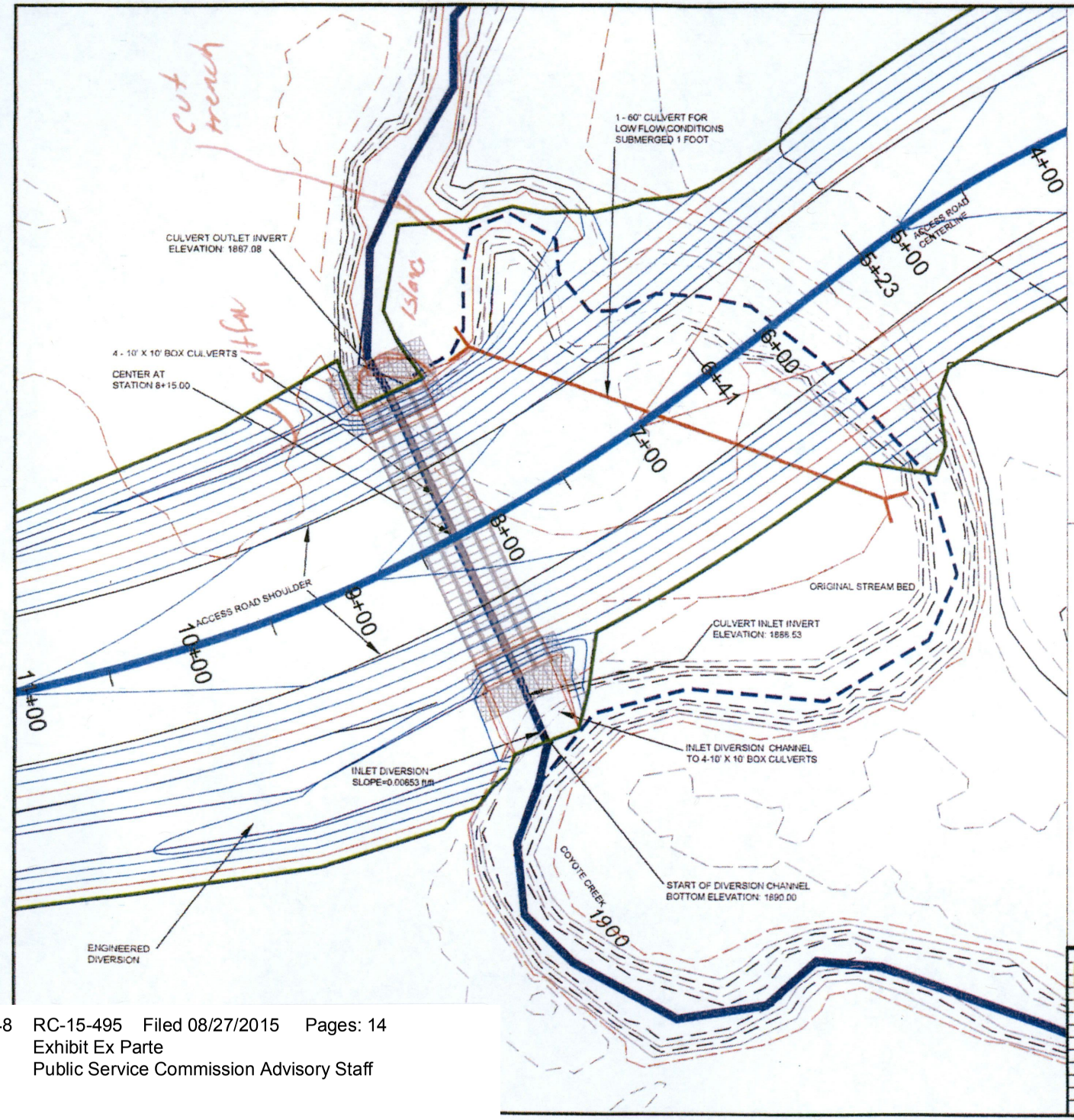
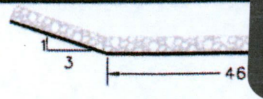
EXHIBIT

tabbies

Ex Parte





TYPICAL INLET DIVERSION CROSS SECTION

NOT TO SCALE

NOTE:

1. ALL COORDINATES ARE BASED ON THE NORTH DAKOTA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NORTH AMERICAN DATUM OF 1983.
2. ELEVATIONS ARE BASED ON THE NATIONAL GEODETIC DATUM OF 1988, GEOID 2012.
3. DESIGN SURFACES UTILIZE 1 FOOT CONTOURS TO SHOW ELEVATION CHANGE OF DESIGN SURFACE. EXISTING CONTOURS ARE TWO FOOT CONTOURS.
4. BOTH THE DIVERSION DESIGN SURFACE AND THE ROAD DESIGN SURFACE ARE SHOWN.
5. THE ORIGINAL STREAMBED WILL BE RETAINED FOR LOW FLOW CONDITIONS WITH A 36" CULVERT CROSSING UNDER THE ACCESS ROAD.
6. ALL CULVERTS WILL BE SUBMERGED 1 FOOT TO MEET CURRENT REGULATIONS.

LEGEND

- COYOTE CREEK
- ORIGINAL STREAM BED - LOW FLOW STREAM BED
- LOW-FLOW CULVERT
- ACCESS ROAD CENTERLINE
- CABLE CONCRETE EROSION CONTROL
- EDGE OF DISTURBANCE

I certify that this temporary stream channel diversion drawing was prepared by myself, or under my direction, and that I have previous experience in the design of temporary stream channel diversions. I further certify that the design of this temporary stream channel diversion meets current and prudent engineering standards and the temporary stream channel diversion design requirements of the North Dakota Public Service Commission.

G.N.

0 40' 80' 120' 160'

Scale 1" = 40'

Where is the "island"

COYOTE CREEK MINING COMPANY, L.L.C.
COYOTE CREEK MINE
6902 17th Street SW
Zap, ND 58545
(701) 673-7800 - Fax (701) 673-7810

...EL FOR COYOTE CREEK
...CCESS ROAD
...TION 3.2.5.1

REVISION: 1

Section 3.2.3 – Shop Access Road

The Shop Access Road will facilitate the moving of mining equipment from the office and shop complex to the North-South Haulroad, as shown on the Pit Layout and Facilities Map of Section 3.1.3. Construction of this road is scheduled to start in 2015, and will progress as needed for the mining schedule. The design of this road is presented on two plan and profile drawings in Section 3.2.3.1 and Section 3.2.3.2. The Shop Access Road will begin at Station 0+00 from the Dragline Erection Pad, as seen on the Pit Layout and Facilities Map in Section 3.1.3. The typical cross-section of the road will consist of a 90 foot road top, 3 percent cross slope, and 4H:1V inslopes and 4H:1V backslopes. The final road top will be completed as shown on the typical haulroad cross-sections in Section 3.2.2. The Shop Access Road will end at Station 31+50 when it intersects the North-South Haulroad. The North-South Haulroad will run through Sections 30 and 31 of T143N, R88W.

The road will pass through existing utilities owned by Roughrider Electric Cooperative. Coyote Creek Mining Company will coordinate with the utility company to retire and relocate the utilities lines as needed.

This haulroad will be constructed of overburden removed from the basin of pond P31-01. Pond P31-01 is the first construction project to begin minesite development and furnishes the majority of the Shop Access Haulroad fill. The corridor of land that the road will occupy will initially be stripped of topsoil and subsoil. The topsoil and subsoil will be stockpiled on adjacent piles along the North-South Haulroad corridor. Proposed topsoil and subsoil stockpile locations are shown on the Pit Layout and Facilities Map of Section 3.1.3. The sediment control structures for the haulroad will consist of vegetated cover, shallow sumps, silt fence installations, straw bale dikes, or a combination thereof. The stockpiles will be graded, seeded, and mulched after final soils have been placed on them.

The design of the haulroad requires approximately 210,347 cubic yards of overburden fill. In order to construct the Shop Access Road, overburden will be taken from the basin of pond P-31-01 and adjacent haulroad cut south of the intersection of the north-south haulroad. The Shop Access Road will be in place for the life of the mine to provide access to the rest of the mine. When the Shop Access Road is reclaimed the overburden will be used to reclaim pond P31-01 and adjacent haulroad.

Four 10' by 10' box culverts will be installed adjacent to Coyote Creek. The creek will then temporarily be diverted through the culverts until the road is removed. A diversion channel will need to be excavated to the box culverts on the upstream and down stream sides of the Access Haulroad to connect the creek and allow it to flow freely. A 60" culvert will be placed near the original stream bed location for low flow situations. The 60" culvert will be installed prior to the concrete box culverts. Construction in this manner will allow equipment access to the west side of Coyote Creek for construction and installation of the box culvert. This culvert was not included the modeling nor calculation to safely pass the peak flow of Coyote Creek. There will be a short period of time when Coyote Creek will flow through the 60" culvert prior to installation of the box culvert. During this time an area to the west of the low flow culvert

will be left low to allow high flows to pass through this location. Culvert design data for the Shop Access Road are presented in Section 3.2.6.2. The box culvert diversion channel is discussed and shown in Section 3.2.5 and Section 3.2.5.1 respectively. The peak flow of the watershed was modeled with the HEC-HMS to provide flow rates to size the culverts. The box culverts are sized to pass the peak flow from the 50-year/6-hour precipitation event using available head and storage. All other culvert installations are sized to safely pass the peak flow from the 10-year/6-hour precipitation event using available head. Flood routing for the 10-year/6-hour as required by NDAC 69-05.2-24-03(5)(a) are also included.

Upon completion of haulroad construction, the inslopes, backslopes, and ditch bottoms will be scarified, seeded, and mulched.

An Engineered Diversion acts as the south side ditch of the Shop Access Road, the plan and profile is presented in Section 3.2.3.3. The Shop Access Road to Box Culvert Diversion will be constructed in 2015 downstream of sedimentation pond 31-01 located in Section 31, T143N, R89W to the Shop Access Road Box Culvert. The diversion also serves as the haul road ditch with a design grade at or below the overburden/subsoil interface. Prior to the construction of the diversion, runoff from the diversions watershed will flow into sedimentation pond P31-01. In the unlikely scenario that P31-01 would overflow through its emergency spillway, the diversion will convey flow from P31-01's emergency spillway to the box culverts located at Station 8+20. Station 0+00 of the diversion is located at the end of the P31-01's emergency spillway control section. Three 48 inch corrugated metal culverts are required in the diversion to convey flow under a landowner access approach coming off the haul road. The three 48 inch culverts have been sized to pass the design storm event utilizing available head as shown is Section 3.2.6. An overburden control berm extends to the west from the landowner access approach an adjacent hillside to disallow flow from short circuiting around the approach.

The Shop Access Road Diversion was designed to convey a peak flow of 399.8 cfs at a depth of 2.62 feet, which represents a contributing watershed condition of disturbed and undisturbed acreage. The diversion is a minimum depth of three feet using a trapezoidal cross-section, with a 22 foot bottom width and side slopes of 3H:1V and 4H:1V. The channel is 1,902 feet in length, and is designed with an average slope of 0.010 ft/ft. The elevation of the diversion inlet is 1911.4, and an outlet elevation of 1893.0. Design data for the Shop Access Road Diversion is presented on the following pages.

WATERSHED AREA (acres) =	9.1
RAINFALL 10-YR/6-HR (in.) =	2.5

LAND USE, CONDITION	HYDROLOGIC SOIL GROUP	RUNOFF CURVE NUMBER (CN)	LAND USE AREA (ACRES)	PRODUCT
Rangeland, good	B	61		
Rangeland, fair	B	69	9.1	628
Cropland, good	B	75		
Fallow, clean till	B	82		
Farmsteads	B	74		
Rangeland, good	D	80		
Rangeland, fair	D	84		
Cropland, good	D	87		
Fallow, clean till	D	90		
SPGM Stockpiles	-	76		
Respread SPGM	-	76		
Roads	-	84		
Disturbed Areas	-	90		
Total	-	-	9.1	628
Weighted CN =	**69.0**	**Use CN =**	**69**	

RUNOFF VOLUME (V_R) FOR	
RUNOFF (in.) =	0.42
V_R (ac-ft) =	**0.3**

Time of Concentration (T_c)	
Calculated using SCS Method	
Weighted CN =	69
Length of flow line (ft) =	1454
Average watershed slope (%) =	9.8
T_c (hr) =	0.31

Peak Inflow Determination	
10-yr/6-hr storm event (in) =	2.50
Watershed area (ac) =	9.1
Weighted CN =	69
T_c (hr) =	0.31
Peak inflow (cfs) =	2.1
Outflow Pond P31-01 (cfs)	**397.7**
Total Inflow (cfs)	**399.8**

Access Road Diversion

Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Shop Access Road Diversion
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Mannings Coefficient	0.048
Channel Slope	0.010000 ft/ft
Left Side Slope	4.00 H : V
Right Side Slope	3.00 H : V
Bottom Width	22.00 ft
Discharge	399.80 cfs

Results	
Depth	2.62 ft
Flow Area	81.7 ft²
Wetted Perimeter	41.09 ft
Top Width	40.34 ft
Critical Depth	1.95 ft
Critical Slope	0.029455 ft/ft
Velocity	4.89 ft/s
Velocity Head	0.37 ft
Specific Energy	2.99 ft
Froude Number	0.61
Flow Type	Subcritical

REVISION 1
DECEMBER 2014

Section 3.2.5 – Haulroad Box Culvert – Diversion Channel

Shop-Access Road

Coyote Creek is a perennial stream that will be crossed by the Shop Access Road for access to the mining area. Crossing Coyote Creek will require disturbance within 100 foot stream buffer zone. The flow from the stream will be directed under the road through four ten foot by ten foot reinforced concrete box culverts. This culvert installation is located near station 8+20 on the access road. The culverts have been sized to pass the peak runoff from a 50-year/6-hour rainfall event. Overburden cut material from pond P31-01 will be used to bury the reinforced concrete box culverts. On the upstream side, the fill will be placed at 4H:1V side slopes until reaching the top of the concrete box culverts parapet where manufactured slope of the pre-cast sections will transition to 2H:1V side slopes. On the downstream side, due to constraints from the existing Coyote Creek stream bank, 2.5H:1V side slopes will be utilized until reaching the top of the concrete box culverts parapet where manufactured slope of the pre-cast sections will transition to 2H:1V side slopes. As shown in Section 3.2.5.1, the box culverts will be submerged into the stream bed 1 ft., invert elevations on the drawing will be field verified just before the culverts are placed.

Since Coyote Creek does not flow perpendicular to the Shop Access Road at this location, and because significant flows are developed from the design storm, inlet and outlet channels associated with the culvert structure have been designed. These channels will safely pass a 10 year/24 hour storm event as required by NDAC 69-05.2-16-07. The creek channel enters the shop access road inlet approximately 30 feet south of the culvert structure. The inlet channel will have a 46 foot bottom width with 3H:1V side slopes. The slope of the inlet and outlet channel will be 0.00853 ft/ft.

In order to protect the inlet channel and slope surrounding the entrance to the concrete box culvert installation, cable concrete will be installed as shown on Section 3.2.5.1..

The outlet of the culvert will be a channel approximately 30 feet long. This channel will transition flow from the box culvert structure to the original Coyote Creek streambed. The inlet channel will have a 46 foot bottom width with 3H:1V side slopes. The slope of the inlet and outlet channel will be 0.00853 ft/ft. The outlet channel will be sloped to transition to the existing streambed elevation.

In order to protect the outlet channel and slope surrounding the outlet of the concrete box culvert installation, riprap will be placed across the sides of the outlet channel and along the entire length of the culvert outlet. The riprap will have a D_{100} of 12 inches and will be placed in a single layer having a minimum thickness of 9 inches. This same gradation of riprap will also be placed around the sides of the box culvert entrance for a distance of ten feet. All riprap at the culvert installation entrance will be laid on a single layer of non-woven engineering fabric.

A 60" culvert will be placed near the original stream bed location for low flow situations. The 60" culvert will be installed prior to the concrete box culverts. Construction in this manner

will allow equipment access to the west side of Coyote Creek for construction and installation of the box culvert. This culvert was not included the modeling nor calculation to safely pass the peak flow of Coyote Creek. There will be a short period of time when Coyote Creek will flow through the 60" culvert prior to installation of the box culvert. During this time an area to the west of the low flow culvert will be left low to allow high flows to pass through this location. Culvert design data for the box culverts is presented in Section 3.2.6.2. The diversion channel is discussed and shown in Section 3.2.5 and Section 3.2.5.1 respectively. The peak flow of the watershed was modeled with the HEC-HMS to provide flow rates to size the culverts. The box culverts are sized to pass the peak flow from the 50-year/6-hour precipitation event using available head and storage. Flood routing for the 10-year/6-hour as required by NDAC 69-05.2-24-03(5)(a) are also included.

NDAC 69-05.2-16-07(2)(b) requires a temporary stream channel be designed to safely pass the peak runoff from a 10-year/24-hour storm event. This event was not specifically modeled for this diversion. However, the diversion channel was modeled to pass the peak flow from a 50-year/ 6-hour storm event which is not only a greater rainfall event; it is also a more intense event. With the diversions ability to safely pass the 50 year/6-hour event, the diversion will safely pass the 10-year/24-hour event.

Design data associated with all of the channels can be found on the following pages, and a design drawing is presented in Section 3.2.5.1.

Upon removal of the Shop Access Road and the north-south haulroad, the portion of pre-mining stream channel that was used in low flow scenarios will be restored to its natural meandering shape and pre-mine elevation; therefore it will be at an environmentally acceptable gradient. The original streambed will be restored to facilitate the full flow of Coyote Creek. Refer to Section 4.4.1 for additional information about the reclamation of the creek crossings.

SHOP-ACCESS ROAD
Diversion Channel

Project Description	
Worksheet	Diversion Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.040	
Channel Slope	0.008530	ft/ft
Depth	10.00	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	46.00	ft

Results		
Discharge	9,502.32	cfs
Flow Area	760.0	ft²
Wetted Perimeter	109.25	ft
Top Width	106.00	ft
Critical Depth	8.97	ft
Critical Slope	0.012945	ft/ft
Velocity	12.50	ft/s
Velocity Head	2.43	ft
Specific Energy	12.43	ft
Froude Number	0.82	
Flow Type	Subcritical	

North-South Haulroad

Coyote Creek is a perennial stream that will be crossed by the North-South HaulRoad for access to the mining area. Crossing Coyote Creek will require disturbance within 100 foot stream buffer zone. The flow from the stream will be directed under the road through four ten foot by ten foot reinforced concrete box culverts. This culvert installation is located near station 40+70 on the access road. The culverts have been sized to pass the peak runoff from a 50-year/6-hour rainfall event. Overburden cut material to the south will be used to bury the reinforced concrete box culverts. On the upstream and downstream sides, the overburden fill will be placed at 3H:1V side slopes until reaching the top of the concrete box culverts parapet, where manufactured slope of the pre-cast sections will transition to 2H:1V side slopes. As shown in Section 3.2.5.2, the box culverts will be submerged into the stream bed 1 ft., invert elevations on the drawing will be field verified just before the culverts are placed.

Since Coyote Creek does not flow perpendicular to the North-South Haulroad at this location, and because significant flows are developed from the design storm, inlet and outlet channels associated with the culvert structure have been designed. These channels will safely pass a 10 year/24 hour storm event as required by NDAC 69-05.2-16-07. The creek channel enters the North-South Haulroad inlet approximately 150 feet east of the culvert structure. The inlet channel will have a 46 foot bottom width with 3H:1V side slopes. The slope of the inlet and outlet channel will be 0.00400 ft/ft.

In order to protect the inlet channel and slope surrounding the entrance to the concrete box culvert installation, riprap will be placed across the sides of the inlet channel and along the entire length of the culvert entrance. The riprap will have a D_{100} of 12 inches and will be placed in a single layer having a minimum thickness of 9 inches. This same gradation of riprap will also be placed around the sides of the box culvert entrance for a distance of ten feet. All riprap at the culvert installation entrance will be laid on a single layer of non-woven engineering fabric.

The outlet of the culvert will be a channel approximately 50 feet long. This channel will transition flow from the box culvert structure to the original Coyote Creek streambed. The inlet channel will have a 46 foot bottom width with 3H:1V side slopes. The slope of the inlet and outlet channel will be 0.00400 ft/ft. The outlet channel will be sloped to transition to the existing streambed elevation.

In order to protect the outlet channel and slope surrounding the outlet of the concrete box culvert installation, cable concrete will be installed as shown on Section 3.2.5.1.

The original streambed will flow under the North-South Haulroad at approximately Station 40+70.The original streambed will have a 36" culvert installation to allow flow under the North-South Haulroad and will be used in low flow situations. The contributing watersheds were modeled with the HEC-HMS to provide peak flow rates to size the culverts. The 36 inch culvert was not included when modeling the safe passage of Coyote Creek under the haulroad. The box culverts are sized to safely pass the peak flow from the 50-year/6-hour precipitation event using available head and storage without the 36 inch culvert being installed. The 36 inch

culvert is being installed mainly to keep the original stream channel as unaltered as possible and pass nominal flows. Culvert design data for the box culverts is presented in Section 3.2.6.1.

NDAC 69-05.2-16-07(2)(b) requires a temporary stream channel be designed to safely pass the peak runoff from a 10-year/24-hour storm event. This event was not specifically modeled for this diversion. However, the diversion channel was modeled to pass the peak flow from a 50-year/ 6-hour storm event which is not only a greater rainfall event; it is also a more intense event. With the diversions ability to safely pass the 50 year/6-hour event, the diversion will safely pass the 10-year/24-hour event.

Design data associated with all of the channels can be found on the following pages, and a design drawing is presented in Section 3.2.5.2.

Upon removal of the North-South Haulroad and reclamation of the road corridor in the vicinity of Coyote Creek, the portion of pre-mining stream channel that was used in low flow scenarios will be restored to its natural meandering shape and pre-mine elevation; therefore will be at an environmentally acceptable gradient. The original streambed will be restored to facilitate the full flow of Coyote Creek. The post-mine topography is the same as that found pre-mine and is shown in Section 4.1.2. Because the disturbed stretches of the stream are very short, restoring the longitudinal profile and cross section will be accomplished by tying into the undisturbed portion of the stream both up and downstream from the disturbance. In between these two points, the pre-mine survey will be used as the post-mine plan, which will result in a channel very similar to that found prior to mining. The only significant change is the undisturbed channel has been very incised by erosion, creating banks that are not stable. The slopes of the banks will be enhanced during reclaiming by constructing the slopes to a stable angle; less than what is found pre-mine. The slopes will be seeded to the native grassland seed mix, any disturbed trees will be replanted to the deciduous mix, and the site will likely be invaded from the surrounding undisturbed areas to further enhance the similarity of the reclaimed stream channel to what it was prior to mining.

The segment of stream channel to be disturbed by the North-South Haulroad construction lies in native grassland; therefore, the reclaimed adjacent flood plain will be revegetated with a native grassland seed mix.

DIVERSION CHANNEL STATION 40+70
Worksheet for Trapezoidal Channel

Project Description	

Worksheet	Diversion Channel Station 40+70
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data

Mannings Coefficient	0.040	
Channel Slope	0.004000	ft/ft
Depth	10.00	ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	46.00	ft

Results

Discharge	6,507.07	cfs
Flow Area	760.0	ft²
Wetted Perimeter	109.25	ft
Top Width	106.00	ft
Critical Depth	7.24	ft
Critical Slope	0.013690	ft/ft
Velocity	8.56	ft/s
Velocity Head	1.14	ft
Specific Energy	11.14	ft
Froude Number	0.56	
Flow Type	Subcritical	

Haulroad North of County Road 12

Brush Creek is a perennial stream that will be crossed by the Haulroad North of County Road 12 (haulroad) for access to the coal processing facility. Crossing Brush Creek will require disturbance within 100 foot stream buffer zone. The flow from the stream will be directed under the road through two ten foot by ten foot reinforced concrete box culverts. This culvert installation is located near station 201+14 on the haulroad. The culverts have been sized to pass the peak runoff from a 50-year/6-hour rainfall event. Subsoil material from the west will be used to bury the reinforced concrete box culverts. On the upstream and downstream sides, the subsoil fill will be placed at 3H:1V side slopes until reaching the top of the concrete box culverts parapet, where manufactured slope of the pre-cast sections will transition to 2H:1V side slopes. As shown in Section 3.2.5.3, the box culverts will be submerged into the stream bed 1 ft., invert elevations on the drawing will be field verified just before the culverts are placed.

Since Brush Creek does not flow perpendicular to the haulroad at this location, and because significant flows are developed from the design storm, inlet and outlet channels associated with the culvert structure have been designed. These channels will safely pass a 10 year/24 hour storm event as required by NDAC 69-05.2-16-07. The creek channel enters the haulroad inlet approximately 45 feet south of the culvert structure. The inlet channel will have a 25 foot bottom width with 3H:1V side slopes. The slope of the inlet and outlet channel will be 0.00380 ft/ft.

In order to protect the inlet channel and slope surrounding the entrance to the concrete box culvert installation, cable concrete will be installed as shown on Section 3.2.5.1.

The outlet of the culvert will be a channel approximately 225 feet long. This channel will transition flow from the box culvert structure to the original Brush Creek streambed. The inlet channel will have a 25 foot bottom width with 3H:1V side slopes. The slope of the inlet and outlet channel will be 0.00380 ft/ft. The outlet channel will be sloped to transition to the existing streambed elevation.

In order to protect the outlet channel and slope surrounding the outlet of the concrete box culvert installation, cable concrete will be installed as shown on Section 3.2.5.1.

The original streambed will flow under the haulroad at approximately Station 203+40. The original streambed will have a 36" culvert installation to allow flow under the haulroad and will be used in low flow situations. The contributing watersheds were modeled with the HEC-HMS to provide peak flow rates to size the culverts. The 36 inch culvert was not included when modeling the safe passage of Coyote Creek under the haulroad. The box culverts are sized to safely pass the peak flow from the 50-year/6-hour precipitation event using available head and storage without the 36 inch culvert being installed. The 36 inch culvert is being installed mainly to keep the original stream channel as unaltered as possible and pass nominal flows. Culvert design data for the box culverts is presented in Section 3.2.5.3.

NDAC 69-05.2-16-07(2)(b) requires a temporary stream channel be designed to safely pass the peak runoff from a 10-year/24-hour storm event. This event was not specifically modeled for this diversion. However, the diversion channel was modeled to pass the peak flow

from a 50-year/ 6-hour storm event which is not only a greater rainfall event; it is also a more intense event. With the diversions ability to safely pass the 50 year/6-hour event, the diversion will safely pass the 10-year/24-hour event.

Design data associated with all of the channels can be found on the following pages, and a design drawing is presented in Section 3.2.5.3

Upon removal of the haulroad and reclamation of the road corridor in the vicinity of Brush Creek, the portion of pre-mining stream channel that was used in low flow scenarios will be restored to its natural meandering shape and pre-mine elevation; therefore will be at an environmentally acceptable gradient. The original streambed will be restored to facilitate the full flow of Brush Creek. The post-mine topography is the same as that found pre-mine and is shown in Section 4.1.2. Because the disturbed stretches of the stream are very short, restoring the longitudinal profile and cross section will be accomplished by tying into the undisturbed portion of the stream both up and downstream from the disturbance. In between these two points, the pre-mine survey will be used as the post-mine plan, which will result in a channel very similar to that found prior to mining. The only significant change is the undisturbed channel has been very incised by erosion, creating banks that are not stable. The slopes of the banks will be enhanced during reclaiming by constructing the slopes to a stable angle; less than what is found pre-mine. The slopes will be seeded to the native grassland seed mix, any disturbed trees will be replanted to the deciduous mix, and the site will likely be invaded from the surrounding undisturbed areas to further enhance the similarity of the reclaimed stream channel to what it was prior to mining.

The segment of stream channel to be disturbed by the haulroad construction lies in native grassland; therefore, the reclaimed adjacent flood plain will be revegetated with a native grassland seed mix.

DIVERSION CHANNEL STATION 201+14
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Diversion Channel Station 201+14
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coefficient	0.040
Channel Slope	0.003800 ft/ft
Depth	10.00 ft
Left Side Slope	3.00 H : V
Right Side Slope	3.00 H : V
Bottom Width	25.00 ft

Results	
Discharge	4,265.50 cfs
Flow Area	550.0 ft²
Wetted Perimeter	88.25 ft
Top Width	85.00 ft
Critical Depth	7.24 ft
Critical Slope	0.014318 ft/ft
Velocity	7.76 ft/s
Velocity Head	0.93 ft
Specific Energy	10.93 ft
Froude Number	0.54
Flow Type	Subcritical

REVISION 1
DECEMBER 2014