OPEN SPACE ADVISORY COMMITTEE
STAFF REPORT

MEETING DATE: December 16, 2013

AGENDA ITEM NUMBER: 3E

STAFF: Juan F. Guzman, Open Space Manager

REQUEST: **For Possible Action:** To recommend to the Board of Supervisors the approval of a maintenance plan for Ash Canyon Road.

GENERAL DISCUSSION: Attached for your review and approval is the draft of the Ash Canyon Maintenance and Erosion Control Plan. This document was prepared by Resource Concepts, Inc. under a grant from the State of Nevada with the purpose to mitigate point source pollution sites. The grant was for a total of $10,000, and as a match Carson City contributed $11,000. The match were funds used to pay for the maintenance of Ash Canyon Road. There were several deliverables that must be completed with the grant. In addition to the plan, we are required to install as best management practices features to reinforce at least five of the water dips, to provide markers of mileage on the road edge, to close and re-vegetate certain areas that have been disturbed due to unauthorized use, and the creation of parking spaces near the access point into the Ash Canyon Trail. The contractor also started widening the road and out-sloping the road toward the canyon as opposed to the inside.

For the next year the staff has obtained approval for a similar grant for $10,000 with the completed project to include rock walls to berm and alleviate erosion in an area of road located after the water tanks.

RECOMMENDED ACTION: Move to recommend to the Board of Supervisors the approval of a maintenance plan for Ash Canyon Road.

DRAFT

Ash Canyon Erosion Control Plan

November 2013

Prepared for:

Carson City Parks and Recreation Department
3303 Butti Way, Bldg. 9
Carson City, NV 89706

Prepared by:

Resource Concepts Inc

Resource Concepts, Inc.
340 N. Minnesota Street
Carson City, NV 89703-4152

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Note: this is a living document and should be modified as needed

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1.0 Background, Purpose, and Need

Ash Canyon is located in the Carson Range immediately west of Carson City, Nevada. The Ash Canyon watershed is comprised of steep gradients and highly erodible granitic soils. Ash Canyon Creek is an important municipal water source for Carson City, which maintains a diversion structure located at the mouth of the canyon. The diversion structure is vulnerable to sedimentation and damage as a result of stormwater debris. Sediment from the canyon also flows through and deposits in the city stormwater system on its way to the Carson River.

The Ash Canyon Road is open for public use and is the primary access to Hobart Reservoir, a popular alpine fishery. It is a single-lane improved dirt road nearly five miles in length that begins at the western urban interface of Carson City at approximately 4,900 feet in elevation, and terminates at the Sierra Crest at approximately 8,000 feet in elevation. It is the only public vehicular access into the crest of the Sierras between Highway 50 at Spooner Summit and State Route 431 at Mount Rose. The bottom 0.7 miles provides critical access to the Carson City water storage tanks. Beyond this point, the road is primarily used for recreational access (hiking, mountain biking, horse riding, hunting and off-road driving) to lands primarily managed by Carson City or the Humboldt-Toiyabe Forest in addition to some private parcels.

The Carson City Parks and Recreation Department (CCPR) conducts annual road maintenance as funding allows. The City has a 30-foot easement across the private and public lands for the road.

In 2012 the City received a "319(h) Grant" specific to Nonpoint Source Stormwater Planning from the Nevada Division of Environmental Protection. The City committed to preparing an Ash Canyon Road Erosion Control Plan and implementation of the plan as funding allows with the proposed project objective to reduce erosion from Ash Canyon Road and thus sediment in Ash Canyon Creek, a municipal water source for Carson City. The purpose of this plan is to achieve this objective, as well as the following four goals:

Goal 1: Develop an Ash Canyon Erosion Control Plan to help with consistent, effective and efficient roadway maintenance and erosion and sedimentation monitoring.

Goal 2: Improve public education to reduce public impacts to water quality.

Goal 3: Identify and implement specific best management practices (BMPs) for Ash Canyon Road to reduce impacts to water quality.

Goal 4: Provide a framework for BMP storm event monitoring in several key areas of Ash Canyon Road to assess project success.

2.0 Overview of the Ash Canyon Erosion Control Plan

This erosion control plan outlines the approach for accomplishing the following:

- Improve public education to reduce public impacts to water quality (Section 3.0).
- Identify specific best management practices (BMP) for Ash Canyon Road to reduce impacts to water quality (Sections 4.0 and 5.0).
    - BMPs are consist with the USDA Best Management Practices for Water Quality Management on National Forest System Lands, including:
        - A description of existing BMPs (Section 4.0),
        - A description and cost estimate for proposed new BMPs (Section 5.0) and
        - A description of annual monitoring and maintenance BMPs (Section 6.0).

Development of this plan has been iterative and comprehensive. Resource Concepts, Inc. (RCI) developed a Preliminary Draft Ash Canyon Erosion Control Plan based on field reconnaissance of Ash Canyon Road. Fieldwork included touring the road with Carson City Parks and Recreation staff and the contractor who currently conducts the annual maintenance on Ash Canyon Road (Brian Smith, Horizon Construction). Maintenance activities were summarized, trouble areas noted, and potential future projects identified.

Once the Preliminary Plan was completed, CCPR personnel completed a review and provided comment. RCI incorporated all CCPR comments, and provide a Draft Ash Canyon Erosion Control Plan for final review. CCPR conducted a final review, including public discussion and inputs it deems necessary.

3.0 Public Education to Reduce Impacts to Water Quality

Due to Ash Canyon's proximity to Carson City and its popularity for a multitude of recreational pursuits, Ash Canyon is a popular public use area. While proper use of the watershed and a well-maintained road does not negatively impact the surrounding watershed, improper use can have negative impacts to the road, watershed and municipal water supply for Carson City. As such, it is essential that public users of the Ash Canyon area are well informed regarding responsible uses. Education is also essential to public safety along Ash Canyon Road. Due to its narrow nature, steep topography and lack of daily maintenance and/or snow removal there is an inherent potential for single or multiple vehicle collisions, rollovers or conflicts between recreational users and vehicular traffic.

Improved signage was identified as the primary means of improving public education in regards to the Ash Canyon Road and Watershed. Strategically located signage will deliver the targeted messages to the intended audience – the public who use Ash Canyon Road. Some signage, mostly informational in nature, already exists along the Ash Canyon Road. CCPR will maintain or improve existing informational signage (depicted on Maps 1, 2, and 3) that has been installed by local Boy Scout Troops and others as they provide education background on the natural environment and significance of the area.

3.1 Signs

A series of signs specific to the use of Ash Canyon Road will be developed, installed and maintained, as funding is available as described below.

3.1.1 Mileage Markers

Permanent mile markers will be placed every 0.5 miles in order to aid in public reporting of emergencies / accidents, or maintenance issues. The signs will be installed along Ash Canyon Road at strategic locations as depicted on Maps 1, 2, and 3.

3.1.2 Welcome and Drive Responsibly Sign

This sign will be posted at the water tank area (MP 0.65) to alert drivers that there are rules to follow and to encourage them to be aware as follows

Welcome to Ash Canyon
This is Carson City's Municipal Water Source
Please Drive and Recreate Responsibly

- 5 mph
- Steep Narrow Road
- Stay on Existing Roadways
- Parking in Designated Areas Only
- Do not drive when road is muddy, snowy or icy
- Leave no trace: Pick up your trash

As funding allows, an informational kiosk may be installed in this vicinity with a shaded relief topographic map of the area including Ash Canyon Road and points of interest. Seasonal information would also be posted.

3.1.3 Parking Area

Parking Area signs will be posted at the areas noted on Maps 1, 2, and 3 as needed near MP 0.6, 1.65, 1.75, 2.55, and 2.95.

PARKING AREA

3.1.4 Steep, Narrow Road Next 3 Miles– Slow Please

This sign will be posted above the parking area at MP 1.75

STEEP, NARROW ROAD
Next 3 Miles
SLOW PLEASE

3.1.5 Landing #3 Parking and High Clearance Vehicles Only

The landing and parking sign will be posted at MP 2.55 and the High Clearance Vehicles Only sign will be posted just above the parking area at MP 2.55

3.1.6 Landing #4 Parking and Scenic Overlook; Danger Narrow Icy Road

These signs will be posted at the parking area at MP 2.55. A Danger - Narrow Icy road sign would be placed just past the landing.

3.1.7 Carson City Scenic Overlook

A Carson City Scenic Overlook sign would be placed near MP 4.9. The extent of this sign (i.e. informational with names of various features) would depend on available funding.

4.0 Description of Existing Best Management Practices

BMPs consist of both the physical construction of features designed to reduce the road's impact to water quality or the implementation of certain maintenance actions or practices. This section documents both types of BMPs focusing on those that already exist.

4.1 Road Surface

The lower portion of Ash Canyon Road from approximately milepost 0.00 to 0.65 has been surfaced with asphalt grindings. A series of water bars direct stormwater flow off of the driving surface.

The balance of Ash Canyon Road consists of a native soil surface, primarily decomposed granite (DG). The DG is highly erodible and subject to rilling particularly on steep slopes.

4.2 Rolling Dips and Dip Outlets

A series of rolling dips and water bars direct stormwater flow off of the driving surface along the length of the road as illustrated in Photo 1.

Photo 1. Rolling dips are noted by arrows near MP 2.2.

Water is conveyed from the rolling dips off of the edge of the roadway. In some places, the water is conveyed into BMPs consisting of either rock-lined drainages, or galvanized steel chutes as illustrated in Photos 2 and 3.

Photo 2. View of rock lined drainage near MP 1.2.

Galvanized steel chutes are in place in some areas where road shoulders are extremely steep and stormwater is concentrated down highly erodible, unvegetated soils. The chutes appear to be accomplishing their intended purpose of conveying stormwater away from the driving surface in a manner that does not result in down slope rilling and erosion.

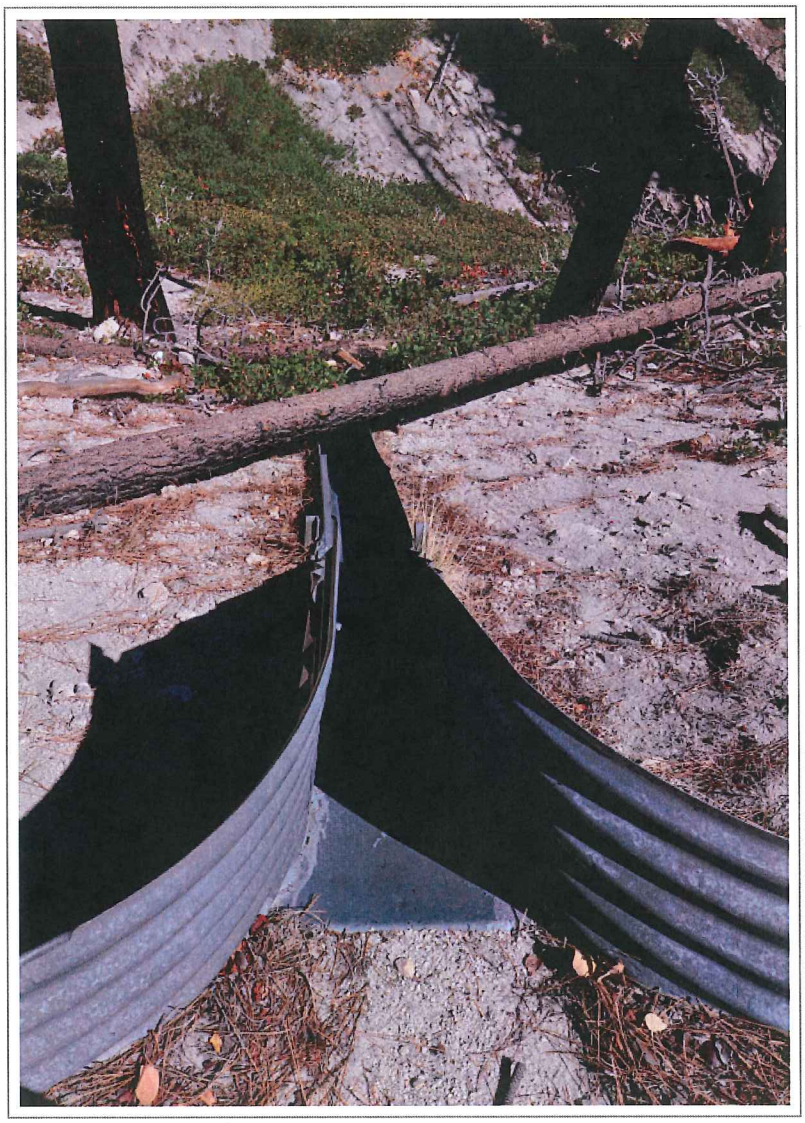


Photo 3. View down galvanized steel chute near MP 3.4.

4.3 Closed Roads

Access has been limited to several auxiliary dirt roads originating from the main Ash Canyon Road. This has been accomplished through a series of signs and / or placement of large obstructions (dirt berms, boulders and/or logs) as illustrated by Photo 4 and 5.

Photo 4. NDOW Road closure with boulders near MP 1.1.

Photo 5. Road #2 closure with log, berm, and boulders near MP 1.65.

4.4 Parking Areas

Several parking and pullout areas are located along the length of the road. These have been placed primarily to take advantage of natural wide spots or old helicopter landings. Some of the landings have been covered with wood chips in the past in an effort to prevent erosion across the otherwise unimproved DG surfaces.

Photo 6. Parking area at Landing #4 with wood chips.

5.0 Description of Proposed New BMPs

Due to the steep nature of the Ash Canyon watershed and the highly erosive DG soils that make up the majority of the road surface, pullout areas and parking areas, additional BMPs are warranted.

The following recommendations should be implemented in a systematic fashion as funding becomes available.

The primary goals for each of the listed projects are to reduce erosion and sedimentation that may affect Ash Canyon Creek and Carson City's Municipal water supply and to improve the durability and reduce annual maintenance costs for Ash Canyon Road.

The following recommendations have been categorized by type, and a full list of all improvements, and a cost estimate is summarized at the end of this section.

5.1 Additional Rolling Dips

In areas where annual monitoring reveals rilling of the driving surface, construct additional rolling dips. Rolling dips should be spaced based on slope and surface type, per the following table (Kelly and Sherar, 2003).

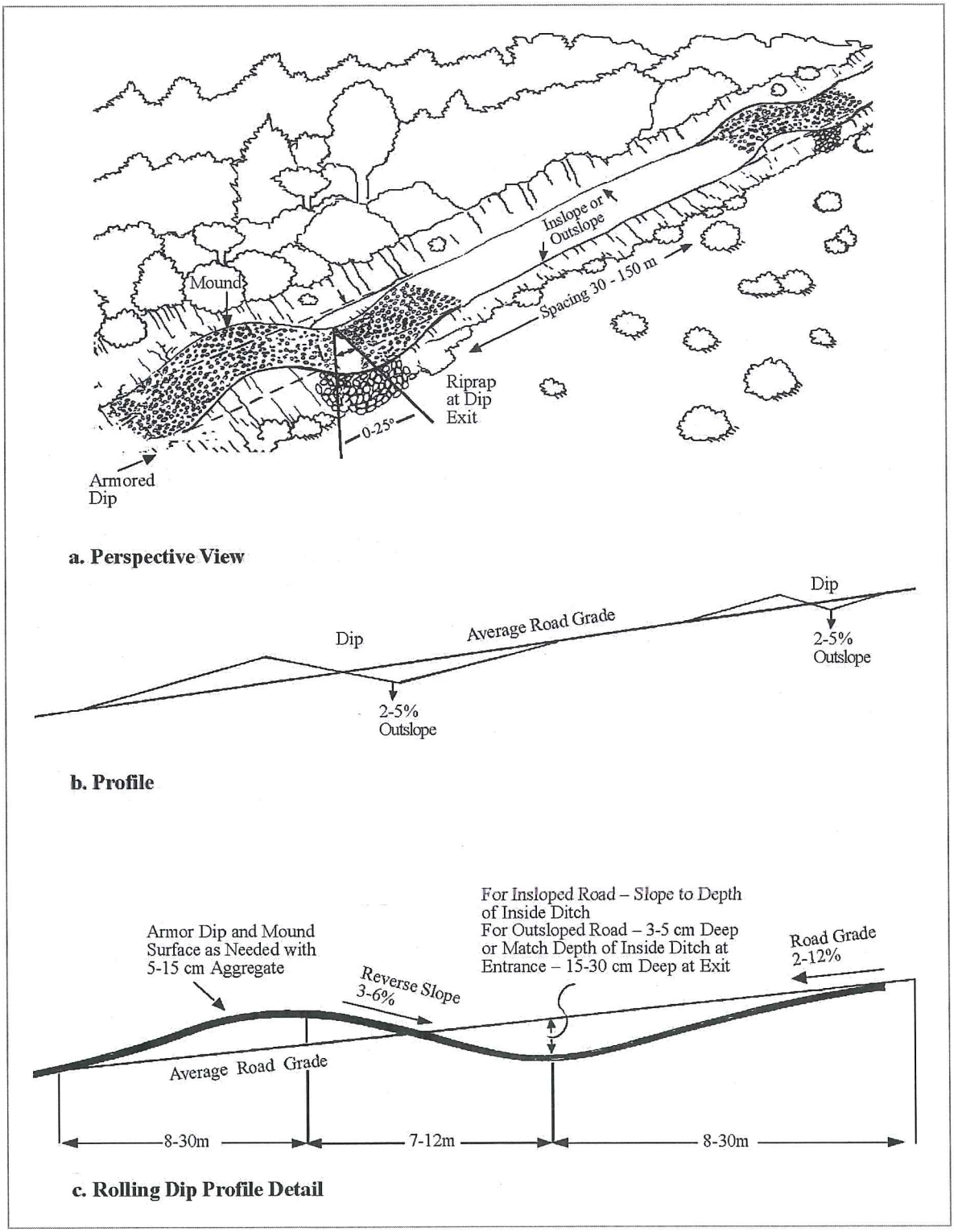
Table 1. Recommended Maximum Distance Between Rolling Dip or Culvert Cross-Drains

Road Grade %	Maximum Spacing in Low to non-Erosive Soils (meters and feet)	Maximum Spacing in Erosive Soils (meters and feet)
0-3	120m 394 ft	75m 246 ft
4-6	90m 295 ft	50m 164 ft
7-9	75m 246 ft	40m 131 ft
10-12	60m 197 ft	35m 115 ft
12+	50m 164 ft	30m 98 ft

Low Erosion Soils = Course Rocky Soils, Gravel, and Some Clay
High Erosion Soils = Fine, Friable Soils, Silt, Fine Sands

Rolling dips should be designed and maintained with the dimensions and parameters shown in the following figure (Kelly and Sherar, 2003)

Figure 1. Rolling Dip Detail



Kelly and Sherar, 2003

5.2 Armor Rolling Dips and Ditches and Drain Outlets

There are a significant number of rolling dips and culverts already located along Ash Canyon Road. There are fewer ditches and those that are in place appear to have been subject to erosion during storm events. Since funding isn't available to armor all of the rolling dips and drain outlets, prioritization of such improvements will be based on monitoring as follows:

- In areas where monitoring reveals chronic issues with rilling and erosion, culvert and/or drain outlets and drain ditches will be rock armored with riprap placed over geotextile.
- Rolling dips that are subject to chronic erosion or damage will be surfaced with rock aggregate as noted in the above figure (Kelly and Sherar, 2003).

5.3 Armor Pullouts, Parking Areas and Landings

Nearly all of the existing pullouts, parking areas and landings are surfaced with native DG soils. These relatively large areas are compacted, have little to no vegetation and are vulnerable to sheet flow and transport of fine sediment. Armoring would reduce erosion and provide a more stable surface during wet or windy weather conditions. The following actions are options to consider:

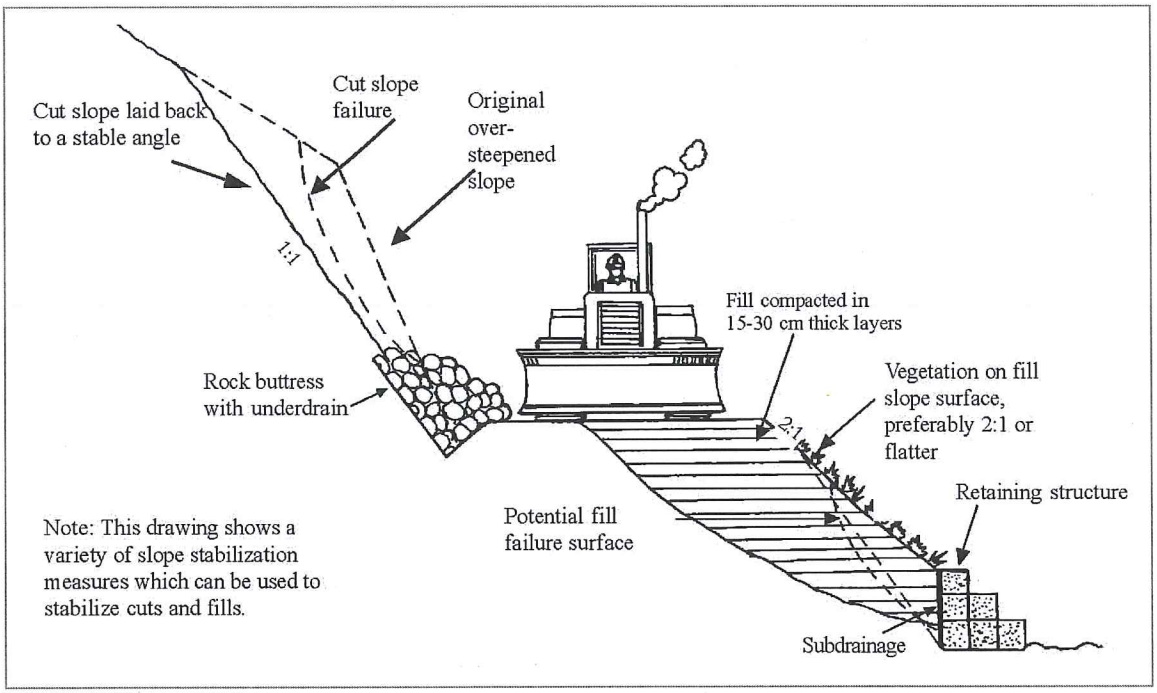
- Armoring on an annual basis with a decomposable mulch (i.e. wood chips) is an option, but it is costly and somewhat awkward for public users.
- A more permanent improvement using six inches of gravel armoring placed over geotextile would be more user-friendly and durable.
- Obstructions (large boulders, logs and berms) should be strategically placed around the perimeter of parking areas to prevent erosion of steep areas and pioneering of new trails.

5.4 Cut slope stabilization

There are several steep cut slopes located along Ash Canyon Road. Most consist of granite bedrock covered with loose DG, resulting in slumping of loosed DG onto the driving surface during storm events. This also results in some degree of sedimentation into the adjacent creeks. Standard stabilization options, such as revegetation or geotextile, are limited due to the presence of bedrock, which hinders the inability to stake down geotextiles or to establish vegetation.

An improvement option is to key in boulders at the toe of the slope and construct a rock buttress, as shown in the below figure. This may not be feasible for all cut slopes depending on the depth to bedrock and width of the driving surface (Kelly and Sherar, 2003). Figure 2 illustrates this method.

Figure 2. Slope Stabilization Detail with Rock Buttress



Kelly and Sherar, 2003

5.5 Reclaim Closed Roads

Several roads originating from Ash Canyon Road have been closed as they are no longer needed or were never authorized. Due to compaction, these roads have not revegetated and are prone to erosion.

The best means of road reclamation is to:

- Rip the soil to a depth of 6", seed and rake or drag the soils to incorporate the seed into the loosened soils.
- For new pioneered roads and trails with minimal use, ripping may not be needed and seeding and raking may be sufficient.

5.6 Place Obstructions Across Pioneered Roads and Trails, and Around Parking Areas and Landings

The placement of natural obstructions such as rocks and logs has proven effective in Ash Canyon at eliminating travel across closed or unauthorized roads and trails. The most effective means of blocking roads and trails permanently is to key in rocks and boulders so they cannot be pushed or pulled out of the way as illustrated in Photos 4 and 5. Landing #4 is currently in need of such barriers as illustrated by Photo 7.

Photo 7. View from hill above parking area at Landing #4. Note OHV use in foreground. Vehicle barriers and signage should be installed to inform the users that this area is restricted to foot traffic only.

5.7 Proposed BMP Summary

Table 2 represents the projects identified by RCI and CCPR during a field review of Ash Canyon Road completed during the summer of 2013. Cost estimates are based on previous similar projects.

Table 2. Ash Canyon Road - Proposed Improvement Project Summary

Mile Post	Project Description	Quantity	Unit	Unit Price	Estimated Cost
0.45	Rock line cut slope and roadside ditch on either side of existing 24" culvert, and mark either end of culvert with post or sign.	350	LF	$50	$17,500
0.70	Rock buttress at toe of cut slope.	125	LF	$100	$12,500
1.08	Reclaim and revegetate old NDOW road.	5,500	Sq Ft	$1.50	$8,250
1.08	Alternatively — Reconstruct road as a trail, block vehicle access, and add new sign for non-motorized access only.	2,750	Sq Ft	$1.50	$4,125
1.51	Reclaim and revegetate old road. Block vehicle access (complete).	2,000	Sq Ft	$1.50	$3,000
1.63	Grade existing road to allow 2 perpendicular parking spaces (complete). Block access to existing road, and construct berm to prevent sheet flow across parking area (complete).	NA	NA	NA	$1,200
1.63	Reclaim and revegetate old road.	8,000	Sq Ft	$1.50	$12,000
1.63	Armor existing parking area with 6" minimum depth gravel over geotextile.	1,000	Sq Ft	$1.50	$1,500
1.75	Widen and grade new parking area for public parking at new trailhead (complete). Relocate existing "boy scout" sign (complete). Add new parking sign and trailhead sign.	NA	NA	NA	$1,200
1.75	Armor existing parking area with 6" minimum depth gravel over geotextile.	5,600	Sq Ft	$1.50	$8,400
1.78	Rock line existing raw drainage between road and new trail.	70	LF	$50	$3,500
1.80-1.90	Rock buttress at toe of cut slope.	100	LF	$100	$10,000
1.95	Grade out existing berm along road edge and create pull-out area (complete). Armor new pull-out area with 6" minimum depth gravel over geotextile.	600	Sq Ft	$1.50	$900
2.08	Remove existing water bar (complete) and gravel 20 LF of existing road.	300	Sq Ft	$1.50	$450
2.10	Rock buttress at toe of cut slope.	110	LF	$100	$11,000
2.12	Armor existing pull-out area with 6" minimum depth gravel over geotextile.	450	Sq Ft	$1.50	$675
2.44	Armor existing pull-out area with 6" minimum depth gravel over geotextile.	600	Sq Ft	$1.50	$900
2.54	Add rock check dams (3) in existing gully.		ea		
2.56	Armor existing landing area with 6" minimum depth gravel over geotextile.	10,000	Sq Ft	$1.50	$15,000
2.94	Armor existing landing area with 6" minimum depth gravel over geotextile.	4,550	Sq Ft	$1.50	$6,825

6.0 Monitoring and Maintenance BMPs

Ash Canyon Road will be inspected under the following conditions:

- Annually in the spring when snow and weather conditions allow for full access and a dry driving surface.
- After large rainfall events (i.e. 25-year events or greater) as road and weather conditions allow.
- Photographs will be taken of the problem areas. The locations will be noted on the detailed maps or with GPS coordinates.

The following actions will be implemented annually as funding allows:

- Any rilling, erosion, loose rock or slumping soils in or around the driving surface, and pullouts / parking areas will be noted.
- All loose soils that have slumped onto the road surface over the winter months will be removed and used to re-enforce existing water bars.
- Any loose rock will be removed from the driving surface and only sections of rough road are graded.
- Any observed erosion will be addressed, typically be placing erosion wattles, gravel rolls or rock.
- If deadfalls or new vegetation growth have crowded the driving surface, particularly at the upper elevations, it will be removed or trimmed back to allow proper vehicle clearance.
- If any new pioneered routes are observed, obstructions will be placed to discourage the expansion of new unauthorized roads and trails.
- All culverts and galvanized slope drains will be inspected, and any obstructions removed and damage repaired.

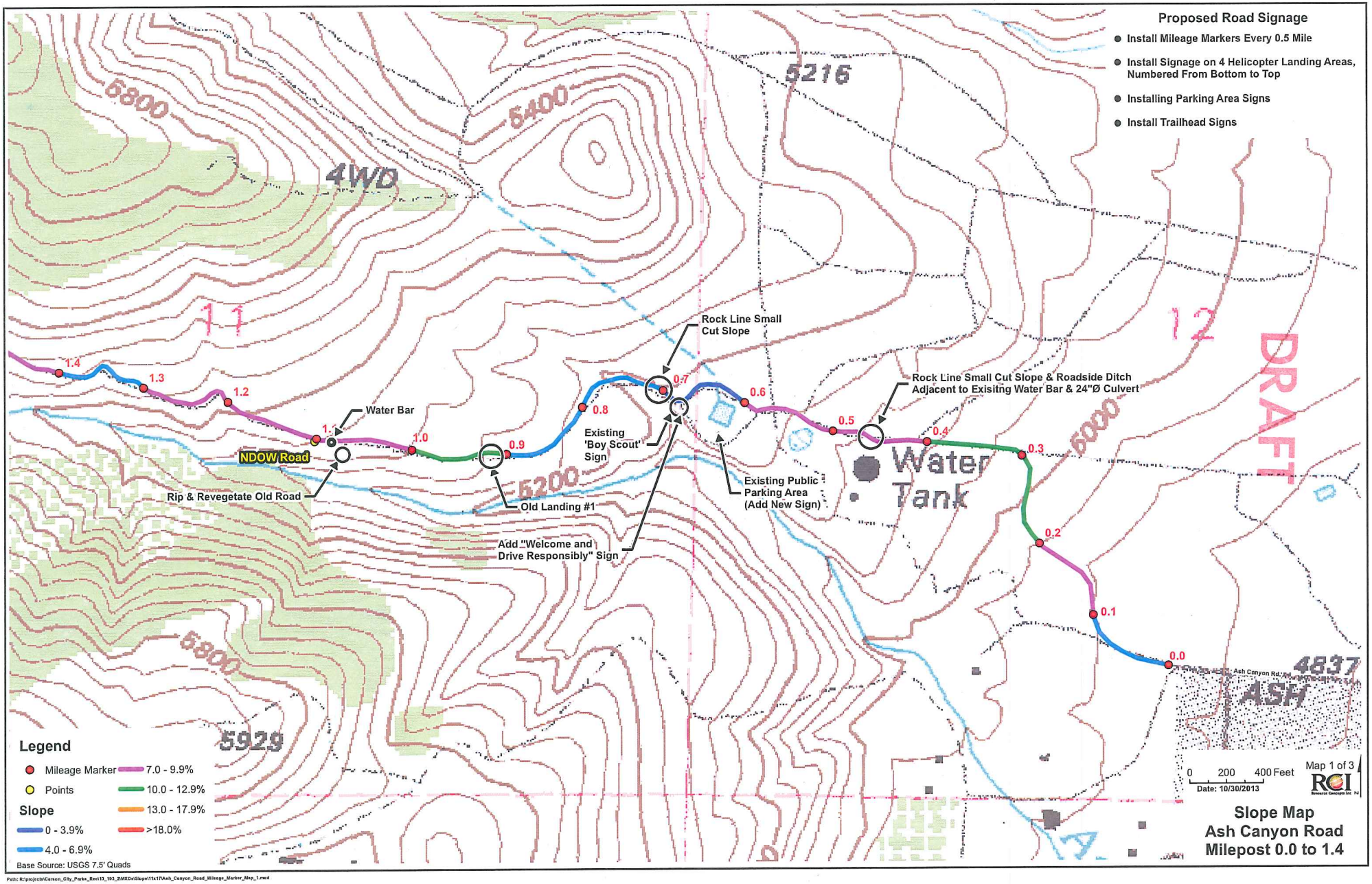
This plan and maps will be updated as needed.

7.0 References

Kelly, G. and James Sherar, 2003. *Low-Volume Roads Engineering Best Management Practices Field Guide.* USDAFS/USAID

Maps

Map 1 Ash Canyon Road Milepost 0.0 to 1.4
Map 2 Ash Canyon Road Milepost 1.4 to 3.4
Map 3 Ash Canyon Road Milepost 3.4 to 5.0



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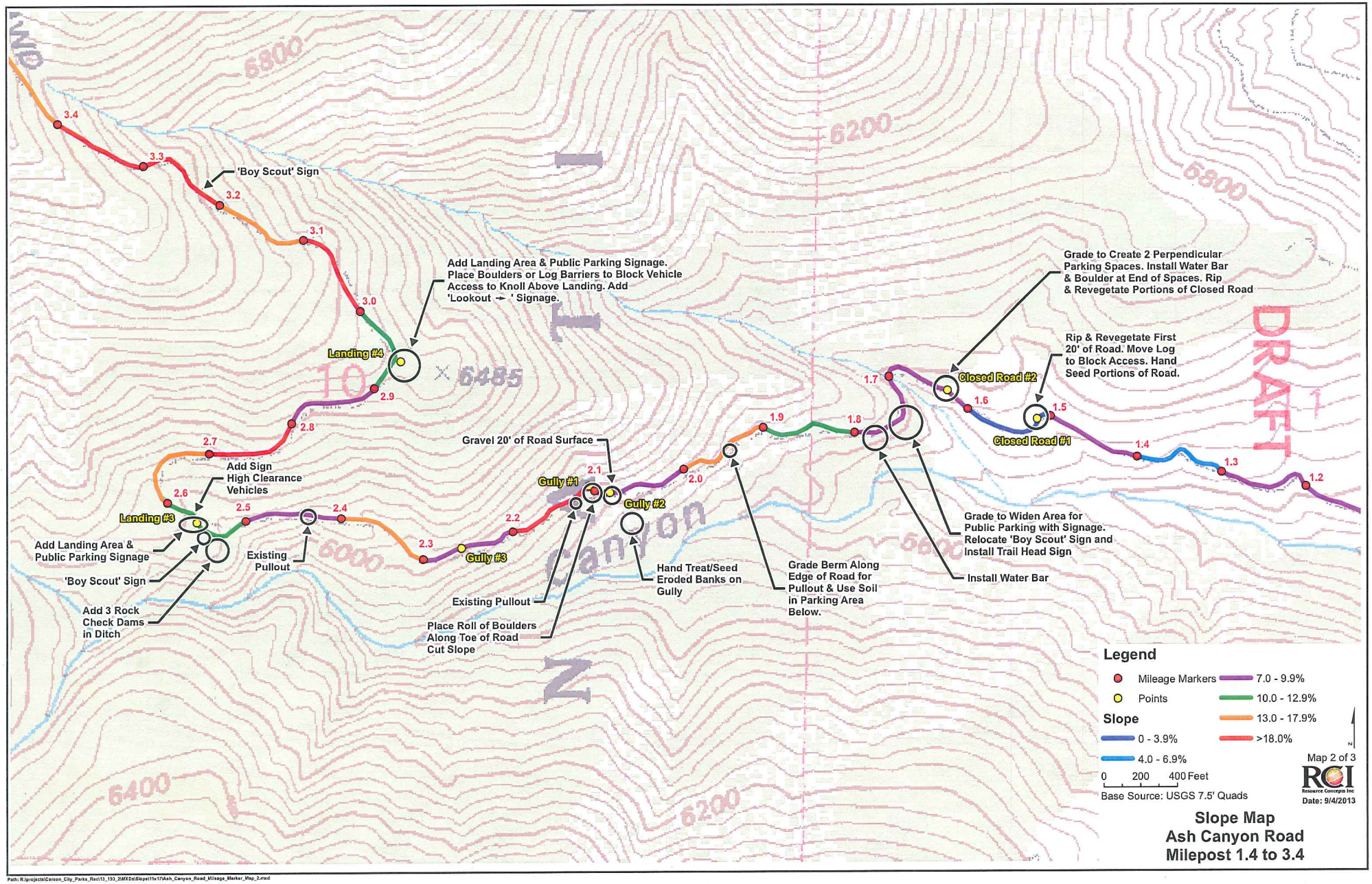

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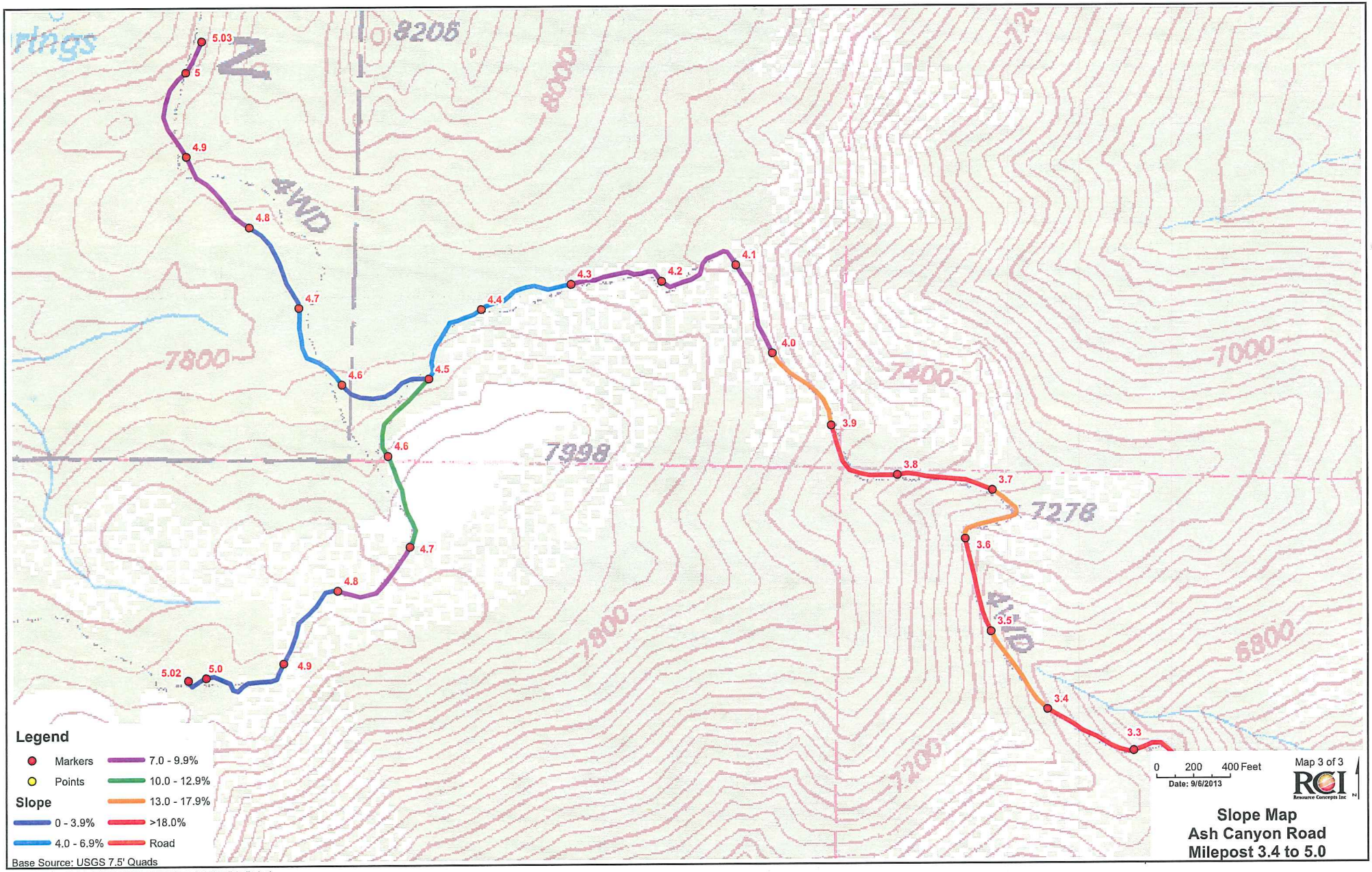

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