



Construction Report

McLaren Adit Closure, Road Reclamation, and Revegetation Contract

Contract AG-0398-C-10-0023
2010-2011

New World Mining District
Response and Restoration Project

Prepared by
Peter Werner
Mining Engineer (GNF)
June 2012

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Executive Summary

The McLaren Adit Closure, Road Reclamation, and Revegetation contract represents the 8th contract issued in support of the New World Mining District Response and Restoration Project, the multi-year effort to improve water quality and reclaim abandoned mine sites in this historic mining district near Cooke City, MT. The work prescribed in the contract consisted of closing the historic McLaren Adit, reconditioning roads within the New World Mining District to minimize sediment discharge to area creeks, and establishing self-sustaining vegetation on mining impaired areas.

A contract valued at **\$1,144,857.60** was issued to Knife-River, Inc. of Billings MT on August 16, 2010. Work commenced in September 2010, and was substantially complete by October, 2011. Owing to a late start in 2010, the Contractor limited work to the McLaren Adit closure portion of the contract during the 2010 construction season. In 2011, the Contractor installed surface water management controls on District roads and reclaimed mining impacted sites with soil amendments and erosion control treatments.

Adjustments were made to the Schedule of Items to account for unanticipated site conditions. These related to failing subgrades on roadways which required additional time and materials to stabilize, along with additional quantities for armored ditches above what was estimated in the contract. The Government made available rock which was stockpiled at a staging area near the intersection of the Lulu Pass County Road and Highway 212. The net cost overrun to the contract was \$84,833.83. This represents a 7.4% cost increase over the initial contract price. The final contract price was **\$1,229,691.43**.

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Final Schedule of Items

New World Road Restoration

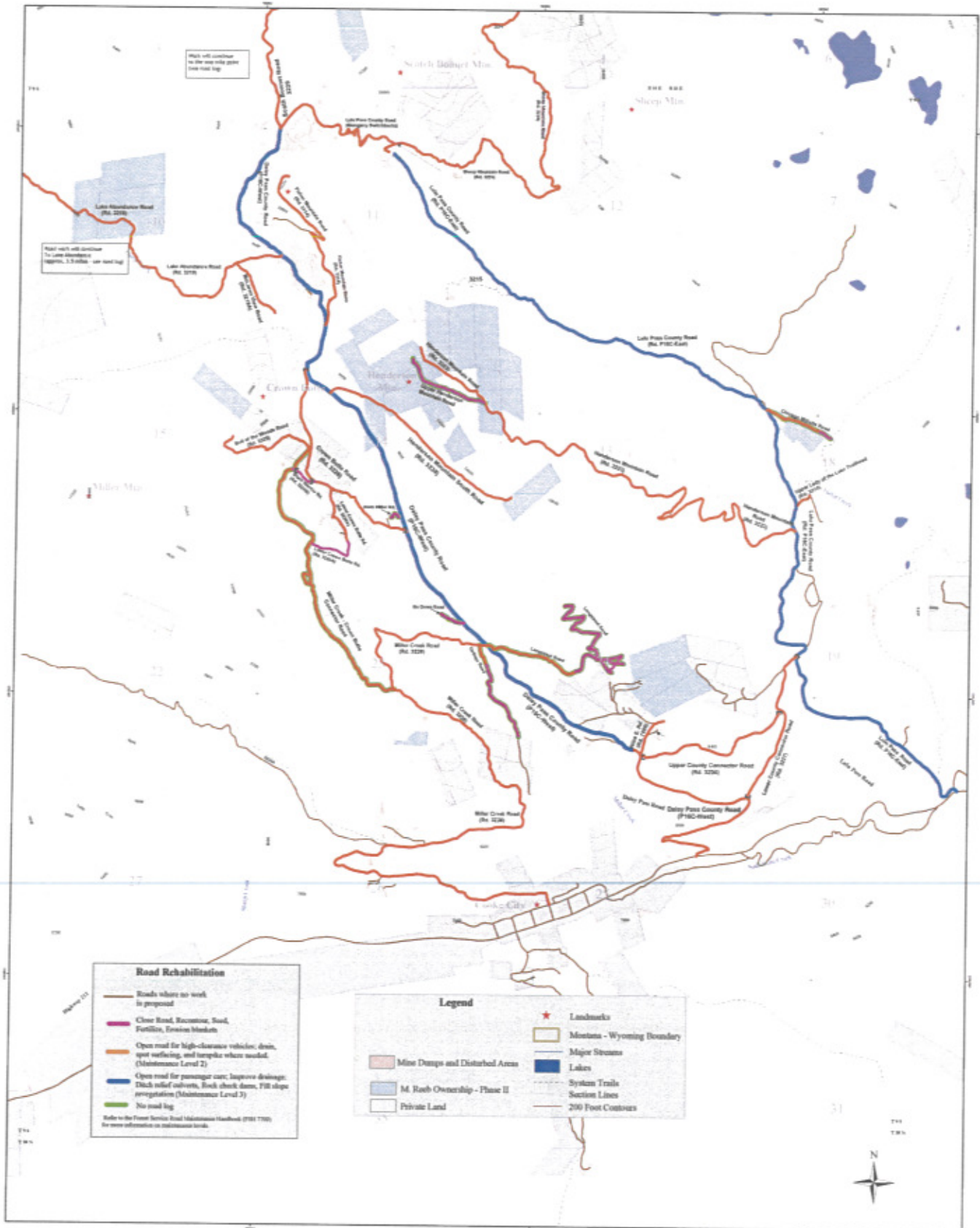


Figure 1 - Site Location Map

0 1,000 2,000 4,000 Feet

1. INTRODUCTION

The McLaren Adit Closure, Road Reclamation and Revegetation contract (the Project) falls under the aegis of the New World Mining District Response and Restoration Project, a multi-year effort to improve natural resource habitat in the New World Mining District (the District). The New World Mining District Response and Restoration Project is a non-time critical CERCLA removal action targeting the reclamation of historic mine disturbances through stabilizing and restoring these sites to a self-sustaining condition with the goal of achieving the highest and best water quality practicably attainable within the District. Located near Cooke City, Montana (Figure 1), the New World Mining District was the site of both historic and recent mining endeavors, and it is this legacy that has contributed to natural resource impairment in and around the District. By virtue of a Settlement Agreement and subsequent Consent Decree between the United States and interested parties, funds were made available to reclaim the historic disturbances and mitigate the environmental degradation from years of mining activity.

This contract, executed in 2010, is the 8th contract issued as part the New World Mining District Response and Restoration Project, and represents the last major contract issued as part of a multi-year cleanup effort of mining impacted NFS lands. The contract specifically addresses the closure of the historic McLaren Adit and the stabilization of District roads. The objectives of this contract were to, 1) capture and control McLaren Adit water, 2) install surface water management controls on District roads to minimize sediment discharge to surface waters, and 3) establish a sustainable vegetative cover over reclaimed areas.

The principal tasks contained in this contract include:

1. Install a water collection and discharge system for the McLaren Adit
2. Construct an infiltration gallery for adit water
3. Fully reclaim approximately 1.5 miles of abandoned historic mine roads
4. Stabilize approximately 30 miles of District roads by installing drain dips, armored ditches, culverts, and road bed contouring.

The USDA-Forest Service issued a Request for Proposals in March 2010 using negotiated contract procedures. Three (3) proposals were received and evaluated. A contract was negotiated and awarded to Johnson-Palmer of Greely, CO in June 2010. Subsequent difficulties in securing the appropriate contract documents resulted in the contract being terminated and a new contract being awarded to Knife-River (the Contractor) on August 16, 2010, with the Notice to Proceed being issued on September 1, 2010.

TABLE 1 CONTRACT INFORMATION	
Contract Name	McLaren Adit Closure, Road Reclamation and Revegetation
Contract Number	AG-0398-C-10-0023
Award Date	August 16, 2010
Notice to Proceed	September 1, 2010
Contract Close Date	October 31, 2011
Contractor	Knife-River (Yellowstone Division), Billings, MT
Original Contract Amount	\$1,144,857.60
Final Contact Amount	\$1,229,691.43
Design Engineer	Maxim Technologies Inc. (TetraTech), Helena, MT
USDA-FS Contracting Officer	Gary B. Stephens

Contracting Officer's Representative	Peter Werner
On-Scene Coordinator	MaryBeth Marks
Inspectors	Stewart Deschamps (USFS)
Sub-Contractors	
Vegetation and Erosion Mat	Quality Landscaping (Plains, MT)

1.1. OVERALL CONTRACTOR PERFORMANCE

The Contractor's onsite management team and many of the equipment operators had prior experience working in the Cooke City area. In addition, during the term of this project the Contractor was under contract with the State of Montana for the McLaren Tailings project located on the outskirts of Cooke City. This experience and having a local presence proved invaluable in scheduling, operations, and execution of the work under this contract.

The Contractor was attentive to safety and to the needs of the public and the Forest Service. The scheduled work required use of public roads and areas frequented by forest users. Great care was taken to respect the public's access rights, and accommodation was made by the Contractor to ensure these rights were observed. During the course of the two season work program all requests made by the COR regarding public safety or access were promptly implemented by the Contractor. As an example, the plans called for 3 in minus rock armoring in the drain dips. With minor screening a suitable 5 in minus product could be produced that did not require crushing. The COR directed the Contractor to use this material for the armoring which resulted in a significant savings to the Government. Some complaints were received from the public about the coarse rock used in the drain dips. The COR directed the Contractor to place a thin layer of road base material over the armoring in the drain dips along the *Lulu Pass County Road* between Highway 212 and the Goose Lake turnoff to help alleviate the angularity and unevenness of the large diameter rock. This section of road receives the most public use by non-high clearance vehicles and the placement of road base in the drain dips seemed to adequately address the situation. This work was performed on a Sunday which demonstrated the Contractor's commitment to ensuring the public's concerns were addressed in a timely and responsible manner.

The heavy winter snowfall of 2010-2011 resulted in a later than usual start to the 2011 construction season, and work did not commence until the first week in August 2011. Both the COR and Contractor were confident going into the summer of 2011 that all of the remaining work could be easily accomplished in one field season since the *McLaren Adit* closure was already complete, but the late start to the 2011 construction season put the scheduled completion date of Oct 31 in jeopardy. The Contractor often had personnel working seven days a week to make up for the late start. This redoubling of effort resulted in completing the project on schedule.

The Contractor was responsible for all quality control and site grade control. The Forest Service COR and Inspector were on site during 75% of the construction to provide additional quality assurance beyond that provided by the Contractor.

1.2. EQUIPMENT AND PERSONNEL

Personnel

Personnel on site, not including sub-contractors, averaged 7 FTEs at the height of the construction season.

Personnel	
Site Program Manager	1
QC Engineer	1

Superintendent	1
Equipment Operators	5
Mechanic	1

Equipment

Equipment used during the course of the contract included:

Equipment Used	
Excavator	2
Dozer	2
Front end loader	1
Road Grader	1
Skid Steer	1
Off Highway Trucks (25T-35T)	2
Water Truck	1
Lime spreader	1
Job Site Pick Up	2

1.3. SCHEDULE and CHANGE IN SCOPE

Schedule

The work was intended to be completed within one construction season, however with the delay in contract award it was decided to complete the adit closure portion of the contract during 2010 and the remaining work in 2011. Work at the *McLaren Adit* commenced September 9, 2010, and the water collection and infiltration systems were completed by October 5, 2010. The soil amendment and ground treatment at the site was delayed until the 2011 work season.

Work on the roads and on the soil amendment application at the *McLaren Adit* site began Aug 9, 2011 and was completed October 5, 2011.

Change in Scope

The details and quantities of the water management controls for the road work were based on a site inspection from 2006. In the 5 years between the inspection and when the work was performed, road conditions had deteriorated considerably. Very little road maintenance had been performed during this time unlike prior to 2006 when annual road maintenance was an ongoing part of other mine reclamation work in the District. As a result, more drain dips, more ditch work, and more road subgrade stabilization were required than anticipated in the contract. The Contractor was able to incorporate additional work items and make adjustments to existing items within an already compressed construction season without incident or undue changes to the contract schedule.

During the contract term several adjustments in Schedule quantities were necessary. Payment for many of the work items in the Schedule were based on Actual Quantities (AQ) which is not unusual given the type of work involved and the necessity to "field fit" many of the items. The COR and the Contractor laid out drain dip locations as per the contract package but modified locations and types of drainage treatment depending on site specific conditions. The original contract cost was for **\$1,144,857.60**; the final paid amount was **\$1,229,691.43**, which represents an increase of **7.4%** (\$84,838.83) above the initial bid. The most significant contributor to the cost increase was the need to stabilize sections of the road bed through especially soft areas along the *Lake Abundance Road*, the *Sheep Mountain Road*, and the *Miller Creek Road*. This additional work was added under the Changed Conditions clause of the FARS, and represented over half (\$45,600) of the total increase in contract amount. The COR also directed the Contractor to clean existing roadside ditches which had become blocked and non-functioning. This

helped immensely with drainage control on the District road and was particularly effective on the *Daisy Pass County Road*. This work added \$13,000 to the contract. Additional material needs for the *McLaren Adit* closure also added \$21,242 to the project cost.

There were many locations along the District roads where the road bed was soft and unstable from either near surface groundwater, lack of suitable surface water drainage or, where snow stayed late into the summer. The COR directed the Contractor to place coarse rock (5 in minus) in these areas to raise the roadbed and provide a firm running surface across the soft areas. These sections were termed "*belly fills*" and were similar to armored dips in quantity of rock used but much quicker to build. Many of these "*belly fills*" were installed on roads throughout the District.

The Project involved actions throughout the 10 sq mi district, and the logistics of campaigning work so equipment and personnel were fully engaged were challenging. The critical factor controlling the schedule was the supply of materials to the various work sites. The Contractor chose to operate two (2) work crews consisting of an excavator and a haul truck. A small dozer was available to assist with road grading and other work as necessary.

Major work items and scheduling included the following:

2010 Major Accomplishments

- Installed McLaren Adit water capture system
- Installed McLaren Adit infiltration gallery
- Backfilled and graded McLaren Adit site.

The volume of contract work completed during Year 1 allowed for a less urgent work schedule and a reduced work force for Year 2.

- Mob to Site – September 9, 2010
- Demob from Site – October 5, 2010
- Mob to Demob = 26 days
 - 8 days off (weekend)
 - Zero (0) weather days
 - Total Work Days = 18 days

2011 Major Accomplishments

- Amended soil with lime and compost, and revegetated 5 ac site below the McLaren Adit
- Installed surface water control structures on 30 mi of District roads.
- Reclaimed 1.5 mi of abandoned historic mining-associated roads within the District
- Revegetated 17 acres of disturbed ground

A heavy snow pack in the winter of 2010-2011 delayed the start of work until the first week in August. This late start required the Contractor to implement a 7 day work week. Fortunately no days were lost to weather.

- Mob to Site – August 9, 2011
- Demob from Site - October 6, 2011
- Mob to Demob = 59 days
 - Zero (0) weather days
 - Total Work Days = 59 days

2. MCLAREN ADIT CLOSURE (2010)

Background

Located near the junction of the *Daisy Pass County Road* and the *Lake Abundance Road* turn-off, the McLaren Adit is a remnant of historic mining activity which occurred in the McLaren Pit area during the 1930s. The adit is approximately 450 feet in length trending NE under Fisher Mountain. Diffuse groundwater inflow into the underground workings contributes to an average adit discharge of 15 gpm. In 2004 an underground grouting program reduced flows to approximately 5 gpm. The adit flow discharged to a rock-lined channel and settling pond downslope of the adit.

The intent of the work was to capture and discharge the adit water in a controlled manner, along with restricting adit access and reclaiming the site. The work under this contract called for installing a water collection system inside the adit along with a pipeline and infiltration gallery located downslope of the portal area.

The Work

Owing to the late issuance of the Notice to Proceed, the Contractor and COR decided to limit the work during 2010 to the McLaren Adit closure. The Contractor mobilized to the site on September 9, 2010. Debris which had fallen from the roof of the adit was impounding a small amount of water. The Contractor commenced with pumping this impounded water to the existing rock-lined channel. Following dewatering, the Contractor removed an existing 20 ft by 5 ft culvert which was serving as access into the adit, and cleaned the portal area of loose debris (Photograph 1).



Photograph 1 – Stabilizing McLaren Adit prior to Entry

A new 20 ft by 60 in diameter corrugated metal pipe (CMP) was placed in the adit for access, and the existing 5 ft oval CMP was connected to the new section. The Contractor constructed an 18 in tall concrete crib wall just past the end of the interior most culvert (approximately 40 ft inside the adit, Photograph 2). On the interior side of the crib wall was a 30 ft perforated 8 in HDPE pipe; on the portal side of the crib wall the

Contractor placed a solid 8 in HDPE pipe. The Contractor placed a lift of $\frac{3}{4}$ in washed rock around the perforated section of the pipe to serve as a filter for water entering the pipe. The 8 in solid HDPE line was extended through the CMP culvert sections to a 4 ft diameter concrete collection vault located outside of the portal. A 10 ft diameter concrete apron was installed over the top of the concrete vault, and a 3 ft diameter by 5 ft tall concrete riser was placed on the apron and over the access port of the concrete vault (Photograph 3). The purpose of the concrete riser is to allow access to the collection system and pipe network for inspection or repair if needed. The 8 in HDPE pipe coming out of the adit was passed through



Photograph 2 – Concrete crib wall inside the McLaren Adit

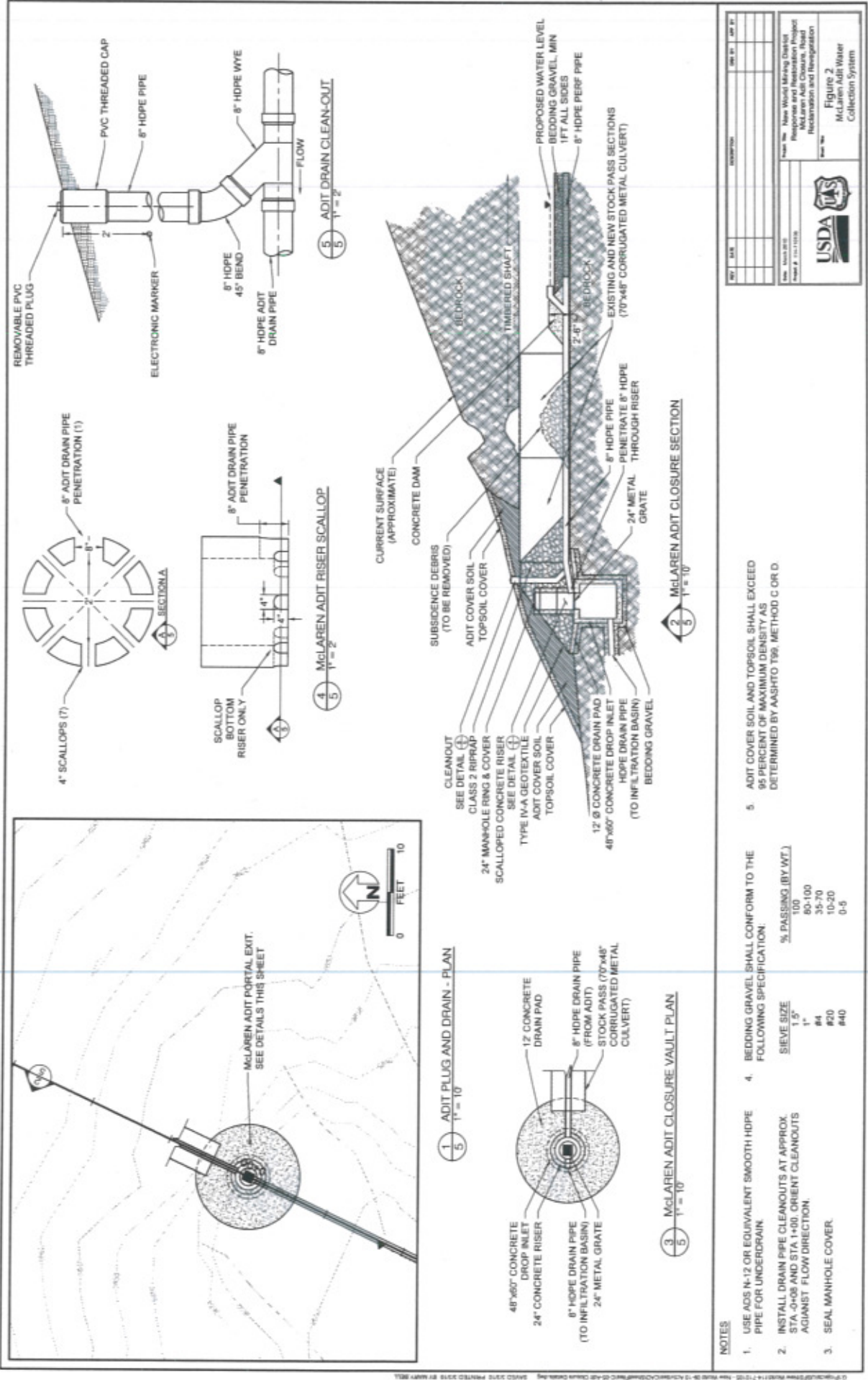
a hole near the bottom of the riser so that water can discharge into the concrete vault. The concrete riser also has small notches on the bottom which provide a means for collecting any water that bypasses the HDPE collection line. An 8 in solid line was installed on the down gradient section of the collection vault and extended 600 ft to the infiltration system. The HDPE line was placed in a 5 ft deep trench surrounded with $\frac{3}{4}$ in washed drain rock and wrapped with a non-woven geotextile (Photograph 4). The design of the collection system is included as Figure 2.

The infiltration gallery is a 30 ft x 30 ft x 5 ft excavation lined with non-woven geotextile and backfilled with 2 ft of $\frac{3}{4}$ in washed gravel. The 8 in solid line transitioned to three 8 in perforated lines at the infiltration gallery which disperses the adit water much as a septic drain field is designed to do (Photograph 5).



Photograph 3 – Riser and Concrete Pad – McLaren Adit Water Collection System

The infiltration gallery includes a rock lined seepage apron on the downhill side to allow an outlet for excess water should percolation rates be less than expected. The soil is very clay rich at the site and soon after turning the water into the discharge system, it was evident adit water was not percolating as quickly as expected. The COR directed the Contractor to excavate a sub-drain from the newly constructed infiltration gallery to a pre-existing small channel located 20 feet to the south. This channel begins up gradient of the infiltration gallery near where the old sediment pond was located. The channel is fed by groundwater as it makes its way downslope and runs perennially except in low precipitation years. The



REV	DATE	DESCRIPTION	BY	CHK

Title: McLaren Adit Water Collection System
 Project: McLaren Adit Water Collection System
 Date: 10/15/2010
 Drawn by: [Name]
 Checked by: [Name]
 Project: McLaren Adit Water Collection System
 Title: McLaren Adit Water Collection System

- NOTES**
- USE ADS N-12 OR EQUIVALENT SMOOTH HDPE PIPE FOR UNDERDRAIN.
 - INSTALL DRAIN PIPE CLEANOUTS AT APPROX. STA. 0+08 AND STA. 1+00. ORIENT CLEANOUTS AGAINST FLOW DIRECTION.
 - SEAL MANHOLE COVER.
 - BEDDING GRAVEL SHALL CONFORM TO THE FOLLOWING SPECIFICATION.

SIEVE SIZE	% PASSING (BY WT.)
1" (25.4)	100
3/4" (19.0)	80-100
#4 (4.75)	35-70
#10 (2.0)	10-20
#40 (0.425)	0-5
 - ADIT COVER SOIL AND TOPSOIL SHALL EXCEED 95 PERCENT OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T99, METHOD C OR D.



Photograph 4 – McLaren Adit Water Discharge Line

Contractor tied into the infiltration gallery basin with geotextile fabric and $\frac{3}{4}$ in drain rock and extended the sub-drain to intercept the channel. The intent was to provide another outlet for excess water accumulating in the infiltration gallery. Soon after the sub-drain was installed it was discharging water into the side channel.

To complete the work for the year, the McLaren Adit portal area was backfilled with clean borrow material and graded to tie into the adjacent topography. The discharge line and infiltration gallery were covered with 4 ft of soil and the sites graded.



Photograph 5 – McLaren Adit Infiltration Gallery



Photograph 6 – McLaren Adit Backfilled and Regraded

3. ROAD STABILIZATION AND SURFACE WATER MANAGEMENT (2011)

A principal objective of this contract was to minimize sediment discharge to area streams and creeks by installing surface water runoff controls along District roads. Steep topography and significant snow accumulation over the winter contribute to high velocity surface water runoff during spring break up resulting in damage to roads and significant levels of sediment discharge to area creeks. Work items in this contract addressed the installation of surface water controls along District roads including culverts, armored drain dips and side ditches, and road cut-and-fill slope stabilization. Fittingly, a greater than average snow pack during the winter of 2010-2011 delayed commencement of the road work until the first week in August.

Since the majority of the work involved operating within a narrow road corridor, space was limited and best suited for one piece of equipment. Once the operators became accustomed to building the drain dips to specification, the work progressed quickly: by the time the haul truck returned with materials, the excavator had prepared the next drain dip (or advanced the side ditch) and was ready to place material.

The Work

1. Daisy Creek Drainage

Roads requiring treatment in the Daisy Creek drainage included the *Lake Abundance Road*, *McLaren View Road*, *Fisher Mountain Road* and a section of the *Daisy Pass County Road* between Daisy Pass and Lulu Pass. The Contractor started with the road reclamation on the *Lake Abundance Road* on August 10, 2011. The construction plan was to start on those roads farthest from the staging area and work back towards this central location to avoid traversing over work already completed. The roadbed was soft in several



Photograph 7 – Unstable Road Subgrade (Lake Abundance Road)

locations with areas of standing water and abundant groundwater seeps. After one pass by the haul trucks the road surface was severely rutted and soon became impassable. Both a haul truck and one of the D6 dozers became mired in a particularly soft area. The Contractor and COR decided to pull off the *Lake Abundance Road* until ground conditions improved. The Contractor transferred the Lake Abundance crew to the *McLaren View Road* where they installed 2 new culverts and constructed a 100 ft x 200 ft parking area for vehicles and trailers.

The COR and Contractor discussed options for stabilizing the soft areas along the *Lake Abundance Road*. The use of geogrid as a reinforcing underlayment was explored but quickly abandoned as being too expensive. It was decided to use coarse rock, of which there was an ample supply in the staging area, and non-woven geotextile fabric as subgrade support to bridge over the soft sections. The Contractor resumed work on the *Lake Abundance Road* on September 10, 2011. Three sections of the road received subgrade stabilization. Soft road materials were excavated from the road prism and set aside. A layer of non-woven geotextile was placed over the excavated section and covered with a minimum 18 in of 5 in minus rock.



Photograph 8 – Unstable Sub-Grade along the Lake Abundance Road



Photograph 9 – Same Section of Road after Stabilization

Approximately 2,000 ft of roadway was stabilized using this technique. The cost to the project was an additional \$45,600.

Culverts, run-off ditches, and armored fords were also installed at strategic locations along the 3.3 mi length of the *Lake Abundance Road*. The Contractor also defined the primary roadway to a single vehicle width and reclaimed sections where multiple pathways had been developed over the years (Photograph 10).

More time and materials were used on the *Lake Abundance Road* than any of the other roads in the District.



Photograph 10 – Section of Lake Abundance Road Reclaimed to Single Lane

The plans called for widening the last $\frac{1}{4}$ mi of the *Fisher Mountain Road* from its current 8 ft width suitable for ATVs to 10 ft to safely accommodate vehicle traffic. The road is on a very steep side hill and is prone to sloughing from the heavy winter snowpack so its long term stability is questionable without regular maintenance. The COR decided it was not cost effective to spend time and money on widening this section of road and redirected efforts to armoring the inlets and outlets at two existing culvert locations along the heavily used *Daisy Pass County Road* between the McLaren Pit and Lulu Pass. The inlets receive significant amounts of runoff and sediment, and the culverts were partially plugged and performing poorly. One culvert required replacement and the COR directed the Contractor to use one of the culverts designated for the *Lake Abundance Road* in this location instead. The Contractor also developed roadside ditches along this section of the *Daisy Pass County Road*.



Photograph 11 – Armored Ditch along the Daisy Pass County Road

2. Fisher Creek Drainage

The following roads received surface water controls and roadway stabilization during the 2011 construction season: *Scotch Bonnet Road, Sheep Mountain Road, Lulu Pass County Road, South Henderson Mountain Road, Upper Henderson Mountain Road, Chicago Mill Site Road, and the Upper Lady of the Lake Trailhead.*

A 200 ft section of the *Sheep Mountain Road* crossed a chronically wet area and required subgrade stabilization similar to the work on the *Lake Abundance Road*. Geotextile fabric and 5 in minus rock was placed along this section which raised the roadbed and provided a stable running surface.



Photograph 12 – Belly Fill along the Scotch Bonnet Road

Additional coarse rock armoring was also placed along sections of the *Scotch Bonnet Road* in sections where snow remained late into the summer. The roadbed through these areas was soft and often rutted from vehicle traffic, and the coarse rock “belly fills” will help maintain a stable and trafficable surface.

The Contractor reclaimed approximately 1,500 ft of the *Upper Henderson Road* (Photograph 13) starting from its intersection with the *Henderson Mountain Road*. The remaining 800 ft of the road traversed a steep and unstable hillside and was already sloughing from snow slides and slope creep. The COR decided



Photograph 13 – Reclaimed section of the *Upper Henderson Mtn. Road*

At the *Lady of the Lake Trailhead Spur Road*, $\frac{3}{4}$ in crushed gravel was placed and compacted on the road and on a small parking area. (Photograph 15)



Photograph 15 – *Lady of the Lake Trailhead*

that it was too dangerous to operate equipment along this slope and it was apparent that time would slowly reclaim the remainder of the road.

Several 100 ft sections of the heavily trafficked *Lulu Pass County Road* received up to 12 in of road base in areas where the running surface was soft and unstable. Side ditches were also cleaned and reestablished, and the road graded (Photograph 14).

The Contractor also reclaimed a section of road near the *Chicago Mill Site Road* that was being used by the public to cross Fisher Creek and gain access to the Lady of the Lake Trail. Other ATV and motorcycle off-road trespass areas were also reclaimed to discourage off road use in the vicinity of the *Chicago Mill Site Road*.



Photograph 14 – *Lulu Pass County Road*

3. Miller Creek Drainage

Roads in the Miller Creek drainage where work was performed include: the *Daisy Pass County Road*, the *Miller Creek Road*, the *South Henderson Mountain Road*, the *Bull of the Woods Road*, the *Black Warrior Road*, the *Crown Butte Road*, the *Lower Crown Butte Road*, the *Upper County Connector Road*, the *Alice E. Road*, the *Cottage Road*, the *Go Down Road*, and the *Longstreet Road*.

The *Miller Creek Road* required armored side ditches and subgrade stabilization over what was estimated in the contract due to extensive surface water discharge and poor ground conditions. There was near surface groundwater and numerous water seeps along a 0.5 mi section of the road starting at the Miller Creek crossing. The seeps and groundwater softened the road subgrade, and in places discharged onto the road creating a soft road surface. The COR directed the Contractor to place geotextile fabric and

coarse rock in locations requiring stabilization, and rock armor in side ditches in areas of obvious water discharge (Photograph 16).

Near the junction of the *Crown Butte Road* and the *Black Warrior Road* extra side ditch armoring was installed. The COR decided that the *Black Warrior Road* was successfully reclaiming itself and no further work was necessary. The other road work in the Miller Creek drainage proceeded in substantial conformance with the plans.



Photograph 16 – Water Management along the Miller Creek Road

4. REVEGETATION

1. *Soil Amendments*

A 7.5 ac area below the McLaren Adit has highly acidic, clay-rich soils that suppress vegetation. The contract called for placement of lime and compost amendments to help establish a more compatible growth environment. The Contractor began placing lime at a rate of 20T/ac on September 20, 2011 using a lime spreader towed by a traditional farm tractor (Photograph 17).



After placement, the lime was incorporated into the top 6 in using a conventional disc harrow. The lime incorporation proceeded quite quickly with the only impediments to application presented by steep grades and confined operating areas, but these were limited within the overall treatment area.

After lime incorporation, compost was placed at a rate of 20 tons (organic matter dry weight) per acre. The compost was placed and spread with a tracked skid steer (Photograph 18). There was some confusion over the quantity of compost that was to

Photograph 17 – Spreading Lime below the McLaren Adit

be applied. The contract called for compost to be applied based on "organic matter (dry weight)". To arrive at the correct amount of compost the moisture content and non-organic content of the compost must be accounted for. This means the amount of compost actually placed on the ground will exceed the "organic matter (dry weight)" quantity cited in the contract. The Contractor initially overlooked this subtlety which resulted in a slight delay in the delivery of the proper amount of compost to the job site.

The final area treated below the McLaren Adit came to 5 acres. The reduction in area was due to treating only disturbed areas lacking vegetation, often old exploration roads, rather than applying compost and lime to areas with established and stable vegetation.

Compost was also placed on select fill slopes along the *Daisy Pass County Road* in areas where vegetation growth suffered from poor soil quality.



Photograph 18 – Applying Compost below the McLaren Adit

2. Revegetation & Erosion Control Blanket

Approximately 15 ac of disturbance was to be revegetated with 14 ac of this receiving erosion control blanket. Past reclamation work in the New World Mining District has demonstrated the value of using erosion control blanket for slope protection and revegetation enhancement. The area below the McLaren Adit that received the lime and compost soil amendments represented approximately ½ of the area (7.5 ac) that was to be reseeded and to receive erosion control blanket; the remaining 7.5 ac to be seeded and blanketed was comprised of disturbed areas along the road corridors where water management work occurred, and on obliterated road segments and other reclaimed areas adjacent to the road corridors.

Placement of erosion control blanket is labor intensive and can be difficult in areas where the full width and length of the blanket are not deployed. The Contractor suggested an alternative to the erosion control blanket, EarthGuard Fiber Matrix, a proprietary soil erosion inhibitor applied with a hydro seeder. Seed and fertilizer could be incorporated into the EarthGuard slurry mix and placed in one application. The product contains cotton fibers which create an elastic and flexible, but breathable, protective layer

over the soil surface. There would be a savings to the Government with this alternative due to reduced labor and time required for placement.



The CO and COR decided to have the Contractor install erosion mat on the area below the McLaren Adit (photo at left) given the proven success record for the mat and owing to the difficult environmental condition of this site, but agreed to use the EarthGuard Fiber Matrix product for reseeding areas along the road corridors where access was more favorable for hydro seeding.

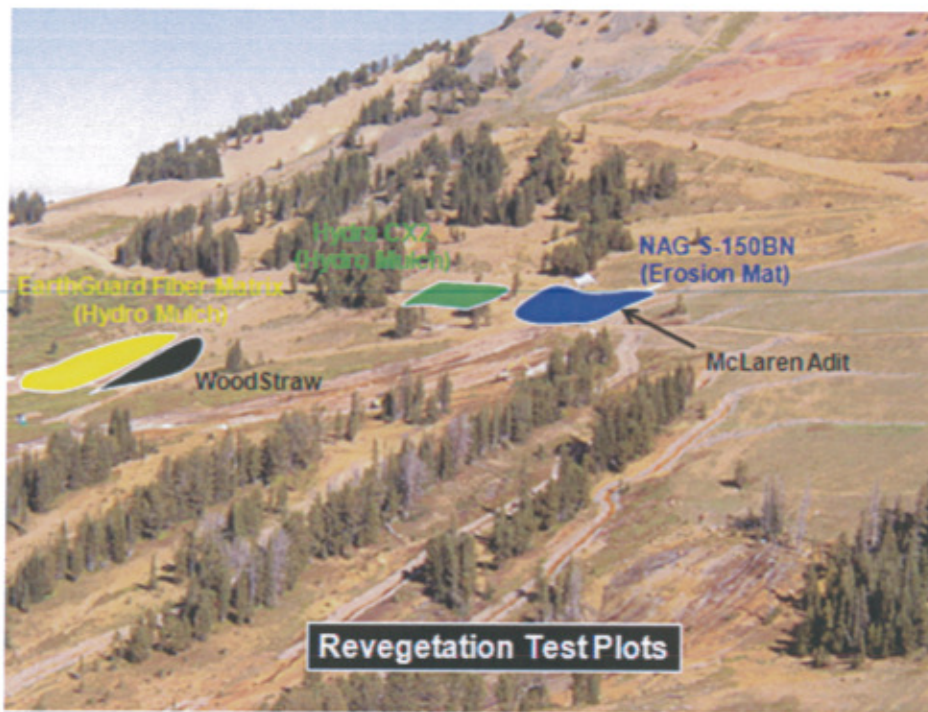
The COR was approached by other vendors with similar products about the same time as negotiations were ongoing with the Contractor over their proposal. Past mine reclamation projects have demonstrated that viable and effective erosion control and revegetation enhancers are critical to successful mine reclamation. The Government was interested in testing other erosion control products, and the various vendors agreed to provide a limited amount of product to the Government to conduct side-by-side performance tests. The COR identified four areas near the McLaren Adit, each approximately 0.1 ac in size, to use



Photograph 20 – Hydroseeding along the *Daisy Pass County Road*

as test plots for the various products. Each area received an application of lime and compost as per contract specifications before the various erosion control products were placed.

The areas were treated with the following: North American Green’s S-150 BN erosion mat, EarthGuard Fiber Matrix, Wood Straw, and North American Green’s HydraCX². North American Green’s S-150 BN is the erosion mat specified in the contract, and WoodStraw is a 100% wood product, chipped into 4 in x 1/8 in ‘straws’ which are broadcast over the soil surface. EarthGuard and HydraCX² are proprietary products applied by a hydro seeder and which form a physical barrier over the soil surface. Photograph 21 shows the location of the test plots in relation to the McLaren Adit.



Photograph 21 – Erosion Protection and Revegetation Test Plots (McLaren Adit area)

The Contractor's vegetation sub-contractor, Quality Landscaping of Plains, Montana mobilized to the site on September 26 & 27, 2011. The sub-contractor began hydro seeding the road corridor and reclaimed areas along the *Lake Abundance Road* on September 28. The weight of the hydro seeder created ruts in the road bed and the Contractor had to dress the running surface with the D6 dozer once the hydro seeding was completed. The revegetation contractor continued with hydro seeding the various road corridors through October 6, 2011. The revegetation sub-contractor brought in additional personnel to place the erosion mat on the treated areas below the McLaren Adit during this time. Approximately 5 ac of reclaimed area received erosion mat. On October 5, 2011, the revegetation sub-contractor placed the various erosion control products on the test areas. All personnel were demobbed from the project by October 6, 2011.

5. SAFETY AND CLAIMS

No safety issues were encountered or claims filed during the term of the contract.

FINAL SCHEDULE OF ITEMS

FINAL SCHEDULE OF ITEMS															
Pay Item No.	ITEM DESCRIPTION	UNIT	CONTRACT AMOUNTS			PROGRESS STATUS						Adjustement to Inv. #5	% Comp.	Remain	
			EST. QNTY	UNIT BID PRICE	TOTAL COST	THIS PERIOD		PREVIOUS PERIODS		TOTAL to DATE					
						Quantity	Cost	Quantity	Cost	Quantity	Cost				
10	202 (06)	DEBRIS REMOVAL	TN	5	\$ 586.00	\$2,930.00	1.50	\$879.00	3.50	\$2,051.00	5.00	\$2,930.00		100%	\$0
20	203 (02)	EXC, PLACE METHOD 2 (MILLER CR/LULU PASS	CY	456	\$ 16.00	\$7,296.00	232.00	\$3,712.00	453.00	\$7,248.00	685.00	\$10,960.00		150%	-\$229
30	203 (02)b	EXC, PLACE METHOD 2 (PORTAL AREA/ADIT CLEAN OUT	CY	230	\$ 46.00	\$10,580.00	0.00	\$0.00	230.00	\$10,580.00	230.00	\$10,580.00		100%	\$0
40	203 (02)c	EXC, PLACE METHOD 2 (INFILTRATION BASIN)	CY	145	\$ 38.50	\$5,582.50	0.00	\$0.00	145.00	\$5,582.50	145.00	\$5,582.50		100%	\$0
50	203 (22)a	TYPE I DRAIN DIPS WITHOUT ARMOR	EA	13	\$ 1,450.00	\$18,850.00	0.00	\$0.00	9.00	\$13,050.00	9.00	\$13,050.00		69%	\$4
60	203 (22)b	TYPE I DRAIN DIPS WITH ARMOR	EA	28	\$ 1,630.00	\$45,640.00	0.00	\$0.00	26.00	\$42,380.00	26.00	\$42,380.00		93%	\$2
70	203 (22)c	TYPE II DRAIN DIPS WITH ARMOR	EA	182	\$ 594.00	\$108,108.00	43.00	\$25,542.00	181.00	\$107,514.00	224.00	\$133,056.00		123%	-\$42
80	203 (23)a	ARMORED SPILLWAY	FT	1605	\$ 32.50	\$52,162.50	0.00	\$0.00	1,192.00	\$38,740.00	1,192.00	\$38,740.00		74%	\$413
90	203 (23)b	ARMORED FORDS	FT	380	\$ 108.00	\$41,040.00	62.00	\$6,696.00	376.00	\$40,608.00	438.00	\$47,304.00		115%	-\$58
100	203 (24)a	IN-SLOPE ROAD WITH DITCH WITHOUT ARMOR	FT	4330	\$ 4.80	\$20,784.00	1,231.00	\$5,908.80	3,910.00	\$18,768.00	5,141.00	\$24,676.80		119%	-\$811
110	203 (24)b	IN-SLOPE ROAD WITH ARMORED DITCH	FT	2270	\$ 23.50	\$53,345.00	885.00	\$20,797.50	2,227.00	\$52,334.50	3,112.00	\$73,132.00		137%	-\$842
120	203 (25)	EXC, PLACE METHOD 1 (DAISY PASS CUT)	SY	7920	\$ 2.10	\$16,632.00	0.00	\$0.00	7,920.00	\$16,632.00	7,920.00	\$16,632.00		100%	\$0
130	204 (19)b	TEMP EROSION CONTROL MEASURES	LS	1	\$ 42,000.00	\$42,000.00	0.00	\$0.00	1.00	\$42,000.00	1.00	\$42,000.00		100%	\$0
140	206 (08)	ADIT DEWATERING	LS	1	\$ 3,330.00	\$3,330.00	0.00	\$0.00	1.00	\$3,330.00	1.00	\$3,330.00		100%	\$0
150	210 (01)a	TREATMENT OF EX. ROADWAY, METHOD A	SY	8279	\$ 3.60	\$29,804.40	1,545.00	\$5,562.00	8,189.00	\$29,480.40	9,734.00	\$35,042.40		118%	-\$1,455
160	210 (01)b	TREATMENT OF EX. ROADWAY, METHOD D	SY	556	\$ 4.80	\$2,668.80	0.00	\$0.00	556.00	\$2,668.80	556.00	\$2,668.80		100%	\$0
170	210 (05)	ROAD OBSTRUCTION, PLACE BOULDERS	EA	28	\$ 432.00	\$12,096.00	7.00	\$3,024.00	28.00	\$12,096.00	35.00	\$15,120.00		125%	-\$7
180	251 (14)b	CULVERT APRONS, CLASS I, METHOD A	EA	1	\$ 1,030.00	\$1,030.00	0.00	\$0.00	1.00	\$1,030.00	1.00	\$1,030.00		100%	\$0
190	304 (23)	SURFACE COURSE AGG, GRADING SIZE 2	CY	1634	\$ 44.50	\$72,713.00	290.00	\$12,905.00	1,631.00	\$72,579.50	1,921.00	\$85,484.50	(\$28,949.47)	118%	-\$287
200	304 (24)	SUBGRADE AGG, GRADING CLASS 1 RIPRAP	CY	164	\$ 85.50	\$14,022.00	250.00	\$21,375.00	150.00	\$12,825.00	400.00	\$34,200.00	(\$6,028.00)	244%	-\$236
210	306 (05)	RECONDITION OF ROAD, COMP. METHOD A	SY	35906	\$ 0.70	\$25,134.20	0.00	\$0.00	35,906.00	\$25,134.20	35,906.00	\$25,134.20		100%	\$0
220	306 (06)	J-HOLE TURNAROUND	EA	3	\$ 1,630.00	\$4,890.00	2.00	\$3,260.00	3.00	\$4,890.00	5.00	\$8,150.00		167%	-\$2
230	311 (01)	DEFINE ROADWAY W/SLASH & LOGS	FT	5175	\$ 1.90	\$9,832.50	0.00	\$0.00	4,988.00	\$9,477.20	4,988.00	\$9,477.20		96%	\$187
240	601 (01)	MOBILIZATION	LS	1	\$ 122,300.00	\$122,300.00	0.00	\$0.00	1.00	\$122,300.00	1.00	\$122,300.00		100%	\$0
250	602 (02)	CONCRETE DRAIN PAD, METHOD C	LS	1	\$ 7,130.00	\$7,130.00	0.00	\$0.00	1.00	\$7,130.00	1.00	\$7,130.00		100%	\$0
260	603 (01)a	24" DIA, CMP 0.079" THICKNESS STEEL	FT	68	\$ 109.00	\$7,412.00	0.00	\$0.00	30.00	\$3,270.00	30.00	\$3,270.00		44%	\$38
270	603 (01)b	36" DIA, CMP, 0.109" THICKNESS STEEL	FT	26	\$ 220.00	\$5,720.00	0.00	\$0.00	26.00	\$5,720.00	26.00	\$5,720.00		100%	\$0
280	603 (01)c	70" X 40" CMP, METHOD C	FT	25	\$ 506.00	\$12,650.00	0.00	\$0.00	25.00	\$12,650.00	25.00	\$12,650.00		100%	\$0
290	603B (01)a	18" DIA, HDPE PLASTIC PIPE TYPE S	FT	116	\$ 76.50	\$8,874.00	0.00	\$0.00	80.00	\$6,120.00	80.00	\$6,120.00		69%	\$36
300	603B (01)b	24" DIA, HDPE PLASTIC PIPE TYPE S	FT	28	\$ 133.00	\$3,724.00	2.00	\$266.00	28.00	\$3,724.00	30.00	\$3,990.00		107%	-\$2
310	603B (01)c	30" DIA, HDPE PLASTIC PIPE TYPE S	FT	30	\$ 175.00	\$5,250.00	6.00	\$1,050.00	30.00	\$5,250.00	36.00	\$6,300.00		120%	-\$6
320	603B (01)d	8" DIA, HDPE PERFORATED PLASTIC PIPE	FT	72	\$ 81.00	\$5,832.00	0.00	\$0.00	72.00	\$5,832.00	72.00	\$5,832.00		100%	\$0
340	603B (01)e	8" DIA, HDPE PLASTIC PIPE	FT	585	\$ 57.50	\$33,637.50	0.00	\$0.00	585.00	\$33,637.50	585.00	\$33,637.50		100%	\$0
350	624 (02)	FURNISH AND PLACE TOPSOIL	CY	150	\$ 39.50	\$5,925.00	0.00	\$0.00	0.00	\$0.00	0.00	\$0.00		0%	\$150
360	625 (01)	SEEDING, METHOD A (WITHOUT MULCH)	AC	15	\$ 642.00	\$9,630.00	6.00	\$3,852.00	11.00	\$7,062.00	17.00	\$10,914.00		113%	-\$2
370	625 (03)	MULCH, SUPPLEMENTAL APPLICATION	TN	171	\$ 89.00	\$15,219.00	0.00	\$0.00	121.00	\$10,769.00	121.00	\$10,769.00		71%	\$50
380	625 (07)	EROSION CONTROL BLANKET	SY	67068	\$ 3.15	\$211,264.20	43,068.00	\$135,664.20	24,000.00	\$75,600.00	67,068.00	\$211,264.20		100%	\$0
390	661 (01)	CALCIUM CARBONATE AMENDMENT	TN	188	\$ 295.00	\$55,460.00	0.00	\$0.00	102.00	\$30,090.00	102.00	\$30,090.00		54%	\$86
400	702 (02)	DROP INLET BEDDING GRAVEL	CY	241	\$ 48.00	\$11,568.00	0.00	\$0.00	241.00	\$11,568.00	241.00	\$11,568.00		100%	\$0
410	705 (01)	PORTAL PLUG COARSE ROCK-CLASS 2 RIPRAP	CY	30	\$ 185.00	\$5,550.00	0.00	\$0.00	30.00	\$5,550.00	30.00	\$5,550.00		100%	\$0
420	714 (01)	TYPE IV-A GEOTEXTILE	SY	735	\$ 4.60	\$3,381.00	0.00	\$0.00	735.00	\$3,381.00	735.00	\$3,381.00		100%	\$0
430	725 (01)a	WATER SEAL 70" X 40" CMP	LS	1	\$ 1,060.00	\$1,060.00	0.00	\$0.00	1.00	\$1,060.00	1.00	\$1,060.00		100%	\$0
440	725 (01)b	DROP INLET STRUCTURE	LS	1	\$ 12,800.00	\$12,800.00	0.00	\$0.00	1.00	\$12,800.00	1.00	\$12,800.00		100%	\$0
ORIGINAL CONTRACT						\$1,144,857.60		\$250,493.50		\$934,512.60		\$1,185,006.10			
MODS															
1		NO PRICE CHANGE - COMPLETION DATE													
2	11/4/2010	ADDITIONAL EMBANKMENT AND CMP CULVERT PIPE	LS	1	\$ 21,242.00	\$21,242.00			1.00	\$21,242.00	1.00	\$21,242.00		100%	\$0
3	9/22/2011	UNSTABLE ROADWAY REPAIR	LF	2000	\$22.80	\$45,600.00		\$0.00	1,988.00	\$45,326.40	1,988.00	\$45,326.40		99%	
4		CRUSHING DEDUCTION		1		(\$34,977.47)	1.00	(\$34,977.47)	0.00	\$0.00	1.00	(\$34,977.47)			
4		DITCH CLEANING	LF	10560	\$1.24	\$13,094.40	10,560.00	\$13,094.40	0.00	\$0.00	10,560.00	\$13,094.40			
4		FINAL QUANTITY ADJUSTMENT				\$39,874.90		\$0.00				\$0.00			
TOTAL MOD CHANGES						\$84,833.83		(\$21,883.07)		\$66,568.40		\$44,685.33		52.67%	
TOTAL CONTRACT AMOUNT INCLUDING MOD CHANGES						\$1,229,691.43		\$228,610.43		\$1,001,081.00		\$1,229,691.43		100.00%	