SCA operations. The Division was notified by letter dated March 17, 1993 of SCA's intentions regarding Terra-Tek.

527 TRANSPORTATION FACILITIES

The roads within the SCA Permit Area are shown on Plate 5-2. Also included on Plate 5-2 is a table showing widths, grades and lengths of each road within the SCA Permit Area. Plates 5-2 (C, D, G, H, J & K) AND 5-3 include typical cross-sections for the roads and plan and profiles of each road. All roads located within the Refuse Pile area are pit roads and will adjust as required throughout the operational period.

Roads within the SCA Permit Area will be maintained during the permit period. Maintenance will consist of basic custodial care to control erosion, repair of structures and drainage systems, removal of debris from culverts and ditches, and replacement of road surface material as needed. Additionally, all unpaved roads being used by mobile equipment and other unpaved operational areas will be water sprayed and/or chemically treated as necessary to reduce fugitive dust as required by SCA's Air Quality Permit.

In the event of a catastrophic event, roads will be repaired as soon as possible after the damage has occurred. Furthermore, there are no plans to alter any natural drainage way, or make alterations involving a steep cut slope.

Transportation facilities will be properly maintained and then restored at the end of the cogeneration plant life to prevent damage to fish, wildlife, and related environmental values, as well as to prevent additional contributions of suspended solids to stream flow or runoff outside the SCA Permit Area. Appendix 5-7 includes a description of each road and structural stability calculations for the roadway embankments. A few roads are identified in the reclamation plan to remain beyond reclamation to provide access through the permit area. Additional information on final reclamation of roads can be found in Chapter Ten. All transportation facilities meet or exceed the permanent program performance standards.

WASTE COAL HANDLING SYSTEM DESCRIPTION

The following sections discuss operations involving the use of the crushing facility. The crushing system utilizes the following units:

APPENDIX 5-7
ROAD DESCRIPTIONS

ROAD DESCRIPTIONS

TRANSPORTATION FACILITIES

The roads within the SCA Permit Area are used for a variety of purposes. These include hauling of refuse material, general access around the site, and various non-mining uses.

Presently, there are various roads within the permit area which connect to roads outside the permit area and provide a continuity of those outside uses. The discussion in this appendix related to roads within the permit area pertains only to mine uses within the permit. No additional information is included related to outside uses.

The following section includes descriptions of the transportation facilities within the SCA Permit Area, including the general location and most common uses of each road. All of the roads have a letter name (A, B, C, etc.) and a traditional name acquired throughout the past decades of operation. Road names match the designations shown on Plate 5-2.

A. Tonka Road is located in the north east portion of the permit area and provides access to/from properties east of the SCA Permit Area
B. Upper Old Coarse Refuse Road is located in the south east portion of the permit area and provides access for inspection and monitoring
E. Lower Haul Road is located in the central portion of the permit area and runs generally along the northerly edge of the Coarse Refuse Pile. This road provides access for haul trucks to the refuse pile.
F. Railroad Access Road is located in the northeast portion of the permit area and provides access to this portion of the permit area
G. Excess Spoil Disposal Area #2 Road is located in the northeast portion of the permit area between the Excess Spoil Disposal Area #2 and the coke ovens. This road provides access to the reclaimed disposal area and drainage features in the area for inspection and monitoring.
I. Clear Water Pond Access Road is located in the northeast portion of the permit area near the Excess Spoil Disposal Area #2 (former Clear Water Pond was in this area). This road provides access around the reclaimed disposal area.
J. New Haul Access Road is located in the north central portion of the permit area and is heavily used for the haul trucks to deliver refuse to the processing area.
K. Borrow Area Pond South Access Road is located in the southeast portion of the permit area and provides access to/from properties to the south and east of the SCA Permit Area.
L. East Slurry Cell South Access Road is located in the southeast portion of the permit area and provides access to / along the top of the south bank of the former East Slurry Cell. It is on the Coarse Refuse Pile and may be removed at some point as part of the refuse excavation process.
M. Coarse Refuse Seep Access Road is located in the west portion of the permit area. It provides access for inspection and monitoring.
N. Coarse Refuse Toe Pond Access Road is located in the west portion of the permit area. It provides access for inspection and monitoring.

P. Rail Cut Pond West Access Road is located in the south west portion of the permit area. It provides access for inspection and monitoring.

Q. Old Coarse Refuse Road Sediment Pond Access Road is located in the south east portion of the permit area. It provides access for inspection and monitoring.

R. Lower Old Coarse Refuse Road is located in the west portion of the permit area. It provides access for inspection and monitoring.

S. West Pasture Access Road is located in the north central portion of the permit area and provides access to / from adjacent facilities north of the permit area. This road is used regularly for trucks crossing through the permit area to reach facilities on the other side of the permit area.

T. Refuse Pile Access Road is located in the central portion of the permit area crossing the Refuse Pile. This road is used regularly for trucks crossing through the permit area to reach facilities on either side of the permit area. It is also used for haul trucks accessing the refuse pile.

Plate 5-2 provides a description of the physical properties of each road. Please refer to Plate 5-2 for the following information pertaining to each individual road: Name, Type of Use, Road Plan & Profile drawing reference, Maximum Grade, Average Width, and Approximate Length.

STRUCTURAL STABILITY OF EMBANKMENTS

The structural stability of roads within the SCA Permit Area is largely determined by the stability of the roadside embankments. This section provides calculations to determine the stability of these embankments and their factor of safety. Calculations are based on methods presented in Hoek and Bray's Rock Slope Engineering.

Most of the roads within the permit area fall within a common ranges of characteristics and embankment slopes. For simplification, these stability calculations will focus on the worst case scenario within the range and group all roads within the range together.

Soils

Information concerning soil types is included in the permit in Appendix 2-9 (the ACZ Soil Borrow Material Report); the SCS Soils Survey of Carbon Area; and Plate 2-1 (Soil Identification Map). The soils in the area are a Strych soil type ranging from very stony loam to a Gerst-Strych-Badland complex. These soil units are described in detail in the SCS Soil Survey for the Carbon Area. The soil type for each area was used to determine the cohesion strength, friction angle, and the density of the material. It should be recognized that values for cohesion strength were estimated based on existing information for the soil type in the designated area. In areas where the soil type was not apparent, a mixture of Strych dry stony loam and Gerst-Strych-Badland soil was assumed and an average value for the quantities listed below was employed for the purposes of determining structural stability.

Assumptions and Method

The "Circular Failure Method" from Rock Slope Engineering was used to determine the factor of safety for the road embankments. Using this method, the following assumptions were made:

- Soil type ranges from SM-SC to GM-GC
- Friction Angle Φ ranges from 31° for SM-SC to > 31° and >34° for GM and GC soils.
- Density γ values range between 90 to 100 pcf.
- Groundwater conditions are generally fully drained, but to be conservative, we will use Chart 2 representing a surface water source at a distance of 8 x the slope height.
- The soil is may not be compacted. Values for cohesion strength were estimated based on upper and lower limits for each soil type. Generally cohesion strength is between 450 and 600 lb/sqft for soils and estimated at 300 lb/sqft for refuse.

Most of the roads and embankments in the permit area are such that they have very minor slopes. For simplicity in calculations, we have grouped all roads at or less than the following characteristics into a single classification.

Typical Characteristics:
Embankment Height H = 30 feet
Embankment Slope 2H:1V = Θ = 26.5°
Friction Angle Φ = 31°
Density γ = 100 pcf
Groundwater Chart 2 at 8x slope distance or more away
Cohesion strength c = 450 lb/sqft

For these typical roads, the calculation values indicate the following:

$$\frac{c}{(\gamma \text{ H Tan } \Phi)} = \frac{450}{100\text{x}30\text{xTan}31} = 0.26$$

Chart 2 indicates for s 26.5° slope that the (Tan Φ / F) value =0.27
This gives a **Factor of Safety F = 2.2**

Roads with smaller or gentler embankment slopes have a higher factor of safety.

Other roads with steeper or higher embankments are calculated separately below.

Road K – Height H = 50 ft, SlopeΘ = 45°, Cohesion c=450, Factor of Safety = 1.3
Road F – Height H = 16 ft, SlopeΘ = 33°, Cohesion c=300, Factor of Safety = 2.2
Road L – Height H = 40 ft, SlopeΘ = 38°, Cohesion c=300, Factor of Safety = 1.4

Road embankments within the permit area appear to have an adequate Factor of Safety against circular failure.

PASTURE SEDIMENT POND - Hydrologic Calculations

INTRODUCTION

The Pasture Sediment Pond (UPDES 009) is located north of the West Slurry Cell (see Plate 7-1). The pond is an off channel, temporary sediment control structure, with a total as-built volume of 3.08 acre-feet (top of bank). Surface water runoff and sediment runoff from a 109.25 acre watershed is captured by the pond.

The Pasture Pond has been in service for a number of decades. In 2007, SCA proposed to enlarge this pond and use it to treat runoff from the area formerly served by the Clear Water Pond and Slurry Ponds 1 and 2. These former ponds are now the site of the Excess Spoil Disposal Area #2. The new hydrologic modeling accompanying this appendix section includes the entire combined watershed and the proposed design size of the pond.

The structure is a temporary pond as addressed in R645-301-732.200. The structure does not meet the size or other qualifying criteria of the MSHA of 30 CPR 77.216(a). Therefore, it provides a combination of principal and emergency spillways that will safely discharge a 25 year, 6 hour event.

The pond contains a 2 inch drain pipe. This 2 inch pipe is normally closed but can be opened to discharge the pond after major storm events after appropriate settling times. The pond is modeled in Sedimot-II with the 2 inch drain pipe closed, however, the pond is considered empty above the level of the drain pipe when the storm begins. The maximum sediment level allowed in the pond is therefore set at the elevation of the inlet to the 2-inch drain pipe.

The pond can discharge through an 18 inch culvert when the water level reaches the stage elevation of 6490.6 (6.1 feet deep). The 18 inch pipe spillway is capable of passing the 25 year, 6 hour peak flow. The pond treats the 10 year, 24 hour storm such that effluent is well within the UPDES limits. In 2015, the ditch leaving the discharge point from the Pasture Pond was re-routed to flow into the Coal Pile Sediment Pond (014). This provides a backup treatment option in the event of any discharge from the Pasture Pond.

Culverts and diversion ditches were designed for these watersheds previously under a very conservative storm (100 yr 6 hr). With the combined watersheds now proposed, many of the ditches and culverts will experience a different flow rate for a given storm since upper sub watersheds will now be routed through these lower ditches. Nonetheless, we have compared the previous design flows with the current modeled flows for the 10 year 6 hour storm, 10 year 24 hour storm and 25 year 6 hour storm. We have used the higher of the previous design flow or the current modeled design flow from these storms.

SUBWATERSHEDS

The Pasture Pond drainage area is divided into eighteen sub watersheds for routing analysis. These are labeled in keeping with former naming convention as follows: CW-SWS1, CW-SWS2, CW-SWS3, CW-SWS4, CW-SWS6, CW-SWS7, CW-SWS8, CW-SWS9, CW-SWS10, CW-SWS11, PAST-SWSl, PAST-SWS2, PAST-SWS3, PAST-SWS4, PAST-SWS5, PAST-SWS6, PAST-SWS7, and PAST-SWS8 (see Plate 7-1).

SOIL TYPE

According to the SCS Soil Survey of Carbon Area, Utah, the soil type found in this drainage area is predominantly SCS # 114, Strych. Three soil samples from the adjacent Reclamation Borrow Area were analyzed by Huntingdon/Chen-Northern in the early 1990s. The particle size distribution from these samples was plotted and averaged as shown in Figure One. Other soil characteristics are as follows:

SCS Soil Name	Strych
Submerged Specific Gravity	1.75
Specific Gravity	2.75
Erosion K value	0.20
Bulk Density	1.4

CURVE NUMBERS

The Pasture Pond curve numbers are based on the Soil Conservation Service graph included as Figure Two. The soil types found on the site correspond to SCS hydrologic Class B as indicated in the SCS Soil Survey for Carbon Area, Utah. The vegetation cover is relatively sparse, consisting of a mixture of Juniper-Grass, Mountain Brush, and Desert Brush. Curve numbers were averaged from these vegetation types. When the storage areas are covered with a pile of coarse refuse and refuse fines which have relatively high infiltration rates, these curve numbers will be conservative.

TIME OF CONCENTRATION

Each sub watershed requires a certain time for the water to reach the outlet following the longest path. The runoff from these sub watersheds is approximated by Sedimot-II unit "Disturbed" unit hydrograph for areas with poor vegetative cover. The overland flow velocity was estimated using the Soil Conservation Service Upland Curves (SCS 1972) corresponding to the slope and vegetation of the drainage areas. Time of concentration was calculated by dividing the average velocity into the distance to the sub watershed outlet.

SUB WATERSHED CHARACTERISTICS

Drainage Area	SCS Hydro Class	Vegetation Cover Density	Juniper Grass CN	Mt. Brush CN	Desert Brush CN	**Average Curve Number**	Area acres	Distance to Outlet (ft)	Average Velocity (ft/s)	**Concentration (hrs)**
CW-SWS1	B	50%	58	57	80	**65**	27.7	1800	2.8	**0.18**
CW-SWS2	B	40%	63	66	81	**60**	14	1000	1.4	**0.20**
CW-SWS3	B	40%	63	66	81	**65**	8.6	800	1.1	**0.20**
CW-SWS4	B	40%	63	66	81	**65**	5.5	600	1.2	**0.14**
CW-SWS6	B	40%	63	66	81	**60**	3	900	1.3	**0.19**
CW-SWS7	B	40%	63	66	81	**60**	7.4	800	1.1	**0.20**
CW-SWS8	B	40%	63	66	81	**65**	4.1	500	1.3	**0.11**
CW-SWS9	B	40%	63	66	81	**70**	10.3	400	1.1	**0.10**
CW-SWS10	Reclaimed	0%	-	-	-	**60**	7.9	250	1.9	**0.04**
CW-SWS11	Reclaimed	0%	-	-	-	**60**	3.2	100	1.3	**0.02**
Past-SWS1	B	30%	69	73	83	**65**	3.9	900	1.79	**0.14**
Past-SWS2	B	15%	76	79	83	**79**	1.2	300	2.08	**0.04**
Past-SWS3	B	15%	76	79	83	**79**	2	950	1.76	**0.15**
Past-SWS4	B	15%	76	79	83	**79**	1.9	800	1.85	**0.12**
Past-SWS5	B	15%	76	79	83	**79**	3.6	700	0.78	**0.25**
Past-SWS6	B	30%	69	73	83	**75**	2.4	900	1	**0.25**
Past-SWS7	B	15%	76	79	83	**79**	1.7	400	1.59	**0.07**
Past-SWS8	B	15%	76	79	83	**79**	0.55	40	1.11	**0.01**

ROUTING COEFFICIENTS

"Sedimot-II" uses Muskingum routing methods. Flows must be routed between structures or from a subwatershed outlet to the corresponding structure (if the outlet is not at the structure). No routing is used through sub watersheds that do not have inflow from a previous watershed, or structure (this water flow is accounted for with the time of concentration and the unit hydrograph). Areas requiring routing coefficients are indicated in the program output data. Muskingum coefficients K and X are used as follows:

K = Travel time through diversion.

$$X = \frac{0.5 * \text{Velocity}}{1.7 + \text{Velocity}}$$

RIPRAP SIZING

Riprap is placed along steep channel slopes and at select culvert outlets to control erosion. The size of the stones is based on the expected maximum velocity of water flowing. When peak velocities in the smooth channel are expected to reach 5 ft/s, riprap is required. Figure Three is used to determine the median stone diameter (D_{50}). The riprap mixture should approximate the following gradation:

Stone Size	% Finer
$2*D_{50}$	100
D_{50}	50
$0.5*D_{50}$	20
$0.2*D_{50}$	0

In areas where the increased roughness from riprap does not reduce the velocity below 5 ft/s, a filter blanket (or gravel bedding in a layer $3*D_{50}$) will be used.

STORM RUNOFF VOLUMES AND SEDIMENT VOLUMES

Storm Event	Total Runoff (acft)	Total Sediment (acft)	Pond Stage Elevation	Pond Discharge
10yr 6 hr	**0.56**	0.01 acft	6487.4	0 cfs
10yr 24 hr	**1.93**	0.03 acft	6490.5	0 cfs
25yr 6 hr	**1.27**	0.02 acft	6489.0	0 cfs
100yr 6 hr	**2.65**	0.05 acft	6491.0	4 cfs

The flowline of the primary discharge (decant) pipe is at elevation 6486.6. Sediment levels in the pond are allowed to fill to a maximum of 6485.5 (1.1 ft below the pipe flowline) prior to a required cleaning. The volume of the pond below the sediment fill line is approximately 0.2 acre feet. Ample storage exists to contain the calculated storm runoff volumes and the projected sediment volume from the modeled storms.

The permittee is encouraged to perform the periodic cleaning to elevations lower than the minimum design depth to allow for additional sedimentation storage between cleaning events. Factor of safety values for the berm allow for additional depths for the pond of up to 4 feet as long as these additional depths are at least 12 feet from the interior edge of the berm (3:1 slope from the toe of the berm).

The 100 year 6 hour storm is projected to have a discharge from the pond. Detention time for this storm is modeled to be over 2 hours. This is expected to be adequate to allow settling to occur in the pond adequate to meet the UPDES discharge concentration volumes.

DIVERSION / CULVERT DESIGN FLOWS

Storm Event	CW D1/C1 cfs	CW D2 cfs	CW D3 cfs	CW D4 cfs	CW D5/C3 cfs	CW D6 cfs	CW D7/C4-5 cfs	Past D1 cfs	Past D3/C1 cfs	Past D4/C2 cfs	Past D6/C4 cfs	Past D8 cfs	Past D9 outlet cfs
10yr 6 hr	0.20	0.62	0.07	0.30	0.90	0.11	1.06	0.75	1.24	1.41	0.88	0.61	0.00
10yr 24 hr	0.93	2.54	0.34	1.05	3.44	0.71	3.92	1.60	2.60	4.71	1.61	0.89	0.00
25yr 6 hr	0.93	2.53	0.34	1.10	3.24	0.76	3.82	1.80	2.65	4.86	1.67	1.05	0.00
100yr 6 hr	2.64	7.90	0.98	2.99	10.31	1.92	11.52	3.00	5.40	13.14	3.11	1.74	3.98
Design flows	**2.40**	**7.80**	**2.50**	**4.80**	**10.10**	**5.00**	**11.5**	**2.20**	**2.80**	**4.86**	**3.60**	**1.70**	**3.98**

DIVERSION DESIGN

Temporary diversions and culverts for these miscellaneous flows are required to be designed to pass the 10 year, 6 hour storm (R645-301-742.333). They were previously designed for the 100 year 6 hour storm. Combining of the watersheds as proposed in 2006 does not always allow for that same conservative design. However, the designs are still more conservative than the 10 year 6 hour storm. See the table above for design flow rates.

Permanent diversion designs are described in the permit term reclamation plan and final reclamation plan. Design summaries are given in the tables below. The diversions were designed to fit within a range of expected field values. The minimum design channel depth is conservatively calculated by using a minimum channel slope and a maximum expected Mannings N. Additional freeboard is not required in the regulations, but the operator may construct the diversions larger than required to reduce the risk of overflow from storms greater than the required design precipitation event.

The Maximum velocity expected in the channel is calculated by using minimum Manning's N values and maximum channel slopes. Manning's N for a channel bed with riprap is estimated by the equation $N=0.0395*(D_{50})^{1/6}$ with D_{50} in feet (Applied Hydrology and Sedimentology for Disturbed Areas page 188). If the normal depth of flow is less than twice D_{50} then N is estimated by the equation $N=0.456*(D_{50}$ $*\text{Slope})0.159$ with D_{50} in inches and slope in feet/feet (*Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase 1* May 1987, Colorado State University, prepared for Uranium Recovery Field Office and Division of Waste Management).

While the slopes and N values are expected to be near the middle of the range provided, these values provide the maximum variance accepted without additional rip rap or lining through the channel. The cross sections may vary but must always be sufficient to provide the maximum required flow area.

DIVERSION DESIGN CRITERIA

Ditch No.	Manning N		Side Slope	Min Bottom Width	Design Flow	Channel Slope (%)		Flow Depth (ft)		Flow Area (ft^2)		Maximum Velocity	Minimum Channel Depth	Comments
	Min	Max	minH/1V	(ft)	(cfs)	Min	Max	Min	Max	Min	Max	(ft/s)	(ft)	No lining required
CW-D1	0.03	0.05	2	0	**2.40**	1.6	5	0.53	0.8	0.60	1.30	4.3	0.80	No lining required
CW-D2	0.03	0.05	2	0	**7.80**	3	4	0.89	1.1	1.58	2.40	4.9	1.10	No lining required
CW-D3	0.03	0.05	2	0	**2.50**	2	6	0.52	0.8	0.54	1.30	4.62	0.80	No lining required
CW-D4	0.03	0.05	2	0	**4.80**	2	5	0.70	1.0	0.98	2.10	4.9	1.00	No lining required
CW-D5	0.03	0.05	2	0	**10.10**	1	2.5	1.04	1.5	2.16	4.70	4.7	1.50	No lining required
CW-D6	0.03	0.05	2	1	**5.00**	1	6	0.56	0.9	1.19	2.50	4.2	0.90	No lining required
CW-D7	0.03	0.05	2	1	**14.50**	1	2.3	0.98	1.5	2.90	6.00	5	1.50	No lining required
Past-D1	0.012	0.03	2	2	**2.20**	0.2	1.5	0.20	0.6	0.48	1.92	4.58	0.60	No lining required
Past-D3	0.025	0.05	2	0	**2.80**	1	4	0.55	0.9	0.61	1.62	4.59	0.90	No lining required
Past-D4	0.025	0.05	2	1	**4.86**	2	5	0.49	0.8	0.97	2.10	4.95	0.80	No lining required
Past-D5	0.025	0.05	2	1	**2.50**	0.5	2.5	0.38	0.8	0.67	2.08	3.73	0.80	No lining required
Past-D6	0.03	0.05	2	1	**3.60**	2	5	0.42	0.7	0.77	1.68	4.68	0.70	No lining required
Past-D8	0.025	0.05	2	0	**1.70**	1	5	0.44	0.8	0.39	1.28	4.36	0.80	No lining required
Past-D9	0.025	0.05	2	1	**3.98**	0.8	5	0.46	1.0	0.82	2.20	4.85	1.00	No lining required

CULVERT DESIGN CRITERIA

Culvert No	Minimum Pipe Diameter (in)	Pipe Length (ft)	Pipe Slope %	Controlling Head Water (Ft)	Design Flow (cfs)	Design Velocity (ft/s)	Inlet / Outlet Conditions
Past-C1	18	40	1	1	**2.8**	2.3	No lining req'd
Past-C2	24	115	3	1.2	**4.9**	2.9	No lining req'd
Past-C4	12	75	3	1.65	**3.6**	4.6	Submerged inlet outlet Riprap D50=6"
CW-C1	12	60	3.7	1.9	**4**	5	No lining req'd
CW-C3	4@8"	10	6	0.67	**6.8**	5	No lining req'd
CW-C4	36	60	1.7	1.9	**3.8**	4.2	No lining req'd
CW-C5	18	780	1.8	3	**11.5**	4.9	No lining req'd

Culverts were designed for these watersheds previously under a very conservative storm (100 yr 6 hr). With the combined watersheds now proposed, we have checked to make sure that the designs are still more conservative than the required 10 year 6 hour storm. See the table above for the design flow rates used.

The 18" CMP Emergency Spillway is required to be designed to safely pass the 25 year 6 hour storm. It is also required that the discharge be controlled in a manner to reduce erosion and to minimize disturbance to the hydrologic balance. Hydrologic modeling projects that the 25 yr 6 hr storm would not have a discharge from the pond. The 100 year 6 hour storm is projected to have a 3.98 cfs discharge (See tables above for Past D9 / outlet). The spillway and outlet ditch D9 were designed to pass the 100 year storm with velocities less than 5 ft/sec to reduce erosion and minimize disturbance to the hydrologic balance. The outlet ditch flows to the Coal Pile Sediment Pond (014).

Pasture Pond outlet pipe capacity

Inlet Control Culvert Flow

$$\text{Area} = \frac{Q}{C*(2*g*h)^{0.5}}$$

	Solve for Area		Solve for Head		Solve for Flow Rate Q	
Q=	4.0	cfs	4.25	cfs	17.02	cfs
C=	0.6		0.6		0.6	
h=	0.5	ft	0.25	ft	4	ft
g=	32.2	ft/s^2	32.2	ft/s^2	32.2	ft/s^2
area=	169.2	in^2	254.5	in^2	254.5	in^2
d=	14.7	in	18	in	18	in

h= head of water above center of pipe

Note:

_The existing Pasture Pond 18" outlet culvert is intended to remain in place even with the pond expansion.

_The hydrologic modeling projects that the 10 year 24 hour design storm will be totally contained without discharge

_The smaller volume of the 25 year 6 hour storm would also be contained with no discharge.

_The 100 year 6 hour storm is projected to have a discharge of approximately 4 cfs.

_The existing 18 inch culvert is calculated to pass 4 cfs with only 0.25 feet of head above the center of the pipe.

_The existing 18 inch culvert is calculated to pass as much as 17 cfs with approximately 4 feet of head in the stand pipe structure

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NOV 17 2015

Div. of Oil, Gas & Mining

RAILCUT SEDIMENT POND - Hydrologic Calculations

INTRODUCTION

The RAILCUT Sediment Pond (UPDES 007) is located near the southwest corner of the permit area (see Plate 7-1). It collects drainage from the upper portion of the refuse pile and the industrial borrow area. The pond is an off channel, temporary sediment control structure, with a total as-built volume of approximately 4.8 acre-feet (top of bank). Surface water runoff and sediment runoff from a 113.7 acre watershed is captured by the pond.

The RAILCUT Pond has been in service for a number of decades. During the past several years, excavation of the Refuse Pile (including the former West and East Cells) has modified the drainage elevations such that these Cells are no longer impoundments and have been incorporated as part of the Refuse Pile. The new hydrologic modeling accompanying this appendix section includes the entire combined watershed now contributing to the Rail Cut Pond.

The structure is a temporary pond as addressed in R645-301-732.200. The structure does not meet the size or other qualifying criteria of the MSHA of 30 CFR 77.216(a). Therefore, it provides a combination of principal and emergency spillways that will safely discharge a 25 year, 6 hour event.

The pond contains a 2 inch drain pipe. This 2 inch pipe is normally closed but can be opened to discharge the pond following major storm events after appropriate settling times. The pond is modeled in Sedimot-II with the pond essentially considered empty when the storm begins.

The pond can discharge through a 48 inch drop inlet spillway when the water level reaches the stage elevation of 6212.34 (5.34 feet deep). The 48 inch pipe spillway is capable of passing the 25 year, 6 hour peak flow. The pond treats the 10 year, 24 hour storm such that effluent is well within the UPDES limits.

Culverts and diversion ditches are required to be designed for these watersheds using the 100 year 6 hour storm for refuse pile ditches / culverts and the 10 year 6 hour storm for non-refuse pile ditches. In an effort to provide a conservative design, SCA has designed them all for the 100 yr 6 hr storm.

Topsoil was removed prior to construction of the pile and is stored in a stockpile directly south of the pond. After the useful life of the pond, the area will be appropriately reclaimed.

SUBWATERSHEDS

The RAIL CUT Pond drainage area is divided into eight sub watersheds for routing analysis. These are labeled as follows: RC-SWS1, RC-SWS2, RC-SWS3, RC-SWS4, RC-SWS6, RC-SWS7, and RC-SWS8 (see Plate 7-1).

SOIL TYPE

According to the SCS Soil Survey of Carbon Area, Utah, the soil type found in this drainage area is predominantly SCS # 114, Strych. Three soil samples from the adjacent Reclamation Borrow Area were analyzed by Huntingdon/Chen-Northern in the early 1990s. The particle size distribution from these samples was plotted and averaged for use in sediment modeling. Other soil characteristics are as follows:

SCS Soil Name	Strych
Submerged Specific Gravity	1.75
Specific Gravity	2.75
Erosion K value	0.20
Bulk Density	1.4

An estimated particle distribution was used for areas covered with refuse material.

CURVE NUMBERS

The RAIL CUT Pond curve numbers are based on the Soil Conservation Service graph. The soil types found on the site correspond to SCS hydrologic Class B as indicated in the SCS Soil Survey for Carbon Area, Utah. The vegetation cover is relatively sparse, consisting of a mixture of Juniper Grass, Mountain Brush, and Desert Brush. Curve numbers were averaged from these vegetation types. Areas covered with refuse material are expected to have minimal vegetation but a relatively high infiltration rate. Curve numbers were estimated for these areas.

TIME OF CONCENTRATION

Each sub watershed requires a certain time for the water to reach the outlet following the longest path. The runoff from these sub watersheds is approximated by Sedimot-II "Disturbed" unit hydrograph for areas with poor vegetative cover. The overland flow velocity was estimated using the Soil Conservation Service Upland Curves (SCS 1972) corresponding to the slope and vegetation of the drainage areas. Time of concentration was calculated by dividing the average velocity into the distance to the sub watershed outlet.

SUB WATERSHED CHARACTERISTICS

Drainage Area	SCS Hydro Class	Vegetation Cover Density	Juniper Grass CN	Mt. Brush CN	Desert Brush CN	**Average Curve Number**	Area acres	Distance to Outlet (ft)	Average Velocity (ft/s)	**Concentration (hrs)**
RC-SWS1	B	40%	62	65	81	**75**	13	1550	1.72	**0.25**
RC-SWS2	Refuse	0%				**70**	64.9	2600	1.2	**0.6**
RC-SWS3	Spoil	10%				**70**	10.6	2000	1.35	**0.40**
RC-SWS4	B	20%	74	77	83	**78**	3.1	1100	1.7	**0.17**
RC-SWS5	B	20%	74	77	83	**78**	3.9	850	1.69	**0.14**
RC-SWS6	B	25%	71	75	82	**75**	1.7	600	2.38	**0.07**
RC-SWS7	B	30%	68	72	82	**74**	4.3	800	1.71	**0.13**
RC-SWS8	B	40%	62	65	81	**70**	12.2	1800	1.65	**0.3**

ROUTING COEFFICIENTS

"Sedimot-II" uses Muskingum routing methods. Flows must be routed between structures or from a subwatershed outlet to the corresponding structure (if the outlet is not at the structure). No routing is used through sub watersheds that do not have inflow from a previous watershed, or structure (this water flow is accounted for with the time of concentration and the unit hydrograph). Areas requiring routing coefficients are indicated in the program output data. Muskingum coefficients K and X are used as follows:

K = Travel time through diversion.

$$X = \frac{0.5 * \text{Velocity}}{1.7 + \text{Velocity}}$$

STORM RUNOFF VOLUMES AND DESIGN FLOWS

Storm Event	Total Runoff (acft)	Total Sediment (tons)	Pond Stage Elevation	D1 cfs	D2 cfs	D3/C1 cfs	D4 cfs	D5 cfs	C2 cfs	C3 cfs	D7 cfs	D8 cfs	D9 cfs	Outlet cfs
10yr 24hr	2.0	680	6212.3	2.9	3.5	0.8	5.2	1.4	5.7	6.0	0.6	6.1	6.7	0.0
25yr 6 hr	1.3	557	6211.2	3.0	4	0.8	5.4	1.6	6.0	6.3	0.7	6.3	7.1	**0.0**
100yr 6hr	2.8	1314	6212.6	**6.3**	**7**	**2.3**	**13.7**	**2.9**	**15.0**	**15.7**	**1.2**	**15.7**	**17.2**	4.8

The flowline of the primary discharge (decant) pipe (and 100% sediment storage) is at elevation 6209.07. Sediment levels in the pond are allowed to fill to 60% of sediment capacity (6207.7) prior to a required cleaning. Adequate storage exists to treat the calculated storm runoff volumes and the projected sediment volume from the modeled storms.

The permittee is encouraged to perform the periodic cleaning to elevations lower than the minimum design depth to allow for additional sedimentation storage between cleaning events.

The 100 year 6 hour storm is projected to have a discharge from the pond. Detention time for this storm is modeled to be over 2 hours. This is expected to be adequate to allow settling to occur in the pond adequate to meet the UPDES discharge concentration volumes.

DIVERSION DESIGN

Temporary diversions and culverts for these miscellaneous flows are required to be designed to pass the 10 year, 6 hour storm (R645-301-742.333). Diversions on a refuse pile are required to be designed for the 100 year 6 hour storm. SCA has provided a design for the 100 yr 6 hr storm on all the ditches in this watershed. Permanent diversion designs are described in the permit term reclamation plan and final reclamation plan.

Design summaries are given in the tables below. The diversions were designed to fit within a range of expected field values. The flow depth and flow area are calculated by using the average channel slope and an assumed channel cross section. Due to the reality that the channel conditions will vary in the field, the critical value is to provide the minimum required cross sectional flow area for the storm flows to pass. Additional freeboard is not required in the regulations, but we have recommended that the operator may construct the diversions larger than required to reduce the risk of overflow from conditions not assumed in this hydrologic model.

DIVERSION DESIGN CRITERIA

Ditch No.	Manning N	Side Slope minH/1V	Bottom Width (ft)	Design Flow (cfs)	Channel Slope Avg %	Flow Depth ft	Reqd Flow Area sqft	Maximum Velocity (ft/s)	Recommended Channel Depth Minimum (ft)
RC-D1	0.035	2	1	**6.3**	1	0.8	1.5	4	1.3
RC-D2	0.035	2	1	**7**	5.5	0.5	1.4	5.0	1.0
RC-D3	0.035	2	0	**2.3**	3	0.27	0.54	4.3	0.8
RC-D4	0.035	2	1	**13.7**	1	1.54	4.62	3.0	2.0
RC-D5	0.035	2	0	**2.9**	2	0.41	0.82	3.5	0.9
RC-D7	0.035	2	0	**1.2**	5	0.13	0.26	4.8	0.6
RC-D8	0.035	2	2	**15.7**	2.5	0.84	3.36	4.7	1.3
RC-D9	0.035	2	3	**17.2**	0.4	1.52	7.60	2.3	2.0

RIPRAP SIZING

Riprap is placed along steep channel slopes and at select culvert outlets to control erosion. The size of the stones is based on the expected maximum velocity of water flowing. When peak velocities in the smooth channel are expected to reach 5 ft/s, riprap is required. The operator may choose to add riprap in other channel areas where erosive conditions present a difficulty for the site. The riprap mixture should approximate the following gradation:

Stone Size	% Finer
$2*D_{50}$	100
D_{50}	50
$0.5*D_{50}$	20
$0.2*D_{50}$	0

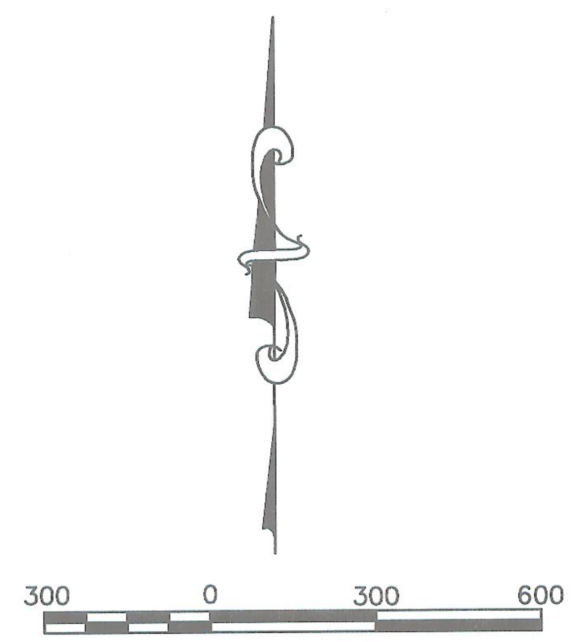
In areas where the increased roughness from riprap does not reduce the velocity below 5 ft/s, a filter blanket (or gravel bedding in a layer $3*D_{50}$) may be used.

The velocity expected in the channel is calculated by dividing the flow rate by the flow cross sectional area. Manning's N for a channel bed with riprap is estimated by the equation $N=0.0395*(D_{50})^{1/6}$ with D_{50} in feet (Applied Hydrology and Sedimentology for Disturbed Areas page 188). If the normal depth of flow is less than twice D_{50} then N is estimated by the equation $N=0.456*(D_{50}*\text{Slope})0.159$ with D_{50} in inches and slope in feet/feet (*Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase 1* May 1987, Colorado State University, prepared for Uranium Recovery Field Office and Division of Waste Management).

CULVERT DESIGN CRITERIA

Culvert No	Pipe Diameter (in)	Pipe Length (ft)	Pipe Slope %	Controlling Head Water (Ft)	Design Flow (cfs)	Design Velocity (ft/s)	Inlet / Outlet Conditions
RC-C1 RC-C2 RC-C3	36	150	33	<2	**<25**	<10	Inlet end section and outlet splash pool

The three culverts installed on the face of the refuse pile were constructed with a standard end section for inlet control and an energy dissipating splash pool at the outlet. The 36" culverts are clearly overdesigned for the current conditions under the regulations but the permittee wished to minimize the potential for problems from flows greater than anticipated at the time of installation.



ROAD SUMMARY

ROAD DESIGNATION	ROAD NAME	ROAD TYPE (SEE LEGEND)	PLAN & PROFILE PLATE #	MAX. GRADE (%)	AVERAGE WIDTH (FEET)	APPROX. LENGTH (FEET)
A	Tonka Road	A	Plate 5-2C	22.4	31	1080
B	Upper Old Coarse Refuse Road	A	Plate 5-2H	5.6	12	2950
E	Lower Haul Road	PR	Plate 5-2C	9.7	24	2915
F	Railroad Access Road	A	Plate 5-2D	1.4	13	1490
G	Excess Spoil Disposal Area #2	A	Plate 5-2D	1.2	23	1560
I	Clear Water Pond Access Road	A	Plate 5-2D	2.0	23	2475
J	New Haul Access Road	PR	Plate 5-3	3.0	25	1065
K	Borrow Area Pond South Access Road	PR	Plate 5-2G	8.4	17	850
L	East Slurry Cell South Access Road	PT	Plate 5-2G	13.8	11	880
M	Coarse Refuse Seep Access Road	A	Plate 5-2J	8.5	13	560
N	Coarse Refuse Toe Pond Access Road	A	Plate 5-2J	20.0	11	475
P	Railcut Pond West Access Road	A	Plate 5-2J	2.2	15	985
Q	Old Coarse Refuse Road Sediment Pond Access Road	A	Plate 5-2G	13.0	11	183
R	Lower Old Coarse Refuse Road	A	Plate 5-2J	4.2	15	2510
S	West Pasture Access Road	PR	Plate 5-2K	3.0	30	985
T	Refuse Pile Access Road	PT	Plate 5-2K	3.0	30	1570

NOTE:

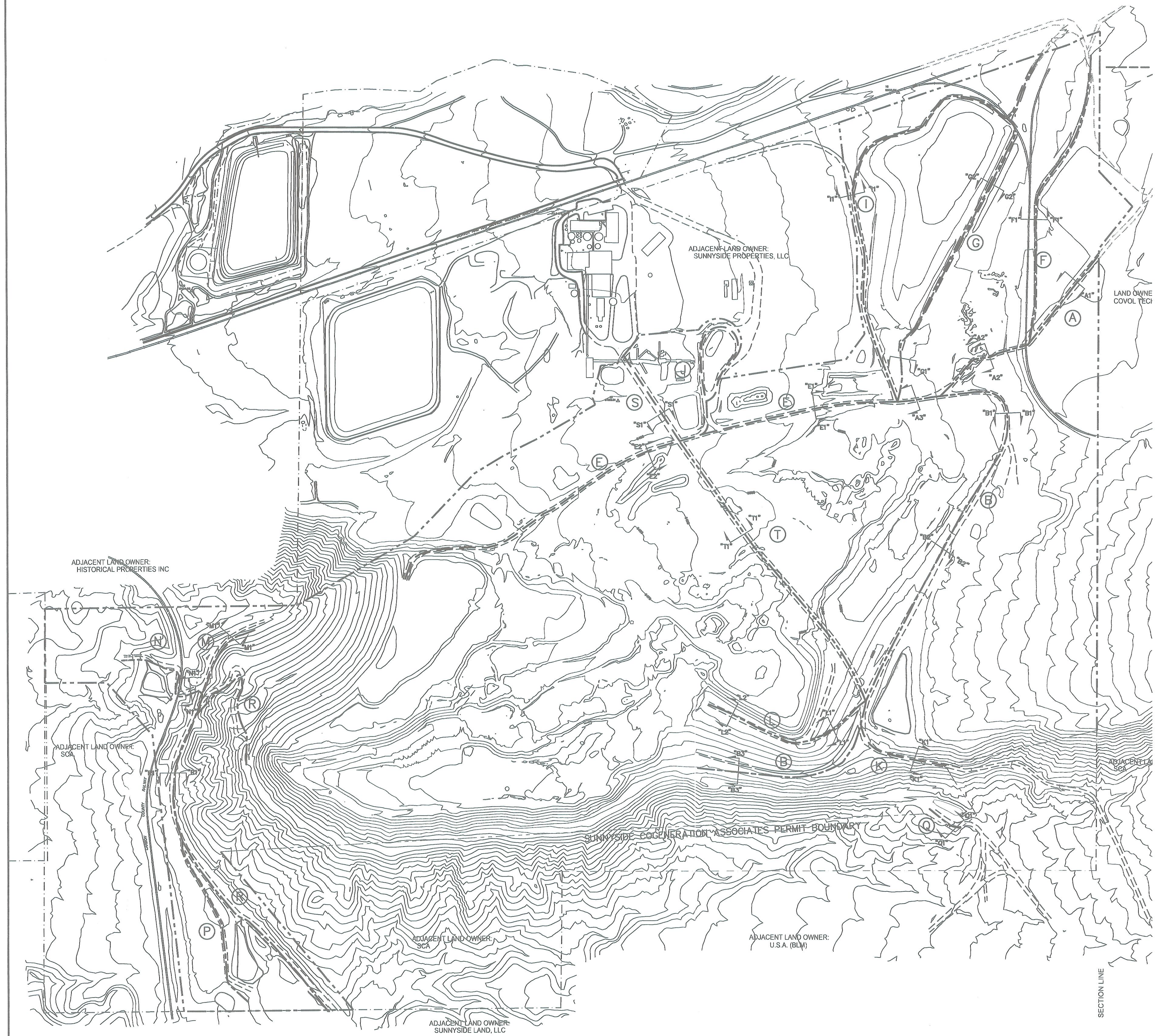
SEE PLAN AND PROFILE SHEETS FOR STATIONING

LEGEND

— — — — PRIMARY ROADS (PR)
— — - — — ANCILLARY ROADS (A)
—-—-—-— PIT ROADS (PT)
—-—--—-— PERMIT BOUNDARY

NOTE: ROAD TYPES ARE REFLECTED IN CENTERLINE LINETYPES ON THIS DRAWING.

ALL ROADS WITHIN THE REFUSE PILE AREA ARE PIT ROADS AND WILL ADJUST AS REQUIRED THROUGHOUT THE OPERATIONAL PERIOD. FOR SIMPLICITY, THESE ROAD HAVE NOT BEEN SHOWN ON THIS DRAWING.



REV	DATE	DESCRIPTION	BY	APP'D
9	7/15	WEST PASTURE AND REFUSE PILE ACCESS ROADS	AH	
8	11/10	BOUNDARY AND TOPO UPDATE	AH	
7	2/07	CHANGE IN ROAD H	AH	
6	9/02	2002 PERMIT RENEWAIL	PAM	
5	9/94	CHANGE IN ROAD B AND R	AJZ	
4	2/94	CHANGE ON CLASSIFICATION	AH	

LICENSED PROFESSIONAL ENGINEER
No. 187727
S. SCOTT CARLSON
11-2015
STATE OF UTAH

DATE 09-28-94
SCALE 1" = 300'
PROJECT NO. -

Sunnyside Cogeneration Associates
ROAD CLASSIFICATION MAP

TWIN PEAKS
Engineering & Land Surveying
2264 NORTH 1450 EAST LEHI, UTAH 84043
(801) 450-3511, (801) 439-0700 FAX

DESIGNED AH
DRAWN AH
CHECKED SSC

SHEET
5-2

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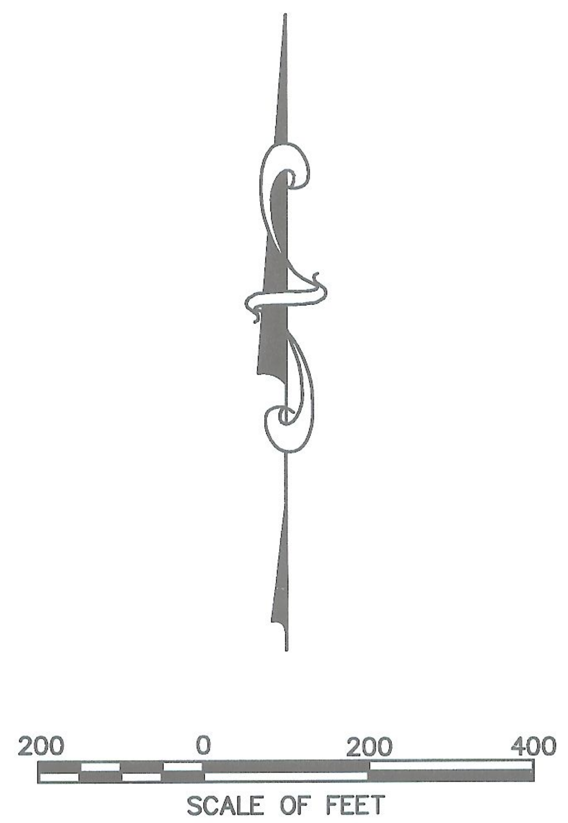
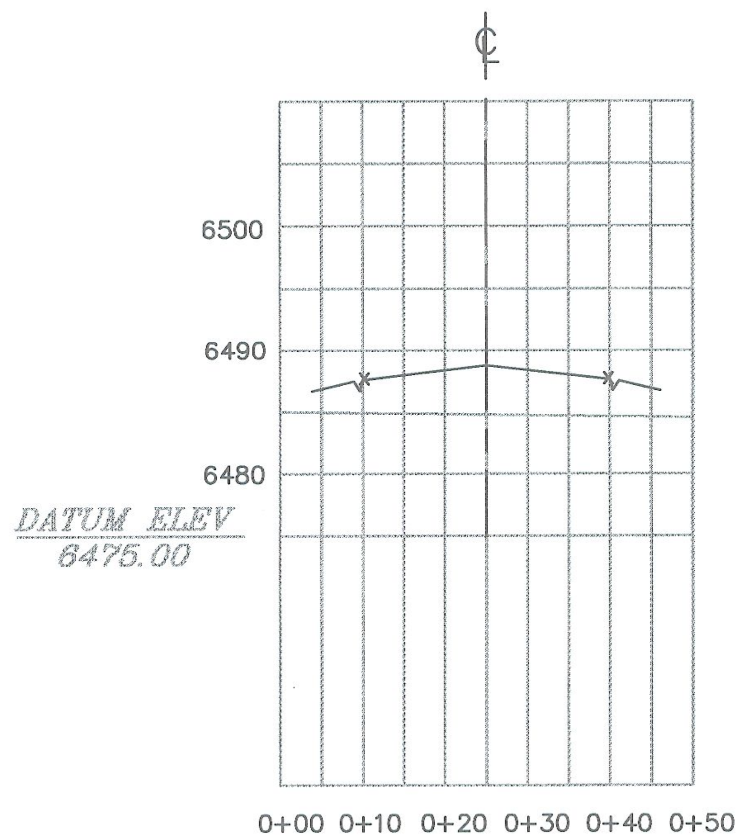
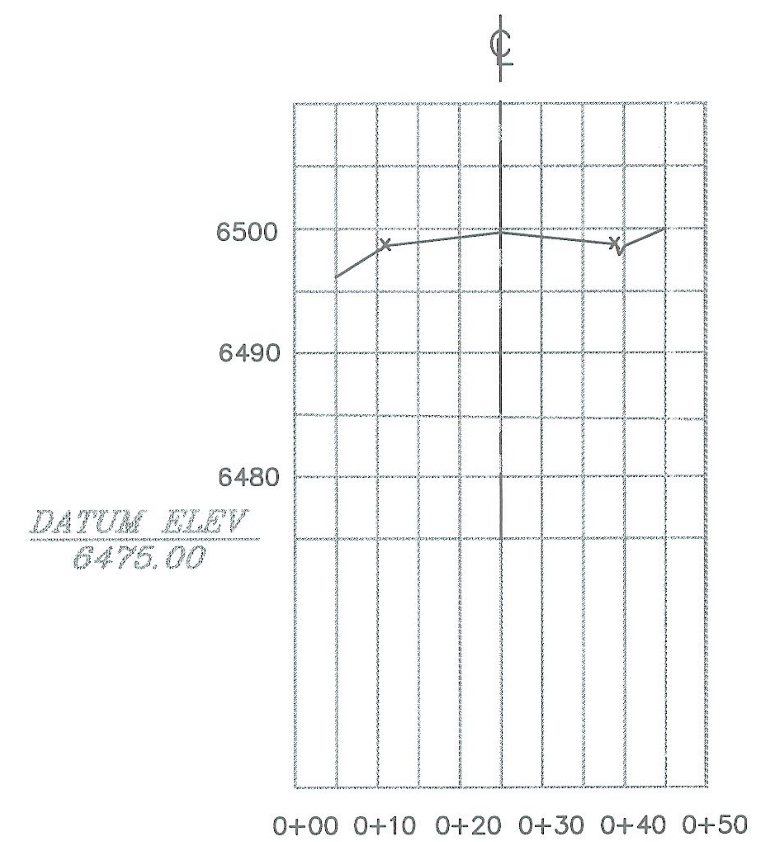


NOTE:
1. ALL SECTIONS ARE NON-TYPICAL, AND MAY VARY FROM THAT SHOWN.
2. X = ROAD LIMITS ON CROSS-SECTIONS.

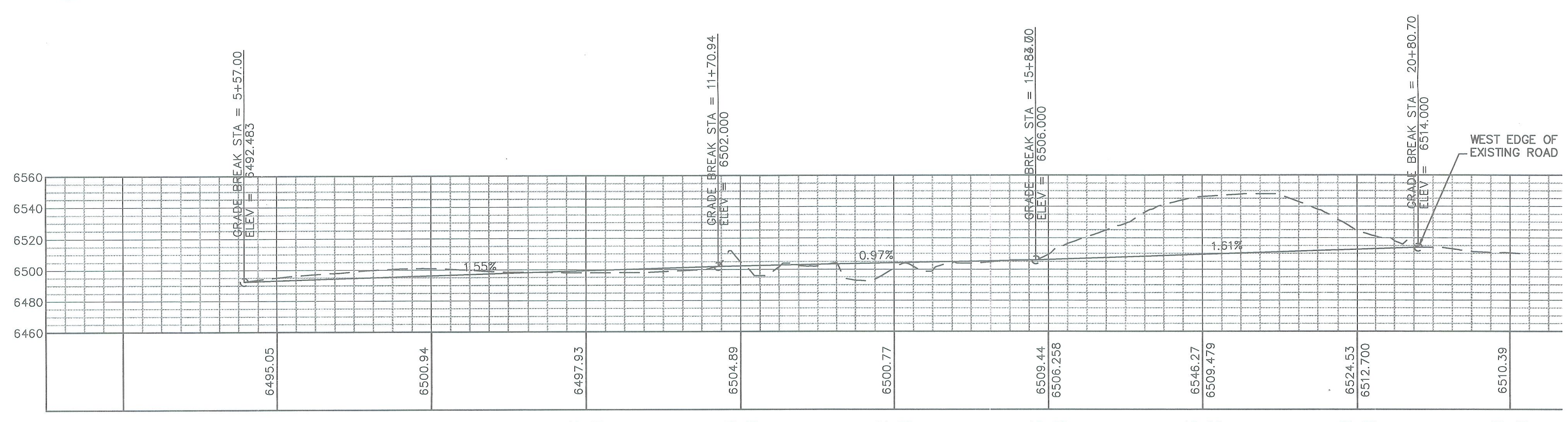


S1 SECTION (ROAD "S")



T1 SECTION (ROAD "T")

WEST PASTURE ACCESS ROAD (ROAD S) - PROFILE



ROAD T (PIT ROAD) - PROFILE

REV	DATE	DESCRIPTION	BY	APP'D
△				
△				
△				
△				
△				
△			AH	

LICENSED PROFESSIONAL ENGINEER No. 187727 S. SCOTT CARLSON STATE OF UTAH

7-2015

SCALE 1" = 200'

PROJECT NO. –

Sunnyside Cogeneration Associates
PLAN AND PROFILES
ROADS "S" & "T"

TWIN PEAKS
Engineering & Land Surveying
2264 NORTH 1450 EAST LEHI, UTAH 84043
(801) 450-3511; (801) 439-0700 FAX

DESIGNED AH
DRAWN AH
CHECKED SSC

SHEET

5-2K

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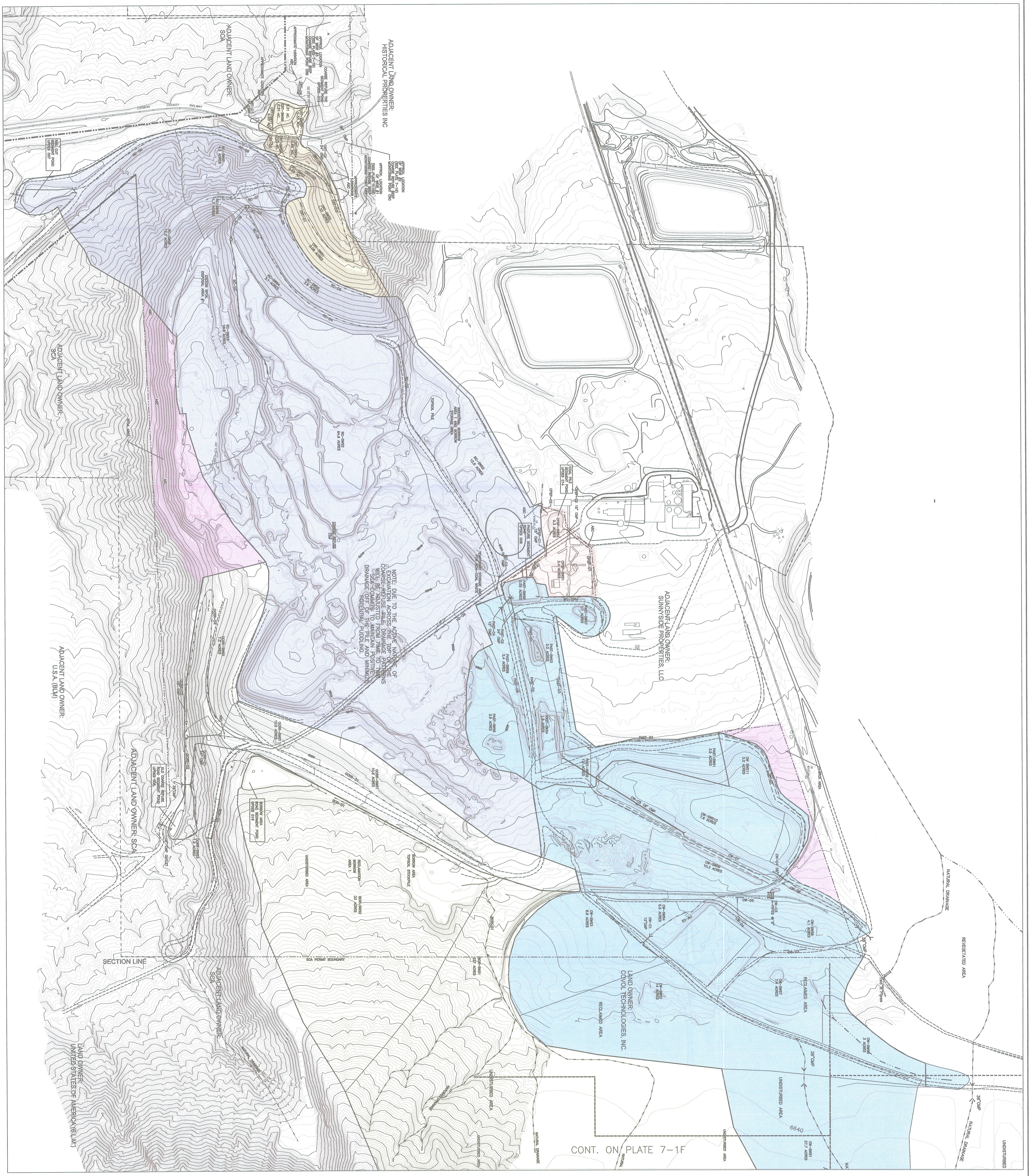
PLOTTED DATE: Sunday, 26 July 2015 - 9:38am

PLOTTED DATE: Tuesday, 13 October 2015 - 4:56pm



LEGEND

- PERMIT BOUNDARY
- COLLECTOR DITCH
- WATERSHED BOUNDARY
- SUB-WATERSHED BOUNDARY
- ROAD
- ALTERNATE SEDIMENT CONTROL (ASC)
- UPDES POINTS
- COARSE REFUSE TOE SEDIMENT POND DRAINAGE
- BORROW AREA POND DRAINAGE
- OLD COARSE REFUSE ROAD SEDIMENT POND DRAINAGE
- PASTURE SEDIMENT POND DRAINAGE
- RAIL CUT SEDIMENT POND DRAINAGE
- BTCA AREA
- COAL PILE SEDIMENT POND DRAINAGE

GRAPHIC SCALE (IN FEET) 0 100 200 400 800

NOTE:
AREAS HATCHED ARE BASED ON DRAINAGE PATTERNS AND MAY INCLUDE BOTH DISTURBED AND UNDISTURBED GROUND.

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REV	DATE	DESCRIPTION	BY	APP'D
	7/15	REMOVE CULVERTS IN PASTURE POND DRAINAGE AREA	AH	
		ADD DITCHES AND CULVERTS IN RAIL CUT DRAINAGE	AH	
	11/10	BOUNDARY UPDATE	AH	
	8/10	UPDATE SITE AND TOPO	AH	
	5/08	MOVE PASTURE POND CULVERT-C1	SSC	
	5/07	UPDATE PASTURE POND	AH	
	3/06	UPDATE DRAINAGE AREAS	AH	
	9/97	PERMIT RENEWAL-UPDATES	AH	

SHEET 7-1

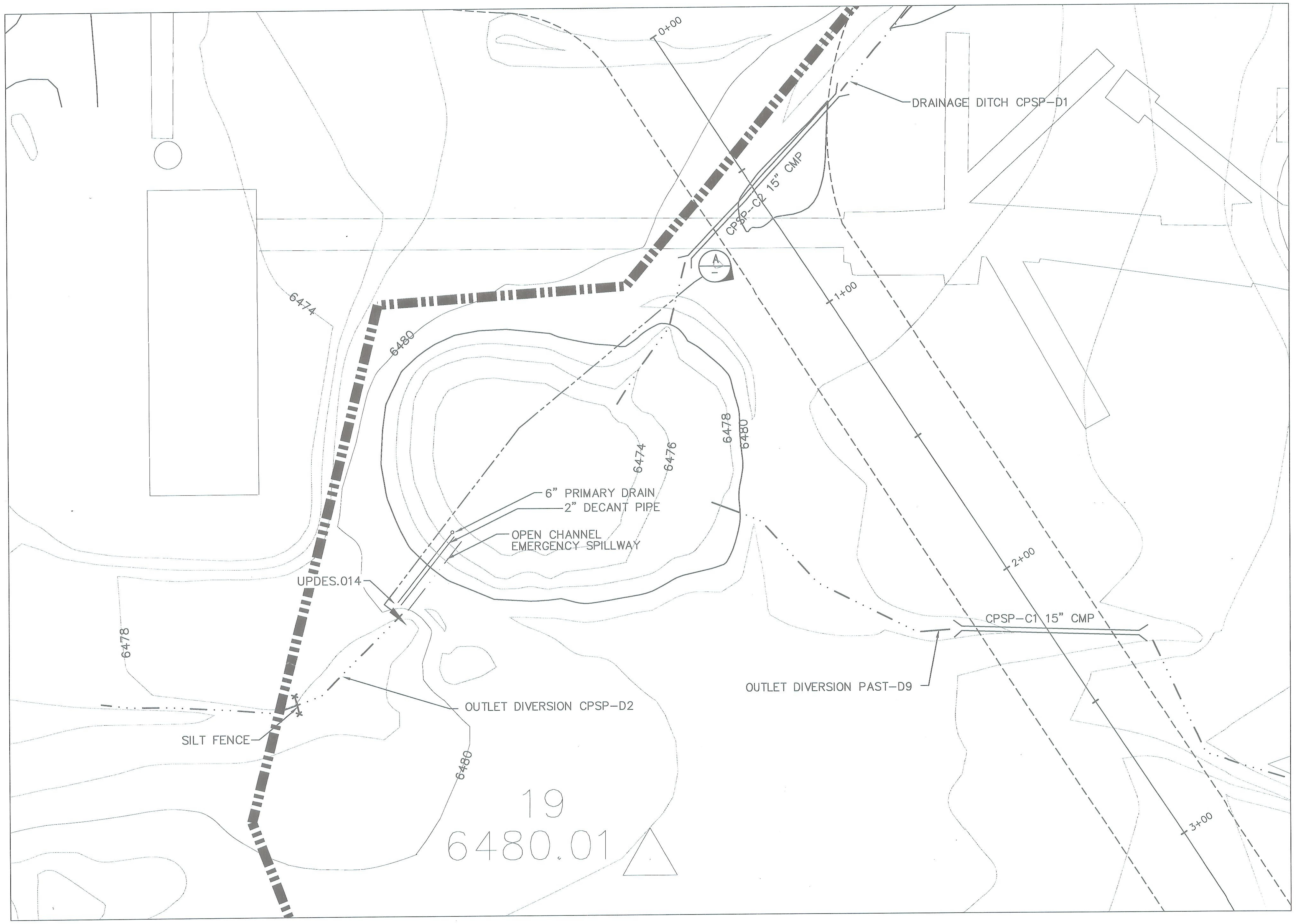
LICENSED PROFESSIONAL ENGINEER No. 187727 S. SCOTT CARLSON 11-2015 STATE OF UTAH

TWIN PEAKS Engineering & Land Surveying
2264 NORTH 1450 EAST LEHI, UTAH 84043
(801) 450-3511, (801) 439-0700 FAX

DESIGNED AH
DRAFTED AH
CHECKED SSC

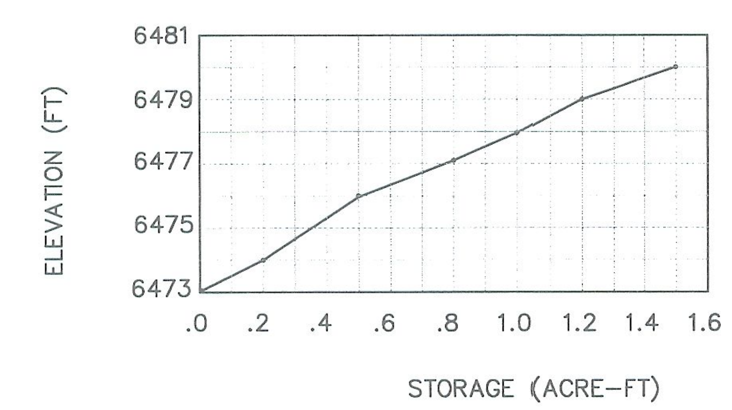
Sunnyside Cogeneration Asso
HYDROLOGIC INDEX MAP

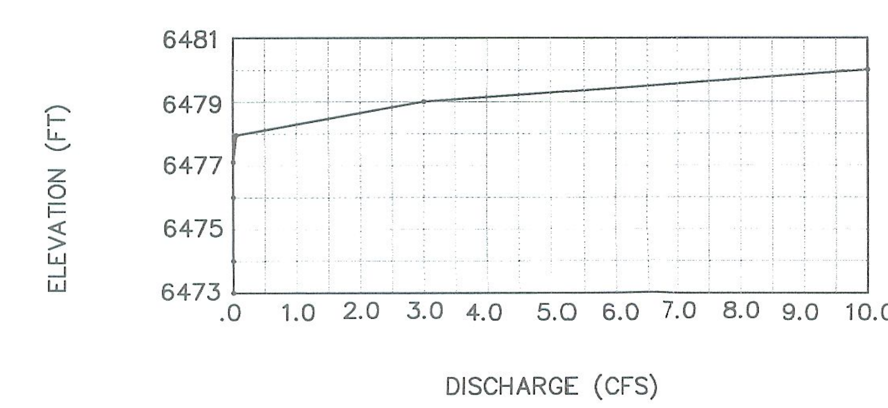
DATE:
PLOT DATE:
SCALE
PROJECT NUMBER —

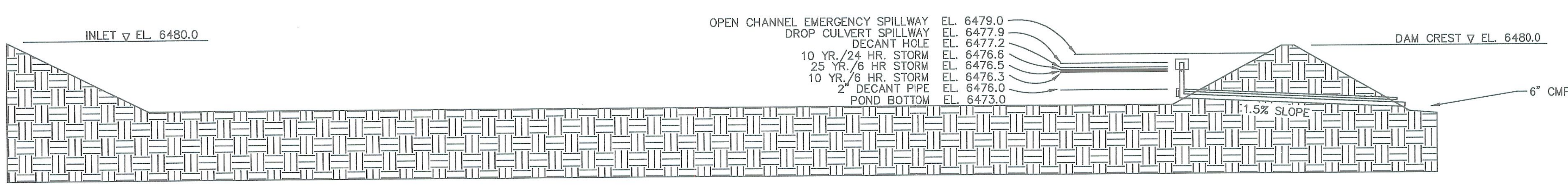


20 0 20 40
SCALE OF FEET

ELEVATION (FT)	AREA (ACRES)	DISCHARGE (CFS)	STORAGE (AC-FT)
6473.0	.14	0.0	0.0
6474.0	.17	0.0	0.2
6476.0	.21	0.0	0.5
6477.2	.23	0.0	0.8
6477.9	.24	0.2	1.0
6479.0	.26	3	1.2
6480.0	.28	10	1.5

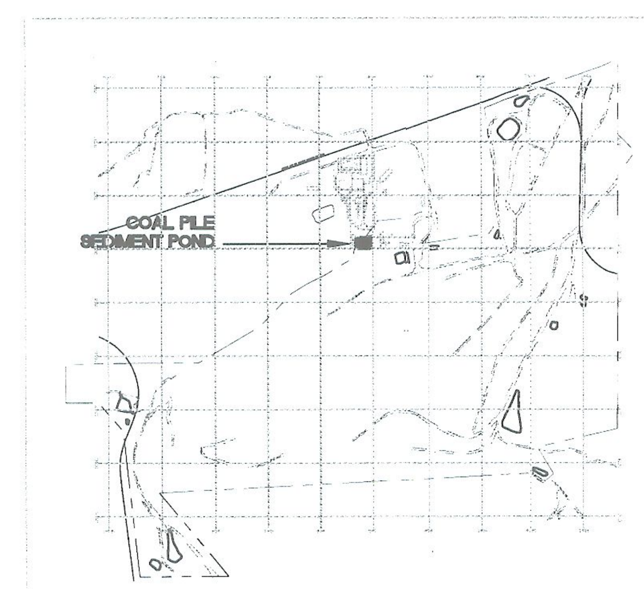






(A) COAL PILE SEDIMENT POND CROSS-SECTION

SCALE: 1" = 10"



VICINITY MAP

REV	DATE	DESCRIPTION	BY	APP'D
△				
△	10/15	REDIRECTED WATER FROM PASTURE POND	AH	
△	9/02	2002 PERMIT RENEWAL		
△	8/95	ADDED 6' SILT FENCE		
△	1/95	ADDED 2" DECANT PIPE		
△	6/93	ADDED SLOPE TO CMP		

LICENSED PROFESSIONAL ENGINEER No. 187727 S. SCOTT CARLSON STATE OF UTAH

INCORPORATED NOV 17 2015 Div. of Oil, Gas & Mining

RECEIVED NOV 17 2015 DIV. OF OIL, GAS & MINING

Sunnyside Cogeneration Associates

COAL PILE/SEDIMENT POND AND CROSS-SECTION

TWIN PEAKS
Engineering & Land Surveying
2764 NORTH 1450 EAST LEHI, UTAH 84043
(801) 450-3511, (801) 439-0700 FAX

DWG DATE: OCTOBER 2015

PLOT DATE: 13 October 2015

SHEET 7-18